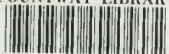


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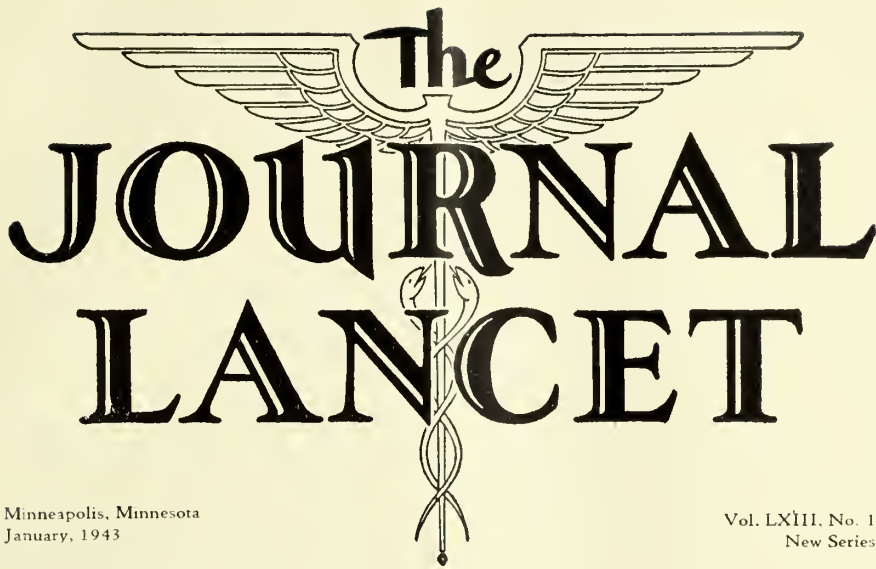


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Wounds of the Heart

A Review of Seventeen Cases with Four Operations

H. M. Blegen, M.D.

Missoula, Montana

IN the past ten years there has been a gradually increasing interest in the diagnosis and treatment of wounds of the heart. Surgeons are becoming heart conscious. Especially in the southern states, where the negro population is high, cardiac tamponade from injury is more frequently being properly diagnosed and treated. However, in many hospitals the signs and symptoms still go unrecognized, and the patient presenting himself with the typical syndrome is often given up as beyond medical aid. It is the purpose of this paper to review briefly the subject with a study of 17 patients with cardiac injury and to present in detail four of these who were operated upon, all at St. Joseph Hospital, Lexington, Kentucky, since 1928.

HISTORY¹

Early treatment of wounds of the heart consisted of plugging the wound to prevent hemorrhage and the application of leeches and the use of venesection to reduce the increased venous pressure. Larrey in 1829, when presented with a man apparently dying from a stab wound over the heart, passed a catheter into the wound and drained off "three beakers of wine colored fluid." Subsequently he passed a sound and obtained five more beakers of similar fluid. The patient recovered. Whether or not Larrey understood the pathological condition present is not known. However, it is obvious now that

¹From the surgical service of F. W. Rankin and B. F. Robinson, St. Joseph Hospital, Lexington, Kentucky. Read before the Western Montana Medical society.

he saved this man's life by relieving the tamponade. The wound in the heart itself must have been small and the active bleeding point occluded by thrombosis. Ten years later Jobert, for the first time, accurately described the condition which we now speak of as cardiac tamponade.

In 1866 George Fisher presented a comprehensive monograph on this subject reporting 452 cases of penetrating wounds of the heart with a mortality of 90 per cent. In 1881 Roberts suggested that wounds of the heart might be sutured, and one year later Block demonstrated the suturing of hearts on rabbits. However, the medical profession refused to believe that surgery on the human heart was possible. Even Billroth, a pioneer in the realms of gastric surgery, made the statement that any surgeon attempting to suture the living human heart would lose the respect of his colleagues. This was the attitude that prevailed until 1896 when Rehn in Frankfurt, Germany, first successfully operated upon a 22 year old man, releasing the tamponade and subsequently suturing the hole in the right ventricle with three silk sutures.

Since then it is estimated that between 600 and 700 cases have been reported in the literature. Ramsdell¹⁸ in 1932 reviewed the literature and collected 428 cases reported by Rehn, Peck, Poole, Ballance, Smith, and Warfield. The mortality in these groups varied from 24 to 75 per cent, with an average mortality of 50 per cent. In 1939 Bigger,⁶ feeling that many cases were not

reported, sent out a questionnaire to members of the American Association of Thoracic Surgery, The American Surgical Association, and the Southern Surgical Association and collected 124 cases that had been operated upon by these men. To this he added 17 cases of his own. Of these 141 cases the mortality was approximately 50 per cent. In 1940⁵ Bigger reported a series of 25 cases operated upon at the Medical College of Virginia Hospital with nine deaths or a mortality of 36 per cent.

Elkin¹³ in 1941 again reported his growing series of 38 cases with 16 deaths, a mortality of 42 per cent. In 1938 the mortality on the first 22 cases of this series was 50 per cent. Griswold¹⁵ in February 1942 reported a summary of 40 cases seen at Louisville City Hospital. Thirteen of these died within 20 minutes of admission, 5 were treated conservatively with 1 death, and 22 were operated upon with 6 deaths. This gives a total mortality of 50 per cent or an exceptionally good operative mortality of 25 per cent. He and his staff have had only one death in their last 13 operations. Streider²⁰ and Singleton¹⁹ have likewise reported cases in which recovery occurred after pericardial aspiration alone but they advise great caution in a conservative regime. Electrocardiographic observations have been made by Olim and Hughes,¹⁷ Elkin,¹¹ Griswold¹⁵ and others.

Much of our present knowledge of cardiac surgery is due to the exhaustive experimental and clinical studies of Claude Beck^{1,2,3,4} on cardiac physiology, cardiac suturing, and cardiac resuscitation.

PHYSIOLOGY

Death from penetrating wounds of the heart is due either to direct hemorrhage or more frequently to the results of acute cardiac compression as a result of cardiac tamponade. A sudden accumulation of fluid in the pericardial cavity gives rise to the acute cardiac compression triad of Beck,² which consists of, (1) falling arterial pressure, (2) rising venous pressure, and (3) a small, quiet heart. All other manifestations of acute cardiac compression are secondary to this triad. Symptoms are dependent not on the amount of fluid in the pericardial sac, but rather on the suddenness of the rise of intrapericardial pressure produced by the fluid. A sudden accumulation of as little as 200 cc. of blood and a pressure of as little as 16 cm. of water may be fatal, whereas a slow gradual accumulation of as much as 2000 cc. of fluid and a pressure of 38 cm. of water has been known to be compatible with life.⁴ As the intrapericardial pressure rises, the cardiac pulsation becomes restricted. There follows a decrease in the amount of blood entering the heart with an associated decrease in the cardiac output, resulting in a "piling up" of blood on the venous side of the circulatory bed. This process results in a generalized anoxemia.

SIGNS AND SYMPTOMS

With an understanding of these principles, the symptoms and physical signs are self explanatory. There is a history of injury occurring shortly before admission to the hospital, usually a stab wound over the heart or a gunshot wound of the thorax. There is an interval fol-

lowing injury (during which time blood is accumulating in the pericardium) in which the patient not uncommonly continues to fight or possibly to walk a block or more. Finally he collapses, becomes rather restless, apprehensive, violent, and finally unconscious. Various cerebral symptoms may manifest themselves as a result of cerebral anoxemia. There may be varying amounts of external bleeding, but at times in the case of a small stab wound there may be none. Physical examination reveals usually a picture of profound peripheral vascular collapse out of proportion to the amount of blood loss. Unconsciousness may or may not occur. The skin is cold and moist. The pulse is very weak and feeble. The blood pressure is low. The neck veins are engorged. The heart sounds are faint or absent. If death fails to occur in the first ten or fifteen minutes, there may be a period of temporary adjustment in which the patient shows slight improvement. It is in this period when operation is best performed.

In cases where there is a large rent in the pericardium and where there is a wide communication into the pleural cavity or to the outside, the signs and symptoms of tamponade are absent and the patient presents a picture of profound shock from hemorrhage. In these cases examination of the lung fields shows the presence of hemothorax or hemopneumothorax and careful auscultation over the precordium frequently reveals a splashing, churning sound which is a definite diagnostic sign of cardiac injury. Cerebral symptoms as a result of prolonged anoxemia may produce paralysis, mental confusion, unconsciousness, and death. Mayer¹⁶ in 1936 presented two cases which show how these cerebral symptoms may confuse the diagnosis. The first case is that of an ice pick wound of the chest. The patient had a contusion of the left orbit and a right sided hemiplegia and because of the strong evidence of a left cerebral lesion, operation was delayed eighteen hours. The cardiac tamponade was then relieved surgically but death followed shortly afterward. Autopsy showed no fracture of the skull and normal brain tissue. The second case was that of a cardiac tamponade from a stab wound with a partial paralysis of the right side of the body with marked mental confusion. Following surgical release of the tamponade, the paralysis gradually cleared up and the patient returned to work one month later. In both of these cases the paralysis was due to cerebral anoxemia as the result of tamponade.

DIAGNOSIS

Usually, the diagnosis is made by careful examination alone, further diagnostic measures being unnecessary. However, in questionable cases the diagnosis can be verified by the use of two simple procedures: (1) Venous pressure readings; (2) fluoroscopic examinations of the heart shadow. The tension of the venous system is an exact measurement of the intrapericardial pressure and normally this tension is equal to about 8 or 10 cm. of water. This can be measured easily with a venous manometer as described by Beck³ or by a spinal manometer, intravenous needle, and an intravenous saline apparatus. If the venous pressure is above 15 cm. of water, one can

feel highly suspicious of tamponade. The value of fluoroscopic examination in borderline cases was first pointed out by Bigger⁷ in 1936, who showed that the pericardium pulsations are obliterated and the shadow is immobile.

TREATMENT

In direct contrast to primitive methods of therapy—namely of plugging the stab wound and reducing venous pressure by leeches and venesection—modern therapy is aimed at increasing the venous pressure by the intravenous administration of fluids and reducing intrapericardial pressure by aspiration or preferably operation. Permanent relief cannot be obtained until the active bleeding from the heart muscle or coronary vessels has been controlled. Therefore, whenever the diagnosis is suspected, preparation for operation should be made immediately. While the operating room is being set up, Bigger and Elkin recommend placing the patient in Trendelenberg position and giving intravenous fluids and blood if possible. In the most serious cases, pericardial aspiration performed during this interval of delay may be a life-saving measure. Seldom does a surgeon meet with a condition which requires more immediate attention and where success of the operation is so dependent upon the efficient coöperation of the hospital personnel. The value of an alert resident staff, blood bank, and adequate hospital facilities is paramount.

Recently Singleton,¹⁹ Strieder,²⁰ Griswold¹⁵ and others have reported cases in which permanent relief was obtained from pericardial aspiration alone. In these cases recovery occurred only because the bleeding wound of the heart muscle, coronaries, or pericardium had become occluded by thrombosis. Such conservative procedures should be performed in the operating room with the patient under close observation and if repeated venous and arterial pressure readings show signs of recurring tamponade, operation should be performed immediately. Occasionally in cases with mild tamponade or in elderly individuals suspected of having considerable myocardial degeneration from coronary sclerosis, one is justified in attempting to relieve the tamponade by aspiration in the hope of preventing a more radical operation. However, the immediate dangers of delay make conservative treatment very hazardous.

Bigger⁶ divides the cases entering the Medical College of Virginia Hospitals into four groups:

1. Patients with moderate hemorrhage into the pleural cavity or to the outside *without* tamponade. These cases are treated conservatively even though pericardial injury is proven by the presence of blood and air in the pericardial sac by fluoroscopy.
2. Patients with mild tamponade who respond to conservative treatment. These cases are treated without operation but are observed closely with frequent venous and arterial pressure readings. Operation is performed if the tamponade re-occurs. It is this group in which conservative treatment is hazardous.
3. Patients with severe tamponade who fail to re-

spond to conservative treatment. This group requires immediate operative interference.

4. Patients without tamponade but with severe hemorrhage into the pleural cavity or to the outside. These patients usually die on the table, but operation should be performed anyway with the hope of saving a few.

ANESTHESIA

The choice of anesthetic varies with each case. When the patient is conscious and coöperative, local anesthetic may be used. In totally unconscious patients, the procedure may be begun without any anesthesia; however, following the release of the tamponade, consciousness will soon return and the patient is apt to be restless, moving about on the table, and uncoöperative at a stage in the operative procedure that requires a minimum of difficulty. Positive pressure inhalation anesthesia is often desirable when there is an injury to the pleura or lung with a pneumothorax. For these reasons, positive pressure ether or gas inhalation anesthesia is usually preferred.

OPERATIVE PROCEDURE

Various types of incisions have been advocated. Whatever approach is used it is imperative to obtain adequate exposure quickly. The median sternotomy of Duval-Barasti gives good exposure, but is time consuming and shocking. The Spangara incision gives less exposure but is frequently used. It consists of a long left intercostal incision between the two ribs giving best access to the wound. A T-shaped extension is made along the border of the sternum through the cartilages of the adjacent ribs. Elkins¹³ suggests a transverse incision with resection of two or more ribs. The unconventional, long, parasternal incision described in cases one and four below was made rapidly and gave excellent exposure by easily spreading the entire thoracic cage. For less experienced cardiac surgeons this incision is very satisfactory in such an emergency. Regardless of the type of incision the intercostal arteries must be ligated. The lung and pleura, if not injured, are pushed laterally exposing the pericardium which presents itself as a tightly distended pulseless sac. This is opened widely and the blood is removed. As soon as the pericardial pressure is relieved, the contractions of the heart increase in force. The left hand is gently introduced behind the heart and the organ is lifted so that a traction suture may be placed through the apex. Using this as a guide, the wound is sought. Elkin suggests the use of fine black silk in suturing heart muscle, and advises that the stitch pass through the muscle but not through the endocardium. Beck¹ found, in experimental studies on dogs, that wounds of the left ventricle were more difficult to control with suture than wounds of the right ventricle. He suggests holding the traction suture between the middle finger and thumb of the left hand and placing the index finger over the wound in the heart. With the right hand as a control, a suture is then placed on either side of the wound. The index finger is then withdrawn and the control sutures are crossed and pulled

against each other. This controls the bleeding and allows the operator to place his permanent sutures. However, now that blood and plasma are available in blood banks, one or more transfusions are running and unless the cardiac laceration is extensive, one usually has time to place the necessary sutures. Care must be taken not to injure the coronary vessels. In case of an injury to the right auricle, one must bear in mind that the sinoauricular node and the atrioventricular node are located in the posterior wall of this chamber.

After the wound is sutured, the pericardial cavity is irrigated with saline solution and closed loosely with interrupted sutures, space being allowed for the escape of fluid. Elkin¹⁰ and Bigger⁵ advise not draining the pericardium. Griswold¹⁴ advises leaving a low opening in the pericardium so that any postoperative bleeding or accumulation might drain directly into the mediastinum or pleural cavity, and, if necessary, later drained by thoracentesis.

The postoperative care consists of restoration of blood, administration of oxygen if necessary, and rigid bed rest for a period of at least three weeks to prevent increase in the intracardiac pressure and a resultant increase of tension on the sutures. Blood in the pleural space may or may not be removed, depending on the degree of respiratory embarrassment. Morphine should be given freely. Careful venous and blood pressure readings should be made frequently so that any recurrence of tamponade will be detected early. If there is such recurrence, pericardial aspiration should be done. Postoperative pericardial effusion is a common occurrence. Bigger⁵ advises the use of heparin in any case where the coronary vessels are injured or where the chambers of the heart are entered.

Death occurring during or immediately following operation is due to hemorrhage, ligation of coronary vessels, or injury to the neuromuscular bundles with the prolonged cerebral anoxemia. Later complications most frequently met with are pneumonia, pericardial effusion, acute purulent pericarditis, empyema, atelectasis, wound infection, mural thrombosis with pulmonary infarction, and postoperative psychosis as a result of temporary cerebral anoxemia.

In the past fourteen years four patients with cardiac tamponade from penetrating chest wounds have been operated upon at St. Joseph Hospital. The first of these operations was performed in 1928 by W. O. Bullock⁹ and reported in the *Annals of Surgery* in 1936. The second operation was performed in 1936 and the last two were performed by the author in 1941. Two of these four patients recovered, giving an operative mortality of 50 per cent. A review of the hospital records reveals that during this period, seventeen patients were admitted with cardiac injury. These patients were divided into four groups:

	No. of Cases	Recoveries	Deaths
Group I	4	2	2
Patients with cardiac tamponade operated upon.			

Group II	5	0	5
Patients dying in the emergency room a few minutes after admission before any treatment could be given.			
Group III	6	1	5
Patients with cardiac injury treated but not operated upon.			
Group IV	2	0	2
Patients with cardiac injury due to non-penetrating body blows.			

Of the entire group, there were fourteen deaths and three recoveries. Excluding the five patients dying in the emergency room before treatment could possibly be given and also excluding one patient in Group IV who died from causes other than his cardiac injury, the corrected mortality reads: three recoveries and eight deaths or a mortality of 73%. Had the admitting staff been "heart conscious," several patients in Group II and III might have been saved by early diagnosis and operation.

GROUP I.

PATIENTS WITH STAB AND GUNSHOT WOUNDS OF THE HEART WITH TAMPONADE OPERATED UPON

Case No. 1 was a stab wound of the heart with cardiac tamponade, operated upon by H. M. B. with recovery. The patient, a colored man, age 26, was admitted at 3:50 P. M. on Feb. 1, 1941, about 15 or 20 minutes after having been stabbed over the heart. He was unconscious, with pulse imperceptible and blood pressure unobtainable. The neck veins were markedly distended, the skin cold and clammy. There was a small stab wound in the fourth interspace just to the left of the sternum. A second stab wound was found in the right mid-clavicular line at the upper border of the liver. The lung fields were clear. The heart sounds could not be heard. The patient was taken to the operating room immediately. While on the stretcher he aroused slightly and began waving his arms and shouting. It was necessary to give him a few whiffs of ether. A left parasternal incision was made down through the skin and subcutaneous tissue. At this point, air was sucked through the stab wound in the chest wall proper, producing a pneumothorax on the left side. This perforation was closed with gauze. The incision was then carried through the second, third, fourth and fifth costal cartilages. The thoracic cage was spread with a pair of large, blunt retractors. The pleura contained a stab wound about the size of the middle finger, but it had not been injured in making the incision. The distended, pulseless pericardium was opened widely, releasing a large amount of liquid and clotted blood. The heart was beating very feebly at first, but the contractions increased in intensity and the rate became slower. At this point, the left hand was inserted into the pericardium and the heart was lifted up, while a long traction suture was placed in the apex. Using this as a guide, the heart was examined. A freely bleeding stab wound was found in the right ventricle just to the right of the anterior descending coronary near its base. Two interrupted chromic sutures were placed in the heart muscle controlling the bleeding. The apical suture was then removed. The pericardial cavity was emptied of clots, and the pericardium was closed loosely. A small rubber tissue drain was left down to the pericardium at the apex. The wound in the pleura, which measured about 1 cm. in diameter, was then closed. Considerable blood had drained into the pleural cavity during the operation. Blood plasma and whole blood were given intravenously during the operation. The blood pressure at the end of the procedure was 90/60. The pulse was between 80 and 90. The patient was returned to the ward at 4:45 P. M., about one hour after admission. He became conscious about one-half hour later. That evening he had considerable respiratory distress and a large amount of air and some

blood was removed from the left chest by aspiration at this time. His pulse the following day was 100, and the blood pressure 130/90. His temperature ranged between 100 and 101, gradually returning to normal on the sixth day. Venous pressure readings were about 12 cm. of water. The roentgen ray on the second day showed some fluid in the left chest with no air. Eight days later this had cleared. A pericardial effusion occurred, but gradually absorbed in about twenty-five days. On the tenth day the patient complained of pain in the right chest. Roentgen examination now showed what was thought to be a patch of pneumonia in the right base. The temperature rose to 102. Sulfathiazole was given and the fever again returned to normal forty-eight hours later. The patient coughed no blood and no friction rub was heard. However, the roentgen findings persisted, possibly due to an infarct from a mural thrombus, although probably pneumonia. The heart sounds were at all times a little faint, but no murmurs were heard. Electrocardiogram on the day after the operation showed a sinus tachycardia, high origin of RT1 and RT2. This was also present on the fifth day. However on the seventeenth day the Q.R.S. complexes were normal and the T waves were negative in Leads 1 and 4. The wound healed by primary intention. At no time was there evidence of any intrathoracic or intra-abdominal injury as a result of the second stab wound, although this was a risk we had to take.

Case No. 2 is that of a colored man who was operated upon by W. O. B. with recovery. The patient, age 43, was admitted to the hospital ten minutes after having been shot in the chest with a small calibre bullet. The wound of entrance was seen in the fourth interspace just to the left of the sternum. The patient was unconscious, gasping for breath. The pulse was imperceptible and the blood pressure unobtainable. The skin was cool and damp. The patient was given 1 cc. of adrenalin in the heart, and caffeine intramuscularly. Following this, the heart could be heard faintly and the pulse barely felt. The patient was taken to the operating room immediately. A curved incision was made along the left border of the sternum and down along the left costal margin. Costal cartilages of the ribs were cut and the chest wall turned laterally, giving wide exposure. At this point the pleura was accidentally opened. The pericardium was opened widely, liberating a large amount of clotted blood. The right ventricle was bleeding freely from a tangential bullet wound 2 inches from the apex. This was closed with interrupted chromic sutures. The pericardium was closed with interrupted chromic sutures. No attempt was made to close the pleura. The chest wall was sutured back in place. The general condition was fair upon leaving the operating room. During the operation the heart had apparently stopped beating; respirations had dropped to about two a minute. After opening the pericardium, 1 cc. of adrenalin was injected into the heart muscle, and the cardiac pulsations were restored. The patient was given 400 cc. of salt solution and 1 cc. of adrenalin intravenously during the operation. The patient regained consciousness in twelve hours. His convalescence was complicated by an acute purulent pericarditis and empyema of the left chest. These were drained through the lateral half of the incision. Three months later the patient was dismissed. Empyema continued to drain, but finally healed and he was apparently well.

Case No. 3. A stab wound of the heart with cardiac tamponade, was operated upon by B. F. R. and J. A. S. The patient, a colored man of 26, died 20 minutes later. He had been admitted with a stab wound in the third interspace in the left mid-clavicular line. He was unconscious, perspiring freely, with the skin cold, pulse imperceptible, and blood pressure 50/20. There was evidence of hemothorax on the left. Operation was begun 40 minutes after admission. Under local anesthesia four ribs over the heart region were dissected out. The pericardial sac was opened. Blood and clots were removed. The bleeding wound in the left auricle was identified and clamped with forceps and sutured over with interrupted catgut sutures. The stab wound was satisfactorily closed. Intravenous dextrose was given during the operation. The heart started beating rapidly after the pressure was released. The patient was in extreme shock and pulseless before and throughout the operation. He died five minutes after having been removed to his bed. The opera-

tion had lasted one hour. The patient had been given coramine and adrenalin. Death was due either to shock from blood loss, or possibly to interference with the neuromuscular conduction bundles.

Case No. 4, a gunshot wound of the heart with cardiac tamponade, was operated upon by H. M. B. The patient, a colored man 33 years of age, who had been shot shortly before admission, died on the operating table. There were multiple bullet wounds scattered over the body and two bullet wounds in the right anterior axillary lines at about the level of the nipple. The patient was in shock, pulse imperceptible, and no heart sounds could be heard. Breath sounds could be heard in both lung fields. The blood pressure could not be determined. There was no noticeable venous engorgement in the neck veins. Venous pressure readings in the arm were 18 cm. of water. Fluoroscopy of the chest showed a slightly enlarged immobile pericardium. Lung fields were clear. Pericardial aspiration performed and blood obtained. The patient was taken to the operating room immediately. He was quite restless and it was necessary to give him ether inhalation anesthesia under positive pressure. A left parasternal incision was made through the third, fourth, fifth, and sixth costal cartilages. The pericardium was exposed and opened widely, releasing a large quantity of clotted and liquid blood. Chromic suture was placed in the apex of the heart. An enormous amount of blood continued to ooze up from the pericardial cavity as fast as we could empty it. The great vessels at the base of the heart were compressed with the fingers and the heart lifted upward. A large wound was found in the right auricle, about an inch and a half in diameter. This was closed as quickly as possible with chromic catgut and in approximately five minutes after the pericardium had been entered. However, the patient died from massive hemorrhage occurring in this interval of time, in spite of transfusions of blood and plasma. Adrenalin was injected into the heart muscle and the heart was pumped manually. Oxygen was given by positive pressure inhalation, but to no avail.

Case No. 1 is typical of the numerous cases recorded in the literature. Convalescence was uneventful except for mild pericardial effusion and the development of pathology in the base of the right lung. This was probably pneumonia, but could possibly have been an infarct from a mural-thrombus in the right ventricle. Electrocardiograms showed the classical picture, with early elevation of the ST segments and a later inversion of the T waves with a return to normal in about one month.

Case No. 2, in which the patient was operated on by W. O. Bullock in 1928, was reported by him in 1936.⁹ The patient was thought dead before the pericardium was reached. However, the operation was continued with restoration of the heart beat and recovery.

Case No. 3 was a wound of the right auricle, with death occurring 20 minutes after the operation. At that time the hospital did not have a blood bank and blood was not available. This might have been a vital factor in this instance.

Case No. 4 was interesting from a diagnostic standpoint. The bullet wounds were in the right axillary line and a definite diagnosis was made by means of venous pressure reading, fluoroscopy, and pericardial aspirations. However, this patient had such a large wound in the right auricle that death resulted from massive hemorrhage occurring in the time elapsing between the opening of the pericardium and the suturing of this larger wound.

The type of incision used in Cases No. 1 and 4 was not usual, but it was easy to make and offered a surprisingly good exposure. These two operations were performed by the resident staff with the counsel of the vis-

iting surgeon on his arrival. This is emphasized only to show again the importance of early recognition and early treatment of the condition.

GROUP II.

PATIENTS WITH STAB AND GUNSHOT WOUNDS DYING IN THE EMERGENCY ROOM WITHOUT TREATMENT. (5 cases, 5 deaths)

Two of these cases were the result of stab wounds directly over the heart and three were due to bullet wounds. All of them died shortly after admission. One of the patients had walked two and one-half blocks and collapsed on the steps of the emergency room. Pericardial aspiration was not attempted on any of these patients and it is possible that such a procedure followed by large amounts of intravenous fluids might have prolonged life for a short time while preparations were made for an emergency operation. Bullock suggests⁹ that all of these patients be submitted to a quick thoracic "autopsy" in the hope of possibly saving a few.

GROUP III.

PATIENTS WITH STAB AND GUNSHOT WOUNDS OF HEART NOT OPERATED ON (6 cases, 1 recovery and 5 deaths)

This group includes six patients, all of whom lived longer than one hour after admission.

Case No. 5: A 29 year old white man was admitted 30 minutes after injury with a small calibre gunshot wound over the heart. He died two and one-half hours later. He was given intravenous fluids, morphine, and adrenalin. Autopsy showed a large amount of blood in the pericardial cavity with a small wound in the intrapericardial portion of the vena cava.

Case No. 6: A 35 year old colored man was admitted with a small calibre gunshot wound over the heart. Although in extremis on admission, he responded to intravenous glucose and stimulants and became so very restless and violent that large doses of sedatives were required to control him. He died 19 hours after admission. Autopsy showed cardiac tamponade with hemothorax. The bullet had passed through the intrapericardial portions of the great vessels of the heart and was lodged in the sixth vertebra.

Case No. 7: A 33 year old colored man was admitted with a stab wound directly over the heart. He died one and one-half hours later.

Case No. 8: A 29 year old colored man died one hour after admission with a small calibre bullet wound below the left nipple. This record was very scanty but the attending physician stated that "the bullet apparently pierced the pericardium and heart."

Case No. 9: A 64 year old colored man was admitted with a small calibre gunshot wound of the chest. Roentgen ray showed a hemothorax of the left chest and the bullet lodged in the upper part of the heart shadow. Following intravenous glucose and stimulants, he improved somewhat; however, he died 36 hours after admission without regaining consciousness.

Case No. 10: A 24 year old colored woman was admitted with a small calibre gunshot wound over the heart. She was conscious on admission and her pulse was 100, but weak. The blood pressure was 90/40. She had physical evidence of hemothorax in the left. No venous pressure readings were made on admission. Five days later roentgen rays and fluoroscopy showed evidence of pericardial effusion and hemothorax with bullet lodged in the heart shadow and pulsating. Recovery followed repeated pericardial and pleural aspirations without operation. She was seen again two years afterward with symptoms suggestive of early pericardial constriction, mild precordial pain, slight dyspnea, and edema of ankles.

All of these patients lived longer than one hour; one lived 19 and another 36 hours. The lack of venous pres-

sure readings, fluoroscopy, and pericardial aspiration, as diagnostic measures, makes it apparent that the significance of tamponade and the possibility of surgical relief was not considered by the admitting physician. The records of these patients were very scanty and, when reviewing them, one feels that the attending medical opinion held these patients as being beyond medical aid.

GROUP IV.

WOUNDS OF THE HEART DUE TO NON-PENETRATING CHEST BLOWS (2 cases, 2 deaths)

This group includes two men, both of whom had cardiac injury as the result of non-penetrating body blows.

Case No. 11. A 40 year old white man was admitted shortly after being in an automobile accident. He was in mild shock on admission but conscious. Pulse was 130. He had multiple lacerations about the face and extensive lacerations of the right leg. He developed a gas bacillus infection in the right leg and amputation was performed 48 hours later. He died on the fifth day from gas bacillus infection. Autopsy revealed evidence of gas bacillus infection of the amputation stump with toxic degeneration of all the viscera. In addition, the mediastinal tissues showed extensive hemorrhage throughout. There were petechial hemorrhages in the pericardium and epicardium, but no blood was found in the pericardial cavity. However, there was a recent linear rupture of the endocardium of the right auricle about 3 cm. long. This patient died of a gas bacillus infection. His cardiac lesion was not discovered clinically and there is no doubt but what he would have recovered from it.

Case No. 12 presented an undiagnosed traumatic rupture of the heart with hemopericardium and tamponade. A white man, age 40, was found in an automobile wreck and brought to the hospital immediately. He was semi-conscious, pulse weak, and blood pressure low. Because of a strong odor of alcohol on his breath, the admitting physician treated him for alcoholism. His stomach was lavaged and he was given 1,000 cc. of 5 per cent glucose intravenously and various stimulants. He died five hours after admission. Autopsy showed a transverse fracture of the lower sternum and fractures of the third and fourth ribs on the right near the sternocostal junction. There was some extravasation of blood in the anterior mediastinum. The pericardium was intact and contained 500 cc. of liquid and clotted blood. There was a small linear tear in the posterior wall of the right auricle near its junction with the inferior vena cava.

Both of these cases were caused by a blow on the sternum from the steering wheel of an automobile. In Case No. 11, the cardiac lesion was found unexpectedly at autopsy, death occurring as a result of a gas bacillus infection in an accompanying laceration of the foot. The patient undoubtedly would have recovered from the cardiac lesion. Case No. 12 had a typical cardiac tamponade. Due to the absence of signs of external violence, and also to the strong odor of alcohol on this breath, the diagnosis was missed and the patient was treated for acute intoxication, dying five hours after admission.

Bright and Beck¹⁰ in 1935 collected from the literature 168 cases of cardiac injury due to non-penetrating body blows. One hundred fifty-two of these patients died as a result of cardiac rupture while 11 died of cardiac failure. The rest recovered. However, many cases similar to Case No. 11 are never recognized, making it impossible to determine the incidence of non-fatal injuries (contusions or small lacerations) as a result of

severe body blows. Beck and Bright experimentally traumatized dogs' hearts and found that recovery was the rule rather than the exception. As yet, no cases have been reported in the literature in which tamponade, as a result of severe non-penetrating body blows, has been relieved by surgery. Patient No. 12 might have been saved by operation. All cases of automobile injury with cardiovascular collapse out of proportion to blood loss or out of proportion to other injuries should be carefully examined for signs of tamponade.

SUMMARY

Seventeen cases of heart injury admitted to St. Joseph Hospital over a fourteen year period are reviewed. In this group thirteen were colored and four were white. Nine were due to gunshot wounds, five were due to stab wounds and two were due to non-penetrating body blows. Sixteen of the patients were male, one was female. Seven had cardiac tamponade proven at operation or autopsy. Of these seven, the wounds were located in the right ventricle twice, the right auricle three times and in the intra-pericardial portions of the great vessels twice.

Four patients admitted with the typical signs and symptoms of cardiac tamponade were operated upon. Two of these recovered, giving an operative mortality of 50 per cent. Five patients died in the emergency room shortly after admission before treatment could be given. Six were not offered surgery in spite of the fact that they lived longer than one hour. One of these recovered with conservative measures alone. Two patients had cardiac injury proven by autopsy as the result of non-penetrating body blows. One of these had cardiac tamponade as a result of a rupture of the right auricle, living five hours after admission. The other had a ruptured auricular endocardium which was not detected clinically and which would have been compatible with life had not the patient died from a gas bacillus infection in an accompanying laceration of the foot.

The operative mortality in this series is 50 per cent. The corrected total mortality reads: three recoveries and eight deaths or 73 per cent. This high mortality was due in part to the fact that signs and symptoms of tamponade frequently were not carefully sought for and also to a lesser extent the fact that this series contained a high percentage of severe gunshot wounds.

CONCLUSIONS

1. Modern surgical methods have reduced the mortality of cardiac tamponade resulting from penetrating chest wounds from 90 per cent in the untreated cases to 50 per cent or lower in those properly handled.

2. Because of the fact that patients presenting themselves with this syndrome usually appear to be on the verge of death and because of the fact that the resident staffs in many smaller hospitals as yet are not acutely

conscious of the relief that might be obtained by early diagnosis and operation, many patients admitted with typical signs and symptoms are considered as being beyond medical aid. It is suggested that everyone treating patients in the emergency rooms constantly be prepared and encouraged to handle this type of case when the emergency arises.

3. A definite diagnosis usually can be made by means of three simple tests; namely, (1) venous pressure readings, (2) fluoroscopy, or if necessary, (3) pericardial aspiration.

4. Cardiac injury from non-penetrating body blows is more frequent than is commonly suspected. Patients with many of these milder injuries recover without being detected clinically. While cardiac rupture with tamponade following a body blow has been discovered occasionally at autopsy, yet as far as I can determine, no case has been diagnosed and relieved surgically. For this reason it is further suggested that all patients especially those injured in automobile accidents who show signs of cardiovascular collapse out of proportion to blood loss or other injuries, be examined carefully for tamponade with the hope of saving some of them by early operation.

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Emergency Treatment of Lacerations*

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IN a study of some of the recent literature on the care of wounds, certain fundamental principles make themselves apparent. One is impressed by the soundness of these principles and wonders why their application has been so long delayed. Among the papers of special interest dealing with this subject are those of Koch¹²; Mason¹; Collier and Farris¹¹; McClure⁹; Stevenson and Reid¹⁰; Reid and Carter²; Whipple and Elliott⁸; Jenson, Johnsrud and Nelson.⁶

Healing appears to be a natural property of living tissue, which under certain optimal conditions proceeds at a definite and measurable pace (Mason¹). It should be one's purpose, in treating wounds, to make every effort to aid nature in her tremendous urge to heal. To this end, we should be ever watchful that we do no further damage. One should take care, for example, not to jeopardize the circulation of an extremity by overzealous efforts to control bleeding with a tourniquet, when in most cases bleeding can be easily controlled by pressure over the site of injury with a sterile pad banded firmly in place, together with elevation of the part. Strict avoidance of the introduction of antiseptic solutions into the wound itself is another way one can prevent further damage. It seems only reasonable that if bacteria can be damaged or killed by antiseptic solutions, then tissue cells themselves, many of which are much more delicate than most bacteria, will likewise be greatly damaged. Bacteria thrive on dead and devitalized tissue and conversely, healthy undamaged tissue cells have a great natural tendency to combat invading organisms. One is greatly impressed on a visit to Koch's Hand Clinic at Cook County Hospital by the kindly healing taking place under the treatment used there. Koch and Mason were among the first to preach widely against the pernicious practice of pouring antiseptics into open wounds, which, as Mason says, is a tribute to the drug salesman's efforts and not to our own good sense.

A special effort should be made to protect an open wound from bacterial contamination by *human sources*. These bacteria cultured *in vivo* are said to have acquired more or less immunity to human natural protective mechanisms—antibodies, agglutinins, etc. Thus, the wound may develop a virulent superimposed infection *after* injury by the injudicious use of a handkerchief on the wound, or from the noses and mouths of bystanders, or from clumsy attempts at first aid, where unclean fingers have been allowed to contaminate the wound. Everyone, particularly including nurses and physicians, who approaches a wound at any time, should have both nose and mouth adequately covered.

Further damage can be prevented by careful splinting. Even if a fracture is not suspected, rest of an injured

member is as important in extensive soft tissue injuries as when bone is injured. The careful handling of tissue at the time of repair with fine instruments, engaging only small amounts of tissue, use of only the finest kind of suture material, avoiding use of rough retraction, use of frequent warm saline irrigations to prevent drying out of tissues, and avoiding rough and frequent use of sponges, all are aimed at the prevention of further damage.

Careful removal of all foreign matter, of dead and devitalized tissue is extremely important. Debridement of the wound then means converting a dirty wound into a clean one. This is a meticulous and time-consuming procedure if properly done. A great deal of patience is needed to remove every last particle of dirt, every tiny bit of ischemic muscle, or devitalized fat or fascia. Strong emphasis has been placed on this aspect of wound treatment by many men, and its value is strikingly borne out by the report of 225 cases of compound fractures from the fracture service of Minneapolis General Hospital, in which an especially thorough debridement was carried out.¹⁴ In this series only five cases of infection appeared, and of these, two developed gas gangrene and both died. Postmortem study revealed in both cases small deposits of gravel and other debris, indicating incomplete debridement, in spite of the fact that a good deal of time was spent in each case and a thorough debridement thought to have been done. It is true that sulfanilamide locally also was used in those cases, but debridement when meticulously done is considered more important in that institution than any other factor in their treatment.⁶ Particles of wool clothing introduced into wounds are a great potential source for tetanus and gas infection. It is of especial importance to remove these bits of clothing and it has been said that, were it possible to substitute cotton clothing for the wool clothing that soldiers now wear, one of the great hazards to anaerobic infection would be eliminated.

Stevenson and Reid¹⁰ have emphasized the difference between a contaminated wound and an infected wound. Every wound, whether made surgically or accidentally, is contaminated. Studies by Meleny and Ives^{4,5} and Hirschfeld³ indicate that nearly 100 per cent of so-called clean operative wounds yield positive cultures if careful means of culturing bacteria are used. The fact that the large majority of operative wounds heal by primary intention emphasizes the great natural tendency of tissue to fight off invading organisms. Bacteria which contaminate a wound vary greatly in virulence. They lie dormant for a time in order to accommodate themselves to their new environment, except possibly in the case of contamination from human sources, when the period of acclimatization is greatly shortened, since these bacteria are already accustomed to human tissue fluids.

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Up to this time, variously estimated at from four to eight hours, the wound is simply contaminated. If one can remove a sufficient number of these bacteria and leave the tissues in the best possible shape to combat the ones remaining, healing by primary intention will likely take place. Once the bacteria have begun to multiply in sufficient numbers to actually invade tissue, the wound is infected, and active surgical measures may be dangerous (Mason¹).

Numerous are the enthusiastic reports of the value of local implantation of the sulfonamides into wounds. Experimental and clinical evidence suggests that, unlike antiseptic solutions, they are not harmful to human tissue cells. Action of the sulfonamides on bacteria, although not completely understood, appears to be one of inhibition. They are bacteriostatic, rather than bacteriocidal. They interfere with the complicated manner in which bacteria obtain their nourishment and thus delay and inhibit their action and prevent their reproduction.⁷ Probably a combination of sulfanilamide and sulfathiazole in equal doses is most effective. The former is said to provide a sudden high concentration in the wound, up to 800 mg. per cent, but is rapidly absorbed. The latter gives a more prolonged effect, being much more slowly absorbed, but its local concentration does not go above 50 mg. per cent. The recommended doses have varied considerably, up to 20 gm. or more; possibly in most cases 8 to 10 gm. is the optimum amount. Administration by other routes should be continued for five or six days in most cases. Sulfathiazole must be introduced in finely powdered form, preferably with an atomizer, as it has the disadvantage of caking if not well distributed, and large portions of it remain unabsorbed for long periods.

Protection against tetanus and gas gangrene should be provided by prophylactic doses of antitoxin.

The simple incised wounds of the skin may be treated by cleansing a wide area of the surrounding skin with plain soap and water, followed by the application of an antiseptic solution over the surrounding skin *up to* the edges of the wound, but never allowing it to enter the wound itself. Novocain infiltration may then be carried out well away from the wound edges. The wound itself may be gently cleaned and freshened with sterile gauze moistened in warm normal saline solution. Any debris present in the wound should be carefully removed. If the skin edges are fresh they may be immediately sutured, or if ragged and macerated they should be excised and then sutured. Suture of the skin is carried out following the application of a thin layer of sulfathiazole powder in the wound with an atomizer. A light pressure dressing is applied to the wound and not disturbed again until the sutures are to come out.

A more severe laceration of soft parts, involving deeper structures, should be treated somewhat as follows: if seen at the time of injury, no treatment is given except the application of a copious sterile gauze dressing bandaged firmly in place. Pressure at the site of injury will usually suffice to control bleeding, especially if combined with elevation of the part, thus avoiding the possible dam-

aging effects of a tourniquet hastily applied, although pressure over the proximal artery at a suitable point may be required.

The use of adequate splints will make the patient more comfortable and possibly avoid further damage, especially to bones, nerves and blood vessels. Morphine, in doses of one-quarter to one-half grain, is almost always indicated. It is the best means of preventing or combating shock. Transportation to a hospital is then carried out and there further examination made to determine if other injuries are present, paying particular attention to the possibility of nerve injury. This should be accomplished without removal of the dressings. At this time also one can determine if the patient may be immediately treated or if treatment must be delayed because of shock. X-ray examination, if indicated, is then carried out. Preparation is then made for treatment of the wound in the same manner as for any major surgical operation, the wound not being exposed until the personnel are completely masked, the surgeon having scrubbed for ten minutes and donned sterile gloves. The splint and dressing are then gently removed and the wound packed lightly with a sterile gauze fluff. A wide area of the surrounding skin is shaved, using benzene and ether gently to remove grease and dirt. The surgeon himself then gently scrubs the area surrounding the wound with plain white soap and water for ten minutes, using sterile cotton, which is less irritating to the skin than a ten-minute scrub with gauze. A suitable antiseptic is then applied up to the wound edges, again being careful not to allow it to enter the wound. If an extremity is involved, much time will be saved by application of a blood pressure cuff, with pressure maintained at 250 mm. of mercury, following elevation of the part for a few moments. Suitable sterile drapes are applied, and the surgeon and assistants wear sterile gowns, gloves, and masks covering both nose and mouth.

Local infiltration of novocain may then be carried out, well away from the wound edges, but if the wound is very extensive a general inhalation anesthetic or an intravenous anesthetic is more desirable. If the wound is so situated that complete excision is feasible, this is then quickly carried out. Reid and Carter² have pointed out that excision is possible with practically no contamination of underlying structures. If the wound involves vital structures, complete excision is of course not possible. In that event, the superficial portions of the wound, that is, the skin and subcutaneous tissue,³ are excised, and all the obviously dead tissue and debris in the depth of the wound is removed. With the blood pressure cuff in place this can quickly be done with no bleeding and a minimum of sponging. The wound is then copiously irrigated with warm normal saline solution, using several quarts of solution and being sure to irrigate the very depths of the wound. A light gauze pack is re-inserted, the surrounding areas dried and re-treated with antiseptic solution; the wound is completely re-draped and fresh gown, gloves and fresh instruments are secured. A meticulous debridement is then carried out. This is time-consuming. Every fine particle of foreign matter,

every bit of devitalized tissue is removed, using frequent warm saline irrigations. Injured nerves and tendons are then repaired, using interrupted sutures of fine silk. At this time most of the cut blood vessels can be secured without removing the blood pressure cuff. They will be seen protruding slightly from the surrounding tissue. These are caught with fine pointed forceps, engaging only the blood vessel itself, and ligated with fine silk. The blood pressure cuff is then removed and the remaining bleeders secured similarly. Gentle pressure will control a great deal of minor bleeding and oozing, and thus reduce to a minimum the total amount of necrosis and foreign material with which the tissues will have to deal. When complete hemostasis is obtained, a final irrigation is done and the sulfonamide powders introduced, using both sulfanilamide and sulfathiazole in equal doses. The deep fascia is then approximated, using interrupted sutures of silk, tied without tension, and the skin closed similarly.

Mason¹ feels that tight skin sutures are particularly hazardous, where a linear necrosis may lead to a serious infection. No drainage is used. A large sterile fluffed gauze dressing covering a wide area and bandaged firmly in place nicely prevents the postoperative oozing which is always likely to take place otherwise, thus avoiding accumulations of blood and serum.

The part is then adequately splinted, preferably in plaster. Plaster fixation has long been recognized as a valuable factor in treatment of compound fractures. It should be equally valuable in extensive soft tissue injuries. A prophylactic dose of gas bacillus and tetanus antitoxin is administered. A moderate elevation of the part above heart level has been recommended by Wangenstein¹³ and others, to prevent stasis edema. Wangenstein has reported several virulent infections of a phlegmonous nature which were brought to satisfactory conclusion with the use of complete immobilization and elevation alone.

The wound is not disturbed until the sutures are to be removed, unless a definite indication such as undue pain, unexplained fever, or impaired circulation is present. If closure of the wound cannot be accomplished without tension, then one may employ relaxing incisions on either side of the wound, being certain that they are made in such a way that the blood supply to the skin flaps is not disturbed. These incisions are sprinkled with powdered sulfathiazole and covered with sterile vaseline gauze and left alone, and usually heal without trouble.

If treatment has been delayed beyond the usually prescribed optimum time for treatment of six to eight hours, it may be debrided as described, treated with the sulfonamide powders and packed open with sterile gauze. Delayed suture may then be accomplished in twenty-four to thirty-six hours, if the wound looks clean, or it may be repacked with plain sterile gauze every three or four days and allowed to heal from the bottom by granulation. The application of a firm pressure dressing as advocated by Koch¹² in these cases will prevent exuberant granulations.

A recently recommended treatment for grossly infected wounds is the so-called "cocktail dressing." This consists of a pack, made up of gauze impregnated with cod liver oil and equal parts of powdered sulfanilamide and sulfathiazole, changed as required.

In summary, it seems well to remind ourselves once again that there is nothing we can do to *make tissues heal*. Healing can only be accomplished by the tissues themselves, and proceeds at a definite pace under optimum conditions. In attempting to promote optimum conditions, we must treat tissues very gently at all times, provide adequate rest, be ever mindful of adequate blood supply, and be careful not to add injurious agents so that the tissues have that additional obstacle to overcome.

Ambrose Paré in 1537 decried the use of hot oil in open wounds which has its modern counterpart in the misuse of variously colored solutions today. In other words, to quote Collier once again, "The cycle has been completed. Once more we are back to the time of Paré, who said, "I treated him; God healed him."

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The Depressed Patient*

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"All the world is melancholy or mad, and every member of it. I can but wish myself and all of us a good physician and a better mind."

THE above words were written in 1651 by Burton in a treatise on *The Anatomy of Melancholy*. Nearly three centuries ago this writer called melancholy "a universal malady, an epidemical disease." Nowadays, depression, anxiety, and pain, are still perhaps the commonest symptoms in medicine; but depression and anxiety are often not mentioned by the patient who is more apt to describe the physical discomforts which result from these disorders of feeling. For this reason the physician is in danger of overlooking the fundamental psychiatric condition that forms the real basis for the patient's complaints. Inasmuch as most cases seen in general practice are of a relatively mild degree the practitioner must be "depression conscious" in order to avoid the mistake of treating the physical symptoms and ignoring the psychiatric entity underlying it. Very frequently a patient rationalizes the cause of his difficulty and relates it to an organ. That is, there is "conversion of the psychalgia." The physician may accept this rationalization and treat the organ, sometimes even resorting to a surgical attack upon that portion of the body referred to by the patient as being the seat of the trouble. This invariably makes the patient worse because it is ineffective and merely serves to confirm the patient's hopelessness about his condition. Furthermore, the treatment usually is given half-heartedly so even the element of suggestion is absent. Small wonder that the victim gradually gravitates to the office of a chiropractor or a practitioner of one of the other so-called "cults" of healing.

The medical, public health, and social problems which arise as a result of mental depression cannot be estimated. In the public hospitals of the United States there are more than 50,000 patients suffering from depressions of various kinds. In addition to this there are probably five times that number consulting practicing physicians for varying degrees of mood disorders which are severe enough to lessen the efficiency of the individual in all of his contacts, and in that way lower the general morale of society. It goes without saying that in these critical times the general morale of our people is of paramount importance. For this reason a study of the causes, characteristics, and treatment of depressions becomes important. At least, it will be helpful in correcting some of the existing misunderstandings which interfere with the proper management of the depressed patient.

Depression is a mood disorder which results from a form of inhibition at the highest level of the nervous system. It may vary in degree from simple retardation

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to profound stupor. As one writer put it, "the patient says he cannot, his friends say he will not, the truth is he cannot will." I wish to emphasize the fact that the depressed patient is really sick. Just as a man suffering from a dislocated ankle will limp physically in spite of the most magnificent display of will power, a man suffering from a dislocated mood will limp psychologically. All of his will power, all of the entreaties of his friends, and all of the scolding ridicule and verbal abuse of his attending physician are powerless to force the patient to "snap out of it." One may as well ask a patient with pneumonia to "snap out" of his fever by the exercise of sheer will power. No, the depressed patient is sick, and his sickness must be understood in order to be properly and successfully managed.

Although depression may result from a number of causes some of which will be discussed later, there are certain symptoms generally common to all depressions. Lemere has divided these symptoms into mental and physical somewhat as follows:

MENTAL SYMPTOMS

1. *Depressed spirits.* The patient feels gloomy, he is subject to crying spells, expresses ideas of hopelessness, is worse in the morning, and is a potential suicide. This last fact is very often disregarded, and one regularly reads in the daily press accounts of people having committed suicide with "despondency over ill health" given as the cause.
2. *Feelings of inadequacy.* The patient says that he has an "inferiority complex," although in the Adlerian sense his diagnosis of inferiority complex is not correct. At any rate the patient is sure that he is a failure, he blames himself for all of the trouble that has come into the lives of his family and friends, he feels unworthy of any consideration or regard, guilt reactions are prominent, and the patient is given over to retrospection and self-accusation.
3. *Inability to concentrate or to remember.* This interferes with the patient's reading and it also impairs his conversational powers. This causes him to fear that he is losing his mind although he will not express this particular fear unless the physician asks leading questions.
4. *Loss of interest in everything but himself.* This detachment of interest (libido) from the external world and its investment in the patient himself brings about a qualitative as well as quantitative change in the mood swing. Therefore, depression is something more than a mere quantitative increase in the amplitude of the down swing. It is also qualitative in that the ego-superego relationship is profoundly disturbed.
5. *Anxiety.* This may take the form of a diffuse or a specific preoccupation. By this is meant that the pa-

tient may complain merely of feelings of uneasiness and general tension, or he may refer his symptoms to some organ or system of organs. Douglas Singer once said that an organ neurosis is the result of a patient's inability to get along as he is with his life situation as it is. The organ selected for the expression of the patient's conflict will be determined to a large degree by the previous experience of the patient. If he has a family history of heart trouble, or if close friends or prominent people in the community have died suddenly and dramatically of heart trouble, he will have a cardiac neurosis. If, on the other hand, the idea of carcinoma has been impressed on his mind, he might develop a cancerphobia. And so it is with other parts of the body.

6. *Apparent aversion to the ordinary duties of life.* I say "apparent" because I do not believe that this manifestation is a true antipathy or aversion. In my opinion it is excessive psychomotor inhibition coupled with feelings of futility and hopelessness. It is like a fine automobile in good running order but with the brakes set. The power to go ahead is there but excessive inhibition prevents the machine from functioning. Patients frequently have apparent aversion to the doctor and to any form of treatment suggested. What really happens is that the patient is so discouraged that he cannot see any use in trying anything which, according to his point of view, would be just so much waste of time, effort, and money. Furthermore, he usually feels that he isn't worth the trouble.

PHYSICAL SYMPTOMS

1. *Insomnia.* This frequently is the earliest symptom in depressions and may be present several months before the appearance of other and more characteristic manifestations. Following recovery many patients will say that, as they look back over their history, they can see where their illness was coming on long before the time they gave as the date of onset of their trouble. Therefore, every patient suffering from a psychogenic insomnia should have a thorough psychiatric investigation for the purpose of detecting harbingers of an oncoming depression. Sometimes psychotherapy reinforced by mild sedation at this stage of the illness may prevent a future break.
2. *Gastrointestinal symptoms.* Anorexia, flatulence, constipation, vague abdominal discomforts oftentimes can be very deceptive. Unless the surgeon is "depression conscious" he might fall into the error of performing a laparotomy only to find normal organs and later be ignominiously accused not only of having failed to cure the patient, but actually of having made him much worse. I might also add that the surgical mortality is much higher in depressed patients than in people who are emotionally normal. More than one depressed patient has unexpectedly and inexplicably died two or three days after a herniotomy, a simple appendectomy, or some other standard surgical procedure in which the risk is ordinarily considered to be comparatively slight.
3. *Weight loss.* As a result of the anorexia together with defective digestion and assimilation most patients coming to us with depressions are from 5 to 40 pounds under weight. Studies on the weight curves of patients under treatment indicate that few of them begin to improve with respect to emotional tone until the weight increases. This makes nutrition a very important factor in the treatment of the depressed patient.
4. *Feelings of not being rested upon awakening in the morning.* Early morning awakening with feelings of depression is one of the most characteristic symptoms—so much so that in history taking I routinely ask the patient if there is any particular time of the day during which the mood symptoms are most disturbing. If the patient replies that he invariably feels worse in the morning but that his feelings improve toward evening, one can be quite certain that he is dealing with a depression. The exact explanation of this phenomenon has never been given although there are a number of theories.
5. *Symptoms relating to the sexual life of the individual,* i. e., impotence and amenorrhea.
 - a. *Impotence.* Psychic impotence is characterized by the profound disturbance in emotivity which accompanies loss of sexual power. In this way psychic or functional impotence differs from that resulting from organic diseases such as tabes dorsalis and other neurologic lesions. Sufferers from organic impotence rarely, if ever, show excessive concern over their weakness. On the other hand, patients with psychic impotence are emotionally devastated. They complain bitterly about "lost manhood," frequently contemplate and sometimes commit suicide, and present a picture of extreme and pitiful dejection.
 - b. *Amenorrhea* in women is not accompanied by the same degree of concern as is functional impotence in men. The important point to be remembered in connection with amenorrhea is that it does not necessarily indicate the onset of a true physiological menopause. Neither is it an uncontradictable indication for the exhibition of one of the estrogenic substances for therapeutic purposes. While some of the tension states, hot flashes, and other vasomotor symptoms of physiological menopause are relieved by the administration of estrogenic substance, one should not be too optimistic about relieving mental depressions whether they are associated with the climacteric or not. It is important to remember that amenorrhea can be a result of the depression, and when the depression lifts normal menstrual function returns. Too often a patient is told that her depression is a sign of her "change of life." She recovers from her depression, begins again to menstruate regularly, and then worries about having another "change of life" with depression. I have seen a

number of women living in a state of constant fear and anxiety in anticipation of a much dreaded second "change of life."

6. *Occipito-nuchal pain (ONP)*. This has been discussed by me elsewhere. Suffice it to say here that ONP is almost pathognomonic of depression if it is continuously present during the day, never awakens a patient from sleep at night, and is accompanied by various fears, apprehensions, and disturbances in emotionality. It is due to increased tension in the muscles in the back of the neck ("base of the brain" to the average layman) and it responds to reassurance, physiotherapy, and mild sedation.

While there is no sharp dividing line between depressions associated with constitutional diseases or organic cerebral disorders on the one hand, and purely psychogenic depressions on the other, it might be well to consider these two main groups independently. Depression, aboulia, loss of interest, and emotional instability may be the earliest manifestations of cerebral syphilis, cerebral vascular disease, brain tumor, multiple sclerosis, thyroid dyscrasia, metabolic diseases and pulmonary tuberculosis. In these cases the serological, neurological, and physical findings are helpful in establishing the diagnosis. Depressions characterizing the onset of senile dementia are distinguishable by the age at which they occur plus the fact that they soon are accompanied by signs of progressive memory impairment and mental deterioration. The depressions accompanying metabolic diseases such as gout, diabetes, and hypothyroidism are purely secondary to the underlying constitutional disorder. In the conditions just mentioned management of the primary disorder is all important, and the fact that the primary disorder can easily be obscured by the heavy emotional overlay makes a complete physical and neurological examination mandatory in every case of depression. The more certain I am that a patient is suffering from a functional or a neurotic disorder, the more painstaking and complete is my examination.

Mrs. B. B., age 32, married and the mother of two children, was sent to me because of severe emotional depression, irritability, and crying spells, associated with a persistent hacking cough. Two months previously her chest had been examined roentgenographically and declared to be normal. Her Mantoux reaction was faintly positive, and a competent internist had made a diagnosis of anxiety neurosis and hysterical cough. When she came to see me, Mrs. B. had lost 15 pounds in weight (not uncommon in anxiety states), she was severely depressed, could not eat or sleep, wept profusely at mention of her cough, said that she could not get her mind off herself and she wished she were dead. Physical examination of the chest showed diffuse crepitant rales throughout both lungs, and X-ray films showed extensive miliary tuberculosis.

Mrs. F. C., a childless widow, was referred to me with a diagnosis of hysterical dysphagia. She was irritable, uncoöperative, severely depressed, had violent and noisy crying spells, refused medicine and all other attempts to do anything for her, and had lost 20 pounds in weight. Her past life had been filled with enough grief and misfortune to cause almost anybody to break down emotionally and a competent internist with the aid of an excellent roentgenologist had ruled out all organic disease of the gastrointestinal tract. I was consulted with regard to her melancholia. The patient, however, had so much cardiospasm that it was impossible for her to swallow food or medicine. After

consultation with a surgeon it was decided to dilate the lower part of her esophagus. This was done and the patient died a few hours later. At autopsy a carcinoma was found in the cardia of the stomach with diffuse peritoneal metastases.

Mr. E. S., age 40, came to me in prohibition days when it was the fashion for certain citizens to manufacture alcoholic beverages in their own home. Mr. S. was depressed, apprehensive, had crying spells and thought that the revenue agents were spying on him through the walls of his home and listening to him over a radio device. He labored under the delusion that his family was going to be murdered by the government agents, and that he, himself, would be shot. He attempted suicide by drinking a quantity of cleaning fluid. The physical and neurological examinations were entirely negative for organic signs. The Wassermann reaction on the blood was negative. Obviously Mr. S. was suffering from melancholia so he was sent to the hospital and treated for the condition. However, he failed to show any improvement. At the end of the second month his wife arrived from New York to discuss the case with me. I noticed that she had miotic and irregular pupils. I asked her if I could examine her eyes and I found typical Argyll-Robertson pupils. The following day I obtained a specimen of my patient's spinal fluid, and the laboratory reported a four-plus Wassermann reaction, and a typical parietic formula. Under treatment with malaria followed by two years of intravenous Tryparsamide the patient made a satisfactory adjustment and is now well and happy, living with a second wife.

The functional depressions, i. e., those of purely psychogenic origin and for which no physical or organic basis can be demonstrated fall into two main groups. These are the reactive (neurotic) depressions, and intrinsic (psychotic) depressions. Each kind has certain distinctive characteristics with respect to the prepsychotic personality of the patient and also the clinical symptoms he presents during the active phase of his disorder. It is important to distinguish between a neurotic and a psychotic depression because the psychodynamics, prognosis, and management differ in the two types. However, there are some cases which cannot be identified without the use of one of the several specialized technics of personality analysis. The one I use is known as the Rorschach experiment or test.

The Rorschach test is made by recording the verbal responses of an individual to a series of ten standardized ink blots. Formulation and interpretation of these responses according to the criteria established by the late Herman Rorschach yields knowledge about the psychic structure of the patient that can be put to diagnostic, prognostic, and therapeutic use. The procedure is not really a "test" as the word would be used in natural science generally, or even in the looser sense in which the word is applied to intelligence tests. Neither the Rorschach nor any of the other "tests" is a technic from whose results a trait or a trait complex can be read. What we can expect from a number of personality tests is that they reveal characteristics of personality structure that afford opportunities for interpretive insight that could not be developed without them. Rorschach's genius gave his procedure a definition and a precision which has made it one of the most useful means of rapid analysis of the individual personality. In each personality type, whether it be healthy adult, problem child, schizophrenic, depressed, hysteric, or any other type, certain psychological processes hang together. The Rorschach test cross-sections these psychological processes, and from it we can deduce many useful facts concerning them.

There are many technical details surrounding the administration, scoring, and interpretation of the test. It employs many symbols, and even some terms which are almost a separate language. One of the criticisms of the test is that it is too complicated, and that an expert in the Rorschach technic must be a specialist on that method only. I disagree with this point of view. It seems to me that, as long as the results of any test can be validated, and as long as they are useful and helpful to the clinician, the test has merit. Merely to say that it is too complicated misses the point.

On the basis of our clinical observations aided by such procedures as the Rorschach experiment, we usually are able to distinguish between the neurotic and the psychotic depressions. The former are, for the most part, situational reactions. That is, they are reactions to some external life situation although the reason may not always be known to the patient. These neurotic depressions occur in superior adults who have introversive tendencies (introverts). They are highly organized, sensitive personalities, and their pre-morbid reactions are characterized by perfectionism, meticulousness, and a hypersensitive conscience. In the breakdown the patient never hallucinates, never goes over into delusional formation, and is always in contact with reality. He knows that he is sick and usually is cooperative in his treatment. Physical tension and psychomotor unrest are apt to be more common than severe inhibition. The patient frequently complains of somatic symptoms which are nothing more or less than "conversions" of the psychalgia into a form of physical discomfort. The seriously conflicted victims of neurotic depression are particularly prone to suicide. In Rorschach experience, an adult of superior intelligence who is depressed, and whose record shows evidences of neurosis and deep conflict is, at some time or other during his illness, almost certain to attempt suicide. The tragedy of it all is that this danger so frequently is either unrecognized or ignored by the family and friends of the patient, even after they have been warned by the physician. Their reaction usually is, "Oh, he hasn't got the nerve!" or "She is too religious!" or "There never has been anything like that in the family!" That is all beside the point. The fact still remains that every neurotic depression is a potential suicide.

The psychotic depressions, rather than being a reaction to some external life situation, are intrinsic in the individual. They bear the same relationship to neurotic depressions as diabetes mellitus bears to alimentary glycosuria. The latter is a reaction to the ingestion of an excess of carbohydrate, while the former is a disease intrinsic in the individual and probably rests on a constitutional basis. Whereas the person suffering from neurotic depression knows that he is ill and is accessible and willing to cooperate in treatment, the psychotic depressive has no insight into his condition. He is sick but he doesn't know it. In doubtful cases the high or low psychotic potential can be judged by the amount of insight and the accessibility of the patient. The pre-morbid personality has been described as "bilious, rheumatic, gouty, vagotonic, and spasmophilic." Anthro-

logically the patients correspond to the "pyknic habitus" described by Kretchmer. Their prepsychotic personality is predominantly extravertive and they frequently give a history of preceding episodes of elation or of depression. The depression itself is characterized by the most painful delusions of retrospection, self accusation, and impending ruin. The delusions of ruin may relate either to the spiritual life of the individual, his socio-economic status, his physical body, or the welfare of his family. The patient isolates himself in a hermetically sealed psychological cubicle of his own, and, until the depression begins to lift, the most heroic attempts on the part of the psychiatrist to enter this cubicle are to no avail. One of the great contributions of shock therapy is that it makes many patients accessible to psychotherapy. As in the neurotic depressions, suicide is common.

Whether involuntional melancholia is an independent entity or whether it should be looked upon as a subgroup of the manic-depressive psychoses is still a moot question. However, it is a fact that many men and women become depressed at some time during the involuntional period of their lives. The diagnosis, prognosis, and management conforms in general to that of the other depressions.

When we come to consider the treatment of the depressed patient I feel that our approach should be eclectic. It should be borne in mind that no one school of psychiatric thought has a monopoly on effective treatment. Psychobiology has contributed greatly to our knowledge of depressions. So has psychoanalysis. Neurophysiology, neuropathology, electroencephalography, endocrinology, and many other branches of medical science all have had their share in the development of our present philosophy of the depressions. Be all this as it may, there are some general principles which should be followed regardless of what particular technical approach one selects in the treatment of depressions.

First comes the attitude of the physician toward the patient and the establishment of what is known as proper rapport. To tell the patient that there is nothing wrong with him—that he should go home, forget himself, and take a trip—is to get off to the worst possible start. This advice, given to many patients suffering from depression, whatever the cause, not only fails to relieve them but is actually harmful. It is harmful because it is not constructive. Inferentially it is destructive criticism and it merely tends further to depress the patient, and he either goes to another doctor, a cultist, or he suffers along with the one who has given him this advice. When a patient goes to his doctor there really is something wrong with him and he knows it. It may be an unreasoning fear, a phobia, a complex, something purely functional, or an alcoholic hangover. Yet, to that particular individual it is something real, and should command the respect of the physician. A depressed patient does not have a raging fever, and his symptoms cannot be heard with a stethoscope, measured with a thermometer, or seen by the X-ray. However, to him they are none the less real and they mean that he must be subjected to a most searching investigation of both his

psyche and his soma. In no other way can the symptoms be evaluated.

Proper rapport having been established between the depressed patient and his physician, it now becomes necessary that the causes and the nature of his depression be determined. In some cases this can be done at the time of the first interview. In other cases, it is necessary to employ a battery of psychological, psychiatric, physical, and laboratory tests. The presence or absence of organic causes must be determined. If the depression is functional (psychogenic) some test such as the Rorschach may be necessary.

One of the most important decisions to be made is whether the patient should be managed by a series of office interviews or whether he should be sent to a hospital. The practitioner's decision will be influenced by the duration, severity, and nature of the symptoms, as well as by the likelihood of suicide. In doubtful cases it is my practice to err on the safe side and send the patient to the hospital or sanitarium. I find it more effective and economical in the long run to hospitalize a patient at least for a period of observation, than to dally along with office treatment for several months only to have to resort to hospital treatment after the patient has become dissatisfied, discouraged, impoverished, or has attempted suicide.

If the patient is to be treated by a series of office interviews it is important that the doctor set aside enough time to give due consideration to the problem at hand. What I have described as "bromide and pep talk" psychiatry often is worse than nothing. Some doctors quote Thomas á Kempis who said "It will pass. It has happened before, and if you live long enough, it will happen again." However, most depressed patients need something more than that. They must be seen two or three times a week, and, some of them, daily. Each interview requires from one-half to one hour. The patient must be allowed to discuss his symptoms. The physician must develop in the patient an interpretive insight into the true nature and the meaning of those symptoms. Psycho-desensitization, training in the fundamentals of the physiology of the sympathetic nervous system, the doctrine of "conversion", elements of psychobiology, philosophy, and religion, all must be woven together into the procedure known as "psychotherapy". In addition to this, the patient's physical condition should be given attention. Malnutrition should be corrected, bowel function should be regulated, and physical tension should be relieved by the use of mild sedatives, frequently changed. For patients who are not sufficiently intelligent to grasp the psychological and psychiatric principles involved, some form of suggestive therapy in the form of high frequency currents should be employed. (I sometimes suspect that some of the marvelous cures attributed to various hypodermic and intramuscular injections are the result of suggestion. *Something is being done for the patient.*) The important thing to remember is that no single procedure can cure the patient. The patient is

cured by the coöperative and cumulative effect of a variety of procedures, properly coördinated and administered according to the best knowledge, skill, and judgment of the physician.

If the patient is definitely suicidal or if, as in many cases, there are indications that he should be separated from his family and friends, he should be sent to a hospital, preferably one that is equipped to care for psychiatric cases. In the hospital the same psychotherapeutic procedures are carried out as in office practice. However, we now are in a position to take advantage of a number of adjuncts to office procedure. These are physiotherapy in the form of hot baths, packs, and continuous tub; electrotherapy; dietotherapy; bibliotherapy; occupational and recreational therapy; and a number of others. Each one of these adjuncts is under the direction of a therapist trained in that particular field, and each activity is correlated with the others into an integrated program. In addition to the above, the several forms of shock treatment can be used. Time will not permit a discussion of the various types of shock therapy, but, as far as the depressions are concerned, I favor electroshock. Electroshock is a form of convulsion therapy that has superseded Metrazol. It induces convulsions that are shorter, safer, less distressing by the reason of the patient's complete amnesia for the treatment, and more effective than any form of convulsion therapy with which I am familiar. There are other psychiatric conditions in which insulin and other forms of shock therapy are useful, but in the affective states I have obtained the best results with electroshock. However, it is not a specific, and, in spite of all the modern refinements and additions to the treatment of depressed patients, psychotherapy still is the principal foundation stone.

In conclusion I wish to emphasize the following points.

1. A depressed patient is really sick.
2. His sickness may be organic or it may be psychogenic.
3. The type of depression usually can be determined.
4. The technic of managing depressions is just as objective and as rational as any other therapeutic procedure.
5. No physician should undertake the treatment of a depressed patient unless he has a clear idea of what he is treating and of what procedure to follow.
6. A depressed patient cured is among the most grateful of all human beings.

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Fifty Years of Students' Health Work*

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TO chronicle the development and promotion of the student health movement in American colleges is of historical interest. The modern student health movement resulted from the advancements in scientific curative and preventive medicine, and the trend of modern sociology, and evolved from the gymnastic or anthropometric stage. Thence it progressed to the sanitation period, and on to the present organizations providing a service for the health of all students by a sustained program of health education, prevention of illness, and the care of the sick.

From the great period of Pericles in Ancient Greece down through the ages the athlete was a living symbol of health. In the Scandinavian and Germanic countries mass gymnastic exercises were cultivated. These later were introduced and became popular in this country during the twenties and thirties of the nineteenth century, first at Harvard, then at Yale, Amherst, Williams, and other New England colleges. After Folin of Harvard introduced gymnastics, there sprang up gymnasiums on many college campuses, which were the pioneer laboratories for determining the future need of health programs for college students. The historian of physical education, Eugene Leonard of Williams, is said to have stated that "our students for the lack of exercise will no longer leave college with emaciated frames and countenances." As earnest workers were developing health values, perceived through the teaching of physical culture in wholesome activities promoting neuromuscular skills and interest in play and recreation, the development of new social and moral standards was also achieved.

As early as 1856 President Stearns of Amherst College realized the fact that the students of our colleges demanding higher education have bodies, too, which need care and culture. In 1859, through his recommendations, the Barrett Gymnasium was erected and Dr. Edward Hitchcock became the first appointed professor of physical culture and hygiene. It is of particular interest to review the duties of the director during that pre-Pasteur era: He was to teach gymnastics, oversee the general health of the students, and teach elocution, hygiene, and physical culture. After sixteen years of labor, in 1877 Dr. Hitchcock published his first monograph, entitled *The Hygiene at Amherst College*, in which he stated that the principal health activity consisted of various body exercises. To prove that this requirement was not irksome to students, whereby they would shirk his department, it was found by statistical evidence, that, comparatively, the attendance at the gymnasium was 84 per cent and at the Chapel 80 per cent. Lectures on

hygiene and elementary anatomy were provided for the entering freshmen.

Observations showed the time lost by illness per student annually had been 2.64 days. During this period forty-eight students, an average of three annually, had left college because of such physical disabilities as constitutional disability, typhoid, consumption, injured eyes, and other infirmities. Of the sixteen deaths that occurred, ten were from typhoid, two from consumption. The fact that typhoid had been the principal cause of death at Amherst he used for a comparison with the Massachusetts mortality tables, finding that 28 per cent of all deaths had been due to the zymotic class in which typhoid fever is placed, and that typhoid stood fourth in order of all causes, consumption, pneumonia and old age outranking it in the number of victims. Still further, this observer noted that 42 per cent of the deaths from this cause occurred between the ages of 15 and 30 years, the average Amherst student being just over 21 years. Forty-four per cent of these deaths occurred during the months of September, October, and November, a large part of the college term. His conclusions from this study were that, "as the students are not at home, and are at the daring and inconsiderate age, it seems a wonder that there has not been rather more than less of this malady among college students." Dr. Hitchcock then reports the maladies which had visited Amherst, recorded in order of their frequency which is of interest to this 1941 assemblage; note the nomenclature and the diseases of yesterday, to wit: colds, including lung fever and influenza (35 per cent), physical accidents, boils and eye conditions being most prevalent. He also reports in a decreasing ratio of such numbers as fibracula, typhoid, quinsy, debility, mumps, bilious fever, diphtheria, stomach irritation, intermittent fever, measles, etc. He is of the opinion, further, that the work in gymnastics was beneficial to his students; that they carried themselves in their walk with more erectness and elasticity, not to say grace, than did the former students at college, and that it had done much to improve their health. He introduced the play spirit in this work, but failed to report how elocution benefited a college health program. In recognition of Dr. Hitchcock's pioneer work in student health, the American Student Health Association in 1932 awarded Amherst College a memorial, the presentation being made by Professor Raycroft of Princeton University.

It can be safely stated that, from Hitchcock's pioneering era to this day, medicine has made greater progress than in all preceding time since man appeared on our planet. The foundation was laid in the discovery of the causes of infectious diseases and immunity, making possible modern surgery, public health, and preventive medicine. These discoveries opened every avenue of medicine, created the inductive, in contrast to the speculative,

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method of reasoning by experimentation, and as a result the period of longevity and happiness of mankind was progressively increased. Likewise student health became a reality.

During these various decades it was natural that sanitation should be linked with the physical culture programs; thus sanitary inspections to control smells and miasmas were maintained. Health lectures were pioneered by Dr. Jackson as early as 1818 at Harvard, in 1834 at Horace Mann State Teachers College, in 1836 at Mt. Holyoke, in 1854 at Williams, in 1859 at Amherst and in 1865 at Vassar. Other institutions of learning followed. Several colleges introduced practical measures endeavoring to control infectious diseases; quarantine was instituted, and later, in the beginning of the twentieth century, elementary bacteriology was taught in the health programs. Some colleges employed a physician to be on call in the event of an emergency. It was during this era that men with medical degrees were attracted by the idea of teaching, becoming professors of physical education and hygiene: men such as McKenzie of Pennsylvania, Raycroft of Chicago, Sargent of Harvard, Reinhardt of California, and Storey of the College of the City of New York, whose contributions paved the way for the student health services of today.

I am paying my respects to my predecessor, Dr. George F. Reinhardt of Berkeley, in saying that with his foresight, experience, and untiring effort he laid the foundation of the twentieth century, modern students' health service at the University of California. Reinhardt in 1895 became assistant in the department of physical culture at the University of California. It was in this field that he received the inspiration that caused him to study medicine, and upon receiving his degree in 1902 he became assistant in medicine, and in 1906 Professor of Hygiene and University Physician. That same year the great fire and earthquake took place in San Francisco. The emergency needs of this time gave him the impetus to establish the pioneer infirmary on the campus, where students could receive examination and early treatment at the dispensary and were provided with bed care under the same roof. He had realized from his experiences in physical education that, while the results included improved functional health, physical education could not control communicable diseases nor establish immunity against infection. The health service was then supplemented by a compulsory course in informational hygiene; and so was developed a college infirmary which correlated functional body building and health education with curative and preventive medicine. To be able to control infectious disease, to observe patients when disease is curable, in the early stages before grave pathology ensues, is modern preventive and curative medicine. In Reinhardt's first Report to the President of the University of California in 1906 he said: "The existence of such a system would be an immense relief to the mind of every student of limited resources; a great comfort to all parents and the means of saving many lives."

After his death in 1914, his successor[‡] developed from this excellent beginning a group specialist's staff, and

[‡]Dr. Robert T. Legge.

organized a standardized hospital and out-patient department which culminated in the planning and building of the Cowell Memorial Hospital Health Service, an almost ideal organization.

Time and space do not permit listing all the outstanding health services in the various universities, whose directors and staffs have contributed much in research and have developed a system of preventive and curative practice which constitutes a triumph of American medicine. McCosh Infirmary at Princeton, 1892, University of Michigan, 1913, Yale, 1916, Minnesota, 1918, Washington, 1916, et al., are some of the fine examples of well equipped, well staffed infirmaries for sick students. In passing, one cannot but pay tribute to the men and women who, as pioneers, have made such valuable contributions and have made possible the perfecting of student health activities in the colleges of this country: such men as Drs. Bradshaw, Canuteson, Chenoweth, Diehl, Forsythe, Ferguson, Hall, Kingsford, Raycroft, Reed, Smiley, Shrader, Shepard, Storey, and Sundwall. The women physicians, too, not to be forgotten, are Drs. Baldwin, Boynton, Cunningham, Gove, Paroni, Rea, Richardson, and Snow, whose administrative services and publications on problems of health of college women students are contributions of much merit.

The American Student Health Association was initiated on March 4th, 1920, when twenty representatives, interested in student health in American colleges, met at Chicago. The first annual meeting was held on December 31st, 1920, in the same city, with fifty-three colleges listed as charter members. Today about two hundred institutions are represented in the membership. To provide opportunities for more schools to participate in this field, fifteen local sections have been organized. These hold annual sessions. The Pacific Coast Section includes California, Oregon, Washington, Nevada, Idaho, and Arizona. It was organized and held its first meeting on December 2, 1933, on the campus of the University of California with Dr. R. T. Legge as president and Dr. T. A. Storey as Chairman of the Organization Plan.

Student Health Work is an American activity but its success and influence has stimulated interest in other countries. Already four international university conferences devoted to this field have been held in Europe. At Syracuse University in New York state in 1931, under the sponsorship of the President's Committee of Fifty on college hygiene, the American Student Health Association and the National Council of Health held its first conference. The meeting was called by the late President Livingstone Farrand of Cornell University. This historic meeting made a profound impression on administrative officers of our colleges in regard to the importance of the organization of health for students. To attempt to cite the able contributions in research, teaching, and administration procedures offered by members of the parent association would be in vain, as the content would fill many volumes. To mention three alone will suffice to show the quality of the productions: a summary of the study of Longevity of College Athletes,

The American Youth Commission report on Health of College Students, and The Committee Study on Tuberculosis among Students.

What stands before us in the future? This is a matter dependent on whether the present world's upheaval will end in retrogression and return to a period of medievalism, or whether democracy will survive and the present advancement in science be maintained. The knowledge we have acquired through research and experience can only be salvaged and advanced under conditions of peace in a world devoted to the social well-being of mankind. As man is the greatest asset in the world, all efforts must be devoted entirely to his betterment, and the sciences of medicine, sociology, economics, politics, and jurisprudence must be devoted to the most vital problem the world has ever undertaken.

In conclusion, it is a privilege to participate with this great institution of learning in its semi-centennial celebration. We pay our respects and extend our greetings. With pride we congratulate President Ray Lyman Wilbur and his faculty on this occasion. We shall always remember the many men and women, members of our society, who received their education in these halls, and the faculty who have contributed much to the health activities of college students, names which we revere such as Drs. Thomas D. Wood, Ray Lyman Wilbur, William Snow, C. W. Hetherington, Thomas A. Storey, Walter H. Brown, Charles E. Shepard, Clelia D. Moser, and such graduates as Lillian R. Titcomb, E. H. Coleman, Bertha and Marshall Mason, D. S. MacKinnon, and others. Hail Stanford University! Accept our salutations for the next fifty years of progress.

International Society of Surgery Reorganized

By a vote of the delegates from all of the affiliated societies of the Americas, representing Argentina, Brazil, Canada, Cuba, Ecuador, Guatemala, Mexico, Paraguay, Peru, United States, Uruguay and Venezuela, the headquarters of the International Society of Surgery was provisionally transferred from its European headquarters in Brussels, Belgium, to the United States. More specifically, the headquarters have been established in the Inter-American Division of The New York Academy of Medicine in New York City.

In explaining the need for the change in headquarters, Dr. Rudolph Matas of New Orleans, Acting Secretary and Treasurer of the International Society of Surgery, said:

"The German occupation of Belgium and the Nazi devastation of the rest of Europe and all the other war torn nations, had virtually restricted the international relations of the Society to the Western Hemisphere where its fellowship is widely spread through its affiliated branches in North, Central and South America.

"The Executive Committee of the United States Division, the largest, most active contributor to its transaction, felt it their duty conjointly with their Latin American colleagues to rescue the Society out of the perils of the European conflagration. The first steps were taken November 1941 at Boston but no final action could be taken to transfer the official sanctum in Brussels to America without the concurrence and approval of all the affiliated branches in America."

The act by which the transference of the International Society of Surgery from Europe to the United States was effected, was signed either personally or by proxy by the delegates from all the affiliated societies of the Americas.

By the action of the Council of Delegates, the official seat of the Society will be established in the Inter-American Division of the New York Academy of Medicine, directed by Dr. Mahlon Ashford, where Dr. Enrique J. Cervantes, assistant secretary-treasurer of the executive committee, editor of *America Clinica*, the official organ of the society, and editor and secretary of the Hispanic-American Medical Society, will be able

to render service to the Fellows of the Society and medical visitors hailing from the Latin American countries.

The affairs of the International Society of Surgery are to be administered by an executive committee composed of the following: Dr. Elliott C. Cutler, Col. M. C., U. S. Army, Chairman in Absentia, Dr. Eugene Pool, Dr. Arthur W. Allen and Dr. Rudolph Matas, Acting Secretary and Treasurer.

The meeting was presided over by Dr. Eugene Pool, who serves as acting chairman of the executive committee for the United States, in the absence of Colonel Elliott C. Cutler, now at the front.

Dr. José Arce, Dean of the University of Buenos Aires, will serve as acting president of the International Society of Surgery in the absence of Professor L. Meyer of Brussels, detained in Belgium by Nazi compulsion.

The revision of the constitution adopted on Thursday, November 12, 1942, was prepared by Dr. Rudolph Matas of New Orleans, former president of the Society and now acting secretary-treasurer. A representative group of Fellows from New York and elsewhere signed the Act of Reorganization, as witnesses of the signing of the Act by the delegates of the Governing Council, among whom were Dr. Mahlon Ashford, director of the Inter-American Division of the Academy, Dr. Archibald Malloch, librarian of the New York Academy of Medicine; as fellows and guests were Drs. Walter Estell Lee of Philadelphia, Russell S. Fowler, Ralph Colp, Edwin G. Ramsdell, Frederick W. Bancroft, Howard Lillenthal, Charles Elsborg, Seward Erdman, Carl Eggers, Henry Lyle and others elsewhere, by proxy.

The establishment of an Inter-America Division of the New York Academy, directed by Dr. Ashford, with the opening of the editorial offices of *America Clinica*, the most widely read of Spanish-Portuguese medical publications in South, Central America and Mexico and the opening of an Inter-American Bureau to render a free service for medical information, has proved probably the most valuable of all the practical contributions that the United States has made to the cause of Latin American good will and friendship.

Psoriasis of the Nails Producing an Arthritis-like Picture*

Report of a Case with a Seven-Year Follow-up

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A GREAT deal has been written regarding the relationship of arthritis and psoriasis and there has been considerable controversy in the literature as to whether or not psoriatic arthritis is a definite clinical entity.^{5,9,14} Alibert,² one hundred twenty years ago, was the first to call attention to the occurrence of joint pains in psoriasis, and in 1860 Bazin³ differentiated rheumatism with psoriasis from that without associated skin lesions. At the turn of the century, Adrian¹ reviewed the subject thoroughly and did much to establish it as a syndrome. Since then several contributions have appeared yearly, mainly by foreign authors. A comprehensive study of the literature discloses only a few reports from this country. One of them is by O'Leary¹⁷ who saw 8 cases of arthritis in 1400 patients with psoriasis at the Mayo Clinic. One of them was reported in detail by Hench.¹² In 1938, Dawson and Tyson⁷ analyzed 1000 cases of rheumatoid arthritis and found 26 cases of psoriasis—whereas, in the same number of osteoarthritics they found only three. This led them to conclude that there must be a direct relationship between rheumatoid arthritis and psoriasis, while in the hypertrophic type the association is, probably, purely coincidental. Twelve cases were considered to be "classical" in that they showed the clinical features and X-ray changes usually associated with rheumatoid arthritis, and two-thirds of these had involvement of the nails. In 75 per cent of all of their cases with psoriasis, the skin lesions preceded the development of the arthritis by a considerable period.

Crawford,⁶ in studying more than 200 cases of psoriasis without arthritis, found that half had lesions in the nails, the finger nails being affected twice as often as the toe nails. He frequently observed disturbances in the nail bed and stated that treatment of the nails was of little avail until attention was directed to the disease as a whole.

DIAGNOSIS

Hench et al¹³ maintain that true *arthropathia psoriatica* is the result of a long continued and uncontrolled psoriasis and that it usually develops months or years after the onset of skin lesions. They state that, as a rule, it is an asymmetrical peripheral arthritis in which the terminal phalangeal joints of the fingers and toes are most frequently involved. Garrod and Evans¹⁰ feel that the diagnosis depends principally on the close relationship in time between the increase and subsidence of both skin and joint manifestations. They state that severe and symmetrical involvement of the fingers and toes is common and characteristic and in the proportion

*From the arthritis clinic, Knickerbocker Hospital, New York, New York.

of five females to one male. O'Leary¹⁷ says that the parallelism between the severity of the skin and joint symptoms seems to support the theory that the "arthritis is due to toxic products absorbed from these skin lesions."

White¹⁹ states that "psoriasis of the nails is characterized by punctuate erosions or small thimble-like depressions which by their very multiplicity can be distinguished from the nail changes in syphilis." He believes that these erosions prove incontestably that this is a disease of *internal* origin which begins in the matrix of the nail and, after passing through an erythrodermic phase, attacks the soft tissues of the fingers. This opinion is shared by Büscher.⁴

DISCUSSION

Popp and Addington¹⁸ reported 24 cases of psoriasis of the nails (8 in the hands alone and 16 in the hands and feet), in which the symptoms had persisted for an average duration of seven years. In nine of these (38 per cent) the appearance of skin and nail lesions aggravated previously existing rheumatic symptoms. However, roentgenographs showed only periarticular swellings. There were no changes of any kind in the underlying bone. Of eighteen patients given X-ray therapy six had complete remission of nail changes and four of these also reported relief from joint symptoms. Ten others were much improved and the benefits lasted from six months to five years.

CASE HISTORY

A 28 year old barber was first seen in an arthritis clinic in October, 1935, at which time he gave the story that he had been well until about four years previously, when, after an appendectomy, he noticed fleeting pains in his finger joints. These gradually increased in frequency and had become much more severe in the preceding six months. The patient complained also of some pain in his neck, shoulders, back and feet. Physical examination revealed a scaly, silver-white rash on the elbows and behind the ears, and some roughening and pitting of the nails. The tonsils and left antrum were found to be infected. His heart and lungs were normal. The tips of the fingers were swollen and tender and the nails were surrounded by a dull red zone of inflammation in the soft tissues. Laboratory examinations at that time revealed a normal sedimentation rate. This test was repeated at regular intervals and was never elevated. The uric acid was 3.6 mg. per cent; roentgenographs of the teeth and chest were negative. The fingers showed only soft tissue swelling without any changes in the bones. A diagnosis was made of possible early rheumatoid arthritis with psoriasis and treatment was instituted. The tonsils were cleanly removed by dissection and snare in November, 1935, and soon after this a left antrotomy was done.

Thereafter, the patient was not seen again for a period of two years, whereupon he returned complaining of an increase in the pain in the fingers, associated with an exacerbation of the psoriatic lesions in his nails. The roentgen-ray examination of the fingers still showed no bony change. Six months later he stated he was much better; but, at his next semi-annual check-up he



Fig. 1.

reported that "the ends of his fingers were just as painful as ever." We decided at this time to try some general X-ray therapy. Accordingly, he received 28 treatments over a period of 14 months, but this was without apparent benefit. Since no treatment had proven effective in this case during a time interval of five years, and since benefit from chrysotherapy had been reported in a few cases showing both arthritis and psoriasis,^{8,11,16,20} we then began a course of gold salts. This consisted of 1025 mg. of myochrysin (gold thiomalate) administered over an interval of four months. However, at the end of this time the drug was discontinued in view of the fact that its only effect seemed to be to aggravate the pain. He was also placed on a low fat, high vitamin diet as suggested by Madden,¹⁵ but there was no change in his symptoms or in the character of the lesions.

SUMMARY

1. Certain patients with psoriasis have definite arthritis. Others have only joint pains without demonstrable changes in the underlying bone.

2. As a rule, appearance of the skin and nail lesions antedates the joint symptoms by a considerable period. Whether or not there is a causal relationship between the two diseases is still in question.

3. Psoriasis can, in some individuals, cause such marked changes in the nail bed and disturbances in circulation that the patient may complain of "arthritic pains" in the hands. It is important to differentiate these cases from true arthritis as the prognosis and treatment vary widely.

4. In general, local treatment of the psoriasis in the nails is of little avail. The therapy must be directed to the disease as a whole.

5. To date, this patient has not responded to any of the accepted methods of therapy.

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Relief of Colonic Obstruction

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Minneapolis, Minnesota

COLONIC obstruction frequently presents a perplexing problem because of the difficulty in determining the cause and location of the obstruction and of the knowledge that a quick decision must be made if one is to obtain either temporary or lasting benefit to the patient.

Usually the patient is seen for the first time with a greatly distended abdomen and it is vitally important that the nature and location of the obstruction be determined without delay so that the necessary treatment may be instituted. The obstruction may be caused by conditions in the upper intestinal tract, the lower intestinal tract, or by such extrinsic factors as tumors outside the intestinal tract, strangulated hernia, mesenteric thrombosis, as well as factors of neurogenic origin. To reach such a conclusion a careful evaluation of the history and symptoms is essential and this in correlation with the roentgenographic studies, proctoscopic examination, et cetera, should determine the location and nature of the obstruction.

If a patient gives a history of a sudden onset with severe pains and accompanying symptoms of intestinal obstruction, one should be suspicious of a strangulated internal hernia, mesenteric thrombosis, or volvulus. If, however, the history is one of increasing constipation or constipation alternating with diarrhea or bleeding with a bowel movement, a sigmoidoscopic examination should be made immediately, as in all probability, these symptoms are caused by a growth in the rectum or the distal portion of the sigmoid. Barium by mouth definitely is contraindicated in such cases because the administration of barium would tend to impede any method of relieving the obstruction by a simple treatment and might result in the death of the patient if an operation were undertaken.

The Wangensteen suction and the Miller-Abbott tube have given relief in many of these conditions. There is also a method, to be described later, which I have found successful in several cases which had not been relieved by either of these treatments.

If immediate relief is not obtained by the above methods, especially when the obstruction occurs in the large bowel, colostomy, cecostomy or appendectomy should be performed without delay. It is a well known fact that if an obstruction in the large bowel is not relieved it is apt to cause a perforation of the cecum, as anatomically the cecum is the weakest portion of the large bowel and is, therefore, the site of perforation due to

distention of that portion. Occasionally a colostomy fails to relieve the distention due to an obstructing growth located caudal to the colostomy and a perforation of the cecum results. For this reason it is well to remember that if the right side of the bowel is still distended after a colostomy has been performed and the non-operative methods have failed to give relief, cecostomy or appendectomy should be done immediately. The explanation of the distention of the right portion of the bowel following a colostomy is considered by many to be due to a kinking of the bowel resulting in retention of gas in the cecum.

Recently I have seen three cases of intestinal obstruction caused by a carcinoma of the rectosigmoid or the distal portion of the sigmoid. These cases were seen for the first time when the patients were in an almost moribund condition with large distended abdomens.

Sigmoidoscopic examination revealed growths in the rectosigmoid or distal sigmoid which completely obstructed the lumen. In each of these cases I was able to pass a catheter into the lumen of the bowel beyond the mass and in each case the obstruction was relieved by a violent expulsion of gas and feces through the tube. After the catheter was passed beyond the obstructed area it was fixed in place and frequent warm irrigations and suction were used to keep the tube open and the bowel irrigated.

On two of these cases the Wangensteen suction apparatus had been used without relief and the Miller-Abbott tube had been inserted in the other case but apparently it had not passed through the duodenal cap.

In one case the distention had completely disappeared by the following day and in a few more days we were able to restore the fluid and electrolyte balance making it comparatively safe for a colostomy. The other two patients refused operation but they have been free from obstruction for a period of several months.

It is my contention that many cases of intestinal obstruction due to carcinoma of the rectum, rectosigmoid or distal colon can be relieved quickly by this method. The obstruction in many cases is brought on by edema and infection of the growth which can be greatly diminished by warm irrigations through the catheter. This method is only applicable in cases where the growth is within reach of the sigmoidoscope and much care must be exercised in passing the catheter so that it will not penetrate the bowel wall as the carcinomatous tissue is very fragile.

The Medical Aspects of Dental Health in Childhood

E. S. Platou, M.D.
Minneapolis, Minnesota

MUCH has been written and said about the medical aspects of dental health in childhood, but such an important subject can hardly be over-emphasized. Maldevelopments and defects have their onset and perhaps their greatest effects on health in the formative years and the responsibility for proper prophylaxis and care should fall to the lot of physicians and dentists jointly.

It is beyond the scope of this discussion to more than mention such extremely formidable factors as healthy genetical anchorage and proper antepartum prophylaxis in dental health. The former is all too frequently deficient as is evidenced by common anomalies of development and dento-facial deformities. Since all the deciduous teeth are partially calcified at birth and even the first permanent molars calcify soon thereafter it is obvious that prenatal influences likewise have an important bearing on proper odontoblastic, ameloblastic and other functions that are vital to sound teeth.

From earliest infancy, defects which are manifest or those which progress insidiously deserve the most careful coöperation of dentist and physician. Deformities, developmental defects, congenital disease and deficiency states are no doubt our first consideration. It has been repeatedly demonstrated that dental hypoplasia and caries can be influenced by diet and that children with "optimum" nutrition have less of such defects than those with ordinary or poor nutrition. The so-called "coeliac" type of diet with extremely high protein, monosaccharide and vitamin values (meat, egg, dairy products, banana, simple fruits, vegetables and cod liver oil) has been shown to better effect "optimum" nutrition than one rich in starches, fats and complex carbohydrates. Balance studies have further demonstrated that such a diet is adequate in calcium, phosphorus and iron and that excessive ingestion of these elements in some forms at least may result in reciprocal losses in the body which may become detrimental.

In spite of our increased knowledge regarding nutrition, we find as in other applications of fact that practice is axiomatically slow. Adherence to a diet of essentials over the long period necessary for good results is difficult and the desires and whims of a child usually come to take precedence all too often. We must, therefore, remind our patients that calcification of the teeth is now regarded as a more or less continuous process. Biochemical changes from deficiency states, deformities and disease may not be evident in the tooth until very late.

The physician must be especially concerned with the known effects of inadequately treated prenatal disease,

with refractory anemia and rickets attendant to prematurity and even with rickets occurring in apparently healthy babies receiving cod liver oil. Other vitamin deficiencies though quite uncommon may have an indirect effect on dental health.

In the appraisal of a child's health, one familiar with normal attributes can and should recognize thyroid, pituitary and other hormonal deficiencies early enough to preclude by treatment such sequences as late dentition, poor calcification and early caries.

That these and especially the nutritional inadequacies mentioned have much to do with the etiology of dental caries can no longer be denied. A lack of proper balance of all these factors deprives the enamel of its ability to oppose the disintegrating effects of acids and bacteria in the mouth. The source of these harmful acids has been the subject of a great deal of speculation. If they result, as some contend, from the effect of bacteria on certain complex carbohydrates or on "fractions" of certain cereal grains fermenting in the oral cavity it would seem prudent to employ a dietary regimen in which these possible offending factors have been eliminated before consumption.

If caries has already begun in a child lacking in "optimum" nutrition complete coöperation on the part of dentist and physician is especially important.

Correction of nutritional and endocrine faults and of diseased states affecting the child's teeth may task the ingenuity of one well equipped to understand child health. Painstaking operative dentistry on deciduous teeth and careful orthodontia have become recognized as fundamentals in a sound foundation for general health.

The pathologic results of dental caries on the human organism are of course immediate and remote and the loss of effective masticating surfaces not only interferes with proper trituration of food but leads eventually to pulp decay and loss of the tooth.

Infected teeth and alveoli serve as potent sources of disease and may be the cause of profoundly debilitating states. Despite the fact that the permanent teeth depend on the deciduous teeth for jaw growth and prevention of caries, when one is confronted with the question of removal of deciduous teeth before their natural time for exfoliation, it must be remembered that early removal is much to be preferred over possible disability from systemic invasion of bacteria.

If we will regard sound teeth as but one index of well ordered skeletal growth and treat them with the same care as we would any other skeletal part we will have done much to advance child health in general.



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LOOKING AHEAD

The Year 1943 finds many JOURNAL-LANCET readers in military service. They are making personal sacrifices in having temporarily given up their chosen work and locations. At the same time, they are contributing enormously to the war effort. Many of them will have opportunities to gain experience which could be afforded in no other way and, thus, their communities will be greatly benefited on their return.

In the absence of these physicians, those who remain at home because of age, physical disabilities, etc., must do much more work in order to provide adequate care for the sick and to keep communicable diseases under control. Even they will learn through the large volume of medical work being conducted in various branches of the military service, at home, and in defense plants. Physicians, whether in the military service or not, will be made better because of sacrifice, hard work, and

opportunities to learn. Thus, we look forward to the time when members of the medical profession are re-assembled, each in the place of his choosing throughout the nation, relieving suffering and increasing the length of human life.

In extending its best wishes for 1943, the JOURNAL-LANCET promises to put forth every effort to present to its readers authoritative and timely articles.

J. A. M.

MORALE IN 1943

This thing we call morale, what is it? A state of mind which may be good or bad, according to circumstances. It may be called normal when an individual, through self-control, can maintain a healthy mental attitude toward his surroundings, in any circumstances. We shall need a lot of it this year in this country, when stresses and strains will predominate. Our armed forces,

in constantly increasing numbers, are all over the world and everything points to the fact that it will be a year of maximum effort on their part to wage offensive and effective combat against heavy resistance by relentless and fanatically driven foes who until very recently have been stimulated by almost unbroken successes. Inevitably there must be heavy losses in our forces, keenly felt by every family in the land, since each one, even now, has a relative or a friend directly involved in the conflict. Of the ultimate outcome there can be no doubt; anyone with pencil and paper can figure it out, as the *New York Times* did long before the end of the last war. What we are concerned with is what will happen in the meantime, and afterwards, especially if, as seems most likely, it is a long drawn out affair.

History affords an extreme example in the case of the Black Death, which, in the Middle Ages, wiped out one-fourth of the population of England and Central Europe. The people, stunned and staggering, were an easy prey to mass hysteria which manifested itself as a curious religious frenzy known as dancing mania. A wave of spiritualism swept over England after the last war. Many people believed that the sudden snuffing out of young lives must thin the veil between this life and the next and eagerly grasped the chance to try to communicate with their loved ones. It is nothing new for those who have been through prolonged harrowing experiences to turn to bizarre religious practices for mental relief.

The medical profession can render definite service in the present situation. Every physician who is worthy of the title is a potential psychologist. Without the ability to inspire confidence he is helpless to accomplish anything, no matter how competent he may be otherwise. That is why people often go to him with their personal problems instead of to a lawyer or a clergyman and since they know him and trust him he can often do them more good. He will have plenty of opportunity to use this faculty during the emergency which now confronts us and it will be appreciated by those who need it. It also constitutes a strong argument against socialized medicine, for the impersonal service of that type of practice has certainly nothing to offer in this connection. But that is another story.

G. C.

LATRINOGRAMS IN MEDICINE

The Army has a nomenclature all its own, very telling at times, very appropriate. While visiting an airfield somewhere in our fair land last year, we learned that rumors in that unique language were known as latrinograms.

It strikes you at once as an improvement on the common term. It is more descriptive, more signifying, a trifle longer but somehow more pat, and above all, it definitely suggests a malodorous source.

To a man of science, nothing is nauseating. It may be stinky, but not nauseating, and in like manner this holds true of a soldier. A rumor isn't sickening to him. He has been warned against propaganda and hears idle gossip with a becoming attitude of contempt. That is why he has coined the word latrinogram. It is a splendid accompaniment to his shrug of the shoulder which denotes doubt even as he stands alert.

We also have medical latrinograms. There is a rather benign, because well intentioned but nevertheless misleading, type based on unconfirmed reports about diseases and remedies. You may hear it in any drawing room. It is not slyly spoken. It does not have a mischievous purpose and while sometimes disgusting to the well informed, it is more amusing than harmful.

On the other hand, there is a form of malicious gossip that Osler described in a paper on "Charity and Fraternity in Medicine." He referred to "the wagging tongues of others who are too often ready to tell tales and make trouble between doctors," and concluded with the admonition, "never believe what a patient tells you to the detriment of a brother, *even though you may think it to be true.*"

There has been some talk of establishing a rumor clinic in the psychology department at the University of Minnesota to study the origin and method of propagation of this vile disorder and although prompted no doubt by the present war interest, it is to be hoped that much lasting good may come from this effort.

A. E. H.

Book Reviews

The Making of a Surgeon: A Midwestern Chronicle, by ERNEST V. SMITH, M.D., D.Sc., F.A.C.S.; first edition, blue fabricoid, gold-stamped, 344 pages, 45 illustrations, no index. Fond du Lac, Wis., Berndt Printing Co., 1942. Price, \$3.00.

Dr. Smith, for some years the chief surgical assistant to Dr. William J. Mayo at Rochester, is a graduate of the University of Minnesota College of Medicine and Surgery, Class of 1907, and has contributed to *THE JOURNAL-LANCET* (Smith, E. V.: Tetanus and its Treatment, *Journal-Lancet* 42:141-146 [Mar. 15] 1922). Left to his own resources at an early age, he

worked his way through the University of Minnesota to become a physician, a feat which would be virtually impossible today. He then became one of the first fellows of what is now the Mayo Foundation for Medical Education and Research at Rochester. His training there, as he freely says, provided him with new insight as to how a surgeon should be trained and how he should conduct himself in the performance of his services. When he founded a clinic at Fond du Lac, Wisconsin, with an internist as partner, he put his principles into active practice, and they have guided his actions to this day.

Although he does not pretend to be a Savonarola, Dr. Smith does not believe surgery in the United States is as good as it is possible to make it. His reasons for such a view are set forth convincingly, and few could find fault with his suggestions aimed at correction of the defects he perceives. He spares no one, not even himself, in his arguments for better surgical practice, and in doing so produces an interesting and certainly unusual autobiography.

SOUTH DAKOTA STATE MEDICAL ASSOCIATION

The Council of the South Dakota State Medical Association convened in the private dining room of the Marvin Hewitt Hotel in Huron on Wednesday, November 25, at noon. Following the luncheon the meeting was called to order by the chairman, Dr. D. S. Baughman. Roll call followed. Members present were Drs. N. J. Nessa, D. S. Baughman, J. L. Calene, G. E. Whitson, C. E. Robbins, W. H. Saxton, W. E. Donahoe, R. E. Jernstrom and C. E. Sherwood. Dr. J. F. D. Cook, superintendent of the State Board of Health, and Karl Goldsmith, Association attorney, were also present.

There being a quorum present, the meeting was duly opened. The chairman called for the reading of the minutes of the previous meeting. The secretary called attention to the fact that the minutes had been printed in the August, 1942, issue of the JOURNAL-LANCET on page 284. It was moved by Dr. Calene and seconded by Dr. Whitson that the minutes be approved as printed without the formality of re-reading. The motion carried and was so ordered.

Discussion was held relative to the advisability of postponing the annual session scheduled for spring in Rapid City. After considerable discussion it was moved by Dr. Donahoe that the meeting for next year be postponed and that the incumbent officers should remain in office until their successors be elected and qualified, and that meetings of the Council (and/or) the House of Delegates be at the call of the executive officers as conditions should seem to indicate. Motion was seconded by Dr. Saxton and carried with one opposing vote.

Communication from Mrs. Tollevs, state commander of the Women's Field Army of the Society for the Prevention of Cancer was read, asking the South Dakota State Medical Association to endorse membership campaign and a mail campaign for funds. It was brought out that the purpose of the Women's Field Army is to educate the laity on the necessity of early recognition, diagnosis and treatment of cancer. It was moved by Dr. Jernstrom and seconded by Dr. Saxton that the Council of the State Association endorse the program of the Women's Field Army. Motion was carried. It was moved by Dr. Nessa and seconded by Dr. Whitson that Mrs. Tollevs be informed that the State Association approved her plans of raising funds to carry on the work and recommend that the funds received this year shall be ear-marked for work organization in the state.

Dr. Robbins, speaking for the Pierre district, asked the Council for an expression relative to a continuance of their contract for the Pierre District Medical Aid Association. Dr. Saxton, also, speaking for the Huron district, discussed the possibility of entering into some such arrangement. After the discussion it was moved by Dr. Whitson that the Council does not object to the Pierre and Huron district societies continuing with local medical aid projects that permit of free choice of physicians. This motion was seconded by Dr. Jernstrom and carried. Discussion brought out the fact that the unit in the state association was the district society and that it was perfectly within the function of the district to formulate and operate pre-payment plans of medical care insurance, provided they were carried on in an ethical manner.

Dr. Cook discussed venereal clinics and also the new program carried out through the State Board of Health of medical aid to needy wives of soldiers in service.

The possibility of increasing the top limit for medical care in compensation cases was also discussed, no specific action being taken.

Karl Goldsmith called attention to the recent action of the Supreme Court in establishing a new ruling relative to Expert Witnesses. The court appoints witnesses either on its own motion or on request of either side in the litigation. The Rule reads by title: *A Rule of Court to appoint Expert Witnesses in Civil and Criminal proceedings, providing for conferences and joint reports of Expert Witnesses and the compensation of Expert Witnesses.*

There being no further business, the meeting was adjourned.

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FROM THE WAR MANPOWER COMMISSION

"It is of the utmost importance that the Procurement and Assignment Service for Physicians, Dentists, and Veterinarians, immediately has the name of any doctor who really is willing to be dislocated for service, either in industry or in over-populated areas, and who has not been declared essential to his present locality. This is necessary if the medical profession is to be able to meet these needs adequately and promptly. We urgently request that any physician over the age of 45 who wishes to participate in the war effort send in his name to the State Chairman for the Procurement and Assignment Service in his State."

News Items

Dr. R. F. Peterson, Butte, Montana, was elected president of the Silver Bow County Medical society at a meeting of the group December 22. Dr. J. E. Garvey was named vice president, Dr. C. R. Canty, treasurer, and Dr. S. V. Wilking, secretary.

Dr. Edward Parnall, formerly on the staff of the Northwest clinic, Minot, North Dakota, now in the Army Medical Corps with the rank of major, has been transferred for duty outside the United States. He had been stationed at Camp White, Oregon.

Dr. O. Charles Erickson, Sioux Falls, South Dakota, was elected president of the Seventh District Medical society at the annual meeting held December 15. He succeeds Dr. Edwin S. Stenberg. Dr. George A. Stevens was elected vice president and Dr. C. J. McDonald, secretary-treasurer. Dr. Stenberg, Dr. McDonald, both of Sioux Falls, and Dr. Otto Hanson, Valley Springs, were elected delegates to the board of directors of the South Dakota State Medical association.

Dr. Leo D. Crowley, a member of the Montana mental hospital staff at Warm Springs for the past 14 years, has resigned to accept a west coast post with the U. S. public health service.

Dr. Arthur A. Nichols, Fargo, North Dakota, has been appointed Cass county physician to complete the unexpired term of Dr. Arthur C. Burt. Dr. Burt now is a lieutenant, senior grade, in the U. S. navy.

Dr. A. P. Scheib, formerly of Brookings, South Dakota, is now practicing in Watertown.

Dr. Howard Claydon of Red Wing has been elected president of the Goodhue County Medical society. Dr. M. Flom of Zumbrota, is vice president; Dr. J. F. Brusegard, secretary-treasurer; Dr. R. F. Hedin, delegate, and Dr. H. T. McGuigan, alternate delegate.

Dr. J. M. Spatz, formerly of Cut Bank, Montana, is now in the Army Medical Corps.

Dr. O. K. Behr, Crookston, Minnesota, has been awarded a fellowship by the College of Surgeons. The award was made by the national organization on December 13, on the recommendation of the credentials committee.

Dr. H. A. Burns, superintendent of the state sanitarium at Walker, Minnesota, has been appointed head of the tuberculosis control unit in state mental hospitals. Dr. Burns, who has been at Walker for 13 year, will be succeeded by Dr. F. F. Callahan, superintendent of the Pokegama sanitarium.

Dr. W. O. B. Nelson, Fergus Falls, Minnesota, has been appointed city health officer to fill the vacancy caused by the death of Dr. W. A. Lee.

Dr. J. D. J. Pemberton was reelected president of the Mayo Clinic staff recently.

Lieutenant Harold C. Freedman, formerly a resident physician at Minneapolis General hospital, now at Gardner Field, California, has been promoted to captain.

Dr. Paul B. Monroe, formerly of Two Harbors, Minnesota, has joined the staff of the Raiter hospital, Cloquet, Minnesota.

Dr. S. A. Cooney, Helena, Montana, has been reappointed county physician for the coming year.

Dr. Herbert A. Carlson, formerly of Minot, North Dakota, is now making his home in Los Angeles.

Dr. A. Veitch, Cavalier, North Dakota, has been commissioned Captain in the medical corps reserve.

Dr. W. C. Hills, Bonesteel, South Dakota, has accepted a position in the state hospital at Yankton.

Dr. C. T. Helme, Menno, South Dakota, has been appointed vice president of the County Board of Health.

Dr. R. H. Waldschmidt, Bismarck, North Dakota, is the new president of the Sixth district medical society. He succeeds Dr. George Monteith of Hazelton. Dr. M. S. Jacobson, Elgin, is vice president; Dr. W. B. Pierce, Bismarck, secretary-treasurer; Dr. F. B. Strauss, Bismarck, censor; and Dr. C. C. Smith, Mandan, delegate to the state association.

Dr. Frank O. Robertson, East Grand Forks, North Dakota, has been promoted to the rank of Major in the Army medical corps. He is stationed at the Fitzsimmons General hospital, Denver, Colorado.

Dr. Harry J. McGregor, Great Falls, Montana, has been named county physician. He succeeds Dr. L. R. McBurney.

Dr. Charles A. Aling, Minneapolis, Minnesota, has been commissioned a Captain in the Army medical corps.

Dr. J. F. Schmid, Worthington, Minnesota, has been commissioned a First Lieutenant in the Army medical corps.

Dr. Walter E. Hatch, Duluth, Minnesota, is the new president-elect of the St. Louis county medical society.

Dr. Michele Gerundo was recently named assistant professor of pathology on the medical school faculty at the University of South Dakota, Vermillion. He succeeds Dr. Fred Dick who is now doing war research. Dr. Gerundo formerly served on the faculty of medicine, University of Paris, France, and attended the University of Guatemala City Medical school and the Institute of Medical Sciences in Mexico.

Dr. F. O. Hanson, superintendent of Swedish hospital, Minneapolis, for nearly ten years, has resigned his position to become director of appeal at Gustavus Adolphus college, St. Peter, where he will conduct a campaign for funds for a new college library.

Dr. Philip Rains Beckjord, Willmar, Minnesota, has been promoted to the rank of Major in the Army medical corps. At present he is Executive Officer in a medical battalion at Camp Van Dorn, Mississippi.

Dr. G. B. Wright, Kalispell, Montana, is the new county health officer and county physician. He succeeds Dr. A. A. Dodge who held the position for 21 years.

Dr. W. V. Accola, formerly of Bowbells, North Dakota, is now practicing in West Virginia.

Dr. M. R. Snodgrass, Anaconda, Montana, was elected president of the Mount Powell Medical society at the regular meeting of the group, December 14. Other officers are: Dr. J. L. O'Rourke, vice president; Dr. L. G. Dunlap, secretary; Dr. W. E. Long, censor; Dr. Gladys Holmes, treasurer.

Lt. John H. Peterson, Duluth, a medical officer on the destroyer Hammann, has been awarded a Silver Star medal, the Navy announced December 10. After the Hammann was sunk, Lt. Peterson struggled to a lifeboat and picked up wounded seamen. He also was cited for his work "for three days after the action when he exerted himself to the point of exhaustion in providing medical attention to the 100 wounded men" in addition to steering the lifeboat.

Dr. G. T. Notson has resigned as administrator of the Chamberlain Hospital and Sanitarium, Chamberlain, South Dakota.

Dr. Jean J. Darius, formerly of Lame Deer, Montana, is now senior physician at the Indian hospital, Bemidji, Minnesota.

Dr. C. G. Johnson, Rugby, North Dakota, has been promoted to the rank of Major in the Army medical corps.

Dr. R. P. Frink, formerly of Wessington Springs, South Dakota, is now in Redfield where he is assistant doctor at the State School for Feeble Minded.

Dr. Emory J. Bourdeau, Missoula, Montana, has reported for duty as a lieutenant, senior grade, in the Navy.

Dr. Stuart Grove is now practicing in Sioux Falls, South Dakota. A graduate of the University of Minnesota medical school, Dr. Grove took his internship at Ancker hospital, St. Paul, and spent the past eight years there specializing in surgery.

Dr. J. E. Curtis, Lemmon, South Dakota, is the new president of the Sixth District medical society.

Dr. Charles B. Darner, Fargo, North Dakota, has been commissioned a lieutenant, senior grade, in the U. S. Navy.

Dr. Hugh J. Brown, Butte, Montana, is now a Lieutenant at the Naval hospital, Bremerton, Washington. For the past ten years, he was engaged in private practice at Tillamook, Oregon.

University of Minnesota has been chosen as one of the institutions to provide a special series of intensive courses to qualify additional medical and dental officers to overcome an "acute shortage" in several groups of medical and surgical specialists. Officers selected for training will be under 50 and only those with a minimum of 12 months' full time training of practical experience in general surgery will be chosen.

Necrology

Dr. Edward Lieurance, 63, Warm Springs, Montana, assistant superintendent of the Montana State hospital for 13 years, died January 2, 1943. A veteran of the Spanish-American War and the World War, Dr. Lieurance was resident physician in Indian Agencies in Oregon and Montana before coming to Warm Springs.

Dr. C. A. Kelly, 33, Taylors Falls, Minnesota, was killed in a hunting accident recently.

Dr. A. O. Arneson, 63, McVille, North Dakota, died at his home December 11, 1942. Coming to North Dakota in 1904, he had practiced in McVille in 1906. He was state representative from the 17th district (Nelson county) at the time of his death.

Dr. A. L. Garner, 57, former resident of Dickinson, North Dakota, died December 28 in Devils Lake after a month's illness. He practiced at Dickinson for 20 years before going to Texas to operate a ranch about ten years ago.

Dr. Arthur J. Kolling, 42, Minneapolis, died December 13.

Dr. Ralph E. Weible, 64, one of the founders of and president of the Dakota Clinic, Fargo, North Dakota, died November 8, 1942, in Minneapolis. An outstanding surgeon, Dr. Weible studied in Europe and in the British Isles. He was a charter member of the list of accredited surgeons of the American College of Surgeons and served the American Board of Surgeons as its North Dakota examiner.

Dr. T. H. Hanbidge, 85, Darby, Montana, who practiced medicine in Missoula, Victor and Darby for more than 45 years, died at his home December 1, 1942.

Dr. K. Olafson, Cando, North Dakota, died December 2, 1942. He formerly lived at Gardner, North Dakota and was a graduate of the University of Manitoba medical school.

Dr. Harlan Nelson, 35, of Brooten, Minnesota, a former surgeon in Minneapolis where he spent five years on the staff of General hospital, was killed December 6. His car hit a stretch of loose gravel near Braham, Minnesota. He had returned to Minneapolis recently from Los Angeles to join the Navy as surgeon.

Dr. W. A. Lee, Fergus Falls, Minnesota, died November 22.

Dr. Hiram J. Lloyd, 65, of Mankato, Minnesota, died December 14.

CONTINUATION STUDY COURSES

Medicine, Hospital Service, Public Health

Winter 1943

CENTER FOR CONTINUATION STUDY

University of Minnesota

Minneapolis

Hospital Administration	January 11-16
General Practice	January 18-23
Hospital Nursing	January 18-20
Blood and Blood Substitutes	January 21-22
Internal Medicine	January 25-30
Anesthesiology	February 8-10
Dietetics	February 18-20
Medical Social Service	February 18-20
Rheumatic Fever	February 22-24
General Surgery	March 8-13

Hospital Administration—January 11-16

Lectures, discussions, panels, movies, and demonstrations. Program will provide answers to wartime problems of hospitals. Nursing service, personnel, food restrictions, purchasing supplies and equipment, civilian defense, and post-war planning. Distinguished hospital leaders will serve on faculty. Tuition \$10.

General Practice—January 18-23

Society must rely on general practitioners in middle and late life to care for most civilian medical needs. This course has been arranged for physicians who have been relatively inactive or have limited the scope of their services. Will review recent developments in medicine, surgery, obstetrics, pediatrics, and various specialties. Lectures, clinics, and round table question and answer periods. Practitioners who must resume active service or those who must broaden scope of service will find this course of great assistance. Tuition \$25.

Hospital Nursing—January 18-20

Many nurses have become inactive through marriage or other reasons. There is great need for nurses to teach classes in home nursing and to assist in hospital service. Many changes have occurred in last few years in nursing. This course will show most major changes. A repeat course—the first one having been given last fall with great success. Tuition \$5.

Blood and Blood Substitutes—January 21-22

Special course for physicians, technologists, and nurses in use of blood and blood substitutes. Intravenous use of blood and blood substitutes, no longer limited to teaching hospitals, is now being used in all institutions. Voluntary hospital problems are many. The course will give detailed instruction in collection, preservation, and use with special reference to avoiding reactions. Repeat course as one given last fall had excellent results. Tuition \$4.

Internal Medicine—January 25-30

Course in internal medicine arranged for members of American College of Physicians and others with similar training and interest. Enrolment limited to college members, diplomates of American Board of Internal Medicine, physicians studying for special examinations in internal medicine, and others whose practice is mainly internal medicine. Specialists in internal medicine now on active military duty will be admitted without payment of tuition for \$20 (room and board). Others will pay \$45 for tuition, room and board. Registration limited.

Anesthesiology—February 8-10

Course for nurse anesthetists. Because of large numbers of physicians in military service more anesthetics are being given by nurses. Course will review recent developments with especial emphasis on safety factors. Enrolment limited to members of American Association of Nurse Anesthetists and others with equal training and experience. Program last year was of great value to nurse anesthetists at that time. Study is being made of special needs at present time. Please send for special information card. Tuition \$5.

Dietetics—February 18-20

Course for dietitians and nutritionists. Dietitians employed in hospitals, community agencies and institutions as well as home economists in teaching or administrative positions will find this course of value. Program will deal exclusively with nutritional problems growing out of wartime difficulties. Tuition \$5.

Medical Social Service—February 18-20

Course for medical social workers on special wartime problems in their field. Medical social service has also been affected by new developments in medical practice. Program will consist of lectures, discussions, and demonstrations. Tuition \$5.

Rheumatic Fever—February 22-24

One of the most important diseases of children with potentially serious effects in childhood and later life. Course for public health nurses to help them understand the disease. Program will cover practical aspects of rheumatic fever problem as it affects children and adults. Inclusion of heart disease in crippled children's program is reason for offering course at present time. Tuition \$5.

General Surgery—March 8-13

Course will consist of lectures, clinics, demonstrations, and round table question and answer periods. Subject matter will deal largely with surgical problems of emergency nature. Recommended for all who must give surgical service in these times. Outstanding leaders in surgical thought and practice will take part. There will be no opportunity to acquire operative skills, but demonstrations and discussions will bring out modern surgical teaching. Tuition \$25.

Other Courses

Arrangement will be made to offer other special courses. Please send your suggestions.

LIST OF PHYSICIANS LICENSED BY THE MINNESOTA STATE BOARD OF MEDICAL EXAMINERS
ON NOVEMBER 13, 1942

OCTOBER EXAMINATION

Name	School	Address
Armstrong, Wallace David	U. of Minn., M.B. 1937, M.D. 1937	310 Cecil St., S.E., Minneapolis, Minn.
Arzt, Philip Klaus	Creighton U., M.D. 1937	2057 Portland Ave., St. Paul, Minn.
Babb, John William	U. of Western Ont., M.D. 1941	Mayo Clinic, Rochester, Minn.
Baker, Jeannette L.	Indiana U., M.D. 1929	Fergus Falls, Minn.
Banner, Edward Arthur	Loyola U., M.D. 1940	Mayo Clinic, Rochester, Minn.
Bechtel, Martin John	U. of Minn., M.B. 1942	Mpls. General Hospital, Minneapolis, Minn.
Bernstein, Irving C.	U. of Minn., M.B. 1942	Ancker Hospital, St. Paul, Minn.
Black, Albert Seward, Jr.	Rush Med. Col., M.D. 1940	Mayo Clinic, Rochester, Minn.
Blackmore, Sidney Charles	U. of Minn., M.B. 1941, M.D. 1942	Mpls. General Hospital, Minneapolis, Minn.
Carmona, Manuel Gumersindo	Jefferson Med. Col., M.D. 1941	Mayo Clinic, Rochester, Minn.
Connolly, Coleman Joseph	U. of Minn., M.B. 1942	Ancker Hospital, St. Paul, Minn.
Copsey, Harvey Gayle	U. of Neb., M.D. 1941	Mayo Clinic, Rochester, Minn.
Dahleen, Henry Cross	Stanford U., M.D. 1940	Mayo Clinic, Rochester, Minn.
DeVall, Lois Valborg	Rush Med. Col., M.D. 1941	St. Mary's Hospital, Minneapolis, Minn.
Dougherty, Charles Joseph	Jefferson Med. Col., M.D. 1938	Mayo Clinic, Rochester, Minn.
Faber, William Max	U. of Wis., M.D. 1938	Mayo Clinic, Rochester, Minn.
Frear, Rosemary R.	U. of Minn., M.B. 1934, M.D. 1942	St. Mary's Hospital, Minneapolis, Minn.
Golden, Peter Bernard	U. of Wis., M.D. 1940	Mayo Clinic, Rochester, Minn.
Grant, John Carton	U. of Minn., M.B. 1942	Ancker Hospital, St. Paul, Minn.
Hawkins, William John	Rush Med. Col., M.D. 1939	Mayo Clinic, Rochester, Minn.
Heinrich, Weston Ackland	Northwestern, M.B. 1941, M.D. 1942	Mayo Clinic, Rochester, Minn.
Heise, Paul von Rohr	Marquette U., M.D. 1941	Mpls. General Hospital, Minneapolis, Minn.
Heller, Ben Irwin	U. of Minn., M.B. 1941, M.D. 1942	745 Belgrade Ave. N., Mankato, Minn.
Humphrey, Irving Leslie	Harvard U., M.D. 1940	Mayo Clinic, Rochester, Minn.
Janecky, Allen Gustav	U. of Minn., M.B. 1942	Asbury Hospital, Minneapolis, Minn.
Kirkwood, Roger Tom	Northwestern, M.B. 1942	Mpls. General Hospital, Minneapolis, Minn.
Kratzer, Guy Livingston	Temple U., M.D. 1935	Mayo Clinic, Rochester, Minn.
Kuhlmann, Lawrence Bernard	U. of Neb., M.D. 1942	St. Joseph's Hospital, St. Paul, Minn.
Leemhuis, Andrew Joseph	U. of Minn., M.B. 1942	Mpls. General Hospital, Minneapolis, Minn.
Lemon, Willis Edward	U. of Minn., M.B. 1942	Mercy Hospital, Pittsburgh, Pa.
Long, Gabe Celsor	U. of Ill., M.D. 1938	Mayo Clinic, Rochester, Minn.
Lucking, Bernard Anthony	U. of Minn., M.B. 1941	Mpls. General Hospital, Minneapolis, Minn.
Metcalfe, Robert Matthew	U. of Colo., M.D., 1940	Mayo Clinic, Rochester, Minn.
Miller, Richard Cramer	Harvard U., M.D. 1941	Mayo Clinic, Rochester, Minn.
Murphy, Michael E.	U. of Minn., M.B. 1941, M.D. 1941	Mayo Clinic, Rochester, Minn.
Mussey, Mary Elizabeth	U. of Minn., M.B. 1940, M.D. 1941	Mayo Clinic, Rochester, Minn.
Payne, John Hilliard	U. of Cincinnati, M.B. 1940, M.D. 1941	Mayo Clinic, Rochester, Minn.
Reid, Lewis Miller	U. of Minn., M.B. 1941	Mpls. General Hospital, Minneapolis, Minn.
Reinecke, Roger M.	U. of Minn., M.B. 1940, M.D. 1941	Mayo Clinic, Rochester, Minn.
Ritt, Arnold Elmer Frederick	U. of Ill., M.D. 1932	Mpls. General Hospital, Minneapolis, Minn.
Roach, Francis Xavier, Jr.	U. of Minn., M.B. 1942	Ancker Hospital, St. Paul, Minn.
Rowe, Clarence John, Jr.	U. of Minn., M.B. 1942	St. Joseph's Hospital, St. Paul, Minn.
Sauer, William George	U. of Cincinnati, M.B. 1939, M.D. 1940	Mayo Clinic, Rochester, Minn.
Scholten, Roger Adrian	Jefferson Med. Col., M.D. 1937	Mayo Clinic, Rochester, Minn.
Sidell, Richard Huntington	Rush Med. Col., M.D. 1940	Mayo Clinic, Rochester, Minn.
Simmonds, Frank Lawrence	U. of Minn., M.B. 1941	Mpls. General Hospital, Minneapolis, Minn.
Spencer, George Norton	Marquette U., M.D. 1942	St. Barnabas Hospital, Minneapolis, Minn.
Stahr, Aubrey Cecil	U. of Minn., M.B. 1938, M.D. 1939	4528 Fremont Ave. S., Minneapolis, Minn.
Stotler, John Francis	Rush Med. Col., M.D. 1940	Mayo Clinic, Rochester, Minn.
Turner, Thomas Richard	Baylor U., M.D. 1941	Mayo Clinic, Rochester, Minn.

BY RECIPROCITY

Anderson, Leo Eugene	U. of Neb., M.D. 1941	Mayo Clinic, Rochester, Minn.
Blumgren, John Edgar	U. of Iowa, M.D. 1941	St. Mary's Hospital, Duluth, Minn.
Davis, Edward Valentine	U. of Neb., M.D. 1933	Kirksville, Mo.
Swickard, George Yeagley	Ohio State U., M.D. 1931	Gopher Ordnance Works, Rosemount, Minn.
Watson, Thomas Leonard, Jr.	U. of Virginia, M.D. 1930	Gopher Ordnance Works, Rosemount, Minn.

NATIONAL BOARD CREDENTIALS

Alway, Sophia Chamberlin	Yale U., M.D. 1941	803 University Ave., S.E., Minneapolis, Minn.
Balfour, William Mayo	U. of Minn., M.B. 1939, M.D. 1940	Mayo Clinic, Rochester, Minn.
Blumenthal, Lester Sylvan	Geo. Wash. U., M.D. 1941	Mayo Clinic, Rochester, Minn.
Manning, John Joseph	U. of Pa., M.D. 1941	Mayo Clinic, Rochester, Minn.
Meyers, Ward Carl	Northwestern, M.B. 1940, M.D. 1941	Mayo Clinic, Rochester, Minn.
Sweeney, Alvin Randolph, Jr.	Harvard U., M.D. 1939	Mayo Clinic, Rochester, Minn.
White, John Donald	U. of Buffalo, M.D. 1940	Mayo Clinic, Rochester, Minn.

Classified Advertisements

FOR SALE

Office equipment consisting of instruments, electrical appliances, hospital equipment for three beds, treatment lamps; together with the location and good will of the late Dr. George B. Ribble. Terms can be made attractive and convenient. It is very much the desire of Mrs. George B. Ribble to dispose of this practice. Address her at La Moure, North Dakota.

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 714, care this office.

PHYSICIAN WANTED

To join staff of mental institution. Must be United States citizen, qualified to take North Dakota state board. Substantial salary and full maintenance in comfortable quarters for party who is unencumbered, fitted by experience and inclined to make the post his permanent work. Address Box 738, care of this office.

Advertiser's Announcements

A DOCTOR'S PLEA IN WARTIME

The doctor's life, in times like these,
Is not exactly one of ease.

For, on the home front, each M.D.
Is busier than any bee!

He's shouldering the burden for
The other docs, who've gone to war.

This leaves your doctor precious little
Time to sit around and whittle.

And indicates the reason why
You ought to help the poor old guy.

HOW?

1. By keeping yourselves in the best of condition,
Thus avoiding the ills that demand a physician.
2. By phoning him promptly when illness gives warning,
But—unless very serious—waiting till morning.
3. By cheerfully taking whatever appointment
He makes for prescribing his pills or his ointment.
4. By calling on him where he works or resides
Instead of insisting he rush to your sides.
(Of course, he'll come 'round when there's need for
his service—
But spare him the trip when you're nothing but
nervous.)
5. And, last but not least, you can help in this crisis
By carefully following Doctor's advices.

If these commandments you'll adhere to
A doctor's heart you will be dear to!

—Copyright 1942, by The Borden Company

UPJOHN'S "SCOPE" HONORED IN ANNUAL OF ART

Included in the 21st *Art Directors' Annual of Advertising Art* is a cover design from the first issue of *Scope*, seasonal magazine of The Upjohn Company, which is mailed to active physicians and ethical pharmacies. Working closely with Dr. A. G. Macleod, editor, and G. I. Zupanic, technical advisor to the promotion department of The Upjohn Company is Will Burtin of New York, designer whose honored composition is reproduced here. Burtin is original and inventive; and, while most artists would be baffled by having to work with such themes as bacteriology, this subject only stimulated Burtin to the point of triumph.




The composition and design of this cover has broad significance. The baby, taken from Leonardo Da Vinci's *Madonna of the Rocks*, portrays through its health and vigor the hope man has for the fulfillment of his aspirations. Health is being obtained through scientific research, symbolized by the test tube. Background for the test tube is an herb, indicating that empirical knowledge of the curative properties of certain plants is medicine's heritage from ages past, behind which is Nature, of which science is but the unravelling.

Burtin's dogma is that clarity and brevity are the essence of good portrayal and his philosophy of art and expression is in perfect harmony with the tone The Upjohn Company aims to achieve in all of its advertising and sales promotion work.

THANKS TO THE YANKS

Actual records of cigarette sales in service Post Exchanges and Canteens show that Camel is the favorite smoke with men in the Army, Navy, Marines, and Coast Guard.

For the convenience of those who wish to send Camel cigarettes to relatives and friends in the armed services, cartons of Camels are available in a special wrapper all ready for mailing. Dealers have complete forwarding instructions.



Minneapolis, Minnesota
February, 1943

Vol. LXIII, No. 2
New Series

Coronary Insufficiency Precipitated by Hemorrhage from Duodenal Ulcer*

C. A. McKinlay, M.D.

Minneapolis, Minnesota

THE effect of one disease upon another, particularly if the cardiovascular system is involved, may not only present interesting problems in diagnosis and treatment, but may also permit analysis of pathophysiologic factors somewhat comparable to methods of the experimental laboratory. This paper reports a case of hemorrhage from asymptomatic duodenal ulcer which first manifested itself as coronary insufficiency, with angina pectoris as the presenting symptom.

Katz¹ states that anemia may make an asymptomatic coronary sclerosis manifest itself as coronary insufficiency. Bean's² analysis of over 200 cases of myocardial infarction discloses three in which collapse with attendant fall in blood pressure seemed to precipitate fresh infarcts. One was in a patient with severe hemorrhage from peptic ulcer and in another with severe epistaxis. McLaughlin³ reports a fatal case of hemorrhage from peptic ulcer in which the clinical severity of the course of disease ending in death could not be accounted for on the basis of hemorrhage alone. Absence of coronary thrombosis was noted at necropsy although acute upon chronic myocardial infarction was considered to be present. Master and Jaffee⁴ report a case of a young woman who died of massive hemorrhage from ulcerative colitis. The electrocardiograph showed RS-T depression in standard leads and low T wave in all leads. Necropsy revealed in addition to ulcerative colitis, necrosis of the papillary

muscles without coronary thrombosis. Master, Dack, and Jaffee⁵ differentiate acute coronary insufficiency, resultant from prolonged ischemia of the heart muscle, with focal and disseminated myomyolacia, localized in the subendocardium and in the papillary muscles of the left ventricle, from coronary thrombosis which is a complete occlusion of a coronary artery with massive infarction as a rule. Priest⁶ states that other factors in collapse, shock or severe hemorrhage, such as changes in the physical and chemical properties of the blood, diminished oxygen carrying power (reduced hemoglobin and erythrocyte count) increased oxygen need and tachycardia may play a part in precipitating thrombosis or infarction, that however, a common factor in a large percent is a sharp fall in blood pressure; that it seems that if the low blood pressure persists the chances of thrombosis and infarction are increased. Blumgart, Schlessinger and Zoll⁷ note in a series of 11 cases out of 350 reported in elderly patients particularly those with coronary sclerosis that shock in one instance due to severe gastrointestinal hemorrhage led to the development of frank coronary occlusion. Blumgart, Schlessinger and Davis⁸ in their study of the relation of the clinical manifestations of angina pectoris to the pathologic findings note that in the hearts of several patients in which the coronary blood flow was already reduced and presumably slowed because of occlusions and narrowing, the sudden fall in blood pressure which accompanied postoperative shock evidently led to further stagnation, anoxemia and deposi-

*Presented before the Minneapolis Academy of Medicine, October 8, 1942.

tion of multiple coronary thrombi. These authors emphasize the importance of avoiding a fall in blood pressure, whatever the cause, in cases of coronary arteriosclerosis. Anoxia, infarction and fibrosis of the myocardium and their accompanying clinical manifestations arise whenever there is a discrepancy between the nutritional requirements of the heart muscle on one hand and factors governing nutritional supply on the other.

CASE REPORT

The patient, a male, age 58, married and an office manager, was first examined six years previously during an attack of biliary colic, episodes of which had been noted for eight years. The patient stated that about six years previously he had been treated for peptic ulcer with relief of symptoms after a period of several weeks. The examination when first observed revealed X-ray findings of nonfunctioning gall-bladder with multiple calcified stones. After recurrent attacks of abdominal pain the patient consulted the staff of the Mayo Clinic where cholecystectomy was performed, five years prior to the present illness. Scar of the duodenal bulb from previous ulcer was noted at the operation. In the interval before the present illness there were no outstanding complaints; fatigue tendency was occasionally noted. Hypertension had not been present. One year previously the patient appeared with the complaint of epigastric distress noted before meals, but did not consent to further study; the episode was of brief duration. Under all occasions the patient's response to usually painful stimuli appeared to be minimal.

THE PRESENT ILLNESS

Episode 1. The patient, examined at his home, complained of aggravation of chest pain of two days duration. The pain was described as pressure sensation localized in the substernal region. The patient appeared to be gray and in pain. The pulse rate was 108, regular, the blood pressure 136/80. The heart tones showed some loss of timber. There was no pericardial friction rub. The impression gained was angina without shock symptoms of myocardial infarction. The patient was admitted immediately to the hospital. On entrance the blood pressure was 128/70. Electrocardiogram (fig. 1) showed low amplitude of T waves in all leads and otherwise was not remarkable. The leucocyte count was 8,000 cells per cmm. and the sedimentation rate was 4 in one hour. The pain tended to subside. Two days after admission weakness was the outstanding symptom without pain or marked dyspnea. The erythrocyte cell count of 2,070,000 per cmm. and hemoglobin of 38 per cent, suggested hemorrhage and directed attention to the gastrointestinal source. The occurrence of dark tarry stools of four days duration was then established. There had been nausea but no pain at onset. Tarry stools disappeared after a few days; occult blood was demonstrated for several days. The hemoglobin reached a low of 37 per cent on the fourth day after admission; under supportive treatment and dietary management by the sixth day the hemoglobin had increased to 49 per cent, and five days later reached 55 per cent and one day later there were 2,720,000 erythrocytes per cmm., and 24 days later the hemoglobin was 84 per cent and the erythrocytes 4,360,000 per cmm. X-ray findings 17 days after admission showed deformity of the duodenal cap which was believed to be secondary to duodenal ulcer. The six foot heart film showed slight accentuation of the left ventricular border. The measurements were within normal limits. The interpretation of events of this episode was (1) hemorrhage from symptomatically silent duodenal ulcer (2) angina due to anoxemia of myocardium precipitated by acute hemorrhage and anemia.

Episode 2. About five months after onset of present illness the patient was seen at 3 A. M. in his home complaining of substernal pain with radiation into both arms, and weakness. The blood pressure was 146/98. The patient was removed to the hospital, pain continued, pallor was ashen, and about six hours later, there was some degree of shock and the blood pressure was 84/66. The heart tones showed loss of timber, there was no pericardial friction rub. The sedimentation rate

was increased, the hemoglobin was 67 per cent and the erythrocytes 4,975,000 per cmm. The nature of the pain, prostration, fall of blood pressure and increased sedimentation rate (70 mms. in one hour) indicated myocardial infarction; the electrocardiogram showed alterations of Q: T_a type consistent with posterior infarction (fig. 1). Within two days marked pallor was noted, and the hemoglobin dropped to 49 per cent and hemorrhage from duodenal ulcer was suggested. Later tarry stools were noted. The blood pressure continued to be low and periods of increased weakness and shortness of breath occurred. The therapy consisted of blood transfusions and dietary and alkali management for duodenal ulcer in addition to the use of xanthine derivatives, and iron and vitamin supplementation. The temperature record while in the hospital showed a maximum elevation of 101.2 degrees on the second hospital day with only minor recrudescence. The pulse rate varied from 78 to 120, usually below 100. When discharged on the forty-third hospital day the blood pressure was 142/100. The last recorded hemoglobin was 63 per cent. The patient became ambulatory and resumed business activity and within three months the hemoglobin reached 100 per cent. Later the patient was examined on account of abdominal distress not characteristic of ulcer; this disappeared within a few days. The patient had not stayed under close supervision except in the emergencies.

Episode 3. The patient was reexamined in his home four months later because of weakness that had developed during the day. The pulse rate was 120, blood pressure 135/88, and on admission to the hospital within about eight hours of onset on complaint, the hemoglobin was 75 per cent, and the erythrocyte count 3,800,000 per cmm. Recurrent gastrointestinal hemorrhage was suggested. The electrocardiogram showed T wave inversion in lead I (fig. 1). The hemoglobin dropped to 64, 45, and 42 per cent on succeeding days and the stools contained gross blood. Under therapy as outlined previously, the hemoglobin increased to 59 per cent within 11 days and the stools became negative to occult blood. Since discharge from the hospital the hemoglobin became normal and the patient has carried on his occupation under restricted hours. X-ray study showed duodenal deformity without evidence of crater.

DISCUSSION

In an individual with low threshold of pain response, hemorrhage occurred from asymptomatic duodenal ulcer and precipitated angina pectoris. It is postulated that in this individual, coronary arteriosclerosis may be presumed to have been present prior to the present illness, but that the provocation of coronary insufficiency depended upon the ischemia and impaired myocardial respiration secondary to hemorrhage and rapidly developing anemia. The nutritional demands of the myocardium had been satisfied at all times at the patient's level of physical activity except after hemorrhage with its reduction in hemoglobin and erythrocytes and with resultant reduced oxygen carrying power of the blood. It is considered that this pathophysiologic experiment is the counterpart of the anoxemia test for diminished coronary reserve proposed by Levy and coworkers.⁹ In this test individuals showing any one of certain electrocardiographic changes and sometimes angina alone during a period of anoxemia of the myocardium induced by breathing oxygen poor (10 per cent) atmosphere are considered to have diminished reserve of the coronary circulation. The electrocardiographic criteria suggested¹⁰ are (1) the arithmetic sum of RS-T deviation in all four leads totals 3 mms. or more; (2) there is a partial or complete reversal of the direction of the T wave in lead I, accompanied by an RS-T deviation of 1 mm. or more in this lead; (3) there is a complete reversal of the direction of

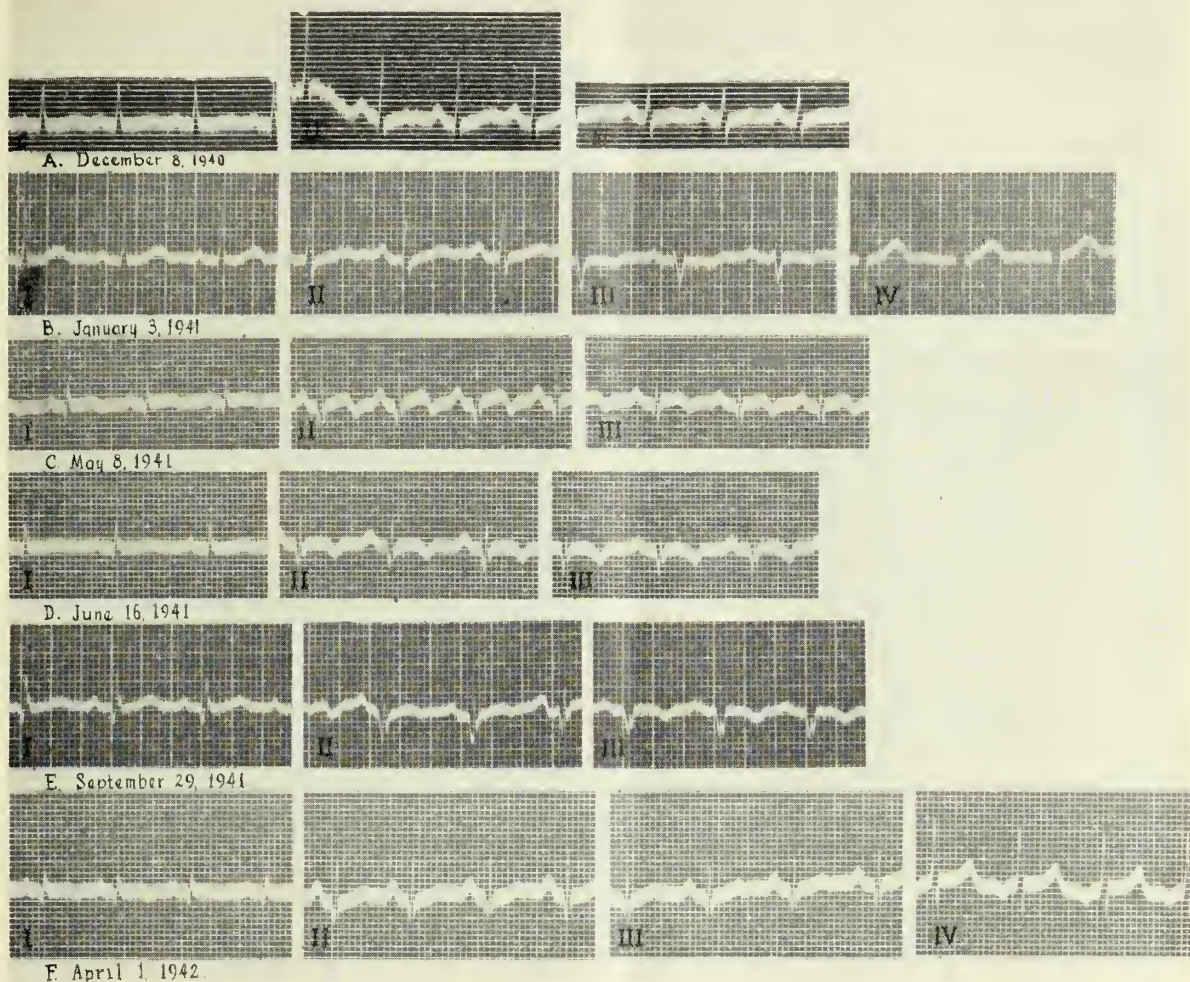


Fig. 1. Serial electrocardiograms: A. At first episode of hemorrhage with angina pectoris, low amplitude T waves all leads. B. Interval tracing, left axis deviation. C. At second episode of hemorrhage, posterior myocardial infarction $Q_3 T_3$ type. D. Later stage (38 days). E. Interval tracing. F. At third episode of hemorrhage, inversion T wave lead I.

the T wave in lead IV F regardless of any associated RS-T deviation in this lead.

The second episode differed in that the patient was seen with severe substernal pain, within six hours showed shock, prostration and marked reduction of blood pressure to 84/66. This lowering of blood pressure was more than would have been anticipated from the degree of hemorrhage alone as the hemoglobin was only moderately reduced to 67 per cent and the erythrocytes were reported to be normal. The electrocardiographic changes were consistent with posterior myocardial infarction. The abruptly developing anemia with hemoglobin of 49 per cent, which was demonstrated within two days of the attack of pain, would not seem to be fortuitous but would appear to be related to development of myocardial infarction. It is considered reasonable to assume that in the presence of coronary sclerosis, myocardial infarction was hastened or precipitated early in this episode of gastrointestinal hemorrhage. The events suggested would be beginning hemorrhage, reduced hemoglobin and ery-

throcyte count and diminished oxygen carrying power, diminished coronary flow and reduced blood pressure, and precipitation of myocardial ischemia and infarction without the necessity of assuming that coronary occlusion had occurred. However, the delayed (48 hours) evidence of marked hemorrhage does not allow dogmatic conjecture. In the third episode of acute gastrointestinal hemorrhage without angina the electrocardiogram showed T wave negativity in lead I not present in the last preceding tracing. It might be assumed that myocardial respiration was adequately maintained due to the development of anastomotic arterial channels. The work of Blumgart and coworkers⁸ has emphasized the extraordinary significance of the collateral circulation in bridging the discrepancy between nutritional supply and demand. They conclude from the study of the coronary arteries of diseased human hearts injected postmortem that gradual coronary occlusion, if accompanied by the development of anastomotic circulation does not necessarily produce clinical manifestations.

CONCLUSIONS

A case is reported in which episodes of hemorrhage from duodenal ulcer had at onset predominately cardiac manifestation. In the first episode coronary insufficiency, not noted previously, was suggested with angina pectoris first appearing at this time. Within five months (probably early in a recurrent episode of hemorrhage) the features of acute myocardial infarction of the posterior wall type with Q_3 T_3 electrocardiographic pattern appeared. After recovery there were persistent electrocardiographic changes of myocardial damage. In a third period of hemorrhage nine months later angina pectoris did not supervene although T wave negativity in lead I occurred. The pathophysiologic relationships in the case reported are considered to represent a clinical disease experiment similar in principles involved to those of the induced anoxemia test, and a possible explanation of the sequence of events is proposed. This and other reports referred to emphasize that hemorrhage, shock, and causes of fall in blood pressure occasionally appear to precipitate coronary insufficiency and myocardial infarction, and necessitate especial effort for their control in patients with coronary arteriosclerosis.

Discussion

Dr. KARL ANDERSON: A private patient of mine entered University Hospital in November 1933 with a bleeding duodenal ulcer. He was ready to be discharged the first of the year, because he had improved so markedly, and I happened to go over there on New Year's Eve about nine o'clock to see him, purely as a friendly gesture. To my surprise I found him in a semi-unconscious state apparently having a very severe coronary attack. I instituted emergency therapy immediately and put him under oxygen, and he gradually made an improvement. He was discharged from University Hospital in April. His electrocardiogram showed a coronary occlusion associated with his duodenal ulcer. During the period of his hospitalization his electrocardiograms showed flutter at times, fibrillation, and then went back to regular rhythm. He had negative T's, and before he was discharged from the hospital his electrocardiograms became normal. I have had the opportunity of watching this man continuously since. He has had numerous attacks of duodenal ulcer, but he has had no recurrence of his coronary affair.

Because of the recurrence of his ulcer syndrome and the fact

that he has persistently had very high total acids, we have been insistent that he have a gastric resection done, but not too insistent in the light of his previous coronary affair. He remembers it almost too vividly and will not subject himself to such an operation in the light of his past history.

This case appears to be very similar to Dr. McKinlay's, except that this man seems to have enjoyed fairly good health in between his episodes of ulcer syndromes.

Dr. JAY DAVIS: I have seen several patients who have gone through this same course of events. All of them were patients with coronary sclerosis and duodenal ulcer who hemorrhaged. They all recovered with transfusions, and as soon as the hemoglobin came up the anginal pain ceased.

The electrocardiogram changes were similar to the tracings shown by Dr. McKinlay. Some had negative T_1 and T_2 's which returned to normal with the rise in hemoglobin.

Dr. C. A. MCKINLAY: Such cases as the one here reported and those mentioned by Doctors Karl Anderson and Jay Davis emphasize the hazard of acute hemorrhage and fall of blood pressure in persons with coronary arteriosclerosis, and suggest particular care in such emergencies. Differing from cases mentioned by Dr. Davis, the one reported had the criteria of myocardial infarction with evidence of myocardial change thereafter.

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Glaucoma and the General Practitioner*

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IT may seem odd to bring to the attention of physicians at a general meeting such a distinct eye subject as glaucoma. It is in fact a disease primarily confined to and concerned with the eye. It is also an established fact that glaucoma left alone will result in blindness and when this has occurred or nearly occurred, there is no cure for the disease and the restoration of vision is impossible.

Glaucoma is not uncommon in our state. According to the statistics from the Aid to the Blind Program in North Dakota we have 10.3 per cent of the blind cases receiving care under that program listed as glaucoma.

Chandler, in the *New England Journal of Medicine*,¹ states that glaucoma is the cause of one-third of all blindness in patients past middle life. Gradle² estimates that glaucoma probably constitutes about 15 to 20 per cent of the eye diseases in the United States, although the usual figures given are lower, being about 6 per cent, so you may see that it is not a rare condition.

As before stated, glaucoma left alone results in blindness. Vision is prolonged and maintained when glaucoma is recognized early and properly treated. Hence, this appeal to you as physicians for the early recognition and care of this disease.

It is unfortunate that the term glaucoma sounds so much like trachoma to the laity, for they confuse the terms, the diseases, and their outcomes.

As you know, glaucoma is due to an increase in intraocular pressure too high for the eye to withstand safely, varying with the individual and resulting in damage to the fibers of the optic nerve. When such damage does occur, it is irreparable even though the tension is reduced and the progress of the disease stopped. Thus, if we can recognize and treat glaucoma in its incipient or early stages, very little loss will occur. The problem is to recognize these early cases and this is the reason for my bringing this subject to your attention.

Who may have glaucoma? Generally speaking, except for a few forms mentioned later, it is a disease occurring in persons over 35 years of age. It is intimately connected with worry, nervousness, and physical ill-health, though not directly attributable to the same. It may be present in conjunction with other acute or chronic disease, or with cataract. Truly, it is often hard to diagnose the early case and often doubly hard to make patients realize the seriousness of their condition and to keep them under observation and treatment. Frequently, they see no improvement and get discouraged and neglect their care. When they finally note the loss of vision, so much is gone that a favorable prognosis is nearly hopeless.

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I hope that all of you will become glaucoma conscious. It is often a sad story, so let me illustrate a typical case.

First, the patient notes dimming of vision or poor night vision, and in some types dull eye pain. He consults his doctor, optometrist, or oculist and too often is given a sedative, vitamin A, a pair of glasses, or he is told that he has cataracts and is sent home to wait until they are "ripe". Later, when he has tried all the glasses he can pay for, or has waited until he has to be led about, he seeks help and finds that it is not a refractive error, presbyopia, or cataract, but glaucoma with or without these other conditions. Now, it is too late to save his vision and he is doomed to blindness for his remaining years. Not a pleasant picture! But it happens!

When a patient consults you with a handful of glasses, when he has had attacks of pain or redness of the eyes and blurred vision and the pressure feels hard to the finger touch, or he has no light projection, beware! Look for something besides a cataract.

There are different types of glaucoma and different terminologies. I will give you some of the simple and familiar ones, so we may have a common understanding. They are juvenile, absolute, secondary, and primary glaucoma.

Juvenile or congenital glaucoma is present from or shortly after birth. It is noted by loss of vision and an enlarged pupil. Examination of the optic discs shows pallor and cupping. No treatment helps and preparation for blind training is to be recommended. Congenital anomalies, such as buphthalmos or large eye, are usually in this group. A case illustrating this condition is as follows:

Case 1. C. M., infant aged 1, was seen on May 28, 1930. The parents stated that the child apparently did not see; otherwise he was well. The family history was irrelevant. Examination revealed no vision. There were aimless and nystagmoid movements of the eyes. The pupils were large and dilated and did not react. Ophthalmoscopic examination showed marked pallor of the discs with cupping. No treatment was given. Blind school education later was advised.

Absolute glaucoma is a term describing the result of glaucoma, either primary or secondary, untreated or treated unsuccessfully so that all vision is lost. These cases are terminal ones insofar as vision goes, that is, it is nil and because of the pain, enucleation is performed.

The history these patients give is of preceding attacks of glaucoma or of gradual loss of vision. These cases have often been mistakenly diagnosed as cataracts and told to wait for ripening before operation. Sometimes cataracts are present, but they are not the primary cause of visual loss and operation does not restore vision.

Among the symptoms of absolute glaucoma, pain is usual and may be severe, often accompanied by headache. There is a total loss of vision. There is usually

a cloudy cornea and media and a dilated and fixed pupil. The sclera has a peculiar whitish appearance; the anterior ciliary vein is dilated and there is atrophy of the iris. A cataractous lens is frequently present, but if the fundus can be seen, it shows atrophy and deep excavation of the optic disc. The tension is very high and occasionally may result in rupture of the globe.

These unfortunate people are often melancholic because of the loss of vision and seek relief because of the intolerable pain. As heretofore stated, removal of the eye is the treatment. Let me cite one case as illustrative of this condition and of the course of uncontrolled glaucoma which we will discuss more in detail later.

Case 2. Mrs. A. S., age 64, was seen on October 13, 1936. This patient came in because of blindness, having noted poor vision at night two and one-half months previously. She found that the left eye was blind and the right practically so, but stated that she could read and sew prior to this time. Subsequently, the eyes became painful and sore. She used medicine in them which was prescribed by her local physician, but with no improvement.

Upon further inquiry she stated that she had noted a gradual diminution of vision in the left eye for a long time. One year previously she had consulted an ophthalmologist who told her that she had lens opacities in this eye and a mild type of cataract was developing. He refracted her, gave her glasses, and told her there was nothing more to do at that time.

Upon examination vision in the right eye was light perception; left eye nil. Externally, there was a conjunctival injection; the pupils were widely dilated and did not react to light, accommodation, or in convergence. Perimetric fields could not be obtained. The cornea and media were hazy and there were lens opacities in both eyes. The fundi were seen indistinctly but definite cupping and marked pallor were made out. The tension with the Schiotz tonometer was 75 in the right and 92 in the left eye. Her general physical examination was negative except for hypertension, with a blood pressure of 170/110.

Her family insisted that something be done because of the pain in the right eye. It was explained that the case was hopeless from a visual standpoint and enucleation was advised, but was not consented to. Upon insistence by the family a trephining was performed on the right eye and massage of the eyes ordered.

One month later the tension in the right eye was 32 and in the left 60. There was a good filtering bleb in the right eye with light perception. Vision in the left eye was nil. She still had pain in the left eye. The lens opacities were present and the fundi were as heretofore noted. Later the left eye was enucleated.

One year later she had a mature cataract of the right eye and wished extraction, but this was refused as there was no chance to improve the vision. She was now consulting a minister who claimed he could "cure" eye diseases. The family was advised that it was reprehensible to give her false hopes as to restoration of vision.

Secondary glaucoma, as its name implies, is secondary to some other disease. It is usually acute in form, though it may become chronic and most often follows iritis or trauma, or may occur postoperatively following cataract extraction. Here, the recognition and treatment often depend upon the underlying causes, and a definite pathological factor is present.

In the acute types such as iritis, iridocyclitis and keratitis, atropine is indicated. Chronic inflammation of the uveal tract may also occur and cause adhesions of the pupil and closure of the angle of the anterior chamber.

Secondary glaucoma may be due to changes from trauma with a swelling or dislocation of the lens.

Lastly, there are types due to anomalies of the retinae, such as from hemorrhage, detachments, thrombosis, and tumors.

An illustration of this type is demonstrated briefly as follows:

Case 3. L. C. G., age 51, was seen on October 13, 1934. This patient came in complaining of pain in the left eye with redness and diminution of vision. His trouble had started eight years previously. Vision in the right eye was 6/6-3 with correction; in the left eye 6/20 with correction. The right eye was clear and showed pallor of the disc. The left eye had a marked injection, the cornea was hazy, and the pupils contracted. The tension was 23 in the right eye and 30 in the left eye. A diagnosis of acute iritis with secondary glaucoma was made. The patient was hospitalized and treated with salicylates, hot compresses, instillations of atropine and adrenalin, intravenous typhoid vaccine, etc. He made a good recovery.

The treatment is, of course, directed, if possible, at the underlying cause and, as heretofore noted, the diagnosis is paramount.

When secondary to uveal disease, then mydriatics, such as atropine together with heat and other supportive treatment, are used. Iridectomy may be necessary. If due to lens swelling or dislocation, extraction of the same may be indicated. In cases which are postoperative, say to cataract extraction, the treatment is difficult although miotics often serve the best.

Primary glaucoma may be divided into the acute or chronic, or in newer terms, it is classified as non-compensated and compensated. The acute primary glaucoma is the most dramatic, and also frequently the easiest to diagnose. Its exciting causes are often emotional, or may follow acute physical crises due to the instability of the vasomotor system. It rarely occurs below 35 years of age. Often there are intermittent prodromal attacks. These frequently come after vasomotor upsets, worry, fatigue, etc. They are characterized by temporary misty vision and localized frontal headaches; often by light flashes and halos about lights. Sometimes there is a slight pericorneal flush or even a steamy cornea. These may lead later into the acute phase with the following symptoms.

These start with the usual acute onset in the early morning involving one eye with marked pain and tender globe. There is accompanying edema of the lids and lacrimation and a marked reduction of vision. A circumcorneal and later a diffuse injection of the eye is present, the iris blurred, the anterior chamber shallow and the cornea steamy, like frosted glass. The pupil is dilated and does not react to light and if the fundus can be seen, papilledema and engorged retinal vessels are present. There is marked increase in intraocular tension and all this is accompanied by nausea and vomiting and marked prostration (the patient is very ill).

Acute Primary Glaucoma:

1. Usual acute onset in the early morning.
2. Marked pain.
3. Tender globe to touch.
4. Edema of the lids and lacrimation.
5. Circumcorneal and later diffuse injection of the eye.

6. A steamy cornea (like frosted glass).
7. Iris blurred and a shallow anterior chamber.
8. Dilatation of the pupil and no reaction to light.
9. Fundus seen poorly. If it can be seen, papilledema and engorged retinal vessels are present.
10. Marked reduction of vision.
11. Marked increase in intraocular tension.
12. Usually unilateral.
13. Nausea and vomiting and marked prostration.

The two cases cited are illustrative of this disease.

Case 4. Mrs. F. T., age 57, was seen on January 8, 1932. This patient gave a history of slight pain and redness of the eyes for three years. She had noted halos about lights and blurred vision on close work. She had been refracted here by an associate four years previously; vision was 6/6 with correction. The tactile tension was normal and the fundi were negative at that time. When seen she was ill in bed, and was worried, fatigued, and depressed from a recent death in the family. Her doctor had been giving her sedatives and miotics, but with little effect.

The patient was apprehensive and had her eyes covered. Externally, they were negative and the vision was poor with only light perception. The tension was 47 in the right eye and 32 in the left (Schiotz). The fields could not be obtained. The conjunctivae were injected, the right more than the left. Corneae were cloudy and the pupils irregular, dilated, and fixed. The fundi were not seen. There were scattered lens opacities in both eyes. The blood pressure was 165/100. A diagnosis of acute glaucoma was made.

She improved slightly under treatment but the right eye went on to absolute glaucoma and was enucleated, while an iridectomy was performed in the left eye. When she was last seen, the right socket was normal, the vision in the left eye was 3/60 and the tension was 14 with a Schiotz tonometer.

Case 5. Mrs. J. K., age 70, was seen on November 6, 1929. She complained of poor vision in the right eye. This had failed suddenly and progressively five weeks previously. Five days before she had had pain in the right eye with lachrimation and redness. She was seen by her local doctor who used atropine and heat, and she became worse.

When examined she was able to count fingers at a distance of one foot with the right eye and at three feet with the left eye. There was redness and edema of the lids with photophobia and lachrimation. Corneae were insensitive and clear and a greenish reflex was present in the pupillary area. The media was cloudy and there was no cupping of the disc. The tension in the right eye was 31 and in the left 14 (Schiotz). Miotics helped.

An iridectomy was performed on the right eye and because of marked contraction of the perimetric fields, trephining was advised on the left eye, but refused. When she was last seen five years later, the vision was light perception in the right eye and 6/6-3 in the left. The tension was 12 in the right eye and 52 in the left (Schiotz). There was still marked contraction for form and colors in the left eye. She was advised to have an operation. Her diagnosis was acute glaucoma of the right eye and chronic simple glaucoma of the left eye.

These are only a few illustrations of the acute cases which are seen from time to time.

Now, let us consider the differential diagnosis in acute glaucoma from the two most confusing diseases, acute conjunctivitis and acute iritis. Such an error in diagnosis was present in the above case. The importance of a correct diagnosis is self-evident, especially when treatment is to be undertaken. Consider a case of a few hours or days standing with the patient acutely ill and the diagnosis and treatment resting between acute glaucoma and acute iritis, possibly complicated by secondary glaucoma. The treatment in the first, among other things, is mi-

otics and in the other the exact opposite, mydriatics. To help determine the diagnosis, let me recount the points of differential diagnosis.

I doubt if any of you will confuse acute conjunctivitis with acute iritis or acute glaucoma. In acute conjunctivitis there is no pain or tenderness, but only discomfort. The vision is good and the pupil and tension are normal. The media is clear. A mucopurulent secretion is present. The onset is gradual and the superficial injection starts in the fornix and is not circumciliary.

However, this is not true in acute iritis and acute glaucoma, as will be noted in Table I:

TABLE I.
Differential Symptoms Between Acute Iritis and Acute Glaucoma

Symptoms	Acute Iritis	Acute Glaucoma
Pain	Moderate. In eye and first branch of 5th nerve	Very severe. In eye and neuralgia 5th nerve to jaw and beyond
Tenderness	Marked	Marked
Injection	Deep ciliary	Deep ciliary
Pupil	Small and irregular	Large and oval
Tension	Usually normal or low	High
Media	Opacities in pupil	Cornea steamy
Secretion	Watery	Watery
Vision	Fair	Poor
Onset	Usually gradual	Sudden
Systemic complications	Few	Prostration and vomiting

It chiefly is a question between acute iritis and acute glaucoma. As noted in Table I, they both have pain which is more marked in glaucoma. Both have tenderness and deep ciliary injection and lachrimation. In iritis there may be pupillary opacities and in glaucoma a steamy cornea. The onset of acute glaucoma is sudden, the vision is poor. High tension is present, with a large, oval pupil in contradistinction to a small, irregular one in iritis. The vision is poor and the prostration and malaise profound in acute glaucoma.

The treatment of all types of glaucoma can be divided into general and special. The general treatment is to correct the fundamental causes. Attention should be paid to the patient's hygiene and habits and the counteracting of constitutional diatherms. Thus, treatment generally is directed toward the control of the elements of emotion, anxiety, fatigue, sudden temperature changes, excesses in food and drink and head congestion. The avoidance of dark glasses and dark places is recommended. Specifically, try to maintain the intraocular tension within normal limits by medicinal or surgical means.

Acute glaucoma is an emergency and immediate treatment is necessary to control the attack and enable operative procedure to be undertaken. Bed rest and the relief of pain by morphine sulphate should be started at once together with general elimination by sweats, purges, etc. Heat or long or short wave diathermy is used. Retrobulbar injections may help. Miotics, such as

eserine, pilocarpine, mecholyl, etc., in large and frequent doses should be used. Retrobulbar adrenalin and novocain can be injected sometimes followed with one cubic centimeter of 50 per cent alcohol. Try to get the eye quiescent within twenty-four to forty-eight hours; then operate with a broad base iridectomy. The eye always suffers permanent damage.

The second type of primary glaucoma is the so-called chronic simple or compensated glaucoma. It has the same predisposing factors as acute glaucoma. However, it seems as if the anatomic causes are more important than the instability of the vasomotor system. A slow rise in tension, even if not high, will cause damage to the nerve fibers. Its occurrence is five times more frequent than acute glaucoma. This type is the insidious thief in the night that destroys vision before the patient is aware of the disease. It is remarkable how many people do not know the vision has failed in one eye. The following is a report of a recent case seen at the Clinic.

Case 6. A. A., age 73, male, retired, was seen on March 22, 1942, when he came in for operation to restore his sight. He stated that he had been blind in the right eye for twenty years. He was able to see a light flash in the left eye. The first part of the year he had noted slight cloudiness of the left eye. Two days later he had no vision. He was told by a doctor that he had a cataract and to wait. His general health was good. Tension was 31 in the right eye and 19 in the left (Schiotz). The pupils were widely dilated, the reflexes poor, and the anterior chambers shallow. There was a central cataract in the right eye, the disc was cupped and pale and arteriolar sclerosis was present. The left eye showed a few lens opacities, optic atrophy, and cupping with a hazy retina and marked arteriolar sclerosis.

The causes of chronic simple glaucoma are unknown, but it occurs in persons over middle age who have some vascular disability, either of sclerosis or dysfunction. Some predisposing factors are seasonable cold, hypermetropia, systemic diseases, focal sepsis, vascular and metabolic disturbances, and an unstable neuro-vegetative system or an endocrine imbalance. Often it is preceded by intermittent prodromal attacks with vasomotor upsets, fatigue, localized headache and halos, light flashes, and misty vision.

Provocative tests may make an otherwise obscure diagnosis possible.

Pain is rare though there is sometimes a dull aching and congestion is usually absent. There is a gradual loss of vision of which the patient is often unaware until late in the progress of the disease. The pupils are sometimes moderately dilated and sluggish with a shallow anterior chamber. After tension has existed sometime, cupping of the optic disc is visible; this is often the earliest sign seen by the ophthalmologist during a routine eye examination.

Although a cataract may complicate the picture, the media is usually clear, though at times a slight corneal edema is noted by slit lamp examination.

A lowering of the light sense is present and the tension elevated but not often as high as in acute glaucoma. The condition is bilateral, but one eye may be affected earlier than the other and lastly the visual fields show typical changes in every case.

Classified, these symptoms of chronic simple (non-congestive or compensated glaucoma) are:

1. Pain rare; sometimes a dull aching.
2. Gradual loss of vision. Patient often unaware of it until late in the disease.
3. Congestion usually absent.
4. Sometimes anterior chamber shallow.
5. The pupil is sometimes moderately dilated and sluggish.
6. Cupping of the optic disc not visible until tension has existed sometime. Often it is the earliest sign seen routinely by the ophthalmologist.
7. Media usually clear, unless a cataract complicates the picture. Sometimes slight corneal edema is seen with the slit lamp.
8. A lowering of light sense.
9. Tension is up but not as in acute glaucoma.
10. Usually bilateral, though one eye may be affected earlier than the other.
11. Visual fields show typical changes in every case. These are often the so-called gun barrel type.
 - a. Enlarged blind spot, sickle-shaped scotoma (Bjerrum's sign).
 - b. Peripheral field contraction in one or more quadrants. Ronne's step.
 - c. A paracentral scotoma which may break through to join the peripheral field defect forming a large quadrant defect.
 - d. Later large portion of field may disappear leaving central vision. Sometimes the quadrants are normal and central fields are affected.

Here are typical cases illustrative of this condition:

Case 7. Mrs. G. J., age 63, was seen on June 9, 1930. She came in because she was bothered for near work. She had had some dizziness but no headaches. She had noted colors about lights, and had worn her present bifocals for two years.

When examined, externally the eyes were negative. The vision was 6/60 without correction, both eyes; with correction the right was 6/7+4 and the left 6/7+2. She was able to read A.M.A. 14/24.5 at 34. She was myopic and presbyopic. Her tension was 30 in both eyes (Schiotz). The fundi showed a deep cupping of the discs with the lamina cribrosa visible. The perimetric fields showed central vision only. Miotics were used. The tension came down but was variable and operation was advised.

The right eye was trephined on September 16, 1933, and the left eye about 2½ months later. She was under observation with frequent and systematic check-ups. When last seen, the fields were contracted, but holding steadily. The tension was 14 in the right eye and 6 in the left (Schiotz). Vision was 6/6 - 1 right eye and 6/7 - 2 left eye with correction, and for reading as heretofore. There were good filtering blebs. The fundi showed pallor of the discs with deep cupping.

Case 8. Mrs. G. K., age 50, was seen on March 13, 1935. This patient came in for refraction. She had noted the summer previously that at times she had poor vision. Her present glasses had been changed a number of times; the last time by an optometrist who saw a spot in her eyes, but couldn't help her. Her vision was worse at night. She had been very nervous since an only child died four years previously, and she had also had financial worries.

Her vision was 6/6 - 1 both eyes with correction and normal for close work. The glasses needed no change. The fundi showed pallor of the discs and cupping. Tension was 38 in the right eye and 44 in the left with Schiotz tonometer. Perimetric

fields showed marked contraction of form fields and enlargement of the blind spot. Blue was contracted and she had central vision only for red and green. Her tension was lowered with miotics, but operation was advised.

A trephining was performed on both eyes and she was kept under supervision and observation. She was last seen on February 6, 1942. Her vision was 6/6 - 3 in the right eye and 6/60 in the left with correction. The tension in the right eye was 15 and in the left 16 (Schiotz). The perimetric fields were the same as heretofore and good filtering blebs were present.

The general treatment in this type of glaucoma is the same as heretofore outlined under acute glaucoma, that is, good hygiene, physical fitness, and absence of worry. If medical treatment is undertaken, the patient must lead the so-called "miotic life," that is, under the constant use of miotics and general care as noted above.

This treatment is aimed at keeping the pupil small and thus lowering the tension. Some miotic drugs, such as pilocarpine and histamine, act directly upon the musculature. Others such as doryl act on the parasympathetics as supplements, and eserine and prostigmine inhibit the acetyl-choline esterase.

Physical measures used are to promote osmosis as with sorbital, intravenous glucose, sodium chloride, and also by local massage and diathermy to the eye.

Surgical treatment, the most frequent procedure, should be done early even though the vision is good. The fields fail later and cannot be restored. It is not the purpose here to discuss the different operative techniques. These are determined by the case and the preference of the ophthalmic surgeon.

That glaucoma is a serious and timely problem is evidenced by the attention that has been paid to it in ophthalmological circles. The Section in Ophthalmology of the American Medical Association and the Ophthalmological Societies have made it a major project.³ It is being brought before general societies, groups and Federal and state agencies, such as the "Aid to the Blind" program of the Public Welfare Boards. The work of the National Society for the Prevention of Blindness is especially notable. It is important to keep adequate case records, to instruct and properly train social workers and nurses in follow-up work, and to make yearly surveys and reports of cases. The two most important suggestions, I think, are: (1) the education of the patient as to complete coöperation; (2) an educational campaign to inform the public about the results of inadequate treatment of glaucoma.

Today earlier diagnosis and control of glaucoma is made possible by such aids as perimetry, tonometric graphs, provocative tests, slit lamp microscopy, gionoscopy and other aids which all ophthalmologists should have available. We must utilize these tests together with the

recognition of cases and follow-up by social workers, nurses, etc.

Remember, do not send away the patient who complains of visual disturbances unless you can definitely tell what is wrong and why. Listen to the complaint of poor vision at night or in the movie. Be suspicious of many pairs of glasses in a short time. Look for a dilated pupil. Check the patient who has cataracts to be sure something else is not present. Take the tension by having the patient look down and use the tips of your forefingers on the globe. Look at the fundus.

Every glaucomatous patient is a potential victim of partial or total loss of vision and this loss is preventable in many cases. Such prevention depends on, first, early diagnosis and early persistent treatment, and second, upon the patient's coöperation, understanding and ability to carry out his instructions. To get such results, that is, the prevention of visual loss, I am sure each patient needs to have individual care and a thorough study made of his medical and social environment in order to properly advise and outline his treatment.

Dr. Harry Gradle of Chicago, in a discussion of this problem and in a personal communication,² states that he thinks "the chief problem is to contact the patient who might have glaucoma and thus get him under treatment." The optometrist doesn't know glaucoma and if he does, he does not refer the patient to an ophthalmologist. By and large, the general practitioner sees the case first and he should be able to recognize early glaucoma and get the patient under treatment. That is the purpose of this paper. If the problem is to be handled adequately and vision retained for these unfortunate victims of this disease, early recognition and proper care and follow-up are imperative. This is not easy for any of us, I know. It is not easy to recognize or suspect early glaucoma. Remember the early signs and symptoms which were outlined.

To care for these cases, once diagnosed, careful ophthalmological studies need to be made. Many times these are negative and seem a useless waste of time, but if one unsuspected case is found, they are not. We must not tell the patient that nothing is wrong until it is so proven, or that he has cataracts and to wait, or if he has glaucoma that later operation is all right. As I have shown, many of them do wait, and when they finally come in, it is then too late and they are tragically blind.

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Nutrition Problems Among College Students*

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IN recent years the relationship of proper nutrition to health and disease has been a subject of ever-widening scope. Studies based on analyses of food purchases such as those reported by Stiebeling and Phipard,¹ of the Federal Bureau of Home Economics, have indicated that only about 25 per cent of the urban and rural families of the United States have wholly adequate diets; that about 40 per cent have diets rated as "fair"; and that about 35 per cent have diets rated as "poor". Essentially similar results have been reported in studies conducted by the Millbank Memorial Fund² and by the Council on Nutrition in Canada.³

Collateral evidence which suggests the possible consequences of such widespread deficiency has been contributed by Williams and Wilder and their co-workers,⁴ who have investigated the results of experimental thiamine restriction in man. The startling resemblance of the syndrome which they produced to that of neurasthenia has been responsible for the popular designation of vitamin B as the "morale" vitamin. Whether that term is justified or not remains to be seen, but they did watch a group of previously healthy, cheerful young women become transformed coincident with a moderate restriction of thiamine to a group of "morose, depressed, fearful, irritable, uncoöperative, slovenly individuals who made numerous vague complaints of eye-strain, headache, palpitation of the heart, dyspnea on exertion, capricious appetite, anorexia and distress after meals." This seems a truly remarkable change, but it is reported that these symptoms entirely disappeared when thiamine was restored.

Similar studies on the effects of sub- or pre-clinical deficiencies have been made by McLester⁵ in pre-pellagrous states, by Sydenstricker⁶ in general vitamin B complex deficiency, and by Lund and Crandon⁷ in experimental human scurvy. All these workers stress the frequency of these mild deficiencies and the protean pattern of the resultant symptoms. Any physician after surveying such evidence as this must be led inevitably to the conclusion that here is a vast new sector of knowledge which he must explore for the benefit of those for whom he cares. In no instance is this added responsibility more plain than in the case of the university and its health service personnel. Our universities are the richest source of our country's leaders, leaders not only in peace but in war. The diets which those future leaders eat during the formative and strenuous years of college represent a problem which demands our most careful and searching thought. This is especially true in those institutions where the food of many students is chosen entirely in accordance with the harsh realities of an empty purse. Even brief reflection on this problem suffices to reveal its multiple aspects.

We are first of all concerned with *what* our students eat. The answer to this question is not easily obtained except possibly in those schools where meals are supplied to all students as a part of the college program. And even in this group the dietitian who plans the menus is not often aware of the exact quantities of minerals and vitamins which are being supplied. The paucity of quantitative individual dietary surveys in the literature is indicative of their laborious and time-consuming nature, but they are essential to a clear understanding of dietary habits.

In large, urban universities such quantitative studies are even more urgently required and are the only way in which one may measure the food intake of large fractions of the student population. At the University of Minnesota only 7.4 per cent of our students live in dormitories and eat food prepared by the University. In addition, 60 per cent of our student population is either wholly or partially self-supporting, with all that that implies in food-selection. We have attempted to obtain a picture of the dietary habits of certain student groups at the University of Minnesota in the following manner:

As a yardstick for the study to be presently described, the first step was to make a complete analysis of the menus of two university dormitories, one for boys and one for girls. This procedure was followed instead of the more accurate individual menu analysis method because it was felt that these diets were so liberal that the inaccuracies due to variation in individual consumption would be of little consequence. This opinion was strengthened by the results of the analysis and by the observations of dining hall attendants, who reported that the menus represented minimum rather than maximum food intakes.

In the case of the boys' dormitory the analysis extended over 14 consecutive days, and in the girls' the interval was 13 successive days. The results of the analysis are given in Tables I and II. The theoretical daily requirements listed are the most recent ones advised by the Committee on Food and Nutrition of the National Research Council.

It will be noted that these diets are exceedingly liberal and more than adequate from the standpoint of energy content and specific vitamin and mineral requirements, with the exception of the vitamin B₁ intake in Comstock Hall (girls), which is slightly below the recommended quantity. This, of course, is what one might expect in a group which has the double advantage of an above-average economic status plus the services of competent dietitians.

With this analysis as a basis for comparison, an attempt was then made to obtain a quantitative estimate of the dietary habits of a lower economic level of the student population. The plan of this study was as follows:

*Taken from the records of the Students' Health Service, University of Minnesota, Minneapolis, Minnesota. Presented before the American Student Health Association.

TABLE I.
Menu Analysis—Pioneer Hall—Boys

1st Week	Calories	CHO (G)	PRO (G)	FAT (G)	CA (G)	P (G)	FE**	VIT. A*	B ₁ *	C**	D*	G***
Monday	3489	275.15	105.7	218.5	2.208	2.167	15.65	8658	636	88	123	753
Tuesday	3983	371.00	127.0	222.3	2.429	2.858	22.16	11367	576	71	160	952
Wednesday	4283	459.75	126.3	215.51	2.776	2.765	31.115	10984	528	104	126	884
Thursday	3607	312.00	120.6	208.3	2.008	2.337	22.58	8408	817	63	200	890
Friday	4395	525.00	121.4	201.4	2.679	2.879	26.31	10070	625	30	123	1031
Saturday	4004	390.30	139.5	209.4	2.282	2.636	18.08	7993	734	78	132	916
Sunday	4289	455.40	131.3	216.0	2.012	3.211	13.56	5296	722	63	160	782
Daily Average	4007	398.37	124.5	213.1	2.342	2.693	21.35	9968	662	71	146	886
Requirements	3000		70.0		8	1.32	12.00	5000	600	75	300?	600
2nd Week												
Monday	4158	439.4	116.6	214.9	2.460	2.599	22.15	6239	825	156	124	909
Tuesday	4001	386.4	137.4	220.2	2.224	2.617	20.63	8370	570	25	120	927
Wednesday	4811	521.9	140.1	240.3	2.590	2.912	25.13	17018	884	135	151	1362
Thursday	3335	257.3	126.0	200.2	2.383	2.628	17.94	9949	557	65	166	386
Friday	3608	352.94	123.65	189.1	2.287	2.119	15.41	8046	633	79	128	770
Saturday	3729	380.25	125.3	189.7	2.262	2.564	30.11	8137	487	118	126	926
Sunday	3822	309.40	126.9	230.8	2.330	2.373	15.09	9350	662	75	166	1288
Daily Average	3924	378.22	128.0	213.2	2.362	2.463	20.92	9587	659	93	140	938
Requirements	3000		70.0		8	1.32	12.00	5000	600	75	300?	600
2 Week Average	3966	388.30	126.3	213.2	2.352	2.578	21.14	9778	661	82	143	912

*International Units

**Milligrams

***Riboflavin—Sherman-Bourquin Units.

With the cooperation of Mrs. Dorothy Johnson, Director of the Employment Bureau of the University of Minnesota, we obtained the names of two hundred students who were receiving aid from the National Youth administration. These students were selected only in that students were chosen who were living away from home and whose payment for their part-time work did not include their meals. In other words, this group consisted of two hundred students of low economic level who were forced to purchase their own meals with no guidance other than their own. The relative economic status of this group is measured by the fact that their average monthly expenditure for all purposes during this school year, as calculated by the National Youth Administration, is \$46.92. In addition a supplementary list of 25 names was drawn up from those students who had applied for N.Y.A. aid too late to receive it, and whose income was thought to be even less than that of the preceding group.

A letter was sent to each of these 225 students, outlining the purpose of this investigation. They were frankly told that if they felt they could not cooperate to the fullest extent we would prefer that they did not participate in the survey. There was not the slightest element of compulsion, for obvious reasons. With the letter were enclosed seven post-cards. Each was divided into four columns, headed "Breakfast", "Lunch", "Din-

ner", and "Other". Each card was dated, and the student was instructed to carry the proper card with him on each day of the seven-day period. As soon as he finished each meal he was to record it in minute detail in the proper space. Careful instructions were given in regard to the description of the kind, quantity, and method of preparation of foods. In addition the cost of each meal was to be noted. At the end of the day the self-addressed card was to be dropped in the mail.

From this group of 225 students we obtained a total of 88 complete sets of seven cards, representing a total of 1,848 meals. While data was thus received from only 39 per cent of the original group, a study of the sex ratio, and the range of income and dietary intake in this 39 per cent leads us to believe that they are a representative sample of the group originally queried. Eighty of these were from N.Y.A. students and eight from the supplementary list of non-N.Y.A. students. Differences between these groups were not considered significant because of the small number of non-N.Y.A. students, and they are hereafter grouped together as "low income" students. Individual food analysis sheets were then set up for each day for each student. The various items of food were then translated into their individual fractions of the basic quantities being studied and the totals added and a daily average obtained. These figures, together with the average cost figures, comprise the raw data.

TABLE II.
Menu Analysis—Comstock Hall—Girls

1st Week

	Calories	CHO (G)	PRO (G)	FAT (G)	CA (G)	P (G)	FE**	VIT. A*	B ₁ *	C**	D*	G***
Monday	2880	279.1	84.7	158.7	1.279	1.620	26.56	3948	788	89	68	705
Tuesday	2891	294.1	77.2	155.2	1.328	1.490	14.13	7600	544	68	90	497
Wednesday	2714	236.8	76.5	132.0	1.452	1.700	26.32	4532	543	72	31	494
Thursday	3395	317.5	97.1	191.8	1.250	1.821	16.94	5542	407	62	100	417
Friday	2529	266.65	64.54	132.42	1.215	1.262	11.95	4952	351	82	281	427
Saturday	2863	323.6	74.0	148.7	1.301	1.497	11.14	6936	378	90	140	631
Sunday	2824	283.9	79.3	151.63	1.326	1.723	14.75	5647	428	67	138	530
Daily Average	2866	285.9	79.0	152.9	1.307	1.587	17.39	5593	491	75	121	528
Requirements	2500		60		.8	1.32	12.00	5000	500	70	300?	600
2nd Week												
Monday	2657	291.1	88.1	141.32	1.207	1.752	18.11	6084	310	43	106	568
Tuesday	3306	350.6	86.75	172.9	1.404	1.688	14.33	11433	886	78	106	589
Wednesday	3436	311.5	92.1	119.16	1.215	1.555	17.96	16065	508	110	110	1373
Thursday	2559	271.0	81.9	128.45	1.203	1.477	13.82	10066	417	99	100	570
Friday	3220	368.9	81.5	157.1	1.538	1.710	13.31	5173	380	90	71	533
Saturday	2525	222.9	92.7	135.8	1.198	1.560	14.37	5626	406	100	106	692
Daily Average	2950	302.6	73.5	142.4	1.294	1.623	15.31	9074	484	86	99	720
Requirements	2500		60		.8	1.32	12.00	5000	500	70	300?	600
13 Day Average	2908	294.3	76.3	147.7	1.301	1.605	16.35	7334	488	81	110	624

*International units.

**Milligrams.

***Riboflavin—Sherman-Bourquin units.

The figures in these tables speak for themselves, and only a few points need to be re-emphasized. The first is that *not a single diet* was adequate in every factor studied, and that in ten cases, or 11.3 per cent (both boys and girls) the diets were inadequate *in every factor studied*. The distressing implications of these findings need no further comment.

The second point of importance is that while the average amount spent for food is perhaps the primary controlling factor in determining the adequacy of the diet obtained, it is nevertheless true that examination of the individual cases reveals the fact that in the low income group the correlation between amount spent and adequacy of diet obtained is practically non-existent.

A mathematical expression of this lack of relationship has been obtained, using the rank-difference method of obtaining a coefficient of correlation. Each member of the low-income group was ranked in terms of the amount which was spent for food, and for each of the eight dietary factors studied. The average rank in terms of the remainder of the group for these eight dietary factors was then obtained, and the coefficient calculated in terms of the following formula:

$$r = 1 - \frac{6d^2}{N(N_2 - 1)}$$

d² equals sum of rank differences squared.
N equals No. in group.

For boys, *r*, the coefficient of correlation, was plus .185, and for girls it was plus .118. These coefficients indicate the almost complete lack of relationship between

cost and diet obtained. The obvious inference, of course, is that knowledge of nutrition in this group is inadequate, and that we should urge an increased emphasis upon practical nutrition in our curricula.

A question which is perfectly proper to raise at this point is: What evidence do we have that these arbitrary dietary requirements which we have set up are correct? In other words, do we have any objective evidence that these inadequate diets have produced any changes in these students? Unfortunately, we cannot answer this question now. Within the near future, all of these low income students will have a careful periodic health examination. In addition, we intend to obtain such laboratory indices of nutrition as hemoglobin, red blood cell count, hematocrit, plasma proteins, ascorbic acid saturation tests, together with biophotometer and slit lamp examinations. These data will then be compared with similar studies on a group from the dormitories. With this in hand we hope to be able to answer the above question.

In spite of this lack of objective evidence, however, the presumption even now must be that diets such as those described above are definitely harmful, even though the relatively crude laboratory methods available today may not confirm that belief.

II.

The second aspect of the problem of nutrition among college students is to examine the incidence of nutritional disease in a college population. In this respect we are concerned not only with actual deficiency states,

TABLE III.
Diet Analysis—Low Income—Boys

Name	PRO	FAT	CHO	CAL	CA	P	FE	A*	B ₁ *	C**	D*	G***	Ave. Daily Cost
R. A.	106.2	152.0	298.8	2988	1.335	1.799	17.06	11665	495	51	182	649	.75
W. R. A.	78.9	100.2	265.0	2277	1.146	1.478	11.02	4608	460	64	53	446	.40
Rt. A.	128.5	193.1	439.6	4010	2.399	2.679	18.74	8951	649	81	132	906	.76
K. B.	88.3	137.0	342.0	2954	1.129	1.534	14.27	4484	439	53	69	409	.82
M. B.	86.9	140.0	292.8	2779	1.175	1.614	16.49	7109	457	93	147	582	.60
I. E.	75.9	84.5	180.8	1787	.870	1.178	11.06	3210	259	57	175	355	.73
H. E.	99.3	171.5	441.4	3706	1.704	1.992	16.43	6445	523	65	116	660	.86
G. E.	86.7	128.5	297.4	2693	1.121	1.778	13.96	4878	322	31	78	426	1.13
H. G.	80.2	138.7	326.2	2874	1.069	1.254	10.49	5097	410	45	75	433	.73
D. G.	102.5	143.7	289.6	2862	1.274	1.927	15.57	5706	714	49	89	586	.95
K. W. H.	99.3	136.3	297.0	2812	1.212	1.784	17.00	4817	616	56	79	526	.92
A. H.	84.1	155.3	340.8	3097	1.200	1.531	13.31	4299	413	35	82	417	.95
W. H.	119.6	197.3	334.1	3591	1.882	2.200	16.20	8210	556	86	13	645	.73
R. J.	80.5	155.8	288.8	2879	.808	1.241	17.27	6247	394	51	183	424	.71
V. J.	80.5	128.2	241.4	2441	1.001	1.452	11.64	6014	426	52	68	448	.83
J. K.	76.3	112.0	266.3	2378	1.110	1.551	16.82	5395	379	39	97	439	.67
L. K.	89.8	123.9	282.8	2606	.777	1.412	12.51	4928	426	77	85	375	.60
A. K.	81.6	119.8	222.3	2294	.750	1.205	12.02	4299	497	35	63	392	.90
R. K.	102.3	119.9	377.7	2999	1.367	1.859	22.61	1216	551	94	95	693	1.00
L. L.	122.9	168.3	373.7	3501	2.069	2.560	18.86	7973	1695	73	226	756	.87
F. L.	94.1	139.9	332.5	2965	2.077	1.679	14.40	5838	460	55	72	494	.78
D. L.	81.5	140.7	372.4	3982	.970	1.630	14.05	5092	435	46	52	442	.86
G. M.	115.1	192.6	378.4	3707	1.678	4.948	13.27	8186	454	50	165	593	.70
P. M.	78.1	89.0	262.8	2165	.844	1.286	12.22	2732	420	51	74	392	.80
W. M.	56.8	70.5	179.2	1579	.956	1.266	9.82	12600	252	70	63	608	.84
R. M.	93.9	138.7	378.3	3137	1.353	1.657	12.34	3590	500	24	44	533	.79
A. M.	108.8	165.6	388.8	3481	1.461	1.877	18.80	6384	590	74	69	672	.89
M. C.	107.0	127.2	319.7	2852	1.199	1.589	8.64	8843	377	68	78	552	.73
R. W. H.	68.8	121.9	218.2	2245	.581	1.082	11.61	3132	341	34	37	313	.83
M. R.	100.1	151.7	424.3	3463	1.838	2.086	15.62	9200	416	72	56	599	1.03
M. L.	65.4	103.0	306.0	2413	.953	1.273	12.60	7970	359	53	46	453	.78
D. A.	67.2	108.9	226.2	2154	.680	1.098	12.22	5225	399	56	147	357	.63
R. A. A.	106.1	153.0	345.6	3183	1.144	1.675	16.36	5498	555	60	85	531	.80
R. B.	115.4	162.7	319.2	3203	2.130	2.214	13.61	6360	544	63	81	739	1.12
E. C.	97.9	142.4	312.4	2923	1.373	1.708	14.95	6386	547	80	69	553	.76
D. W.	71.0	126.1	311.9	2667	.978	1.109	13.00	17513	312	45	47	469	.75
L. H.	78.2	111.5	271.2	2301	1.213	1.803	15.21	5539	342	31	43	440	.91
W. L.	91.5	101.9	196.1	2066	1.005	1.530	15.01	3800	629	58	52	530	.60
R. M.	68.7	109.2	282.3	2386	.990	1.402	14.26	5467	354	62	84	483	.83
G. M.	66.6	94.5	279.1	2254	1.037	1.306	10.56	5670	352	115	32	476	.66
A. J. O.	99.6	147.4	284.9	2865	1.380	1.688	19.37	5331	833	57	94	528	.60
D. C.	82.9	109.0	197.0	2461	.896	1.298	12.65	3826	370	37	51	415	.79
M. C.	96.2	155.1	318.3	3054	.885	1.705	17.58	6176	339	51	83	481	.68
M. P.	130.9	197.9	335.6	3647	2.081	2.409	18.49	20925	475	55	107	925	1.24
W. N.	97.0	145.6	281.0	2822	.998	1.475	15.06	4326	324	48	67	355	.51
W. Nr.	87.9	162.0	296.4	2995	.957	1.518	19.45	6329	486	69	125	546	.71
D. C.	103.4	189.2	395.1	3696	1.180	1.613	16.45	6570	452	92	524	538	.96
E. D.	89.9	142.5	360.3	3055	1.259	1.853	12.43	7806	351	59	68	525	.81

TABLE III. Continued
Diet Analysis—Low Income Boys

Name	PRO	FAT	CHO	CAL	CA	P	FE	A*	B ₁ *	C**	D*	G***	Ave. Daily Cost
L. G.	108.4	164.3	332.3	3242	1.662	2.029	17.15	14075	417	58	76	559	81
R. M.	98.9	131.4	339.0	2934	1.250	1.759	15.59	5747	404	57	121	530	1.32
Rd. M.	94.7	125.7	239.5	2390	1.195	1.617	14.94	9935	401	79	146	659	65
M. G.	62.3	135.6	293.8	2645	.797	1.205	11.12	3919	260	47	57	341	42
W. S. II.	94.2	119.5	309.6	2691	1.109	1.754	17.24	6651	477	72	43	627	98
E. R. J.	104.09	161.8	358.9	3308	1.527	1.949	15.87	4823	541	49	82	576	95
M. M.	102.5	147.5	302.9	2949	.983	1.713	18.18	5734	436	51	103	546	75
R. M. P.	100.7	165.2	361.3	3335	1.236	1.627	20.06	10629	503	80	89	691	71
L. M.	73.4	118.7	270.3	2443	.807	1.254	12.08	3684	259	13	53	280	.78
R. P.	78.1	135.1	270.9	2612	.985	1.508	11.92	5321	714	31	84	317	79
L. R.	104.1	162.9	348.1	3275	1.276	1.778	12.60	5616	769	73	139	478	39
W. G.	91.8	125.2	253.1	2505	.951	1.506	16.21	5016	409	45	79	488	50
O. O.	71.0	127.7	235.3	2375	.680	1.191	11.83	3610	445	29	53	370	.85
N. P.	55.1	84.6	214.7	1841	.435	.846	10.47	3219	338	24	54	280	75
T. O.	61.8	95.3	214.6	1963	.744	1.202	10.48	5025	273	95	47	400	.80
S. P.	60.0	97.2	287.7	2266	.514	.940	8.73	3895	265	37	41	245	.75
R. H.	103.5	146.3	315.2	2992	1.247	1.781	22.42	5777	505	57	90	534	61
E. I.	89.9	147.6	404.0	3304	.832	1.529	16.78	7520	457	119	118	462	1.05
Average	90.1	136.3	304.9	2823.0	1.178	1.545	14.65	6394.9	464	58.2	92.4	507.5	79
% of Standard	129			94	147	117	122	128	77	78	31	85	

*International units.

**Milligrams.

***Riboflavin—Sherman-Bourquin units.

TABLE IV.
Diet Analysis—Low Income Girls

Name	PRO	FAT	CHO	CAL	CA	P	FE	A*	B ₁ *	C**	D*	G***	Ave. Daily Cost
E. B.	54.4	71.4	226.0	1764	.838	1.020	10.68	7283	280	57	31	424	.35
M. B.	67.2	87.4	164.3	1712	.979	1.347	10.79	4595	331	45	28	339	.90
Mn. B.	58.8	81.8	138.6	1526	.763	1.439	11.06	3675	270	60	14	321	.50
L. B.	34.2	62.2	156.2	1321	.267	.536	6.42	2783	178	41	17	177	.49
C. C.	66.6	94.6	212.7	1969	.819	1.215	11.20	4204	742	25	34	338	.71
S. F.	66.1	101.9	248.5	2176	.890	2.109	10.98	4008	231	33	65	379	.54
T. G.	48.2	68.0	127.4	1314	.525	.795	8.35	2580	237	35	65	250	.70
A. H.	40.6	89.5	157.3	1597	.389	.804	7.41	2653	210	42	29	189	1.00
A. L.	66.8	98.1	238.0	2102	1.025	1.230	9.47	3970	339	54	48	341	.40
J. L.	68.3	123.2	294.7	2561	.977	1.254	13.56	4809	361	86	171	376	.72
E. M.	71.1	131.8	302.1	2679	.991	1.327	16.32	7821	670	73	60	559	.61
D. H.	90.4	235.9	262.1	3533	1.281	1.669	12.57	6164	418	58	61	523	.51
M. M.	81.2	122.6	308.3	2661	1.135	1.483	11.08	5236	386	83	67	435	.90
D. K.	67.81	159.3	362.9	3157	.829	1.164	17.40	5328	308	68	40	390	.95
O. K.	62.2	98.4	192.7	1413	.566	.844	9.09	3674	331	56	51	257	.33
K. K.	55.2	87.1	210.0	1845	.595	.838	8.80	3949	353	73	44	275	.39
E. E.	77.8	142.3	210.5	2434	.863	1.167	12.34	5573	341	46	69	355	.39
I. M.	71.6	113.3	268.1	2379	1.110	1.349	12.23	7086	302	53	51	432	.63
R. L.	106.0	160.9	303.8	3087	1.667	2.039	15.40	8061	502	69	93	616	.84
M. P.	89.3	185.1	308.7	3258	1.523	1.725	11.87	4436	369	54	67	477	.36
A. J.	86.5	137.6	358.3	3018	.990	1.457	14.09	8045	378	61	158	458	.80
Z. O.	55.7	81.1	242.4	1922	.355	.754	9.61	3190	196	38	30	257	.85
Average	67.5	115.2	240.6	2246.7	.881	1.253	11.40	4960	351.0	55.0	58.9	371.3	.63
% of Standard	113			90	110	95	95	99	70	79	20	62	

*International units.

**Milligrams.

***Riboflavin—Sherman-Bourquin units.

TABLE V.
Average Diets—All Groups

	Calories	Protein	Calcium	Iron	A	B ₁	C	G
Low Income—Boys	2823	72.7	1.178	14.65	6395	464	58	508
Pioneer Hall—Boys	3966	126.3	2.352	21.14	9778	661	82	912
Low Income—Girls	2247	67.5	.881	11.40	4960	351	55	371
Comstock Halls—Girls	2908	76.3	1.301	16.35	7334	488	81	624

TABLE VI.
Extent of Dietary Deficiency
Per Cent of Diets Adequate in Each Dietary Factor

	Calories	Protein	Calcium	Iron	A	B ₁	C	G
Low Income—Boys	31.8	84.8	86.8	75.8	68.2	12.1	18.2	19.7
Low Income—Girls	36.4	68.2	68.2	36.4	40.9	13.6	18.2	4.5

TABLE VII.
Extent of Dietary Deficiency

No. of Factors Adequate	LOW INCOME—BOYS			LOW INCOME—GIRLS		
	No.	%	Cumulative %	No.	%	Cumulative %
0	5	7.6	7.6	5	22.7	22.7
1	1	1.5	9.1	2	9.1	31.8
2	5	7.6	16.7	4	18.2	50.0
3	13	19.7	36.4	2	9.1	59.1
4	16	24.2	60.6	2	9.1	68.2
5	14	21.2	81.8	5	22.7	90.9
6	8	12.1	93.9	0	0	90.9
7	4	6.1	100.0	2	9.1	100.0
8	0	0		0	0	
Total	66	100		22	100	

TABLE VIII.
Daily Cost of Diets—University of Minnesota 1941

	Average	Range
Low Income—Boys	\$0.79	\$0.39 - \$1.32
Pioneer Hall	1.00	
Low Income—Girls	.63	0.33 - 0.95
Comstock Hall	.85	

TABLE IX.
Nutrition Problems in a College Population
University of Minnesota—1937-40

	Number	Incidence Per 10,000 College Students
Overweight—120% or more*	1310	761.72
Underweight—less than 80%*	270	156.99
Anemia**	110	107.68
Peptic Ulcer	167	97.10
Diseases of Colon	90	52.33
Diabetes	34	19.77
Diseases of Gall-bladder and Liver	18	10.47
Miscellaneous	3	1.74

but in a larger sense with all diseases in which nutritional factors may be of importance. With this in mind we have examined our records in order to determine the frequency of these conditions as they have been seen at the University of Minnesota in recent years.

Some discussion of these abnormalities is necessary. It should be noted first of all that the position of overweight as the most frequent nutritional abnormality in our student population does not permit any inference as to the average nutritional status of the whole college group, nor is one even safe in assuming that there is an adequate intake of all nutritional factors in the overweight group itself.

From this distribution one sees that only a relatively small fraction of our students are overweight, in spite of the predominance of this condition in the frequency distribution of nutritional abnormalities. The further investigations which we intend to make of the physical and laboratory status of the low income group will, we hope, answer the question as to whether nutritional deficiency may co-exist with normal or overweight.

In view of the modern concepts of iron metabolism, and the pathogenesis of iron deficiency, the inclusion of anemia in the list of nutritional abnormalities might be questioned. We are well aware of the fact that the primary factor in the production of iron deficiency

*Based on 18,717 entrance examinations.

**Based on 10,215 periodic health examinations.

TABLE X.
Incidence of Overweight and Underweight
Entrance Examinations 1937-40
University of Minnesota

	Men		Women	
	Number	Per Cent	Number	Per Cent
More than 20% underweight	86	0.8	184	2.5
11% to 20%	1150	10.1	1427	19.4
Normal weight	7668	67.6	4521	61.4
10% to 19% overweight	1646	14.5	725	9.8
20% to 29% overweight	510	4.5	304	4.1
30% to 39%	195	1.7	100	1.4
40% to 49%	47	0.4	48	0.7
50% and more	49	0.4	57	0.8
Total:	11351		7366	

anemia is blood loss. In the adolescent and young adult the most frequent cause of such blood loss and resultant anemia of iron deficiency type is the menstrual period. This is well shown in our experience by the fact that 2.7 per cent of our entering girls have hemoglobins below 70 per cent, as opposed to 0.1 per cent of our entering boys. It is equally true, however, that in the presence of adequate iron intake and normal absorption, physiological blood loss rarely if ever results in anemia. In this sense, anemia of this type is a true deficiency disease.

A final point which should be noted in connection with this pattern of nutritional abnormalities is the absence from it of instances of outspoken, classical vitamin deficiency. We have not seen, to our knowledge, any cases of frank xerophthalmia, beri-beri, ariboflavinosis, pellagra, scurvy, or rickets. These syndromes are rare even in the public clinics of the North Central states, and it is not surprising that they should not be found in our group. It should be emphasized again, however, that the absence of such clinical entities can never permit us to ignore the possible presence of milder degrees of deficiency. As in many other conditions their ultimate detection doubtless awaits merely the introduction of more refined diagnostic methods.

III.

A third and final aspect of this question which I would like to discuss is the matter of what we student health physicians can do when confronted with the vast implications of this interrelationship of nutrition and health.

Certainly, we can insist upon the proper analysis and regulation of dormitory menus, a responsibility which will be increasingly important in the future of rising food costs which is at hand. We can and must insist that the diets of impoverished students eating outside the sphere of university supervision be subjected to scrutiny. It may be that arrangements for a proper diet while at college should be as much a requirement for admission as the proper number of high school credits. Certainly there is very little value to an education which

is obtained at the price of possible constitutional weakening which, for all we know, may be permanent in its damaging effects.

The problems of specific nutritional diseases are more easily appreciated. Any student health physician is acutely aware of the difficulties which often impair his attempts to provide proper dietary treatment of such relatively common ailments as diabetes mellitus and duodenal ulcer. The fixed diets of boarding houses and dormitories often result in the student's discouraged conclusion that the cards are stacked against him, with the result that he leaves school, to his own and society's loss.

Recognition of this situation by Dr. Ruth Boynton, Director of the Students' Health Service of the University of Minnesota, resulted in the creation of a diet table in 1939. A portion of the Health Service with an adjoining kitchen was set aside for this purpose. The services of a graduate dietitian and kitchen help were obtained, with the whole service under the supervision of a member of the full-time medical staff.

From the beginning this experiment has been an unqualified success. The normal capacity of the table is 30 students, but in case of necessity this can be expanded to 35. Normally, the table runs at capacity, the number of overweight students receiving treatment being reduced in the event more serious conditions require treatment, and increased ordinarily quite readily when the number of cases of other conditions drops below normal. At the beginning, the charge for this service was \$0.90 per day for three meals. This year we have been forced to increase the charge to \$1.00, which is the same as the cost of food at the boys' dormitory. It is unfortunate that this charge cannot be less, but the high cost of handling a small number of varied diets makes a lesser fee impossible.

Any physician on the Health Service staff may, of course, recommend the diet table to a student for a specific purpose. In practice, however, it has been found best to route such requests and students through the staff member supervising the diet table, and he assumes the responsibility for the character of their diets and the length of their period of treatment there.

Since the establishment of the diet table in 1939, 148 students have been treated.

TABLE XI.
University of Minnesota Diet Table
Conditions Treated—1939-41

Condition	Number	Per Cent
Overweight	60	40.5
Diabetes Mellitus	33	22.2
Peptic Ulcer	28	18.8
Allergy	7	4.7
Underweight	5	3.3
Ulcerative Colitis	3	2.0
Miscellaneous (liver, kidney, blood disease, etc.)	12	8.1
Total:	148	99.6

The predominance of obesity as a nutritional problem is again noted here, and although this paper is not intended to include a discussion of therapy, I should like to point out that the diet table is in our experience by far the best method of treatment in these cases. The character of dormitory and boarding house diets makes a balanced reduction diet extremely difficult for a student to obtain. Diet table treatment is ordinarily reserved for students who are more than 40 per cent overweight, but even in this group the results are far superior to that obtained when the student is merely given a diet and left to his own devices. In a study of a group of 120 cases of obesity who voluntarily requested treatment in 1940-41, 30 cases were treated on the diet table for an average period of 10.9 weeks. The average weight loss for this period was 18.2 pounds. The remaining 90 cases were treated in the usual fashion by the prescription of a specific diet which they were to follow at home or elsewhere. This group was followed for an average period of 11.7 weeks, and the average weight loss was 2.4 pounds. It is of considerable interest to note that 57 of this latter group returned to the physician only once after their initial visit. Their discouragement is presumed if not proved.

The advantages of the diet table in the treatment of such conditions as diabetes mellitus, peptic ulcer, and ulcerative colitis are too obvious to require discussion. We have also found it of inestimable value in the treatment of obscure allergic states by elimination diets.

In conclusion, I should like to reiterate the urgent necessity of our full recognition of the importance of nutrition in our own sphere of activity. We must continually remember the almost certain existence of deficient diets in large segments of our student bodies, with

all that that implies. We must strive to diagnose mild nutritional deficiency; we must constantly consider the effect of such deficiency in the pathogenesis and prognosis of other disease; and we must, in our capacity as advisers to administrative officers, attempt to improve the nutritional knowledge and the nutritional opportunities of our low income students. And, finally, we must review again the importance of dietary treatment, with full appreciation of the vast gulf which frequently lies between the prescribing and the taking, in the hope that such a review may effectively narrow that gulf for the benefit of those who are in our care.

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The Orthopedic and Medical Management of Arthritis*

A Preliminary Report

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CLOSELY related to arthritis and frequently associated with it are fibrositis, myositis and myofasciitis. Gouty arthritis, senile osteoporosis, and the arthritic manifestations associated with osteitis deformans (Paget's) and acromegaly are forms of arthritis often overlooked. An accurate diagnosis is obviously a prerequisite to successful management.

A certain number of patients with early arthritis improve with or without treatment. Because of this occasional tendency to recover spontaneously, some patients with early arthritis improve regardless of the remedy used. On the other hand, it is our opinion that proper intensive medical and orthopedic management of these patients may do much to hasten the alleviation of pain, prevention of deformities and restoration of these persons to activity. In addition, those patients who show no tendency to improve spontaneously and regress towards chronicity may also be materially benefited with adequate treatment.

With this thought in mind, a treatment clinic for patients with arthritis was established at the Cook County Hospital in April, 1941. One hundred eighty arthritic patients are included in the present series. Of this series, 30 private cases and 80 clinic patients who have not been under treatment for our minimal study requirements (six months) have been excluded from this preliminary report. The 70 patients who constitute the basis for the present report, have been under management for a period of six months or longer.

This series of 70 cases, for the most part, is comprised of patients with rheumatoid arthritis, osteoarthritis, or mixed arthritis. It also includes cases of Marie-Strumpell disease, gouty arthritis, Paget's osteitis deformans, senile osteoporosis and arthritis associated with acromegaly. All of the severe arthritic patients entering the general orthopedic clinic were assigned to the arthritis division. The early arthritics with only mild symptoms were not included in this clinical investigation. In all but 13 of the patients chosen for this study, arthritis was present longer than two years.

DIAGNOSIS

The criteria for the diagnosis of the various types of arthritis were those suggested by the Subcommittee on Arthritis of the Committee on Chronic Illness, Welfare Council of New York City.

The patients with rheumatoid arthritis were usually thin and anemic, with systemic involvement. In practically all of the cases the proximal interphalangeal joints

of the fingers were affected, giving the characteristic spindle-shaped fingers. Muscular atrophy occurred too early and was too well marked to be due entirely to disuse. There was a tendency to symmetrical polyarticular involvement. Subcutaneous nodules, when they occur, are pathognomonic for both rheumatoid arthritis and the arthritis of rheumatic fever. In advanced cases deformity, subluxation, joint disorganization and ankylosis are also characteristic.

In cases of ankylosing spondylitis (Marie-Strumpell) the patients are usually thin young men with definite symptoms of chronic systemic disease, frequently with low-grade fever and leukocytosis, "poker-back", stooped shoulders, and head held rigid with the neck flexed. X-ray findings are characteristic and show generalized osteoporosis, fusion of the small intervertebral joints, and calcification of the longitudinal ligaments. The sacroiliac joints are frequently involved.

In degenerative arthritis the patients are frequently over-weight and do not show evidence of systemic disturbance. It is much more common in middle-aged or elderly people. The joints involved are enlarged due to overgrowth of bone and also to soft tissue swelling. For the diagnosis of degenerative arthritis, the X-ray findings are frequently pathognomonic. Lipping or osteophytes occur at the margins of the joints. Cyst-like areas of degeneration are sometimes seen in the region of the articular surfaces. Decalcification usually does not occur. Contact sclerosis or eburnation is evident.

In the diagnosis of gouty arthritis, both acute and chronic, the history is of primary importance. The metatarsophalangeal joint of the big toe may be the first involved. The early attacks occur usually at night with severe pain and purplish discoloration of the joints. The attack is of short duration and there is complete remission of symptoms between attacks. Small punched-out areas may be seen along the line of attachment of the joint capsule. A high blood uric acid is frequently encountered. Repeated tests should be made.

In the diagnosis of all forms of arthritis, the history, clinical symptoms, lesions, disturbed function, blood chemistry, sedimentation rate, and X-ray findings may each be important. The characteristics and value of each of these factors will be discussed in a future publication.

PROCEDURE

A comprehensive history of each patient was obtained. The various methods of treatment prior to admission to our clinic were recorded. A complete orthopedic and medical examination was given to each patient. The weight was recorded and complete laboratory work

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ordered. The latter consisted of blood count and blood chemistry, including non-protein nitrogen, sugar, uric acid, calcium, phosphorus, phosphatase, total protein, creatinine, Wassermann, Kahn, erythrocyte sedimentation rate and urinalysis. Basal metabolic rates were determined when indicated. Dynamometer readings were made in instances in which arthritis affected the upper extremities. When indicated, electrocardiograms were ordered.

A careful examination of the laboratory data suggests that there is no correlation between the blood chemistry and the progress of the arthritic process. In order to simplify the management of these patients, we intend to eliminate all laboratory procedures which we have found superfluous. The determination of the uric acid, Kahn, Wassermann and sedimentation rate is essential in each case. Other tests should be performed only when specifically indicated.

Roentgenograms of involved joints and photographs and motion pictures were made of many patients as their treatment progressed. The colored motion pictures vividly portray the degree of limitation of joint movement, swelling about joints, difficulty in locomotion and abnormal posture.

After the physical examination and laboratory tests were completed, the data obtained was summarized and carefully studied. Some patients required referral to special clinics, such as dental, ear, nose and throat, gynecology, genito-urinary and vascular. The diagnosis having been made, and contributing factors evaluated, therapy was instituted.

MANAGEMENT

In every patient an attempt was made to eliminate contributory etiological factors, bearing in mind that in these chronic cases secondary residual foci may remain in the synovial membrane. Unless incriminating evidence presented itself, a relatively conservative attitude was assumed regarding focal infection. However, abscessed teeth and tonsils, showing evidence of pathology or considered responsible for severe recurrent infection, were eliminated. Constipation, when present, was corrected. Genito-urinary or gynecological conditions were given special consideration. The obese patients were placed on a gradual weight reduction diet while the emaciated were given a higher caloric diet.

Mechanical factors, such as pronated flat feet and knock-knees were treated in the Out-patient Clinic by proper corrective shoes and supports.

Patients with circulatory deficiency or varicose veins were referred to the Vascular Clinic.

Deformities of the large joints were treated by hospitalization in the orthopedic wards. Recumbency, traction, wedge casts, gentle manipulation under anesthesia, molded casts, corsets, braces and physical therapy were used when necessary on in-patients. Surgical measures, such as synovectomy, arthroplasty, capsulotomy and tenotomy, were occasionally required.

Patients presenting visceroptosis and dorsum rotundum with poor vital capacity were given corrective exercises. Occasionally blow bottles were prescribed to increase rib excursion and improve costo-vertebral movement.

Patients with bursitis, especially subdeltoid and trochanteric, were given multiple punctures of procaine and aspiration treatment. Many patients with myofasciitis, especially those with lumbo gluteal involvement were given focal point injections of 1 per cent procaine.

Each patient received the specific systemic treatment which his condition required. Patients with gouty arthritis received low-purine diets. Those with hypothyroidism received thyroid and those with menopausal symptoms were given hormone therapy. Most of these patients had been under observation and had proven resistant to many of the known forms of antiarthritic therapy before they were accepted for this investigation.

Many of these patients were treated in the orthopedic and other clinics for more than two years before being admitted to this special research series. If, after the maximum response to the routine therapeutic measures was obtained and if after the concomitant diseases were adequately controlled, the arthritic process still progressed or warranted additional treatment, the patient was then included in this special arthritic clinic.

In addition to the routine treatment, all of the patients in this series received electrically activated vaporized ergosterol (Whittier Process.)* The treatment was initiated with one capsule (50,000 units) three times daily. The dose was increased by one capsule daily, every three days, until the patient was receiving six capsules daily. This dose was then continued, unless signs of intolerance developed, which occurred in very few instances. All patients were encouraged to drink one glass of milk after each dose of activated ergosterol, not with any idea of increasing the therapeutic effectiveness of the medication, but to furnish calcium and phosphorus. The medication was not taken in the milk.

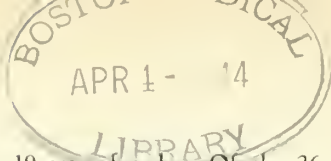
SIGNS OF INTOLERANCE

Since all previous publications¹⁻¹² on the subject have emphasized the safety of this activated sterol therapy, we have not been concerned very greatly with the possibility of any toxicity. In 7 of the clinic patients, some nausea and anorexia occurred. This may, or may not, have been due to the medication. In the obese patients, there was a rather high incidence of gallbladder disease and in the rheumatoid group a rather large majority of the patients had disturbed liver function,¹²⁻¹⁷ impaired gall-bladder activity,¹²⁻¹⁸ or disturbance of the secretion of gastric hydrochloric acid.¹² For this reason, digestive upsets may occur as a result of the systemic involvement rather than from the medication which the patient is receiving. In patients with either nausea, anorexia or nocturia, the medication was stopped for a few days and then started again at a slightly lower dosage. Many of the older patients had nocturia prior to the administration of vitamin D therapy. The gastric symptoms were persistent only in 2 patients who had had peptic ulcers for many years.

SUMMARY

This series of 70 patients consists of 44 clinic patients and 26 private cases. Of the 44 clinic patients, 25 were

*This investigation was made possible by a grant from the Nutrition Research Laboratories, Chicago, Illinois, who furnished the Ertron for this study.



males and 19 were females. Of the 26 private cases, only 4 were males and 22 were females. These patients varied in age from 10 years to 77 years.

Various types of chronic arthritis were included, namely: rheumatoid arthritis, degenerative arthritis, Still's disease, spondylitis rhizomelique (Marie-Strumpell), gout, traumatic arthritis, and arthritis associated with osteitis deformans (Paget's disease), and senile osteoporosis.

In evaluating the results obtained in the management of these arthritic patients, it is important to keep in mind the fact that in addition to the arthritic process, there were frequently other disease processes which necessitated care. In this series of patients the following were the most commonly encountered concomitant pathological processes: disturbed gall-bladder and liver function, absence or lack of gastric acidity, colitis, gastric and duodenal ulcers, dietary deficiencies, arteriosclerosis, neuritis, hypertrophy of the prostate, salpingitis and oöphoritis, faulty body mechanics, pronated feet, bursitis, etc.

It is evident that these patients did not respond favorably to previous therapy, otherwise they would not seek additional medical attention for relief.

Most of these patients had had one or several recognized types of therapy. Among the procedures listed were surgical removal or treatment of foci of infection including teeth, tonsils, sinuses, prostate, gall-bladder and appendix. Other therapeutic measures which had been tried were bed rest, colonic irrigations, casts, braces and orthopedic appliances, physiotherapy, spa therapy, gold, vaccines, fever therapy, salicylates, cincophen, colchicine, and special diets. Many had had treatment by cultists of various types before coming to our clinic.

DISCUSSION

It is recognized that the period of management of these patients is, as yet, much too short to permit any conclusions as to the permanency of the results obtained, *nor is any specificity claimed*. Nevertheless, the improvement attained by the large majority of the group has been such as to warrant a preliminary report.

The outstanding feature of the management was the improved sense of well-being manifested by the patients within a varying period after the institution of therapy. In most of the cases, it became noticeable within three to four weeks, and in others, after two or three months.

Following the general systemic improvement, there was diminution of pain, decrease of soft tissue swelling, increase in range of motion, better muscular tone and greater endurance.

As was to be expected, the management, in approximately 5 per cent of the patients, did not bring the desired benefits. These patients are still under observation and the treatment is being continued and supplemented. The ultimate result in these instances will be reported in a later publication, which will include a much larger group of patients.

It is our hope that this management which we have found satisfactory to date can be continued for a long enough period and on a large enough group of patients to fully establish its value. In view of the number of

patients who, to date, have been restored to activity and relieved of discomfort, the type of management employed would appear to have definite therapeutic value in the treatment of chronic arthritis.

The mode of management employed is based on the individualization of the patient. In each case, an attempt is made to treat the patient as a separate and distinct problem. The only common factor which all of the patients received was Ertron. In this series, each patient received adjuvant treatment such as diet, orthopedic measures and physiotherapy, which seemed to be indicated in each particular case. For this reason, our results were better and the improvement occurred more rapidly and in a larger percentage of patients than in such a purely research series as reported by Snyder and Squires.^{10,11,12} We feel that it is only fair to point out that since it was their intention primarily to determine the therapeutic value of one medicinal agent, they selected only old chronic cases and, once therapy was instituted, no adjuvant measures were employed.

The writers wish to express their gratitude to the administrators of the Cook County Hospital and Fantus Clinic and laboratories and to the late Dr. M. Hubeny of the X-ray department, Dr. D. Kobak of the Physical Therapy department and those clinicians in the special clinics for their whole-hearted coöperation and team work so necessary in the treatment of arthritis.

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The Cause of Toxemias of Pregnancy*

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AT the October meeting of this Society in 1932, a report was given concerning the most probable cause of the true toxemias of pregnancy, a report based upon a comprehensive review of literature and clinical observations. It was maintained that all evidence converged upon the hypothesis that the primary cause originated from antigens or toxins, call them what you will, arising from the cells of the products of conception.

The data of serology indicate that as the cells of the products of conception develop, they gradually become bristling with lipo-carbohydrate and likely protein antigens. These antigens are harmless to the cells from which they arise and harmless to any organism to which they gain access if the cells of that organism possess these antigens. But, if the cells of an organism, to which these antigens gain access, do not possess these antigens, and do not possess inherited antibodies, the cells of this organism develop these antibodies, which first neutralize the antigens; then, if in excess strength, these antibodies will act to kill the cells from which the antigens arise, if they gain access to the organism from which they arise. The very fact that a cell produces antibodies against an antigen is *prima facie* evidence that the antigen is harmful to it.

That the cells of the products of conception are seldom if ever absolutely consonant with those of the mother seems to be suggested by the finding that the maternal organism reacts to the products of conception much as it does to a low grade bacterial infection, namely, by showing a leucocytosis, an increased sedimentation rate, at times a fever, and again, at times, anemias similar to those found in bacterial infection.

This observation, together with the impetus given by experiences with blood transfusions, groupings, and cross-matching, in the last war, led a number of us to investigate the question of incompatibility of bloods in its possible relationship to the toxemias of pregnancy. At that time, the A and B factors were alone envisaged. Some of us soon abandoned the work, because, in many of the worst early and late toxemias encountered, in which eventually both the baby and mother were saved, the bloods of mother, baby and even the father proved to be compatible, by methods of crossmatching then used. In 1923, our colleague, Dr. Irvine McQuarrie, published in the *Johns Hopkins Bulletin*, observations on 180 mothers and their babies as regards the incidence of late toxemia among incompatible and compatible bloods. He found that toxemia occurred $16\frac{1}{2}$ times more frequently when the fetal and maternal bloods were incompatible. Ninety-three and three-tenths per cent of the toxemia cases were found where bloods were incompatible, and only 6.7 per cent where the bloods were compatible. This was arresting evidence. His research also brought out an important finding, and that

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was that in 23.7 per cent of the cases the mother's blood agglutinated that of her offspring, whereas in only 2.7 per cent did the blood of the offspring agglutinate the blood cells of the mother. This 2.7 per cent may be interpreted as a high chance figure because in 1929, Polayes, Lederer, and Wiener in 500 cases found not a single newborn whose blood agglutinated that of the mother. Allowing for technical errors and chance, it may thus be assumed that disease in the mother cannot be attributed to antibodies from the fetus, because seldom is a child born with antibodies other than those of the mother. In 1928, it was shown by Smith that whatever antibodies are found in the fetus at birth, they diminish or disappear during the first ten days of life. The disappearing antibodies came from the mother's blood. The antibodies pass through the placenta by filtration as occurs with syphilitic reagins. These reagins disappear and if the fetus really has syphilis, it later develops its own reagins.

On the other hand, antigens from the fetus may get into the maternal circulation either by the breaking off of villi, as suggested by Veit in 1902, by bleeding from the vessels of the villi, as first suggested by Dienst in 1905, or by partial separations of the placenta, infarction and necrosis, as suggested by James Young in 1914.

It is pertinent to observe here, that in 1930 Kemp showed that iso-agglutinogens could be first demonstrated in fetal blood on the thirty-seventh day. This is about the time that nausea and vomiting or other signs of early toxemia begin. From the standpoint of possible fetal destruction, this observation is again pertinent, because, if natural or acquired antibodies can gain entrance to the fetus from the mother, the fetal blood cells can be subject to attack from the thirty-seventh day. It is obvious that this antigen-antibody reaction could explain some early abortions and miscarriages, apart from the morphological defects described by Mall. That the fetus is not more frequently killed in this manner could be explained by the finding of Kemp: that the red cells of the newborn infant generally have only 20 per cent of the sensitivity to agglutination that adult cells have.

As some factor other than the A and B antigens had to be found to make the antigen hypothesis tenable in those cases of toxemia in which it was found that the A and B incompatibility was not involved, an attempt was made to assess the possible part played by placental infarcts as regards antigens in general. A skin test was devised whereby placental infarcts were aseptically triturated with sterile normal saline solution immediately after birth, and this placental juice was used to form an intradural bleb on the mother, a control bleb being made with the sterile normal saline solution. In some instances a marked skin reaction appeared within twelve to twenty-four hours, especially marked in cases of fulminating toxemia. The possible implications of this test, where

positive, were discussed at the February meeting of this Society in 1937. At best, the test is crude and not qualitative and quantitative as are serological studies in which known antibody titers can be accurately tabulated.

In 1927, Landsteiner and Levine found the iso-agglutinogens M and N, with the interesting finding that the iso-agglutinin M is almost never found naturally in human blood, and the iso-agglutinin N never so found. In 1928 the agglutinin P was found by Landsteiner and Levine. Again in 1935, Andresen found another agglutinable property in human blood which he designated as X. This he found in 94 per cent of a series of 200 bloods. These data are informative from the standpoint of the antigen hypothesis of toxemia because they show that there are likely an infinite number of undiscovered antigens, any one of which may not only account for the toxemia found in cases where A and B compatibility exists, but may throw a different light on a more basic cause where A and B incompatibility obtains.

In 1940, Landsteiner and Wiener brought to the fore the Rh factor, and, early in 1941, Levine, Katzen, and Burnham showed the relationship of the Rh factor to erythroblastosis, toxemia, repeated abortions, miscarriages, stillbirths, and macerated fetuses. Since then, much work has been done on the Rh factor in relation to transfusion and erythroblastosis. The findings and approximate figures to date are as follows: Around 85 per cent of the population are Rh positive and 15 per cent are Rh negative, irrespective of other group specific substances. The Rh factor is a dominant and appears in the fetus with an Rh father. The Rh antigen in the fetus stimulates the production of Rh antibodies in a Rh negative mother; and these antibodies, gaining access to the fetus, cause the condition known as erythroblastosis, characterized by varying degrees of anemia, hemorrhage, icterus, and hydrops, that may lead to intrauterine or neonatal death of the fetus. In the mother, the titers of the Rh antibodies can be watched. Rapid increase in the Rh titer is a grave sign for the fetus. The finding pertinent to our subject is that in approximately 30 per cent of these cases, a clinical toxemia appears in the mother. That a subclinical toxemia does not exist in the remainder is not known.

This is one more indication that where fetal antigens are not present naturally in the mother, a clash is precipitated between fetus and mother that may injure or destroy the fetus, the mother or both.

One of the main reasons for seeking to establish beyond question the cause of a disease is to permit the formulation of some means of prophylaxis or to permit the assessment of unfavorable conditions that may result in the disease and thus stimulate vigilance in watching for the first signs of its accession. Now, clinical, laboratory, and theoretical data point strongly to the conclusion that the most practical prophylaxis against late toxemia is the elimination of focal infection and the prevention of acute infections. Apart from any deleterious action that the infection itself may exert on the maternal organs, it may raise the titer of maternal antibodies to the point where increased antigen-antibody reaction at the placental site may seriously damage the placenta and

the subsequent necrosis may bring about increased absorption of antigens by the mother. For many years it has been suspected, and in the past two years, where the Rh factor is concerned, it has been demonstrated to a high degree of probability that antigen-antibody reaction is a not infrequent cause of abortions, miscarriages, stillbirths, and macerated fetuses, and is accompanied by a substantially high percentage of late toxemias; but over a much longer period of years, clinical observations have indicated that focal infection and particularly acute infections of any type are frequent precursors of these entities. In reviewing histories taken in cases of late toxemia one will often find no mention of clinical infection shortly antedating the accession of toxemia, either because it was not considered important, or because no care was taken to elicit the evidence.

The following sequence of events occurs too frequently to be a mere chance occurrence: a pregnancy is progressing with apparent normality, when suddenly the mother develops some form of acute infection; you visualize that a shower of placental infarcts may be taking place. Shortly after, an acute toxemia develops, and at birth the placenta will show outstanding infarcts with distinctive characteristics, and, as accurately as it is possible to estimate the age of infarcts, it is estimated that they occurred during the infection. The large number of cases in which you may have infection not followed by toxemia and possibly showing widespread placental infarction do not invalidate the above findings and deductions, because, the characteristics of the infarcts are not the same, and, if the hypothesis that the toxin arises as an antigen from the products of conception is true, it is likewise true as a corollary that no amount of placental infarction can cause a true toxemia if the products of conception are not specifically toxic to the mother.

The following case well illustrates what an infection may do. Dr. R. W. Koucky of this city showed me the titer records of a mother who five weeks previously had delivered an erythroblastotic child. This mother proved to be an Rh positive and in group O. The baby was in group B. At the first examination, five weeks after delivery, the mother's B antibody titer was 1-1600. This titer gradually diminished until eight months after delivery it had fallen to 1-500. She then developed an infection, whereupon the titer rose to 1-2500. One week after the infection the titer fell to 1-800. This case is being followed to eventually establish her normal B antibody titer, so that if she becomes pregnant again with a B group child, the pregnancy may be terminated after viability of the child in time to save the child if the maternal B antibody titer ascends rapidly.

Now, how does this hypothesis of cause, under discussion, affect treatment of the toxemia and are there any important connotations that can be drawn from findings in connection with it?

At present, in so far as treatment is concerned in the interests of the mother alone, it makes little difference what hypothesis a physician chooses to accept as the most probable hypothesis of primal cause so long as he follows approved treatment and indications for terminating the pregnancy. However, if one envisages the toxin as com-

ing from the products of conception and realizes the possibility of its extreme virulence, instead of believing that the primal cause in early toxemia is a psychosis, a hypoglycemia, a dehydration phenomenon, a starvation acidosis or an avitaminosis, he is less likely to place too prolonged confidence in the proper early and intensive treatment of these important entities and less likely to procrastinate in removing the products of conception until it is too late. By the same token, in late toxemia, it would seem that one is more likely to use more reasoned judgment in choosing the best time and type of intervention, according to the conditions obtaining. Again, where a pregnancy is superimposed upon a cardiovascular or kidney lesion, or an essential hypertension, the prognosis and course of treatment must obviously be greatly influenced by the reasoned possibility that the products of conception in this particular pregnancy may not be clinically toxic.

The serologists have given us data that should permit us to save many babies that, following past technics, we have often lost. Not alone in erythroblastosis, where in the past we have followed largely the antenatal X-ray findings in regard to the condition of the child, but in late toxemias in general, we will now not have to depend entirely upon weakening fetal heart sounds to tell when we should step in and attempt to rescue the baby before it is too late. The course of carefully followed known antibody titers of the mother should aid us in this decision. As experience increases, these titers may aid us in deciding more accurately when pregnancy should be terminated in the interests of the mother. At present, the connotations are: that in all cases giving a history of repeated abortions, a history of an erythroblastic baby, or a history of a dead baby in late toxemia, we should have the Rh and A and B antibody titers followed closely. This may become a routine in be exercised in the crossmatching of even the first donor chosen to transfuse a woman who gives a history of a all severe late toxemias. What must still be determined is

just how much any one of these antibody titers should be allowed to change in strength before intervention is indicated, after the period of infant viability has been reached. This recent data makes many of us who have had opportunities of examining the external faces of uteri in cesarean sections associated with late toxemia and premature separations, suspect that both infarcts in toxemia and subperitoneal ecchymoses, etc., in premature separations may very likely be antigen antibody reactions. That many premature separations are associated with toxemia is well known, and if we could, by the careful following of antibody titers, get some clue as to their likelihood, we might be able to circumvent some of the worst of them. You will likely recall cases of severe separations in which if the child had been removed a few days earlier, not only would the child likely have lived, but the mother would have been spared the necessity of multiple transfusions, or likely saved from death. In some of these cases, the difficulty of finding donors who crossmatched properly, even though belonging to compatible groups, makes it seem likely that an antibody was present in that mother's blood which might have forewarned us that intervention should be instituted many days before the catastrophe, had the titers of the mother's antibodies been followed.

These data are of especial importance to all who, for any condition, are called upon to give transfusions to women. It must be remembered that special care must pregnancy within the previous two years. Levine, as you know, has developed a special incubation technic that makes crossmatching more sensitive.

Of all hypotheses of the cause of the toxemias of pregnancy, the hypothesis that the toxin arises from the products of conception seems still to hold the highest degree of probability. It is the only hypothesis upon which all clinical and laboratory findings converge, and conversely, it is the only hypothesis that will account for all the clinical and laboratory findings.

REPORT ON HEALTH ACHIEVEMENTS IN NORTH DAKOTA*

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Since 1900, fourteen years have been added to the average life span in the United States. In 1940 the average life expectancy at birth was 63 years for males and 66 years for females. This increased life expectancy is due in a large degree to the control of diseases made possible by the great strides in medical science and public health service. Deaths from various communicable diseases have been markedly decreased. Medical diagnosis and surgical skill have been greatly improved and hospital facilities have been increased and improved.

Along with these health achievements have come advances in standards of living and in the knowledge and practical application of facts about nutrition. Similarly industry has provided clean, well ventilated factories and shops in which the hazards of the various occupations have been reduced to a minimum.

In 1939 the National Resources Board rated North Dakota as the healthiest state in the union. Newer methods of diagnosis and treatment have reduced the average time a patient spends in the hospital from twenty-eight days in 1890 to

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†Acting state health officer.

twenty-two days in 1915 and to nine days in 1941. This represents a tremendous saving in money and a marked alleviation of suffering. One of the best examples can be found in the modern treatment of pneumonia. In past years a person who became sick with pneumonia had to spend from ten days to three weeks in a hospital. At a recent meeting of the State Medical Association's Pneumonia Committee our attention was called to the fact that at the present time pneumonia patients rarely stay in the hospital more than a week.

During the year 1940 North Dakota had the lowest maternal mortality rate in the United States. This rate, 1.7 per thousand live births, was also the lowest rate ever recorded for our State and although we did not have the lowest infant mortality rate in the United States during 1940 we did attain the lowest rate ever recorded for North Dakota.

In 1940 we had the distinction of having the lowest death rate from both alcoholism and syphilis. The blood testing of selectees showed that the prevalence of syphilis is 5 per thousand placing our State in the group of states having the lowest venereal disease rates in the country.

In tuberculosis deaths, North Dakota was also able to attain distinction. We were sixth from having the lowest in the United States and we ranked first in the number of new cases of tuberculosis discovered for each death. The latter

achievement speaks well for the interest which the medical profession has taken in case finding and reporting. Only two states in the union have more beds for hospitalization per tuberculosis death than North Dakota.

As the population of our State was only about one thousand higher in 1925 than it was in 1940 it will be of interest to make the following comparison: The crude death rate in 1925 was 7.8 as compared to 8.2 per thousand population for 1941. This increase does not represent an actual increase but rather an increase in the efficiency of reporting deaths. A full time state health department was established in North Dakota in 1923 and the apparent increase in the rate, no doubt, represents better recording of deaths rather than an increase in the actual death rate. The crude death rate, 8.2 per thousand population, was the lowest in the United States.

Health achievements are reflected also when one compares the deaths in various age groups during two periods. During 1940 there were twelve hundred fewer deaths in the age group under 45 years of age as compared to 1925. In the age group over 45 years of age there was an increase, or thirteen hundred more deaths in 1940, as compared to 1925. Let us see what these figures mean. It simply means that an increase in the life span will increase the number of aged people in the population. For this reason we are experiencing an increased number of deaths due to diseases of advanced age such as heart disease, intracranial lesions of vascular origin (strokes), cancer, and kidney disease. Medical science will, no doubt, be able to retard the onset of these diseases even more in the future when better diagnosis and treatment are available and when the population has gained and will put into practice the newer knowledge of nutrition. Then we can increase the productive span of life even more.

In spite of the fact that in 1940 North Dakota had a birth rate higher than that of the west northcentral states, 20.8 per thousand, and for the United States as a whole, our infant death rate, 45 per thousand live births, was among the lowest in the area.

Infancy was safer in North Dakota in 1941 than during any previous year with a new low rate of 38 per thousand live births. It is impossible to name all the agencies which have added to the enviable health record of North Dakota. In our public health achievements we owe much credit to the medical profession, the dental profession, public health agencies, and other health agencies, both private and public. All agencies whose objectives are to develop a healthier people in North Dakota can have a just pride in our achievements because their tireless efforts daily give the command "Go down death." We owe much to the physicians who strive daily to attain more scientific knowledge and who are willing to pass on its practical applications through inculcating health habits early in pregnancy. We have reason to believe that some contribution has been made through the efforts of the Maternal and Child Hygiene Division and nurses who teach the public the value of these services.

Motherhood was safer in North Dakota during 1940 than in any other state. Back in 1925 the maternal mortality rate for North Dakota and the United States were about the same. The rate for North Dakota dropped from 6.2 to 1.7 per thousand live births during the past 15 years. In 1940 the rate for North Dakota was just about half that for the United States as a whole. This outstanding record has been accomplished through the years of effort of the medical profession, its Maternal and Child Hygiene Committee, and the educational efforts and activities of the state and local health departments.

Over 94 per cent of the births in North Dakota were attended by physicians during 1940. In the cities 75 per cent had the benefits of hospital facilities while in rural communities only 50 per cent had these advantages. Further reductions in maternal and infant mortality will occur in the future as facilities to meet all emergencies are made available to a greater percentage of mothers and their infants.

Many communicable diseases are on the decline in North Dakota. The application of the known preventive procedures such as smallpox vaccination, diphtheria immunization, and

similar preparations have resulted in a tremendous saving of human lives, suffering, and expense to the taxpayers. During the period 1902 to 1925 the reports of county health officers indicate that counties were spending from two to five thousand dollars annually for the care of smallpox and typhoid patients. At the present time such expenditures have been almost eliminated. A comparison with 15 years ago reveals that tuberculosis deaths dropped from 309 to 121; pneumonia deaths from 500 to 251; diphtheria from 83 to 5; scarlet fever from 66 to 3; whooping cough from 70 to 16; smallpox from 7 to none. Although the smallpox deaths have dropped to none during the past 20 years we had more than 5,000 cases of smallpox in our State. This suffering from smallpox could be prevented if all individuals were vaccinated against smallpox. At the present time we have a law which makes it illegal to require smallpox vaccination as prerequisite for school attendance. If we were to replace our present law with a compulsory vaccination law we could eliminate smallpox from the state of North Dakota.

Typhoid fever is another disease which has been relegated in many counties to the position of a medical curiosity. This has been accomplished through the persistent efforts in water and milk sanitation and in our program of typhoid fever carrier control. Typhoid deaths decreased from 24 in 1924 to 1 in 1941. Education in regard to the danger of taking laxatives for stomach ailments and advancements in treatment have decreased about 63 per cent the deaths from appendicitis during the past 15 years. Appendicitis deaths have dropped from 136 to 50.

Influenza and pneumonia were among the five leading causes of death in all age groups except those between 25 and 44. Heart disease has been among the five leading causes in all ages except those under 5. Cancer was among the five leading causes of death in all age groups over 25 years. Intracranial lesions of vascular origin (strokes) and kidney ailments are among the leading causes of death in all groups over 45 years of age. Tuberculosis remains among the leading causes of death for the age groups 5 to 44 years. Motor vehicle deaths (accidents) are one of the leading enemies for the age groups 1 to 4 and 15 to 44. Appendicitis takes a striking toll in those between 1 and 25 years. Diarrhea and enteritis are leading public health problems in all under 5 years.

The five principal causes of deaths in 1941 in North Dakota were (1) heart disease, (2) cancer, (3) intracranial lesions of vascular origin (strokes), (4) influenza and pneumonia and (5) kidney diseases. These causes of death accounted for almost 60 per cent of all the deaths in the State. Almost half of the total deaths occurred in those over 65 years of age. Nearly one-fourth of the total deaths occurred between 45 and 64 years of age.

Diseases arising as a result of advanced years are one of our major public health problems at the present time because people are living to be older as a result of our health gains in the lower age groups. These are diseases which must be reduced through personal hygiene. To cope with them requires the individual attention of a physician. They can not be attacked by mass treatment methods. Education of the public through the combined efforts of the individual physicians, State Health Department and North Dakota Women's Field Army for the Control of Cancer, is our present method of attack on cancer.

According to Surgeon General Thomas Parran "almost every year additions are being made to the scientific knowledge which makes it possible for us to do more than was previously possible in the prevention of disease. We have every reason to believe that we should accomplish more now than we did in the past. We must find ways to shorten the lag between what we know and what we do in prevention and treatment." Examples of applying our newer knowledge and surer weapons are illustrated in such diseases as rickets, pneumonia, diphtheria, syphilis, typhoid fever, cancer, heart disease, diabetes, smallpox, tuberculosis. We are finding surer weapons such as the Kenny treatment for poliomyelitis, new methods of saving teeth, newer knowledge of vitamins, minerals, and other nutritional elements. The trend of our progress is upward. We must all join the fight if the trend is to remain upward.



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MEDICAL MEETINGS IN 1943

As a contribution to the nation-wide effort to conserve all resources, the larger medical meetings are being cancelled for 1943. It is a logical thing to do, from every standpoint, and will meet with universal approbation. Not only will many material *essentials* be saved, but the physical and mental energy involved can well be diverted into channels more directly concerned in the business of winning the war. There can be no dispute about that.

That these meetings are highly useful in normal times must also be admitted. What we must try to do now is to see that their value, while in a state of suspense, is not wholly lost. This means that we who are not in the armed forces must put forth every effort to keep the medical home fires burning. Every type of local meeting must be kept up to the best level of efficiency and

made attractive as well as useful. There is in every community a wealth of interesting clinical material and those who are capable of developing its scientific value. Splendid programs can be made up from this source, either on the basis of contributed papers or round table discussions. It should be a good training school for those who have modestly concealed their talents or through unwarranted diffidence kept in the background. Hospital staff meetings afford an unusually good opportunity for useful and interesting presentation of clinical and pathological material. Now is the time to make the most of it.

For the duration, then, let us merely consider our larger medical contacts as decentralized. The time will come when we can travel again and perhaps we shall enjoy it more for having to depend on our own resources in the meanwhile.

G. C.

MEN DIE BUT IDEALS LIVE ON

The death of Alexander Woolcott on January 23, 1943, brings to mind a tribute he paid to "a general practitioner" in his compilation of masterpieces from the literature of his day in his first volume of *The Woolcott Reader*.

Woolcott was not a plagiarist but probably the greatest raconteur of his time. While this often called for a repetition of formerly told stories, it must be admitted that he added much by his choice of narratives, appropriate comments and charming rendition. He was a master of the long descriptive sentence spoken in a low dulcet, story-telling tone, with slight but gentle inflection. It suggested few punctuation marks and no dyspnea.

In Woolcott's comments on the chronicle of Dr. McLure of Drumtochty, written by Ian Maclaren, a Liverpool clergyman who died in Iowa in 1907, he made this statement: "If in some crisis of flood or fire, I knew I could keep, in my flight to safety, but one out of all the sacred writings in this book, there would be no moment

of hesitation. I should choose *A Doctor of the Old School*."

Nearly everyone is familiar with *Beside the Bonnie Brier Bush*. Woolcott admitted having read it forty times; but each is far too prone to think of it as a tale of experiences that could only befall an humble doctor in an humble community in the humble past. On the contrary, the same altruism that characterized the life of Dr. McLure continues to operate in our profession today and it is not confined to the general practitioner. Recently when an orthopedist was asked to view the roentgenograms in a case of fracture at the neck of the femur in a patient in her nineties, the referring physician felt it only fair to tell him that she had no money. "How much difference would that make if he were to operate?" The answer came back ringing clear "Not a bit." There was no hesitation, no mercenary quibbling. Instances of this kind occur every day and many times a day. Hippocrates is dead and that rugged Scotsman of Drumtochty is dead but their ideals live on.

A. E. H.

Book Reviews

What the Citizen Should Know About Wartime Medicine, by JOSEPH R. DARNALL, M.D., United States Army, and VIOLA IRENE COOPER; New York: W. W. Norton Co., Inc. Tan fabrikoid, gold-stamped, 222 pages, plus bibliography and index. Price \$2.50.

This is a well organized and well written book on medicine as it is practiced in the military services of our country at war. The authors cover the field of medicine completely, that is, both preventive and therapeutic, in the short span of the book. They have read, digested and presented in a very readable form practically all medical subject matter that has anything to do with wartime medicine in its many phases.

Air medicine is given an important position; military sanitation and hygiene, communicable diseases, infectious diseases, as well as venereal diseases are all discussed with a very modern concept.

This book portrays the present status of medicine in the United States, not only in military service, but also in civilian service and in educational and public health service fields. The authors are to be congratulated on the readability of the book as well as the concise inclusion of subject matter.

Anatomy of the Human Body, by HENRY GRAY, F.R.S.; edited by WARREN H. LEWIS, B.S., M.D., assisted by EARL T. ENGLE, Ph.D.; JOSEPH C. HINSEY, Ph.D.; NORMAND L. HOERR, Ph.D., M.D.; KARL E. MASON, Ph.D.; DAVID McK. RIOCH, M.D.; and ROY G. WILLIAMS, M.D.; red pebbled buckram, gold-stamped, 1380 pages of text plus index of 47 pages, 1,256 engravings (many in color); Philadelphia, Lea and Febiger, Ed. 24, 1942. Price, \$12.00.

Mr. HENRY GRAY, F.R.S., (1827-1861) wrote his famous *Anatomy* in 1858, when he was only 31 years old. Three years later, at 34, he was dead of confluent smallpox. Since that time the work of the brilliant demonstrator and lecturer on anatomy at Saint George's Hospital in London has been issued in twenty-eight editions in England and twenty-four in the United States. Should there yet remain those who believe that anatomy as a basic science is largely static, the words of a distinguished Minnesota cardiologist may be recalled in refutation: the carotid sinus, represented anatomically by an enlargement of the ter-

minial part of the common carotid artery and of the internal carotid artery as it leaves the common carotid artery, has been included and described in textbooks of anatomy only within very recent years, whereas it was originally demonstrated functionally and topographically by physiologists and has been known to cardiologists longer than it has been known to anatomists. It is described, for instance, in the current (twenty-fourth) edition of Gray's *Anatomy*, but is not pictured. In another textbook of anatomy, published within a year, it is neither depicted nor described.

Osler's well-known contention that "More than any others, radiographers need the salutary lessons of the dead-house . . ." has been applied in reverse to the present work: thirty new roentgenograms added to the section on surface and topographic anatomy testify to the assistance which roentgenology can render to anatomy as well as to diagnosis and therapeutics. The volume is forty-seven pages longer than its predecessor, and has had the benefits of the addition of six associate editors or collaborators. Dr. Engle, of Columbia University, writes on the ductless glands. Dr. Hinsey, of Cornell University, writes on the peripheral and autonomic nervous systems. Dr. Hoerr, of Western Reserve University, writes on the blood vascular system. Dr. Mason, of the University of Rochester, writes on the respiratory and digestive systems. Dr. Riach, of Washington University, writes on the central nervous system, and Dr. Williams, of the University of Pennsylvania, writes on the urogenital system. The general editor, Dr. Lewis, is a member of the Wistar Institute of Anatomy and Biology of Philadelphia.

To say at this time that Gray's *Anatomy of the Human Body* is a valuable textbook would be supererogatory, for it has been recognized as being preëminently such for more than seventy-five years. It can be said, however, that the latest edition of the work, with the extensive revision it has undergone and the emendations it has received from the new editors, is a notable descendant of Henry Gray's volume of only 750 pages which first appeared in 1858.

A Short History of Science to the Nineteenth Century, by CHAS. SINGER; Oxford at the Clarendon Press; 392 pages.

This history of science, in spite of its brevity, covers a span of over 2500 years. The author discusses in a really simple form the development of an amazing number of subjects, such as geography, medicine, public health, mathematics, physics, religion, astronomy, etc. He has succeeded admirably in interdigitating and narrating the material in a fashion that makes for most instructive and interesting reading. This small volume should make a constructive addition to most libraries.

News Items

Dr. Alfred Blalock of Baltimore, Maryland, professor and director of the department of surgery at the Johns Hopkins Hospital, will give the tenth E. Starr Judd lecture at the University of Minnesota in the Museum of Natural History Auditorium on Thursday, March 11, 1943, at 8:15 P. M. The subject of Dr. Blalock's lecture is "Traumatic Shock with Particular Reference to War Injuries." The late E. Starr Judd, an alumnus of the Medical School of the University of Minnesota, established this annual lectureship in Surgery a few years before his death.

Dr. Fred W. Ferguson, Kulm, North Dakota, and Dr. W. H. Long, Fargo, are the new members of the state board of medical examiners. The appointments were made by Governor John Moses of North Dakota, who at the same time reappointed Dr. W. H. Sihler, Devils Lake.

Dr. H. C. Joesting, formerly of Butte, Montana, is now in Seattle where he is director of the Clein Children's clinic. Dr. Joesting practiced in Butte for 12 years.

Dr. William H. Griffith of Hollywood, California, formerly of Huron, South Dakota, is now a captain in the U. S. Army medical corps.

Major Robert Cochran, formerly of Plankinton, South Dakota, is taking a three months' postgraduate course in plastic surgery at Columbia university, New York.

Dr. J. J. Kane, Butte, Montana, has been reappointed Silver Bow county physician.

Dr. Theodore Loken, Ada, Minnesota, is the new president of the Red River Valley medical society. He succeeds Dr. V. V. Boardman of Twin Valley who is now in the Army. Dr. C. H. Homstrom, Warren, is vice president and Dr. C. L. Oppegard, Crookston, secretary.

Dr. George H. Holt, Jamestown, North Dakota, is the new president of the Stutsman County medical society.

Dr. Charlotte J. Morrison, Minneapolis, is the first woman ever appointed Hennepin County physician.

Dr. E. D. Risser, Winona, Minnesota, is the new president of the Winona County medical society.

Dr. George Bergh, Montevideo, Minnesota, has been promoted to the rank of major in the U. S. Army medical corps.

Dr. A. C. Fortney, Fargo, North Dakota, has joined the Army medical corps as a captain.

Dr. O. O. Larsen, Detroit Lakes, Minnesota, has been elected president of the Clay-Becker County medical society. Dr. H. G. Rice, former president, is now in the navy.

Dr. John G. Thompson, Helena, Montana, is the new president of the St. John's hospital association.

Dr. Frank Towers, Minneapolis, said to be the oldest living member of Hennepin County medical society, observed his ninety-fourth birthday recently. Former Hennepin county coroner and Minneapolis city physician, Dr. Towers retired 25 years ago after having maintained a local practice since graduating from medical school.

Dr. Erling S. Fugelso, Minot, North Dakota, has been promoted to the rank of lieutenant colonel in the medical corps of the U. S. Army. The promotion followed a period of training at the command and general staff school, Fort Leavenworth, Kansas. At present he is stationed at Camp Grant, Illinois.

Lieutenant Commander B. C. Shearer of Helena, Montana, officer in charge of the medical department of the main Montana navy recruiting station, has been transferred to a new navy hospital in New Orleans, La.

Dr. Emory J. Bordeaux, Missoula, Montana, is now a lieutenant in the navy.

Dr. N. O. Monserud, Cloquet, Minnesota, a member of the Raiter hospital staff, has received a commission as first lieutenant in the medical corps of the Army.

Dr. Lewis Miller Reid of Minneapolis has taken over the practice of Dr. H. C. Arey, Excelsior, Minnesota, who is now a medical officer in the navy.

Woman's Auxiliary to the South Dakota State Medical Association

The Seventh District medical auxiliary met at the home of Mrs. N. J. Nessa recently. Co-hostesses were Mrs. M. A. Stern, Mrs. O. V. Opheim and Mrs. C. J. Mac Donald. Two communications, one from the state president, Mrs. J. C. Hagin, Miller, and one from the state program chairman, Mrs. C. E. Sherwood, Madison, were read. Both stressed support of the auxiliary program as approved by the South Dakota State Medical association. It embraces a varied scope including active participation in all phases of Red Cross and War Defense work, promotion of health education, legislation and a thorough survey of the *Bulletin*, official organ of the national auxiliary. It was decided that "Doctor's Day" be observed March 30.

Announcement of a \$1,000 Award for Outstanding Research on Alcoholism During 1943

1. The research for which the award will be granted must contribute new knowledge, in some branch of medicine, biology, or sociology, important to the understanding or prevention or treatment of alcoholism.

2. Any scientist in the United States, Canada or Latin America is eligible for the award.

3. The project may have been inaugurated at any time in the past or during the year 1943, provided (a) that a substantial part of the work be carried on during the year 1943, (b) that it be developed to a point at which significant conclusions are possible before the end of the year, and (c) that a report on the work has not been previously announced and described before a scientific body or previously published.

4. It is desirable, but not necessary, that those planning to work for the award send to the Council before

March 1, 1943, a statement of such intention. If the Council receives such information, it can be helpful in the prevention of undesirable duplication of effort. If a research project is conceived and inaugurated later in the year 1943, a statement of intention may be sent to the Council at a later date.

5. A report on the work and resulting conclusions must be submitted to the Research Council on Problems of Alcohol on or before February 15, 1944. The Council will provide an outline for use in the preparation of reports.

6. The award will be in cash, and will be given to an individual scientist whose work is judged sufficiently outstanding and significant to merit the award.

7. The Committee of Award will consist of five persons—an officer of the American Association for the Advancement of Science, and four representatives of the Scientific Committee of the Research Council on Problems of Alcohol.

8. If the Committee is not convinced of the outstanding merit of the research done during 1943, as described in reports submitted, it may, at its discretion, postpone the award until another year, or until such time as work of such merit has been performed.

The Director,
Research Council on Problems of Alcohol,
Pondfield Road West,
Bronxville, New York.

Necrology

Resolution Drafted in Death of Dr. F. H. Malee

The Silver Bow County Medical society recently adopted the following resolution on the death of one of its members, Dr. F. H. Malee, prominent Butte physician, who died at Los Angeles while on duty with the United States Army:

"Whereas, our member and colleague, Dr. F. H. Malee, has volunteered his services with our armed forces during this time of national and international crisis, and

"Whereas, while on duty with our armed forces Dr. Malee's life was taken,

"Be it resolved that we, the members of the Silver Bow County Medical society, pause in our deliberations to remember his life with us and to pay our respects to his character, ability and personality.

"Be it further resolved that we remember those of his family who are still with us, and offer them the consolation of knowing that their husband, father and brother died in the service of his country and our country in her hour of need.

"Be it further resolved that a copy of these resolutions be spread upon the minutes of this society and a copy be sent to the press and to the bereaved family.

"(Signed) D. L. Gillespie, M.D.; J. E. Garvey, M.D.; Harold W. Gregg, M.D."

CONTINUATION STUDY COURSES Medicine, Hospital Service, Public Health Winter 1943

CENTER FOR CONTINUATION STUDY

University of Minnesota
Minneapolis

Anesthesiology	February 8-10
Dietetics	February 18-20
Medical Social Service	February 18-20
Rheumatic Fever	February 22-24
General Surgery	March 8-13

Anesthesiology—February 8-10

Course for nurse anesthetists. Because of large numbers of physicians in military service more anesthetics are being given by nurses. Course will review recent developments with especial emphasis on safety factors. Enrolment limited to members of American Association of Nurse Anesthetists and others with equal training and experience. Program last year was of great value to nurse anesthetists at that time. Study is being made of special needs at present time. Please send for special information card. Tuition \$5.

Dietetics—February 18-20

Course for dietitians and nutritionists. Dietitians employed in hospitals, community agencies and institutions as well as home economists in teaching or administrative positions will find this course of value. Program will deal exclusively with nutritional problems growing out of wartime difficulties. Tuition \$5.

Medical Social Service—February 18-20

Course for medical social workers on special wartime problems in their field. Medical social service has also been affected by new developments in medical practice. Program will consist of lectures, discussions, and demonstrations. Tuition \$5.

Rheumatic Fever—February 22-24

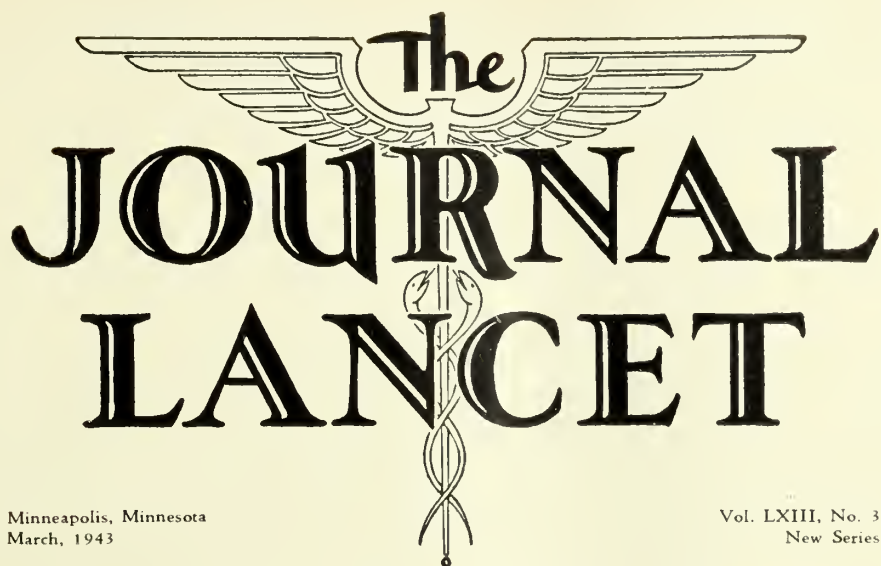
One of the most important diseases of children with potentially serious effects in childhood and later life. Course for public health nurses to help them understand the disease. Program will cover practical aspects of rheumatic fever problem as it affects children and adults. Inclusion of heart disease in crippled children's program is reason for offering course at present time. Tuition \$5.

General Surgery—March 8-13

Course will consist of lectures, clinics, demonstrations, and round table question and answer periods. Subject matter will deal largely with surgical problems of emergency nature. Recommended for all who must give surgical service in these times. Outstanding leaders in surgical thought and practice will take part. There will be no opportunity to acquire operative skills, but demonstrations and discussions will bring out modern surgical teaching. Tuition \$25.

Other Courses

Arrangement will be made to offer other special courses. Please send your suggestions.



Minneapolis, Minnesota
March, 1943

Vol. LXIII, No. 3
New Series

Nutrition Problems of University Students*

Maj. B. A. Watson, M.C.

Minneapolis, Minnesota

THE main nutritional problems encountered in the general student body of the University of Minnesota are obesity and undernutrition. Sixty-six and four-tenths per cent (66.4%) of the students are of normal weight;† 17.1 per cent are overweight; and 16.5 per cent are underweight, according to a survey of 4,652 consecutive records of students.

One should never presume that a patient is over- or underweight because his weight is reported as 80 to 120 per cent of normal. The fact that the bony framework and body build are important in determining whether an individual is truly over- or underweight has not received enough consideration. The writer has seen persons of both sexes placed in under- and overweight groups by statistical computation when one glance at the individuals in question would have indicated that no such disturbance existed. Hence, before dietary measures for nutritional disturbances are recommended, the physician should give careful consideration to body build.

CALCULATION OF IDEAL WEIGHT

Dr. Diehl, in his book, *Healthful Living*, gives a formula which is as accurate as any and enables the physician to calculate ideal weight rapidly. It should, however, not be used in calculating the ideal weight for subjects under 15 years of age. The formula is as follows:

*From the Nutrition Clinic, University of Minnesota Students' Health Service.

†Normal weight, 90 to 110 per cent variation from the ideal weight, as calculated from standard height-weight tables. Underweight, less than 90 per cent of ideal weight. Overweight, 110 per cent or more of ideal weight.

Ideal weight for males: Age + 100 + 3 lbs. per inch over 5 feet. Example: Male age 20, 5 feet 10 inches tall: $120 + 30 = 150$ lbs.

Ideal weight for females: Age + 100 + 3 lbs. per inch over 5 feet minus 5 lbs. Example: Female age 35, 5 feet 6 inches tall; $135 + 18 - 5 = 148$ lbs.

Variations of 10 to 20 per cent above or below these calculated ideal weights may be allowable, depending on body build, before the state of obesity or undernutrition is diagnosed. The real age is used up to 35 years, but after that the figure remains at 35 for both sexes.

TYPES OF OBESITY

Obesity may be divided into two groups on the basis of etiology:

A. *Gluttony:* In this type the individual consumes more calories each day than are expended in normal activity.

B. *Glandular Disturbance:* In this type the increased weight is due to conditions beyond the control of the patient, and is usually the result of an underfunction of the thyroid gland or dysfunction of the pituitary or gonads.

Gluttony is responsible for approximately 85 to 90 per cent of overnutrition and can best be treated by dietary restriction. One should remember that under basal conditions the adult human body requires about 10 calories per pound per 24 hours to maintain itself in a fasting state at complete rest. Depending on activity,

one must add approximately 40 to 100 per cent to the basal caloric requirements to arrive at the proper estimation of total caloric intake for a given individual:

Example A. Office worker who should weigh 150 pounds: 150×10 calories per pound = 1,500 calories for basal requirement. $1500 + 50$ per cent above basal for activity = $1,500 + 720 = 2,220$ calories to maintain health and activity.

Example B. Ditch digger who should weigh 160 pounds: 160×10 calories = 1,600 calories for basal requirements. $1,600 + 100$ per cent = $1,600 + 1,600 = 3,200$ calories to maintain health and activity.

If an individual requires only 2,200 calories a day and eats 3,000 there is a daily caloric excess of 800 calories. In one month this would mean that 24,000 calories in excess of normal requirements had been consumed. As the excess calories are stored as fat and in 1 gram of fat there is the equivalent of 9 calories, then $24,000 \text{ calories} \div 9 \text{ calories} = 2,666.6$ grams, or 5.8 pounds, added during the month. This is an extreme example, but nevertheless illustrates that consistent overeating, even though in small quantities, can result in obesity.

Glandular obesity, fortunately, occurs in a comparatively small number of cases. The so-called "pituitary type" of obesity can be diagnosed clinically, but rarely if ever is it completely corrected with our present knowledge of endocrinology. It should be noted that this type of obesity does respond to some extent to restricted caloric intake.

Hypofunction of the thyroid gland may aid in the development of another type of glandular obesity. However, this type of obesity is in our experience exceedingly uncommon. It should be noted that markedly overweight individuals have almost uniformly low basal metabolic rates, but this does not imply the presence of true hypothyroidism. It has been repeatedly observed in our clinic that individuals with a basal metabolism rate of -20 or -30 who are obese will, by reducing weight (and body surface), be found to have a gradually rising basal rate in the absence of any thyroid therapy. The routine prescription of large doses of thyroid extract to obese patients has two detrimental effects: (1) it tends to increase metabolism, thereby increasing appetite; and (2) it gives the patient a false sense of security that medicine rather than diet will reduce weight.

I believe that the giving of thyroid extract to an obese patient should be reserved for those cases in which other signs and symptoms of definite, even though mild, clinical or subclinical myxedema exist.

DIETARY MANAGEMENT

The use of an excessively restricted caloric intake in weight reduction is ill-advised and may result in actual harm to the patient. A reducing diet should fulfill two needs: (1) it should be readily available to the subject; (2) it should contain minimal essential requirements for the patient's health. Many reducing diets that are deficient in vitamins, iron, calcium, etc., produce an inherent craving for certain foods, making it extremely difficult for the patient to follow the diet.

The speed of the reduction is not nearly so important as continued reduction, and at the same time the education of the patient, so that when the desired weight is reached it can be maintained. This last point is too often disregarded.

In the Nutrition Clinic at the University of Minnesota Students' Health Service it has been our practice to give patients a basic diet of approximately 56 grams carbohydrate, 56 grams fat, and 45 grams protein (Table I). This basic diet meets minimal requirements for health. It has been used for as long as nine months by a patient with no detrimental effect. The patient soon learns this basic diet. When the time for increasing the diet comes, the patient is told to add one slice of bread or its equivalent (Table II). As the patient reduces, more bread is gradually added until a maintenance diet is approached. Butter, bacon and cream may be added if desired, though too high a fat intake reduces the bulk of the diet and the patient may feel extremely hungry, and tend to dietary indiscretions.

Thus by diet and education an obese individual can reduce and ultimately attain a diet which maintains ideal weight and health.

The patient should be warned that weight loss may occur in two ways: (1) continuous, gradual loss may occur; or (2) there may be periods of five to seven days when no apparent loss takes place, then in 24 hours five or six pounds may be lost. This is due to fluid retention in tissues of the body, but it is discouraging to the patient if he is unprepared for it. One should also tell the patient that the closer ideal weight is approached the slower will be the weight loss. Strenuous exercise should be discouraged, as it tends to increase the appetite and cause weakness in an individual who is on a restricted caloric intake.

UNDERNUTRITION

Undernutrition, unfortunately, is more difficult to correct than overnutrition. Experience in our nutrition clinic has shown that unless a patient is 15 to 20 per cent underweight very little can be gained from treatment. Underweight patients can usually be classed in one of two groups:

Group A. Patients who are underweight in spite of adequate food intake.

Group B. Patients who are underweight because of an admittedly poor appetite or a sense of fullness shortly after taking even small quantities of food.

Group A. It is extremely difficult to obtain satisfactory results with treatment in this group. Infrequently one will be able to suggest an increase in the fat content of the diet, such as cream, butter, etc.; and by reducing the amounts of salads and other low-calorie, high-fiber foods one can assist the patient in making a satisfactory gain in weight. Usually, however, a careful diet inventory reveals adequate intake of high-calorie foods. Hygienic measures, such as increased periods of sleep beyond seven to eight hours and less exercise, serve, in our experience, no lasting purpose.

Group B. Those individuals with poor appetites or sense of fullness after eating should be divided, so far

as treatment is concerned. Individuals with poor appetites should:

- Be given lists of foods of high caloric value.
- Be given certain gastric stimulants, such as alcoholic elixirs.
- Restrict fluids at meal times.
- Thoroughly masticate the food so it may be properly utilized.

Those individuals with a sense of fullness shortly after even minimal amounts of food are taken should be placed on a diet having high caloric foods and taken in four to six feedings rather than three.

GENERAL CONSIDERATIONS

In this discussion it has been assumed that the patient has had a complete physical examination to rule out definitely any apparent cause for nutritional disturbance. Such an examination should include a Mantoux test followed by an X-ray of the chest if the Mantoux is positive.

Vitamin B₁ (thiamin chloride) has been recommended by some as being particularly valuable in stimulating appetite. During the last year a careful study has been carried on at the University of Minnesota Students' Health Service to determine if the vitamin B complex was efficacious in stimulating appetite. Three hundred International Units of vitamin B₁, riboflavin, 15 Sherman-Bourquin units of vitamin G were given in divided doses daily.* The controls were given inert tablets of the same size in the same dosage. Patients with admittedly poor appetites who were 20 per cent or more underweight were chosen. The appetites were stated as improved in about 50 per cent of the treated and control series. However, maximum weight gain over a three-month period in the treated group was 2 pounds, and in the control group, 13 pounds. Thus one must conclude from this series that vitamin therapy is of no value.

Insulin therapy has been suggested by some authors to increase weight by producing low blood sugars with a resultant increase in appetite. This method has been used at our clinics. There is usually an increase in appetite with a resultant increase in weight during the active treatment, but on cessation of therapy the appetite returns to its former level, and the weight is usually lost. Thus this method cannot be recommended.

In summary, there are certain underweight patients who will gain on a definite regime and others whose weight it is impossible to increase with our present knowledge of metabolism and nutrition.

CONCLUSIONS

1. Obesity occurs in 17.1 per cent and undernutrition in 16.5 per cent of the general student population.
2. Careful inspection of the patient should be made before a diagnosis of over- or underweight is made, re-

*Acknowledgment is hereby made to the White Laboratories, Inc., Newark, New Jersey, for their cooperation in furnishing both the vitamin and inert tablets.

ardless of the rating given by standard height-weight charts.

3. A formula for rapid calculation of ideal weight is presented. Variations from the calculation of 10 to 20 per cent must be allowed in the college age group before treatment is considered necessary.

4. Thorough physical examination, including a Mantoux test, should be made of all patients before attempting to treat nutritional disturbances.

5. Obesity due to gluttony is best treated by low-calorie diets. Education of the patient as to caloric values of common foods is essential.

6. Glandular obesity is rare in occurrence; prescribing thyroid extract in the presence of only a low basal metabolic rate, when no other symptoms of hypothyroidism exist, is not recommended.

7. Undernutrition presents many problems in management. Vitamins, in our experience, are of no value in stimulating appetite or the gaining of weight.

8. The use of insulin, in the writer's opinion, is not justified in the average patient with undernutrition.

TABLE I
Basic Diet Leading to 4½ to 1 Ratio of Carbohydrate to Fat
Carbohydrate = 56 Fat = 56 Protein = 42

Breakfast:	1 orange or 1 apple or ½ medium-sized grapefruit. 1 egg (prepared in any form; no extra butter allowed for frying). —slices bread (1 slice weighs 1 oz.). 1 portion butter (average size pat or 1/3 oz.). ½ glassful whole milk (½ glassful = ⅜ cup). Tea or coffee (no cream).
Lunch:	Fat-free broth of any kind. 1 cooked portion lean meat or fish (about size of ½ slice bread or 1½ oz.). 2 portions vegetables from list allowed (1 portion = 3 oz.). 1 portion fruit from list allowed (3 oz.). ½ glassful milk (⅜ cup). 1 portion butter (1/3 oz.). —slices bread. Tea or coffee.
Dinner:	Same as lunch, substituting various meats, fish, fruits, vegetables, and allowing — slices of bread.

TABLE II
Increase in Basic Diet

Step	Carbohydrate 56	Fat 56	Protein 42
1	84		45
2	92		48
3	110		51
4	128		54
5	146		57
6	164		60
7	182		63
8	200		66
9	218		69
10	236		72
11	244	56	75

Total calories = 1,780

Structive Surgery* As Carried On in North Dakota

George C. Foster, M.D.

Fargo Clinic, Fargo, North Dakota

INASMUCH as a large number of cases presented in this paper were taken care of under the Crippled Children's Program of the Child Welfare Division of the Public Welfare Board of North Dakota, I wish in beginning to pay tribute to the truly great work of this combined federal and state movement, which makes it possible for handicapped children to receive aid and correction at a time in their lives when it will do them most good toward making them useful members of society.

Even though the desired result in the operative correction of strabismus is functional as well as cosmetic, I am including a few such cases together with the lips, palates, rhinoplasties, lid and mouth cases. The majority of cases of strabismus are of the convergent type. Again, the majority of these patients are farsighted, and it is the extreme stimulation for accommodation required to overcome the farsightedness which carries with it the closely associated stimulation for convergence, causing the resulting convergent strabismus. The treatment of these cases should begin as soon as a definite strabismus becomes established.

If, before the age of two, fixation is carried out by one eye exclusively, the other crossed eye will not develop acute vision because nature suppresses the image in the crossed eye. Babies are not born with acute vision, but develop it through use. If this use entails only one eye, acute vision is not developed in the other eye. Therefore, during this period, as soon as one eye is found to be dominant and fixing all of the time, that eye is covered all of the time by a patch, forcing use of the eye which has been crossed and thus forcing development of acute vision in that eye. After a varying period of time it will usually be found that the formerly crossed eye has now become the dominant eye. It is then wise to uncover the patched eye and again allow the use of both eyes, until one eye definitely shows a dominance. That eye is then patched and the performance is repeated. Thus we are able to develop acuity of vision in each eye at approximately the same rate.

At the age of two, or before, if it seems practicable, refraction is done under atropine cycloplegia, and a complete correction in the form of glasses is prescribed. It is amazing how the very small children tolerate the glasses when patience is used at the start in directing their use. The program of patching is continued as before if a definite dominance persists.

The old custom of doing nothing and hoping that the child will outgrow a strabismus is completely fallacious and often postpones adequate treatment until the desired results cannot be obtained by the simplest and most effective methods. Before the age of six visual

acuity can be developed quite readily. After this age, although it is known that it can be developed, the time that it takes to achieve the end, and the practical difficulties of interference with school and other activities, make the patching procedure almost hopeless. It is for this reason that these patients should come under the care of a specialist as early as possible. It is generally accepted that if the eyes do not straighten after six months of the wearing of a full refractive correction, such means will be ineffective and surgery must be resorted to.

The preceding program has been followed out in all of the cases which are illustrated. Figure 1 depicts a boy with convergent strabismus, before and after surgery. The girl shown in Figure 2 showed particularly gratifying results. She had alternating concomitant esotropia associated with hypermetropic astigmatism. Vision in each eye was normal with proper correction. Wearing of the proper correcting lenses over a period of years brought no improvement in the strabismus. A bilateral recession of the medial recti produced both a perfect cosmetic and functional result. In this case there is binocular single vision with stereopsis.

Figure 3 shows an elderly man with a senile ectropion of the left lower lid. This was corrected by a Kuhn-Szymanowski¹ operation.

The patient pictured in Figure 4 suffered traumatic rupture of the left eyeball, comminuted fracture of the left superior maxilla and zygoma, and fracture of the mandible. An enucleation was performed and, because of the depression of the floor of the orbit, packing was introduced into the left maxillary sinus through the canine fossa approach. However, the floor of the left orbit remained somewhat depressed, and the left lower lid was relaxed, so that the left lid aperture was markedly lower. Figure 4C shows the result following a Kuhn-Szymanowski procedure on the left lower lid and the procurement of a better prosthesis.

The boy pictured in Figure 5 got hold of some lye at the age of eighteen months. Fortunately for him, it apparently got no further than his lips, as the microstomia caused by the heavy ring of scar tissue is the only evidence of lye burn which can be found. Surgical correction had been twice attempted elsewhere, with the result shown in Figure 5A. Figure 5B shows the result seven days following surgery. Ferris Smith's² modification of Werneck's operation for microstomia was used on the right side of the mouth and simple horizontal incision with vertical suture was used to obtain the small effect necessary on the left side. Figure 5C, taken about two years later, shows how benign nature frequently is in smoothing the results of structive surgery.

Figure 6A shows a young man with a perfectly formed ear cartilage, which a vestigial muscle or tendinous

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attachment insists on pulling out of its sac of skin and up beneath the scalp. At operation the cartilage was delivered into its proper place, the redundant tissue excised, the vestigial attachment severed (and the remaining tissue shirred), so that the cartilage remained in its proper place. Figure 6B, taken rather shortly after operation, shows a rather rough result. The parents write me, however, that at the present time the ear cannot be distinguished from its fellow.

The patient in Figure 7 dislocated the cartilaginous portion of her septum, very likely by falling upon her nose, in early childhood. She came for cosmetic improvement. However, as demonstrated in Figure 7C, the right nostril was completely occluded by the dislocated septal cartilage and the anterior edge of the septal cartilage protruded into the left nostril, being completely dislocated from its proper position in the columella. The first procedure was to replace the cartilage in the midline by the procedure of Metzenbaum. Removal by the ordinary submucous resection would have been unsatisfactory because the support of the septum was imperative. The next procedure was the implantation of a piece of costal cartilage. The satisfactory profile is demonstrated in Figure 7E. Since this procedure was carried out, I have been narrowing the noses, and at the present time I should not consider the broad nose shown in 7D to be satisfactory.

Figure 8 shows a young lady who had had a non-specific pyogenic abscess of the septum when she was eight years of age, which destroyed portions of the bony and cartilaginous septum with the pictured result. The septum was not deviated and required no preliminary work. The result was obtained in one procedure by means of an implant of costal cartilage.

Figure 9 shows a young lady who suffered a traumatic dislocation of the nasal septum in infancy. In addition to the external deformity, she presented a complete obstruction of the left nostril by the septum. A plastic straightening of the anterior portion of the septum, retaining the cartilage for support of the bridge of the nose, resection of the posterior deviated portion of the septal cartilage and bone, removal of most of the hump, and reposition of the lower portion of the nose in relation to the face, were all done in one step. The result as pictured in Figures 9C and 9D was quite good. However, the profile was not perfect and the nose was too broad. A year later I reoperated on this young lady, narrowing the nose and improving the profile.

In the repair of cleft lips I follow the principle of Blair and Brown² of repairing the muscular elements as early as possible so that, by their continuous molding, they may gradually force the bony elements into their proper relationship. It has been repeatedly demonstrated that in almost every case the molding thus performed produces a more perfect result than can be obtained by forceful correction and position of the bony elements at operation. It is thus easily seen that the earlier the lip is repaired, the greater will be the molding effect from its muscular elements. Repair is sometimes carried out when the infant is a few hours old. As a matter of fact, passage through the birth canal is an exceedingly shock-

ing procedure and nature has prepared the fetus well for this occurrence. It is well known that in the first day or two following birth, the infant is relatively shock-proof, and one may perform the repair of a cleft lip without anesthesia, and with relative impunity. At the present time the period of jaundice with its increased tendency can be well controlled by the use of vitamin K. However, if the infant is not operated on within a day or two of birth, it is probably wisest to wait until it has regained its birth weight and is satisfactorily established on a feeding schedule.

Repair of the palate^{4,5,6} is postponed to some time between the ages of 18 and 36 months, as the repair of the palate is a rather shocking procedure and the patient should be as strong as possible to withstand the operation.

Figure 10 shows a simple cleft of the soft palate before and after repair. Figure 11 shows what can be accomplished in the repair of wide clefts of the palate in adults.

Figure 12 shows an example of the worst type of deformity. This is a bilateral cleft of the lip and of the alveolar ridge, with the prolabium and the premaxilla projecting almost straight out from the tip of the nose, and associated complete cleft of the palate. This child died shortly after the picture was taken, from an associated congenital heart lesion. Its father had a cleft lip which had been repaired in infancy, and an unrepaired complete cleft of the palate.

The baby illustrated in Figure 14 is a cousin of the baby illustrated in Figure 12, with identically the same deformity. Figure 14B illustrates the result obtained after a repair following the method of Harry P. Ritchie⁴ of St. Paul, which, I believe, gives the most artistic repair of these bilateral clefts of the lip. A repair of this type obviates the rather unsightly notch which almost invariably accompanies the repair according to the method of Hagedoorn.

Enough of my patients have been from families where there are instances of similar deformities to persuade me that the tendency toward this lesion is to some degree hereditary. The baby illustrated in Figure 15 with the same extreme bilateral cleft is the child of a woman with a repaired cleft of the lip and an unrepaired cleft of the palate. The repair of the first side of the lip was done at approximately six weeks of age, and the second side was repaired at about fourteen weeks of age. Figure 15E shows the effect of the action of the orbicularis oris muscle in pulling the premaxilla down into place and producing a tip to the nose and a columella in a relatively normal position. As this baby grows the protrusion of the upper lip will be lessened markedly, until it assumes its normal position.

The young man illustrated in Figure 13 demonstrates a minimal cleft, i. e., that of the muscle body without much cleft of the skin or mucous membrane. It is easy to notice the effect which the non-union of the muscle bodies has had upon the right nostril, causing it to stretch so that it is twice as wide as the opposite one. Repair of this cleft necessitates just the same operation as a much more extensive cleft, in that the cleft must



Fig. 1.



Fig. 5.



Fig. 2.



Fig. 6.

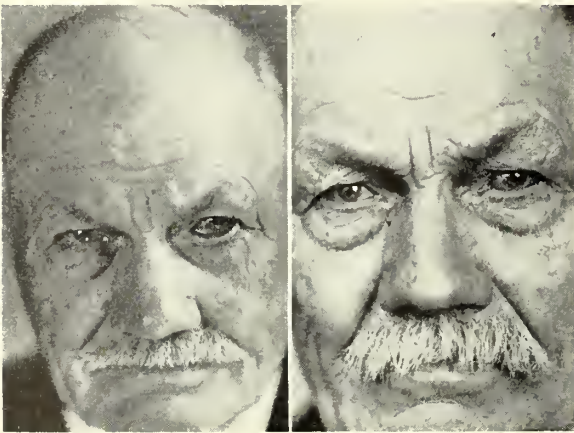


Fig. 3.



Fig. 4.



Fig. 7.



Fig. 8.



Fig. 9.



Fig. 10



Fig. 11



Fig. 12.



Fig. 13.



Fig. 14.

be converted into a complete one and the floor of the nostril narrowed to make it like its mate. The post-operative picture shows some remaining induration which will shortly disappear.

The baby in Figure 14 was operated on at the age of three months. The second picture was taken seven days after the first one. The baby illustrated in Figure 14 demonstrates that repair of the nostril is an essential part of the repair of a cleft lip; in fact, it is frequently the most difficult part of the problem.



Fig. 15.

The baby shown in Figure 15 was repaired elsewhere, somewhat inadequately, the line of incision being too short, causing a marked asymmetry of the mouth, and some vermilion tissue in the scarline. The nostril is also too large. This operation was completely redone, with the result illustrated.

The baby in Figure 15 draws our attention to the fact that it frequently takes multiple steps to obtain a satisfactory result in cosmetic surgery. This baby was three months of age at the time of the original operation. As Figure 15B shows, the immediate result was rough, and the nose not quite straight in relation to the rest of the face. The baby was returned one year later, when an operation on the septum improved the position of the nose in relation to the face. Figure 15C shows this child two years later. The scar includes some vermilion tissue and is too prominent. The left ala is too wide and down too far. Therefore, another procedure was undertaken, with the result shown in Figure 15D.

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Dental Caries in the Expectant Mother*

A Critical Analysis

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THE opinion that women's teeth are rendered more susceptible to dental decay during or as a result of gestation is widely held and discussed. Contrary to belief, however, there is little authentic evidence on which to base such a conclusion. Few experimental studies concerning the relationship of pregnancy to dental caries are available in the literature, in sharp contrast to the large body of opinionated literature with little basis for the conclusions reached.

"If the problem of pregnancy and caries is analyzed, it resolves itself into two questions: Is there actually an increase in the amount of caries during pregnancy? and, if there is such an increase, how can it be explained?"¹

The answer to the first question can be given only by statistical data. Studies on the occurrence of dental caries in a great number of pregnant women are essential. The results of these observations have to be compared with the incidence of caries in an equal number of non-pregnant women of the same age, the same race, and the same social level. Only such data can merit general acceptance.¹

A leading proponent of the theory of increased caries susceptibility during gestation is Gerson.² He made observations on 50 pregnant women first examined between the second and fourth months, and as a control 50 non-pregnant women of the same age and social standing. Six months later he examined the whole group again. His results showed that the increase in caries susceptibility of the pregnant group was considerably over 100 per cent that of the non-pregnant group. His conclusions are that "if pregnant and non-pregnant women have the same number of good teeth to begin with, the harmful influence of pregnancy on the teeth is readily seen at a later period." In an analysis of Gerson's figures Ziskin³ points out that "he does not record the number of teeth present to begin with. Hence, his conclusion that 'if pregnant and non-pregnant women have the same number of good teeth to begin with' is merely a postulation. Caries frequency is shown in an age range of ten years—too long a period for comprehensive comparison; the average age, an essential element, is lacking. Progress of decay is measured by the number of extractions necessary in both groups—an erroneous measurement inasmuch as extraction may be necessitated by toothaches or abscesses without progressive tooth decay."

Lintz, quoted by Weintraub,⁴ reported on a study of 229 consecutive cases—179 pregnant women and 50 non-pregnant controls. Among his conclusions were the following: The pregnant patient lost more teeth and had greater caries incidence. Women lost an average of two teeth for every pregnancy. The more pregnancies a

woman had, the more teeth she lost. It is important to note here that many considerations bearing directly on the problem have been ignored. For instance, Lintz made no observations on the actual progress of dental disease during gestation and lactation.

Hardgrove⁵ states that in pregnancy the endocrine glands are thrown out of balance and the expectant mother is the victim of decalcification of her teeth in most instances.

Bodecker⁶ is still more vague on the subject when he says: "We frequently note an increase of dental caries during pregnancy. This may be caused by a reduction of the mineral salts in the teeth, which would increase their permeability."

Weintraub⁴ "feels convinced from personal observation in hospital and private practice and from the frequency with which prenatal patients complain of dental difficulties, that there is an increased disposition to dental disintegration during gestation." However, no exact experimental data are given. Likewise Greenstone⁷ writes of a marked increase in the number of cavities and the rapidity with which caries develops during pregnancy.

Therefore, despite the old adage, "A tooth for every child," the literature of our own times gives relatively scant proof, on a strictly scientific basis, to establish this proposition. In fact, some authorities deny it.

FURTHER STUDIES

Klein⁸ found only one out of five studies on humans suggesting a positive correlation of pregnancy with an increased tendency toward dental decay. Biro⁹ in his studies of 400 maids and cooks, of whom 200 had been pregnant and 200 non-pregnant, found no significant differences in the amount of dental disease. In both groups, which were of the same social level, the number of decayed teeth increased with increase in age.

Ziskin¹⁰ studied 599 pregnant and 205 non-pregnant women. Only pregnancy was considered as a causative factor, any other theory which may have had a bearing on the cause of caries of pregnancy being excluded. Both groups were comparable as to age and class. His data show an ascending rate of frequency of caries with an increase in age and no positive correlation between frequency of caries and the number of pregnancies. On his graph one curve shows average carious and missing teeth according to pregnancy order, the other average carious and missing teeth according to age divisions. He observes, "The curves rise in about the same degrees. This tends to show that age is the determining factor in the increase in caries rather than pregnancy; for, if pregnancy order would influence the frequency of caries, we would expect a much steeper curve."

In 1937 Ziskin and Hotteling³ made another attempt to throw further light on the problem. Three hundred

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and twenty-four pregnant women were studied. The factor of dietary instruction was eliminated in many cases by mouth examinations when patients first applied for routine prenatal care. By means of the Bodecker caries index they found that pregnancy does not incite caries. They observed that more teeth may be extracted during pregnancy than in the non-gravid state, but that the causes for extraction are not related to the progress of decay. Teeth with large cavities may be free from pain for some time before the pregnant state, but become painful during the term, necessitating extraction. Starobinsky¹² sees an explanation of this in that "the hyperemia of the head usually present in pregnancy evokes a hyperemia of the dental pulp, and on this account the toothache, whether due to caries or chronic pulpitis, is the more violent." The method of least squares was used by Ziskin and Hotteling to analyze their data, with the conclusion that pregnancy actually prevents decay to a significant extent. This is brought out in the following table (Ziskin and Hotteling):

	No Pregnancy	Primi-parae	Secundi-parae	Multi-parae
Age	27.7	23.6	27.1	29.1
Caries index	42.9	31.0	35.9	39.0
Caries index per year	1.54	1.31	1.32	1.31
Percentage of carious surface per year after deducting values for fillings and missing teeth	7.9	5.3	5.1	6.7

The mean caries index of their non-pregnant group is much higher than are those of the pregnant groups. This is interpreted by Ziskin and Hotteling to mean either that pregnancy prevents caries, or that cases were not selected at random. It is clear at any rate that in the pregnant group repeated pregnancy is in some way associated with a condition which prevents tooth decay.

Starobinsky¹² reports a study of 216 pregnant and 150 non-pregnant women. He divided the pregnant group into primiparae (average age 25.8 years), secundiparae (average age 28.6 years), and multiparae (average age 31.4 years). He noted that the second group showed an increase in caries of 4.4 per cent over the first; there was a similar increase in the third group over the second. He also divided the pregnant and the non-pregnant cases into three age groups (20-25, 25-30, 30-36). He found the increase in caries to be about the same in each age group, the non-pregnant group showing slightly larger numbers of decayed teeth than the pregnant.

Mull, Bill, and Kinney¹³ reported dental findings in 358 women who were examined during pregnancy and after delivery. The incidence of new cavities during this period did not exceed the average incidence for all women of identical age range during the same length of time. They concluded that "there is no appreciable change in the teeth of women during pregnancy or the first few weeks of lactation other than that which would probably occur in a similar group of non-pregnant women during the same period of time. Only 15 per cent of the cases studied showed change." Assuming that bearing children is a major cause of tooth destruction, there should be a consistent rise in the average number of missing and carious teeth with the number of preg-

nancies. No rise of any degree can be demonstrated from their table, which is given below:

Para	1	2	3	4	5	6	7-10
No. of cases	232	120	51	23	15	15	9
No. of missing teeth	1.62	2.24	2.64	2.74	3.24	2.8	1.66
No. of carious teeth	5.54	5.77	7.03	6.91	5.1	6.1	5.33

It will be noted that in the following table, where Mull and co-workers made the distribution on the basis of age, there is a marked rise in the number of carious and missing teeth. This is in complete agreement with the work of Ziskin:

	13-17 yrs.	18-22 yrs.	23-27 yrs.	28-32 yrs.	33-40 yrs.
No. of cases	45	220	131	50	19
No. of missing teeth	1.04	1.51	2.62	3.62	3.63
No. of carious teeth	4.11	5.24	6.41	7.88	8.21

ORAL CONDITIONS DURING PREGNANCY

The second part of the problem is how a slight increase in caries incidence in pregnancy could be explained, if such an increase were actually demonstrated. The question arises: What are the factors that may influence the oral conditions during pregnancy? These may be classified as local environmental and metabolic factors.

A complication occurring during the early months of pregnancy is the pernicious vomiting of pregnancy, or hyperemesis gravidarum. Vomiting begins about the sixth week of pregnancy and may last through the third or fourth month. This condition has been considered as a possible cause of tooth destruction. Daro¹⁴ in 1940. writes "that just at the time (fourth month) when the fetus begins to make great demands for calcium, phosphorus, iron and other minerals, the system is lacking in these important elements, lost during the vomiting period. It would be logical therefore to assume that the vomiting of this early period of pregnancy plus the increasing demand for minerals is the cause of tooth decay in the early months of pregnancy." However, how calcium is actually lost by vomiting is not demonstrated. Similarly Weintraub⁴ comments on vomiting during pregnancy, but with no specific data.

Mull, Bill, and Kinney¹³ found that of the 54 patients who showed active tooth decay, exactly half experienced vomiting in various degrees while the others were free from it. On the other hand, 60 per cent of all patients observed reported vomiting although only 15 per cent of the total showed active tooth decay. Vomiting therefore can probably not be considered as a primary cause of caries. Perhaps additional data would provide more substantial basis for conclusions.

In connection with vomiting during pregnancy we often hear patients complain of a disagreeable taste, especially a change in the normal alkalinity of the saliva. Shulman¹⁵ considers the marked hyperacidity of the secretion and the frequent vomiting in the early months of gestation as an important factor in the incidence of caries. According to Weintraub⁴ this increasing acidity of the saliva in combination with neglected mouth hygiene is an important contributing local factor in the destructive effects of pregnancy on the teeth. Both

writers fail to substantiate their statements with tests or figures.

The above hypothesis is not supported by the studies of Karshan, Krasnow and Krejci¹⁶ or of Stern,¹⁷ who demonstrated that there is no direct connection between the pH of the saliva and the formation of caries.

Mull, Bill, and Kinney,¹³ working with the idea that there might be a change in the buffering power of saliva during pregnancy, found upon experimentation no increase in the titrable acidity of the saliva. Ziskin^{3,23} found the saliva slightly more acid during pregnancy, a condition which he links up with the existing gastric hyperacidity. However, the fact that more caries was found in his non-pregnant group (saliva pH means 6.61) indicates that the salivary pH at these levels has little or no influence on caries frequency and may be disregarded.

Jay, Hadley, Bunting, and Koehne,¹⁸ using a quantitative method devised by Hadley,¹⁹ have reported that the concentration of lactobacilli in the saliva is a reliable index of the acidity of dental caries in the mouth. Boyd, Zentmire, and Drain²⁰ and others failed to confirm the general trend of these findings, which may be owing to faulty technic or interpretation. The specificity of lactobacilli in the production of caries is therefore still debatable. Assuming caries is due to the action of this bacillus and pregnancy promotes caries, we should find an increasing concentration of the bacilli in the mouth as pregnancy progresses. With this idea in mind, Mull et al.¹³ cultured *B. acidophilus* from saliva of pregnant women. They found that *B. acidophilus* is not consistently present in the mouths of pregnant women, nor always maintained throughout the term of pregnancy. However, the method they used is that described by Bunting⁶¹ in 1925 and since revised.

Before leaving the subject of hyperacidity in pregnancy, we mention the concept of Broderick, who has attempted to show that caries and pyorrhea are simply opposite conditions caused by variations in the pH contents of the saliva. In acidosis, calcium salts are removed from the teeth into the saliva by a process of osmosis, and in alkalosis calcium salts are similarly deposited into the teeth from the saliva. This condition, thinks Broderick,²¹ might account for the various dental disorders of pregnancy, as it seems to cover any fluctuations in the general conditions of pregnancy, and not only a few odd months.

There has often been noticed a general laxity in oral hygiene as pregnancy progresses. Mull, Bill, and Kinney¹³ are of the opinion that no particular importance should be attached to such observations, since it has been fairly well proven that oral hygiene has little to do with the developing of caries in any case.^{22,23}

We must not forget that in pregnancy we often find gingivitis, which increases food retention. The studies of Rosebury, Karshan, and Foley in rats²⁴ and of Rosebury and Karshan among Eskimos²⁵ suggest that dental caries in man may be caused primarily by food particles rich in carbohydrates and having a physical character that favors forcible impaction into the recesses of the teeth. (Coarsely ground raw cereals induced caries in

rats even though the diet as a whole was fully adequate in all nutritional elements.) It seems clear that pregnancy in itself could only modify other conditions which cause caries.

METABOLIC FACTORS

Next there is the problem of the metabolic factors, which has been debated again and again. In considering the subject from this angle, calcium metabolism, diet, and endocrine function assume a great importance.

Serum calcium tends to decline during the later months of pregnancy. This is clearly brought out by Mull and Bill,²⁶ who performed nearly 5,000 determinations on a group of 900 subjects. The decline is progressive as pregnancy advances, but is interrupted six to seven weeks before delivery, when there is a slight rise until delivery, followed by a sharper elevation after delivery. Oberst and Plass²⁷ observed no change of serum calcium early in pregnancy (average 10.4 mg. per 100 cc.), but during the eighth and ninth months the concentrations varied between 8.8 and 10.8 mg. During labor the average was restored to 9.9 mg. and remained at this level during the succeeding seven to nine days of observation. Bodansky's²⁸ results in this respect confirm those of both Oberst and Plass²⁷ and Mull and Bill.²⁶

Mull, Bill, and Kinney,¹³ who studied the blood and teeth of a large series of pregnant women, found that the calcium and the inorganic phosphorus of the serum bear no direct relation to the condition of the teeth. The small percentage of their cases that showed evidence of active tooth destruction were abnormal neither in the calcium nor in the phosphorus findings.

Just what significance is to be attached to the low serum calcium is not clear. An explanation may lie in the nutritional status of the patient. The lowest values reported in human subjects which may be definitely attributed to calcium deficiency were those obtained by Maxwell²⁹ in his studies of osteomalacia among pregnant Chinese women. The general experience, however, has been that within comparatively wide limits the level of calcium in the food has little effect on the serum calcium concentration.^{30,31} It is not improbable that even moderate degrees of hypocalcemia may be caused by dietary calcium deficiency.²⁸

DIETARY FACTORS

What influence does diet have on dental caries in pregnancy? In animals it has been shown by Rosebury and Foley²⁴ that pregnancy and lactation, despite the feeding of diets deficient in calcium and vitamin D, did not cause caries. Changes were found only in the calcification of bone and the new dentin. Klein's⁸ study of 700 rats revealed about the same amount of caries in the molars of both sexes, pregnancy not being a factor. Toverud,³² on the other hand, reported a noticeable difference in the microscopic appearance and chemical composition of normal rats as compared with those whose diet was deficient in calcium. However, Toverud studied the incidence of dental decay only in the incisors and in the molars of rats.⁸ This fact must be clearly pointed out; for the growing incisor of the rat

can be influenced by dietary means—in contrast with man's fully developed teeth.

Fish³³ kept a pregnant dog on a calcium-deficient diet. At the end of the experiment the bones were soft and decalcified to such an extent that they were hardly visible in the radiograph and could be cut with a knife; the teeth, however, showed an unchanged density radiographically. As to the chemical composition, the teeth were unchanged either by dieting, increasing or withholding vitamin D, deprivation of calcium during pregnancy, or by giving calcium carbonate.

The recent study of Day and others³⁴ showed an average of only 1.54 cavities in women who had high incidence of rickets and osteomalacia and definite vitamin D, calcium and phosphorus deficiencies in their diets. Moreover, their diets consisted mainly of carbohydrate food, which is supposed to be a very important causative factor in caries, according to Bunting and co-workers. In this connection Jay⁶² emphasizes the fact that their diets did not contain any refined sugar.

A number of investigations have been interpreted as indicating that improvement in the diet (especially by including vitamin D) results in reduction of the incidence of dental caries in children.³⁵⁻³⁷ This points to an effect of mitigation rather than of prevention. The evidence certainly does not show that caries is caused by dietary deficiency. "This subtotal reduction of caries induced by vitamin D feeding may indicate that the 'protective' effect of dietary changes counteracts but does not remove other conditions of a directly causative nature."³⁸

Teel, Burke, and Draper³⁹ have shown that the expectant mother needs appreciable greater amounts of vitamin C. Well, Howe,^{40,41} and others observed changes in the odontoblastic layer as well as in the pulp. None, however, reported the development of dental caries.

These few examples may suffice to show that the only tooth whose structure and calcification can be influenced is the growing tooth. After the tooth has erupted, no internal changes can be expected from dietary measures. A nutritionally sound diet is, of course, necessary and desirable. Unlike the bones, the teeth are not subject to calcium withdrawal.

ENDOCRINE FUNCTION

It is also conceivable that so high a frequency of hypocalcemia reflects relatively impaired function of the endocrine organs. Among them the parathyroids appear to be most important as far as calcium metabolism is concerned. Even on an adequate calcium intake, the parathyroids increase in size and apparently in functional activity during pregnancy. It is logical to assume that a calcium deficiency may occur, with the necessity of maintaining a more active calcium metabolism than at other times. The evidence for it is not established at present. Bodansky²⁸ was unable to attribute hypocalcemia specifically to parathyroid deficiency or to explain it on the basis of nutritional deficiency alone. It may be assumed that an intrinsic calcium-depressing factor exists in pregnancy to maintain a subnormal calcium level. The

sharp rise in the maternal calcium level after delivery and the decline in that of the newborn suggest such a factor.³¹

In considering the influence of the parathyroids from the dental standpoint, we know that upon removal of these glands the calcification of dentin is disturbed and enamel hypoplasia is produced. Schour, Chandler, and Tweedy⁴² removed the parathyroid glands from rats. In those that survived over four months repeated pregnancies and lactations failed to produce any histologic evidence of calcium withdrawal from the teeth. In another direction, Thoma⁴³ made a histologic study of the teeth of a boy aged 15 years who had a parathyroid tumor and found no evidence of resorption in the teeth. Albright, Aub, and Bauer⁴⁴ reported the clinical and laboratory findings of seventeen patients with hyperparathyroidism and decalcification of the bones. They state: "The teeth do not take part in the generalized decalcification. They may fall out because of disease of the jaws but they themselves remain well calcified."

Concerning the influence of the gonads, Tandler and Grosz⁴⁵ made a careful study of eunuchs and found no changes in their teeth. This is not surprising, since the castrations were, as a rule, performed when the development of the teeth was practically completed. The effects of injections of gonadal or gonadotropic hormones upon the teeth have to my knowledge not been reported. The response of the gums to hormonal treatment has been demonstrated by Ziskin⁴⁶ and others.

The data available on the function of other endocrine glands and their effect on adult teeth are scarce.

LACTATION AND TOOTH DECAY

In regard to lactation, an abundance of data indicates that it may produce greater mineral disturbance than gestation.⁴⁷⁻⁵¹ It has been shown that the calcium content of the mother's milk remains the same regardless of the lack of calcium in her diet.⁵² Here, as in pregnancy, then, unless the intake is made sufficient, the supply will be drawn from the reserve store in the mother's bones. The possible direct influence of lactation on the incidence of tooth decay has been studied to some extent. The few experiments of Day and Dagg,⁶³ Rosebury,²⁴ and others in rats brought out no positive correlation. Hunscher⁵² observed no change in the teeth of three women after six months of lactation. On the other hand, Mull, Bill, and Kinney¹³ and others observed that especially following delivery, when the care of the child makes an increased demand upon the mother's time, less and less attention is paid to the care of the mouth. This might increase the incidence of decay in a caries-susceptible mouth.

DISCUSSION

From the foregoing it is evident that there is no basis for designating pregnancy as a cause of dental caries. The question arises, Why do so many physicians and dentists observe a tremendous amount of dental caries in the pregnant? Probably on the basis of subjective observations. The decay noted would probably have occurred in a similar group of non-pregnant women during the same period of time.¹³ Very often a necessary

treatment has been neglected. The observation has been made that more teeth may be extracted during pregnancy than ordinarily, but such extractions may become necessary for reasons other than progress of tooth decay.³ In the undoubted individual instances in which pregnancy is associated with a marked increase in caries the reason apparently lies in some circumstance not related to pregnancy in any essential way.

On the contrary, Ziskin's analysis may indicate "some factor operating during pregnancy" which somehow tends to prevent tooth decay. Whether such a factor is to be found in the serum, the saliva, or elsewhere is subject to speculation and research.

Encouraging are the recent studies on human saliva. Hill,⁵⁴ Weinmann,⁵⁵ and others speak of special constituents of the saliva that stimulate or inhibit growth of oral bacteria. Such a substance may be more active during pregnancy to prevent decay. If Bunting's⁶¹ theory is correct, experimental studies should show a definite correlation between carbohydrate content of the diet, the occurrence of *L. acidophilus* and incidence of dental caries during pregnancy. However, Mull, Bill, and Kinney¹³ could not find such a correlation. It might be of value to carry out tests during pregnancy similar to those made by Fosdick, Hansen, and Epple.^{56,11} They found that saliva, sugar, and enamel mixtures would form acids at varying rates and that the rate of acid formation was related to the caries activity. Saliva from caries-susceptible persons was found to contain large amounts of added calcium, whereas the saliva of the caries-free group showed little or no change. The recent findings of Karshan⁵⁷ show that the solubility of enamel depends largely on the concentration of calcium and phosphorus ions in the surrounding medium. Stimulated and unstimulated saliva gave higher mean values in a caries-free than in a caries-active group (1) for CO₂ capacity, (2) for total calcium and inorganic phosphate and (3) for the percentage of calcium and phosphate removed from saliva on shaking with tri-calcium phosphate, the last probably being the reflection of a difference of the forms in which calcium and phosphorus exist in saliva. In reviewing the literature nothing was found about tests of this type in relation to the subject here discussed. If pregnancy actually prevents decay, as brought out by Ziskin,³ such tests should indicate a saliva which would protect enamel against solution by acids to a greater degree.

Several reports suggest that changes in certain of the salivary characteristics discussed above can be brought about by dietary means.^{58,59} In other studies, however, attempts to alter the composition of saliva by dietary means have yielded negative results.⁶⁰ Further studies on this important subject are needed.

CONCLUSIONS AND SUMMARY

1. Pregnancy *per se* might not be considered as a cause of dental caries.
2. There is apparently no appreciable change in the teeth of women during pregnancy or the first weeks of lactation other than that which would probably occur in a similar group of non-pregnant women during the same period of time (Mull, Bill, and Kinney).

3. Data indicate an increase in the number of missing and decayed teeth with advancing age.

4. According to Ziskin, repeated pregnancy may be associated in some way with a condition which actually prevents tooth decay.

5. General laxity in oral hygiene, especially following delivery, may or may not have a bearing on the condition of the teeth.

6. The slightly lower pH values of the saliva during pregnancy are probably not sufficient to cause caries.

7. The present experimental facts show that there is no confirmed relationship between levels of calcium and inorganic phosphorus in serum and the occurrence of caries during pregnancy.

8. Evidence points to the conclusion that the additions of calcium and phosphorus preparations do not improve the structure of the teeth and decrease dental caries during pregnancy, except in known cases of calcium deficiency.

9. There is no evidence to show that endocrine dysfunction has any effect on the fully calcified tooth structure.

10. Factors which might be effective in the improvement of oral health during pregnancy form a part of the problem.

The author wishes to thank Dr. Karl John Karnaky, Houston, Texas, for his constructive criticism of this paper.

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Persistent Cough Produced by Ascariasis

With a Case Report

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THE eelworm or roundworm, technically called *Ascaris lumbricoides*, is encountered frequently in moist or tropical climates. Tice¹ claims that children, miners, and persons who work in the soil are most liable to infection from this source. He adds that the disease is more common in rural districts than in cities. It is said to be much more common in children than in adults. Furthermore, negroes are more often infested than whites, according to Tice, and females are more prone to the disease than males.

Many times no symptoms are caused by the infection. If symptoms occur, these are mainly gastrointestinal in nature. Tice states that indefinite pain and weight in the epigastrium may be present with flatulence. There may be vomiting or diarrhea and the appetite may be diminished. Vertigo or fainting may be present. Nervous symptoms are common, probably owing to the toxic manifestations of the worms. Convulsions, paralyses, pruritus (nose and anus) may occur.

Symptoms of the pulmonary system are not too common, but Tice¹ mentioned Pantin, who stated that in

Fukien province in China coughing is frequently observed in persons severely infested with ascaris, and that the bronchitis is frequently cured with a vermifuge.

Voegtlin² reported a case of ascariasis in which the patient complained of a sensation of something crawling through her chest. This sensation was also present at intervals in the throat region.

Stahr³ reported two patients who complained of occasional cough, dyspnea, and bronchial asthma. Estrada and Garcia⁴ described a case in which the later symptom was pain in the right hypochondrium radiating to the right chest and back. Africa⁵ claims that this nematode can actually enter the human heart, liver, pancreas, trachea, bronchi, and other organs more or less accessible to the alimentary tract.

Debdas⁶ mentioned Patterson's observations (no quotation given) in pulmonary abscesses caused by roundworms. A patient expectorated a female ascaris 8 inches in length but there was no mention of eggs in the sputum.

The toxic or allergic factor due to this infestation has been mentioned by Williams,⁷ who wrote that children with this infection are particularly subject to attacks of urticaria, asthma, bronchitis, and pneumonia. He feels that their pulmonary complaints may be due to some extent to the passage of larval forms through the lungs.

Osler⁸ quotes from German autopsy statistics published by Heller and Müller, in which 9.67 per cent of males, 13.41 per cent of females, and 17.29 per cent of children were infected with ascaris.

CASE REPORT

The following case report of an eelworm infection is unique in that it occurred in a male, age 34, whose only complaint was a persistent cough of about three months' duration. This subsided for about a month, then returned and has been present since. The cough is "tight" in nature and "deep." The past winter the patient complained of diarrhea (three to four times a day). He has never complained of pain anywhere. After a day's work, he felt tired but not markedly. He has never been nervous. He has not noticed worms in his bowel movements. History by systems, except for the above, was negative. The patient had had no acute illnesses nor operations. The family history was also negative. He had undergone a tonsillectomy in childhood. Repeated recent physical examinations were negative.

Recently, in vomiting and coughing, a worm was produced. This was found to be an *Ascaris lumbricoides* female which measured 8 inches in length. The sputum was examined for ova, but the report was negative. The patient's stools were carefully watched, and several large roundworms were noted.

An unusual feature of this case report is the fact that *no eosinophiles were noted in the patient's blood count.* The white cells numbered 11,000. The hemoglobin was 88 per cent, and the red blood count was 3,820,000. The differential white blood count was within normal limits. Repeated urinalyses showed no abnormal findings.

This patient had spent some time in a German concentration camp about four years ago. It is questionable whether he acquired the infection there, for his symptoms were rather recent in their origin.

TREATMENT

The patient was given 15 minims of oil of chenopodium in 30 minims of olive oil. This was followed

with 1 ounce of castor oil. This produced six bowel movements which, upon examination, showed no ascaris. The following day the patient took a soapsuds enema, and the stool was examined for ova. None were noted.

The cough persisted after the above therapy. This distressing symptom might have still been due to the absorption of the toxic material from the roundworms, or these might still have been present in other parts of the body. However, an X-ray plate of the chest showed no evidence of the presence of such an infection.

Since the cough persisted even after the forementioned purge, the patient was given "Crystoids" Anthelmintic (Sharp and Dohme), five 0.2 Gm. pills on an empty stomach. The same day he had many bowel movements which produced countless numbers of smaller roundworms. Other dead worms were evacuated following the administration of soapwater enemas, repeated for three evenings on his return from work. Since then, the cough has subsided markedly.

COMMENTS

This case is unusual in its symptomatology. A persistent cough was the only complaint which caused the patient to seek medical advice. Repeated complete physical examinations revealed nothing of clinical importance. The X-ray chest plate showed no abnormal findings. There were some calcified peribronchial lymph nodes, but nothing was noted which would explain the patient's chronic cough.

The answer to the problem became obvious when the patient coughed up an 8-inch female *Ascaris lumbricoides*. Since there is evidence clinically and experimentally that the roundworm produces a toxic material which acts as a gastrointestinal and pulmonary irritant, it is presumed that this caused the chronic cough.

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Headquarters Seventh Service Command, Office of the Surgeon.

Omaha, Nebraska, March 13, 1943.

Neurogenic Bladder: Microcystometry and Treatment

Studies in Bladder Function XI

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CYSTOMETRY is the clinical study of the physiology of the detrusor of the urinary bladder. The several layers of the bladder acting as one are referred to as the detrusor.

Cystometry is performed by filling the bladder with a series of increments of fluid (usually 50 cc.) and measuring the intravesical pressure after each filling with a manometer. During the course of the fillings the patient experiences certain sensations, such as (1) desire to void, (2) distress or pain and (3) severe pain. These three *sensory points* occur normally at fairly fixed intervals and are interpolated into the numerical manometric chart. They are of as much importance as the manometric observations, as they vary in dystonias of the bladder of either myogenic or neurogenic causation. Without them the record is incomplete. The record, termed a cystometrogram, may be converted into a graphic chart, if desired.

Variations from the normal are known as hypertonia and hypotonia. These reflect an increase or decrease in intravesical pressure, due to hypertrophy or atrophy of the vesical musculature or to a more or less continual state of increased or decreased tonus of the musculature of neurogenic causation.

The former types may be caused by pathological obstruction at the vesical outlet, as the concomitant hypertrophy or atrophy may be due to a muscular compensation sometimes followed by decompensation; these types are as a rule of urologic causation and show little or no change in the position of the sensory points. We have termed these non-neurogenic (myogenic) hypertonias and hypotonias. The latter types are caused by changes in pathologic physiology and are found in various diseases of the nervous system.

Neurogenic increase in tonus may be due to various causes, such as essential increases in autonomic impulses or interference with inhibitory impulses destined for certain cord centers. Likewise neurogenic decrease in tonus may be due to the destruction of certain cord centers or to interference with certain afferent impulses from the bladder. These types in addition to the increase or decrease in tonus show marked increase or decrease of sensitivity, manifested by the very early or very late appearance of their sensory points. We have insisted on both sensory and motor factors in determining neurogenic hypertonias and hypotonias.

It is, of course, self-evident that acute inflammation of the bladder causes hypertonia and hence cystometry is of little value in acute cystitis. As the cystitis becomes subacute or chronic it does not interfere, particularly in neurogenic cases that have subsensitive bladders, as may occur in tabes. It is also self-evident that there may be a

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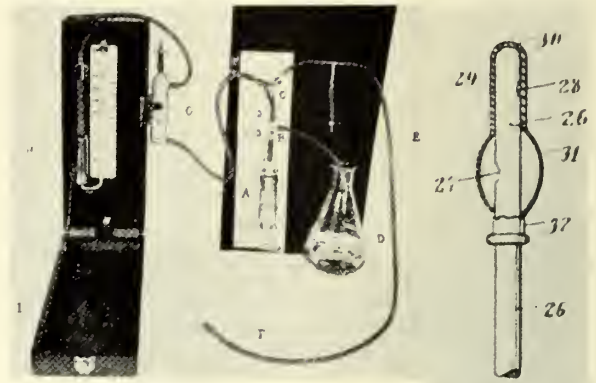


Fig. 1. The Microcystometer.
Fig. 2. The Sphincterometer.

combination of neurogenic and urologic obstruction, so that other methods of bladder study should not be discarded in favor of cystometry alone. These mixed cases have caused us to advocate a combined type of treatment.

CRITERIA FOR CYSTOMETRY AND CYSTOMETERS

Cystometry is an artificial procedure and by no means simulates intravesical conditions, as urine gradually collects in the bladder. With each increment of filling the autonomic phasic reflex of the detrusor is elicited. We prefer a mercury manometer, but water and aneroid manometers may be used. The fillings must be done in a few seconds to prevent the physiologic relaxation of the detrusor. We therefore object to a drip method or a continuous inflow method of filling. The reflex must be elicited by a sudden impulse such as is used in eliciting the knee-jerk.

THE SIMONS' MICROCYSTOMETER AND SPHINCTEROMETER

The cystometer shown in figure 1 is compact, portable, accurate and inexpensive and is capable of delivering any quantity of fluid under controllable pressure. It has one advantage over all other cystometers, in that it can be used with the Sphincterometer,‡ the only clinical instrument: by means of which the tonus of the internal and external sphincters of the bladder can be estimated.

The method of using these instruments has been described in detail by the author.^{3,4}

The Sphincterometer shows that:

The norm of tonus is 15 mm. of mercury for the internal sphincter and 23 mm. for the external sphincter.

Hypertonic detrusors show an elevation in tonus of the internal sphincter.

‡Manufactured by the Elm Sales Co., 1140 Broadway, New York, N. Y., U. S. A.

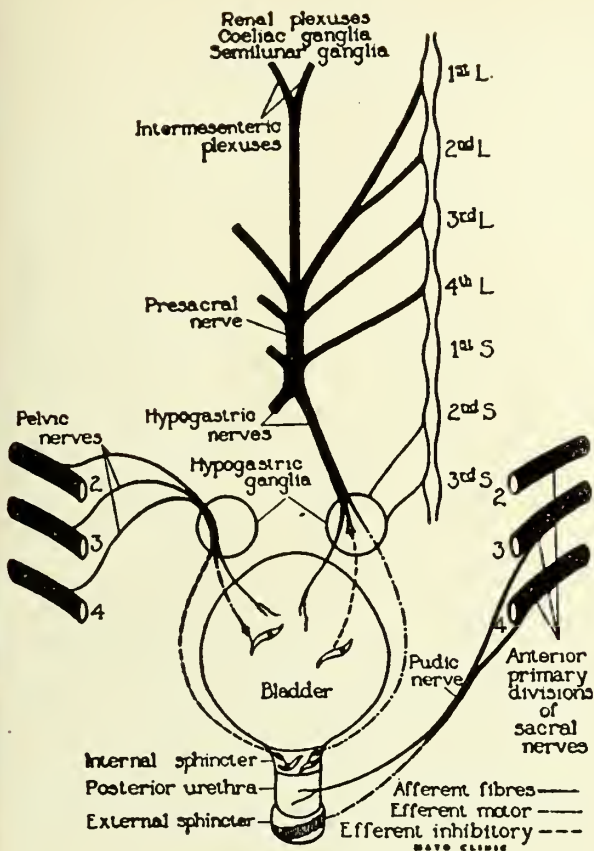


Fig. 3. After Learmonth.

Incontinence of urine is probably based on the balance between the tonus of the detrusor and the external sphincter.

Retention of urine and residual urine are probably caused by a disturbance in balance between the detrusor and the internal sphincter.

NORMAL MICTURITION

Until disproven, we subscribe to the idea of a dual autonomic innervation of the bladder. As fluid gradually accumulates in the bladder the sympathetic (thoracolumbar) centers are in control. These "nerves of fill-in" through the presacral nerves relax the detrusor and keep the internal sphincter in a state of tonus.

Normally the bladder is able to empty itself completely. When it has accumulated about 200 cc. of urine or fluid there is *desire to void* and the sacral parasympathetic (conus medullaris) center begins to be called upon. The "nerves of emptying" are the pelvic nerves from the conus; they contract the detrusor and relax the internal sphincter. Due to afferent impulses one of the higher centers, probably in the paracentral lobule, sends an impulse downward to the conus, which is relayed to the detrusor via the pelvic nerves.

With a bladder content below the "desire to void" point, there can be a voluntary instigation of micturition. In this orderly sequence the detrusor gently contracts

and the internal sphincter opens, but not due to the force exerted by the detrusor or the voluntary pressure of the abdominal muscles and fluid enters the deep urethra. An afferent-efferent impulse through the pudic nerves then relaxes the external sphincter and at the end of micturition the sphincters close.

THE ANATOMY OF THE AUTONOMIC SPINAL REFLEX ARC

This has been well outlined by Learmonth.² The supra-segmental centers of instigation and regulation in the cortex and in the fourth ventricle and their connections with the spinal centers by way of the corticospinal tracts have been outlined by Simons and Emanuel.¹¹ There is also some connection between the extrapyramidal centers and those in the cord.

Tables 1 and 2 show average charts of the two neurogenic and the two non-neurogenic (or myogenic) dystonias of the bladder encountered in neurogenic and urologic diseases. Typical case reports have been published.^{10,7,12}

DYSTONIAS OF THE BLADDER

Dystonias are defined as aberrations of function of the bladder musculature. They can be revealed only by cystometry. Since the beginning of cystometry it has seemed probable that there was some connection between the action of the detrusor and its control by the nervous system; which if accurately recorded by instrumental means might be of clinical value. These dystonias may be of local (urologic) and of neurologic causation. Studies of local or urologic causation have been reported.^{10,5,7}

NEUROGENIC DYSTONIAS OF THE BLADDER

Dystonias that occur in neurologic disease are not all due to cord involvement. Some are due to involvement of suprasegmental and cerebral centers and others seem to be due to involvement of the autonomic nervous system.^{11,12} For this reason we prefer to substitute for cord-bladder the term neurogenic bladder.

Many neurologists have assumed in bladder involvement caused by injuries or diseases of the nervous system, that the bladder and/or its internal sphincter were paralyzed; that the bladder was flaccid and due to this it could not act very well and residual urine developed in lesser or greater amount. The term *overflow* or *paradoxical incontinence* was coined and has been very loosely used. Incontinence was assumed to be due to paralysis of the sphincters. Cord-bladders and other types of dystonia that occur in cases of disease of the central nervous system were never suspected of being hypertonic at any stage.

Cystometric investigations in a series of neurologic cases¹² we found that, aside from certain luetic cases and some transverse myelopathies, subtonic or paralyzed detrusors were a comparative rarity; that most neurogenic bladders were hypertonic; that incontinence of urine was usually associated with hypertonic detrusors; that most cases of incontinence of urine were associated not with

TABLE I
Composite cystometrogram records of groups I, II, III, IV and V

Hypertonia:		
I. Neurogenic:	3, *33, P56, SP62	MVP 90
II. Non-neurogenic:	2, 5, 8, *11, 18; 23, P31, 27, SP30, 36	MVP 98
III. Normal:	1, 3, 4, *5, 6; 8, 9, P10, 11, SP15; 16, 24	MVP 62
Hypotonia:		
IV. Non-neurogenic:	1, 2, 2, 3, 4; *4, 5, P6, 12, SP9; 10, 12, 13, 14, 11; 15	MVP 77
V. Neurogenic:	0, 1, 2, 2, 3; 3, 4, 5, 6, *6; 7, 9, P10, 12, 14; SP10, 14, 11, 18, 22	MVP 85

TABLE II
Sensory analysis of cystometrograms in groups I, II, III, IV and V

	*Desire Observations	Cc.	P-Pain Observation	Cc.	SP-Severe Pain Observation	Cc.	MVP
Hypertonia:							
I. Neurogenic	2	100	3	150	4	200	100
II. Non-neurogenic	4	200	7	350	9	450	98
III. Normal	4	200	8	400	10	500	62
Hypotonia:							
IV. Non-neurogenic	6	300	8	400	10	500	77
V. Neurogenic	10	500	13	650	16	800	85

The Groups I to V were made on clinical grounds in an attempt to interpret the results obtained by cystometric examination. In explaining, for example, the cystometrogram of Group I: Neurogenic Hypertonia: 3, *33, P56, SP62; MVP 90. The numbers 3, 33 etc. represent the manometric pressure recorded in mm. of mercury recorded as the detrusor contracted upon the successive increments (50 cc, 100 cc etc.) as the bladder was filled; the sensory points are represented by * (first desire to void), P (pain or discomfort), SP (severe pain); and MVP represents the maximum voluntary pressure recorded by the patient when he used all of his accessory muscles of micturition. It might be here remarked that this last is not an autonomic action of the detrusor and should not be incited except at the end of the cystometry, as it may bring on detrusor spasm, and interfere with the production of the cystometrogram. It is also not to be confused with detrusor spasm termed by some "the stretch-reflex" from a study of which reflex deductions have been drawn by other investigators. For further details see: Simons, I., Studies I, II and IV.

From this it is seen that compared with Group III, the normal: Group I. True neurogenic hypertonias have very short charts with sensory points shifted markedly to the left. Group V. True neurogenic hypotonias have very long charts with the sensory points shifted markedly to the right. Groups II and IV have hypertonia and hypotonia at times almost as great as Groups I and V respectively, but their sensory points are normally or nearly normally placed. Their deviation in tonus is purely myogenic and can usually be explained by local findings in the lower urinary tract. Likewise there are no neurologic clinical findings in the somatic nervous system in cases that fall into Groups II and IV. For more detailed methods of using Tables I and II in differentiating neurogenic from non-neurogenic cystometrograms, see Simons, I. and Bisher, W.: Study III, in which abstracts of typical cases of each of the five groups are given and discussed.

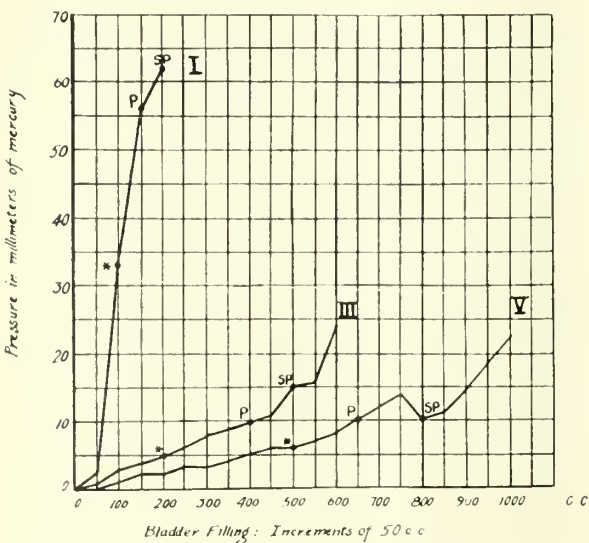


Fig. 4. Graphic record of cystometrograms.

Sensory symbols: (*) desire to void; (P) pain; (SP) severe pain; (MVP) maximum voluntary pressure.
Cystometrogram date:
mm. : ; MVP
cc. : 50 250 500 750 1000

subtonic or paralyzed sphincters, but on the contrary the internal sphincters were normal or hypertonic.

We have begun to question the term paradoxical incontinence as applicable only to paralytic bladders with residual urine, because we have found that even *very hypertonic detrusors* and even *those with incontinence* had residual urine. We have also found that latent luetics and even non-luetics, urologically negative to cystoscopy, could develop a subtonic or atonic bladder, which was not associated with neurologic findings. It seems probable that such bladders are due to involvement of the autonomic nervous system.

Bladders in manifest neurologic disease as a rule show some degree of dystonia, even though the patient does not complain of dysuria. Neurogenic dystonias (tables 1 and 2) are either hypertonic or hypotonic.

Hypertonia neurogenica shows a diminution in vesical capacity to four increments (200 cc.) or less. There is hypersensitivity on filling and the sensory points are shifted to the left. Clinically this type of hypertonia has been found very often in cases with corticospinal tract interference. We feel that the parasympathetic conus center is overactive due to interference with descending regulatory impulses. Therefore we prefer the term "efferent neurogenic bladder."

TABLE III¹²
Cystometric studies of neurologic cases

	Group I	Group II	Group III	Group IV	Group V	Total	Hyper-reflexias (confirmed)
Tabes and taboparesis		1	5		19	25	
Cerebrospinal lues	4		9		9	22	1
Lues latens	5				10	15	
Hemiplegia	10		6			16	16
Combined sclerosis	2		4		1	7	7
Multiple sclerosis	15	2	4			21	21
Lateral sclerosis	3					3	3
Amyotrophic lateral sclerosis	2		8		1	11	9
Syringomyelia	8	2			1	11	10
Transverse myelopathy	11	2			1	14	7
Friedrich's ataxia			4			4	4
Spinal cord neoplasm	6	1			1	8	6
Extra-pyramidal tract disease	6	3	5		2	16	9
	72	11				173	93
Miscellaneous cases						27	
Undiagnosed cases						6	
						206	

Of 93 cases with true hyperreflexia:

74 (79.5%) had vesical hypertonia (Groups I + II)

64 (68.8%) had hypertonia neurogenica (Group I)

Hypotonia neurogenica is the opposite of the above. Due to hyposensitivity the "desire to void"(*) point is markedly shifted to the right, occurring at an average of 500 cc. and the manometric pressure is low. The capacity of these bladders approaches twenty increments (1000 cc.) and may exceed this. These bladders may be even completely asensitive. They may have overflow incontinence. This is the clinical picture of the so-called tabetic bladder. As the hyposensitivity is of earlier occurrence and is in our opinion the causative factor in the dystonia, we prefer the term "afferent neurogenic bladder."

AFERENT NEUROGENIC BLADDER

The afferent neurogenic bladder is the first dystonia of the bladder that was suspected of being neurogenic. It is also called Hypotonia neurogenica (Group V)—(tables 1 and 2). The criterion is that it *must* be hyposensitive and it usually is hypotonic. It was thought to be exclusively due to luetic infection and the resultant involvement of the posterior columns (Goll and Burdach). However, cystometric studies have shown that it is rare even in tabes, in which the posterior columns are completely scarred; that it may occur in lues latens in which there are no somatic neurologic signs; that it may or may not occur in cerebrospinal lues without posterior column signs; that it may occur in non-luetics after horse-serum injection (the allergic type) and in diabetes without adequate neurologic signs (pseudo-tabes); that it has been found in syringomyelia and multiple sclerosis, but rarely; and we have seen it recover completely in taboparesis after malarial therapy, although the posterior column signs did not disappear.

For these reasons and on account of the findings in certain animal experimentation, we are inclined to be-

lieve that: (1) the afferent impulses from the bladder ascend chiefly, if not entirely, by paths other than the posterior columns; (2) that the lesion is of the autonomic nervous system and is carried by sacral roots to the cord and then possibly by the spinothalamic tracts;¹¹ that the etiology is primarily sensory (afferent) and that the hypotonia is a later result due to degeneration of the bladder musculature from disuse and the stretching by the accumulation of chronic residual urine.

LUETIC NEUROGENIC BLADDER

Table 3 shows that while hyposensitive hypotonic bladders (Group V) are the commonest finding in luetics with neurogenic bladder, this does not always occur. In fact it occurred in only 38 of the 62 cases studied. Hypertonia neurogenica was not found in tabes at all. But there were 4 cases of it in cerebrospinal and 5 cases of it in latent lues, although the latter condition showed hypotonia in 10 of 15 cases.

This hypertonia might mean cortical lesions which give no other signs (see Efferent neurogenic bladder). In the 38 cases of hypotonia, only 19 had posterior column involvement in the cord; the other 19 cases showed none at all. This of course suggests that afferent impulses *do not* travel or certainly *need not* travel upward via the posterior columns. And also that the lesion is probably outside the cord in the autonomic nervous system, or else that it is absolutely confined to the sacral ganglia and roots 2, 3 and 4. At any rate tabetic bladder is not synonymous with luetic neurogenic bladder, even if it is never hypertonic. Certainly the studies tabulated in table 3 show that afferent neurogenic bladder occurs without tabetic involvement of the cord.

EFFERENT NEUROGENIC BLADDER

The meaning of true somatic hyperreflexia with confirmatory pathological reflexes, such as Babinski, etc., is well understood. It is due to corticospinal tract interference.

There are two autonomic spinal reflex arcs from the bladder. One passes through the conus center; the other through the thoraco-lumbar centers. The former is the more important as to function, as it has to do with the emptying of the bladder. In cystometry it is used in order to elicit autonomic phasic reflexes, using the detrusor as a means to an end, just as the neurologist uses the quadriceps femoris and other muscles for eliciting reflexes.

A study of 93 cases in which there was true hyperreflexia (table 3) showed hypertonia of the detrusor in 79.5 per cent, suggesting concomitant interference with cortico-spinal tracts with resultant hypertonia neurogenica. In other words, due to lack of inhibition, the conus center overacted producing hypertonia of the detrusor, just as occurs in voluntary muscles. While we cannot at present explain this, there were certain cases (e. g. amyotrophic lateral sclerosis, Friedrich's ataxia, etc.) in which hypertonia of the detrusor seldom or never occurred. Yet of more importance is the fact that there were *some* cases of neurologic disease in which hypertonia of the detrusor was very marked and yet cortico-spinal tract signs were *slight or absent*, which suggests the possibility of using such hypertonia as a physical sign in the neurologic examination.

Such uninhibited conus action has a tendency to produce urgency and frequency of micturition and even incontinence, which is a common symptom in most of the neurologic diseases in which these descending tracts are interfered with, such as multiple sclerosis, transverse myelopathy, hemiplegia, etc.

While the tonus of the internal sphincter is not forcibly overcome by detrusor action in the act of micturition, we believe that this does occur in hypertonia of the detrusor in neurologic disease. It is of interest to note that in these cases the internal sphincter is moderately or markedly hypertonic (20 to 30 mm. of mercury), probably a defense reaction, yet this is apparently not enough to withstand detrusor pressures of 100 to 200 mm. It is of interest and importance to note that incontinence of urine is in these cases *not* associated with paralyzed internal sphincters but with sphincters more powerful than the normal. This type of incontinence is certainly *not* an *ischuria paradoxa*, a retention with incontinence due to overfilling of a large flabby bladder as soon as intravesical pressure rises beyond a certain point. On the contrary it is an *active*, not a *passive* type of incontinence. The detrusor *overcomes* the internal sphincter intermittently or continuously. These are usually complete types of incontinence and are often associated with rectal incontinence.

THE ROLE OF THE SPHINCTERS

Before the invention of the sphincterometer the tonus of the sphincters could not be estimated either together or separately. Their role in the production of retention

of (residual) urine and of incontinence is still only partly understood.

The internal sphincter is apparently controlled by adrenergic impulses. Residual urine may be caused by internal sphincteric tonus, which even though normal may be too strong for a weak detrusor. This does not explain the fact that even in the case of hypertonia of the detrusor, which is apparently controlled by cholinergic impulses, there is still at times considerable residual urine. The only explanation, that we can at present suggest, is that micturition, whether normal or pathological, can not be entirely explained by a dynamic or physical theory. The physiological element is apparently too strong and too important to be ignored. There must be team-play between detrusor and internal sphincter, the latter relaxing as soon as the former goes into action. Without such team-work the emptying of the bladder is not smoothly performed. Hence the residual urine in hypertonic neurogenic bladders.

After the urine passes the internal sphincter into the posterior urethra a reflex is set up relaxing the external sphincter, as the latter cannot long withstand a strong desire to void. If the team-play is continuous a normal complete emptying of the bladder occurs. If not normal there may be a stoppage of the stream before the act of micturition proceeds very far; or as often occurs the act is never completed and there is residual urine, as occurs fairly regularly in hypertonia neurogenica. The balance between the detrusor and external sphincteric tonus probably determines incontinence.⁵

THERAPY OF THE NEUROGENIC BLADDER

This may be divided into the therapy of retention of urine, of residual urine, of urgency and incontinence of urine and of infection of the genitourinary tract.

In retention of urine after abdominal operations and after opening of the dura of the cord, various drugs have been advocated, both cholenergic and those said to enhance the action of these drugs. In acute injuries of the brain and especially of the cord, whether by trauma or hemorrhage, there is a period of "spinal shock" with complete retention of urine, which latter lasts from a few days to a month or so. During this retention intermittent or in-dwelling catheterization is necessary. Apparently there is a sympathetic (adrenergic) preponderance. As a rule this period can be shortened by removing the retention catheter rather soon and in some cases giving Trasentin, as many of these are hypertonic. Mixed cases of course occur in which there is also some urological obstruction at the vesical neck, which indicates transurethral resection; the latter has even been advocated in tabetic bladder.

In cases in which catheterization is very difficult or impossible, suprapubic vesical puncture is indicated and in some cases trocar drainage may be necessary with an in-dwelling Malecot catheter, which may or may not be later removed.

Many of the patients with acute retention in transverse and other cord lesions develop incontinence which may last for months or years. They are usually hypertonic and we have had excellent results in some cases

with Trasentin, 600 mgm. by mouth daily.^{12,9} Some have been improved and some completely relieved. It has not proven toxic up to 900 mgm. daily for periods of two to three weeks, and has none of the disagreeable untoward effects of atropine. In irremediable cases of complete incontinence suprapubic trocar puncture and permanent drainage is indicated.

The drug treatment of the hypotonic or atonic bladder with large residual urine is still under study.

Infection of the bladder is the greatest problem in neurogenic bladder. Tidal drainage through the urethra is indicated but an in-dwelling urethral catheter over a long period is unsatisfactory. The procedure may be carried out through a Malecot catheter left in place after suprapubic puncture drainage.

The use of Trasentin for neurogenic bladder is indicated only in those patients who are cystometrically *hypertonic*. We have shown that the tonus can be reduced and that improvement of the clinical symptoms can follow or often outstrip the reduction of the hypertonia. The complete relief of incontinence after Trasentin[§] has persisted in some cases.

SUMMARY

Microcystometry and Sphincterometry furnish a physiologic clinical approach which checks and augments the cystoscopic anatomic findings in neurogenic bladders.

Microcystometry has been so simplified that it may be done by neurologists and even by general practitioners.

Micturition is controlled chiefly by the lower autonomic neurone. The center is in the conus medullaris.

Normally the conus center is initiated and inhibited from the paracentral lobules; and it is also controlled by hind-brain and extrapyramidal centers.

The sympathetic (thoracolumbar) center is of importance but is still of lesser importance in micturition.

The term cord-bladder should be replaced by neurogenic bladder.

Microcystometry can differentiate vesical dystonias of non-neurogenic (myogenic) from those of neurogenic

[§]The Trasentin, used for these studies, was furnished by the Ciba Pharmaceutical Products, Inc., of Summit, N. J.

causation. The latter are preferably termed Afferent (hypotonic) and Efferent (hypertonic) Neurogenic Bladders.

It seems probable that the Afferent Neurogenic Bladder, which includes the tabetic bladder, is not due to posterior column involvement of the cord.

The Efferent (hypertonic) Neurogenic Bladder is far more commonly found. It is due to lack of inhibition of the conus center, usually because of lesions in the corticospinal (pyramidal) tracts. This causes urgency and often incontinence.

Considerable relief and often cure can be obtained by the use of parasympathetic depressants. Trasentin has proven of value.

The medicinal treatment of the subtonic neurogenic bladder is still under study.

Urologic and semisurgical measures like tidal drainage, transurethral resection of the vesical neck and suprapubic catheter drainage by means of vesical puncture are still of value in combating retention, incontinence and infection, until better methods are evolved.

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TRANSACTIONS OF THE MINNEAPOLIS ACADEMY OF MEDICINE

Founded January 17, 1920

Meeting Held on Thursday, October 8, 1942, Dr. Roy E. Swanson Presiding

A paper on "Coronary Insufficiency Precipitated by Hemorrhage from Duodenal Ulcer" was presented by Dr. C. A. McKinlay. (The text of this paper was published in the February issue of *JOURNAL-LANCET*.)

INAUGURAL THESIS

The inaugural thesis, "Technic of Thyroidectomy," was presented by Dr. D. C. MacKinnon. Since this presentation consisted essentially of colored lantern slides, and the text is of little value without the illustrations, it is not presented for publication. After the paper, the following discussion took place:

Dr. ROBERT CARON: "I would like to compliment Dr. MacKinnon on his very excellent presentation, which entailed a great

deal of preparation. I should like to know if general anesthesia is employed. Does he allow the patient to awaken in between sides in order to ascertain whether or not there has been any involvement of the recurrent laryngeal nerve?

"It appears to me that the use of Ochsner forceps for the immobilization of the strap muscles is somewhat of a harsh treatment to the strap muscles. Bainbridge forceps are much less traumatic. They are very narrow, and their use facilitates an easy closure."

Dr. R. C. WEBB: "I wish to congratulate Dr. MacKinnon on this very excellent detailed presentation of the technic of thyroidectomy. His pictures have shown the technic in a clear

and interesting manner.

"The surgical technic of the operation for goiter typifies the supreme triumph of the surgeon's art. The operation was conceived a thousand years ago, but the technic was not perfected until about fifty years ago. Other operations more delicate, and sometimes more difficult, have only naturally followed in the paths made clear for them by the early masters of goiter surgery.

"Those interested in the technic of the thyroid operation would enjoy reading the *Operative Story of Goiter*, a 300-page monograph published in 1919 by William S. Halsted. In this book Doctor Halsted shows the goiter instruments designed by him for the Johns Hopkins Hospital in 1889.

"Dr. Caron has emphasized local anesthesia. I personally prefer very much to use local anesthesia for all goiter operations. I use general anesthesia only when the patient insists upon it.

"About five years ago I discontinued using catgut in goiter operations and have used fine silk. The wounds heal more kindly; drainage usually stops at twenty-four hours, and I occasionally close the wounds without drainage.

"Dr. MacKinnon has shown a useful point in the dressing with the use of towels. I have found it helpful to ask the nurse for 'a piece of 2-inch adhesive as long as the bed is wide.' When a gauze dressing is placed in the center of a piece of adhesive of this width and length, and the center is placed on the back of a patient's neck, the two ends will fold across in front of the dressing, and fasten to the patient's chest so that one piece of adhesive will suffice."

DR. KARL ANDERSON: "It has been my impression in underwriting thyroid cases that there has been a marked decrease in this type of impairment. At least, we do not see it nearly as frequently among insurance applicants as previously. Have you any figures that would prove or disprove this impression clinically?"

DR. DONALD C. MACKINNON: "First, I wish to make it clear that the technic of thyroidectomy that I have just demonstrated with colored slides is that used at the Lahey Clinic. It is not my original claim, although I approve of it, accept it, and use it regularly.

"Dr. Caron asked the question concerning the choice of anesthesia, and the use of local anesthesia for thyroidectomy. It is probably a matter of personal choice as to whether one wishes to use local or general. Personally, I prefer to use a general anesthetic that carries a high concentration of oxygen, such as cyclopropane. Patients with severe hyperthyroidism demand and use more oxygen than those individuals with mild hyperthyroidism. In patients given cyclopropane the blood is always bright red, in patients having other gas anesthetics it is darker or more dusky in appearance.

"Patients under local anesthesia are usually aware of the fact that surgery is being done, and this may be a factor in causing postoperative reactions in the more toxic cases. However, some surgeons are very clever local anesthetists, and are able to do the operation with very little discomfort to their patients.

"The matter of adequate preoperative sedation is very important, whether one uses general or local anesthesia. If large doses of nembutal, morphine, and scopolamine are given preoperatively, according to the age, size, and toxicity of the patients, they will usually be well sedated when they enter the operating room.

"Just a few nights ago, at a Minneapolis Surgical Society Meeting, Dr. Rae made a statement that impressed me, concerning the preoperative sedation of patients with hyperthyroidism. He suggested that the patient be put to sleep in bed with pentothal, without announcing the time of operation, and then removed to the operating room for surgery.

"Incidentally, Dr. Rae also is using spinal anesthesia in hyperthyroidism to forestall a postoperative thyroid crisis. This was brought to his attention by the successful treatment of a few cases of severe postoperative thyroid storms with spinal anesthesia.

"Dr. Caron asked the question as to whether one should awaken the patient before starting to operate on the other lobe. I presume that he has in mind the testing of recurrent laryngeal nerve injury of the side just operated upon. I think it is

very difficult to determine nerve injury by the quality of the voice while the patient is on the operating table. Frequently the voice is husky or hoarse due to irritation of the larynx or trachea, mucus, or laryngeal spasm. Furthermore, the procedure is very disturbing to the patient. If the surgeon understands the anatomy and course of the recurrent nerves, identifies them, and avoids injury to them, it is not necessary to arouse the patient to test the voice.

"If there is injury to one recurrent nerve, there will usually be a little hoarseness that persists for several weeks or months after the operation. If both recurrent nerves have been injured, the patient will first have hoarseness after the operation, followed by obstruction of the glottis, which may follow immediately, or weeks, or months later. It may become necessary to do a tracheotomy if the obstruction is severe.

"If the patient has had a previous thyroidectomy, it is most important to do a thorough laryngoscopic examination of the vocal cords to determine recurrent nerve injury before doing further surgery. If a recurrent nerve has been injured, and a vocal cord is paralyzed, it is very important to know it so that one can take special care not to injure the normal nerve. Likewise, in doing the second stage of a two-stage procedure, it is important to examine the cords to make sure that the right recurrent nerve was not injured while doing the first stage, or right hemithyroidectomy.

"There is only one advantage in allowing the patient to awaken during a thyroidectomy, and that would be to give the surgeon an opportunity to see if any of the ligatures would come off the blood vessels while the patient was straining and coughing. One might then ligate any bleeding vessel, and avoid serious postoperative hemorrhage.

"Dr. Caron also asked about special clamps used on the cut prethyroid muscles. I am not acquainted with the use of those clamps, and cannot make any remarks about them. I have used heavy Ochsner forceps for this purpose, and found them to be very satisfactory.

"A question was asked about the use of various suture material in thyroidectomy. At the Lahey Clinic plain catgut is still being used. It frequently causes wound induration. Fine silk is popular with many surgeons, and does not produce wound induration. However, if a wound infection does occur, there is a disadvantage in having used it, since it may be extruded from the wound for some time. I think there are fewer serum collections in the wound when silk is used, and when infection does not occur.

"I cannot answer the question as to whether or not there are fewer cases of hyperthyroidism at the present time."

DR. C. A. MCKINLAY: "It seems to be common experience that there are fewer cases of hyperthyroidism presenting themselves for treatment. Thyroidectomy continues to be the treatment of choice."

DR. KARL W. ANDERSON: "I had the opportunity of following a series of thyroid cases with Dr. Stenstrom at University Hospital, in which we used deep X-ray as a mode of therapy, giving most of the patients Lugol's during the period of the X-ray therapy. I must admit that I was quite disappointed with the results, although I do not think Dr. Stenstrom was quite as disappointed as I. I personally felt that in most of these cases better results would have been obtained with surgery. There were a few mild cases which X-ray seemed to help, and there were also some postoperative cases that we didn't want to subject to surgery a second or third time."

DR. DONALD C. MACKINNON: "As to the question of recurrent hyperthyroidism, and cures in these patients, I have a feeling that some just cannot be cured. In some individuals no matter what one does, they will continue to have hyperthyroidism. I recall one woman who had a typical picture of recurrent hyperthyroidism, with weight loss, high pulse rate, high basal metabolism, and other symptoms and signs of hyperthyroidism. She had been operated upon three times, and when operated on for the fourth time there was no gland to remove, but she continued to exhibit hyperthyroidism. Perhaps there is some other cause for this symptom complex outside of the thyroid gland.

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CLEMENCY FOR INCLEMENT WEATHER

Who would change our climate for any other? Change is the most outstanding thing about it as it is. It is sometimes said that we have more weather than climate and anyone who does not like it at the moment needs but to wait for another change. In spite of any effort at levity and local loyalty, we must admit that these often severe changes do cause much havoc to the chronically afflicted. These poor souls may have been too brave at some earlier period of their lives and neglected the little precautions and adjustments necessary to protect themselves against exposure. Now they have greater susceptibility to upper respiratory infections, chilly sensations that forebode an oncoming change, rheumatic pains or acute exacerbations of some other chronic affliction like that of bronchitis. They must exercise great care on the advent of the inclement weather that comes with abundant frequency at this time of the year.

We should like to recommend the use of some cov-

ering of the nose and mouth in damp and frosty weather. We would advocate a return to the fascinator—some have never heard the word except as a synonym for charmer. In this case, however, we refer to that soft, knitted little shawl worn on the head by sensible women of old who also learned to adjust it over a cold nose on sleigh rides. With the present popularity of the Russian babuscka, the time would seem propitious to bring back the American scarf with the fascinating name. When worn to cover the face, as did our mothers of old, it wins hands down in open air competition with any other contraption ever devised. We air condition our homes, our offices and our shops but when we step outside we unhesitatingly stick our necks out, leading with an uncovered proboscis known by everyone to be the chief entrance of infection to the human body. We should like here and now to enlist the sympathetic interest of an enlightened profession in promoting a return to the simple faith of our mothers.

A. E. H.

CIVILIAN DEFENSE

Recent advices from Washington indicate a radical change in the organization of medical units for air-raid disaster. Originally, squads of doctors, nurses and nurses' aides, with adequate equipment, were allocated for first-aid posts, casualty stations and base hospitals, very much in the same manner as provided for the evacuation of battle casualties by all modern armies. Admirable as it is for strictly military purposes, this arrangement has been found wholly unfitted for air-raid casualty relief, where the situation in all its details is so different.

"The experiences of Britain under air-raid conditions have dispelled many preconceived notions concerning first aid," reports Dr. George Baehr, Chief of OCD's Medical Division, who recently returned from England. Most raids occur at night. Victims are pinned beneath debris and are either killed or severely injured. All serious casualties are moved directly to hospitals, never to first-aid posts. The darkness under which the rescuers must work, the general confusion during a raid, the dust and dirt in the air, and the need for immediate hospitalization of those seriously injured generally eliminate the possibility of applying the usual first-aid measures. Open wounds are merely covered until the patient reaches the hospital, traction splints are not used, and blood transfusions are likewise delayed until the patient reaches the hospital. First-aid parties (stretcher teams) are considered a waste of manpower. Increasingly, first-aid parties are being merged with rescue squads. Four-stretcher ambulances are essential. They have been made in England and Scotland by stripping used cars and mounting a simple ambulance body on the chassis. At least one of these ambulances is required for every 10,000 persons in target area cities.

Under this new plan, the basic unit dispatched to the site of a bombing will be an "express party," consisting only of a rescue team, a "mobile medical team," and ambulance and possibly a passenger car or station wagon. Such an express party will usually be sufficient to handle a major incident or a group of neighboring minor incidents with casualties. Additional medical and rescue personnel, ambulance and passenger cars for sitting cases should be held in reserve and dispatched by the control center only on request of the doctor at the incident. The mobile medical team, as heretofore, will consist only of one doctor, a trained nurse and two auxiliaries, and, as stated, will be ample for most contingencies, in place of the larger units originally provided.

The foregoing, quoted freely from the directive issued by Director Landis on December 5, implies an enormous simplification of air-raid disaster relief. It will be especially welcome and applicable to the inland areas, where the likelihood of mass bombing is more remote than in the coastal and more thickly populated regions. It will greatly lighten the burden of those who have the responsibility of handling these problems in the smaller places, where trained personnel is more scarce and yet equally necessary for quick action. It appears to us to be a very sensible and practical modification of the plans for the whole country.

G. C.

WARTIME PSYCHONEUROSES

In a time of stress such as the present, it is obvious that many persons are suffering from a sense of insecurity, apprehension or frustration relative to increased work and responsibilities, changed family life, altered finances, possible loss of loved ones and the like. The fundamentally stable individual tends to remain for the most part composed and functioning; the poorly integrated person tends to add these new factors to and weave them in with his usual neurotic tendencies. The result is often an accentuation of hypochondriacal or hysterical symptoms and a visit to the physician.

Since the patient commonly interprets the symptoms in terms of serious illness, one should perform a reasonably careful general physical examination even though the history seems clearly to indicate a predominately neurotic component in the case. The quick history and physical examination make it possible for one easily to bring up the question of the patient's worries and fears, and provides for the physician a position of authority so that the patient's concern over his health can be at least partially allayed.

Cases of acute anxiety commonly clear up with fair promptness under conditions allowing for an unburdening of the patient's reasons for the anxiety. This may indeed take an extra bit of the physician's time but it is time well spent in that many of these patients who seem severely disabled on an emotional basis alone, can be rehabilitated quickly if encountered sufficiently early and given suggestion, reassurance and persuasion by one whose statements can be accepted as authoritative. Appropriate handling of insomnia by mild sedation and, when feasible, by out-of-doors' exercise, is commonly of great aid. There is likely then to be improvement in appetite. The patient usually should be returned to his ordinary occupational status as rapidly as possible unless the occupation itself has seemed to be one of the etiologic factors in the anxiety.

The conditions are quite different in cases of the more involved hypochondriacs, reactive depressives and long-standing hysterics. While treatment methods like the foregoing will commonly give this group of patients a certain amount of assistance in the acute situation, these cases usually require much more protracted management and psychotherapy, often beyond the time allotment that can be spared by the busy practitioner. If the severity of the case is not too pressing, one may reasonably try to act as a crutch through office interviews. In severely psychoneurotic cases, it is commonly advisable to remove the person from his home to a hospital environment where the usual irritants associated with the development of the neuroses are no longer immediately at hand.

One can do little to alter the personal distress of the actual situations involved in the entrance of a brother, husband or son into military service but one can assist his patients to stand courageous and functioning in the face of such experiences and thus add his bit to the public morale and the efficiency of the home group of citizenry as a whole.

J. C. M.

Book Reviews

Synopsis of Diseases of the Skin, by RICHARD L. SUTTON, M.D., and RICHARD L. SUTTON, JR., M.D.; St. Louis: C. V. Mosby Co., green fabrikoid, gold-stamped, 460 pages, plus index of 20 pages and 413 illustrations. Price \$5.50.

The Drs. Sutton have written a very practical book, as the title indicates. Especially interesting is Chapter One, which has numerous clear-cut anatomic and histologic illustrations.

Brevity, although a prime purpose in a book of this type, has not prevented the authors from including all essentials. Allergic manifestations of the skin are itemized. Therapeutic medicaments, both internal and topical as well as roentgen, radium, and physical therapy, are all discussed. Inflammatory diseases, diseases due to bacterial infections of the skin, and fungus diseases are all dealt with. A revised treatment of syphilis is presented. Outlines of all topics including precanceroses are brief but quite inclusive.

The book is valuable to a busy general practitioner from a standpoint of concise, factual information. To a specialist or a teacher it is a pleasure to observe the completeness of the outline in the various topics discussed by the authors. The reviewer can recommend this book very highly to medical students not only for the subject material, but also for the illustrations of the various diseases.

Vitamin Values of Foods: A Compilation, by LELA E. BOOHER, EVA R. HORTZLER, and ELIZABETH M. HEWSTON; New York: Chemical Publishing Co., Inc. Price \$2.75.

This very detailed and excellently edited compilation summarizes the vitamin A, thiamin, ascorbic acid, vitamin D and riboflavin values of foods as recorded in the literature from the date of establishment of the latest international standards for vitamins through December, 1940. Values of the foods are expressed in terms of International Units or absolute weights of these vitamins per 100 grams of edible portions of foods. The periodicals drawn upon by the authors for their data comprise thirty-four of the leading scientific and medical journals, both American and foreign.

Vitamin Values of Foods presents vitamin data in relation to (1) places of production or source of material; (2) method of cultivation or feeding practice and degree of maturity; (3) variety and part of plant or breed of animal; (4) method of cooking, processing, and storage; and (5) method of analysis.

This reference volume should be of interest and use to any biochemist or clinician engaged in vitamin research. It summarizes in a detailed and painstaking manner much information which had heretofore been at loose ends. The nutritionist, dietitian, teacher, and housewife may also learn many valuable facts from this compilation. The practical usefulness of the material, quite apart from its general theoretical significance, may be judged by the following typical specific observation: One hundred grams of unpared New York Northern Spy apples will lose 3 mg. of vitamin C upon standing one hour after paring and quartering, or 27 per cent of the total vitamin C value. Likewise heavily toasted bread loses 21 per cent of its vitamin B₁ value. There is a greater destruction in the vitamin C value of tomato juice when a space is left in the bottle on canning than when the bottle is completely filled. There is 42.8 per cent more vitamin C in the "sunny side" of an apple than in the "shady side."

The authors are Lela E. Booher, formerly senior nutrition chemist of the Bureau of Home Economics, Eva R. Hertzler, formerly assistant chemist, and Elizabeth M. Hewston, associate chemist. Miss Booher is now director of the Institute of Nutrition, Milwaukee Children's Hospital, and Miss Hertzler is now with Bio-Chemical Research Laboratories, Parke, Davis and Co., Detroit. The volume includes a bibliography of the 298 studies relied upon in its compilation.

LEGISLATION

Grand Forks North Dakota District Medical Society, comprising counties of Grand Forks, Walsh, Pembina, Cavalier, Nelson and Traill, went on record as disapproving of Senate Bill Number 434 introduced into the U. S. Senate by William Langer, senator from North Dakota. This bill, which proposes "to prohibit experiments on living dogs in the District of Columbia" was introduced by the North Dakota senator only by request and was withdrawn promptly as soon as the committee appointed by the president of the district society wrote the senator regarding it.

RED CROSS APPOINTMENT

Dr. Albert McCown, Director of Medical and Health Service of American Red Cross, writing from national headquarters at Washington, D. C., announces the appointment of Dr. G. Foard McGinnes as Director of Medical and Health Service of the Midwestern Area, headquarters for which are in St. Louis and which includes Minnesota, North Dakota, South Dakota and Montana. Dr. McCown says: "Dr. McGinnes comes to the Red Cross from the Tennessee Department of Public Health where since 1929 he was Director of Venereal Disease Control Service, Associate Professor of Preventive Medicine of the University of Tennessee and Chief of the Department of Siphilology, Meharry Medical College. Previous to 1929 he was with the Virginia State Department of Health, Director of Bureau of Communicable Diseases. It is important that sound and constructive relationships be maintained between the American Red Cross and the medical profession in the several states. Doctor McGinnes' clinical background and viewpoint will promote such relationships. Officers of county medical societies are asked to note his appointment and availability in the discussion and promotion of medical-Red Cross relationships."

SOUTH DAKOTA MEDICAL AUXILIARY DISTRICT MEETINGS

The February monthly dinner meeting of Seventh District (Sioux Valley) Medical Auxiliary, held in Sioux Falls, South Dakota, and attended by twenty-four members, devoted a portion of its deliberations to arrangements for the annual Doctors' Day dinner to be held March 30. Chairman for the occasion will be Mrs. Chas. J. McDonald. Speaker of the February meeting was Mrs. Joseph Smith, missionary, of Burma. The auxiliary is actively engaged in making Red Cross items. Ninety-six wool squares for an afghan were turned in and work on a second has begun.

The Women's Auxiliary to the Huron South Dakota District Medical Society met February 24th at the Hotel Marvin Hughitt with state president, Mrs. Jno. C. Hagin, Miller, as its guest. Mrs. B. T. Lenz, district president, was in the chair. Plans were made for the observance of Doctors' Day and for the remaining ten months of 1943.

HOSPITAL TRAINING SPEEDED UP

Ernest L. Olrich, district director of Training Within Industry agency of the War Manpower Commission, is reported to have set a new pattern in faster, more effective training of hospital personnel by transplanting methods developed to assist war plants in adapting new workers to unfamiliar industrial operations. Hospitals participating are Abbott, Fairview, Deaconess, General, Northwestern, St. Barnabas, Swedish and University in Minneapolis and Ancker, Miller, Northern Pacific, St. John's and St. Joseph's in St. Paul.

News Items

Dr. L. G. Dunlap, Anaconda, Montana, addressed the Montana Academy of Eye, Ear and Nose and Throat Surgeons in Butte on February 22nd. He had been awarded an honorary degree in eye and ear surgery earlier in the month at the conclusion of a two-week mid-winter postgraduate course held in Los Angeles for eye, ear, nose and throat surgeons at which 250 surgeons studied.

Dr. W. N. McPhail, Missoula, Montana, has been appointed director of the health service at Montana State University for the winter quarter. He is a graduate of that institution as well as of the medical school at McGill University, Montreal, Canada.

Dr. Wm. Knoll, for two years a member of the Battle Mountain Sanitarium medical staff at Hot Springs, South Dakota, has taken a post with the Veterans' Administration Facility at Indianapolis, Indiana. He and Mrs. Knoll will make their home in that city.

Dr. Jos. D. Craven was elected president of the Montana Medical society at the annual meeting held at Williston, North Dakota. Dr. C. M. Lund was elected secretary-treasurer and Dr. Willard A. Wright delegate to the state meeting expected to be held in Bismarck.

Dr. R. J. Jackson, Rapid City, South Dakota, has been appointed physician for Pennington county by the commissioners of that county and Dr. D. L. Kegaries county coroner by the same body at that meeting.

Dr. D. S. MacKenzie, Jr., Havre, Montana, son of Dr. D. S. MacKenzie, Sr., has been promoted to the rank of major. In the army two years he is stationed at Camp Grant, Illinois.

Dr. Walter M. Boothby, director of Mayo Aero Medical Unit, recently visited Williams Field, the air base at Chandler, Arizona, where he is recovering from an attack of pneumonia. Mrs. Boothby made the visit with the doctor.

Dr. B. K. Kilbourne, state epidemiologist of Montana, reports that last year was the most healthful in the history of the state. With great declines in the number of cases of communicable diseases in 1942 from 1941, there were only a limited number of diseases in which increases were shown.

1943 Elections to date for chiefs-of-staff at hospitals in this region disclose the following selections: Deaconess at Grand Forks, Dr. H. W. F. Law; Hibbing General, Dr. Robt. L. Bowen; Miller Memorial at Duluth, Dr. P. G. Boman; St. Mary's at Duluth, Dr. F. N. Knapp; Union Hospital of New Ulm, Dr. C. A. Saffert; Loretto Hospital, Dr. F. H. Dubbe; Kalispell General, Dr. A. Brassett.

Dr. W. E. G. Lancaster, Fargo, North Dakota, president of the Cass County Medical society, has joined the Fargo clinic, carrying on his practice of internal medicine and pediatrics.

Dr. Curtis W. Wilder, Lewistown, Montana, in an action taken by the board of commissioners of Fergus county, has received the appointment to succeed the late Dr. C. C. Wallin as county health officer. Dr. Wallin held simultaneously the position of county health officer, Lewistown city health officer and full time school physician. The two latter posts are yet to be filled.

Dr. Jno. A. McIntyre, Owatonna, Minnesota, was elected president of the Steele County Medical society. Other elections included Dr. E. J. Nelson, vice-president, Dr. D. H. Dewey, secretary-treasurer, Dr. D. E. Morehead, delegate to the state society meeting.

Major Robt. B. Radl, after serving as medical officer at Fraine Barracks, Bismarck, North Dakota, has been transferred to Minnesota state selective service headquarters at St. Paul. The major and Mrs. Radl were honor guests at a farewell dinner given by doctors of the Quain and Ramstad clinic, Bismarck.

Dr. Geo. E. Baker, Casper, Wyoming, health officer of Natrona county, is engaged in a special study of "tick" fever as differentiated from "Rocky Mountain Spotted Fever" which is not confined to the region denoted by its name. This disease was the subject of the 1942 JOURNAL-LANCET Lecture at the Medical School of the University of Minnesota.

Dr. Willard L. Burnap, Fergus Falls, Minnesota, was elected president of the National Conference on Medical Service, held in Chicago. Among the speakers on the conference program were Dr. A. W. Adson of the Mayo clinic, Rochester, and Dr. E. J. Carey, dean of Marquette Medical School, Milwaukee.

Dr. Donald C. Balfour, Rochester, Minnesota, spoke at Chicago recently before the council on medical education and hospital, sponsored by the American Medical Association. He said he believed that one effect of the war would be the restriction of graduate training in medicine and the curtailment of research and clinical investigation.

Dr. Maude Gerdes of the Mississippi State Board of Health, graduate of the Medical School of University of Minnesota and formerly of the United States Health Service, presented a paper on "Syphilis in Pregnancy" before the January meeting of the Yellowstone Valley Medical Society meeting at Billings, Montana. Dr. Cedric H. Nelson of that city presided. Present were members from Billings, Hardin, Columbus and Laurel.

Dr. Raymond F. Peterson, Butte, Montana, addressed the Mount Powell Medical society of Anaconda on blood groupings in relation to transfusions on the occasion of the mid-February meeting. Members of the society in Granite, Powell and Deer Lodge counties attended and were joined by doctors from Helena, Butte, Missoula and Dillon.

Dr. L. J. Alger, Grand Forks, North Dakota, has returned from a month of postgraduate work in the Department of Ophthalmology, Columbia University.

Dr. Howard L. Saylor, Huron, South Dakota, received the state department of health's appointment to the position of Beadle county health physician.

Dr. Russell Wilder of Mayo Clinic, Rochester, has accepted an appointment to serve on the national health advisory council organized in Washington in February by the Chamber of Commerce of the United States. The council will project and carry out a broad program looking to health conservation as one of the most important factors in winning the war.

Ernest L. Olrich, district director of Training Within Industry agency of the War Manpower Commission, is reported to have set a new pattern in faster, more effective training of hospital personnel by transplanting methods developed to assist war plants in adapting new workers to unfamiliar industrial operations. Hospitals participating are Abbott, Fairview, Deaconess, General, Northwestern, St. Barnabas, Swedish and University in Minneapolis and Ancker, Miller, Northern Pacific, St. John's and St. Joseph's in St. Paul.

Dr. E. Klaveness, St. Paul, physician, surgeon and dermatologist, has completed the manuscript, in Norwegian, of his second book, a series of biographies of the doctors who received their medical education in Norway and practised in the United States in the last 100 years. The stories of 116 practitioners appear. Eleven are still living of whom two have retired. The work will receive a translation into English shortly.

Major Wayne S. Hagen, M. C. of Minneapolis is stationed in Brooklyn, N. Y. His promotion to a majority took place a year ago. He is the chief of the medical service at Ft. Hamilton, N. Y.

Recent elections to chief-of-staff at Minneapolis hospitals are: Asbury, Dr. Leonard K. Buzzelle; Eitel, Dr. E. W. Bedford; Deaconess, Dr. N. T. Johnson; Maternity, Dr. Edward C. Maeder; St. Andrews, Dr. Lawrence Cady; St. Barnabas, Dr. Wm. B. Roberts; St. Mary's, Dr. Jno. T. Litchfield; Swedish, Dr. E. F. Lundquist.

Dr. F. E. Harrington, health commissioner of the city of Minneapolis, faces retirement June 19th of next year under the terms of a pension bill just passed by the Minnesota state legislature. Accordingly he has warned the board of public welfare of the city to give thought to a successor.

Dr. Miland E. Knapp, Minneapolis, University of Minnesota professor of physiotherapy, and Dr. E. J. Huenekens, Minneapolis, professor of pediatrics at that institution, will serve under Dr. Wallace H. Cole, St. Paul, chief of staff at the Twin Cities polio hospital opened Sunday, February 21, by the St. Barnabas hospital organization of Minneapolis.

AMERICAN UROLOGICAL ASSOCIATION

Dr. Miley B. Wesson, chairman Committee on Research, American Urological Association, reports that the \$500 Research Prize annually offered by the Association will not be awarded this year. The government having again discouraged the holding of medical conventions, except those primarily of military interest—and at which there is to be a ban on social events—plans for the June meeting of the American Urological Association in St. Louis have been cancelled.

Necrology

Dr. Lorenzo Nelson Grosvenor, 74, of Huron, South Dakota, died November 26 at a hospital in Rochester, Minnesota, of a cardiac attack following an operation performed on November 14.

Dr. Grosvenor was a graduate of Chicago Homeopathic Medical College, 1889, and Rush Medical College in 1902. He practiced in Chicago prior to coming to Huron in 1913. He was a Fellow of the American College of Surgeons, specializing in Eye, Ear, Nose and Throat, president of the South Dakota State Medical Association in 1930, past-president of the Tri-State Ophthalmological Society of Chicago, member and past-president and secretary of the Huron District Medical Society, and at the time of his death was superintendent of the Beadle County Board of Health.

Dr. John Franklin Dufferin Cook, 71, of Pierre, South Dakota, died January 27 at Pierre of postoperative complications.

Dr. Cook was graduated from the University of Illinois College of Medicine in 1897. He was licensed in 1897 and for many years practiced medicine in Langford, South Dakota. He was a Fellow of the American College of Surgeons, member of the South Dakota State Medical Association and First District Medical Society. He was secretary-treasurer of the state medical association from 1925 to 1937, president of the South Dakota State Medical Association in 1938 and, at the time of his death, was Superintendent of the State Board of Health and Director of Medical Licensure. These latter positions he had held for several years.

Dr. George H. Barbour, 81, Helena, Montana, retired physician, died in a Helena hospital. He practised from 1889 until 1939.

Dr. Nels Werner, 63, Eau Claire, Wisconsin, associate at Middlefart Clinic of that city, died suddenly at Eau Claire, February 26. A 1904 graduate of Rush Medical, Dr. Werner began his practise at Barron, Wisconsin, whence he removed to Eau Claire.

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LIST OF PHYSICIANS LICENSED BY THE MINNESOTA STATE BOARD OF MEDICAL EXAMINERS
ON FEBRUARY 13, 1943
BY EXAMINATION

Name	School	Address
Altman, Richard Fortune	U. of Nebraska, M.D. 1942	St. Joseph's Hospital, St. Paul, Minn.
Arnesen, John Francis	U. of Minn., M.B. 1942	Ancker Hospital, St. Paul, Minn.
Black, William August	Temple University, M.D. 1940	Mayo Clinic, Rochester, Minn.
Chesler, Merrill David	U. of Minn., M.B. 1942	Ancker Hospital, St. Paul, Minn.
Ellingson, Eugene Andrew	U. of Texas, M.D. 1940	Mayo Clinic, Rochester, Minn.
Flickinger, Frederick Miles	Ohio State, M.D. 1941	Mayo Clinic, Rochester, Minn.
Gilbertson, Eva Labelle	Temple University, M.D. 1941	Mayo Clinic, Rochester, Minn.
Godward, Alfred Charles	U. of Minn., M.B. 1942	5104 Colfax Ave. S., Minneapolis, Minn.
Green, Walter Stanley	U. of So. Calif., M.D. 1942	Mayo Clinic, Rochester, Minn.
Hagan, Edward Jordan	Rush, M.D. 1942	Ancker Hospital, St. Paul, Minn.
Hanlon, George Henry	Jefferson, M.D. 1941	Mayo Clinic, Rochester, Minn.
Hartwich, Roger Frank	U. of Minn., M.B. 1942	Milwaukee Co. Hosp., Wauwatosa, Wis.
Heim, Delmar John	Wayne, M.D. 1942	1210 Lowry Med. Arts Bldg., St. Paul, Minn.
Henderson, Lowell Lawrence	Indiana U., M.D. 1941	Mayo Clinic, Rochester, Minn.
Hinz, Walter Ernest	Northwestern, M.B. 1942	Ancker Hospital, St. Paul, Minn.
Hoyer, Louis Paul Jr.	U. of Pa., M.D. 1940	Mayo Clinic, Rochester, Minn.
Kabat, Herman	U. of Minn., M.D. 1942	1512-7th St. S. E., Minneapolis, Minn.
Leibold, Edwin Francis	Marquette, M.D. 1942	St. Mary's Hosp., Duluth, Minn.
Leitschuh, Thomas Henry	U. of Minn., M.B. 1942	St. Mary's Hosp., Duluth, Minn.
Lewis, Richard Edwin	U. of Minn., M.B. 1942	Ancker Hosp., St. Paul, Minn.
Long, Russell C.	U. of Cincinnati, M.D. 1941	Mayo Clinic, Rochester, Minn.
McKibbin, John Philip	Northwestern, M.D. 1941	Mayo Clinic, Rochester, Minn.
Malbin, Morris	Rush, M.D. 1938	U. Hosp. Cancer Inst., Minneapolis, Minn.
Melton, Thomas June Jr.	Tulane, M.D. 1940	Mayo Clinic, Rochester, Minn.
Menold, William Fredrick	U. of Minn., M.B. 1942	St. Joseph's Hosp., St. Paul, Minn.
Miller, Sidney	Johns Hopkins, M.D. 1940	Mayo Clinic, Rochester, Minn.
Monahan, Robert Hugh Jr.	U. of Minn., M.B. 1942	Miller Hosp., St. Paul, Minn.
Morton, Paul Vanderhoff	McGill, M.D. 1940	Mayo Clinic, Rochester, Minn.
Nesset, Lawren Blane	U. of Minn., M.B. 1942	General Hosp., Minneapolis, Minn.
Peterson, Carl Andrew	U. of Minn., M.B. 1942	Ancker Hospital, St. Paul, Minn.
Phares, Otto Carmony	U. of Minn., M.B. 1942	General Hosp., Minneapolis, Minn.
Regan, Joseph Michael	Marquette, M.D. 1941	Mayo Clinic, Rochester, Minn.
Remington, John Paul	U. of Minn., M.B. 1942	Ancker Hospital, St. Paul, Minn.
Rosberg, Raymond Arnold	U. of Minn., M.B. 1942	Ancker Hospital, St. Paul, Minn.
Rowland, Willard Daniel	Washington U., M.D. 1940	Mayo Clinic, Rochester, Minn.
Ruch, Donald Merrill	U. of Rochester, M.D. 1941	Mayo Clinic, Rochester, Minn.
Sheridan, Richard Brinsley	Yale, M.D. 1941	Mayo Clinic, Rochester, Minn.
Smith, Scott Meadows	U. of Louisville, M.D. 1939	University Hosp., Minneapolis, Minn.
BY RECIPROCIITY		
Watkins, David Hyder	U. of Colorado, M.D. 1940	Mayo Clinic, Rochester, Minn.
Clarkson, William Rycroft	Hah. Pa., M.D. 1940	Mayo Clinic, Rochester, Minn.
O'Connor, William Benedict	St. Louis U., M.D. 1942	1163 Hague Ave., St. Paul, Minn.
Tosseland, Noel Everett	St. Louis U., M.D. 1942	St. Mary's Hosp., Duluth, Minn.
NATIONAL BOARD CREDENTIALS		
Sengpiel, Gene William	Marquette, M.D. 1941	Mayo Clinic, Rochester, Minn.
Thomas, John Fulton	U. of Pa., M.D. 1940	Mayo Clinic, Rochester, Minn.
Tice, George Irving	U. of Iowa, M.D. 1940	Mayo Clinic, Rochester, Minn.

Classified Advertisements

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Physician's office at 3801 Nicollet Ave., Minneapolis. Three rooms, laboratory and waiting room. Formerly occupied (for 12 years) by prominent physician. S. A. Otness, 5341 Clinton Ave. Telephone: Colfax 7017.

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Advertiser's Announcements

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The Curdolac analysis charts are available to interested parties who will request them on their letterhead.



The
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Minneapolis, Minnesota
April, 1943

Vol. LXIII, No. 4
New Series

Tuberculosis--Post-War

Kendall Emerson, M.D.†
New York City, New York

Carlyle wrote, "No little hope sufficeth—in the face of universal destruction." Tuberculosis fighters in the invaded lands of Asia and Europe are facing the universal destruction of their life work at the ruthless hand of half-civilized conquerors. It demands no little faith, no meagre courage, to carry on. Yet reports of their undaunted heroism are drifting in.

From an old friend in Belgium comes a piteous cry for a few vitamins to eke out the starvation ration allowed him for his patients. Dr. Lim and his devoted colleagues are promoting more than a semblance of public health work in China in addition to the overwhelming demands made on their time and strength by emergency war duties. Despite their efforts the white plague rides again in these and all other occupied countries.

Must we too expect a recrudescence of our ancient enemy? The war has rendered us short-handed in doctors and nurses to care for the sick and in public health personnel to maintain established preventive measures. Extra burdens fall on those of us destined to fight the war along the home front. It is for us who remain to take up the guage of battle, to assume double duty, to join forces in guarding the public safety.

The Early Diagnosis Campaign this year is an appeal to the loyalty and patriotism of all practising physicians to contribute their full strength and interest toward fighting the spread in this country of those communicable diseases which add a further disaster to the grim tragedy of war. We are especially grateful to the JOURNAL-LANCET for continuing its fine record of public service by emphasizing this national danger and by pointing out our professional responsibility to combat any decline in our standards of tuberculosis control.

†Managing Director, National Tuberculosis Association.

The Importance of Preventive Measures in the Tuberculosis Program

S. L. Cox, M.D.*

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IT is a well-known fact that a majority of the clinical cases of tuberculosis that are definitely diagnosed and placed under treatment are moderately or far advanced at the time such diagnosis is made and treatment instituted. According to Drolet's¹ survey of 99 institutions for the five-year period, 1937-41, covering 218,723 patients, 176,798 were discharged alive and 41,925 (or 19 per cent) died while under institutional treatment. "In some regions the ratio was as low as 13 per cent, and in one it rose to 26 per cent; New York City institutions experienced a 20 per cent mortality." Many patients leave various institutions against medical advice, and a rather large percentage of these, as well as a smaller proportion of those regularly discharged, die of tuberculosis within five years after leaving the sanatorium. So it can readily be seen that the total mortality (those dying while under institutional treatment plus those who die within a few years after leaving the sanatorium) is very high.

While it is true that modern use of the tuberculin test, followed by roentgenograms of the chest in the case of reactors to tuberculin, results in the discovery of more cases of clinical tuberculosis than formerly—and in the earlier diagnosis of many of these cases—there are still large numbers of persons with clinical tuberculous disease who are not discovered early enough for successful treatment to be instituted, the patient restored to good health and enabled to resume a gainful occupation. It would seem desirable, if not imperative, that some program be instituted that will either prevent these individuals from ever contracting active clinical disease, or will facilitate the discovery of their tuberculosis at a sufficiently early stage so that successful treatment can be provided and the patients restored to health.

One method, and a very effective one, for the early diagnosis of tuberculosis is the use of miniature films or paper films for x-raying the chests of certain groups, such as college or university students, enlisted personnel in the Army and Navy, employees in industrial plants, etc. This method is very efficient and satisfactory where the persons to be x-rayed are already assembled and can be examined as a unit. In smaller establishments, in relatively small schools—whether high schools or colleges—and in rural communities mass x-raying is not so feasible as in the larger cities. It is in these smaller communities, where the percentage of positive reactors to the tuberculin test is quite small, that Mantoux tuberculin testing, as a preliminary screening process, seems to have special value.

In the State of Washington the Tuberculosis Association has sponsored, and carried out to a rather large degree, Mantoux tuberculin testing as an educational and preventive procedure in tuberculosis control. The

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work has been done primarily in the public schools throughout the state and has been a definite part of our program since 1932. During this ten-year period something over 100,000 tuberculin tests have been given by the author. These were distributed as follows:

High school pupils	50,629
Junior high and grade school pupils	37,149
College students	4,497
Teachers	3,904
Miscellaneous (adults, contacts, etc.)	4,307
Total	100,486

We stress the preliminary educational work in the schools before the date for the actual tuberculin testing. A regulation of the state department of health requires all teachers and school employees to have an x-ray film of the chest at regular intervals, so that teachers throughout the state have some information concerning tuberculosis as a possible menace to health. School superintendents, high school principals, certain members of the teaching staff, and in some instances a parent-teacher organization in the community, are contacted before any testing is done in a given school. A talk on tuberculosis before the student body, given by a trained worker, and the showing of one or more films on the subject of tuberculosis and its prevention are utilized as methods of providing dependable information to the pupils prior to the actual testing itself.

While giving the tests, and also when reading them, we take time to explain different points about the test—the material used, the significance of a positive reaction, the necessity for those who are negative to have the test repeated later on, etc. After reading the tests, the physician has a personal interview with each reactor. These reactors are assured that they do not necessarily ever need to experience actual illness or difficulty simply because they are positive to the tuberculin test. They are urged, however, to take reasonable precaution as regards general health habits and to have periodic re-examinations (including an x-ray of the chest) at least until they have reached adulthood.

In recent months we have been doing our tuberculin testing with an intermediate strength of purified protein derivative. Previously the great majority of our tests were done with old tuberculin in a dilution of 1 to 1,000. In regard to the dosage of purified protein derivative, Esmond R. Long² of the Henry Phipps Institute, Philadelphia, states: "The question of a suitable dosage of purified protein derivative has been lengthily studied by investigators in the U. S. Public Health Service. The investigations of Furcolow, Hewell, Nelson and Palmer^{3,4} show that an overwhelming majority of all patients with clinical tuberculosis react to small doses of the purified protein derivative, and that relatively small doses are effective in the majority of tuberculous contacts who might be assumed to have acquired infection if not actual

clinical disease. On the other hand, it appeared clear from their results that increasing dosage soon brings the test into the range of nonspecificity, where persons presumably free from present or past contact with tuberculosis react. Their results indicated that 0.0001 mg. of purified protein derivative represents approximately the critical level, lesser doses being highly specific and higher doses causing an increasing percentage of nonspecific reactions. Studies at the Henry Phipps Institute have repeatedly demonstrated the effectiveness of the standard first dose of the purified protein derivative in eliciting a positive tuberculin reaction in cases of clinical tuberculosis."

In our experience in the State of Washington there has been a slow, but very definite, decline in the percentage of positive reactors during the past ten years. The results among high school students are as follows:

	No. of Tests	Positive	Per Cent Positive
Sept. 1931—April 1935	17,191	2,356	13.70
May 1935—May 1938	15,929	1,890	11.86
June 1938—May 1941	17,509	1,759	10.04
Total	50,629	6,005	11.85

It will be noted that the drop in percentage of positive reactors for the two three-year periods was almost identical—1.84 per cent from 1935 to 1938 and 1.82 per cent during the three years 1938-41.

During the same ten-year period the following results were noted among younger pupils (junior high and grade school pupils):

	No. of Tests	Positive	Per Cent Positive
Sept. 1931—April 1935	8,026	867	10.80
May 1935—May 1938	13,156	1,065	8.09
June 1938—May 1941	15,967	889	5.56
Total	37,149	2,821	7.59

No city children are included in the 87,778 pupils shown in the preceding tabulations. Testing in the cities of Seattle, Tacoma, and Spokane has been done by the tuberculosis organizations and local health authorities in those cities.

Comparison of the four different age groups—grade and junior high school pupils, senior high school students, college students, and finally an adult group (teachers) shows very definitely an increase in positive reactors as the age of the group advances. Of the 4,497 college students tested, a total of 874, or 19.43 per cent, were positive. Teachers showed a percentage almost twice that of the college students—37.65 per cent positive (1,470 positive reactors out of 3,904 teachers given the tuberculin test).

As do similar organizations in other states, the Washington Tuberculosis Association carries on a general educational program not only in the public schools and colleges but also among the general population of the

state. For the past two years a large part of the chest clinic work in Washington has been conducted by the state department of health, particularly in those counties in which there is a full-time county health unit. The county tuberculosis organizations cooperate in the clinic program, and in many instances where the family in question is unable to pay for x-ray service they pay for chest films requested by the clinician. These chest clinics afford opportunity for re-examination of many of the ten thousand or more positive reactors that have been found in our tuberculin testing program during the past ten years.

As a result of the program of health education in the high schools, the tuberculin testing procedure itself and the follow-up after the tests, a very definite amount of active tuberculosis should actually be prevented, and a considerable number of deaths from tuberculosis in later life avoided. If a total of 500 cases of clinical tuberculosis can be prevented by the testing and education of 100,000 individuals, the number tested in the State of Washington, the saving in actual money alone would eventually be more than \$1,000,000. This is at the very low estimate of \$2,000 per case—\$1,000 for sanatorium care and \$1,000 for loss of earning capacity during the period of illness and treatment. If the educational and preventive work were not done, and these 500 cases went on to develop moderately or far advanced tuberculosis, the mortality would reach at least 100, many of the deaths among young people.

The campaign against tuberculosis calls for sustained and varied effort along many different lines. Procedures that help find the open cases of tuberculosis, and get these patients isolated and under scientific care and treatment, should of course be increasingly utilized. In the long view, however, education of the general population concerning this age-old disease would seem to be one of our best methods of approach to the problem. The very encouraging fact that tuberculosis really is *preventable*, and also curable when found early, should direct our plans and energies more and more toward finding the cases *earlier*, or better still, discovering the potential cases by widespread use of the tuberculin test and greater employment of all available x-ray facilities.

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DO SOMETHING FOR A SERVICE DOCTOR

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The Tuberculin Test in Tuberculosis Control

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AN examination of the chest by x-ray only may be satisfactory if the purpose of the examination is merely to determine the presence or absence of pulmonary pathology at the time of the examination. But I think it is a serious mistake to eliminate the tuberculin test as part of an examination if the purpose of that examination is to control tuberculosis. I hold to this belief even where it is less costly to x-ray the entire group than to first administer the tuberculin test to the entire group, then x-ray the reactors.

In December, 1937, a program to control tuberculosis was started in De Kalb County, Illinois, and in September, 1938, a similar program was started in La Salle County. The program is the practical application of the principles of tuberculosis control advocated for the past fifteen years by several specialists in the field.

Previous to the introduction of this program, minimal tuberculosis in these two counties had not been recognized. During 1941, 53 per cent of all the new cases of pulmonary tuberculosis discovered in De Kalb County were found while still in the minimal stage; 43 per cent of those in La Salle County were minimal cases.

In 1937, De Kalb County had 15 deaths from pulmonary tuberculosis, or a tuberculosis death rate of about 45 per 100,000. In 1938 La Salle County had 48 deaths from pulmonary tuberculosis, or a tuberculosis death rate of 48 per 100,000. These figures vary but little from the tuberculosis death rate of the state for the same period.

There were 3 deaths from pulmonary tuberculosis in De Kalb County in 1940, a rate of 9 per 100,000; 2 deaths in 1941, a rate of 6 per 100,000. To November, 1942, we have had 3 deaths; two of these cases were first diagnosed as pulmonary tuberculosis before 1937.

La Salle County had a death rate of 18 per 100,000 in 1940, 25 per 100,000 in 1941; to November, 1942, there have been 6 deaths from pulmonary tuberculosis and one from tuberculous meningitis. One of the six patients who died had been in the county only six weeks before death, having spent the previous four years at a state hospital.

Our success during the past few years in reducing the death rate from pulmonary tuberculosis in these two counties can be attributed in a large measure to the use of the tuberculin test.

Unity of medical thought concerning tuberculosis is important in a tuberculosis control program. The medical profession in these two counties represented not only the tuberculosis teaching of different medical schools, but the ever-changing tuberculosis teaching at the same medical school during the evolution of our present-day concepts of this disease.

The tuberculin-testing surveys were used primarily for their educational value. Doctors were hired in rotation

to conduct the testing clinics in the high schools of the county. From this experience these physicians learned the technic of tuberculin testing and became familiar with the various reactions to tuberculin. Not merely did they discover that only about 20 per cent of these young adults reacted to tuberculin, but also that among the reactors were a large number who had no known history of contact to tuberculosis.

These facts plus the recently acquired familiarity with the tuberculin test induced the doctors to give tuberculin tests to their private patients. It was not long before they discovered active pulmonary tuberculosis in patients who had never been suspected of having the disease, from either the history, the symptoms, or the physical examination. The lesions, however, could be definitely demonstrated on the x-ray film, and some of the patients even had advanced tuberculosis. The doctors soon recognized the importance of an x-ray examination of the chest for diagnosing pulmonary pathology, particularly early tuberculosis. Most of the doctors thus became convinced of the importance of the tuberculin test in discovering reactors and of the importance of x-raying all reactors for possible active tuberculosis.

A few of the doctors, as is true in any community, held to the ideas about tuberculosis that they had been taught in medical school and did not readily accept the tuberculin test as a method for discovering tuberculous infection; nor did they accept the idea that patients could have active tuberculosis yet appear healthy and have physical findings that they could not detect.

This small group learned the hard way—by experience. I shall present a few cases relating these experiences.

CASE REPORTS

Case 1. F. S., a girl aged 20, worked daily in a factory and attended about three dances a week. She had been under the care of her family physician for about three months, became dissatisfied and changed doctors. The second physician placed her in a hospital for observation. His examination included the tuberculin test, which showed her to be a reactor. The subsequent x-ray film revealed evidence of extensive disease, which proved to be far-advanced tuberculosis and which required two and one-half years of sanatorium care. The patient had a positive sputum. She is now working and living a normal life—a patient of the second doctor.

Case 2. A. R., a man aged 72, had been seeing his family physician for two years because of a cardiac lesion. He finally changed doctors on advice of friends. The second physician included the tuberculin test in his first examination, and the patient was found to be a reactor. Examination including x-ray inspection of his chest revealed advanced tuberculosis. His sputum was positive. The doctor then gave tuberculin tests to the patients' children and grandchildren, all of whom reacted. Although none was found to have clinical tuberculosis, these several families are being examined regularly by the second doctor.

Case 3. L. P., a girl aged 20, under the care of her family physician for six months, became dissatisfied and so changed doctors. The second physician included the tuberculin test in his first examination and, finding her to be a reactor, x-rayed

*LaSalle County Sanatorium.

†Read before Mississippi Valley Conference on Tuberculosis, Chicago, Ill., September, 1942.

her chest. Far-advanced pulmonary tuberculosis with a positive sputum was diagnosed. This patient died two years later. Her family was also given the tuberculin test; all of them reacted. Further examination, including x-rays of their chests, revealed that two of her sisters had active tuberculosis. The husband of this patient refused to change doctors and later died from tuberculosis. It is believed that he was the original source of infection in this family. The bitterness of the family toward the first doctor can be excused.

Case 4. D. J., a woman, aged 26, married, and with one child, called her family doctor because of fever, cough, generalized aching, and other symptoms. The doctor diagnosed influenza, which was prevalent at the time. There being no improvement, three weeks later her mother called another physician. The second doctor included the tuberculin test as part of his first examination. The woman reacted to tuberculin, and other phases of the examination revealed advanced tuberculosis. Her sputum was positive. After 18 months at the sanatorium, she is now home and caring for her family.

Case 5. P. G., aged 20, married, worked as a waitress. She is 5 feet, 5 inches tall and weighed 185 pounds. She complained of tiredness, pain in the lower back, and frequency of urination. Her family physician treated her for nine months for a kidney condition. A friend advised that she try another doctor; this second physician included the tuberculin test as part of his examination. She reacted and was found to have far-advanced pulmonary tuberculosis. She had a positive sputum. She has been in the sanatorium for the past 14 months, and it will be some time before she can go back to normal living.

Case 6. L. R., a man aged 21, was being treated for chronic bronchitis. A year-old baby in a home at which this patient was a frequent visitor died from a tuberculous meningitis. He worked in a food locker and was requested to have a tuberculin test and, if found to be a reactor, to have an x-ray of his chest. His doctor did not think this was necessary for chronic bronchitis, since his only symptom was a cough which he had had for two years. He lost the job at the food locker and entered a barber college in Peoria. The Peoria health authorities were notified and insisted on a chest examination; this showed advanced tuberculosis with positive sputum. He entered the La Salle County Sanatorium, where he is at the present time. I have presented this case because it has a direct bearing on the next case.

Case 7. E. F., a woman aged 28, complained of mental symptoms and sinus trouble. She had visited some twelve doctors in and about Illinois during a six-month period, with no results. She then visited a doctor who gave her a tuberculin test as a routine measure. She was found to be a reactor, and a subsequent x-ray film of the chest revealed chronic tuberculosis. Her sputum contained tubercle bacilli. A thoracoplasty was done. She is now physically well and her mental condition has cleared. The doctor who discovered her true illness is the same doctor who did not think it necessary to give the previous case a tuberculin test. He has benefited from that experience.

Case 8. L. S. The wife of the patient under discussion worked temporarily in the health department, where she came in contact with the tuberculosis program. Upon learning that we advocate routine tuberculin testing of all adults, she and two nephews who live with her were tested and found to be reactors. X-ray films of all three showed no evidence of active tuberculosis. Her husband had never had the tuberculin test, but had been examined frequently during the past ten years for a chronic cough. Sputum examinations on two or three occasions were reported as containing no tubercle bacilli and a diagnosis of chronic bronchitis had been made. The patient weighed 190 pounds and had never lost any time from work. His wife nevertheless urged him to have a tuberculin test. He was found to be a reactor. The x-ray film revealed evidence of a large cavity in the right apex. The sputum contained 50 tubercle bacilli per field. He is in the sanatorium at present waiting for thoracoplasty.

Each of the doctors who missed the diagnosis of pulmonary tuberculosis in the above cases, and thus lost their families as patients, is now giving the tuberculin

test to most of his patients and is an ardent supporter of the tuberculosis program.

These cases illustrate the type of experiences that will be encountered by those doctors who are reluctant to accept the tuberculin-testing program. They also illustrate how the tuberculin test can be used to ferret out cases of pulmonary tuberculosis. In a community where the tuberculin test is widely used all the doctors will ultimately use it as a diagnostic aid, if for no other reason than self-protection.

It has been of interest to note from our experience how many family doctors became interested in tuberculosis only after taking an active part in a tuberculin-testing survey. Such surveys in the schools make the doctors tuberculosis-conscious; tuberculin-testing their patients serves to keep them tuberculosis-minded.

The tuberculin-testing program has created a common opinion concerning tuberculosis rather than the diversified opinion that previously prevailed among the medical profession in the two counties under discussion. Tuberculin-testing surveys and the tuberculin testing of private patients, plus a common opinion about tuberculosis among the members of the medical profession, create a tuberculosis-minded public and a unified opinion of the public about tuberculosis. We believe that this is important for the success of any control program.

It has been our experience that contact cases who have had a negative x-ray picture of the chest rarely come back for further check-up unless pressed to do so by the public health worker. A patient who has had a tuberculin test is much more apt to be interested in and concerned about tuberculosis than is the patient who has not been tested. Many patients who do not react to tuberculin have the test repeated each year.

In our experience several from this group became reactors in later years; one case of active pulmonary tuberculosis was found, and in two cases the source of infection was discovered. O. W., a young boy, who was first tested in high school, had three annual negative tests. On the fourth, he reacted and the x-ray film revealed a minimal lesion. His mother was found to be the source of infection. She had a far-advanced lesion and a positive sputum. A teacher, who was a nonreactor when first tested, became a reactor two years later. A study of her recent contacts revealed a previously undiscovered active case of tuberculosis in a friend with whom she had vacationed the previous summer.

A large percentage of the reactors continue to have an annual x-ray check-up of the chest as a precautionary measure. Several cases of active tuberculosis have been discovered in this group.

An incorrect diagnosis of pulmonary tuberculosis may react detrimentally to the tuberculosis control program. We had a patient with active pulmonary tuberculosis who refused sanatorium care because she thought she could get well at home. A friend had been diagnosed as having advanced pulmonary tuberculosis, refused to go to a sanatorium, and recovered in a short period at home. On the other hand, the patient knew several people who had gone to the sanatorium and died. This patient later died from tuberculosis; four of her five

children also died from pulmonary tuberculosis between the ages of 16 and 19. A tuberculin test might have prevented this tragedy by revealing this woman's friend to be a nonreactor.

If the patient fails to react to tuberculin, the diagnosis of tuberculosis should be withheld until definitely proved by a confirmed positive sputum. We find the tuberculin test a most reliable and valuable diagnostic aid. The recent procedure of x-raying the chest without doing a tuberculin test is producing many incorrectly diagnosed cases of pulmonary tuberculosis. A study of the draft rejectees for tuberculosis will confirm this statement.

Two industries in our county routinely x-ray all employees, but do no tuberculin testing. Quite frequently,

a patient sent to the sanatorium with a diagnosis of pulmonary tuberculosis fails to react to tuberculin. The patient is refused employment or discharged because of an incorrect diagnosis. In another industry all employees and applicants are given tuberculin tests; only the positive reactors are x-rayed. Not a single case of far-advanced tuberculosis has been discovered in this industry since the adoption of this plan. In this as in other instances the tuberculin test has proved to be the most effective single factor in the program for the control of tuberculosis in the two counties under consideration.

The use of the tuberculin test made it possible to control tuberculosis in cattle and the use of the same test may prove to be the most effective agent we have for controlling tuberculosis in man.

The Doctor of Medicine and His Responsibility*

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MEMBERS of the North Central Medical Conference, representing the states of North Dakota, South Dakota, Minnesota, Wisconsin, Nebraska, and Iowa, have entrusted me with the responsibility of addressing this National Conference on Medical Service concerning medical problems that are of both local and national interest.

It is the duty of every doctor of medicine to prevent illness, to supply adequate medical care to those who are ill, to perpetuate the science of medicine, and to encourage medical investigation. It is true that the average physician would prefer to go unregimented among his sick and administer to their needs, irrespective of race, color, creed, or financial status, rather than busy himself with administrative and political problems. However, since the courts have ruled that group health is a business and have found that medical societies are guilty of restraining trade when attempting to maintain the standards of the practice of medicine, a challenge has been issued to the medical profession: Is there a necessity for lay groups and the federal government to take over the control of the practice of medicine?

Has the science of medicine reached its zenith? Have the men and women of medicine become so decadent that they are unable to assume their responsibilities? Are the doctors of medicine no longer able to conduct their practice without government control? Do they lack ability to appreciate their problems? Or are they incapable of constructive leadership in the solution of the numerous responsibilities that are confronting the medical profession today? The reply is, "No".

The science of medicine has been nurtured by men and women who have advanced the knowledge of relieving pain, correcting deformities, lowering infant mortality, prolonging life, and preventing illness by sanitary

and public health measures. This progress must continue if civilization is to survive.

The medical profession is conscious of social and economic changes and stands ready to cooperate with, and offer leadership to, state and federal agencies in the solution of medical problems. It further believes that better medical service can be rendered by offering advice and leadership to welfare agencies than by serving as a tool of political bureaus.

The medical profession recognizes the necessity of state and federal control of communicable diseases and medical services to inmates of state and federal institutions. It appreciates its responsibility to the armed forces and expects to supply the needed personnel. It is willing to cooperate with welfare agencies in providing adequate medical care for the low-income and indigent groups of the population; but in providing this care, it believes that the medical service is augmented when the patient-physician relationship can be maintained by permitting the patient, whenever possible, to choose his own physician. In order to protect the public from worthless, so-called medical procedures and unnecessary operations by unscrupulous individuals, it likewise believes that high standards of medical education and practice must be maintained. This applies not only to the practice of medicine in the office; it applies to the practice of medicine in the humble home or in the most modern hospital.

Although medical education begins in the medical school, it is never completed as long as the physician continues his practice. Medical schools have adopted standards of education and have required certain courses of study in order that the public might avail itself of the best practices of medicine. Medical licensing boards have further protected the public by requiring of their candidates for licensure prescribed courses of study. State laws governing the practice of medicine and con-

*Read at the meeting of the National Conference on Medical Service, February 14, 1943.

duct of physicians further protect the public from irregular practices and charlatans.

Medical societies, county, state, and national, have been organized to further the education of the physician by acquainting him with the advances and new discoveries in the science of medicine. They likewise serve as administrative units in the consideration and solution of medical problems. It is obvious that the responsibilities of the respective state organizations are greater than those of the county organizations, and that the national organization is charged with greater responsibilities than those of the state organizations. However, it is also obvious that the activities of all groups must be integrated if medical problems are to be solved effectively. In some states, such as Minnesota, the administrative and the legislative bodies have the confidence of the medical profession. Likewise the medical profession has the confidence of the state administrative and legislative bodies. This confidence has made it possible for representatives of both groups to attack and solve the medical problems which are of mutual interest.

The national organization, through its respective bodies and committees, has done excellent work in furthering medical education. It has crystallized the standards of medical education for the medical student as well as for the practitioner of medicine; it has investigated the claims of new and nonofficial remedies, foods, and therapeutic measures and has further protected the public by approval or disapproval of the articles investigated. It has taken active steps through its Procurement and Assignment Committee in providing medical men for the armed forces, without robbing communities of adequate medical personnel, and has made provisions for relocation of physicians where more medical service is needed. It has acquainted the public with the important role that the science of medicine plays in their daily lives, but apparently it has not gained the confidence of the national administrative and legislative bodies as have some of the state medical societies. The National Physicians' Committee has made some progress in acquainting the public with the necessity of medical science, but it too has not obtained the confidence of the national administrative and legislative branches of our government. Therefore, the recent court decision has emphasized the weakness of the educational program so far conducted for the purpose of acquainting the public, the administrative and legislative bodies of certain states, and the national institutions with the important function of the science of medicine in our civilization. It is our duty, as physicians and citizens, to assure those in administrative positions and legislative bodies that we are familiar with the social and economic changes that have thrown greater responsibilities on the medical profession and that we stand ready to cooperate with these agencies in offering leadership in the solution of the numerous problems which nonmedical personnel are trying to solve.

The chief medical problem that concerns doctors of medicine and welfare agencies is that of providing adequate medical care to those who are financially unable to procure this care. This group includes those who are indigent and those with low incomes. Medical care, in

its true sense, embraces more than emergency treatment for a particular illness, since it should include a rehabilitation program, such as the correction of deformities and ailments that impair the efficiency of individuals. The rehabilitation program should also provide for adequate and proper diets, physical training, recreation, protective clothing and housing. In most of the cities the indigent are provided with proper medical care through the charity hospitals, where competent physicians give of their services. This same group in the rural districts is not always so fortunate, since local welfare boards are reluctant to provide this care. It is in these situations that the physicians have been overburdened in assuming all the responsibility of providing necessary medical care. Prior to the more recent economic changes, physicians were willing to assume this obligation because those who could afford to pay for professional services attempted to meet their obligations. However, as a result of the recent social and economic changes, the government has taken over more and more control of the civilian's activities, and those with moderate and low incomes have been less willing to assume their obligations of medical care and are insisting that it is the government's duty to provide medical care and that it is the individual's privilege to squander his extra change.

The problems of this group cannot be solved by physicians alone or by federal, state, and local welfare agencies alone. Ours is a joint responsibility. Conscientious leadership by physicians working in cooperation with county, state, and federal agencies can and will bring forth a solution of the problem. Medical service must be rendered, and the physician is willing to give a good portion of his services. But the government must provide reasonable funds for the care of its indigent, as it must provide for catastrophic illness in the low-income group. Nevertheless, those who come within the low-income group should be made to realize that they too owe a responsibility to their local, state, and federal governments and should be encouraged and advised in budgeting their incomes.

Industrial compensation has accomplished much in providing proper medical care and the necessities of life during illness for those employed in industrial institutions. However, there still remain a large group of individuals who receive moderate or low incomes and are desirous of securing the assurance of adequate medical service in the event of illness. Insurance companies have offered this protection through policies covering accident and illness disabilities, but again this protection only partially solves the problem, since many an insuree expects more for his premium than the insurer is able to give. In several states medical societies have attempted to develop medical service plans whereby the insuree may purchase from the doctors within the group full medical protection or medical protection for unexpected serious illnesses. In some states, under the farm security program, experimental medical service plans are being tested out in an attempt to find the solution of the problem of supplying medical care to farmers and their families who are being rehabilitated. In some instances physicians are hired to render medical service to indigent and coopera-

tive groups. Even though physicians, welfare agencies, and low-income groups are struggling with the problems of medical service plans, as yet no satisfactory plan for all classes has been developed. The recipients expect more than the vendors can supply for the premiums paid.

These controversies give rise to discussions on the necessity of compulsory medical insurance. Should such a program evolve, results would be disappointing from the patient's as well as the physician's points of view if placed under the control of political bureaus, and the patient would be deprived of his free choice of physician.

Therefore, we as physicians believe that a more equitable solution of the perplexing medical problems referred to will be reached if we are permitted to consult and advise administrative officials, legislative bodies, and welfare agencies, since we are more familiar with the medical needs of our respective communities than are those who have a casual knowledge of the medical necessities.

It is befitting to quote the statement found in the opinion written by Justice Miller of the United States Court of Appeals of the District of Columbia, in the case of the United States of America versus the American Medical Association, and the case of the United States of America versus the Medical Society of the District of Columbia. The italics are mine.

"It may be regrettable that Congress chose to take over in the Sherman Act the common law concept of trade, at least to the extent of including therein the practice of medicine. Developments which have taken place during recent decades in the building up of standards of professional education and licensure, together with self-imposed standards of discipline and professional ethics, have, in the belief of many persons, resulted in substantial differences between professional practices and the generally accepted methods of trade and business. As we pointed out in our earlier decision, the American Medical Association and other local medical associations have undoubtedly made a profound contribution to this development. *However, our task is not to legislate or declare policy in such matters, but rather, to interpret and apply standards and policies which have been declared by the legislature. That Congress did use the common law test there is no doubt. That Congress was not otherwise advised was perhaps because of the failure of the professional groups to insist upon the distinction and to secure its legislative recognition.*"

Does the medical profession of this country need a stronger invitation or a more direct challenge to take an intelligent, helpful, and fair stand in the enactment of legislation that concerns not only the public welfare but the welfare of medicine itself? Does not the medical profession of this country, as citizens and taxpayers, have a right to express its opinion in these matters before legislation is enacted and rules and regulations adopted by some bureau? I do not share the opinion that the time for the medical profession to speak up is after such things have taken place. Neither do I believe that Con-

gress would be resentful of intelligent, courageous, and fair advice on such matters. What better proof can be asked than the quotation from Justice Miller's opinion that the Court is not responsible for the absence of advice from the medical profession when Congress is drafting a law?

It is not the purpose of this paper to criticize the efforts of our national medical organization nor to criticize the efforts of the National Physicians' Committee, but it is the desire of the members of the North Central Medical Conference to express a wish that a more active program be conducted to acquaint the public, government officials, and legislative bodies with the necessity of medical science and the important role it plays in our civilization. It is essential that we as physicians dispel the fear that government administrative agencies and legislative bodies have of our medical organizations and that they be assured of our cooperation in solving the social and economic problems that confront us as a nation.

The functions of acquainting the public on matters of medical interest, assisting bureaus in formulating plans on medical care, and offering constructive advice on proposed medical legislation rightfully belong to the national organization known as the American Medical Association. They could be assigned to the National Physicians' Committee, or they might even be undertaken by unifying the activities of the various state committees on public policy and legislation. Representative committees could be appointed for each of the component societies, county, state, and national. These could all be so integrated that national opinion and advice could be obtained and made available for committee hearings on legislation within a few hours' time. Through the national, state, and county committees the entire profession could be informed of proposed medical legislation. Thus the local constituents of the respective state and federal legislators could express their views before legislation is enacted. Some states already have medical advisory committees from each county. They also have state medical committees on public policy with a physician as part-time executive chairman assisted by legal counsel. A national committee constructed on the same plan as these state committees would have to be created. A physician who has practised medicine should be chosen as the executive chairman. Both he and his legal counsel would need to be stationed in our national capital. The expense of the national committee on public policy could be financed by one of three agencies, the American Medical Association, the National Physicians' Committee, or the respective state organizations bearing the expense jointly. It would appear more equitable if each physician would be assessed each year for the specific purpose of maintaining a national committee on public policy and legislation.

Our problems are not unlike those of dentists and hospital associations. Therefore, unified effort of medical, dental, and hospital associations should further the welfare of the patient.

Echinococcus Cyst of the Lung

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THE purpose of this short article is to present some illustrations showing echinococcus cyst in the lungs. These cases were found during routine examination for tuberculous infection of inhabitants of the mountains of Cordoba, Argentina. The altitude here is 8,000 feet above sea level. The chief occupation of the persons included in the survey is the herding of sheep.

Echinococcosis of the lungs can be primary or secondary. It is primary when the infection of the lung is produced by an embryo hexacante which originates from a *Taenia echinococcus* egg in the organism derived from vegetables or contaminated water. Secondary echinococcosis occurs when the pulmonary involvement is produced by organisms which belong to another hydatid cyst already developed in the body. Generally speaking, the primary echinococcosis of the lung is single, the secondary is multiple.

When the hexacante embryo finds a place where it can live in the lung, a hydatid cyst is developed. The cyst is formed by a laminated membrane and a parenchymatous layer and contains hydatid fluid. The primary function of the laminated membrane is to protect the delicate development of scoleces within the cyst. It also has very special properties of permeability which serve to retain the specific fluid and to prevent the entry of noxious substances into the cyst. The germinal layer lines the interior of the laminated membrane. This germinal layer is variously called endocyst, parenchymatous or embryonic membrane; it produces germinal buds (scoleces).

In the interior of the cyst there is a colorless limpid fluid described by the French as *l'eau de roche*, water of rock. Its function is to act as a protective buffer to the developing scoleces and as a nutritive medium. In addition, toxic substances are present in variable amounts; anaphylactic symptoms can also be produced by its injection into sensitized subjects and antibodies form in the blood of the host.

As the cyst enlarges it may exert pressure on various structures. Since practically any organ may be affected, it can readily be understood that bizarre and protean manifestations may be produced. The development of the cyst in critical centers is usually detected early because of the symptoms produced. Owing to the extremely slow growth and to the fact that infestation occurs most frequently during the growing period, compensatory changes frequently occur. This is one of the explanations of the latency of even the enormous, uncomplicated cysts sometimes observed. As the cyst enlarges it may encroach on the natural channels, such as bile ducts or bronchi; it may rupture into a hollow viscus or even discharge through the external skin, though the latter occurrence is rare. It is easy to understand that the rupture of the cyst may be followed by the introduction of a micro-organism and suppuration may follow.

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DISTRIBUTION OF CYSTS IN ADULTS AND CHILDREN

Man may be infected by eating contaminated mutton or vegetables or drinking contaminated water. It is well known that dogs and sheep are the most important sources of infection. Unlike the cyst stage of other cestodes, which is often restricted to a particular tissue, hydatid cyst has been recorded in practically every tissue of the body. Transport of the embryo by means of the circulation explains all the facts concerning distribution. The great majority of embryos carried by the portal blood stream are arrested in the liver, and about 70 per cent of primary cysts are found in that organ. However, owing to the relatively small size of the embryo, it may pass through the liver capillaries and lodge in the lungs, which are next in frequency of affection.

The distribution of cysts in children under the age of fifteen reveals some striking differences from the figure for adults. Doubtless such figures give a much truer conception of the distribution of primary cysts. While the liver and the lungs account for more than 80 per cent, the percentage of intracranial cysts is much higher than in adults. It will be noted that cysts of the brain are about seven times more frequent in children than in adults. This fact has recently been emphasized by several South American writers.

CLINICAL ASPECTS

Simple uncomplicated cysts are most frequently seen in children or young adults. The latency of the disease is striking and many cases have been recorded in which enormous cysts have existed for years without causing serious symptoms. In general the health of the patient is remarkably good; not infrequently the disease is discovered by an observing mother or during a routine examination for some other reason, as in our cases.

DIAGNOSIS

Diagnosis can be made from: (1) high eosinophilia in the presence of other symptoms; (2) the complement fixation test; and (3) the intradermal test. If the cyst is in the lung, it may be detected by its radiological aspect. Of importance is the residence of the patient and the kind of work he performs. It is also pertinent to know if he is a sheep-raiser or if there are dogs where he works.

Complement Fixation Test: The principles of the Bordet-Gengou reaction were first applied to this disease by Ghedini. Weinberg investigated these reactions in various helminthic infections, including hydatid disease in sheep, and later called attention to the value of this diagnostic method in human cases. It is a specific test and depends on the presence of a specific antibody in the serum of patients who have absorbed hydatid antigen. This antibody, in the presence of specific antigen, com-



Fig. 1



Fig. 2

bines with normal complement; the latter cannot be demonstrated by means of a sensitized system of red blood cells and specific hemolysin. The test is performed in the same way as the Wassermann test, the presence of hemolysin indicating that the complement has not been fixed.

Intradermal Reaction of Casoni: The occasional occurrence of urticaria, erythema, and other symptoms suggestive of anaphylaxis, following the rupture or exploratory puncture of a cyst, directed attention to the presence of skin sensitiveness in cases of hydatid infestation. A cutaneous test, carried out like that of Von Pirquet, yielded indefinite results but Casoni was able to obtain a high percentage of positive cases in patients with hydatid disease when hydatid fluid was injected intradermally. This test is the most satisfactory.

COMPLICATIONS

As echinococcus cyst may develop in any part of the body, complications are in accord with the location; that is, evolution in the lungs produces suppurative abscess, which, if it opens into the pleural cavity, causes hydatid pleurisy, suppurative pleurisy and often pyopneumothorax. Development in the abdomen causes hydatid peritonitis, or growth of a cyst in the brain induces pyohydatid peritonitis, meningitis and all the symptoms of brain tumor.

TREATMENT

Benign hydatid cyst can be removed if it is in an operable site. If possible, the cyst must be enucleated; otherwise, it should be drained by aspiration and made the marsupialization of the cavity. No known chemotherapy is of any avail.

Don't Give Up the Tuberculin Test

Oscar Lotz, M.D.*

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FOR a Badger medic to remind Gopher medics not to give up the tuberculin test certainly suggests "carrying coals to Newcastle." With Minnesota's splendid record in the eradication of bovine tuberculosis; with its widespread case-finding program reaching out from every sanatorium to the highways and byways of the state; with well-organized student health services in its colleges; and with its recently inaugurated program

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of county accreditation—all of which projects are fundamentally based upon the use of the tuberculin test—it does seem a bit out of order for Wisconsin to shout the warning, "Don't give up the tuberculin test!" to our progressive and friendly neighbor across the Mississippi. I may perhaps be accused of shouting "Wolf, Wolf" without real cause. Nevertheless, I believe there are certain signs and indications which warrant our attention and which, if permitted to develop unheeded, may result

in the loss of one of the important—if not the most valuable—educational measure in the entire program for the control of tuberculosis.

In our anxiety to bring tuberculosis under control it is, of course, perfectly natural that whenever and wherever possible we make use of the best and most modern means available. Case-finding by means of mass surveys of fertile groups is the order of the day and without question has brought to light many minimal cases which might have gone on to advanced involvement but for the newer diagnostic methods. Modern equipment, especially the miniature films produced by the photofluorographic units, has made these mass studies economically possible. Their value cannot be overestimated. In this statement I am assuming that today no physician is justified in assuring his patient that active pulmonary tuberculosis is not present unless the patient has been fluoroscoped by a person with considerable training or has had a chest film interpreted by a person of experience.

For many years the intradermal tuberculin test has been used as a screen to separate the infected from the noninfected. Today the miniature film is used as a screen; unfortunately, for very good practical reasons, no testing is done. This is particularly true in industry. With all plants geared to top speed, and with maximum production the chief objective, employers are reluctant to give up any more of their employees' time than is absolutely necessary, even for so valuable a project as health examinations. In one of our recent studies all examinations had to be done during the change of working shifts, so that for several nights our workers—nurses and technician—had to be on the job from 11 P. M. to 1 A. M.

In brief, the omission of the tuberculin test in favor of the mobile photofluorographic unit has been the chief cause for my concern.

Two recent incidents tend to confirm or at least to strengthen these fears. One was a well-authenticated report that a health officer of one of our north-central states informed his audience, consisting of public health nurses and tuberculosis workers, that "the tuberculin test today is passé, and since the only method of making a diagnosis of minimal tuberculosis is by means of the x-ray, to do the tuberculin test is a waste of time and money." The other occurrence was the impression of one of our clinic workers. For many years an assistant in stethoscopic, tuberculin-testing, and fluoroscopic clinics, she recently had occasion to assist at a 35-mm. photofluorographic clinic, where a large number of chest films were taken within a comparatively short time. Her reaction was anything but favorable and was based entirely on the feeling that while many more persons could be examined during the miniature film clinic, the speed at which these patients were rushed through gave no opportunity to educate the individual in matters of tuberculosis. She has always felt that these personal contacts between workers and clients were of the greatest educational value.

VALUE OF THE TUBERCULIN TEST

And now, as to the value of the intradermal tuberculin

test. Space does not permit going into detail, but just a word or two as to its various possibilities may act as a reminder of its real value.

As a Diagnostic Measure: Properly given and used in sufficient dosage, the tuberculin test, we believe, is specific for tuberculous infection. There are exceptional cases, but no test that I recall is 100 per cent infallible.

The tuberculin test gives information that no other diagnostic measure provides. The x-ray film is necessary to find the early lesion, but in the majority of cases it will not reveal the presence of tuberculous infection. If we are to carry through our program of tuberculosis control to the point of eradication we must know who harbors the germ.

Because of the relatively low incidence of infection, compared to that of years ago, the value of the test is now greatly enhanced. Formerly the infection rate among children was high, and among adults almost universal. Today, especially in our mid-central and western states, the infection rate is low. This makes the negative reaction an important factor in differential diagnosis.

Modern research in medicine has, during recent years, recognized and identified many general diseases with pulmonary involvement simulating pulmonary tuberculosis. The tuberculin test is absolutely essential in diagnosing these cases.

In Case-Finding: The small film produced by means of the modern photofluorographic unit is, without question, the most economical and easiest method of finding cases with pulmonary lesions. However, to be thorough we must go beyond the finding of the active case. The tuberculin test will bring to light many carriers of tubercle bacilli missed by the x-ray. Following the reactors through to their possible sources, especially in children, will result in finding many more cases than the films alone will unearth. The younger the children, the more productive the results.

As an Educational Measure: The program for the control of tuberculosis advanced by the National Tuberculosis Association and its affiliated branches is based primarily on education as the principal weapon. In our campaign against this disease, literature, exhibits, lectures, moving pictures, demonstrations, etc., by means of which the story of tuberculosis is brought home to child or adult, to the individual or the masses, are all of unquestioned value. However, I sincerely doubt if any of these carry the same significant lessons and the long-lasting impression that does the intradermal tuberculin test. The entire procedure—the presence of the nurse and the doctor, the actual skin injection, the anxiety as to the result and, if positive, the need of the x-ray—is all so impressive to both child and adult that it by far exceeds in value any other educational measure.

That the newer methods of case-finding with the tuberculin test are a great addition to our program is not questioned for a moment, but I do wish to sound the warning that by the omission of the tuberculin test we may at some future time have to pay dearly for our neglect to use this valuable agent in the education of coming generations.

"Don't give up the tuberculin test!"

Tuberculosis Among College Students*

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IN times of war our attention quite naturally becomes more sharply focused on physical fitness. Under conditions imposed upon us through involvement in "total" war, the demands for physical and emotional stamina extend far beyond the ranks of our armed forces. Our entire civil population is being called upon for greater effort and greater efficiency. Moreover, this challenge comes at a time when we face various restrictions which make necessary certain readjustments in our accustomed routine of living. It is conceivable that conditions more exacting than those which now confront us may dominate our national life for an extended period of time. Although such an outlook provides no sound basis for undue alarm, there is obviously a clearly defined need for intelligent medical planning. Measures for the protection of the public health should be provided on a broader front than ever before.

Numerous warnings have been issued recently to the effect that increased death rates from various diseases may be anticipated during the next few years. It is well known that tuberculosis mortality increased tremendously in many European countries following the first World War. In the United States, however, in the absence of extreme conditions of deprivation, exposure, and starvation so prevalent among European nations, it is hardly to be expected that a sharp rise in tuberculosis deaths will occur. It is quite probable, however, that a slight increase in the mortality rate may be observed, or at least the steadily downward trend evident in recent years may be halted temporarily.

Progress in tuberculosis control in this country during recent years has been most encouraging. According to a recent report by the Metropolitan Life Insurance Company¹ the tuberculosis death rate for white males of all ages declined 80 per cent during the interval between the drafts of World War I and the present conflict. For men at the selective service ages the decline was almost 90 per cent. This achievement is all the more noteworthy in view of the fact that our armamentarium for combating tuberculosis has not been fortified by new developments such as vaccine, an antitoxin, or effective chemotherapy. It represents one of the outstanding accomplishments in the entire field of public health since the turn of the century.

TEN YEARS OF COLLEGE TESTING PROGRAMS

The sustained and far-reaching educational campaign directed against tuberculosis over a long period of years has been one of the most important factors contributing to the markedly improved death rate. In college health circles the practical value of such an educational program is clearly in evidence. The first organized effort to develop a comprehensive program of tuberculosis control among the nation's college students had its inception in

*Twelfth annual report of the Tuberculosis Committee, American Student Health Association, for the academic year 1941-42.

1931. Since that time the number of institutions which have set up case-finding programs has increased in a striking manner. The report of Ferguson² shows that from a modest beginning in 1931, when six colleges reported a tuberculosis program, the number increased steadily during the next five years. For the second five-year period, as reported by Lyght,³ further substantial gains were made. In the school year 1940-41 there were 304 institutions conducting active programs for the control of tuberculosis among their students.

During the academic year 1941-42, with which this report deals, many colleges and universities experienced a decrease in student enrollment due to enlistment in the armed forces of a considerable number of college men. Many student health departments suffered rather heavy losses in personnel and there were other disturbing factors. In spite of these unfavorable influences and contrary to our expectations, we are able to report a slight net gain in the number of case-finding programs over last year. Also, the number of colleges reporting to our committee reached a new all-time high. Of 860 institutions contacted by letter and questionnaire, replies were received from 488, or 56.7 per cent. Much credit is due to many of our state tuberculosis associations for their most helpful cooperation during recent years. In numerous instances they have made it possible for certain institutions to establish programs of tuberculosis case-finding by enlisting the aid of the state health department or other health agency. Undoubtedly there are many more colleges which would welcome such assistance. It should be remembered, of course, that not all colleges have an organized health program and many college communities, because of their location, do not have access to adequate x-ray facilities. It would seem that this group of institutions merits special consideration by the Tuberculosis Committee during the coming years.

We realize that much remains to be done when we remember that this year 372 colleges failed to respond to our two requests for a report on their activities. Of 860 institutions contacted by the Committee, 311 reported some form of tuberculosis program in effect during the year. This means that 549 colleges, or approximately 64 per cent of the country's total, presumably do not employ modern tuberculosis case-finding methods. The total enrollment at these institutions is probably in excess of 300,000 students. Since the prevalence of tuberculosis among university students is approximately 2 per 1,000, we are justified in assuming that on the campuses of these 549 colleges there are some 600 students who have unrecognized pulmonary tuberculosis. This is not a pleasant picture when we think of the future in store for many of these young men and young women. Few diseases impose such costly and far-reaching penalties for failure of early diagnosis as does tuberculosis. The years of disability and suffering and the financial costs

involved will reach staggering proportions. The number of persons who will be infected by certain members of this group will undoubtedly be large. Numerous deaths will occur.

Since the cost of a tuberculosis survey of the student group is not infrequently given as the reason for failure to sponsor such a program at some colleges, let us consider this item as applying to these 549 institutions. Based on average costs of surveying such a group, including tuberculin tests and x-raying positive reactors, an expenditure of \$100,000 divided among these institutions would provide an adequate case-finding program for their 300,000 students. On this basis, the cost of finding each of the estimated 600 undiagnosed cases would be \$166. No one familiar with the problem will question the tremendous values which accrue to the individual and to the community through the early diagnosis of tuberculosis. A program designed for the early detection of the disease among students may, by some, be deemed expensive. Failure to provide such a program, however, will invariably prove infinitely more costly.

DECREASE IN TUBERCULOSIS RATES

The tuberculin test provides the most sensitive and reliable index of the prevalence of tuberculous infection in a young adult group. In view of the sharp decline in tuberculosis mortality among white persons in this country between 1920 and 1940, 73 per cent in females and 63 per cent in males, one would naturally expect that the number of persons becoming infected with tubercle bacilli during this period would also show a significant decrease. Unfortunately, there are no published data on the incidence of tuberculous infection among college students dating back to 1920. One of the earliest reports on the results of tuberculin testing of a student group was based on a study conducted at the University of Minnesota¹ in 1928. Tests with the Pirquet method showed the incidence of positive reactions among approximately 2,000 students to be 31 per cent. At the same institution in 1941-42, using the two-dose Mantoux technic, the incidence of infection among 5,481 students was 17 per cent. This represents a reduction of 45 per cent over a period of thirteen years. At the University of Pennsylvania 48 per cent of entering students reacted to tuberculin in 1932 as compared with 38.5 per cent in 1942.

Table IV presents the results of tuberculin testing at 104 colleges located in all parts of the United States, 1941-42. The reports from all of the institutions included in this summary indicate that an adequate dosage was employed. It will be noted that for the country as a whole 21.8 per cent of students react to tuberculin, a rather surprisingly low figure. Comparing these results with those reported by Long² for the year 1934, it is apparent that tuberculous infection is becoming definitely less prevalent among college students. This no doubt reflects the generally improved conditions which prevail today with reference to tuberculosis, especially among persons of the social and economic group represented by college students. As will be seen in Table IV,

the east and west coast areas have a higher infection rate than other sections of the country.

Table VI presents a summary of the new cases of tuberculosis discovered at universities and colleges throughout the country during the college year 1941-42. Here is substantial proof of the real value of the tuberculosis program for the nation's institutions of higher learning. A total of 817 cases of tuberculosis were diagnosed during the year; this number includes only those formally reported to the Committee. No doubt many additional cases were discovered at institutions which, for various reasons, have never filed a report. Of the 817 newly discovered cases, 755 were among students, 22 among food-handlers and 40 among faculty members, administrative officers, and employees. Clinically active cases among students numbered 263, and 246 students withdrew from college to undergo treatment.

ADEQUATE METHODS OF INVESTIGATION

In previous reports by this Committee, attention has been called to the strikingly different results obtained by those colleges with and those without a modern case-finding program. Unfortunately, many of the older ideas relating to tuberculosis seem to be still firmly entrenched in the minds of many people. The belief is all too prevalent that early tuberculosis gives rise to the early symptoms of the disease. We receive reports of various procedures used at certain institutions for the follow-up of "suspects". "Weighing at frequent intervals," "frequent temperature readings," are among the more common of these. The "suspects" are usually those students who are rather markedly underweight. It would seem, therefore, that the Committee is justified in again emphasizing the fact that the tuberculin test and the chest x-ray provide the only adequate means for the early detection of tuberculosis in the vast majority of cases.

As shown in Table VI, the 311 colleges which routinely provided supervision for their students, using modern and accepted methods, found 744 new student cases of tuberculosis. On the basis of total enrollment at these institutions, which does not indicate a true prevalence since the entire group was not examined, this is a rate of 133.5 new cases per 100,000 students. This is indeed in striking contrast to the 11 cases diagnosed at 177 institutions where no case-finding program was employed, the rate here being 7.53 per 100,000. In other words, colleges with a definite control program discovered new cases of pulmonary tuberculosis almost eighteen times as frequently as did those colleges with no program. Such evidence, provided year after year by the Committee, should leave no doubt as to what constitutes an adequate program of tuberculosis control for a student group.

Is there any evidence which indicates a decrease in the prevalence of tuberculosis among college students? Although, as pointed out above, we cannot speak in exact terms of prevalence of tuberculosis as applying to the country's student population, reports available to the Committee over a period of years seem to indicate rather definite improvement. In the 1940-41 annual report of

TABLE I
Questionnaire Survey of Tuberculosis Case-Finding in American Colleges and Universities, 1941-42

	Institutions Contacted	Replies Received	Programs Reported
Maine	7	4	2
New Hampshire	7	3	3
Vermont	6	2	1
Massachusetts	41	22	14
Rhode Island	6	4	4
Connecticut	12	12	8
	79	47	32
New York	59	25	14
Pennsylvania	64	32	20
New Jersey	20	14	11
Delaware	1		4
Maryland	17	8	4
District of Columbia	9	5	3
	170	84	52
Virginia	18	9	7
North Carolina	22	10	7
South Carolina	15	8	3
Georgia	15	6	5
Florida	7	5	4
	77	38	26
Oklahoma	16	9	6
Arkansas	11	4	3
Tennessee	27	11	2
Mississippi	9	6	2
Alabama	13	4	1
Louisiana	13	1	
Texas	32	11	2
	121	46	16
North Dakota	9	6	5
South Dakota	8	3	2
Minnesota	21	15	15
Wisconsin	27	21	16
Michigan	24	22	13
Ohio	47	34	22
West Virginia	14	12	9
Indiana	27	20	14
Illinois	43	27	15
Iowa	26	14	7
Nebraska	16	10	5
Kansas	21	11	7
Missouri	22	15	6
Kentucky	17	7	6
	322	217	142
Montana	6	6	3
Idaho	3	3	1
Wyoming	1	1	1
Nevada	1	1	1
Utah	4	1	
Colorado	9	8	7
Arizona	3	2	2
New Mexico	4	3	2
	31	25	17
Washington	16	9	7
Oregon	11	4	4
California	33	18	15
	60	31	26
Grand Total	860	488 (56.7%)	311

TABLE II
States With Highest Percentage of Colleges Reporting Tuberculosis Control Programs, 1941-42

	No. of Institutions Contacted	No. Reporting Programs	Per Cent
Group I (States with less than 10 accredited institutions):			
Wyoming	1	1	100
Nevada	1	1	100
Colorado	9	7	77.7
Arizona	3	2	66.6
Florida	7	4	57.0
North Dakota	9	5	55.5
Montana	6	3	50
New Mexico	4	2	50
Group II (States with more than 10 accredited institutions):			
Minnesota	21	15	71.4
Connecticut	12	8	66.6
West Virginia	14	9	64.2
Wisconsin	27	16	59.2

New Jersey	20	11	55.0
Michigan	24	13	54.1
Indiana	27	14	51.8

TABLE III
Testing Technics in 254 Colleges Reporting Tuberculin Testing Programs, 1941-42

Testing Method:		
Mantoux intradermal		182
Vollmer patch test		54
Pirquet		4
Combined Mantoux and patch test		3
Unspecified		11
Testing Material:		
Purified protein derivative		93
Old tuberculin		89
Combination of the two		1
Testing Dosage:		
Two-dose technic		63
Single large dose		35
Single intermediate dose		37
Single small dose		37
Combination of dosages		2
Testing Routine:		
New students and all negative reactors annually		63
New students only (no retesting)		49
New students and all seniors		29
Test optional (available to all annually)		47
Other testing routines		46

TABLE IV
Tuberculin Testing of College Students in 104 Colleges (By States and Various Geographical Areas, 1941-42)

	No. Tested	No. Positive	Per Cent Positive
Maine, New Hampshire, Connecticut, Vermont, Massachusetts, Rhode Island	3,390	1,164	34.3
New York, Pennsylvania, New Jersey, Maryland, Virginia, West Virginia	7,143	2,072	29.0
North Carolina, South Carolina, Georgia, Tennessee, Alabama, Mississippi, Florida	4,208	719	17.1
Ohio, Kentucky, Indiana, Illinois, Michigan, Wisconsin, Missouri, Minnesota, Iowa	37,665	7,230	19.4
North Dakota, South Dakota, Kansas, Idaho, Montana, Utah, Wyoming, Colorado, Nebraska	6,775	1,279	19.0
Arkansas, New Mexico, Louisiana, Oklahoma, Arizona, Texas	5,122	951	18.5
Washington, Oregon, California	8,744	2,542	29.0
Total	73,047	15,957	21.8

TABLE V
X-Ray Procedures Reported by Various Institutions, 1941-42

254 Colleges Reporting Tuberculin Testing Program:	
Positive reactors x-rayed once	74
Positive reactors x-rayed annually	66
X-ray optional (acceptance general)	60
X-ray optional (acceptance not satisfactory)	10
Other x-ray routines	19
Fluoroscope used routinely to supplement x-ray	38
Fluoroscope used exclusively (chest x-ray when indicated)	12
57 Colleges Reporting No Tuberculin Testing Program:	
Chest x-ray for all new students	22
Chest x-ray for all students annually	9
Other routine x-ray programs	26

TABLE VI
New Cases of Pulmonary Tuberculosis Diagnosed Among College Students, 1941-42

Institutions with SOME Organized Tuberculosis Program:	
No. of clinically active cases diagnosed	259
No. of apparently arrested cases diagnosed	485
Total new cases reported	744
No. of students who left college because of tuberculosis	240
No. of institutions reporting	311
Approximate total enrollment	558,075
New cases per 100,000 students	133.5
Institutions with NO Organized Tuberculosis Program:	
No. of clinically active cases diagnosed	4
No. of apparently arrested cases diagnosed	7
Total new cases reported	11
No. of students who left college because of tuberculosis	6
No. of institutions reporting	177
Approximate total enrollment	146,000
New cases per 100,000 students	7.53
Total Cases of Pulmonary Tuberculosis Diagnosed 1941-42:	
Student cases newly diagnosed	755
Food-handlers	22
Faculty, administrative officers, etc.	40
Total, new cases	817

the Committee by Lyght,⁶ 304 institutions with organized tuberculosis programs reported 966 newly diagnosed cases of tuberculosis. This represents a rate of 177.2 new cases per 100,000 students, based on an enrollment of 545,000. For the five-year period 1936-41, this case-finding rate stood at 190.5 per 100,000. This year the corresponding rate is 133.5. This apparent reduction of approximately 30 per cent may actually be on the conservative side. For during this period, reports from many of our larger institutions conducting excellent case-finding programs indicate an extension of these procedures to include a higher percentage of their students. In terms of total enrollment, therefore, it is evident that more students are being examined each year, and the technicians employed have improved and become more effective.

NEW STUDIES IN PROGRESS

During the present school year the Committee has enlisted the cooperation of a group of eastern colleges in a study of entering students. Students matriculating at these institutions number approximately 10,000 annually. It is planned to obtain accurate individual records on all first-year students at these colleges over a period of years. The information to be recorded for each student includes age, home address, name and location of secondary school attended and whether a private, public, or parochial school; tuberculin test technic and results; and chest x-ray findings. If such a large group is studied in this manner over a considerable period of time, much valuable information will be obtained. We shall be permitted to observe differences in the prevalence of tuberculous infection among students from various states and various home communities, and accurate comparisons may be made from year to year. It is hoped that this survey may continue without interruption for a period of ten years or longer. If this is possible, the available data should provide a rather sensitive index of any changes in the prevalence of tuberculous infection and disease among students in this area. The Committee wishes to express its appreciation to the following universities and colleges, and especially to their health service projects, who have consented to participate in this new project. We realize the effort and expense which is involved.

Amherst College	North Carolina, Woman's
Bennington College	College of
Bryn Mawr College	Pennsylvania State College
Bucknell University	Pennsylvania, University of
Dartmouth College	Princeton University
Goucher College	Rutgers University
Haverford College	Smith College
New Hampshire,	Syracuse University
University of	Virginia, University of
Wake Forest College	
Wesleyan University	

This report would be incomplete without mention of the immeasurable educational value of the tuberculosis programs now being carried on so effectively in many colleges and universities. And we in the colleges are fully aware of the same fine work being done in an ever-increasing number of secondary schools. This year over half a million young men and women are enrolled in colleges where modern procedures are employed routinely

for the early detection of tuberculosis. During the past ten years millions of students have been brought into intimate contact with these programs. Fortunately, through the student, the parents are being made aware of the protection thus being provided for their sons and daughters. In this way we are building up a formidable army of intelligent men and women, many of whom will be the future leaders in the campaign against tuberculosis.

SUMMARY

Three hundred and eleven colleges and universities, with a total enrollment of 558,075 students, report tuberculosis case-finding programs during the academic year 1941-42.

Seven hundred and forty-four new cases of tuberculosis were diagnosed among the students at these institutions, a rate of 133.5 new cases per 100,000 students.

At 177 colleges which provided no case-finding programs, 11 new cases of tuberculosis were diagnosed among 146,000 students, a rate of 7.5 per 100,000.

The incidence of tuberculous infection among college students has shown a gradual decline during the past ten years. Among 73,000 undergraduate students tuberculin tested in all sections of the United States in 1941-42, there were 21.8 per cent positive reactors.

Reports available to the Committee during the past six years indicate a decline of approximately 30 per cent in the prevalence of tuberculosis among college students during this period.

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The Tuberculin Reaction in Medical and Nursing Students*

A Five-Year Study

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IN the fall of 1937 we began yearly routine tuberculin testing of all students entering the University of Georgia School of Medicine and the University Hospital School of Nursing. Each new class is tested soon after enrollment; the negative reactors are retested at the beginning of the succeeding school year and at the end of their period of training. All positive reactors are either fluoroscoped or x-rayed at least once each year.

The Mantoux intracutaneous test is employed, using a standard old tuberculin (Lilly O. T.) in strengths of 0.10 mg. and 1.0 mg. All students negative to 0.10 mg. O. T. receive the 1.0 mg. test.

In the accompanying tables the percentages of positive reactions are given in round figures; the positive reactors for each year represent the total reactors from the preceding year plus the new ones; e. g., if in a given class there are 20 positive reactors the freshman year and 25 the sophomore year, the number of conversions from negative to positive during the year would be 5.

MEDICAL STUDENTS

Table I gives the result of our study with the medical students. A total of 316 freshmen have been tested. Eighty of these, comprising two classes, have been followed through from entrance to graduation. Forty of this group, or 50 per cent, were positive on admission and approximately 56,‡ or 70.5 per cent, at graduation.

†See footnote to Table I.

In addition, the succeeding classes are tabulated up to the present time.

An interesting fact is observed in studying the table: namely, the largest number of conversions from negative to positive take place in the preclinical years. Since only the senior students work in the tuberculosis wards and in the chest clinic, other factors must be considered, as has been suggested by previous workers.³ Among these is the possible role of the autopsy room and the laboratory.

For the past seven years, owing to limited facilities, only residents of Georgia have been admitted to the medical school. The average age on entrance has been twenty to twenty-one years. Students live in fraternity and boarding houses since there are no dormitories. No student included in this study has developed reinfection tuberculosis while in school. A member of the class of 1941 who entered school with a positive reaction was recently diagnosed by Army officials as having minimal disease. Two x-rays, one on graduation and one in St. Louis, where he was serving his internship, were both

interpreted as negative. He is now a patient in the state sanatorium.

Table II summarizes the findings at several other schools and compares them with ours.

STUDENT NURSES

The University Hospital is a 325-bed general hospital consisting of an administration building, a wing for white patients, a wing for colored patients, an isolation wing, and a new tuberculosis unit of 50 beds. Both private and charity patients are admitted, the wards being used for clinical instruction by the medical school. Prior to February, 1942, tuberculous patients were admitted to the isolation wards. These patients were attended by student nurses of all classes, particularly the seniors.

Student nurses come chiefly from Georgia, South Carolina, and Florida and average eighteen years of age on admission. The white nurses are about evenly divided in residence between urban and rural communities, whereas the colored nurses practically all come from urban homes. They attend the same classes, eat the same food, and have similar living quarters. The chief difference in their opportunity for exposure is the fact that the type of case the colored nurses come in contact with is advanced and acute, as distinguished from the less advanced, less acute white patient nursed by the white girls.

Table III gives in detail our findings with nurses. A unique feature is the inclusion of colored trainees. In our study of available literature we have been unable to find a similar recording.

Three classes have been checked from entrance to graduation. Of the 90 white girls in this group, 30 per cent were positive on admission and 81 per cent at graduation. Of 49 colored girls, 49 per cent were positive on admission and 97 per cent on graduation. Two of the colored classes were 100 per cent positive before their senior year.

Three white members of the 1940 class have developed reinfection tuberculosis, two while in training and one within the past two months. Of the two girls reinfected during training, one entered with a positive test. She did well under collapse therapy and was able to re-enter training after a year and recently graduated. The other student entered with a negative test, which became positive only during her senior year and was demonstrated about a month before graduation. An x-ray revealed moderately advanced disease. Collapse therapy was instituted but convalescence was slow. She returned this fall to complete the month needed for graduation.

The third reinfected nurse also had a negative test

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until a month before graduation. X-rays at that time showed no evidence of parenchymal disease. Since graduation she has been employed as a supervisor in the hospital. An x-ray taken in August, 1942, disclosed bilateral upper lung pathology.

Two colored students also of the class of 1940 developed reinfection disease during training. Both were negative on admission and developed allergy during their first year. One of them developed a moderately advanced disease which responded well to collapse therapy. The other girl had a pleurisy with effusion which cleared on bed rest. She was out of training for a year, then returned and completed her course. Since graduation she has worked in the hospital and a recent check-up shows her to be in excellent condition.

A colored member of the class of 1943 who entered with a positive reaction also developed pleurisy with effusion in the winter of 1941. Several thoracenteses were necessary to control the fluid. No evidence of parenchymal disease was seen. She has returned to her home and abandoned training.

During the preparation of this paper we have seen an x-ray of another colored girl of the class of 1943, which shows definite parenchymal disease in the left upper lobe. Her tuberculin on admission to training was negative and was still so last fall. Recently, however, it was positive and her chest was x-rayed. She is now receiving pneumothorax.

Table IV compares figures from some other training schools with ours.

W.P.A. WORKERS

We have not had the opportunity to study the tuberculin reaction in other white collar groups, but recently we tested 1,000 W.P.A. workers. Their ages ran from twenty-five to forty-five years and both urban and rural residents were included. The following positive results were obtained: white men 64.5 per cent, white women 71 per cent, colored men 80.5 per cent, and colored women 81 per cent. When it is remembered that these individuals are from the lower economic strata, where tuberculosis is common, the comparison of the figures with those of the groups we are reporting is arresting.

PREVENTIVE MEASURES

All medical cases admitted to the wards of the University Hospital have an x-ray of the chest on admission. This tends to prevent unsuspected cases of open tuberculosis from being administered to by students, nurses, and hospital personnel. We believe this to be a most progressive policy and hope to see it extended to include every patient admitted, not only medical, but surgical, obstetrical, and all others, both paying and indigent. All patients with respiratory symptoms are supplied with disposable tissues and an effort is made to have them cover nose and mouth when coughing or sneezing. Food-handlers are routinely checked by test and fluoroscope.

Nurses are required to wear gowns and masks when nursing tuberculous cases. In addition they are urged to wash their hands frequently. Medical students wear

TABLE I
Positive Reactors Among Medical Students

Class	No.	Freshmen	Sophomores	Juniors	Seniors	
					Beginning of Year	End of Year
1941	37	16 (43%)	17 (46%)	21 (57%)	22 (60%)	23 (62%)
1942	43	24 (56%)	26 (60%)	32 (74%)	32 (74%)	33* (79%)
Total	80	40 (50%)	43 (53%)	53 (65%)	54 (67%)	56 (70.5%)
(Mar.) 1943	46	22 (49%)	28 (60%)	29 (63%)	35 (76%)	
(Dec.) 1943	46	23 (50%)	26 (56%)	32 (70%)		
(Sept.) 1944	68	30 (44%)	46 (68%)			
(June) 1945	76	50 (66%)				
Total Tested		316	240	172	126	80
Total Positive		165 (52%)	142 (59%)	114 (66%)	89 (70%)	56 (70.5%)

*Four negative reactors failed to take the final test.

TABLE II
Comparison of Table I with Other Studies

Class	Hahn ⁴ (Cornell)	Myers ⁸ (Minn.)	Stiehm ¹⁰ (Wis.)	Keller ⁶ (Vanderbilt)
Freshman	82%	36%	45%	60%
Senior	92%	68%	55%	69.5%

Class	Baker ⁵ (La. State)	Soper ⁹ (Yale)	Blackford ⁷ (Emory)	U. of Ga.
Freshman	68%	77%	48%	52%
Senior	98%	94%		70.5%

TABLE III
Positive Reactors Among Nursing Students

Class	Race	No.	Probationers	Juniors	Seniors	
					Beginning of Year	End of Year
1940	White	21	5 (23%)	11 (52%)	12 (57%)	17 (81%)
	Col.	24	7 (30%)	20 (83%)	21 (90%)	22 (91%)
1941	White	35	9 (25%)	22 (62%)	28 (80%)	30 (86%)
	Col.	10	5 (50%)	8 (80%)	10 (100%)	10 (100%)
1942	White	34	14 (41%)	19 (56%)	23 (70%)	26 (76%)
	Col.	15	10 (67%)	15 (100%)	15 (100%)	15 (100%)
Total	White	90	28 (30%)	52 (57%)	63 (69%)	73 (81%)
	Col.	49	22 (49%)	43 (88%)	46 (96%)	47 (97%)
1943	White	35	21 (60%)	27 (77%)		
	Col.	16	10 (62%)	13 (81%)		
1944	White	40	18 (45%)			
	Col.	22	13 (59%)			
Total Tested, White			165	125	90	90
Total Tested, Colored			87	65	49	49
Total Positive, White			67 (39%)	79 (62%)	63 (69%)	73 (81%)
Total " Colored			45 (54%)	56 (86%)	46 (96%)	47 (97%)

TABLE IV
Comparison of Table III with Other Studies

Class	Phila. General ³	New York ¹	Boston City ²	Vanderbilt ⁶	U. of Ga.
Probationers	57%	78%	57%	54%	White 39% Colored 54%
Seniors	100%	91.5%	90%	58%	White 81% Colored 97%

masks and are also urged to wash their hands. Medical students have a series of lectures on tuberculosis in the third trimester of the junior year and the nurses during their second year of training. The importance of self-protection is stressed to both these groups.

DISCUSSION

We are convinced that annual checking of students and nurses, particularly nurses, is entirely inadequate to properly safeguard health. Tuberculin tests should be made every three or four months and all positive reactors routinely examined by x-ray at the same intervals.

In spite of the fact that preventive measures are in force, it is obvious from a study of the figures presented that too many students and nurses are infected with tubercle bacilli during their period of training. We have also observed that a large number of these recent conversions have very strongly positive reactions. This phenomenon has been previously commented upon.¹ The most severe reaction we have ever seen occurred in a Jewish girl, a member of the class of 1941. Her test was negative on admission but the next fall, in response to 0.10 mg. O. T., her arm swelled to about twice its normal size. At the site of inoculation there was a bleb about the size of a fifty-cent piece accompanied by marked edema. Two axillary glands became quite palpable and tender and she had a temperature of 104° F. The symptoms subsided without untoward effect, but she was so unnerved by her experience she gave up training.

What further steps should be taken to protect these girls? They take their training during the years when tuberculosis is the chief cause of death. Should only girls with positive tuberculin reactions be admitted to training? We have the impression, though so far it is only an impression, that the positive reactors are in a little better position to cope with the infection than those whose reaction has recently been converted from negative to positive. We are doubtful, however, if a sufficient

number of positive reactors could be recruited to fill the rolls. Then, too, this would place an insurmountable obstacle in the path of those negative reactors wishing to take up training.

Since February, 1942, the tuberculous patients in our hospital have been cared for in a separate building by practical nurses under graduate supervision. It will be extremely interesting to see what effect this move has upon the infection rate of succeeding classes of nurses.

SUMMARY

In making this five-year study of the tuberculin reaction in medical students and nurses, including figures on colored nurses, two classes of medical students and three classes of nurses have been followed throughout their period of training.

Fifty-two per cent of the medical students were positive on admission and 70.5 per cent on graduation; 39 per cent of the white nurses were positive on admission and 81 per cent on graduation; 54 per cent of the colored nurses were positive on admission and 97 per cent on graduation.

In addition, a comparison with local W.P.A. infection rates is given. Preventive measures practiced in the University Hospital are outlined and further measures for more effective control are discussed.

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The Examination of Rejectees*

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THE Department of Health of New York City has provided a complete chest examination for approximately 94 per cent of the men rejected for pulmonary defects at local Army physical examination centers since the first draft call on November 25, 1940. The men examined are those who have been rejected in whole or in part on the basis of pathology as seen in the chest x-rays at the Army physical examination stations. From November 25, 1940, to October, 1942, the Army stations examined approximately 500,000

individuals, or about five-sixths the number (600,000) examined by us in mass surveys between 1934 and 1942. There is every indication to show that within the coming two years an equal or greater number will be examined by the Army; consequently the flow of rejectees to us will not diminish.

The potentialities of this service were fully realized by the Department of Health well before the actual drafting of men started in the fall of 1940. The Army, prior to the actual drafting of men, was committed to the principle of a chest x-ray of each man before acceptance into the armed services. However, the Army was not able to provide the x-ray equipment, nor find men to

*Read at the Metropolitan Sanatorium Conference, December 9, 1942, New York City.

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interpret the films at that time. Accordingly, the Department of Health offered to set up and operate this service for the Army until such time as the military authorities could arrange to assume full responsibility. This offer was promptly accepted by the Surgeon of the Second Corps Area. It should be stated at the outset that the effective and efficient program that has been developed here in New York City is in large measure a tribute to the enthusiastic assistance and cooperation of Second Service Command Surgeon, Col. C. M. Walson, and his staff, and as well the Medical Director of Selective Service, Dr. Samuel J. Kopetsky, and the chairmen of the local draft boards.

The Department of Health provided the entire service for the stations in New York City proper without cost to the Army from November 25, 1940, until January 1, 1941; at this time the Army assumed the cost of the x-ray service, and on January 15, 1941, assigned clinicians to interpret the films. The Department, however, has continued from the outset to provide an examination for the rejectee suspected of having tuberculosis.

There has been the closest cooperation and understanding between the clinicians working in the Army station and those in our clinic. Primarily, this was due to the fact that most of the physicians first assigned by the Army to do this work at stations in New York City were the same men we had assigned during the initial phase of the service, and who had helped to establish the procedures that were adopted. Some of these men were in the Reserve Corps and were placed on active duty by the Army, others served as civilian interpreters on a per diem arrangement. Usually, there have been one or more men serving both at the Army induction board and in our Central Chest Clinic. Also, several men previously connected with our services, and therefore conversant with our routine, have served as civilian interpreters for the Army. Our bureau has also assisted the Army in selecting many of its civilian interpreters. Thus there has been an unusually close understanding between the physicians of the Army induction boards and our clinic as to methods, diagnostic standards, and purposes of the two services.

During the period when the entire service was provided by our department, financial assistance was secured as follows: The W.P.A. project in case-finding being directed by the Department of Health was diverted to this purpose. The Queensboro Tuberculosis and Health Association paid for the x-ray service for the Borough of Queens, and provided some funds to pay for the additional time worked by some clinicians beyond our budgetary allowances. The Bronx Committee of the New York Tuberculosis and Health Association also gave assistance in physicians' compensation beyond our budgetary limits.

EXAMINATION METHODS AT INDUCTION CENTERS

In order to include a chest x-ray as part of a complete examination in the Army induction station, the report on a film would have to be made within a few moments of its exposure. As each induction station was scheduled to handle from 300 to 500 men per day, it became

obvious that entirely new procedures would have to be devised. The roll-paper methods used in our routine surveys were not possible in this work. The equipment was, however, elaborated to permit a continuation of exposures at the rate of 120 per hour, using 14"x17" paper films, which could be developed and made available for wet reading in an average of twenty minutes. Later there was employed at the induction station of Governors Island a battery of five 4"x10" fluorographic x-ray units, each capable of covering 50 to 55 individuals per hour, or 100 to 110 exposure per hour as each individual has stereo pair. Each unit was capable of taking 14"x17" celluloid films when desired.

It was clearly obvious that if men had to be completely examined and cleared by the Army within a matter of a few hours, it would be impossible in all instances to render a final and sound opinion on the pathology shown in their chest films. The majority of lesions would be well defined and no further study would be needed from the standpoint of the Army. A goodly number, however, would be of an equivocal nature demanding further study to determine etiology, activity, and acceptability. As the Department of Health was anxious to realize the maximum benefits from this service as a case-finding method, it was obvious that some plan should be devised to have all men with borderline or disqualifying x-ray pathology referred to us for further study. Thus, this mass survey could be made to render a real service to the Army and the community at the same time.

LESIONS REFERRED TO CHEST CLINIC

Thus, in the initial plans worked out with the Corps Area Surgeon and the Selective Service, it was proposed that men showing the foregoing types of x-ray lesions at time of examination should be referred to a Department of Health clinic for further study. The Central Chest Clinic of the Department, located at 125 Worth Street, and convenient to all transportation lines within the city by direct route or transfer, was designated as the point of examination. These plans also provided that reports from our clinic on each case examined be sent to the local draft board and the induction station. These reports would indicate whether the lesion noted at the Army examining station had been confirmed, thus definitely rejecting the man for future consideration, unless the maximum acceptable standards defined in M.R. 1-9 should be changed later. If the diagnosis was not confirmed, it would permit the reclassification of the man by his draft board as acceptable under the provisions of M.R. 1-9.

Once the Army rejected a man, it had no further supervision over him. He was, however, still under the control of his local draft board and could be called again for reclassification at their discretion. A simple referral slip was provided by the Army. This form gave the rejectee's name, address, local draft board number, and his x-ray diagnosis by code. It also indicated that he was to report within two to four days to our clinic. The Army further strengthened the effect of this gesture by seeing to it that this slip was given to the rejected man upon conclusion of his examination.

It is quite likely that the men receiving these referral slips accepted them as an Army order to appear, as approximately 75 per cent reported promptly to the clinic, although the fact that previously unsuspected pulmonary pathology was found must have been an additional urge to find out what it was all about.

Of the 25 per cent not reporting within two weeks, the clinic sent a reminder by postal card, which was sufficient to bring in the majority. When this failed, a report was sent to the local draft board, which wrote the man a letter requesting him to report to our clinic for examination. Through these three steps we have been able to secure examinations of about 94 per cent of all New York City men rejected in whole or in part on the basis of x-ray pathology as noted at the Army center. We receive daily from the Army a list of all New York City rejectees in which chest x-ray pathology is involved and are thus able to check off the men as they appear.

All films have not been sent to the Department of Health because M.R. 1-9 requires the distribution of such films to the state directors of Selective Service. Accordingly, in obvious cases, no duplicate film was available to send to the Department of Health, but in borderline cases, a 14"x 17" film was always taken in an effort to establish the diagnosis and acceptability; in such cases, the large film was forwarded to the Department of Health.

PROCEDURE AT THE CHEST CLINIC

When the man is admitted to our clinic, he is given a complete chest examination, including history, physical, fluoroscopy, chest x-ray, sputum by concentrate method, and any other examination indicated and possible on an ambulatory basis necessary to arrive at a final diagnosis. At the time of this examination the man is instructed to return in seven days for final advice. At this later date he is interviewed by a physician who explains his condition and its significance. A conference nurse also amplifies this advice and endeavors to get him started on the road to proper supervision. Thus, by the time the individual leaves the Central Chest Clinic, we have endeavored to educate him as to the importance of his x-ray findings and what he should do about them.

At the time of admission to the clinic, a search is made in a master roster of cases gathered in previous surveys and kept at the Central Chest Clinic. Not infrequently we find a previous record and series of x-rays that is of the greatest assistance in evaluating the man's condition at this time. If a definite lesion is noted in the Army film, a search is made in the master case roster of the Department, which contains over 60,000 names of previously registered cases. About 20,000 of these cases are under some form of active supervision, and the remainder are known to be arrested. This check also reveals previously known cases and provides valuable records for comparison with current films.

In a small percentage of cases we find open bacillary lesions in need of prompt hospitalization, and in many such instances the cases go directly from the clinic to the hospital as emergency patients. The majority of those showing reinfection forms of tuberculosis, how-

ever, are not urgently in need of care. In about two-thirds of this group the lesions have all the characteristics of arrest, while the remaining one-third are classified as clinically significant and in need of further supervision. Our experience indicates that we are perhaps overly cautious regarding this latter group, as subsequent supervision has revealed about 50 per cent to be stable so far as x-ray appearance is concerned. We know no way of making a closer selection of these lesions, as they are usually completely negative to physical examination, constitutional symptoms, or known exposure to the disease.

It is the purpose of the examinations in the Central Chest Clinic to arrive at a definite diagnosis. Any subsequent supervision becomes the problem of the man's physician or the district clinic. If the man indicates he has a physician, a report is made to him, providing he requests it. Our records and x-rays are not loaned to the physician but he may review them at the clinic. Further supervision of the case is entrusted to the physician if he is willing to assume the responsibility under our Sanitary Code, just as in any other case.

If the man has no physician, he is referred to the clinic serving the district in which he lives, and all records and x-rays are transferred to that clinic. Regardless of whether the need is for prompt supervision or a periodic examination a month or so hence, the man is urged to call at the clinic within a few days so that he may become acquainted with the physician and nurse and they with him. The district clinic then places the case under the indicated supervision and, if there are contacts to be examined, the routine procedures are followed, just as if the case had originally been found at the clinic. The majority of men examined as rejectees later become district clinic cases. It is obvious, therefore, that all men rejected and examined by us have been offered adequate facilities for supervision of their condition, as well as their contacts. The majority cooperate readily; some, as would be expected, become delinquent.

REPORTS TO THE ARMY

As previously indicated, reports of our final classification are sent to the induction station and the local draft board through the Office of the Medical Director of Selective Service. These reports may indicate a confirmation of the Army findings, or they may indicate that a lesion apparent at the time of the Army examination has since cleared, as in the case of a resolved pneumonia; or the lesion found originally may now be considered as acceptable under the limits prescribed in M.R. 1-9. The number of cases falling in this latter category average about 8 per cent. Such reclassifications are inevitable because of the speed with which men must be cleared by the Army, and the fact that a single x-ray frequently is insufficient evidence to arrive at a final conclusion. It has been our policy never to recommend a man with a lesion as eligible for Army service unless we feel reasonably sure of its etiology or stability. It is our opinion that many of the lesions which are of a disputed character or appear to exceed the limits prescribed by M.R. 1-9, and therefore cause the individual to be rejected on the

basis of a single examination, will later be found to be stable and acceptable without undue risk.

When our examination of a rejectee indicates that a change should be made in the classification based upon the original examination made by the Army, we send our report to the local board and the Army examination station, and also provide for our records and series of x-rays to be sent, if desired, so that these authorities may review our evidence. They make a notation of these findings on their records so that when the man returns for examination the records will carry the complete medical history. In the majority of instances there is agreement between the two staffs on the reclassification, though occasionally the Army decides that its best interests will be served if the man is permanently rejected. In any event, it is the responsibility of the Army to determine eligibility, and our service merely endeavors to assist in accumulating as much medical information as is possible on a given problem case.

ASSISTANCE TO REJECTEES

In the majority of instances, the discovery of a lesion by x-ray is the first evidence the man has that his chest is not normal. It is a matter of considerable concern to him and not infrequently mitigates against his returning to his old job. Fortunately, most of the lesions found are of minimal extent and arrested, and while they may be just cause for rejection for military service, they should have no effect on ordinary activities. Thus men with healed primaries, or with well-healed reinfection forms of the disease, are promptly discharged from further supervision and requested to report back only in the event of intercurrent respiratory symptoms. The problem created in relation to their jobs is a serious one, and the action of many employers in refusing to re-employ the men is unwarranted. In many instances, we have been able to assist the men in re-employment, but there is need for more health education on this subject. This could well be a special project for the tuberculosis and health associations, whose chief function is the dissemination of sound health education to the public.

The Bureau of Tuberculosis has established another vitally important service in cooperation with the Corps Area Surgeon. Not infrequently an individual formerly found at our clinic is inducted into the service without any apparent knowledge of his previous condition. Usually these men have not cleared through the local physical examination centers as selectees; they may have enlisted locally before all such men were x-rayed, on the basis of a physical examination; others have enlisted in other centers, and either purposely or through neglect have failed to divulge their past medical records at the time of examination. On the other hand, a few men with previous bacillary lesions now have only a minimal productive process, the volume of which is within the limits prescribed by M.R. 1-9.

Whenever such a case comes to our attention, usually through the district nurses, a complete report is submitted to the Corps Area Surgeon. He then endeavors to locate the man in the service and secure a current report from the local medical authority. On request from

the local authority we loan our x-rays or other data to assist in the appraisal of the case. As a result, some of these men are mustered out of the service; others who appear to be good risks are retained. In any event, the Army's record of the man carries the full tuberculosis record so far as the known facts are concerned.

INCREASE IN NUMBER OF EXAMINATIONS

The volume of work done by the Department of Health in the first nine months of 1942 increased over 100% as compared with the entire year of 1941. It is to be pointed out that the cases rejected because of pulmonary pathology include all forms of pulmonary and pleural changes as well as lesions obviously of a tuberculous character. This large increase is due to a great extent to the fact that the procedure of induction examination was changed subsequent to January 1, 1942. Prior to that date, each selective service registrant underwent a careful, complete examination by his local board, and a great many cases of chest pathology were thus identified and rejected without being referred to the Army. Since that time, the examination given by the local board has been cursory and is responsible for the fact that the percentage of cases rejected by the Army examining stations has doubled. Thus, the number of pulmonary rejectees referred to the Department of Health in the first nine months of 1942 was about four times as great as the number referred in all of 1941. Figures on the exact ratio of pulmonary tuberculosis and other forms of pulmonary pathology are not available at this time.

Other causes for the increase in the number of rejections for pulmonary causes in 1942 may be stated as follows: The registrants examined in 1942 were of an older average age group—in which we expect to find more tuberculosis and other pulmonary pathology. Also with the increase in the number of individuals being examined, physicians were assigned to induction examining teams without being sufficiently familiar with the interpretation of 4"x10" stereoscopic films; they therefore leaned over backwards in disqualifying registrants who presented defects of little or no significance. This condition is becoming less of a problem as the roentgenologic interpreters gain experience with the newer methods. Contrary to common belief, there is nothing to indicate that the amount of pulmonary tuberculosis disclosed by examination of selective service registrants in the City of New York indicates an increased prevalence of tuberculosis in the community, as the induction station is now examining many cases previously known to the Department of Health.

Now that the number of men needed for the Army has been decided upon, it is obvious that in New York City we may expect no reduction in the numbers examined by the Army for some months to come. However, as many of the selectees to be examined will be in the 18 to 20-year-old group, it is to be expected that the percentage of rejected men will be lower.

The Army has recently transferred its induction station from Governors Island to Grand Central Palace in New York City. This station provides facilities for con-

ducting physical examinations of Selective Service registrants by ten individual teams, each geared to accomplish 200 physical examinations in an eight-hour day. The x-ray units now in use produce 4"x 10" stereoscopic celluloid film, with additional facilities for producing 14"x 17" films when indicated, of the chest or for other diagnostic purposes.

Thus far the Department of Health has not cooperated with the Navy in such examinations, as its recruits are usually x-rayed at the naval stations. We have, however, provided the same reports as to the Army on men known to have previous histories of tuberculosis.

We have also examined many men applying for commissions in the Army who have been rejected on the basis of chest pathology. In some instances, we have been able to get together additional information for the consideration of the Army.

SUMMARY

The Department of Health in New York City, from the outset of the draft in October, 1940, has worked in close relationship with the Army and Selective Service in providing through our facilities a complete chest examination service for rejectees.

This program has been of value to the Army and Selective Service in that more complete examination, usually requiring a protracted period, has recertified about 8 per cent of the rejectees as satisfactory for military service under M.R. 1-9. From the viewpoint of the Department of Health, it has provided a mass survey of numbers far beyond our ability to provide, and therefore has been a potent instrument in getting cases of tuberculosis under proper supervision.

The generous and understanding cooperation of the Corps Area Surgeon and the Medical Director of Selective Service has made it possible to set up and operate a far-reaching service with the maximum efficiency and at a minimum of expense.

As all rejectees are referred directly from the Army physical examination center to our chest clinic, it has been possible to complete their examinations within a few weeks after the lesion is found. There has been excellent cooperation on the part of the rejectees, for 75 per cent report on the basis of a recommendation by the Army. Of the remaining number, a reminder either from us or their local draft board has made it possible to examine approximately 94 per cent of those rejected.

Tuberculosis on a Typical College Campus

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Northfield, Minnesota

AT Carleton College, Northfield, Minnesota, a tuberculosis case-finding program has been in progress for several years. Since the autumn of 1936, when the writer assumed charge, this has included the annual tuberculin testing of every student and of all food-handlers and other employees coming into intimate contact with students. Individuals reacting to the Mantoux test have been x-rayed at once and annually or oftener thereafter while on the campus, with appropriate physical examination, clinical and laboratory studies provided for those whose findings indicated need for detailed follow-up.

The eleven annual reports of the Tuberculosis Committee of the American Student Health Association have traced the phenomenal development of tuberculosis control in our colleges and universities. The results have emphasized the success possible in the search for pre-clinical tuberculosis whenever and wherever modern methods are employed.

In a recently published five-year survey of the accomplishments in the college field, it was brought out that seven times as many cases were discovered in those schools with early diagnosis programs as in colleges where diagnoses are based on the final development of definite symptoms.

It is the purpose of this communication to discuss the experience on a campus where the recommendations of the Tuberculosis Committee have been followed for seven consecutive school years, and to report on the encouraging results obtained. Carleton being a typical mid-western liberal arts college, our data represent a reliable cross-section of young American adults of college age and the tuberculous infection among them.*

EXAMINATION ROUTINE

The enrollment at Carleton has ranged from 792 to 898 during the seven years of our program, averaging 853 per term, and divided almost evenly between the sexes. Each student is examined completely upon entrance, and in addition receives a careful check-up each year through the Health Service. Early in October the whole student body and the employees mentioned above are tuberculin-tested. We use mostly the purified protein derivative of tuberculin, administering an initial dose of 0.00002 mg. If, after 48 to 72 hours, this gives a negative reading, the second dose of 0.005 mg. is given, to be read after a similar interval. A smaller number of students were tested with Saranac Lake old tuberculin, employing a first-strength dose of 0.1 mg. and a second-strength dose, where necessary, of 1 mg.

In our experience, a single small dose fails to discover a considerable number of truly positive reactors, while a single large dose is apt to cause an undue number of

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sore arms or constitutional reactions in highly allergic subjects. Admittedly more bother to all concerned, as well as costing more, the two-dose method still impresses us as safer and as clinically more accurate.

Positive reactors immediately receive a standard 14 x 17 chest roentgenogram, made at the Health Service and financed, like the entire program, from the medical fee included in the tuition charges. Films revealing suspicious findings call for stereoscopic studies, fluoroscopic viewing, and additional examination for possible physical signs. Other scrutiny includes sputum examinations, smear, culture, and guinea-pig inoculations of the fasting gastric sediment, three or more days of observation in bed at the infirmary, with five-minute temperature determinations and one-minute pulse counts recorded every two hours, and laboratory tests that embrace complete blood counts, erythrocyte sedimentation rates by Cutler's method, and a blood Wassermann.

Cases which, upon initial study or repeated follow-up, betray evidence of a pathologically progressive lesion are advised to withdraw from college and place themselves under the best possible care at once, looking toward an early arrest of the process and a return to full or reasonable function as rapidly as their own future welfare and the safety of their associates will permit.

In exceptional cases, where the evidence is entirely reassuring that tubercle bacilli are not being disseminated by the patient among his fellow students, and where the clinical picture, evaluated by college physicians in consultation with chest experts, promises satisfactory progress with less than complete rest, a student may be allowed to remain in college under very close surveillance, some type of collapse therapy perhaps being attempted, and always upon a sharply restricted schedule of academic work and a regimen of extra rest and release from physical education requirements; such students, of course, live in a single room.

TUBERCULIN RESULTS

Carleton students, coming predominantly from the central regions of the nation, show a somewhat smaller percentage of positive reactors than experience would predict for an eastern, southern, or southwestern institution. Along with the encouraging decline in the incidence of infection as revealed by a dwindling frequency of reaction to the Mantoux test throughout American collegiate communities, Carleton figures show that in the autumn of 1936 the positive reactors among our students numbered 3 out of every 10 tested, while in October, 1942, the ratio had dropped to 1 in 5. We have found that, relatively, the male positive reactors will slightly outnumber the females in that category—roughly 12 to 10.5—comparing similar age groups. (Later it will be shown that our diagnosis revealed 5 cases of active tuberculosis in men students as against 2 among student women.)

During a period of four years, from September, 1938, to June, 1941, a special statistical analysis was made, the results being summarized in Table I. It will be noted that in that time, 1,863 students were tested and followed. A downward shift in positivity from year to year is seen, and a regional selectivity is also apparent. The

lowest incidence of positive reactions occurred among students from Minnesota (19.8 per cent). Those coming to Carleton from other portions of the midwest showed a slightly higher percentage (23 per cent), those from more distant parts of the country a still higher one (27.9 per cent); while of students born and reared outside the United States, 3 out of 4 proved to be positive reactors.

When we classified the young people into those coming from communities of over 2,500 population and those from towns of less than that or from farming communities, we again encountered figures which indicate that the multiplied chances of exposure in the more densely crowded areas had resulted in a heightened incidence of infection. Urban dwellers averaged 29.2 per cent positive, rural students only 17.6 per cent reactive.

Similarly, checking the environmental factors against the tuberculin results, we noted that students with one or both parents of foreign origin were more apt to be positive reactors than those whose parents were both born in this country—32.9 and 21.9 per cent respectively.

Viewed from a different angle, but with the same points in mind, we sifted our positive reactors to find that those coming from cities in excess of 2,500 population totalled 62.5 per cent of the group, while among our negative reactors, students from rural areas held the majority (53.6 per cent). Again, among the positive reactors, 81.2 per cent were of entirely American parentage, the percentage among negative reactors being 88.3 per cent. All of which substantiates the well-recognized fact that the more frequent or intimate the exposure to likely sources of infection, the greater the probability of infection.

It must be conceded we are assuming that in an urban center multiple exposures will be the lot of the individual, that in contact with the foreign-born they will be favored. But certainly all studies tend to indicate that the United States compares favorably with Europe and Asia in regard to tuberculosis infection and mortality rates, and that in general rural America contains infinitely less tuberculosis per 100,000 citizens than do our cities. Our present data seem to bear out these suppositions, even though our groups have not been large.

However, when we come to examine the answers received when we questioned students directly as to known actual exposure to tuberculosis, we discover that the average individual in an intelligent group remains blissfully ignorant of such contact.

Significant exposure, therefore, was reported by a remarkably small fraction of our student body, only 5.6 per cent. Nevertheless, we again observed that the knowledge of exposure was to some extent paralleled by the finding of a positive Mantoux, whereas a negative reaction was more apt to occur in those who recalled no exposure. The figures were as follows: Contact with a case of recognized tuberculosis definitely known to negative reactors, 1 in 33 individuals; to all students tested, 1 in 18; to positive reactors, 1 in 7. Even the last and best figure, however, blasts the idea that a history of contact is reliable, easy to secure, or would offer a suitable basis for the selection of persons requiring clinical observation.

X-RAY RESULTS

During the period of detailed analysis, 1938 to 1942, 437 positive reactors were given chest x-rays. Of this number, as shown in Table II, 279 were interpreted as revealing no macroscopically detectable evidence of lesion. These "negative" films represented 63.8 per cent of those examined. The findings in the remaining 158 cases were regarded as indicative of various radiological evidences of pulmonary tuberculosis, viewed in the light of accepted criteria. Doubtful cases were fluoroscoped to determine whether shadows appearing on the films were due to calcified deposits, pleural granularities, and the like. Our final tabulation revealed we had read the films as follows: Roentgenograms thought to show the presence of calcium in the lungs, 123, or 28.1 per cent of all students x-rayed, these being further broken down into 64 individuals with characteristic Ghon's tubercles in the parenchyma and 59 whose visible organized deposits seemed confined to the hilar areas; films thought to reveal purely pleural changes, such as apical caps, localized haze, diaphragmatic irregularities, or obliteration of the normal sulcus, 32 cases, or 7.3 per cent of those filmed; and, finally, those interpreted as compatible with a diagnosis of reinfection tuberculosis in a progressive form, 3 cases, or 0.7 per cent of the entire positive reactor group.

The vast majority of these individuals having remained in college, so that there are anywhere from two annual films to several such studies in the series, we have had opportunity to check on and compare our findings from year to year; we have seldom had to revise previous opinions. If the limitations of radiological appraisal of intrathoracic pathology are kept constantly in mind, it will be apparent that these figures are, at their best, well in keeping with those reported by several other investigators; at their worst, they are probably more reliable than those of studies based solely on x-rays without benefit of prior tuberculin screening. From the experience of other observers, too, we feel that our findings, based on 14 x 17 films, are somewhat more accurate than if small pictures of the fluoroscopic image had been employed, with larger films used only in suspicious cases.

CLINICAL RESULTS

Leaving the special four-year study and returning to a consideration of what the seven-year period of search has actually accomplished in finding early cases of tuberculosis, we are able to report having discovered no less than 7 student cases in a progressive phase of the disease, as well as one young food-handler who, undiagnosed, might have secured employment through which she could have passed her disease on to additional students and fellow workers. This average of 1 case per school year impresses us as ample justification for the program, if not actually sufficient reason for the college's maintaining on its campus a Health Service only one of whose duties is the ferreting out of unsuspected tuberculosis.

In Table III will be found the essential data concerning these 8 cases, so that a separate case history for each is unnecessary. Attention should be directed to the following points:

1. Only 1 of these individuals knew definitely of close contact with "open" tuberculosis. This was the food-handler, and her exposure had occurred eleven years earlier, when her mother had died of tuberculosis. Most of the intervening years had elapsed without medical follow-up, and she had had no x-ray for at least five years. Case No. 2 had worked in a hospital laboratory the summer preceding the October when his Mantoux was first found positive (it had been negative the preceding February). Opportunity for exposure was not lacking in this instance, nor in Case No. 7, a student of American parentage, born and reared in Japan, though the specific contact remained undetermined in both cases. Another boy, Case No. 6, had had occasional contact with a cousin supposedly suffering only from bone tuberculosis. The remaining cases were unable to relate their infection to known exposure.

2. As regards previous history, 4 cases could provide no significant clues; 2 had had previous attacks of pleurisy, one on two occasions, but neither patient had received the benefit of a chest x-ray. One boy, Case No. 5, had a known lesion of minimal extent, under observation at home and under control when admitted to college. We did not discover his lesion, therefore, but did ascertain its reactivation and spread. Another case had been informed that he had "healed childhood tuberculosis," but this was not mentioned on the matriculation medical blank submitted by the family physician, so that the process was found only when we x-rayed his lungs on the basis of his former positive tuberculin reaction.

3. Symptoms, when present at all, were slight in every case. Three patients were symptomless. Two others admitted slight but definite and unusual fatigue; two related their cough, chest discomfort, and general malaise to recent upper respiratory infections. The observation case that broke down and developed cavitation and a systemic reaction during our period of close follow-up thought that his illness had been two rapidly successive attacks of influenza, one at home during the Christmas recess, one in January at college, during which latter illness we determined the true explanation of his toxemia.

4. Two patients came to us with a history of a previously positive Mantoux test; 1 of the others kept her former positive reaction concealed, turning up with a 1+ during our testing; of the remaining 5 cases, 2 were 1+, 1 was 2+ and 1 was 3+ to the first dilution, while 1 showed a 2+ reaction upon receiving the second-strength dose. Dismissal as a supposedly negative reactor following the initial dose would have led to this case being overlooked. In no instance in the past seven years have we encountered a 4+ reaction to tuberculin.

It was possible to record minimal physical findings upon careful examination of the chests of 6 of these 8 people, though in at least 4 it must be emphasized that two competent examiners confess to the fact that the extremely scanty aberrations from normal would have been missed had it not been for directive roentgenological clues. Usually the physical findings consisted of no more than barely noticeable lag or restriction of expansion of the affected apex, occasionally a minor impairment of percussion note, in 2 instances a definite increase in vibra-

TABLE I
Analysis of Four-Year Study of Tuberculin Testing,
Carleton College, 1938-1942

	Men	Women	Total
Students Mantoux-tested	928	935	1,863
Positive reactors	231	206	437
Positives by years	College Year	Number Tested	Per Cent Positive
	1938-39	871	26.5
	1939-40	319 new + old neg.	24.6
	1940-41	339 new + old neg.	22.6
1941-42	334 new + old neg.	22.2	
Origin of students	Region		Number Tested
	Minnesota		769
	Other midwest states		898
	Remainder of U. S.		147
Homes of students	Region		Per Cent Positive
	Cities over 2,500		29.2
Family background	Region		Number Tested
	Suburban or rural areas		929
Family background	Region		Per Cent Positive
	One or both parents foreign-born		32.9
	Region		Number Tested
	Region		Per Cent Positive
Derivation:	Cities over 2,500		Suburban or Rural
	Positive reactors	62.5%	37.5%
Negative reactors	46.4%	53.6%	
Percentage:	Both American-born		One or Both Foreign-born
	Positive reactors	81.2%	18.8%
Negative reactors	88.3%	11.7%	
History of contact:	Definitely Known to Student		
	Among all tested	5.6%	
	Among all negative reactors	3.2%	
	Among all positive reactors	13.7%	

tory phenomena. Unequivocal fine rales after cough were heard in but 3 patients. One of these latter cases also presented a transient friction rub over the involved hilar region. Four cases had no fever; 4 had a daily rise in temperature, none going above 99.8°F. Pulse and respiration rates were virtually unaffected.

5. Laboratory findings included the following: Only 1 case could produce sputum, and this was negative for tubercle bacilli. All the student cases were checked by gastric lavage of the fasting stomach contents. In 2 cases this showed the presence of acid-fast bacilli upon immediate smear, in the remainder not. Guinea-pig inoculation was done in 6 instances, with negative results in 2, definite tubercle development in 2, death of the animal from intercurrent infection in 1, and 1 still incomplete. This portion of the investigation was done for us by the

TABLE II
Four-Year Study of Roentgenograms of Positive Tuberculin Reactors, 1938-1942

	Positive Reactors X-rayed	Interpretation of Films—Predominant Features				
		No Evidence of Pulmonary Tuberculosis	Calcified Deposits		Pleural Changes Only	Progressive Reinfection Type TB
			Ghon's Primary Tubercle	Hilar Nodes Only		
Number	437	279	64	59	32	3
Per Cent	100	63.8	28.1	7.3	0.7	

TABLE III
Data in 8 Cases* of Progressive Reinfection-Type Tuberculosis, 1936-1942

	No. 1	No. 2	No. 3	No. 4	No. 5	No. 6	No. 7	No. 8
Sex	F	M	M	F	M	M	M	F
Age	20	20	18	18	19	18	18	19
Class	Sen.	Jun.	Soph.	Fresh.	Fresh.	Fresh.	Soph.	Employee
Date	1936	1936	1937	1939	1940	1941	1942	1942
Contact known	No	Hospital lab. (?)	No	No	No	Cousin, bone TB	No	Mother died of TB
Past medical history	Pleurisy twice	Pleurisy once	Clear	Clear	Lesion known	"Healed Ch. TB"	Clear	Clear
Symptoms present	Easy fatigue	Slight fatigue	Pain, cough, fatigue	Cough from "cold"	Recent "flu", fatigue	None	None	None
Mantoux results	3+ (1st)	1+ (1st)	1+ (1st)	2+ (2nd)	Prev. pos.	Prev. pos.	2+ (1st)	1+ (1st)
Physical findings:	Found prior to x-ray	No	No	No	Definite	No	No	Suspicious
	Recognizable after x-ray	Definite	With difficulty	Gradually	No	Definite	No	With difficulty
Laboratory findings:	Sputum	None	None	None	Neg.	None	None	None
	Gastric lavage smear	Neg.	Neg.	Neg.	Neg.	Neg.	Plus	None
	Guinea-pig inoc.	Neg.	None	Died (non-TB)	TB	Neg.	TB	None
	Sed. rate (1 hr.)	23 mm.	Normal	Normal	12 mm.	14 mm.	Normal	In progress
	Hgbn (Sahli)	68%	80%	80%	70%	90%	93%	88%
	RBC (million)	3.9	4.5	4.9	4.3	4.9	4.6	4.4
	WBC (thousand)	8.0	6.8	8.3	12.1	9.8	8.5	6.4
	Pmn.	62%	68%	52%	55%	70%	75%	70%
	Lymph.	38%	32%	47%	43%	29%	22%	27%
	Miscel.			1%	2%	1%	3%	3%
	Wass. & Kahn							
	Urinalyses					All negative		
						All normal		
X-ray findings	Left 1stIS Later, Cavit'n Calc. Hilum	Left 1st & 2ndIS Calc. Hilum	Left 2ndIS Ghon Hilar Calc. & Infil'n	Pl. Caps Left 1stIS	Pl. Caps Left & Rt. 1stIS Later, Cavit'n Calc. Hilum	Pl. Cap Left 1stIS Calc. Hilum	Pl. Cap Left 1stIS Calc. Hilum	Left & Rt. 1stIS Cavit'n Left Upper Calc. Hilum

*A ninth case, a foreign student with tuberculous synovitis of the knee, is not included.

Minnesota State Department of Health, Division of Preventable Diseases. The hematological findings are given in Table III and show mild secondary anemia in a few instances, a favorable leukocyte response in all cases, and usually an erythrocyte sedimentation rate that provided little useful information, being normal or very slightly increased.

6. The roentgenographic findings revealed a minimal infiltration in all but 1 case at the initial filming. This case, No. 8, the food-handler, had a bilateral process of moderately advanced proportions. One boy, Case No. 5, had a bilateral involvement, predominantly confined to his left apex. This individual and a girl, Case No. 1, developed cavitation while under observation; the employee presented it when first examined. A curious coincidence is provided by the location of the lesion in the left upper lobe in every one of the 8 cases, with some further involvement of the right upper lobe in 2 of them.

7. All 8 patients have made or are in process of making satisfactory progress. Case No. 1, being a senior, was allowed to finish her course, meanwhile remaining under the constant scrutiny of a noted specialist in chest diseases. In spite of a reduced schedule of studies and what appeared adequate rest, this individual soon showed central excavation in her lesion. This responded favorably to pneumothorax therapy, and the girl completed work for her A.B. degree. The following year, however, demonstrating that her lesion was still capable of causing trouble, an abdominal operation at Rochester, Minnesota, revealed the presence of spread in the form of an acute tuberculous peritonitis. This cleared up, and the patient is now in excellent health, married, and in no way disabled.

Case No. 2 withdrew from college promptly, entered a Minnesota sanatorium, and was soon placed on pneumothorax treatment which was continued for eight months. He returned to college the succeeding year, graduated, entered medical school, and now holds his M.D. degree. Frequent check-ups have shown his lungs to be in good condition.

Case No. 3 could not be induced to consider sanatorium training and care, but rested in bed at home for seven months. He then resumed his studies and is at present in medical school, free from further chest trouble, as proved by frequent re-examinations.

Case No. 4 immediately entered an Iowa sanatorium, remaining there for about one year. She is now a student at a state university and is in good health, as proved by x-ray every three to four months.

Case No. 5 left school to enter a Minnesota sanatorium, was subjected to a successful pneumothorax regimen, and is now enrolled in another college, his health being reported as good but his activities still somewhat limited.

Case No. 6 followed the same course as Case No. 5, remained in another Minnesota sanatorium not quite a year, is still receiving refills periodically, and is attending a state college part-time.

Case No. 7 has barely begun his treatment in a Massachusetts sanatorium at the time this report is being completed.

Case No. 8 is now in her sixth month of care at a Minnesota tuberculosis hospital and doing very well.

COMMENT

In the opinion of the writer the early diagnosis of pulmonary tuberculosis is neither difficult nor costly. In a college or university, made up of undergraduates between the ages of 17 and 23 and graduate students a few years older, failure to make a determined and repeated search for tuberculosis is inexcusable, for this disease is known to be the chief cause of death in this age group.

Where modern methods are followed, gratifying results will be obtained. Every preclinical case of tuberculosis turned up will be to the credit of the institution, to the salvation of the victim, and to the benefit of those who otherwise would be needlessly exposed to infection. The advantages of treating early rather than late cases of tuberculosis are so well recognized today that they need no elaboration. It is enough to emphasize the shorter term of treatment, the more favorable prognosis as to ultimate cure and lasting function, the minimizing of suffering and of spread, the saving of family and taxpayer from multiplied expense.

In anticipation of possible queries whether these early cases might not have healed without any treatment, it should be noted that Cases No. 1, 3, 5, 6, 7, and 8 in this series are known to be examples of breakdown from previously demonstrable lesions, while Cases No. 2 and 4 may well also be, save that the traces of their first infection seem to have been too microscopic or too obscurely situated to cast shadows on a roentgenogram. In view of this circumstance, it seems fair to assume that the predictable course of these 8 cases would have been unfavorable and not benign had nobody succeeded in finding them when they were found, or had their reactivation not been picked up by a system of frequent rechecks.

It is felt that Carleton College, through its tuberculosis case-finding effort, has contributed signally and intelligently to the public health, the public economy, and the public education, and that any college, industry, or other unit can achieve comparable success by adopting and enforcing similar safeguards.

SUMMARY

Seven years of tuberculosis case-finding at Carleton College between 1936 and 1942 are summarized and discussed.

The routine for examining students and employees is outlined; tuberculin-testing results and x-ray findings are analyzed.

History of contact with tuberculosis is revealed as inaccurate and unreliable in a search for new cases.

Ordinary methods of physical examination, short of chest x-ray, are shown to be insufficient to diagnose the majority of cases of preclinical tuberculosis.

The findings and the satisfactory courses of 8 cases of progressive reinfection-type tuberculosis discovered by the program are presented.

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An Analysis of 149 Tuberculosis Deaths During 1940-41

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St. Paul, Minnesota

TUBERCULOSIS deaths are to be expected as a normal sequence of tuberculosis disease. Yet, paradoxical as it may seem, it has been our observation that deaths due to tuberculosis are usually incidental or accidental. Tuberculosis, except in certain forms of the invasion of the tubercle bacillus such as miliary, meningitis, and bilateral renal infection, is in itself not usually a killing disease.

An analysis of our group of cases ending in death would indicate that there is much left to be done in order to postpone if not to alleviate the conditions leading up to death in these patients. Both the chronicity of tuberculosis and its tendency to fibrose, calcify, and reactivate are common among those who have eventually died of this cause. Yet it would appear that the presence of the tubercle bacillus and its tissue reactions are often no more than a paralleling coincidence to the determining cause of death. Had therapeutic procedures been applied when indicated much good might have been accomplished. It is evident from the study of our cases that the prognosis becomes more serious with the delay in beginning treatment. Many of our patients who could not be benefited by the application of known therapeutic measures were those who, following a long prodromal period without recognition, finally were found with extensive pathology. The remaining group with few exceptions constitute a residue of therapeutic and surgical failures which, if treated at an earlier date, would have yielded more satisfactory results.

There were 149 fatalities at the Minnesota State Sanatorium during 1940-41 out of a total of 926 patients cared for in the hospital; of this group 113 were admitted to sanatorium care for the first time, while 36 gave histories of previous admissions. The fatalities can be divided into four groups:

1. Tuberculosis deaths due primarily to pulmonary tuberculosis, 57 cases.
2. Pulmonary tuberculosis in which death was chiefly due to nonpulmonary tuberculosis, 57 cases.
3. Nontuberculous cause of death in patients with chronic tuberculosis, 26 cases.
4. Tuberculosis deaths secondary to childbirth, 9 cases.

There were four deaths in the hospital that are not included in this study. These patients were admitted but a short time before death and were found to be non-tuberculous.

Quite generally, regardless of the grouping, there is a history of a variable prodromal period. The patient is frequently conscious of this change in his sense of well-being for a period of weeks or months before presenting himself to his physician. At times, too, the prodromals may be so obscure that the physician is not able to arrive at a satisfactory diagnosis except through the

*Chief, Tuberculosis Control Unit, Minnesota Division of Institutions.

aid of the skin reaction to tuberculin and the chest roentgenogram.

In our experience the earlier in the prodromal period that clinical investigation is made, the earlier the diagnosis is arrived at and treatment begun. It would seem from our observations that this so-called prodromal period does not constitute a true prodromal period but rather a preclinical phase of tuberculosis, and that active clinical tuberculosis disease as such begins much earlier than has been thought. The "prodromal period" must extend much farther back in the case history to cover the period from establishment of allergy to the beginning of signs now identified as prodromal.

A satisfactory history of a prodromal period was obtained in 70 of our cases. The data would indicate that many of our patients had actually been carrying on their usual family, social, and industrial responsibilities while suffering with active tuberculosis for months or intermittently for years, a period which we must now identify as prodromal.

GROUP I

This group includes 57 cases in which progressive pulmonary tuberculosis was the cause of death. Fifty-six of these were admitted as Stage III cases, 52 of them showing evidence of cavitation. Six were preterminal at the time of admission. Collapse therapy was attempted in 33 cases, and was to some degree successful in 14; while in 24 no attempt at collapse therapy was made. Deaths occurring in this group must be credited to pulmonary tuberculosis because of the advanced stage of the disease on admission. Much might have been done to convert a case with a questionable prognosis into a cure if therapy had been given when indicated.

TABLE I
Duration of Prodromals in 32 Cases of the 56 Admitted as Stage III

Age	Duration of Prodromal
15-19	2 mo., 3 mo., 3 mo., 8 mo.
20-24	3 wk.
25-29	1 mo.
30-34	4 mo., 6 mo., 1 yr.
35-39	2 mo., 4 mo., 6 mo., 1 yr., 2 yr., 2 yr., 4 yr.
40-49	4 mo., 1 yr., 2 yr., 4 yr., 10 yr.
50-59	3 mo., 1 yr., 1 yr., 4 yr., 5 yr., 8 yr., 10 yr.
60-69	10 mo., 1 yr., 2 yr.
70 and over	1 yr.

The prodromal period seems to be somewhat longer in the older age groups (see Table I). To a large extent this can be explained by the closer check-up among younger people. Eight months is the longest reported prodromal period up to the age of 29; from this time on the period lengthens, so that among the older patients prodromals are often recalled in terms of years rather than months.

The number of cases showing a long period of symptoms leading up to the final diagnosis partially explains the increase in tuberculosis deaths among the aged. This no doubt is because we are looking for the disease in the aged more often than we formerly did, rather than be-

cause tuberculosis is now attacking this age group oftener than in former years. The fact that in the past this age group frequently concealed carriers who exposed and infected younger members of the family gave credence for generations to the idea that consumption was an hereditary disease.

The prodromal period at one time extended up to the consumptive state; now we frequently observe it extending into the clinical course of the disease to the point of cavity formation.

GROUP II

In our study there were 57 deaths actually caused by tuberculosis involving parts of the body other than the lungs. Of these 25 gave a history of a prodromal period prior to breakdown. Thirteen of these were under 35 years of age, while 12 were 50 years or over (see Table II).

TABLE II
Deaths Due to Tuberculosis Disease Other Than of the Lungs

Age	Duration of Prodromal
15-19	2 mo., 5 mo., 6 mo., 6 mo., 10 mo.
20-25	1 mo., 2 mo., 8 mo., 5 yr.
30-34	1 yr., 3 yr., 2 mo., 1 yr.
50-59	6 mo., 1 yr., 2 yr., 1 yr., 1 yr., 2 yr.
60-80	1 mo., 6 mo., 3 yr., 1 yr., 1 yr., 5 yr.

These pulmonary and nonpulmonary forms of tuberculosis were advanced when first presenting themselves for treatment. There were 40 cases classed as Stage III, 36 of whom showed evidence of cavity formation when admitted. Some form of collapse therapy was attempted in 24 of these cases. Twenty-seven suffered from laryngitis or enteritis. These complications presented many difficult problems of treatment, coming as they did late in the course of the disease.

GROUP III

This group includes those who were ill with pulmonary tuberculosis but who died from a nontuberculous disease. There were 26 deaths falling in this classification, 23 of whom were in Stage III on admission. Seventeen showed evidence of cavity formation when admitted. Collapse therapy was attempted in 13 of these cases, 4 of whom recovered following thoracoplasty and suffered cardiac deaths. These cases, too, had progressed beyond the point where therapy might hold out promise of permanent relief.

Three patients had had previous sanatorium care with later reactivation. One patient had been hospitalized since 1918. He had succeeded in gaining a negative sputum status which he maintained for two years prior to death. The second patient with reactivation tuberculosis left the sanatorium in 1932 and was employed steadily until readmitted with pneumomycosis. The third patient who reactivated left the sanatorium in July, 1936, and was readmitted in August, 1939. Prodromal periods in the cases of Group III were usually longer than in Groups I and II.

TABLE III
Nontuberculous Cause of Death in Cases with Chronic Tuberculosis

Age	Duration of Prodromal
30-34	1 yr.
40-44	1 yr.
50-54	1 yr., 1 yr., 1 yr., 2 yr.
55-59	1 yr., 2 yr., 4 yr.
60-64	2 mo., 1 yr., 5 yr.
70-74	2 yr.

GROUP IV

Deaths in this group occurred among young mothers, aged 20 to 27, whose histories showed a close relationship between childbirth and tuberculosis. More careful history-taking during the prenatal period as well as at the time of confinement would have indicated the need for a Mantoux test and roentgenogram of the chest in each of these young mothers. In order that an early diagnosis can be made in these cases it is well to bear in mind that the more obvious symptoms are frequently the ones that, being overlooked, permit the disease to become too extensive for our present therapy to influence.

There were 9 deaths in young women 20 to 27 years of age in which the development of tuberculosis was closely associated with childbirth. Thus of the 17 deaths among young women of this age group in our series, over half of them associated their breakdown from tuberculosis with pregnancy and childbirth.

OTHER DATA

The 4 nontuberculous deaths were all among patients who were very ill on admission and died soon after. The deaths were due to lung abscess, to perforation of an incarcerated bowel in diaphragmatic hernia, to carcinoma of the stomach, and to pneumonia.

The successful use of any therapeutic agent in the treatment of tuberculosis depends upon the stage in the development of the disease that diagnosis is made and treatment started. Deaths among the 113 patients admitted to the sanatorium for the first time showed the following conditions to be contributing factors:

Addison's disease	2	Empyema	1
Arteriosclerosis	2	Laryngitis	14
Cerebral hemorrhage	3	Laryngitis	7
Cardiorenal	5	Meningitis	5
Carcinoma	1	Miliary	1
Childbirth	9	Silicosis	1
Coronary disease	2	Spontaneous pneumothorax	4
Diabetes	4	Terminal on admission	12

Many of these cases when first admitted had already passed beyond help other than symptomatic or domiciliary care. We are still unable to apply adequate therapy at the time the disease is usually found.

The incidence of enteritis and laryngitis among our patients was an important factor in the number of fatal terminations. Of the 149 cases, enteritis developing before the patient passed into a terminal state was reported in 21, with laryngitis in 15, the two conditions being combined in 13. These complications all occurred in far-advanced cases of pulmonary disease. Frequently the laryngitis and less often the enteritis was the chief complaint, and remained the most distressing condition during the patient's illness. When both laryngitis and enteritis developed in the same patient it was usually late in the terminal stage. There was seldom cessation in severity of symptoms once the lesions became established.

CONCLUSIONS

1. During much of the prodromal period the patient should be under treatment.
2. By the time most patients present themselves for treatment, they have passed beyond the care of the clinician to that of the surgeon.
3. Many deaths from tuberculosis might have been avoided if it had been possible to have the patient under control at the time treatment was indicated.

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DIAGNOSIS OF TUBERCULOSIS

The diagnosis of tuberculosis has passed through important evolutionary stages since the time of the ancient physicians. The examinations made by Hippocrates and those who followed for many centuries were limited largely to naked eye inspection. Certain symptoms and signs were observed, such as emaciation; hence the names *phthisis* and *consumption*. Thus, this disease was usually diagnosed after it had reached the terminal stage.

Auenbrugger in 1761 introduced immediate percussion but it was little used until 1809 when Corvisart (Napoleon's private physician) called attention to its value in diagnosis.

When Laennec invented the stethoscope in 1816 sounds from within the chest were first distinctly heard by the human ear. Laennec carefully described auscultatory signs and often had an opportunity to interpret them at the postmortem table. Thus, the stethoscope became a valuable instrument in diagnosing the presence of disease.

With the invention of the compound microscope by the Janssens in 1590 physicians were provided with a most valuable instrument. However, it furnished no aid in the diagnosis of tuberculosis in the living body until 1882, when Koch announced the discovery of the tubercle bacillus. This was the first time in the entire history of medicine that the physician had a reasonably accurate procedure in differential diagnosis. Many conditions then and now cause the human body to enter into a consumptive state. The symptoms are almost identical for several diseases of the lungs; no symptom is pathognomonic. This is also true of physical signs. The finding of tubercle bacilli was the only specific information that could be obtained with reference to tuberculosis. Koch's discovery was hailed with glowing enthusiasm because it was believed that in every case of tuberculosis the physician would be able to detect the presence of tubercle bacilli in the secretions or excretions. Time and experience dampened the ardor, however, when it was learned that tubercle bacilli do not appear in the sputum

of most patients until the disease is moderately or far advanced. Moreover, by the time they are found with the microscope, the disease is contagious and may have spread to others.

Further difficulty in microscopic interpretation arose when bacteriologists discovered numerous acid-fast saphrophytes which have the same appearance as tubercle bacilli under the microscope. Thus, animal inoculation became an important diagnostic procedure: First, to determine whether tubercle bacilli were present when the microscope did not reveal them in certain materials; second, whether acid-fast bacilli were pathogenic. When tuberculosis was suspected, and there was no expectoration, a number of methods was devised for producing sputum, such as gagging the patient and the administration of large doses of potassium iodide. Later the examination of gastric washings was found valuable.

The most important step of all time in diagnosis was taken in 1890 when Koch made tuberculin available. The tuberculin test is highly specific for tuberculosis. If an individual does not react to this test, the physician has the satisfaction of knowing that tubercle bacilli are not present unless they have entered within the past few weeks or the disease is in an extremely acute or terminal stage. On the other hand, when the individual reacts to tuberculin the physician knows that living tubercle bacilli are present in the body in lesions which may vary from microscopic to gross proportions. The tuberculin reaction indicates that the individual already has tuberculosis but whether clinical lesions are present or subsequently develop must be determined by other phases of examination.

When Roentgen presented his discovery of a new light ray in 1896, there was so much mystery associated with it that exaggerated predictions were made concerning its future value in diagnosis. This was also hailed with fervor, which was partially justified, as far as the detection of areas of disease in the lung were concerned, but the enthusiasm was restrained when it was realized that inspection of an x-ray film fails to reveal lesions below the range of vision of the unaided eye, that only 75 per cent of the lung is visualized on the ordinary x-ray film, that shadows of disease are not specific findings, and that extensive extrathoracic tuberculosis may be present while the chest appears clear. The etiological diagnosis of any disease can not be determined with certainty by the shadow it casts on the x-ray film.

The bronchoscope, introduced by Killian in 1898, has become an extremely important instrument in differential diagnosis. Through the bronchoscope, material may be obtained for microscopic inspection and, thus, tuberculosis and other diseases are frequently diagnosed accurately when all other phases of examination are of no avail.

Thus, the physician is limited to two medical findings that are specific; namely, the tuberculin reaction and the recovery of tubercle bacilli. In the absence of one or both of them, there is no reason to diagnose tuberculosis, regardless of symptoms, physical signs, and x-ray shadows. The medical profession has erred seriously in recent years by conducting surveys which are limited only to

the tuberculin test and x-ray film inspection of the chest. Indeed, these two procedures are only screens for the purpose of selecting those persons who are in need of adequate medical examination.

By complete examination, beginning with the tuberculin test, inspecting x-ray films of the chests of the reactors, and completely examining by clinical and laboratory procedures (as well as periodic x-ray film inspections) the physician can now diagnose nearly all chronic pulmonary tuberculous lesions long before they cause illness and usually before they are contagious. When found in this early stage, the majority of cases can be treated successfully and the disease is prevented from perpetuating itself.

J. A. M.

TUBERCULOCHEMOTHERAPY

Modern chemotherapy dates from 1909, when Ehrlich's studies culminated in the epochal discovery of arsphenamine. The spectacular benefits issuing from Ehrlich's researches were responsible for the expectation that most, if not all, infectious diseases would quickly, or eventually, be brought under control or subdued by specific chemical agents. These hopes have remained far short of realization. An outstanding example of a disease that has remained stubbornly resistant to chemical agents is tuberculosis. Although innumerable drugs have been tried for experimental tuberculosis, by many investigators since the time of Koch, the results until recently have failed to supply sufficient promise to warrant enthusiasm for chemotherapy as a future weapon for combating the disease. With the advent of the more recent era of chemotherapy ushered in by prontosil in 1935, new impetus was furnished for renewal of the attack on this important problem.

The wide use and relative effectiveness of sulfonamide compounds, such as sulfanilamide, sulfapyridine, sulfathiazole and sulfadiazine, for certain acute infections justified trial of these agents for combating experimental tuberculosis. The results have been generally disappointing. While the experimental form of the disease can to some extent be influenced favorably by the sulfonamide compounds, none of these drugs is sufficiently efficacious to satisfy the exacting criteria demanded for a successful tuberculochemotherapeutic agent. None of the known sulfonamide drugs actually will arrest the progress of experimental tuberculosis in guinea-pigs.

With another group of chemicals known as "sulfones," the results have been definitely more encouraging.¹ Experimental evidence now available indicates that several drugs having a diphenyl-sulfone nucleus are capable of strikingly favorable effects in tuberculosis of guinea-pigs. Most of the sulfones tried have been derivatives of 4,4'-diaminodiphenylsulfone. The parent compound has a high tuberculochemotherapeutic efficacy but its potential toxicity limits its clinical application. The data accumulated during the past three years reveal that tuberculosis in the highly susceptible guinea-pig can be successfully arrested by several drugs of the sulfone series. This has been demonstrated repeatedly, even when treatment has been delayed until six weeks after

the animals had been infected, and the drug has been administered daily thereafter by the oral route.

At present the problem of chemotherapy in experimental tuberculosis has been narrowed to a specific group of compounds that appear to offer the most likely possibilities of being satisfactory agents. It is not an overstatement to say that more encouraging results have been obtained in solution of this problem during the past five years than during the previous fifty. The prospect for future gain seems impressive.

Experimentalists have established evidence that the tubercle bacillus must be added to the growing list of organisms which are vulnerable to chemotherapeutic attack. However, it remains to be proved that tuberculosis of man can be added to the list of diseases which can be cured by chemotherapy. Experience with the acute streptococcal and pneumococcal diseases cannot be strictly applied to such a problem, except that in such diseases chemotherapy appears to arrest the multiplication of organisms and to permit natural defenses to correct the damage inflicted on the host. When treatment in these diseases is delayed long enough to permit extensive destruction of tissue, the response to chemical treatment is not likely to be spectacular. Early pneumonia is rapidly cured but late pneumonia may or may not be benefited; postpneumonic empyema or pulmonary abscesses are not likely to respond at all; although in all instances the infecting organism may be the same. If this analogy holds in the case of tuberculosis, much more definite response to treatment should be anticipated when lesions are in earlier rather than later stages of development. Present experience suggests that this may be true in fact.

The most convincing evidence for tuberculo-therapeutic effect would be afforded if it were possible to cure clinical tuberculosis in some of its irreversible forms, such as tuberculous meningitis, miliary tuberculosis or terminal stages of pulmonary tuberculosis; yet it may be as illogical to anticipate this result as to expect arsphenamine to cure neurosyphilis or sulfonamides to cure lung abscesses.

It will probably require great patience, rare judgment and long experience to define what role chemotherapy may play in the treatment of clinical tuberculosis. As progress continues an unprejudiced point of view should be maintained. Skepticism but not cynicism should be the attitude, with judgment based squarely on evidence. Until abundant and convincing evidence of safety and efficacy is available no drug should be released for commercial exploitation. In the meantime, Federal regulations restrict distribution of these drugs to a few research centers. The following statement by the late Dr. Paul Lewis² deserves repetition and emphasis: "Certainly it will be a most unfortunate thing for the progress of tuberculosis research if every substance showing interesting properties in the laboratory is immediately rushed to

the clinic regardless of consequences. In this situation patience is to be taken more than usually as an evidence of virtue."

W. H. FELDMAN

H. C. HINSHAW

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THE WARRENS OF BOSTON

There used to be an old building on the Harvard campus in Cambridge, Massachusetts, a trifle larger to be sure but otherwise very much like the red schoolhouse that every country boy is familiar with. It had housed the medical school in years gone by and was familiarly spoken of as the Anatomy Building. It was here that Dr. John Warren was teaching in 1776 when the news came that his brother, Dr. Joseph Warren, a major-general of the line, had been killed at the battle of Bunker Hill. Dr. John, without ado, hastened out of the hall, shouldered a musket and joined the troops. There were two sons, both of whom became physicians. One, Dr. John Collins Warren, graduated from Harvard in 1797. He was one of the founders of the Massachusetts General Hospital and its chief surgeon the remainder of his life. He performed the first public operation in which ether was used as an anesthetic in October, 1846. The elder Dr. Reginald Fitz chose up to the very last to give his medical clinics in the same rickety old amphitheater where that epoch-making event had taken place. Dr. Fitz used to enliven his clinics by correcting errors of syntax in responses from his senior students, for although this was holy ground, was it not also cultured Boston?

Another Dr. John Collins Warren was born in Concord May 4, 1842, and died November 11, 1927. Many now living will remember this charming gentleman who graduated from Harvard in 1866 and served as professor of surgery until he reached the established age of retirement in 1907. He felt this inexorable rule very keenly, and mournfully expressed his regrets to the single visitor who attended his last operation while serving under that title at the Massachusetts General Hospital. It was an amputation of the breast for malignancy. He left the final closure to his assistants and graciously came over to one side of the room to visit. There was some rivalry at that time between Halsted of Johns Hopkins and Warren of Boston in this particular; each had developed a distinct technic in radical amputation of the breast, and Warren was naturally enthusiastic in explaining his method to others. There was no word of resentment, no sign of discouragement, but what the heart is full of the mouth speaketh, and so he expressed in simple language the opinion that he was now at his best. He probably was; no one could deny him that opinion. The visitor shook hands with a brave man but sensed a note of sadness in the parting. He lived twenty years after that.

A. E. H.

News Items

Dr. R. C. Sherwood, St. Paul, food chemist, has been named by Dr. Russell M. Wilder, Rochester, Minnesota, as his assistant chief in the civilian food requirements branch of the food distribution administration at the department of agriculture in Washington.

Dr. R. F. Peterson, pathologist at Murray hospital, Butte, Montana, is the first physician from that state to be elected to the board of directors of the American Society for the Control of Cancer. His election took place at the annual meeting held in New York the first week in March.

Lt. I. L. Schuchardt, M.C., former Aberdeen, South Dakota doctor has returned to this country from New Guinea where he has been serving with the army.

Dr. R. T. Edward, Elysian, Minnesota is terminating his residence there after nearly thirty years of practice, to make his home with his sister at Bigfork, Montana.

Dr. A. W. Paulson, Dell Rapids, South Dakota, has been promoted to Lieutenant Colonel at Lubbock, Texas, where he is in command of the hospital of South Plains army flying school. This is his second promotion since his transfer to Lubbock from Randolph Field.

Dr. E. L. Tuohy, Duluth, introduced Dr. William O'Brien, director of postgraduate education at University of Minnesota on the occasion of the latter's public address "Recent Advances in Medicine" given March 8th. Dr. O'Brien urged Duluthians to support the anti-tuberculosis campaign, the cancer drive, the blood donor movement and health activities in general.

The Montana state legislature, in session at Helena, by action of a joint investigating committee, recommended the appointment of more trained doctors and the addition of needed equipment for the state hospital at Warm Springs. The report characterized the institution as understaffed. It asserted that psychiatric treatments should be stressed.

Dr. Irving Mauss, formerly of Hot Springs, South Dakota, has succeeded to the United States Health Department post at Rapid City left vacant by the transfer of Dr. F. H. Redewill to Sioux Falls, the latter city now rating fulltime health service because of the heavy influx of soldiers to the air base two miles outside the city.

Dr. Paul Bunker, president of Aberdeen District Number 1 Medical Society presided at the first Spring meeting of the district society in the Alonzo Ward hotel, at Aberdeen, South Dakota. The meeting was addressed by Dr. Paul Dwan, Minneapolis, head of the University of Minnesota human serum laboratories and technical supervisor of the blood donor centers of Minneapolis and St. Paul. Dr. Dwan explained the blood plasma program and illustrated his discourse with motion pictures.

Dr. Mario Fischer, Duluth city health officer and county welfare medical advisor, has filed a report with the St. Louis county board of commissioners on preliminary steps taken by health agency leaders toward the establishment of a semi-official health organization for the purpose of coordinating anti-tuberculosis activities in St. Louis county. This will be known as the "Advisory Committee of Tuberculosis" and Dr. Fischer will act as chairman. The committee will present a ten-year plan for the county which has one of the highest tuberculosis death rates in the state.

Dr. Herbert T. Caraway, Billings, Montana, has been named by Governor Ford to be chairman of the Montana war health committee, established in February. Also appointed were Drs. Wm. F. Cogswell, Helena, secretary of the state board of health and Ernest D. Hitchcock, Great Falls, president of the State Medical Association, as well as Maj. Chas. F. Jump, Helena, medical officer of the state draft board and the secretary of the state dental association. The committee was created at the suggestion of the war man-power commission.

Dr. Reuben H. Waldschmidt, president of the Sixth District Medical association of North Dakota, presided at the monthly meeting of the association held March 2 in the Grand Pacific Hotel, Bismarck. Papers delivered were "Treatment of Acute Respiratory Diseases of the Child," Dr. Edmund Vinje, Beulah; "Summary of Tropical Diseases," Dr. Alton C. Grorud, Bismarck; "Relation of the Physician to the Selective Service," Dr. Arthur C. Fortney, Fraire Barracks, state selective service medical officer; and "Relation of the Physician to the Procurement and Assignment Services of the Army and Navy," Dr. L. W. Larson, Bismarck, secretary of North Dakota Medical association. Program chairman was Dr. Carl Baumgartner, Bismarck.

Dr. W. F. Cogswell, Helena, Montana, was authorized by the state board of examiners to attend the 41st annual meeting of the United States public health service in Washington, D. C., March 24 and 25.

Dr. Douglas L. Jacobs, Willmar, Minnesota, has been commissioned a Lieutenant (Senior grade) in the United States Navy Reserve and ordered to report to aviation headquarters of the Navy at its San Diego California base.

Lieutenant Lynn M. Hammerstad, Minneapolis, flight surgeon attached to the naval aviation cadet selection board of that city, has been ordered to duty in the western Pacific war theater.

Dr. F. M. Knierim, Glasgow, Montana, who practised in eye, ear, nose and throat ailments at Lewistown prior to removing to Glasgow in 1934, has been commissioned a lieutenant commander in the Navy and has gone to headquarters of the Thirteenth naval district at Seattle, Washington, for assignment.

First Lieutenant T. G. Wellman, M.C., Lake City, Minnesota, the fourth doctor to have left the Lake Pepin community for service with the Armed Forces, is now stationed with the medical corps of the Army Air Corps at Miami Beach, Florida.

The annual meeting of the Montana State Medical Association will be held in Billings July 7th and 8th.

Dr. E. C. Person, Roundup, Montana, has been detached from the battleship Idaho, on which he served nearly two years and has been assigned to graduate work in reconstruction surgery at the Mayo clinic, Rochester, Minnesota.

Dr. Gordon C. MacRae, Duluth, has been promoted from major to lieutenant colonel, according to word received from Camp White, Oregon, where Lt. Col. MacRae is serving with the 81st General Hospital unit.

Dr. Reinhard Schmidtke, Montevideo, Minnesota, has been appointed assistant to Dr. Frank Burch, St. Paul, mainly at Miller Hospital and at the Wilder Dispensary. Dr. Edw. Burch is serving with the Armed Forces.

Dr. Herbert A. Burns, Minneapolis, who resigned last fall as superintendent of Ah-Gwah-Ching sanatorium to head a tuberculosis survey of state hospitals, under the direction of the division of state institutions, is about to disclose the findings of the work which has been in progress five months. It is expected that it will point toward obtaining legislation to shelter tuberculosis patients among the insane, feeble-minded, epileptic and inebriate groups in state hospitals. Treatment of such patients in their present situation is limited; their death rate is higher than from the disease in other elements of the state population: they constitute a health hazard when released to return to their homes.

Mrs. I. H. Mauss, Rapid City, South Dakota, wife of the public health officer of Pennington county, has been conducting a pinworm survey among school students in Fall River and Custer counties. 400 students were examined, all with parental consent. The results are expected to be released for publication very shortly.

The Montana Academy of Oto-ophthalmology met in Butte on Feb. 21-22 at its 40th semi-annual meeting. A scientific program was presented and at the business meeting, the officers elected for 1943 were: President, Dr. Wm. Morrison, Billings; secretary-treasurer, Dr. F. D. Hurd of Great Falls.

Neurology

Dr. Henry Lombert Knight, 81, of San Pedro, California, former staff member of Eitel hospital Minneapolis for ten years and later Mower county physician, died February 2 of carcinoma of the hip. Dr. Knight was graduated from Rush Medical College in 1884, spent two years each in two study periods in Berlin and Vienna and practised in Minneapolis from 1906 to 1928.

Dr. Andrew Clark, 78, of Billings, Montana, died March 7th at a Billings hospital of a heart ailment. His wife, also a doctor, died in 1934.

Dr. H. F. Bright, 65, of Elk Point, South Dakota, died March 22. He had practised 44 years at Blunt, White Lake, Mitchell, Alcester and Elk Point.

Dr. Arter Wayne Deal, 60, of Lewistown, Montana, died March 13 at Lewistown following nearly fifteen years of failing health. Dr. Deal was a graduate of the college of physicians and surgeons of the University of Maryland and for four years prior to 1907 was chief resident physician of Mercy Hospital in Baltimore. He served from 1907 to 1911 as superintendent of Montana state hospital at Warm Springs after which he resided in Lewistown and practiced there until his retirement some years ago. Dr. Deal was appointed surgeon for the Great Northern Railway in 1917, was made chief of staff of St. Joseph's hospital, Lewistown, in 1919, member of the Montana state board of medical examiners in 1920 and, in 1925, became president of that board.

Dr. Francis Gustave Lagerstrom, 67, of Minneapolis, died March 13 at Minneapolis. He was born in Sweden, graduated from Kansas medical college, Topeka, and practised at Lindstrom, Minnesota for seven years before coming to Minneapolis where, for the past twenty-five years he has been a physician and surgeon.

Dr. Chas. Frederick McComb, 85, of Duluth, eight times elected coroner of St. Louis county, died at his home March 13. He had been a Duluth resident and physician for sixty years.

Dr. Thos. J. O'Leary, 61, of Superior, Wisconsin, died February 26 after he had been stricken by a heart attack the night before. Dr. O'Leary was a native of Wabasha, Minnesota, whence he removed to Superior in 1906. At the time of his death he was serving as councillor of the Wisconsin State Medical society.

Dr. Otoniel Trejos Flores, 54, of Dodge Center, Minnesota, died March 6 at St. Mary's hospital, Rochester, where he had been a patient for three weeks. Born in Heredia, Costa Rica, Dr. Flores came to the United States 35 years ago and enjoyed a fellowship at the Mayo clinic for three years before practicing.

IMMEDIATE COMMISSIONS OPEN TO 200 MEDICAL TECHNICIANS

It was announced recently at the headquarters of Major Gen. Kenyon A. Joyce, commanding general of the Ninth Service Command at Fort Douglas, Utah that first-lieutenancies will be granted to medical technicians able to meet special requirements. Parasitologists with four years of clinical practice or an equivalent in graduate study and who are particularly qualified for studies involving malaria and other tropical diseases are sought. Unless unusually qualified the maximum age limit is 48.

Biochemists, also, able to make chemical analyses of body fluids and to identify poisons of various types of origins though those examinations will be accepted between the ages of 35 and 55; excepting that nutritional specialists in biochemistry are not invited. The call is specifically for Montanans and Idahoans in this area and applications are to be submitted to the field office of the Salt Lake City Officer Procurement District, 449 Federal Building, Salt Lake City, Utah.

NORTH DAKOTA
STATE MEDICAL ASSOCIATION

Fifty-Sixth Annual Session
May 9, 10, 11, 1943
Bismarck, North Dakota

Sunday, May 9th:

First Meeting of the House of Delegates, 8 P. M.

Monday, May 10th:

Second Meeting of the House of Delegates, morning.

Beginning of Scientific Program, 1 P. M.

Buffet supper through courtesy of the commercial exhibitors, 5:30 to 8 P. M.

Scientific Program, 8 to 10 P. M.

Tuesday, May 11th:

Scientific Program: morning.

Round Table luncheon meetings: noon.

The meeting will close at the conclusion of round table meetings in time for those who travel by rail to catch late afternoon train.

In addition to several papers to be given by North Dakota physicians, the out-of-state guest speakers will include Dr. W. L. Benedict of Rochester, Dr. W. M. Spink of the University of Minnesota, Dr. L. G. Rigler of the University of Minnesota, Dr. P. K. Arzt from St. Paul, Dr. W. T. Peyton from the University of Minnesota, and Dr. Bryng Bryngelson, (Ph.D.), University of Minnesota.

Several interesting motion pictures will be shown during the day and a half Scientific Session.

Book Reviews

The Answer Is . . . Your Nerves, by ARNOLD S. JACKSON, M.D.; Madison, Wisconsin: Jackson Publications; 200 pages. Price \$2.

This little book is a chatty discourse principally on the subject of the neuroses. The point of view is that of the busy practitioner who is attempting to explain to his patient in simple terms the origin, symptoms, and management of the neuroses. Addressed as it is to the layman, it tends to emphasize the brighter side of the situation and to avoid much mention of the diagnostic pitfalls which plague the medical man over and over in dealing with these cases.

For the most part a psychiatrist would not quarrel with the statements made though a few passages strike one as poorly considered; for example: "Surely a visit to a hospital with incurable diseases such as cancer or advanced tuberculosis would help to cure melancholia and self pity." (page 150). It might also increase a melancholia and generate a whole new train of hypochondriacal symptoms.

The following excerpt regarding shattered nerves hardly fits in with modern neurologic and psychiatric concepts: "Why do people seek operations unnecessarily? It is not an easy question to answer, but usually it is because they wish to escape from some distressing condition. They feel abused; they crave sympathy; they enjoy attention; their nerves are shattered . . ." (page 36).

The book is interestingly written and is illustrated by some amusing drawings of cartoon type. It may well have a certain amount of utility as reading matter for patients but the physician who recommends it should prepare himself for discussion

with his patient on some of the mechanisms touched upon and only superficially clarified.

Clinical Immunology, Biotherapy and Chemotherapy in the Diagnosis, Prevention and Treatment of Disease, by JOHN A. KOLMER, M.S., M.D., Ph.D., Sc.D., L.L.D., F.A.C.P., and LOUIS TUFT, M.D.; Philadelphia: W. B. Saunders Company, 941 pages, 6x9 $\frac{1}{4}$, Illustrated, 1941, Price, \$10.

This is not a laboratory book but a complete compendium of all important diseases responsive to biotherapy or chemotherapy with full descriptions of the prophylactic and immunologic methods applicable thereto, specific advice on the employment of sera, vaccines, and antitoxins (including prevention and handling of reactions) and detailed instructions, including exact dosage, on the use of the four sulfa drugs. Described in full are the technics of the tests that a physician may be called on to perform, together with instructions on how to interpret findings of tests essential in diagnosis and treatment. Blood transfusion and blood storage are dealt with extensively. The book is substantially a clinical discussion, pared to the bone and unimpeded by theory. It is the essence of practise and, as such, becomes an "assistant" to the practitioner.

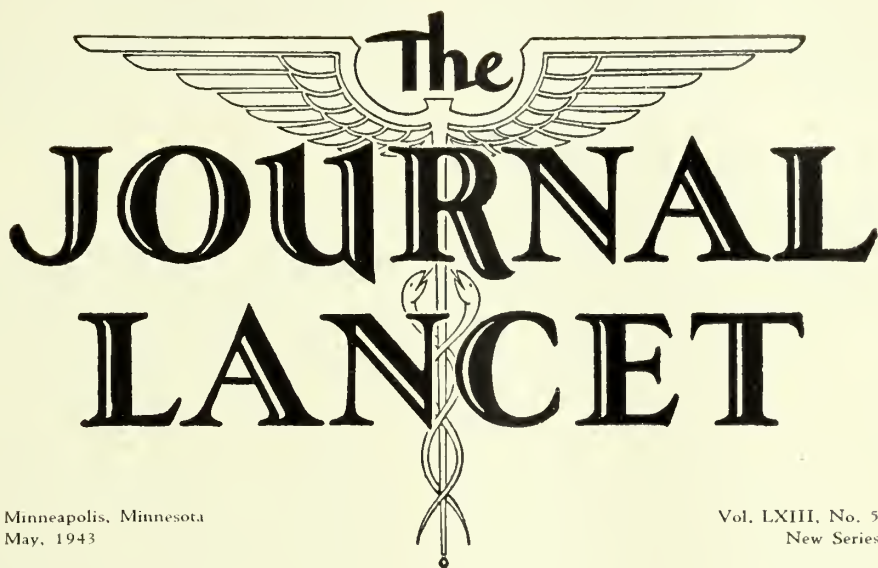
The plan of the book is to state the general aspects of infection and immunity, biotherapy and chemotherapy; then to take up the various diseases and conditions, symptomatology and indications; to follow with the several methods of treatment that have been proved successful, informing when and why each was indicated. The quick-reference summary at the end of each chapter highlights each disease, and is presented graphically in the form of boxed tables. There is a practical table of end-results, as well.

Volume Number I, Military Surgical Manual of Standard Practise of Plastic and Maxillofacial Surgery; prepared and edited by ROBT. H. IVY, (Chrm.), JNO. STAIGE DAVIS, JOS. D. EBY, P. C. LOWERY, FERRIS SMITH, Brig. Gen. LEIGH C. FAIRBANK, Medical Department, U. S. Army, Lt. Col. ROY A. STOUT, Dental Corps, U. S. Army, and contributed to by JNO. SCUDDER and FREDK. P. HAUGEN; Philadelphia: W. B. Saunders Company, 432 pages, 259 figures containing 899 illustrations, 1942, Price, \$5.

Each subject is covered from immediate care and management on the field to the last surgical service performed in the hospital, describing each technic, step by step and elucidating by means of the illustrations, which constitute one of the chief features of the book. The contents are divided into four sections: Reconstructive Surgery, Maxillary Surgery, Maxillofacial Prosthesis and Anesthetic Technics. Typical is the first of these divisions. Beginning with general considerations it involves condensed discussions of important procedures, cheiloplasty, meloplasty, rhinoplasty, blepharoplasty, otoplasty, defects of scalp and cranium, cervicoplasty, loss of hard palate and premaxillary portion of alveolar process. The latter portions of the volume are likewise complete. Treatment of shock, control of bleeding, prevention of infection, supportive therapy—including use of chemotherapy—are developed to meet the needs of the medical officer under combat conditions.

Volume II, Military Surgical Manual, Ophthalmology and Otolaryngology; 331 pages, W. B. Saunders Company, Philadelphia, 1942. Price \$4.00.

The timeliness of this condensed volume dealing with ophthalmology and otolaryngology recommends it. The principles of military surgery and medical care relating to these specialties are treated concisely and practically. There has been an avoidance of subjects of a debatable character. Particularly, noted are specific methods of treatment which will lessen the complications in acute cases pending the availability of a specialist. Primarily written for use by the military surgeon the emergency conditions described in this volume often present themselves to the civilian practitioner for whom this volume would be a profitable investment. The work is excellently illustrated and the contributors are outstanding in their respective fields.



Minneapolis, Minnesota
May, 1943

Vol. LXIII, No. 5
New Series

Pneumonia in Infancy

Pathogenesis and Pathology

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PATHOGENESIS

THE origin of pneumonia and the logical understanding of the pathogenic processes involved are still unsolved problems. Although the upper air passages are assumed to be the natural route of invasion, their significance in the pathogenesis of pneumonia becomes questionable when one considers that pathogenic organisms are found there frequently in the normal subject. Kneeland and Dawes¹ found an increase in pneumococci in the nasal cultures after a common cold; Kneeland² further showed that infants begin to harbor pneumococci at 2 to 3 months of age, but not necessarily associated with symptoms. Recent experiences recorded by Smillie³ demonstrate that even infants can harbor pathogenic pneumococci for some time without developing pneumonia, unless some additional factor (such as an acute infection of the upper respiratory tract) lowers the resistance of the host, making possible invasion of the tissues of the lung. These studies indicate that some additional factor other than the presence of pneumococci must operate in producing pneumonia. Experimental studies by Robertson⁴ on dogs list certain conditions as "essential for the production of the pneumonia lesion: first, the implantation of pneumococci in the terminal airways; second, a fluid but viscous medium which prevents their rapid expulsion from this region of the lung;

and third, the presence of local irritation." Local irritation appears more significant than obstruction in determining whether or not infection occurs. Robertson concludes that the escape of infected fluid exudate from the upper respiratory tract beyond the epiglottic barrier plays a much more important role in the inception of pulmonary infection than does the inhalation of bacteria-containing droplets.

Anatomically, the respiratory passages of the infant are absolutely smaller than in older children and adults, thus adding to the problems of obstruction and elimination of infected exudate. In addition, the infant lung is physiologically immature, so that the mechanisms of elimination such as cough and ciliary and muscular actions are not fully developed.

Preventing infected exudate from passing the epiglottic barrier appears to be a vital factor in the prophylaxis of pneumonia, with gravity undoubtedly playing a large role. By elevating the foot of the infant's crib, much can be accomplished toward avoiding gravitation of infected exudate into the air passages. Since the general direction of the trachea and primary bronchi is downward and backward, placing the infant on its abdomen with the foot of the crib elevated (as shown in Figure 1) facilitates drainage of infected mucus and exudate in the upper respiratory passages out through the mouth and nose. Gray's textbook of anatomy shows that the backward slope of the trachea is 25 degrees or more from

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Fig. 1. A six months old infant showing postural drainage.

the vertical line of the ventral surface of the body (Fig. 2). By elevation of the crib approximately 15 degrees, the angle of the trachea with the horizontal approximates 40 degrees. I have found that infants suffering from respiratory infections are more comfortable on their abdomens as this position alone allows drainage of exudate from upper air passages by way of the nose and mouth. Elevation of the foot of the bed increases this drainage and seems to be well tolerated by the infant. The danger of choking on obstructing mucus is diminished as is the need for expelling this material by coughing. The mattress under the infant should be firm and flat, allowing free movement of the head to one side or the other. Robertson⁴ advises elevation of the foot of the bed for several hours postoperatively to get rid of material aspirated during operation and to prevent flow of more fluid into the lung. Dr. Clifford Sweet has emphasized the importance of postural drainage in the treatment of respiratory infections.

The most frequent diseases predisposing to and precipitating pneumonia are the common cold, influenza, measles and whooping cough. These infections are responsible for local irritation and congestion which appear to be essential factors in the pathogenesis of most of the pneumonias of early life. The factor of inherited or neonatal immunity has been shown to be important, experimentally and clinically. Woolpert, Dettwiler and co-workers^{5,6} were able to infect the lungs of embryo guinea pigs with the influenza virus more readily than the lungs of full term offspring. In a previous study, Adams, Green, Evans and Beach pointed out the increased susceptibility of the prematurely born human infant to the virus of primary virus pneumonitis, with an 85 per cent mortality among these infants as compared with an 8 per cent fatality of full term babies.⁷ In a study of interstitial pneumonia, Giesenbauer⁸ reported postmortem observations in 46 cases, 33 of which were prematurely born.

In patients with chronic cystic fibrosis of the pancreas, death often results from secondary pneumonia or bronchiectasis. Careful study by Anderson⁹ has shown a relatively high incidence, 23 per cent, of severe vitamin A deficiency in these infants. The pathologic change consists of a metaplasia of the epithelial linings of the pul-

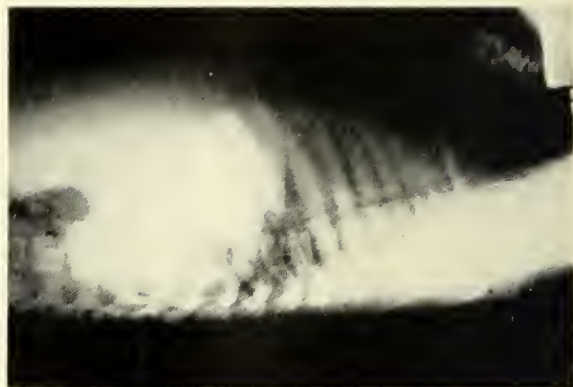


Fig. 2. Roentgenogram of the lung showing the slope of the trachea and main bronchi with respect to the ventral surface of the body.

monary system and other organs, associated with xerophthalmia. It is possible that these lung changes prepare the ground for the invasion of secondary pyogenic organisms. Blackfan and Wolbach¹⁰ state that "the early effect of the deficiency (Vitamin A) upon the respiratory mucosa is a satisfactory explanation of the frequency, severity, and persistence of the pneumonias that have been in most instances responsible for death."

Prematurity, cleft palate, and debilitating diseases are only too obvious as contributing factors in aspiration pneumonia. The aspiration of contaminated amniotic fluid may occur prior to or during birth, producing pneumonia.¹¹ Occasionally, through the same mechanism, thrush pneumonia is produced in the infant.

A pathogenic and etiologic classification of the pneumonias of infancy follows:

- I. ASPIRATION PNEUMONIA
(Lipoid Pneumonia)
(Thrush Pneumonia)
- II. TUBERCULOSIS
(First infection type of Pneumonia)
- III. EOSINOPHILIC PNEUMONIA
(Loeffler's Syndrome)
- IV. NON-SPECIFIC INTERSTITIAL PNEUMONIA
(Pertussis, Measles,
Atypical Pneumonia)
- V. PRIMARY VIRUS PNEUMONITIS
- VI. SECONDARY VIRUS PNEUMONIA
(Goodpasture)
- VII. PRIMARY PYOGENIC PNEUMONIA
- VIII. SECONDARY PYOGENIC PNEUMONIA
- IX. SYPHILITIC PNEUMONIA
(Pneumonia Alba)

PATHOLOGY

The predominating pathologic change in most of the pneumonias in early infancy is an interstitial mononuclear reaction. Sprunt¹² points out that an interstitial mononuclear pneumonia is only one phase of the lung reaction to almost all agents causing pulmonary disease. The only partial exception is in the primary and secondary pyogenic pneumonias, which on occasion will produce a predominantly mononuclear change.¹²

Therefore, in order to compare and differentiate these various forms of pneumonia, the specific histologic differences will be considered in relation to the etiology and development of each entity. Fat-laden macrophages and foreign body giant cells set apart the pneumonias resulting from *aspiration of oils*¹³ (Figure 3). In *tuberculosis*, the epithelioid cell and typical giant cell are characteris-

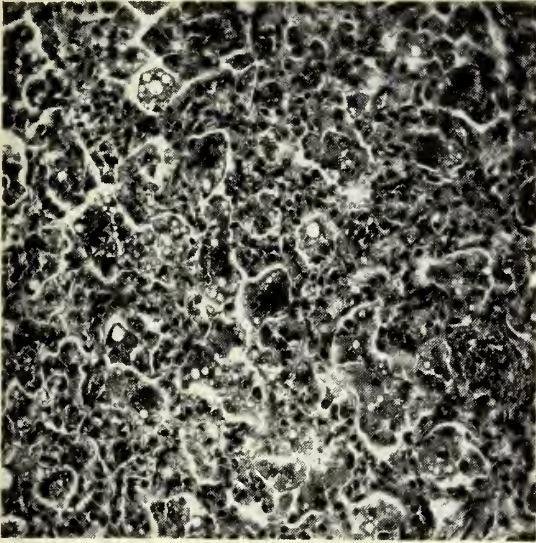


Fig. 3. Photomicrograph of section of lung showing consolidation due in part to complete filling of the alveoli with solid masses of oil-laden macrophages (courtesy of Dr. I. Ikeda).

tic (Figure 4). Wide-spread pulmonary infiltration of the eosinophilic cell, coinciding with high blood eosino-

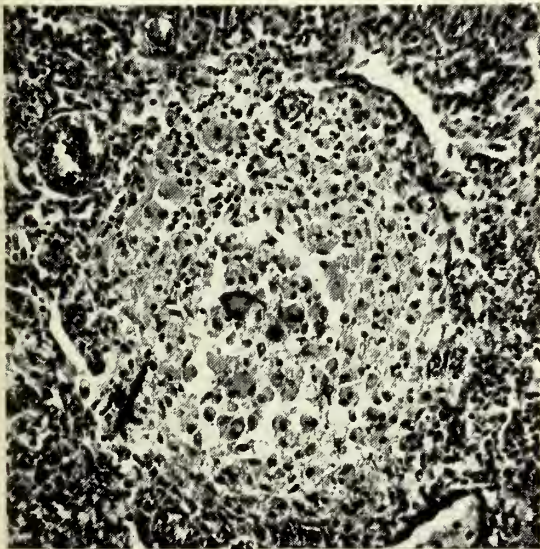


Fig. 4. Section showing tuberculosis of the lung with epithelioid cells and giant cell.

philia is diagnostic of *Loeffler's pneumonia*. The blood eosinophiles are larger than normal, with unusually large granules which are fewer in number than normal.^{14,15} Von Meyenburg¹⁶ recently reported autopsy studies in

this disease and found eosinophilic infiltrations in other organs as well as the lung.

The thickening of the various constituents of the pulmonary system seen in *interstitial pneumonia* is distinctive. Bronchiolitis and peribronchiolitis, thickening of interlobular and alveolar septa and infiltrations of lymphocytes and plasma cells are conspicuous (Figure 5). Gie-

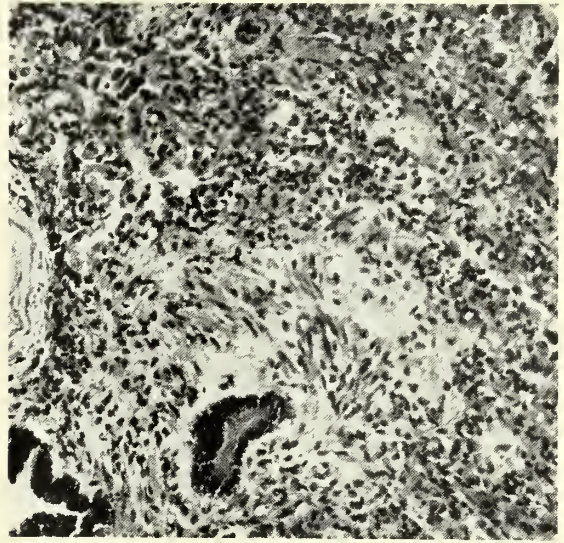


Fig. 5. Section from the lung demonstrating the peribronchiolitis and small round cell infiltration with thickening of connective tissue elements in interstitial pneumonia.

senbauer⁸ and Roulet¹⁷ have recently described the detailed pathologic changes in larger series of cases. Giesbauer⁸ states that the exudate presents a honey-comb appearance, resembles fibrin, but does not take the same stains. The exfoliated alveolar cells frequently contain fatty and lipid granular inclusions.

Primary virus pneumonitis of infants offers a singular opportunity to study the primary pathologic changes most probably produced by a virus in human lung tissues. Necrosis, ulceration and proliferation of bronchial epithelium are conspicuous changes, the exudate being predominantly epithelial and mononuclear, with no bacteria and few polymorphonuclear leucocytes. A mononuclear peribronchiolar infiltration adds to the microscopic picture (Figure 6). The specific distinguishing feature in these cases is the presence of characteristic cytoplasmic inclusion bodies in the epithelial cells of the bronchial, bronchiolar and alveolar tissues. These bodies have definite features, varying in size from three to six microns, stain acidophilic with the hematoxylin and eosin stain, are frequently surrounded by a clear zone or halo and sometimes have vacuoles within the substance of the inclusion (Figure 7).

Secondary virus pneumonia was first described by Goodpasture and his coworkers¹⁸ in 1939 as a virus infection of the lungs following measles, and in one instance whooping cough. The unusual pathologic features are the presence of hemorrhage in the lung, isolated, or situated about areas of definite inflammatory consolidation, a stringy mucoid exudate, ulcerated areas in the

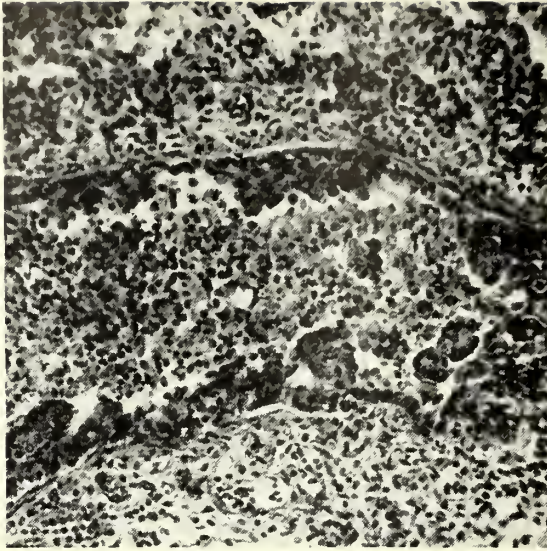


Fig. 6. Section from the lung showing bronchiolus filled with epithelial exudate, necrosis and proliferation of lining epithelium, peribronchiolar mononuclear cell infiltration in primary virus pneumonitis.

trachea and scattered areas of necrosis in the mucous glands. "The specific feature of the process was the presence of intranuclear inclusions, which were almost entirely restricted to epithelial cells" (Figure 8). "These involved cells rapidly underwent necrosis and this was the essential cause of the extensive ulceration."¹⁸

The changes in the lungs caused by the *pyogenic* organisms are well known. MacCallum¹⁹ in the epidemics in 1918 and 1919 was able to differentiate the pneumonias by the distinctive pathologic anatomy produced by the various pyogenic organisms. This led him to the conclusion that epidemic influenza was probably due to a virus and not to bacterial agents acting as secondary and tertiary invaders in a host weakened by coincident or antecedent disease.

In *syphilitic pneumonia* the lungs are pale and specifically demonstrate extensive hyperplasia of the fibrous tissues of the interlobular and interalveolar tissues. *Treponema pallidum* are found in the large mononuclear cells.

Sudden death in infants previously well is still a very perplexing problem. The importance of pneumonia as a cause of sudden death in infants deserves special emphasis. The etiologic factor has seldom been determined, but the almost complete lack of polymorphonuclear leucocytes and bacteria in the microscopic sections of many of these lungs suggests a virus as a possible causative factor. Rivers²⁰ points out, "The fact that inflammation occurs in many virus diseases cannot be denied, and, despite the acute nature of some of the diseases, if secondary infections do not intervene, the inflammatory process is usually characterized by an infiltration of mononuclear cells." Sprunt¹² states that in "virus diseases the mononuclear reaction occurs in the acute phase of the disease and in others, as in pneumococcus pneumonia, in the stage of resolution." McCordock and

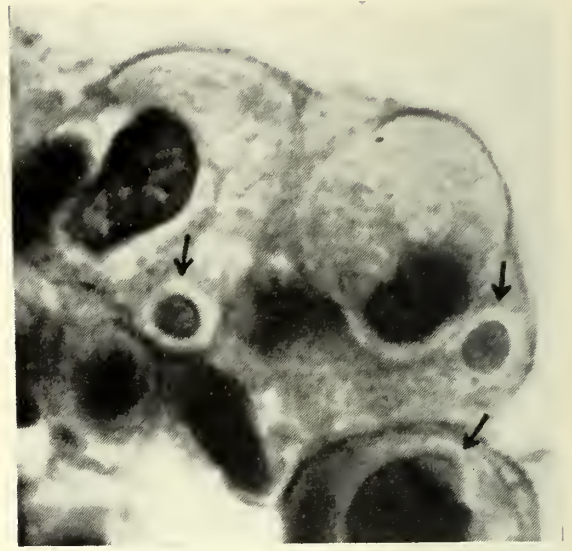


Fig. 7. Photomicrograph of section of lung showing bronchial cells containing typical cytoplasmic inclusion bodies from a case of primary virus pneumonitis (oil immersion).

Muckenfuss²¹ showed that in animals, viruses produce an interstitial mononuclear pneumonia. The distinctive change noted in the cases studied at the University of Minnesota is the presence of patches of mononuclear cells scattered throughout the hemorrhagic and congested areas of the involved lung (Figure 9).

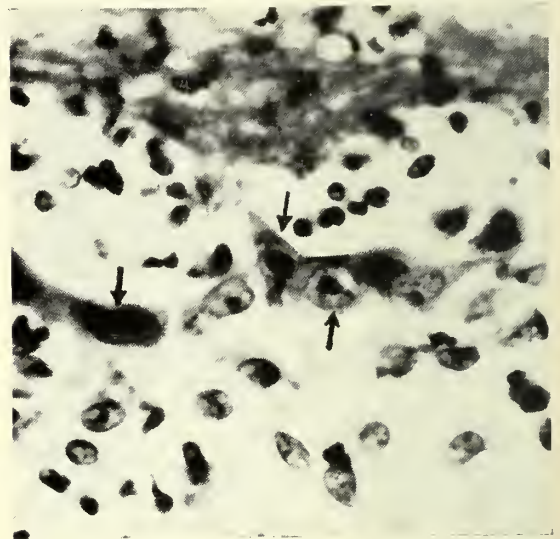


Fig. 8. Photomicrograph of section of lung showing typical intranuclear inclusions in secondary virus pneumonia (courtesy of Dr. E. W. Goodpasture).

SUMMARY

Logical understanding and management of pneumonia in infancy require a study of the pathogenesis of the disease. Anatomic and physiologic factors play a large role in the causation of these pneumonias. Postural drainage of infants is suggested as an important factor in preventing infected fluid exudate from reaching the lower

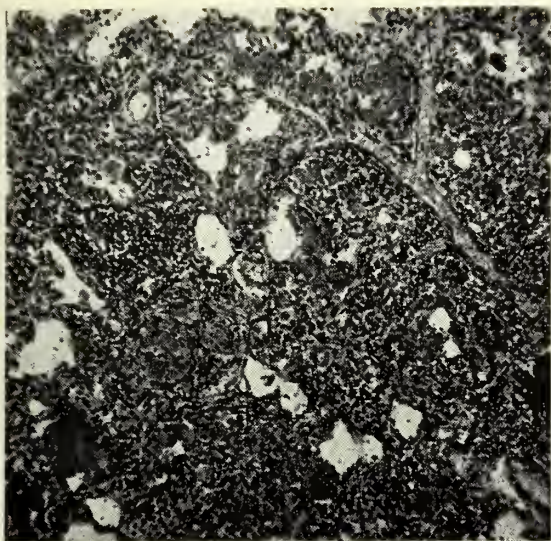


Fig. 9. Section of lung from a case of sudden death due to pneumonia showing edema, hemorrhage and patches of mononuclear infiltration.

respiratory passages and, thus, in preventing pneumonia.

Aspiration of irritating oils, vitamin A deficiency, and antecedent diseases are undoubtedly of great significance in the pathogenesis of some cases of pneumonia. Lack of inherited immunity plays a role in the development of pneumonia, especially in prematurely born infants.

Careful study of the distinctive histologic features will aid in determining the specific cause of death.

Sudden unexpected death in infants may be due to pneumonia. The suggestions regarding postural drainage (such as sleeping on the ventral surface of the body) may aid in preventing these distressing deaths.

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Acute Bacterial Meningitis

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 Erling S. Platou, M.D.†
 Minneapolis, Minnesota

BACTERIAL infections complicated by meningitis are of especial interest at the present time because of the greater ease of spread during military and industrial mobilization with its attendant concentration and transfer of large numbers of persons. The acute meningitides due to the meningococcus, pneumococcus, streptococcus, staphylococcus and Haemophilus influenzae present a serious threat. Conflicting reports regarding the best therapeutic measures for the acute meningitides continue to appear in the literature. Any logical treatment should be from two fundamental angles: immunologic and chemotherapeutic.

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In the following communication the desire is to emphasize the fallacy of assuming that the sulfonamides are always adequate and that serotherapy need be used only when chemotherapy is failing. Not only has the treatment suggested for meningitis often been over-simplified but too many far-reaching claims have been made for chemotherapy alone. Any consideration or evaluation of the host's immune response is conspicuously absent in almost all reported studies.

The problems of treatment are directly related to the peculiarities of the pathogenesis of the disease and the biologic characteristics of the particular organism. The bacteria responsible for meningitis usually reach the men-

inges by the hematogenous route. Rarely, there may be direct traumatic implantation or direct extension from the middle ear, mastoid or paranasal sinuses. Burman and others¹ present evidence that even otorhinogenic meningitis results from the entrance of bacteria into the blood stream from the accessory sinuses or the temporal bone. In meningococcus meningitis bacteria invade the blood stream from a minute focus in the upper respiratory tract or from a purulent focus. The toxic products of the meningococcus cause a loss of integrity of the small blood vessel walls, thus allowing the entrance of bacteria into the blood stream,³⁷ and into the meninges through injured capillary walls.

The meningococcus, pneumococcus, and *H. influenzae* constitute an immunological group, in that they possess a similar pattern of chemical components acting as antigens.² Each of these organisms is surrounded by a capsule containing a specific carbohydrate (specific soluble substance), which is excreted into the surrounding medium. The quantity of free capsular carbohydrate is an index of the severity of the infection and is apparently correlated with the amount of anticarbohydrate (antibody) necessary for neutralization and recovery. Free capsular carbohydrate is excreted in the urine but that which remains in the body must be inactivated by natural or acquired antibody before the substance in the capsule of the bacteria can be neutralized. There is every reason to believe that the biology of the meningococcus and *H. influenzae* closely simulates that of the pneumococcus. The available evidence suggests that the protective antibody in both anti-meningococcus and anti-type B *H. influenzae* serum is the anticarbohydrate antibody. This antibody is an essential part of the recovery process even though its fabrication may be by the host. There is no evidence that sulfonamides influence the production of antibody. Since the capsular carbohydrate seems to be the invasive factor in the pneumococcus, meningococcus, and *H. influenzae*, any effective treatment must contribute to the elimination and neutralization of this substance.

The Gordon and Murray meningococcus types 1, 2, 3 and 4 are classified by Branham³ into groups I (1, 3), II (2), III (4). The group II meningococcus differs in that its type specificity is intimately connected with a protein rather than a carbohydrate.⁴ Group II meningococcus occurs more frequently in sporadic cases and is more apt to produce bacteremia and infection without meningitis. The meningococcus exotoxin, which Ferry⁵ claims to have identified, has many of the characteristics of the capsular substance and in some types a capsule has been demonstrated. The biologic features of the pneumococcus are too well known to warrant description here. Pneumococcal meningitis is almost invariably secondary to a primary focus, and no specific type appears to be meningotropic. The type B *H. influenzae*, which is almost always that responsible for influenzal meningitis, is definitely encapsulated and grows in smooth colonies. Spinal fluid smears showing pleomorphic organisms should be considered strongly suggestive of *H. influenzae*. Lancefield Group A streptococci are the usual ones responsible for human disease. Like the pneumococcus, they are

encapsulated and any one of the 33 types can be the causative organism in meningitis. The staphylococci responsible for meningitis cannot be separated solely on the basis of colony pigment production, but virulent strains may be identified by coagulase production.⁴

Sulfonamides and antisera are the specific agents available for the treatment of acute bacterial meningitis. The part played by immune bodies has been largely overlooked in the general enthusiasm for the more easily used and generally more effective sulfonamides.

Antibody is an essential part of the recovery mechanism whether it is formed by the host as the result of infection or introduced by serum therapy. There is as definite a correlation between antibody production and recovery in the drug treated patient, as in those who get well spontaneously. The mode of action of the sulfonamides is bacteriostatic (i. e., interference with the metabolism of bacteria⁷), facilitating the defense mechanism of the host. Many patients will recover with chemotherapy alone, but some, because of the severity of the infectious process, and others because of an insufficient immunologic response, will need additional help in the form of specific antiserum. The antisera for the pneumococcus and *H. influenzae* act against the capsular carbohydrate. The available meningococcal antisera contain group "antitoxin" as well as specific antibacterial factors against the prevailing four types (Gordon) of organisms and they probably exert their influence against the capsule. Potent staphylococcal antitoxin is now available and although it has no antibacterial or known anticapsular effect, it probably has value. Pooled convalescent scarlet fever serum contains some type specific, anti-invasive antibodies as well as erythrogenic antitoxin, and the use of this serum is an important adjunct in the treatment of Group A streptococcal meningitis.⁸

The appraisal of a therapeutic agent in acute meningitis is difficult. The many factors governing prognosis and the statistics relative to result obtained must be interpreted critically in order to reach a clear understanding of therapeutic effectiveness. Meningitis varies greatly from patient to patient and from time to time in a community. The age of the individual and the duration of the illness before treatment is initiated play significant roles in the outcome. When a treated case recovers, a little search may reveal instances of the same type of infection recovering without any specific measures having been employed. Moreover, as has recently been shown by Pittman⁹ for the influenza bacillus, strains with the same virulence for mice show marked variation in susceptibility to sulfonamides. The outcome in any case of acute meningitis depends on the dosage of pathogenic organisms, the virulence of the organisms and on factors contributing to the resistance of the host. Also, the virulence of the pneumococcus, meningococcus and influenzal bacillus varies with different types.

New therapeutic agents may bring about dramatic improvement in the general fatality rate. For example, the fatality rate in streptococcus meningitis prior to the introduction of sulfanilamide was close to 100 per cent; it is now reported to be as low as 15 to 25 per cent.^{10,11,12} The fatality rate for meningococcus meningitis, in spo-

radic groups of cases, is reported to have decreased from 50 per cent to about 10 per cent since 1937¹³ although similar reduction was previously shown with massive intravenous serum therapy alone. United States government reports show a drop from 55 per cent to 45 per cent between 1933 and 1936, but only from 39 per cent to 35 per cent between 1937 and 1941. Sulfonamide therapy is generally given credit for the apparent marked improvement but other factors must be seriously considered.

Group I meningococci account for the majority of epidemic cases, while in carriers and sporadic cases, the Group II meningococcus is usually found.¹⁴ The latter is less invasive and more apt to produce chronic infection. Group I meningococci constituted 90 per cent of the strains isolated in 1936,³ but have been less frequent each year since with a corresponding increase of Group II. A lowered fatality rate also has been claimed for pneumococcus and *H. influenzae* meningitis during this period.^{12,15,16} A critical analysis of large groups of cases does not substantiate the claim of marked reduction in mortality implied in some reports following drug therapy alone. Separation of reported cases into age groups, reveals that in the extremes of life, particularly infancy, the least improvement prevails.^{17,18} Public Health Service reports since 1939 show a greater number of meningitis deaths from birth to five years than in any other age group. Top in Detroit has found no reduction in the fatality rate of meningococcus meningitis in children under 3 years of age since sulfonamides have been used.¹⁷

The high case mortality in the extremes of life is not due to variation in virulence of pathogens of the same type or to inability of the host to use conferred antibodies.¹⁹ Frequent failure of meningitis to manifest itself as such in early infancy and the failure to make an early bacteriologic diagnosis in patients over one year of age, as well as the probable effects of anatomic, physiologic, and immunologic differences contribute to the high mortality. The immune response of a host varies with age, as has been shown by Sutliff,²⁰ Fothergill,²¹ Hodes²² and others. A definite lack of immunity to the pneumococcus exists between 10 days and 2 years of age.²³ The blood of children between 2 months and 3 years of age has been shown to have no antibacterial antibodies against influenzal bacilli.²¹ Hodes²² attempted to immunize children against the type I pneumococcus; all the children over 2 years of age showed a sharp rise in antibody titre, while a significant rise occurred in only one case under 2 years of age. Similar and more common clinical examples of poor antigenic response can be found in infants under 6 months of age, who have been inoculated too early against pertussis and diphtheria.

At the onset of meningeal infection when possible, an evaluation of the immune status of the host should be carried out so that complete therapy can be instituted at once instead of at a point where irreparable damage may have already been done. Since the amount of antibody essential for recovery varies with the severity of the disease, quantitative evaluation by determination of the amount of antibody in some serums in terms of milli-

grams of antibody nitrogen per unit volume is desirable. In the case of type B *H. influenzae* serum and pneumococcus serum results of analysis by this method parallel that by mouse protection methods; dosage of serum can be determined by amount of spinal fluid sugar. In meningococcus and *H. influenzae* meningitis, when no organisms can be found, a rapid diagnosis can be made by means of the precipitin reaction.^{19,24,25} The need for and adequacy of serum therapy can be similarly determined. Cleared spinal fluid is used to overlay a few drops of diagnostic serum; a positive test consists in the formation of a white ring at the interface. Alexander feels that the time of appearance of the ring is an index of the amount of free specific soluble substance and therefore a measure of the severity of the infection. A severe infection is believed to be present if a ring appears within ten minutes. The Francis test in pneumococcus infections and an analogous test in *H. influenzae* meningitis when positive indicates the presence of excess free anti-carbohydrate antibody. A further method of determining antibody excess is capsular swelling—identical with the one used to type the organism except that the patient's serum is used in place of diagnostic serum. The aim is to build up such an excess of antibody that a 1:10 dilution of the patient's serum will produce capsular swelling.

The discovery of some effective prophylactic agent or procedure against meningococcus infections obviously would be of great value in the event of an epidemic, particularly since the disease is spread almost entirely by carriers and not by patients with the disease.²⁶ The current concentration of large groups of men increases the likelihood of an epidemic. It is believed that an increase of the carrier rate to over 20 per cent is definite warning of an impending epidemic.

There are several reports suggesting that the sulfonamides may be of value prophylactically, but more extensive trials are necessary before acceptance is warranted. Meehan and Herrillees²⁷ were unable to control a series of outbreaks of cerebrospinal fever in a foundling hospital until they gave sulfapyridine to all the carriers. Fairbrother²⁸ believes that sulfonamides will have only a limited application for wholesale use, but that they are of definite worth in clearing proven carriers if used in adequate dosage. Gray and Gear²⁹ used sulfapyridine prophylactically during an epidemic in a military camp, the carrier rate dropping from 22 per cent to none. These reports are suggestive but do not warrant optimism without more extensive trials.

Statistics should be interpreted very carefully in meningitis because of the many factors previously mentioned which affect the prognosis. The results obtained at the Minneapolis General Hospital before and after the advent of sulfonamide therapy are tabulated below without fatality rates.

ACUTE MENINGITIS 1922 THROUGH 1942

	1922-1936		1937-1942		Total	
	No. Cases	No. Deaths	No. Cases	No. Deaths	No. Cases	No. Deaths
Meningococcus	240	92	34	5	274	97
Pneumococcus	85	85	20	17	105	102
<i>H. Influenzae</i>	17	17	6	4	23	21
Streptococcus	137	135	13	3	150	138
Staphylococcus	15	15	3	1	18	16

The most striking improvement has been in streptococcus meningitis, while some reduction in the case fatality rate has occurred in each of the others. Prompt evaluation of the patient's immune status, i. e., precipitin tests, spinal fluid sugar, and capsular swelling, insofar as possible at the time of admission plus the more frequent judicious use of combined sulfonamide-serum therapy and eradication of focus have given improved results.

Organisms resembling pneumococci, meningococci, or *H. influenzae* may be typed by the Neufeld technic. As previously mentioned, in those cases in which the spinal fluid shows no organisms, cleared spinal fluid may be tested for type B *H. influenzae* and meningococci by means of the precipitin reaction.

MENINGOCOCCUS MENINGITIS

One lumbar puncture for diagnosis is usually sufficient, although additional punctures may be done after 24 hours, if there is reason to doubt the efficacy of the treatment or if signs of increased intracranial pressure appear.

All the common sulfa drugs appear to be effective in the treatment of meningococcus meningitis. The dosage used should be sufficient to maintain a blood level of between 5 to 15 milligrams per hundred cubic centimeters. It is not evident that higher levels are more effective (Bank's series).³⁰ The route of administration depends in part on the condition of the patient. The initial dose should be given intravenously to obtain the optimum blood concentration quickly. A one to 5 per cent solution of the sodium salt of sulfapyridine, sulfathiazole or sulfadiazine in normal saline may be used. The 1 per cent solution seems preferable for two reasons: it maintains the blood concentration at a higher level over a longer period of time and it also provides additional fluid. The sodium salts also may be given as a 0.4 to 0.8 per cent solution in physiologic saline subcutaneously. The use of the intravenous or subcutaneous routes is an additional advantage in patients unable or unwilling to cooperate. The crushed tablets or a solution of the sodium salt may, of course, be given through an indwelling gastric tube. The drug is probably best continued until the patient has been afebrile 4 to 5 days and then gradually decreased, although recent reports advocate prompt withdrawal with the first normal spinal fluid.

Serum should be given to any patient with meningococcus meningitis in the extremes of life and to any patient seriously ill.^{30,31} Experimentally, combined chemotherapeutic therapy is definitely superior.^{14,32,33} The practice so far has been to employ serum mainly in those cases which are severe or which have been refractory to sulfonamides. This point should be kept in mind when evaluating series of cases treated with sulfonamide alone or with combined sulfonamide-specific serum therapy, and should prevent arriving at unwarranted conclusions regarding the inferiority of combined therapy.³⁴ It is advisable to give intravenous fluids containing one of the sulfonamides for a period of three to four hours before the serum. The reasons and details for this will be referred to in connection with influenzal meningitis. The intrathecal administration of serum is not indicated,^{35,36} as it seems unrea-

sonable to rely on the circulation of the spinal fluid to transport antibodies, when the blood can do it more quickly and directly; in addition, horse serum intrathecally produces an intense meningitis.¹¹ If within 24 hours the patient does not show definite increase in the spinal fluid sugar, 100,000 units antimeningococcus serum should be given intravenously after sensitivity tests prove negative. This delay appears to be reasonably safe, at least in non-epidemic cases.

The patient's fluid and electrolyte balance should be maintained by oral fluids if possible, and parenterally if necessary. Repeated small blood transfusions are helpful. Freshly drawn blood is preferable to stored bank blood because of its greater antibody activity.

INFLUENZAL MENINGITIS

At the Minneapolis General Hospital the treatment for influenzal meningitis recommended by Alexander¹⁹ has been followed as closely as possible. A continuous intravenous drip of 0.1 gram of drug per kilogram of body weight in saline or Ringer's solution is started at once. Sulfadiazine appears to be the drug of choice. This is given over a 4 hour period for the purpose of inhibiting further formation of free carbohydrate and accelerating the excretion of the free carbohydrate already present.

Anti-type B influenzal rabbit serum is then given intravenously, diluted in 200-300 cc. of sulfonamide-containing saline or Ringer's solution over a 2 hour period. The initial dose of serum is determined by the spinal fluid sugar level as follows:¹⁹

Spinal fluid sugar (mgm.%)	Mgm. antibody nitrogen
Under 15	100
15 to 25	75
25 to 40	50
Over 40	25

The adequacy of the dose is determined one hour later and every 24 hours, by testing the ability of the patient's serum to produce capsular swelling. The original spinal fluid kept on ice after adding 0.4 per cent formalin will serve as a source of encapsulated organisms. The aim is to have sufficient antibody so that a 1:10 dilution of the patient's serum will produce capsular swelling. If no swelling occurs, an additional 50 mgm. antibody nitrogen is given. Lumbar puncture should be repeated 24 hours after the original tap for determination of sugar, cell count, and culture. Need for additional punctures depends on the patient's course. Repeated small transfusions will furnish hemoglobin and antibodies. Sulfonamide therapy should be continued for one week after the first sterile spinal fluid is obtained or for two weeks after fever has subsided, for recurrences are not infrequent. A febrile response to the serum is not uncommon and is misleading. In those cases not responding to the above mentioned treatment the intrathecal administration of 5 cc. of human complement may help.

PNEUMOCOCCUS MENINGITIS

The same outline of treatment applies to pneumococcus meningitis as described for influenzal meningitis. Sulfadiazine or sulfapyridine and type specific rabbit serum

should be used. In determining the initial dose of type specific serum, 1 mg. antibody nitrogen is equivalent to 1000 units, and the dosage is then determined on the basis of the spinal fluid sugar level. Chemotherapy should be continued in full dosages at least one week after the spinal fluid becomes sterile. Particularly in this type of meningitis, foci of infection should be looked for and eradicated if possible. The adequacy of the serum administered should be determined by the Francis test and capsular swelling. The intrathecal administration of complement may be of value in this type of meningitis.

STREPTOCOCCUS MENINGITIS

Sulfadiazine or sulfanilamide in doses sufficient to maintain blood levels of 10 and 15-20 mg, respectively should be given and continued one week after the patient is afebrile and spinal fluid is sterile. Pooled human scarlet fever convalescent serum should be given if available.⁸ Repeated small transfusions and the eradication of foci of infection are important.

STAPHYLOCOCCUS MENINGITIS

The principal points in treatment are the same as mentioned for streptococcus meningitis. Sulfadiazine, as in each of the others, appears to be the best drug, although sulfathiazole is probably very effective. The use of staphylococcus antitoxin intravenously is recommended. The initial dose should be 100,000 units.

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Old Problems in New Settings

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AS the field of psychiatry developed its understanding of human behavior and perfected its technics in treating patients with adjustment difficulties, the early formative years of the individual's life assumed increasing importance. At the same time the pediatrician was learning that emotional and personality problems were an important part of his practice and could no longer be ignored. This mutual emphasis has led to the formulation of a program designed to integrate the two fields more closely. It is natural that this should be developed in the medical schools. The Psychiatric Clinic for Children, established as a part of the University of Minnesota Medical School in October, 1938, is in line with this progressive trend in the field of medicine and medical education.

In the four and one-half years of the clinic's existence

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a total of seven hundred children has been accepted for study. It is significant that 34 per cent (238 children) were referred by the Department of Pediatrics because they presented problems psychosomatic in character. In addition, another 15 per cent were referred directly to the Psychiatric Clinic for Children by practicing physicians, because of complaints that did not seem to be produced entirely by physical disease. The problems included emotional and behavior disorders resulting from or related to organic disease or defect, emotional or personality disorders expressed through organic symptoms of dysfunction, behavior problems related to habit training and management, and difficulties related to intellectual development. This is contrary to the general experience of child guidance clinics where problems of medical interest constitute less than 10 per cent of the referrals. The explanation is the closer identification of these other

clinics with organized community social agencies such as courts, schools, or case working agencies in which the medical practitioner has had little interest.

The neurotic manifestations encountered in these children fall into more or less clearly defined categories. In the young child, refusal to eat, negativism, temper outbursts, whining, attention-getting behavior, and the recurrence of such infantile characteristics as soiling and enuresis predominate. In the school age group neurotic tics, enuresis, daydreaming and vague persistent physical complaints are frequent. In this group there has been a high incidence of school maladjustment, either as academic failure or achievement at a level far below potential capabilities. The physical symptoms that brought the child for study often proved to be devices unconsciously assumed to win sympathy or afford opportunity to evade responsibility and to avoid competition with contemporaries. In the adolescent group, there has been accentuation and perpetuation of these same characteristics, with clearer definition of the patterns of evasion, more pronounced complaints of pain, and, more than occasionally, hysterical reactions and anxiety states in addition to aggressive rebellion.

Throughout all age groups there has been a high incidence of intrafamilial conflict that induced a sense of insecurity within the child. Rejection by parents, unfavorable comparison with others within or without the family, expectation of superior performance in school and athletics, and the imposition of harsh demands and standards have been precipitating factors commonly encountered. Experience in this clinic confirms the often-expressed contention that the primary needs for normal, well-rounded emotional development in childhood must include strong and satisfactory affectional relationships, security and protection, and the opportunity for experimentation that will lead to eventual emancipation. Any lack in this basic constellation contributes to the production of frustration that may find expression in neurotic manifestations. These reactions may be encountered at an extremely early age, even before the child is intellectually capable of appreciating or evaluating conscious reaction. For instance, one infant of three months came to the Pediatrics Clinic because of persistent projectile vomiting. Thorough physical studies failed to substantiate the provisional diagnosis of pyloric stenosis. This child was the only child, born to middle-aged parents after many years of marriage. Both parents possessed many neurotic characteristics, were tense and apprehensive, feared that the child might not survive, and felt guilty lest the lateness of the pregnancy had "marked the child." Parental anxiety was obvious in every action toward the child, who was permitted no opportunity to relax and be peaceful. The child was brought into the hospital for a short period during which time the parents were reassured and their many questions answered in an effort to allay their anxiety. Separation of parents and child brought about a gradual release of tension. Better understanding and handling of the child was then possible and did much to overcome the persistent pylorospasm. Since so much has been written about the correction of feeding problems, negativism and tantrums in

the preschool period it will suffice to comment that our experience confirms the findings of others, namely, that intrafamilial tension producing insecurity and doubt in the child's mind as to his affectional acceptance is of great importance.

The period of the school years is a vital one, not well-understood and often inadequately managed. The division of responsibility between the school, the home and physician leaves many loopholes through which difficulties may develop. The tendency to consider each separate segment of the child's career as a detached entity without looking at the total integrated picture is the greatest weakness. It is during this period that vague and persistent physical symptoms growing out of the child's sense of inadequacy for competition may appear and become the foundation for a confirmed neurosis later on.

The immature child cannot evaluate his experiences, is unable to verbalize his anxieties, and consequently is prone to express his sense of futility in physical complaints that are accepted with greater sympathy and promise of action. Characteristic of this group is a nine-year-old girl, the fourth child in a family of five, referred for examination because of increasingly severe headaches and visual changes suggestive of a rapidly growing brain tumor. She was highly suggestible, and daily added new symptoms as a result of repeated medical examinations. The child's illness complicated an acute family situation, the war having eliminated the father's occupation that for many years produced a comfortable income. His present earnings from a night shift in a defense plant barely covered running expenses and provided little reserve for medical expenses incurred through the child's illness. The oldest child of this family was subnormal as a result of birth trauma. Natural chagrin led the parents to overemphasize the importance of school marks in their children. The second, third and fifth children, immediately older and younger than our patient, were of superior intelligence, while she was of average endowment. The mother had suffered a turbulent pregnancy with our patient, with prolonged pernicious vomiting that caused the father to suggest a therapeutic abortion. The physician's refusal to consider this proposal left a strong sense of guilt in the father. Because of her average intellectual endowment she found difficulty in equalling the achievement of her superior siblings. She was further handicapped by a progressive visual defect exaggerated by poorly fitted glasses. The resulting symptoms were steadily exacerbated by the over-anxious parents and the child's fears that she would fall still farther behind in the strenuous, unequal competition with her more brilliant siblings and be identified with the subnormal oldest child whom they had all been taught to protect. Careful neurological study revealed no evidence of tumor. The ophthalmologist established an exceedingly high refractive error which was corrected by properly fitted glasses. Psychological testing substantiated her average intellectual capacity but indicated severe retardation in reading and arithmetic achievement. The relief of parental anxiety and the substitution of a carefully considered school program that eliminated competition with the siblings and offered an opportunity for

achievement in school work has gone far in re-establishing this child on a healthy level. This type of patient does not require prolonged, specialized treatment, but the important points to be considered are the emotional factors that enter into the attitude of the parents and the relationships between this child, her siblings and the school program. A successful treatment plan must take account of all these elements. It would have been easy in a busy practice to limit attention to the provision of adequate glasses, which was only part of the difficulty. The unequal competition between the children, the overemphasis on academic achievement, the child's fear of identification with the subnormal older sister, and the obvious hyperanxiety of the parents were of equal importance in the production of this child's problems.

In older children the physical symptoms have an even wider variation than in the pre-adolescent group. More mature reactions are expected, more responsibilities call for independent decisions, and often the child is not equal to the new burden. Under such pressures many purely neurotic manifestations without demonstrable organic pathology have been encountered. There have been many carefully controlled studies of the influence that emotional pressure may play in the production of such conditions as ulcerative colitis, gastric and duodenal ulcer and asthma in adults. It is our impression that the findings would hold equally true in children. We have observed repeatedly the increase in frequency of convulsive attacks on a well-established organic basis during periods of emotional stress. It is strongly suspected that in some persons with diabetes more insulin is required to maintain equilibrium during periods of sustained emotional tension. Such findings suggest that much greater consideration must be given to these phases of medical practice than has been customary.

The results of the routine examinations of men appearing at the induction stations, preliminary to military service, are disturbing. A rejection rate of 35 per cent unfit

for service because of physical or psychiatric defects should prove a challenge to medicine for years to come. The largest single group rejected, 9 per cent, have been those in the neuropsychiatric classification, the majority being of the psychoneurotic type. In medical practice, this group has been notoriously unresponsive to treatment. Part of the difficulty has been due to the physicians' lack of training and consequent disinterest in understanding these patients. In addition, the problem is too often complicated by the length of time symptoms have persisted before treatment is initiated.

The experience of the Psychiatric Clinic for Children staff has been that the most effective results can be obtained by preventive measures carried out with children who early show evidence of maladjustment expressed in physical symptoms without organic basis. Careful consideration of the emotional factors within and surrounding the child and efforts to eliminate the sources of friction will generally bring a satisfactory response. A consideration of emotional factors in every patient situation, but more particularly in those where complaints are not confirmed by physical studies, will yield increasing satisfaction to the profession as well as to the patients. While in the beginning this procedure may prove somewhat time-consuming it will prevent the consolidation of symptoms and evasions that become chronic. Viewed from that angle it is actually a time saver.

Probably better than half of the cases encountered in this clinic since its establishment could have been adequately cared for in the office of the general practitioner. The balance of the cases have been so complicated and of such long standing that they require the specialized service of a unit such as this. We feel the greatest contribution which a unit such as ours can make is to emphasize to the practitioner and the medical student the importance of considering emotional factors in every patient situation. As this goal is achieved there will be less need for referral to a clinic reserved for specialized cases.

Gastric Ulceration Complicating Erythroblastosis Fetalis

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PEPTIC ulceration occurs in children at all ages, but gastric ulcer coexisting with erythroblastosis fetalis has not been previously reported. Two such cases are presented in this paper, as well as brief summaries of the records of two additional infants with intestinal ulceration.

In a splendid review of the literature Bird, Limper, and Mayer¹ collected reports of peptic ulceration of the stomach and duodenum in 245 children under the age

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of sixteen years. They also presented the record of one patient upon whom they had operated successfully at the age of 34 hours for a perforated duodenal ulcer. Of these 246 patients 43 were two weeks of age or less when the ulcerations were discovered. The collected data indicate, therefore, that at no period during childhood does the incidence of peptic ulcer equal that recorded for the newborn period. The published reports also disclose a distinct tendency for peptic ulcers in young infants to bleed profusely and to perforate. As a consequence,

melen, hematemesis, abdominal distension, cyanosis, and symptoms of prostration and shock comprise some of the more important manifestations of peptic ulceration in the early weeks of life. Subsequent to perforation the presence of free air in the peritoneal cavity may be demonstrated by x-ray study, and is of great diagnostic significance.

Since Bird et al, published their survey, a few additional instances of peptic ulcer in children have been reported by Bastman,² Moore,³ and Conklin,⁴ showing that in practically all of the recorded cases the ulcerations were grossly visible. In 1924, however, Kennedy⁵ discovered a peptic ulcer of microscopic size in an infant with melena. This observation suggests the probability that peptic ulcers in infants may easily escape detection, and that their incidence may be appreciably higher than is indicated by the literature on the subject.

Apparently multiple ulcerations of the gastric mucosa are relatively rare in childhood. Cases of this character have been reported by Ritter,⁷ Homen,⁸ Delore,⁹ Barber,¹⁰ Butka,¹¹ Dunham,¹² Smythe,¹³ Dunham and Shelton,¹⁴ Mills,¹⁵ and Kunstadter and Gottelman.¹⁶ To this small group we add two additional cases. Furthermore, the gastric ulcerations present in the two infants under our observations coexisted with erythroblastosis fetalis. We are not aware of other reports of peptic ulceration complicating this disease.

The first patient was a full term male infant. The mother was well throughout pregnancy and the delivery was normal. Her Wassermann reaction was negative and the infant was exclusively breast fed. Previously the mother had given birth to two premature infants who died at the ages of eight and thirty-two hours respectively, the deaths being attributed to prematurity.

On the first day of life her third baby had a pronounced jaundice and twitchings of the muscles of the face. When admitted to the hospital at the age of three days he was distinctly dehydrated, apathetic, limp and icteric. The physical examination disclosed coarse moist rales over both lung fields and a definite enlargement of the spleen and liver. There was no evidence of inflammation of the stump of the umbilical cord and the remainder of the physical examination was normal. Three hours after admission to the hospital he regurgitated a small quantity of dark red fluid and this recurred periodically until the infant expired on the fourth day of life. Vitamin K was administered following the first hematemesis. Throughout the period of hospitalization the infant remained afebrile.

Examination of the blood made shortly before death revealed a count of 1.5 million red blood cells with marked anisocytosis, poikilocytosis and polychromatophilia. The incidence of normoblasts was 22 per cent. According to our laboratory studies the mother was Rh positive, indicating that some other factor was responsible for her infant's erythroblastosis.

The necropsy was performed immediately following death and was limited to the thorax and abdomen. It disclosed no evidence of inflammation of the peritoneum, pleura, pericardium or umbilical region. The spleen and liver were enlarged and in the latter, centers of hemo-

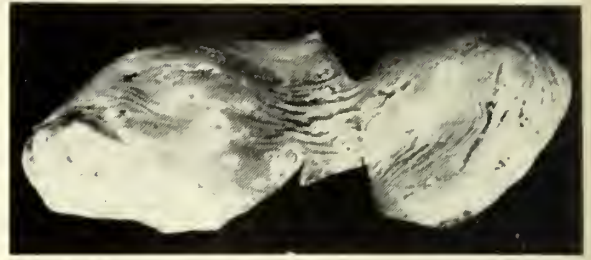


Plate 1.

poiesis were observed. Small hemorrhages were found in the medulla of each adrenal and many petechial pulmonary hemorrhages were present. The gastric mucosa was studded with numerous ulcerations measuring 3 to 5 mm. in diameter (Plate 1). Some of the ulcers extended through the muscularis but none penetrated the serosa. No evidence was found of thrombosis of blood vessels adjacent to the ulcerations. The remainder of the gastrointestinal tract presented no gross evidence of ulceration.

The second patient with multiple gastric ulcers complicating erythroblastosis fetalis was born in Charity Hospital, November 11, 1941, and died twenty-four hours later. The mother's Wassermann reaction was negative, and our laboratory study indicated that she was Rh positive. In this instance, also, the infant's condition was not related to the Rh factor.

The infant, a full term white female, weighed 8 pounds 7 ounces at birth. She was deeply jaundiced at the time of birth and shortly following delivery she developed attacks of cyanosis which recurred periodically until death ensued. The respirations were labored during these attacks but the heart sounds were normal. The liver and spleen were considerably enlarged. Examination of the blood revealed a red blood cell count of 2.4 million with a total of 101,000 nucleated red blood cells per cu. mm. During the brief period the infant was alive she received one blood transfusion.

The necropsy was performed two hours after the patient's death. It disclosed no evidence of inflammation, either of the umbilical region or of the serous membranes. Small petechial hemorrhages were observed in the thymus, epicardium, and in the lungs, and a small amount of clotted blood was present in the left middle cranial fossa. Since no torn intracranial blood vessels were seen the origin of this clot was not determined. The heart, pancreas, adrenals, kidneys, and lungs were normal and the bile ducts were patent. The liver and spleen weighed 295 and 80 grams, respectively, and extramedullary centers of hemopoiesis were noted in these organs as well as in the thymus and lymph nodes. Multiple small erosions about 2 mm. in diameter were present on the greater curvature of the stomach, but none had perforated the serosa. The remainder of the gastrointestinal tract appeared to be normal.

In addition to the cases of multiple gastric ulcerations complicating erythroblastosis fetalis, we have observed two infants with intestinal ulcerations which perforated.

The first patient was born of a mother who at the time of delivery was suffering from a severe diarrhea

which had been present for 24 hours. On the second day of life the baby had six blood-streaked stools. Forty-eight hours after the onset of the diarrhea the blood disappeared from the stools but their frequency continued. The abdomen became greatly distended and tympanic but this complication failed to respond to therapeutic measures. Subsequent to the development of diarrhea the infant's rectal temperature ranged irregularly in the neighborhood of 103° F. The Flexner type of dysentery bacillus was isolated from the infant's and from the mother's stools, and the former was given polyvalent dysentery serum. On the seventh day of life the baby died following a series of attacks of cyanosis.

The postmortem examination was normal except for changes within the abdomen. On opening the peritoneal cavity there was an escape of gas that was evidently under moderate pressure. The cavity contained about 100 cc. of fibrino-purulent exudate, and fecal material was observed in the region of the ascending and transverse colon.

The mucosa of the entire intestinal tract was erythematous and numerous ulcerations were present in the terminal ileum, cecum, and the ascending and transverse segments of the colon. In addition, two perforations measuring 5 mm. in diameter were noted in the ascending and transverse portions of the large intestine.

The second infant with intestinal ulceration was delivered by Dr. Ada Kilbingerin of New Orleans. The mother was well throughout pregnancy and her Wassermann reaction was negative.

The infant seemed to be well until it was eighteen hours old when a rectal temperature of 101° F. developed along with a definite abdominal distension. The fever persisted and the distension increased but the cause of the infant's symptoms was not determined. The child died at the age of forty-eight hours.

At autopsy foul-smelling gas escaped from the abdominal cavity. An acute generalized peritonitis was present, and fecal matter was seen over the ascending colon and small bowel. The appendix was normal but on the anterior aspect of the cecum about 3 cm. above the base of the appendix a perforation with a diameter of 5 mm. was seen. Aside from the single perforation no evidence of intestinal ulceration was observed. The remainder of the postmortem examination was normal, no explanation being found for the perforation of the cecum.

In 1926 Kennedy¹⁷ reported the presence of bacteria in the crater of a duodenal ulcer in an infant three days of age, and in 1933 Dunham¹² published the records of a newborn infant with multiple gastric ulceration due presumably to an infection with staphylococci. In one of our patients a perforated intestinal ulceration accompanied an infection with the Flexner type of dysentery

bacillus. These observations provide a rather conclusive indication that a variety of bacteria may cause ulceration of the stomach and intestines, but in many instances these conditions seem to be entirely independent of infection. The coexistence of gastric ulceration and erythroblastosis fetalis observed in two of our cases may have been an accidental rather than a causal relationship. This deduction derives support from the infrequency with which erythroblastosis has been observed in infants with peptic ulceration.

Our small group of cases provides a fair illustration of the chief manifestations of ulcerations of the gastro-intestinal tract and their complications in young infants. These manifestations include hematemesis, melena, abdominal distension, convulsions, cyanotic attacks and the appearance of free air in the peritoneal cavity following perforation.

Ulcerations of the stomach and intestine occur with appreciable frequency particularly during the early weeks of life, indicating the need for careful consideration of this condition when young infants present typical or suggestive symptoms. The disease is serious, but by no means hopeless. In a few instances perforated peptic ulcers have been operated upon successfully in the newborn period, and it is probable that a larger number can be treated satisfactorily provided the condition is recognized promptly.

SUMMARY

1. Four instances of ulceration of the gastro-intestinal tract during the neo-natal period are reported.
2. In two of the infants multiple gastric ulcers coexisted with erythroblastosis fetalis.
3. The coexistence of these conditions is considered to be an accidental coincidence.
4. Two of our patients had perforated ulcerations of the colon. In one instance the condition was due to an infection with the Flexner type of dysentery bacillus. The etiology of the other perforated intestinal ulcer was not determined.

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Experience with Hematogenous Osteomyelitis in Children*

At the University of Minnesota Hospitals

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ACCORDING to Key¹ one-half of one per cent of all general hospital admissions are for osteomyelitis. The age group most often afflicted is that between 9 and 14, and boys are afflicted about twice as often as girls. If the disease were a short-term indisposition, it would therefore not be of great economic importance, but it is still true that, for the majority of cases, those afflicted with the disease have it for the rest of their lives. Although the onset usually comes in the age period indicated, no age group is immune to the disease. Green and Shannon² collected 95 cases of the disease in infants under 2 years of age in 21 years at the Children's Hospital and the Infants' Hospital in Boston. At the other age extreme, Maxfield and Mitchell³ reported five cases in five years in private practice. At the University of Minnesota Hospitals we have seen nine cases in the past five years, at least one of which started in the acute fashion of childhood osteomyelitis.

BACTERIOLOGY

Staphylococcus is by far the most important organism in osteomyelitis. Of 697 cases collected from the literature by Key, 89 per cent yielded staphylococcus on culture; less than 5 per cent showed streptococcus; 2½ per cent showed pneumococcus and 2½ per cent showed mixed staphylococcus and streptococcus; the remainder were typhoid and influenza bacillus. Infants differ from other osteomyelitic patients in that they suffer from streptococcal infections twice as often as from staphylococci.²

THE DEVELOPMENT OF OSTEOMYELITIS

It is generally agreed that hematogenous osteomyelitis is the result of a combination of circumstances. In 25 per cent of cases it is possible to demonstrate a definite lesion somewhere in the body from which a low grade bacteremia has resulted; in the remainder of cases such a lesion undoubtedly exists or has existed, but is of so minor a grade as to have been overlooked by the patient.¹

Trauma is usually considered to be the deciding factor which leads to hematogenous osteomyelitis once a low grade bacteremia has developed; a definite history of trauma can be obtained in about 25 per cent of cases.

The question of why bacteremia results in infection in the bones has been studied by Hobo (cited by Key), who found that if India ink is injected intravenously into rabbits, it settles chiefly in the reticuloendothelial system and in the wide capillaries of the diaphysis of the long bones adjacent to the epiphysis. Key summarizes these

facts thus: "If we correlate this with the fact that epiphyseal strains are especially apt to occur in growing children and that these may produce minute asymptomatic hemorrhages adjacent to the epiphyseal line, then we have a fairly rational explanation of the development of osteomyelitis in this position."

ADVANCE OF THE DISEASE

Deposit and growth of pyogenic organisms in the ends of the long bones is followed by pus formation; and it is thought that infection is more severe, spreads more widely, and causes more toxemia than an abscess in the soft tissue because of the rigid walls that surround it. For the same reason, thrombosis of blood vessels also is more extensive. The abscess gains in size and follows the course of least resistance, until a means of escape is found, until the patient dies in toxemia, or until the resistance of the patient overcomes the disease without drainage.

Bone necrosis occurs, and much of this necrotic bone is absorbed, but if sufficiently large pieces become necrotic and are surrounded by pus instead of being in contact with osteoclasts and fixed tissue cells, absorption fails to occur, and sequestra form. The pus escapes by virtue of this destruction, most often into the marrow cavity, next most often through the haversian canals of the cortex to the subperiosteal space. From this position it may elevate the periosteum over wide areas, escaping into the soft tissues by virtue of perforation of the periosteum or even back into the bone at other levels through other haversian canals. Usually the periosteum is firmly attached to the epiphyseal line, and pus does not therefore escape into the joint adjacent; an exception to this is the hip joint, where the anatomical arrangement is different. Rarely, the infection passes directly through the epiphysis to the joint.¹

New bone production occurs wherever living osteoblasts retain a good blood supply and are in relation to the infection. Such a situation obtains on the elevated periosteum, and here new bone is formed to make the involucrum. New bone also is believed to form throughout the haversian canal system, leading to gradually increasing density of the bone as the process becomes older.¹

THE CLINICAL PICTURE IN ACUTE OSTEOMYELITIS

In the typical case of acute hematogenous osteomyelitis, the boy becomes severely ill in the course of a very few hours. The temperature rises steeply, usually with chills, and prostration quickly appears. The patient may or may not have had pain in the involved bone or bones prior to the onset of the symptoms of septicemia. If the

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patient survives, Roentgen changes in the bone appear in from 7 to 12 days, leaving a moth-eaten appearance in the bone involved. Earlier changes are not apparent because the picture depends upon resorption of bone, which proceeds slowly. There is great variability in the manner of onset of the disease, and some patients do not appear acutely ill at any phase of the disease, but the majority are extremely ill, and prostration is marked; this is true also of infants.

It is the rule that blood culture reveals many colonies of "coagulase positive" staphylococcus. The local signs include exquisite tenderness in the region of the involved bone, but this is usually not well enough localized to permit certainty as to the bone involved until days have passed. Local tissue swelling and heat and even redness may be equally confusing, particularly in the younger child. Definite differentiation from suppurative arthritis may be impossible for days.

CHRONIC OSTEOMYELITIS

If spontaneous or surgical drainage of the pus occurs, usually there develops a cavity within the bone filled with infected granulation tissue. Sclerosis of the bone occurs, and the bone becomes less well supplied with blood than normal and therefore less able to combat infection. From time to time minor traumata lead to exacerbations associated with fever, pain, and abscess formation. In some instances, sinuses to the skin form and drain for months or years; in others, the lesion becomes quiescent, and the skin heals, only to become reactivated at a later date. Coupled with these changes, sequestration occurs, and bits of dead bone either are extruded spontaneously or remain within the bone or soft tissues to keep the infection active until they are removed surgically. The course in chronic osteomyelitis differs little, whether hematogenous in origin or due to direct contamination from the outside.

Ultimately these patients may die of a variety of causes, such as septicemia, metastatic suppurative processes, amyloid disease, intercurrent infections, etc.

TREATMENT OF HEMATOGENOUS OSTEOMYELITIS IN CHILDREN AT THE UNIVERSITY OF MINNESOTA HOSPITALS

One hundred twenty-two patients under 21 years of age were treated for osteomyelitis at the University of Minnesota Hospitals from January 1, 1938, to January 1, 1943. It is proposed to discuss the results of a variety of the treatments advocated in the light of this experience.

Experience with Acute Osteomyelitis. Prophylaxis is possible to some extent in those known to have a low grade bacteremia, following the drainage of abscesses, in furunculosis, etc. In this group of patients, the likelihood of development of osteomyelitis should be considerably diminished by administration of sulfathiazole for a period and studious avoidance of trauma. This procedure has been followed in several cases in the recent past, but will be impossible to evaluate until a large series has been attained.

With regard to the management of fully developed acute osteomyelitis, opinion is divided into several groups,

those advocating immediate radical surgery,^{4,5,6,7,8} those advocating operation after an interval of some days,⁹ those advocating nonoperative management with drainage of pus when it becomes apparent in the soft tissues,¹⁰ and those advocating nonoperative treatment throughout.^{11,12} Crossan¹³ made a summary in 1938 of all the methods of therapy advocated for acute osteomyelitis and reached the conclusion that the prognosis was poor by any method of therapy, implying that the very variety of treatments at that time indicated the inadequacy of any of them.

In a review of "Progress in Orthopedic Surgery in 1941," the American Academy of Orthopedic Surgeons concluded that neither complete conservatism nor radical surgery is in order.¹⁴ It favors conservative operative measures when indicated, and supportive measures, including plaster. This policy has many advocates.^{2,15,13} For several years the policy on the surgical service here was that of immobilization and elevation in plaster until pus became apparent in the soft tissues, demanding drainage.¹⁰

Our experience with this method in the past five years is portrayed in Table I. Twenty-eight cases of acute

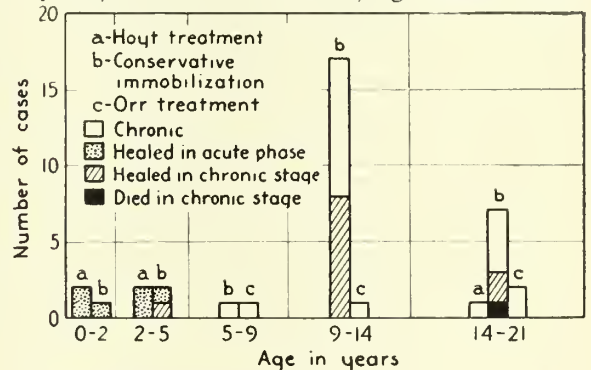


Fig. 1. Relation of age of patient to the result in 37 cases of acute osteomyelitis in children.

osteomyelitis in children treated in this fashion all went on to chronic osteomyelitis with the exception of 2 cases—disease in a humerus in a 2½ year old infant, and in two digits in a 1 week old infant. Of the 26 cases which went on to chronic disease, 1 died later of staphylococcus septicemia with terminal meningitis, 14 have failed to heal, and 11 have healed, 6 with continuation of conservative measures, 2 with the Orr method, 2 with the use of lucite drains, and 1 with saucerization and sulfathiazole implantation.

Orr⁸ and Trueta¹⁶ favor opening the bone, saucerizing, packing with vaselined gauze, and applying plaster, changing plaster and dressings only when the odor necessitates it. Orr reported a considerable series of successful cases, but few others have been as successful with the method. Pyrah and Pain¹⁷ lost both of the patients on whom they tried the method.

At the University of Minnesota Hospitals, the Orr method was applied in 4 cases of acute osteomyelitis in the period under study; all became chronic, and all have failed to heal.

Combinations of sulfathiazole and surgical intervention have been used by many surgeons for acute osteo-

myelitis,^{18,19,20} but there have been few cures. It is felt, however, that sulfathiazole helps to prevent the development of metastatic foci during surgical procedures.

Sulfathiazole was used as the sole therapeutic measure, aside from bed rest, by Hoyt and coworkers, in 8 cases.¹¹ Diagnosis was established by Roentgen film, blood culture, aspiration of abscesses, or, more often, by two or more of these measures. Even when fluctuation indicated pus in the soft tissues, they continued with nonoperative management, and found the abscesses usually resorbed without drainage. There were no deaths, only one case drained spontaneously, and 7 of the 8 were apparently healed completely at the time of the report. The blood levels were kept at about 3 to 4 milligrams per 100 cc. of blood for a period of some two months on the average. Since publication of the original article, this group has increased the number of cases to 17 with equally encouraging results.¹²

Up to January 1, 1943, 5 cases of acute osteomyelitis have been treated at the University Hospitals with bed rest, with or without plaster, and sulfathiazole by mouth over fairly long periods. This treatment, initiated by Drs. Spink and Paine in April, 1940, has been used with some success since in a few cases, although the tendency has been to drain when Roentgen changes have occurred. Of 5 cases so treated, 4, all under 5 years of age, healed without going into the chronic stage, and one became chronic.

A still more recent development is the use of penicillin in the treatment of the disease. This drug is particularly valuable because many times the organism becomes resistant to the sulfonamides as shown by Spink.²¹ Florey and his group have given penicillin to 3 patients with osteomyelitis, with apparently some benefit in each of them.²² The chief drawback is the tremendous cost of the drug.

Studies with the more specialized methods of chemotherapy are in progress under Spink at this hospital.

Among the whole group of patients with acute osteomyelitis seen, a most striking observation has been the difference in results associated with differences in age. Of 7 patients under 5 years of age, 6 healed without passing into the chronic stage, and the seventh healed later (after saucerization and sulfathiazole implantation). This experience tends to support the statements of Green and Shannon, that osteomyelitis in infancy is a disease from which recovery under conservative management is the rule.

Experience with Chronic Osteomyelitis. Baer's maggot treatment for chronic osteomyelitis²³ and the Carrel-Dakin therapy have been widely abandoned, and neither has been used at all here in the past five years. The bulk of the patients suffering from chronic osteomyelitis have been treated here in an expectant fashion, paying no attention to drainage as long as incapacitation did not result. Sequestrectomies have been performed, whenever drainage or fever has increased and Roentgen evidence of sequestra has been present. Plaster immobilization has been employed whenever increased fever, tenderness, or drainage has been manifest.

Chart II indicates our experience under this regimen.

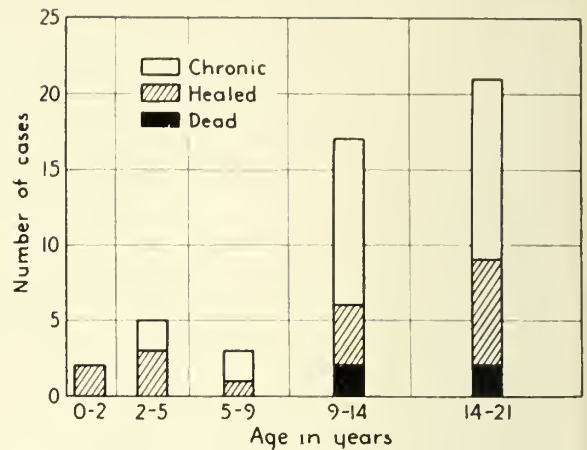


Fig. 11. Lack of relation of age of patient and end result in chronic osteomyelitis treated by conservative measures.

Although the number of patients in the younger age groups is small, it seems apparent that the situation of the younger patients with the chronic disease is not as much more favorable than that of the older ones as is the case in acute osteomyelitis. This general impression is borne out under other treatments of the chronic disease also.

Our experience with all the chronic group is portrayed in Chart III. Of 47 patients treated expectantly, 4 died (one amyloid disease, 2 septicemia, and one meningitis), and 17 healed. The period of treatment required for healing usually was a period of several years, although a very few healed in a matter of months. Of the group of 26 cases which remained in the chronic stage, the bulk were followed for years. A most impressive observation on this group has been the great likelihood of recurrence, even after years of remission.

Nine patients with chronic osteomyelitis were treated here by the Orr treatment, and 3 of these ultimately healed. In 5 cases entire bones were removed, with or without sulfonamide implantation, and apparently complete healing has occurred in 3 of them.

One of the earliest reports on the use of sulfathiazole for chronic osteomyelitis in the literature is that of Paine and Spink from this clinic.²⁴ They saucerized the tibia in a 7 year old girl, and implanted 5 grams of sulfathiazole, closing the wound primarily. The wound healed primarily, and the patient is still symptom-free. A second patient was similarly treated, but at the time of the report it was too early to know what the result would be; this patient ultimately failed to heal.

Dickson and associates²⁵ reported 18 cases so treated; 14 healed primarily, 2 failed to heal, and 2 were too recent to allow judgment. Key²⁶ has had similar results, securing primary healing in 14 out of 17 cases. Baker²⁷ has observed that primary closure after saucerization and implantation of sulfathiazole is usually successful, but that if the wound is packed open after the implantation of the drug, results are no better than if the sulfonamide were not used at all. This observation may explain the failure of a case which was so treated by Spink and the author in February, 1940, apparently one of the first cases to receive sulfathiazole implantation.

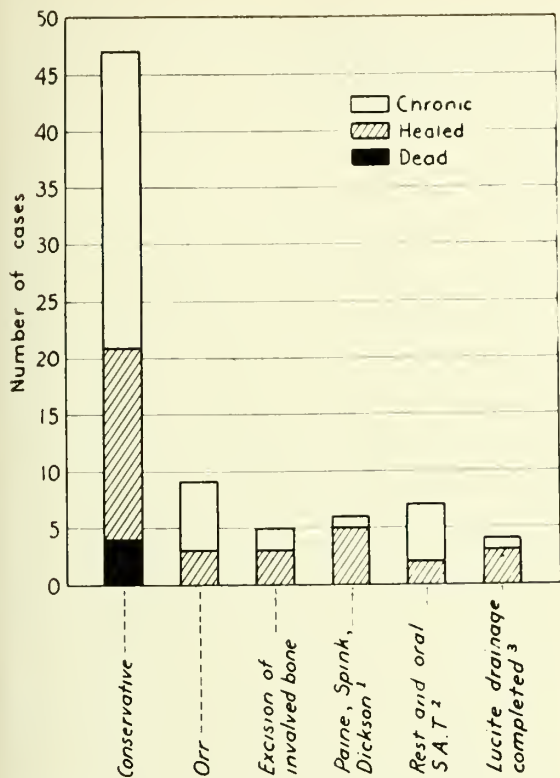


FIG. III. Results following various types of therapy for chronic osteomyelitis.

¹Including adults—12 cases have been so treated—7 have healed. ²Of these patients were relieved of pain—they had no drainage at time of treatment.

³Other children are still under treatment—all are promising. 5 adults have also been treated with encouraging results. Ref.: "Treatment of Chronic Osteomyelitis by Prolonged Dependent Drainage."

N. B.: In addition, 2 patients received no therapy and remained with drainage; one received sulfathiazole locally without saucerization without benefit, and 2 were treated with chemotherapeutic means to be reported by Dr. W. W. Spink.

Our complete experience with the Paine-Spink-Dickson treatment is summarized also in Chart III. Of 6 children, 5 are apparently completely healed. Several adults have also been so treated; and the total figures for hematogenous osteomyelitis show rapid and clinically complete healing in 7 of 12 cases, but in no instance has the Roentgen appearance returned to normal. Of 2 additional adults, with chronic osteomyelitis resulting from fractures of the lower end of the femur, one has healed and one has not.

Seven patients with chronic osteomyelitis have been given bed rest and sulfathiazole by mouth for prolonged periods. In no instance has healing resulted, but in 2 cases with pain but no drainage, the pain has been relieved.

Finally, prolonged dependent drainage with "lucite" drains has been used in a series of 7 children and 5 adults.²⁸ The period for healing seems to be about 15 to 18 months. Of 4 children in whom this therapy has been adequately applied, complete healing seems to have occurred in 3. This method is of particular value in sites in which insufficient soft tissues are present to fill the defect after saucerization and sulfathiazole implanta-

COMMENT

In view of the small number of cases studied, and the fact that each type of treatment was selected expressly for the case in hand, one cannot draw statistically sound conclusions concerning all the measures discussed. Nevertheless, it does seem justifiable to conclude on the basis of the figures presented and observation of the cases discussed that acute osteomyelitis in very young children is a more benign disease than in older individuals. It appears, also, that prolonged bed rest, best with plaster fixation, with oral maintenance of a sulfathiazole blood level of 3 to 5 milligrams per 100 cc. is the most effective measure in early acute osteomyelitis, regardless of the age of the patient. In the chronic disease, the choice would appear to lie between saucerization, sulfathiazole implantation, primary closure, and plaster on the one hand, and prolonged dependent drainage with lucite tubes on the other.

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Responsibilities of the Physician in the Problem of Rheumatic Fever in Children

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IN light of the great progress made during the past two decades in securing public and professional support for extensive programs aimed at the control of two other serious diseases of childhood, namely, tuberculosis and poliomyelitis, it is difficult to understand why recognition of rheumatic fever as a major devastator of our children has been so tardy. Again it is the war which has compelled us to give attention to an important problem, admittedly neglected in peace time. Examination of the figures of the Selective Service, as presented by Roundtree et al.¹ reveals that defects of the cardiovascular system are responsible for the largest number of rejections among young men who are disqualified for any military service. It is well known that most of the individuals who survive acute rheumatic infection in childhood carry scars in the heart valves. This fact, together with the knowledge of the high incidence of rheumatic disease in school children, justifies the assumption that rheumatic infections during the childhood period play the major role in producing the total physical unfitness due to cardiovascular disease in young adults.

The practicing physician is fully aware of the importance of the social, educational, economic, public health, geographic and military aspects of the rheumatic fever problem. He is likewise thoroughly sympathetic with investigative work which promises to clarify the fundamental etiology of the disease. However, his greatest responsibility at the present time is that of learning to diagnose the disease in its early stages. Being aware of its protean manifestations, he will welcome the time when more specific diagnostic tests are developed which will enable him to direct the care of his patients more successfully. He, above all people, is cognizant of the need for a really effective form of specific therapy for the active disease. In lieu of such a boon, however, he must be content, for the present, with measures which ameliorate the condition in any way. The fact that methods have been brought forth which appear to be effective in preventing recrudescences of the disease offers some encouragement. The purpose of the present paper is to consider those aspects of the rheumatic fever problem for which the physician has direct responsibility, namely, diagnosis, treatment and prevention of recurrences.

DIAGNOSIS

Of prime necessity in the diagnosis is thorough familiarity with the extremely variable manifestations of rheumatic fever in children. These have been discussed at length by many writers, so only cursory mention of the main categories is given here for orientation: (a) chorea minor, (b) subcutaneous fibroid nodules, (c) rheumatic arthritis, (d) rheumatic carditis (pericarditis, myocarditis, endocarditis-pancarditis), (e) rheumatic erythema or

purpura, (f) miscellaneous tissue—throat, kidneys, and serous membranes, (g) general evidences of infection.

Valuable information in making the diagnosis of rheumatic fever is obtained by routine laboratory studies, sedimentation rate of the erythrocytes, electrocardiographic and roentgenologic findings. Text books and various articles mention about fifty different conditions whose manifestations are such that they may be considered in the differential diagnosis of rheumatic fever.² The author has tried to simplify the diagnosis of rheumatic fever from a practical point of view by studying hospital records; first, by consideration of disorders which were believed to be rheumatic fever and subsequently found not to be, and second, by consideration of diseases thought to be responsible for the symptoms which were actually due to rheumatic infection.

The case records of 982 children admitted to the pediatric wards of the University of Minnesota Hospital during the year 1941 were studied in regard to the diagnoses made on admission by the intern and resident staff members and referring physicians. Over one-half of these children were between 5 and 15 years, the usual age incidence of rheumatic infection. Rather surprising was the fact that rheumatic fever was mentioned in the differential diagnosis on 20 occasions. The conditions which proved to be responsible for the symptoms in these children were:

Acute osteomyelitis	4
Hyperthyroidism	3
Leukemia	2
Acute glomerulonephritis	2
Poliomyelitis	1
Hodgkin's disease	1
Hysteria	1
Catarrhal jaundice	1
Chronic infectious arthritis	1
Recurrent tonsillitis	1
Idiopathic hypoprothrombinemia (symptomatic purpura)	1
Purulent pericarditis	1
Toxic myocarditis following scarlet fever with mastoiditis and lateral sinus thrombosis	1

It is evident from the foregoing list that a wide variety of disease states may present symptoms which simulate those of rheumatic infection. Patients having such symptoms constituted nearly 3 per cent of the total number of school-age children admitted to the Hospital. If obviously non-rheumatic patients, such as those admitted for treatment of congenital deformities, fractures, diabetes and epilepsy, are excluded from consideration, the incidence of cases in this series presenting signs or symptoms suggestive of rheumatic infection is found to be slightly more than 10 per cent.

It may be very difficult at times to ascertain the true diagnosis early in the course of acute osteomyelitis; that this occurred on four occasions during the period studied

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is significant. In three children with hyperthyroidism there was sufficient similarity in the manifestations to cause chorea minor to be mentioned as a diagnostic possibility. Children in the early stages of acute lymphatic leukemia may present symptoms and signs suggesting acute rheumatic fever, such as arthritic-like pain, hemic murmurs, epistaxis, and fever. During the year 1941, two such cases were encountered and another was seen during the past winter. Similar cases have been reported in detail by a number of authors. In one instance in this series, acute rheumatic fever was the diagnosis given when the patient was suffering from infantile paralysis. This is especially likely to occur in the non-epidemic cases of poliomyelitis, because of the prominence of joint and muscle pain.

From a somewhat different point of view, namely that of cardiac involvement, confusion arose because of nephritis. Cardiac failure may occur in children with acute glomerulonephritis, a phenomenon which has been stressed by Rubin and Rapaport,⁴ and this fact explains the mistaken diagnosis of acute rheumatic fever in the two cases here encountered. The child with Hodgkin's disease had complained of pain in various parts of the body for some weeks before the diagnosis was finally established by histologic examination of a biopsy specimen. The 10 year old boy in whom rheumatic fever was strongly suspected but who proved to have hysteria, complained of polyarthralgia for a period of several months before coming to the hospital. Previous administration of salicylates had been ineffective. On admission to the hospital the sedimentation of the erythrocytes was found to be normal. Rather dramatically in a few days the symptoms subsided without the aid of therapeutic measures and further questioning by the interns and psychiatric staff revealed distinct conflicts in the child's life. The diagnosis of hysteria seemed fully justified in view of later findings.

There is a little more difficulty in understanding why the child with jaundice was thought to have rheumatic fever although he had complained of abdominal and body pain for some time before the icterus was noted. Confusion of acute rheumatic fever with chronic infectious arthritis is not unusual during the early phase of the latter disease as was the situation in the patient in this series. The association of body aches and pains with upper respiratory infections, no doubt explains why one boy was thought to have a rheumatic infection when he had closely recurring episodes of acute sore throat. Removal of the tonsils in this patient seemed to be distinctly beneficial. In the case of the young girl with purpura, epistaxis, and pains in the extremities who was believed to have a rheumatic infection, the diagnosis was determined mostly by exclusion. This was a most unusual type of case, in that there was prolongation of the prothrombin time in the absence of other evidence of liver disease. Rheumatic fever was present in several members of the family and one brother now has a severe rheumatic infection. Detection of a friction rub led to the diagnosis of rheumatic fever in the child with purulent pericarditis, but pericardial tap revealed an exudate containing pus and staphylococci. Recovery followed

treatment with sulfapyridine. In the last of the 20 patients in whom the diagnosis of rheumatic fever was considered a possibility, the child had a hemolytic streptococcal infection; a loud cardiac murmur caused the diagnosis of rheumatic fever to be made.

Many other conditions exist which may present symptoms similar to those found in children suffering from various rheumatic infections. Some of these are rare. Meningococemia may cause symptoms of polyarthritides and present a clinical picture simulating rheumatic fever. No such case was encountered during the time this study was made, although Dyson⁵ recently had an example in which the findings so strongly suggested rheumatic fever that sulfonamide drugs were avoided until three weeks later when blood cultures revealed the causative organism. The response to chemotherapy was prompt, and recovery ensued. No children with undulant fever were seen during the time of this study.

Apparently, difficulty in differential diagnosis results chiefly from failure to recognize rheumatic infection in children. I recently reported³ a review of the diagnoses made by admitting interns and practicing physicians in 271 children with rheumatic fever who were referred to the Department of Pediatrics of the University of Minnesota Hospital over a period of 12 years. There was agreement between the diagnoses made on admission and those finally made in two-thirds of the cases. In only 19 of the 96 cases with chorea minor was there not complete agreement in the diagnoses. Of especial interest are the remaining one-third, 90 cases of all types in which there was no agreement between the admitting and referring diagnoses. Of these, diagnoses could well have been made in 15 instances. The conditions causing confusion in making the correct diagnoses in the other 75 cases are outlined below without referring to the actual number of cases in each group.

- A. Nervousness, as a symptom of chorea minor.
- B. Skin lesions, erythema, purpura.
- C. Nephritis.
- D. Low grade infections.
- E. Acute fulminating illness.
- F. Osteomyelitis.
- G. Poliomyelitis.
- H. Appendicitis.

Chorea minor is readily diagnosed. However, it would appear that the diagnosis could well have been made earlier in the course of the disease in a number of instances. To detect evidence of the disturbed muscle tonus in the early stage of the disease and in the mild cases, we employ the procedure popularized by Dr. Irvine McQuarrie. Although a number of methods of examination are useful, this test seems to fit readily into the routine physical examination. The examiner places his hands, palms upward, in front of the patient, and the child while sitting comfortably is first requested to place his hands palms downward upon the hands of the examiner, then to place his tongue between his lips without touching the teeth. The subject is asked to sit as still as possible for a few moments. Even the six-year old child is able to remain very quiet under these conditions. One

may observe evidences of jerking of certain muscle groups, facial grimacing or feel the dystonia in the fingers. Evidence of weakness of muscle may be obtained by asking the child to grasp the fingers of the examiner and to hold firmly. The patient with chorea usually grasps firmly, loosens the hold, and grips tightly again, often with much gusto. Repeated use of the so-called finer tests soon acquaints one with normal responses. If the physician becomes suspicious of the reaction, he should inquire directly and indirectly of the mother for evidence of emotional instability or personality change in the patient. By the use of such procedure, many of the cases of chorea may be detected earlier and unsuspected mild cases may be brought to light.

There are other types of conditions which appeared to cause confusion in the diagnosis of rheumatic fever in the cases studied. Erythematous and purpuric skin lesions may occur in children with rheumatic fever, which may often be of value in arriving at the diagnosis. Albuminuria and microscopic hematuria may be found in acute rheumatic fever. Oftentimes other manifestations of the disease may be so mild that nephritis may be suspected. A real problem is found in those patients who have low grade rheumatic infection yet are not diagnosed as such. One must be aware of the fact that many patients with rheumatic fever, before they have a severe episode, will have a preceding history of such symptoms as slight anorexia, loss of or failure to gain in weight, weakness, personality change, easy fatigability, occasional epistaxis, pallor and mild pains in the muscles and joints. On the other hand, there are times when the patient with rheumatic fever is so acutely ill that he is suspected of having sepsis of some type. Often a case of carditis is diagnosed as "flu" or pneumonia from which recovery is slow. Under these conditions rheumatic fever should be suspected and the heart carefully examined. In this general group were six patients who were sent to the hospital with the diagnosis of subacute bacterial endocarditis, all of whom were actually suffering from severe rheumatic infection without this complication. Subacute bacterial endocarditis may occur in the child but far less frequently than in the adolescent or young adult. The fact that during the interval the study was made, four children were sent in with the diagnosis of poliomyelitis is significant. During the past two years a number of children have been referred to both the University Hospitals and the Minneapolis General Hospital because of possible poliomyelitis but they were actually suffering from acute rheumatic fever. We believe the reason for this is the apparent desire on the part of the physician or parent to obtain the Sister Kenny treatment being carried on at these institutions. Finally and most surprising in this series of cases, was the fact that appendicitis was frequently confused with rheumatic fever. In 25 per cent of the 75 cases in whom the diagnosis was missed, the presence of abdominal pain caused the diagnosis of appendicitis to be given or strongly suspected. Abdominal pain frequently occurs in patients suffering from rheumatic infections, but its appearance as the prominent symptom in so many instances was amazing.

On the basis of this study of case records in the Department of Pediatrics at the University of Minnesota, the conditions which most frequently must be considered from a practical point of view in the differential diagnosis of acute rheumatic infection in children are:

1. Appendicitis.
2. Poliomyelitis.
3. Osteomyelitis.
4. Acute glomerulonephritis.
5. Leukemia.
6. Hyperthyroidism.
7. Skin manifestation (erythema, purpura).
8. Evidences of low grade infection.
9. Acute fulminating infections, such as septicemia.

TREATMENT

The methods of treatment of acute rheumatic fever in children have shown very little change in the past few years. The most important single fact emphasized by many writers is that the sulfonamide drugs are ineffectual in the treatment of the active disease. The most significant effective measure is strict bed rest. Whether dealing with pain, choreiform movements, or cardiac decompensation, the treatment is symptomatic and in each case must be individualized. Of more interest in recent years is the matter of the prevention of recrudescence, which is perhaps the most characteristic feature of rheumatic infection. The physician must therefore assume responsibility for continuous care and advice for any patient who has suffered a rheumatic episode.

Recognition of recurrence: Not only should the physician be able to detect evidence of the recrudescence in its incipency, but he should also acquaint the parents with the fact that it is likely to occur and should request that the parents bring the patient in for examination periodically whether or not any suspicious symptoms arise. Flare-ups of rheumatic fever are especially likely to occur following upper respiratory infection, such as a sore throat, scarlet fever, measles, varicella and rubella. Extensive studies have shown that continuous observation materially reduces the mortality of this disease.

Nutritional and hygienic factors: Patients who have suffered an attack of rheumatic fever should at all times be maintained on a complete nutritious diet (milk, meat, eggs, butter, vegetables, fruits, whole wheat or enriched cereals and breads, and cod liver oil or its equivalent in vitamins A and D and iron, if anemia is present). This must be done, even if it is necessary to request help from the rationing board or social agencies. Regular sleeping habits, preferably with an afternoon rest period, should be prescribed. Advice regarding the avoidance of fatigue, needless exposure to the elements or to infections and in the use of proper clothing should be given.

Removal of foci of infection: Removal of the tonsils and adenoids will not prevent further attacks of rheumatic fever, but, if indication for their removal exists independent of the rheumatic infection, the procedure should be done, and sulfonamide compounds used prophylactically during this time. Infections in the teeth and the sinuses should be eradicated.

Change of climate: There is considerable evidence that recurrences are less likely to develop, if the patient can

live in such localities as Southern Florida, Cuba or Puerto Rico, Arizona and Southern California. In most cases, however, moving to a more favorable climate is out of the question.

Social and economic conditions: At times, the physician in certain cases can make recommendations to relatives or social agencies to keep the patient in more favorable environmental conditions. If physicians assume full responsibility in regard to the rheumatic infections, they can help to prevent too great expansion in the direction of governmental control of those patients in the relatively less favored social and economic conditions.

Sodium salicylate as a prophylactic agent: Recently Coburn⁶ of Columbia University has used sodium salicylate (4-6 gms. daily to adults and 2-4 gms. daily to children) to prevent recrudescences in certain subjects who have had rheumatic infections. If, at the time the patient suffers an acute upper respiratory infection, hemolytic streptococci Group A are cultured from the throat, salicylates are prescribed for use continuously for a period of one month. By so doing, according to this worker, the chances of a flare-up of the disease are greatly reduced. The matter of obtaining satisfactory throat cultures during each respiratory infection in children would be difficult in private practice, so that this type of prophylaxis may be more valuable in institutions.

Sulfonamides in the prevention of recurrences: A number of investigators have shown that recrudescences of rheumatic fever are far less likely to occur if one of the sulfonamide compounds is taken daily throughout the season (October to June) that recurrences usually develop. Most workers recommend sulfanilamide 10 grains (0.67 gms.) twice daily for this purpose, and almost uniformly favorable results are reported. If this type of therapy is to be used, the situation should be discussed

with the patient and the parents in order that they may understand the purpose of the procedure, to insure proper cooperation. The aim is to prevent a recurrence which may prove fatal or at least render additional damage to the heart. Absence of active rheumatic infection must be determined before the drug is used. It is well to begin with smaller doses, 5 grains (0.3 gms.) once or twice daily, and to check the hemoglobin, white cell count, differential white cell count and urine at bi-weekly or at least weekly intervals for the first three or four weeks. If toxicity to the drug is to develop it usually does so within the first two or three weeks. Levels of the drug in the blood should be determined if at all possible, 2 to 3 mg. per 100 cc. of blood being desirable. Knowledge of the levels of sulfanilamide helps to detect those patients who are not cooperating or are careless in taking the drug regularly. If leucopenia, neutropenia or anemia occurs, the drug should be discontinued. This type of regime will not prevent recurrences during the first two weeks. If signs of a flare-up should appear shortly after the use of the drug has been instituted it is presumptive that the rheumatic infection was still active. So far sulfanilamide prophylaxis seems to be the most practical of the measures employed to prevent recrudescences of rheumatic fever, but with it, the physician should keep the patient under observation at all times.

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Third Annual Journal-Lancet Lecture

University of Minnesota
Medical School

The Third Annual JOURNAL-LANCET Lecture in the Medical School of the University of Minnesota will be delivered by Professor Ernst Gellhorn, M.D., of the Medical School of the University of Illinois. The lecture will be delivered at 8 P. M., Wednesday, May 19, 1943, in the Amphitheater, Room 15, of the Medical Sciences Building of the University. Professor Gellhorn's subject will be "Experimental Studies on Conditioned Reactions and Their Implications for Medical Problems."

The 1943 JOURNAL-LANCET Lecturer has been Professor of Physiology at the University of Illinois since 1933. Prior to that time he held a similar post at the University of Oregon, and earlier at the University in Halle, Germany. He has been for eight years liaison Professor between the Departments of Psychiatry and Physiology, working under a Rockefeller Foundation

grant to the University of Illinois. His main field of investigation has been neurophysiology, with especial reference to clinical physiological problems. He is the author of many important original research papers, and several books, the last of which was published in 1942 and is entitled *Autonomic Regulations—Their Importance to Physiology and Psychiatry*.

Professor Gellhorn has made particularly important contributions to the study of specific physiological disorders in patients with nervous and mental diseases. He has been a pioneer in the endeavor to bring psychiatric problems into the scope of study by physiological methods.

The first JOURNAL-LANCET Lecturer was Dr. Rene Dubos, Professor of Comparative Pathology at Harvard University, and the second, Dr. Herald R. Cox of the United States Public Health Service.

The Problems and Control of Dental Caries in Children

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ALMOST half of the first two million men examined under the present Selective Service Act were rejected because of physical defects. In commenting on this finding, Ciocco, Klein and Palmer state,¹ "Complacency about the Nation's health engendered in late years by emphasis on the declining mortality and the so-called increase in longevity received something of a shock recently when the results of physical examinations of selectees were made public. . . . The immediate reaction based on the exigencies of the moment has been to consider the 'rehabilitation' of men found defective. However, in keeping with the objectives of modern medical science it is appropriate to inquire into the possibilities of preventing the conditions which led to disqualification of men as soldiers." Since dental defects, the leading cause of rejection, was responsible for 20.9 per cent² of all rejections, and since the disease, dental caries, is the principal cause of dental defects in persons below age 35 years, it becomes of major importance to examine our present knowledge of the problem and control of dental caries.

The findings of several dental surveys^{3,4,5} indicate that dental caries is the most prevalent chronic disease of children in the United States. The data in Tables I and II on the prevalence of dental caries in children of Nicollet County, Minnesota, were collected recently (1940-41) by the United States Public Health Service in cooperation with the Minnesota Department of Health. These data illustrate the common finding that more than 90 per cent of children aged 6 years have dental caries in the deciduous teeth and that more than 90 per cent of children aged 14 years have one or more carious permanent teeth. The average number of carious teeth per child for each age group indicates the manner in which carious defects accumulate with age.

Although the etiology of dental caries is not fully known, the chemicobacterial theory proposed by Miller⁶ in 1887 is generally accepted as a broad fundamental description of the carious process. The theory holds that dental decay is a progressive decalcification of the enamel and dentin by lactic acid formed as a result of fermentation of carbohydrates. On the basis of this broad concept of the disease, four major methods for the prevention and control of dental caries have been advocated and promoted. These are: (1) oral hygiene, (2) nutrition, (3) restriction of carbohydrates in the diet, (4) interruption of the carious process by treatment with dental filling materials.

The first three of these represent preventive methods which have been promoted in this country for the past

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two or three decades. However, since available evidence^{3,4,5,7} indicates that the incidence of dental caries has not decreased in this country, it is generally agreed that singly or in combination these preventive procedures have failed. Failure may have been due to basic defects in the methods or to deficiencies in their application. Considerable evidence has been accumulated in recent years which partially explains why these measures have not been successful in reducing the incidence of caries.

The oral hygiene method is founded on the assumption that caries is caused by acids formed by mouth organisms from foods adherent to tooth surfaces and therefore the process can be prevented by removing the substrate by proper use of the toothbrush. Although the sale and use of toothbrushes and tooth cleansing agents have increased tremendously, the expected reduction in dental decay has not yet been demonstrated. Recent findings of Fosdick and co-workers⁸ have a significant bearing on this subject. These workers found that when sugar was placed in an open cavity or in a so-called caries-susceptible area, the pH dropped to levels as low as 4.0 in three minutes. This fact, together with the finding that saliva or dissolved enamel neutralizes the acids in a comparatively short time, indicates that most of the damage to the tooth is done during or shortly after meals. In general the timing of the toothbrushing habit has not been in conformity with these observations.

The second method, nutrition, is based on a common approach to the prevention of many diseases, namely, increasing the resistance of the host. Since teeth are calcified structures, it seemed likely that resistance to decalcifying forces could be increased by fortifying the diet with calcifying elements for the proper formation of the teeth and for the maintenance of their integrity. Defective tooth structure may be produced in laboratory animals by feeding them on diets markedly deficient in one or more of the calcifying components, calcium, phosphorus, and vitamin D. Rigidly controlled experiments have failed to prove, however, that dental caries can be prevented by fortification of the diet.^{9,10,11,14} Furthermore, studies^{12,13} on population groups indicate that persons with evidence of gross deficiencies in nutrition, such as rickets and osteomalacia do not have more dental caries than other members of the same population groups who are without signs of dietary deficiency diseases.

The third method for the prevention of dental caries—restriction of carbohydrates in the diet—might be included under the discussion of nutrition. However, this method is concerned solely with an attempt to withhold from the diet the nutrient substance required by mouth organisms for the rapid production of acids. The work of Bunting and Jay¹⁴ indicated that prevention of dental

caries by rigid restriction of carbohydrates in the diet is possible. Confirmatory evidence has been presented by several independent investigators.^{15,16} Forces operating to render this method of caries prevention impractical can be noted from the fact, for example, that in the United States the annual consumption of sugar per person has shown a steady increase from 8 pounds in 1823 to 108 pounds in 1940.

Although we have not been successful in reducing the incidence of dental caries in children of this country by preventive measures, either because of basic defects in the methods or in their application, long clinical experience has established that the loss of teeth attacked by caries can be prevented or indefinitely postponed by proper treatment and placement of dental filling materials. Quantitative evidence presented recently supports the acknowledged effectiveness of this procedure for the prevention of tooth loss. For example, Nicollet County school children had slightly more carious permanent teeth than children in Hagerstown, Maryland, yet they had lost only half as many permanent teeth as the Hagerstown children. The only reasonable explanation of this reversal in the expected tooth mortality was the finding that Nicollet County children had approximately twice as many carious teeth filled as had Hagerstown children.¹⁷

Since this method of controlling dental caries and preventing tooth loss is based on early detection of the carious lesions and treatment with dental fillings, some concept of the size and nature of the job can be gained from a study of the prevalence figures presented in Tables I and II. The data in Table II indicate, for example, that the average number of carious permanent teeth per child increases relatively uniformly from 0.5 at age 6 years to 11.2 at age 18 years. The average child in Nicollet County is developing slightly less than one carious permanent tooth per year during the age span 6 to 18 years. A similar analysis of the data in Table I indicates that Nicollet County children develop slightly less than two carious deciduous teeth per year per child during the age span 2 to 6 years.

At present, then, the only known practical method of preventing tooth loss from dental caries is to have children's deciduous teeth examined and needed fillings placed at 2 years of age and at regular intervals thereafter until 10 to 12 years of age when exfoliation of the deciduous teeth is completed. Care of the permanent teeth should begin at age 6 and continue throughout life. This system is not only effective in preventing tooth loss but is far more economical than dental neglect which results in the loss of teeth and the need for elaborate and costly replacement appliances. Because of these facts the method has been called Protective Dentistry by Brekhus¹⁸—it does not prevent dental caries but protects against loss of teeth attacked by caries.

RELATION OF FLUORINE TO CONTROL OF CARIES

A number of elements which produce toxic effects when ingested in large amounts are now known, through the feeding of highly purified diets, to be required in trace quantities for the nutrition of laboratory animals.

In the case of fluorine, three independent lines of evidence, two of which refer to the human, have been produced for the beneficial role of this element in the preservation of the integrity of the teeth. *First*, chemical analyses of the enamel of teeth which resist caries and those which succumb to decay; *second*, epidemiological surveys of the incidence of caries in children in relation to the amount of fluorine in communal water supplies; and *third*, demonstration that extra fluorine fed to rats inhibits the initiation of molar caries in this species under a variety of experimental conditions. In the light of recent evidence, it is now realized that observations with respect to the effect of fluorine on developing teeth have been recorded over a period of 40 years, but only since 1937 has the evidence warranted any conclusion other than that fluorine produced deleterious effects on the teeth.

McKay,¹⁹ thoroughly described a condition of permanent teeth occurring in the Rocky Mountain regions characterized by mottling of the enamel with chalky white patches and frequent secondary discolorations ranging from yellow to brown. Eager, of the then U. S. Marine Hospital Service, first described this condition in 1902 when he noted its occurrence near Naples, Italy. In addition to foci in other countries, about 400 areas have since been located in the United States in which mottled enamel occurs endemically in varying degrees of severity.²⁰ McKay was able to demonstrate certain facts with reference to endemic mottled enamel which have been thoroughly confirmed, viz.: (a) only those children born in the community or who lived there from early infancy developed this condition, (b) children born in other regions and who moved to a region of endemic mottled enamel during the age period of enamel calcification developed the lesions on all teeth calcified after taking up residence in the second community, but those teeth calcified before residence in the endemic region were entirely normal and remained so, (c) the etiological factor responsible for the development of mottled enamel was associated with the communal water supply, (d) the etiological factor was commonly present only in water derived from deep wells or springs and was usually absent from surface water, and (e) mottled teeth were apparently no more susceptible or even less susceptible to decay than normal teeth. After the classical work of McKay 15 years elapsed before the presence of unusual quantities of fluorine in drinking water was indicted and proven to be the cause of mottled enamel.^{21,22} It has now been established through the work of Dean and associates²³ that the concentration of fluorine in drinking water required for the production of a mild degree of mottled enamel in 10 per cent of the children who use the drinking water continuously from early infancy is 1.0 mg. per liter (1.0 p.p.m.).

From 1931 to 1937 fluorine was almost universally regarded as an undesirable constituent of communal waters since mottled enamel is unesthetic and, when the condition is severe, the teeth are structurally inferior. Several communities in which mottled enamel occurred changed the source of the common water supply to one of a lower fluorine content with the result that mottled enamel

failed to appear in the permanent teeth of the children born subsequently to the introduction of the new drinking water. However, as mentioned above, there is now strong circumstantial and direct evidence that optimum quantities of fluorine ingested during the period of enamel calcification confers upon the teeth a lasting and considerable degree of increased resistance to caries.

Armstrong and Brekhus whose data²⁴ are quoted in Table III found no significant difference in the composition of the enamel of sound teeth and that of carious teeth with respect to calcium, phosphorus, magnesium and carbonate. The same workers in a later publication²⁵ demonstrated (see lower line of Table III) that a positive relationship exists between the fluorine content of enamel and the resistance of teeth to caries. It is unlikely that the lower fluorine content of the enamel of the carious teeth is a secondary effect of the carious process since no such result was produced by caries in the case of the other constituents of enamel. The enamel of the very severely mottled teeth of a woman who had lived for the first nineteen years of her life in a region of endemic mottled enamel were found to contain 0.033 to 0.036 per cent fluorine.²⁶ This amount is about three times that present in the enamel of the average sound non-mottled tooth. These results demonstrate that relatively small quantities of fluorine in enamel produces, or is accompanied by, profound changes in the character of the enamel. Since the woman had lived in Minneapolis for the twenty years preceding the extraction of her teeth, the results also indicated that fluorine once combined in enamel structure is not susceptible of appreciable reduction.

The inhabitants of the Island of Tristan da Cunha which lies in the South Atlantic Ocean have long been known to be unusually free from dental caries. The cause of this remarkable condition, until recently, had been uncertain. About six years ago, Dr. Reider F. Sognaes visited this island as a member of a Norwegian expedition. He obtained a number of sound exfoliated deciduous crowns and a few permanent teeth, most of the latter being carious. The enamel and dentin of these teeth were subjected to fluorine analysis²⁷ with the results summarized in Table IV. The significant finding was the relatively high fluorine content found in the enamel of both the deciduous and permanent teeth as compared with the results obtained with specimens collected in Minnesota. Furthermore, the fluorine content of the dentin of the Tristanites was considerably higher than that of Minnesotans. All of these facts served to indicate that the Tristanites continued to ingest throughout life an unusually high amount of fluorine. It thus appeared that Tristan da Cunha was yet another locality in which the inhabitants were accidentally receiving during the period of active tooth formation about the optimum quantity of fluorine for the preservation of the integrity of their teeth. This conclusion was strengthened by the clinical observations made by Dr. Sognaes, who noted that about 16 per cent of the Tristanites displayed very mildly mottled enamel.²⁸

Mention has been made that there had been some suspicion in the minds of dentists who saw mottled

enamel that such teeth may be more resistant to caries than teeth not so affected. Dr. H. Trendley Dean and his collaborators of the United States Public Health Service have compiled evidence which amounts to an almost certain demonstration that such is the case. Dean and his co-workers have also shown that the teeth of persons who throughout childhood ingested drinking water containing exceptional amounts of fluorine definitely gained in caries resistance irrespective of whether the teeth were mottled. These investigations have furnished the second line of evidence in support of the beneficial role of fluorine.

Table V shows the results of a study made by Dean's group in Wisconsin.²⁹ Note the unusually low incidence of dental decay observed in Green Bay as compared with seven other towns and cities in Wisconsin. Note also that the water supply of Green Bay contained much more fluorine than was found in the public water of the other communities.

Two other similar, but more thorough studies, were carried out in Illinois. The results of these investigations are shown in Table VI. Only those children who had used their local communal water supplies throughout life, thirty calendar days in any one year excepted, were included in the final tabulation. The first of these compared the caries incidence in Galesburg, Monmouth, Macomb, and Quincy.³⁰ Observe the very much lower incidence of caries found in Galesburg and in Monmouth as compared to the incidence of this disease in Macomb and Quincy. A much larger proportion of the children were caries-free in the two towns whose communal water supplies contained respectively 1.8 and 1.7 p.p.m. of fluorine. The amount of fluorine found in the drinking water of Macomb and Quincy, 0.2 p.p.m., was very close to the quantity found in Minneapolis city water.

In a more recent investigation the dental caries experiences observed in eight towns near Chicago were compared.³¹ These results are shown on the lower part of Table VI. The water of Evanston, Oak Park, and Waukegan was obtained from Lake Michigan and was reported to contain no fluorine. In the other five towns beginning with Elmhurst, the water was obtained from deep wells and contained unusual quantities of fluorine. The caries incidence observed in Elmhurst, Maywood, Aurora, and Joliet was very low—namely, 252 to 323 caries per 100 children. These caries attack rates were less than one-half those seen in the towns whose public water supplies contained no fluorine. The localities characterized by a low caries incidence were those where public water supplies contained 1.2 p.p.m. or more of fluorine. A more recent study³² by the Public Health Service workers was a re-examination of the teeth of residents of Bauxite, Arkansas, who, as children, drank a high fluorine water. Twelve years after the water supply was changed to a nearly fluorine-free source, the teeth of the persons just mentioned were found to have developed fewer caries than either those of persons who were never exposed to high concentrations of fluorine or those of children born in Bauxite since the water supply was changed.

Day³³ in India, and Wilson³⁴ in England, have also noted a decreased incidence of caries in regions characterized by high fluorine content in the drinking water. The low caries attack rate in Deaf Smith County, Texas, has recently attracted considerable attention in the public press. The water in this county contains 2.2 to 2.7 p.p.m. of fluorine. McClendon³⁵ has very recently produced data which led to the conclusion that dental caries varies inversely with the fluorine content of cow's milk.

The third line of evidence indicating that fluorine promotes resistance to dental decay has been derived from studies in experimental animals. Space will not permit a description of the significance of caries in rat molar teeth or an exposition of the details of these experiments. Several investigators in other laboratories demonstrated that the addition of relatively large quantities of fluorine to a dietary regime which was known to produce caries of rat molar teeth greatly reduced the incidence of such lesions below the number which appeared in the teeth of control

cation of fairly strong solutions of sodium fluoride to the teeth. The same conclusion had already been reached by Volker and co-workers.³⁸ The evidence which we have at hand indicates that the topical application of fluoride solutions to the teeth would be an entirely safe procedure if carried out in a systematic manner by dental

TABLE I

Percent of Children with 1 or more Carious (Decayed or Filled) Deciduous Teeth and Average Number of Carious Deciduous Teeth per Child, by Age, for 664 Children, Nicollet County, Minnesota.

Age last birthday	<1	1	2	3	4	5	6
Number of children	7	43	36	61	83	166	268
Percent of children with 1 or more carious deciduous teeth	0.0	4.6	13.9	59.0	66.3	74.1	91.4
Average number of carious deciduous teeth per child	0.0	0.4	0.5	2.5	4.1	5.4	7.3

TABLE II

Percent of Children with 1 or More Carious (Decayed, Missing or Filled) Permanent Teeth and Average Number of Carious Permanent Teeth per Child, by Age, for 2,627 School Children, Nicollet County, Minnesota

Age last birthday	6	7	8	9	10	11	12	13	14	15	16	17	18
Number of children	259	252	276	282	276	265	289	231	159	142	93	79	24
Percent of children with 1 or more carious permanent teeth	24.3	53.6	75.7	84.0	86.2	89.8	92.7	95.2	94.3	98.6	97.8	93.7	100.0
Average number of carious permanent teeth per child	0.5	1.4	2.3	2.8	3.4	4.2	5.5	6.3	7.7	9.6	9.6	10.8	11.2

animals not receiving the extra fluorine. Recently Dr. Rudolph Norvold carried out in our laboratory a well-controlled study in which he demonstrated the positive effect of fluorine in reducing the initiation of rat molar caries under three conditions.³⁶ These three conditions were: (1) when extra fluorine was supplied to the animals only during the stage of tooth formation, and before the animals were put on the caries-producing diet; (2) when the extra fluorine was supplied to the animals concurrently with a caries-producing food; and (3) when the fluorine was given in high concentration in drinking water to mature rats for a period preceding, but not during the caries-producing regimen.

What application of these facts can be made to the reduction of dental caries in the human? One obvious way would be to treat public water supplies with fluorine to the extent that the product should contain 1.0 p.p.m. of fluorine. Probably this method could be employed with safety if carried out under rigid control. However, the water intake of individuals varies and the intake in warmer climates is higher than in the cooler climates. There is some risk, until evidence to the contrary is produced, that the addition of fluorine to communal water supplies might cause toxic results. Furthermore, any benefit to be derived from this procedure would accrue only to those persons who use the high fluoride water during the time of the formation of their teeth.

An accidental observation which we made in connection with another investigation³⁷ has indicated that the fluorine content of the enamel of fully formed, erupted teeth of rats can be increased by a relatively brief appli-

TABLE III

Composition of Enamel of Sound and Carious Teeth

Enamel—Sound Teeth			
	Mean Per Cent	Standard Deviation Per Cent	Number of Analyses
Calcium	35.35	0.977	43
Phosphorus	17.43	0.360	43
Magnesium	0.30	0.041	34
Carbonate—(CO ₂)	3.00	0.187	41
Fluorine	0.0111	0.0020	50
Enamel—Carious Teeth			
Calcium	35.63	0.638	15
Phosphorus	17.21	0.145	15
Magnesium	0.32	0.026	15
Carbonate—(CO ₂)	3.01	0.129	14
Fluorine	0.0069	0.0011	50

TABLE IV

Fluorine Content of Enamel and Dentin of Teeth from Tristan Da Cunha and Minnesota

	Tristan Da Cunha	Enamel Per Cent	Dentin Per Cent
10 Deciduous teeth, caries-free		0.0140	0.0196
8 Permanent teeth		0.0140	0.0270
Minnesota			
3 Deciduous teeth		0.0072	
50 Sound permanent teeth		0.0111	0.0163
50 Carious permanent teeth		0.0069	0.0163
2 Mildly mottled permanent teeth		0.0248	0.0395

TABLE V

Dental Caries Attack Rates in Permanent Teeth in White Children Aged 12 to 14 Years			
City	Number of Children	Number of Carious Teeth per 100 Children	Fluorine Content of Water Supply p.p.m.
Green Bay	687	275	2.3
Sheboygan	244	710	0.5
Manitowoc	661	682	0.35
Two Rivers	382	646	0.3
Milwaukee	2,645	917	0.3
West Allis	160	831	0.3
Baraboo	119	733	0.2
La Crosse	47	731	0.12

TABLE VI

Dental Caries Experience in Children Aged 12 to 14 Years				
City	Number of Children	Caries per 100 Children	Percent Children Caries-Free	Fluorine Content of Water p.p.m.
Galesburg	319	201	35	1.8
Monmouth	148	205	35	1.7
Macomb	112	401	14	0.2
Quincy	306	633	4	0.2
Elmhurst	170	252	25.3	1.8
Maywood	171	258	29.8	1.2
Aurora	633	281	23.5	1.2
Joliet	447	323	18.3	1.3
Elgin	403	444	11.4	0.5
Evanston	256	673	3.9	0.0
Oak Park	329	722	4.3	0.0
Waukegan	423	810	3.1	0.0

practitioners. It must be demonstrated, however, whether fluorine introduced into the teeth in this manner is effective in reducing the caries susceptibility of the teeth. This effect can be proven only by a well-controlled experiment employing children as the subjects. Bibby has made two reports³⁹ and Cheyne a single report⁴⁰ of success in reducing the caries attack rate in children by the use of this method. We have at present 300 school children in Arlington, North Mankato and St. Louis Park, Minnesota, whose teeth received in May, 1942, up to 16 topical treatments with sodium fluoride. We believe that the number of cases and treatments employed in this study will permit a definite assessment of the practical value of this procedure as a means of control of dental caries.

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Chronic Constrictive Pericarditis

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THE pericardium may be involved in various pathological processes, but in children, pericarditis is most often associated with rheumatic fever. Peculiarly, however, rheumatic fever seldom gives rise to scarring of the pericardium to such an extent that it causes obstruction to the heart. In fact, the etiology of the typical syndrome produced by chronic obstructive or constrictive pericarditis is often obscure. This condition, although not very common, is occasionally seen in children. A recent fatal case which we encountered in an eleven year old boy is the basis of this report.

C. K., an 11 year old white male was admitted to Charity Hospital on June 6, 1942.

History. In February, 1942, the patient experienced generalized body aches, cough, increased sweating, poor appetite, and began to lose weight. He was treated by his family physician for "influenza" and improved in about two weeks but did not recover completely. The poor appetite persisted and he failed to regain the weight lost during his illness. During convalescence his physician told the family that he had "heart trouble." In March, 1942, the patient vomited frequently for a period of one week. At that time his physician noted an enlarged liver, ascites, and fluid in the right chest, in addition to edema of the lower extremities and face. In May, 1942, the patient became quite dyspneic and fluid was removed from his chest. He seemed to become worse after this and had to be placed in an oxygen tent. Later a paracentesis was done and a clear straw-colored fluid was removed. The patient was then referred to Charity Hospital, the physician believing that the patient had some form of malignancy.

Past History. The patient had always been anemic and weak but especially so during the past four years. He contracted pertussis and measles during infancy and typhoid fever in 1938. Tonsillectomy was done at the age of six.

Physical Findings. On admission the patient was undernourished, pale and weak. Edema was present on the face and lower extremities. Ascites was a prominent feature. The neck veins were distended and pulsating. The abdominal veins were noticeable. The heart revealed nothing abnormal by auscultation except for an increased rate of 125 per minute. The liver was markedly enlarged, extending down 6 cm. in the region of the right lobe anteriorly and 7 cm. over the left lobe. It was smooth and rather firm to palpation. The spleen was not palpable. The right chest showed diminished excursion and bulging of the interspaces. Tactile fremitus and resonance were diminished over the right chest. Flatness to percussion was also elicited over this same area. The blood pressure was 110/90.

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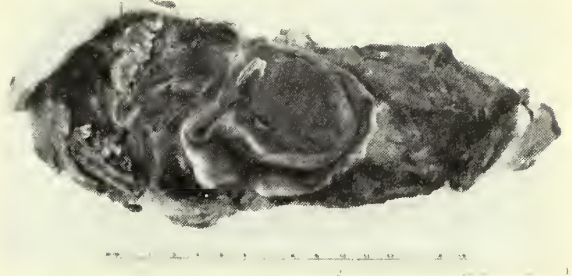


Fig. 1. Gross dissection of heart, lungs and pleura. Note extensive thickening of the pleura as well as the pericardium.

Laboratory Studies: Blood studies showed a hemoglobin of 60 per cent of normal, red blood cell count 5.1 million, white blood cell count 18,000, 60 per cent polymorphonuclear cells, 23 per cent lymphocytes, 11 per cent monocytes, 2.5 per cent eosinophils, and 2 per cent basophils. Urinalysis revealed normal findings. Tuberculin test 1:10,000 to 1:10 was negative. Blood urea was 8.3 mg. per 100 cc., total protein 6.2 grams per 100 cc., with albumin 3.2 grams and globulin 2.95 grams. Wassermann test was negative, blood glucose 103 mg. per 100 cc., and stools were normal. The phenolsulfonaphthalein test showed 60 per cent return in two hours. X-ray studies revealed the left chest to be clear. The right pleural cavity contained air and fluid, the fluid extending to the level of the fourth rib anteriorly. The right pleura was thickened, and the right lung was atelectatic. Repeated fluoroscopic examinations revealed a heart of normal size, with diminished pulsations of all borders of the heart. Intravenous and retrograde pyelograms revealed the kidneys normal. The skull and long bones appeared normal on x-ray studies. The saccharin circulation time was 27 seconds. The venous pressure was 240-270 mm. of water. Kidney and liver function tests were normal. Electrocardiogram showed slight right axis deviation, inversion of the T-waves in all leads, sinus tachycardia, and occasional ventricular premature beats. Repeated examinations of the sputa, abdominal, and pleural fluids for tubercle bacilli were negative by smear, culture, and guinea pig inoculations.

Hospital Course. Thoracentesis was done soon after admission, and about 100 cc. of clear straw-colored fluid was obtained. Repeated thoracentesis was done subsequently with the same findings. Cultures of the fluid revealed no growth. Smears from the sediment showed large macrophages filled with fat droplets. Repeated paracentesis of the abdomen revealed a similar straw-colored fluid, which on culture revealed no growth. Edema of the lower extremities and face disappeared after the removal of the ascitic fluid. On August 12,

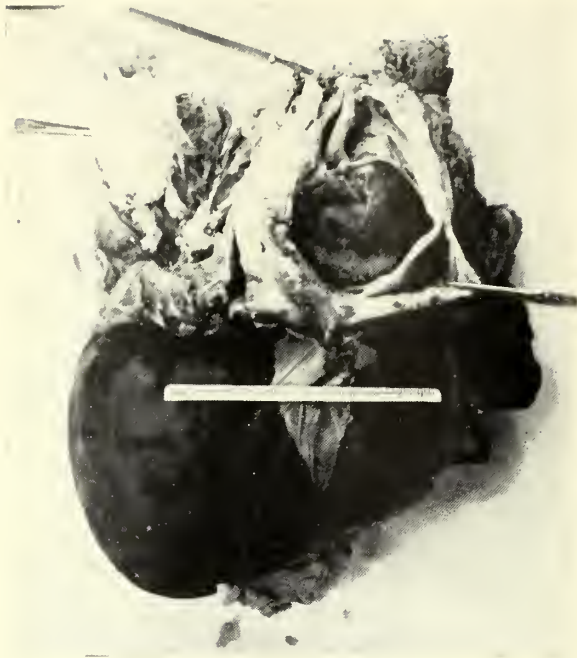


Fig. 2. Gross appearance of heart, pericardium and liver. Anterior surface of heart successfully freed of adhesions by operation. Liver enlarged.

1942, an operation was performed. The pleura and pericardium were thickened and presented many adhesions. Approximately half of the pericardium over the anterior portion of the heart was removed. About twenty-eight hours after the operation the patient became markedly dyspneic. The pulse was weak and the skin clammy. Examination suggested atelectasis of the left lung. A thoracentesis was done in the left posterior interspace but only air was obtained. Another thoracentesis was done anteriorly at the site of the incision, and air and about 80 cc. of straw-colored fluid were obtained. One and a half hours after the second thoracentesis, or thirty-four hours after operation, the patient died.

Pathologic Observations. There was marked thickening of the pleura bilaterally but more extensively on the right side. There were some adhesions between the pleura and the chest wall. On the right side, there was a large empyema cavity filled with thick fibrinous material. (See Figure 1).

The mediastinal structures were densely bound down by adhesions. Both the parietal and visceral pericardium was markedly thickened, completely encasing the heart except over a small area anteriorly where surgical excision was carried out. The liver was markedly enlarged and congested. (See Figure 2).

DISCUSSION

History. The first clinical description of the disease is attributed to Richard Lower.¹ Subsequently, various authors recognized and adequately described the clinical signs, symptoms and pathogenesis of chronic constrictive pericarditis: Chevers,² Wilks,³ Pick,⁴ Kussmaul,⁵ and Vollhardt and Schmieden.⁶

The surgical procedure of pericardiectomy was first

suggested by two Frenchmen, Weill⁷ and Delorme,⁸ but was first carried out by Rehn⁹ and Hallopeau.¹⁰ The first successful operation for constrictive pericarditis in America was reported by Churchill.¹¹ Later Beck,¹² Burwell,¹³ and others claimed similar successes. Prior to the recommendation for decortication, Bruer¹⁴ suggested cardiolysis, a procedure consisting of the removal of precordial bony structures so the tug of the heart would be on the soft structures instead of on the bony chest wall. This operation, however, has been found to be ineffective in chronic constrictive pericarditis.

Etiology. The etiology is usually obscure, as in our case. Some cases are apparently due to tuberculous infection while others are secondary to respiratory infections. Rheumatic fever is not a primary factor.

Clinical Manifestations. For the sake of brevity, the important clinical manifestations will be tabulated in outline form:

1. Loss of weight, weakness, easy fatigability.
2. Dyspnea on exertion.
3. Epigastric distress and anorexia.
4. Slight anemia and decreased blood proteins.
5. Normal temperature.
6. Faint heart sounds, no murmurs.
7. Heart of normal size or small.
8. On fluoroscopy, decreased pulsations of heart borders especially on the right side.
9. Tachycardia especially on exertion.
10. Paradoxical pulse, thready during inspiration.
11. Blood volume increased 30 to 40 per cent above normal.
12. Cardiac output diminished.
13. Circulation time delayed.
14. Venous pressure consistently high.
15. Dilatation of jugular veins with or without pulsations.
16. Systolic pressure low, usually 100-110, diastolic pressure normal or elevated, usually 80.
17. Pulse pressure diminished, usually 20.
18. Electrocardiogram shows low voltage, inversion or flattening of the T-waves in two or more leads.
19. Calcified plaques in pericardium seen in 20 per cent on x-ray.
20. Ascites usually precedes edema of face and extremities by several weeks, or months.
21. Liver markedly enlarged.
22. Impairment of liver function.
23. Pleural effusion.
24. Triad of Beck: Small quiet heart, venous hypertension, ascites and enlarged liver.

Pathogenesis. The symptoms of chronic constrictive pericarditis can be explained on the basis of obstruction arising from compression exerted by the constricting scar tissue. Beck¹² has experimentally determined that the significant point in the obstruction is the thickening of the pericardium and not necessarily the adhesions between the heart and pericardium. Cardiac failure arises because of the inability of the heart to hold, in diastole, sufficient blood to maintain an adequate arterial circulation. The cardiac output is thus diminished and the blood is dammed back into the venous and arterial beds, increasing the blood volume. The heart tries to compensate by increasing its rate but this attempt is limited. Hypertrophy and dilatation of the heart are limited by the thick encircling scar tissue around it, causing the patient to complain of weakness, easy fatigability, and dyspnea on exertion.

As decompensation increases, the blood begins to pile

up in the vena cava and dam back into the systemic venues. The venous pressure increases, its height giving an index of the severity of the cardiac compression. The systemic veins although bearing a tremendous back pressure can stand it far better than the hepatic veins which are without valves. The liver thus suffers from a portal decompensation, becoming large, tender, and congested. With continued back pressure, liver damage occurs, leading ultimately to cirrhosis if the patient survives long enough. Portal decompensation gives rise to ascites.

As the pathologic process continues, generalized edema results from venous stasis. Pleural effusion can similarly be attributed to venous congestion of the parietal pleura.

The high degree of obstruction to the heart produced by the constricting scar tissue is possible only because the pathogenesis arises slowly. The greatest compression force noted by Beck¹² was from 40 to 45 cm. of water. Beck has observed that an acute compression pressure of 15 to 20 cm. of water will be fatal. In our case, it is difficult to determine what part the empyema in the right pleural cavity played in the etiology of the pericarditis. It is possible that a pneumonia and empyema antedated the process in the pericardium.

Surgical Considerations. Operative intervention consists essentially in extrapleural exposure of the heart, and release of the constricting membranes in a one-stage operation. It is important to free the apex of the heart, when adherent to the diaphragmatic surface, and to remove the scar from the left ventricle, first because of danger of dilatation of right ventricle if excision is started on the right side.

Preoperative Treatment. Preoperative treatment consists in external heat before, during, and after operation.

The fluid from the abdomen and chest should be aspirated before operation is performed. Anemia and malnutrition should be corrected by transfusions and a high caloric diet.

Postoperative Care. Postoperative care includes continued oxygen therapy and limitation of fluids. Intravenous fluids should be given with caution because of the severe, sudden strain thrown on the heart, incident to the operative procedure.

SUMMARY

A fatal case of chronic constrictive pericarditis occurring in an eleven year old boy is reported. The pathologic observations and a discussion of the disease are briefly presented.

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The Early Diagnosis of Poliomyelitis

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RECENT interest in the Kenny treatment of poliomyelitis has made the early diagnosis of the disease most important. Miss Kenny has repeatedly stated that the more quickly her treatment is instituted, the shorter the period of special care, and the better the results. Much has been written concerning the diagnosis of infantile paralysis, but many practitioners still do not have a clear clinical picture of the disease during the acute period. A careful study of the records of 259 acute cases admitted to the Minneapolis General Hospital during the past six years has revealed the early symptoms and signs listed in Table I and offered a rather simple description of infantile paralysis. The majority of the patients were children ranging in age from 1 to 14 years with the highest incidence appearing between 5 and 9 years. Starting with a few cases in July of each year, there was a rapid increase in the number until the peak was reached in September, following which there

was a gradual decline for the next three or four months. The number of patients varied greatly from year to year.

The early symptoms of poliomyelitis may not indicate that the disease is present. Usually the first sign is fever which averages 101° F., but may be as high as 104° F. After the fever has been present for a short period of time, patients complain of headache of moderate severity but with no characteristic localization, since it may be frontal, lateral, or occipital. Nausea and vomiting occur indicating a gastro-intestinal upset. The patient becomes restless and irritable. This completes the initial phase, and only a suspicion of infantile paralysis exists.

The disease progresses into a second phase which may reveal that the child has poliomyelitis. The headache becomes more severe and the nausea and vomiting disappear to be followed by constipation. Stiffness of the neck and pain on flexion of the neck and spine appear. The patient is unable to touch the knee with his head owing to the spasm of the spine muscles. Pain becomes more extensive and severe. It is not located in the skin but

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essentially in the muscles of the extremities which still may be moved by the child.

Soon the severity of the headache lessens. Drowsiness develops. The patient now makes little or no effort to move certain groups of muscles. Close inspection of these muscles reveals that they are painful, tender, irritable, shortened, and firm, indicating spasm. The principal locations of the demonstrable muscle spasm are the back, posterior neck, thigh, and calf of leg. The pectoral, quadriceps and biceps muscles and muscles of respiration are also frequently involved. This situation is the most characteristic feature of the disease and represents the third phase. Further examinations of the child should be limited since they can aggravate the spasm, thereby retarding treatment which must be started immediately.

If all the cases of infantile paralysis would follow the course described, the diagnosis would not be difficult. However, there are patients who have a slight rise in temperature, a mild headache, and then, in a very short period of time, they develop rigidity of the neck, marked pain on motion of the back, and loss of function in some of the muscles of the extremities. A positive Kernig's sign may be present. These cases are referred to as having the meningeal type of onset.

Occasionally the disease progresses rapidly to stupor, prostration or delirium. This is the cerebral form of poliomyelitis (also called the Strümpell type).

Almost as frequent as the meningeal type of onset is the one which ushers in the disease with marked gastrointestinal symptoms. Following the initial spell of nausea and vomiting, the child complains of a generalized abdominal pain with or without tenderness. If the former is present a spasm of the recti muscles may be detected. Diarrhea can occur and usually is not severe, but in a few cases it has caused prostration. The diagnosis of infantile paralysis often is not established until the characteristic spasm appears in the muscles of the trunk and extremities.

Another group of patients has the symptoms and signs of an acute attack of coryza which may lead on to acute pharyngitis or tonsillitis with fever and headache. The upper respiratory infection continues for a few days or for as long as a week before it subsides. Then the headache usually becomes more severe and stiffness of the neck appears, frequently followed rather quickly by pain on flexion of the neck and the spine. In spite of the latter signs of poliomyelitis, the diagnosis of the disease is uncertain. It is not until the respiratory infection has disappeared almost completely that the remaining physical findings warrant a more definite diagnosis of infantile paralysis.

In the majority of the cases the course of the disease is progressive with the patient passing from one phase to the next. However, in about one-fourth of the children there is an initial phase of general systemic symptoms such as fever, headache, nausea and vomiting, with or without any evidence of an upper respiratory infection. Improvement appears but after a period of two to seven days, the fever returns, often rising to a high level. The headache becomes more severe and the disease progresses rapidly to the final phase with widespread muscle involve-

ment. This diphasic type of course is sometimes called the "dromedary" type.

An examination of the spinal fluid cannot be neglected as an aid in the diagnosis of poliomyelitis. If the fluid is collected during the first phase of the disease, it may reveal little. No cells or only a small number are found, usually all polymorphonuclear cells. During the second phase, the spinal fluid cell count increases and has risen as high as 1000 although the average range is between 50 and 150. The shift is to the mononuclear cells, and during the third phase of the disease, the majority of the cells are lymphocytes. Soon after this, the count may drop rapidly to zero even though extension of the loss in muscle function has not ceased.

The spinal fluid sugar level changes little, always being close to 60 milligrams per 100 cc. of fluid. Even in the more severe cases there is only an insignificant elevation. During the first and second phases the protein content of the spinal fluid is usually around the normal level of 40 milligrams per 100 cc. of fluid, but in the final phase of the acute period of infantile paralysis it may rise to 80 milligrams or slightly higher in the more severe cases. The delayed rise in the spinal fluid protein is often too late to assist greatly in the early diagnosis of the disease.

During the period of seasonal prevalence and especially if the disease is epidemic, the advantages of an early recognition of poliomyelitis lead the practitioner to make a tentative diagnosis of that disease at the onset of many illnesses which are not infantile paralysis. At the Minneapolis General Hospital one out of every six cases admitted as poliomyelitis proved to be another disease. Table II reveals that upper respiratory infections, meningitis, Guillain-Barre syndrome, pneumonia, encephalitis, and rheumatic fever head the list of diseases which have been incorrectly diagnosed as infantile paralysis. The reason for this is that these diseases have simulated the different clinical pictures produced by the variation in severity of the early symptoms and signs.

Acute upper respiratory infections with fever, headache, nausea, vomiting, and restlessness appearing in autumn frequently can be diagnosed as the onset of poliomyelitis. If no loss in muscle function occurs and a spinal fluid examination is normal, the diagnosis may be dropped. Some of the patients are referred to as having abortive type of infantile paralysis, but there is no way at the present time to prove that this diagnosis is correct. However, with the more careful inspection of the children by the Kenny method, a few of the cases are considered poliomyelitis since muscle spasm is demonstrated. Furthermore, repeated spinal puncture often reveals in these patients the characteristic pathologic changes in the spinal fluid in spite of the fact that the first examination is normal.

Meningitis may easily be confused with infantile paralysis chiefly because the latter can have a rather insignificant onset to be followed by the sudden development of meningeal symptoms such as a severe headache and stiffness of the neck. The rigid neck of meningitis does not relax while that of poliomyelitis is more or less a voluntary mobilization of the neck muscles which can be overcome by moderate and constant resistance on the part of

the examiner. The examination of the spinal fluid is most important as a means of differential diagnosis. The bacteriologic study should not be omitted. The cell count in meningitis is much higher than in infantile paralysis and the polymorphonuclear cells predominate throughout the course of the disease. The only exception is tuberculous meningitis in which the onset is insidious and usually accompanied by other evidence of tuberculosis.

Occasionally a rather mild pharyngitis or tonsillitis will be followed by a symmetrical and bilateral loss of muscle function in the extremities. The latter condition may appear suddenly or it may extend over a period of weeks or months. The proximal muscle groups are more severely involved than the distal. Hyperesthesia to superficial touch is more annoying to the child than muscle pain. Although poliomyelitis is considered, this diagnosis is questioned because the motor impairment does not have the localized and asymmetric distribution noted frequently in infantile paralysis. Furthermore, the hyperesthesia is more prominent than that usually observed in poliomyelitis. The clinical picture resembles that of infectious polyneuritis or the Guillain-Barre syndrome, the diagnosis of which can be made more certain by examination of the spinal fluid. The cell count is low, ranging from a few cells to 50 throughout the course of the disease. The majority of the cells are always lymphocytes. The protein content is high, the average range being between 100 and 300 milligrams per cent.

The onset of pneumococcus pneumonia in young children can simulate infantile paralysis. This is especially true if an upper respiratory infection with symptoms resembling those of the initial phase of poliomyelitis is present just before the patient has a sudden rise in temperature to 104° F. followed by stupor, prostration or delirium. Rigidity of the neck appears, but there is little or no pain on passive motion of the neck or spine. The characteristic muscle pain of poliomyelitis cannot be demonstrated. Convulsions are common, and they are rare in infantile paralysis. Further examination usually reveals the characteristic lung findings of pneumonia and the roentgenogram confirms the diagnosis. Nevertheless, a spinal puncture is indicated. The fluid is under increased tension; as a rule there are no bacteria; and there is either a slight increase in cells and protein, or none at all.

Encephalitis may be confused with the cerebral type of poliomyelitis when the latter progresses rapidly to the third phase and leads to extreme drowsiness. However, the drowsiness of encephalitis is much more profound than that of infantile paralysis; once the patient with poliomyelitis is aroused he is quite alert. The spinal fluid reveals an early, moderate increase in cells. An occasional case of encephalitis may have a spinal fluid cell count as high as 200, mostly lymphocytes. The polymorphonuclear cells never predominate. There is little or no increase in the protein content of the spinal fluid.

An acute attack of rheumatic fever with irregular distribution of joint involvement and pain referred in part to the adjacent areas of the extremities may be inaccurately diagnosed as infantile paralysis, especially when the rheumatic infection appears during the season when poliomyelitis is prevalent. The child

with rheumatic fever may not move the extremities on account of the severity of the pain, but this immobilization is voluntary. No muscle spasm develops, and with new methods of demonstration this absence is significant in indicating that the disease is not infantile paralysis. The sedimentation rate usually is increased and the spinal fluid remains normal. There is a good response to salicylate which never occurs in poliomyelitis.

One-fourth of the cases studied had difficulty in swallowing or in breathing or both. In these patients the course of the disease is gradual through the various phases leading to regurgitation of fluids through the nose, accumulation of mucus in the pharynx, and a weak cough. Occasionally the infection is quite fulminating in character with the early symptoms signs and loss of muscle function being synchronous. The diagnosis is not difficult whenever muscle spasm can be demonstrated in the extremities or back, and the spinal fluid has the characteristic abnormalities of poliomyelitis already described.

SUMMARY

The early diagnosis of infantile paralysis now is essential since the Kenny method of treatment gives the best results when it can be instituted as soon as muscle spasm appears.

To aid in the diagnosis, 259 cases of poliomyelitis admitted to Minneapolis General Hospital were reviewed and from a tabulation of the early symptoms and signs, the average course of the disease was found to fall into the following phases:

Phase 1—fever, headache, nausea and vomiting, restlessness or irritability.

Phase 2—headache continues, stiff neck, pain on flexion of neck or spine, muscle pain especially on motion.

Phase 3—pain on flexion of neck and spine continues, drowsiness, muscle spasm and no motion.

Spinal fluid examination during the second and third phases usually reveals the characteristic changes which may confirm the diagnosis. Therefore, this diagnostic procedure should not be omitted.

Some of the symptoms and signs may be more severe in one case than another and lead to various types of onset—meningeal or cerebral, gastro-intestinal, and respiratory.

Many diseases have been confused with infantile paralysis chiefly because some of their symptoms have been exaggerated to the extent that they resemble the characteristic features of the various types of poliomyelitis.

The more careful inspection and palpation of the muscles as recommended by Miss Kenny reveal muscle spasm early in infantile paralysis and save the patient a great deal of suffering by shortening the period during which a definite diagnosis is made.

TABLE I
Early Symptomatology in 259 Cases of Infantile Paralysis
Minneapolis General Hospital, 1937 to 1942, inclusive.

Symptoms and Signs	No. Cases	Symptoms and Signs	No. Cases
Fever and malaise	230	Difficulty in swallowing	65
Headache	219	Stupor, prostration	25
Stiff or rigid neck	177	Difficulty in breathing	20
Nausea and vomiting	169	Abdominal pain	23
Pain on flexion of neck or spine (backache)	139	Diarrhea	19
Restlessness or irritability	121	Acute pharyngitis-tonsillitis	15
Muscle pain (extremities)	95	Urinary retention	9
Drowsiness	83	Chills	7
Muscle spasm	83	Delirium	5
Constipation	77	Sweating	5
Acute coryza	77	Photophobia	4
Positive Kernig's sign	69	Convulsions	1

TABLE II
Diseases Admitted with Incorrect Diagnosis of Poliomyelitis
(52 Cases)

Diseases	No. Cases	Diseases	No. Cases
Acute upper respiratory infections	11	Appendicitis	2
Meningitis	8	Cardiac disease	2
Guillain-Barre syndrome	5	Malaria	2
Pneumonia	4	Equine encephalomyelitis	1
Encephalitis	3	Transverse myelitis	1
Rheumatic fever	3	Hysteria	1
Chorea (paralytic type)	2	Typhoid fever	1
Brain tumor	2	Scarlet fever	1
Lymphocytic choriomeningitis	2	Measles	1

AMERICAN STUDENT HEALTH ASSOCIATION MONTHLY NEWS-LETTER

(The Council of the American Student Health Association met at the Palmer House in Chicago, March 6 and 7, 1943. At this meeting the Editorial Committee was asked to provide a monthly digest of medical and Association news for distribution to the member institutions either by mail or through the columns of the JOURNAL-LANCET. This month's digest has been prepared by Dr. Dean F. Smiley, Cornell University, now Lieutenant Commander in the U. S. Navy. Other action that was taken in two morning sessions and afternoon session is recorded below Dr. Lyght's editorial.)

STUDENT HEALTH AND THE WAR

Charles E. Lyght, M.D.

Director, Health Education, National Tuberculosis Association

If sometime a graph is drawn to show the growth of student health services in American colleges and universities, the line will not trace an uninterrupted ascent from zero to saturation. Several rests and an occasional stumble will mark its climb to the peak.

Historians of the student health movement have recorded how slowly the idea caught on among educators that institutions of higher learning owe it to their students to provide facilities for health instruction and health protection as well as a reasonable degree of campus medical care. After college presidents and boards had accepted the challenge and had begun to set up admirable departments, there ensued a period of coolness on the part of the medical profession toward the new project. Student health physicians have witnessed the gradual dissipation of suspicion and unfriendliness as they demonstrated to their medical colleagues that they were not in competition with traditional forms of practice. They proved that their activities closed this hiatus in health coverage and that they were educating large numbers of prospective American leaders to the advantages of prompt and adequate medical care.

Following World War I there was a gratifying and prompt increase in the number and quality of college health services, while in the years of the great depression the advance faltered as budgets grew slender and administrators cautious. Latterly there has been another spurt of development, mirrored by a sharp upswing in membership of the American Student Health Association. The recent appointment by the American Medical Association of a Committee on Student Health stresses the importance of the movement and the warm acceptance it is now privileged to enjoy.

At the moment we come to what may appear eventually as another plateau on our graph. The heavy impact of the global war upon colleges and universities is too well realized to need elaboration. Certainly the colleges cannot escape their share of the dislocation of normal plans and functions that war brings to all men and all systems. Nor would they wish to assume less than their allotment of obligations, even tribulations, in winning the war.

However it is well known that physical fitness and mental health are prerequisites to maintaining a war-winning army, navy or civilian front. It is also known that the government has seen fit, in many cases, to choose colleges and universities possessed of modern stu-

dent health facilities, when establishing training centers for young men and women preparing for special branches of service. Only the healthy can meet government standards, and too many of those rejected because of health defects have been found to be the victims of health neglect. Colleges must lead in avoiding these mistakes in the future.

Accordingly, with their staffs shrunken by the demand for doctors and nurses elsewhere, and faced by the uncertainties of material supply and budgetary adequacy, the nation's student health services are needed as never before—needed to keep a wary eye on the effects of vastly accelerated programs of study and of sometimes overly enthusiastic "toughening" processes; needed to prevent campus epidemics, to weed out tuberculosis from the apparently health and to carry out a well rounded plan of immunization against other communicable diseases. Although hope for expansion seems futile, thought of retrenchment must not be entertained. A plateau, perhaps, but no downhill course is permissible.

If the student health physician can help his government, his institution and his uniformed or civilian charges to weather this storm, he will have contributed significantly toward winning the war, and, in the peace that we work and wait for, he will see his efforts and his record rewarded by a tremendous increase in the vitality and scope of the college health movement, until none can be found oblivious to the importance of student health.

The following institutions were voted into membership in the Association which now numbers 195 institutions:

Queens College, Flushing, Long Island, New York,
Montana State Teachers College, Bozeman, Montana,
University of Dayton, Dayton, Ohio,
Southwest Missouri State Teachers College, Springfield, Missouri,
Emory University, Emory University, Georgia,
Earlham College, Richmond, Indiana,

The following changes were made in the Standing Committees:

Dr. E. Lee Shrader replacing Dr. D. F. Smiley, now in the Navy, as Chairman of the Committee on Local Sections.

Dr. C. E. Turner replacing Dr. A. G. Gould, now in the Army, as Chairman of the Committee on Health Instruction.

Dr. M. L. Durfee replacing Dr. W. B. Brown as Chairman of the Committee on Administration.

Dr. E. Lee Shrader, returning to the Chairmanship of the Committee on Research, replacing Dr. Llewellyn R. Cole (acting Chairman).

Dr. C. C. Fry replacing Dr. Helen P. Langner on the Committee on Mental Hygiene.

Dr. R. W. Bradshaw was appointed to draw up a resolution on the death of Dr. Lee H. Ferguson. Dr. Dan G. Stine was appointed to draw up a resolution on the death of Dr. W. B. Brown. Both Dr. Ferguson and Dr. Brown have been active members and have made important contributions to the work of the Association.

After a canvass of the experiences of the institutions represented at the meeting it was the consensus of opinion that in contracting with the military authorities for medical care of military trainees a provisional figure of \$3.50 per student per month was a reasonable one. Where less than complete medical services are provided, deductions would, of course, be made from that figure. It is assumed that all such contracts are tentative ones and that adjustments calling for a return to the government of any profit on the contract, or of refunding to the college for any loss on the contract will be made each quarter.

It was voted to send a letter to the Surgeon General of the Navy inviting attention to our already existing health services and urging their utilization for the care of Navy trainees. The necessity for providing naval personnel to maintain the rather intricate Health Records of the Navy was pointed out.

The Committee on Tuberculosis through its Chairman, Dr. H. D. Lees, reported that among approximately 500,000 students included in the Association's tuberculosis program in 1942, active pulmonary tuberculosis of the adult type was found in approximately 0.2 per cent.

It was voted to leave the question of a 1943 meeting of the Association open for the time being.

Since there was no 1942 meeting, it was voted to hold over such papers and committee reports as had been submitted for publication in the 1943, or 1944 Proceedings and omit publication of any proceedings for 1942.

It was voted to continue membership dues as usual utilizing the funds usually devoted to the proceedings for providing other services to the member institutions.

Personnel Changes: Dr. Ann Tompkins Gibson has been named resident physician at Wilson College, Chambersburg, Pennsylvania, replacing Dr. Agnes Lyon Brown who has entered the United States Public Health Service.

Dr. M. W. Husband has returned to direct the Student Health Service at Kansas State College, Manhattan, Kansas, relieving Dr. J. W. Hanson who has accepted directorship of the Health Service at Carleton College, Northfield, Minnesota. Dr. C. E. Lyght, former director at Carleton College, is now Educational Director for the National Tuberculosis Association.

Dr. Kenneth Christophe has replaced Dr. Nathan Garrick at Boston University.

Dr. Herbert Ratner replaces Dr. Earl E. Kleinschmidt (Head of the Public Health Department of the Loyola

Medical School) as a full time director of Loyola University Health Service. This is the first time in the history of this school that a full time director has been employed.

Dr. Daniel L. Borden, formerly of George Washington University at Washington, D. C., is now a Colonel in the Army Medical Corps and is located at Fort Eustis, Virginia.

Dr. Charles E. Shepard of Stanford University is now in the United States Public Health Service and is stationed in California.

Dr. Dean F. Smiley, in the Navy, is located in Washington, D. C., and Dr. A. G. Gould is in the Army, located at Camp Breckenridge, Kentucky. Dr. Jennette Evans is the acting head of the Health Service at Cornell University.

Dr. William L. Holt is located at Massachusetts State College at Amherst, Massachusetts, while Dr. E. J. Radcliffe is with the Armed Forces.

A.S.H.A. DIGEST OF MEDICAL NEWS

Aid in controlling noise. The January, 1943, *Scientific American* reports the development of a plaster ear stopper. A physician or qualified technician makes an impression of the external auditory canal with a special plaster material. The mold is sent to the company for the preparation of the device in plastic. With the device in the ears there is said to be a diminution in sound intensity of 10,000 times and a reduction of 40 decibels in sound.

Yellow fever prevented in British troops. Only three cases of yellow fever have been reported among British troops since the beginning of the war. Inoculation of all troops going to endemic areas was required before the war and has been consistently maintained, according to the British Secretary of the State for War.

Epidemic kerato-conjunctivitis. The Subcommittee on Ophthalmology of the National Research Council reports this disease occurring in certain larger industries of the west coast, the east coast and recently, New York State and the middle west. There is an average of 18 days loss of work per case and corneal infiltrates occur in 90 per cent of the cases. The conjunctivitis tends to clear spontaneously in less than two weeks, but the corneal infiltrates tend to persist for weeks or months. Infected individuals should be isolated immediately and the spread of the virus by the physicians' hands scrupulously avoided.

Hypertonic saline in burns. Tosenthal of the National Institute of Health finds that hypertonic saline by mouth or parentally, if administered promptly after severe burns has remarkable value in preventing fatal burn-shock in mice. He has not yet applied the principle to humans.

Suitable antiseptic for first-aid use. The Committee on Surgery of the National Research Council recommends a 1-1000 solution in water or 15 per cent alcohol of proflavine monohydro chloride dispensed in a brown bottle to prevent deterioration by light. It is not patented.

(Continued on ninth page following)

Book Reviews

Advances in Pediatrics, Volume I, edited by ADOLPH G. DE SANCTIS, M.D.; 306 pages. New York, New York: Interscience Publishers, Inc., 1942, price \$4.50.

This book reveals the recent progress in the field of pediatrics by means of a collection of papers written by a group of pediatricians. Some of the authors have presented articles which include their own research studies, others have written reviews as volunteers. All papers are well planned and fairly complete, but all the writers are not authorities or leaders in the fields of pediatrics. The book is of definite value to the general practitioner as well as to the practicing pediatrician. However, it is important that the editor make every effort to keep the future volumes up to the standard of the first one. This is a difficult task and if not well performed will lead to a lack of interest in this type of publication.

Abdominal Surgery of Infancy and Childhood, by WM. E. LADD, M.D., and ROBT. E. GROSS, M.D. Philadelphia: W. B. Saunders, 455 pages, 614 illustrations and 268 figures, 1941, price \$10.

For the first time in the history of American surgery such a work is presented and it was long overdue. It could have been produced only with the magnanimous gift of the Godfrey M. Hyams Trust Fund. It is exceedingly well written, the illustrations and charts excellently executed. Outstanding features are chapters on Congenital Hypertrophic Pyloric Stenosis, with particularly well handled matter on pre-operative care and well described and illustrated operative procedures, and on Congenital Atresia and Stenosis of the Intestine.

The following sections contain original and helpful material: Appendicitis, Diseases of the Spleen, Umbilical Hernia, Inguinal Hernia, Undescended Testicle, Embryoma of the Kidney. The references at the end of each chapter are timely and helpful to those inclined toward more extensive reading on the subjects. The book deserves a place on the active bookshelf of doctors who operate on infants and children and will save some lives that might otherwise be lost.

The Prevention of Deformity in Childhood, A Primer by RICHARD BEVERLY RANEY, N.A., M.D., and ALFRED RIVES SHANDS, JR., B.A., M.D. Elyria, Ohio: National Society for Crippled Children, Inc., 188 pages, 1941, price \$1.00.

With increasing interest being shown by the medical profession in deformities of children, the small monograph is most helpful in aiding the physician to obtain orientation as to whether certain diseases will cause deformities and if so, just what the doctor should do to prevent them or reduce their severity. Neglect has led to deformity. Often the physician does not know that a disease can cause a certain deformity. This book is comprehensive enough to instruct him as far as possible in the prevention of deformity for practically every condition he might encounter in his practice.

Handbook of Treatment, by E. A. MULLEN, M.D. Philadelphia: F. A. Davis Co., 707 pages, 1942, price \$4.50.

This volume has again been revised and reprinted as of January, 1942. There will always be demand for a book of this kind and especially at the present time. The advent of sulfanilamide and its derivatives has driven physicians to the use of reference works giving tables of dosage and methods of use. Vitamins with their perplexing combinations require a daily peek at the latest information. We would be inclined to criticize the many examples of polypharmacy in the formulary but without polypharmacy, there would be no need of a formulary and these impressive prescriptions will delight the souls of many.

Carcinoma and Other Malignant Lesions of the Stomach: by WALTMAN WALTERS, HOWARD K. CORAY, JAMES T. PRIESTLEY and associates of the Mayo Clinic and Mayo Foundation, notably ALVAREZ, EUSTERMAN, KIRKLIN, MACCARTY and SNELL. Philadelphia: W. B. Saunders, 576 pages, 1942, price \$10.

By assembling the total experience of the Staff of the Mayo Clinic over a period of thirty-one years, the authors have made available to the medical profession a body of information concerning cancer of the stomach, which, if carefully used and judiciously acted upon, should lead to early, accurate diagnosis and courageous treatment of a disease which, through neglect and pessimism still exacts too large a toll of human life. Eleven thousands cases of malignant disease of the stomach, (99 per cent cancer), with 6,352 operations is a mass of material from which valuable help should certainly be derived. And in characteristic manner, statistical data constitutes an important part of the book.

Following chapters on methods of diagnosis and on pathology summarizing the well known opinions of MacCarty and Broders, the middle one-third of the book is taken up with surgical procedure and technic. A good deal of extraneous matter has been included in this part, much of it not germane to the subject, but no doubt of some interest.

The chapter on roentgen treatment is, by the nature of the disease in question, general and inconclusive. The concluding sections on progressive and end results should be of actuarial value.

* The index is elaborate and historical references to well known sources are given.

Future Meetings

May 24-27, at Rochester, New York: four-day War Conference of the American Association of Industrial Physicians. Dr. Wm. A. Sawyer, Medical Director of Eastman Kodak Company, is general chairman.

May 28, at Omaha, Nebraska: The department of Obstetrics and Gynecology of the University of Nebraska College of Medicine presents a symposium on obstetrical analgesia and anesthesia with guest speakers F. S. Hartman, M.D., Detroit, Michigan, R. A. Hingson, M.D., Staten Island, New York, N. R. Kretzschmar, Ann Arbor, Michigan, A. H. Parmalee, M.D., Chicago, Illinois. Advance registrations should be sent to Dr. Willis E. Brown, University Hospital, Omaha, Nebraska.

July 6-7, at Billings: annual convention of the Montana State Oto-Ophthalmological Academy. Dr. W. R. Morrison of Billings, president.

July 7-8, at Billings: State Medical Association sixty-fifth annual meeting. Session of House of Delegates, Scientific Session, Meeting of the Council, Meeting of Women's Auxiliary.

August 16-26, at the Michael Reese Hospital, Chicago: cardiovascular department, a graduate course in Electrocardiography for physicians; Dr. Louis N. Katz, conducting.

October 12-14, at New York: American Public Health Association three-day Wartime Public Health Conference and 72nd annual business meeting of the Association.



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**CHILD HEALTH AND NATIONAL
STRENGTH**

A perusal of the articles contributed to this special Pediatrics number of the JOURNAL-LANCET strengthens our conviction that more attention should be given to the problems of child health during the war, as well as in peacetime. The exigencies of national defense quite naturally demand first consideration for those among us who are engaged in or are soon to be engaged in military service. However, when our needs beyond the immediate present are considered, we are forced to admit that the emphasis in the medical field must be changed in the future from the reparative to the preventive point of view. The appalling incidence of necessary rejection of men from the armed services because of physical and mental disabilities is a sober challenge to American citizens and particularly to the medical profession.

The special emphasis accorded the subject of child health by Prime Minister Winston Churchill in his most

recent radio message to the British people indicates that our friends on the other side of the Atlantic have encountered problems similar to our own in the matter of health deficiencies in their young adult population. Rather tardily, the British, like ourselves, have come to recognize the paramount importance of making improvement in child health a major feature of any future program to be set up for furtherance of national security and social betterment.

The free peoples of the western democracies have long tacitly recognized that "the child is father of the man" and have made sporadic efforts to make him a worthy "father". However, in proportion to its real importance we have been niggardly in our attention to the most serious responsibility that individuals and states fall heir to upon their arrival at maturity, namely, that of producing a new generation of men superior to the one preceding it. Our present enemies, the totalitarian axis countries, in preparation for forced expansion, organized child health and training programs on a grand scale, be-

cause they recognized the close relationship between good health and national strength. That foresight on their part makes them far more formidable enemies today than they would otherwise have been.

Our own *laissez faire* attitude toward child health and training during the same period places us at a disadvantage. It is true that we have had the benefit of such private youth organizations as the Boy Scouts and Girl Scouts of America and other groups sponsored by individual schools and churches primarily for the purpose of "character building," but the nation's halting program for improving child health has obviously been inadequate. Even our own enlightened profession is still overwhelmingly "cure-minded" or "therapy-minded" instead of being predominantly "prophylaxis-minded".

Those members of the medical profession who participated in the comprehensive, non-governmental program of Mr. Hoover's White House Conference on Child Health and Development in 1929-1930 can recall with what thoroughness and enthusiasm the first phase of the undertaking was carried out. The fact that such a brilliantly conceived and carefully planned program was allowed to succumb merely because it lacked the financial support needed for carrying out its wise recommendations, stands as a testimony to our shortsightedness. It is interesting to speculate on the possible advantages that we might be enjoying today, had wise governmental or private agencies provided adequate support for its full operation over the years which have intervened. Since the data collected and the recommendations made by the White House Conference are as sound today as when they were first brought forth, they should form the basis of a new program to be placed in operation at the earliest possible date. I. McQ.

PEDIATRICS IN NEW ORLEANS

New Orleans has a group of well-trained and capable pediatricians engaged in private practice. In addition to providing their private patients with services of superior quality they also conduct many well-baby clinics which are supported by the New Orleans Bureau of Child Welfare. In these clinics they supervise the feeding of several thousand infants and children each year, and administer the Bureau's immunization program, including Schick and tuberculin testing, small pox vaccination, and immunization against pertussis, diphtheria, tetanus and typhoid fever. The total of 708 immunizations and tests performed during February, 1942, provides a fair estimate of the volume of the work being done by the pediatricians working in these free clinics.

With respect to the type of disease seen most commonly in children, conditions in New Orleans closely resemble those in Minneapolis. Seasonal waves of chicken pox, measles, pertussis and scarlet fever occur, and during the winter months upper respiratory infections and pneumonia are common in children. In the warm months of the year the incidence of diarrhea increases, but its prevalence here is far less than I expected.

In some respects diseases seen in children in the South differ from those seen in the North. Physicians deal daily with a variety of intestinal parasites, and summer-

time brings its crop of furuncles. Rheumatic fever is common in New Orleans and when it occurs in a colored child the difficulty that may attend its diagnosis is increased if sickleemia is present. In the land where oranges grow, florid scurvy is occasionally encountered, and our experience with congenital syphilis is particularly rich. But strange to say, malaria in children is a curiosity in New Orleans. C. A. S.

ACUTE SINUSITIS IN CHILDHOOD

Aggressive treatment of acute sinusitis was once a popular procedure. That is no longer so. The trend is definitely in the reverse direction.

No one knows better than the conscientious physician how necessary it is for him to be alert to the changes in medical thought and practice that occur from time to time. He may ridicule some archaic form of treatment in the distant past, but he cannot be oblivious to the fact that any transition from the old to the new has come about gradually. Progress has been made through a recognition of failure as well as success. Truths as we accept them today have come down slowly through a long grind of research and toil. Careful observation, painstaking examinations, discussions and consultations have contributed to point the way. There may not be complete agreement, but the trend against active surgical intervention in cases of acute sinusitis has nearly completed its cycle. Its status may be compared to the present well established dictum of nonintervention in cases of acute salpingitis.

We are pleased to find that pediatricians, aware as they naturally are of the minute size of their little patients' sinuses, appear to be in full accord with the modern teaching of more gentle and persuasive methods, based on mild astringents to reduce turgescence at the sinus opening, and steam. A.E.H.

OFFICIAL CALL

The House of Delegates of the South Dakota State Medical Association will meet to transact the business of the Association on Friday, May 28, at the Marvin Hughitt Hotel in Huron. The first session of the House of Delegates will convene at 9:30 A. M., the second session at 1:30 P. M.

The Council will meet at 8:00 P. M. on Thursday, May 27, for its first session. The second session will be immediately following the second session of the House of Delegates, at which time the newly elected Councilors will be seated, and the chairman elected for the ensuing year.

The secretary-treasurer's term of office expires at this time, and the matter of electing a secretary-treasurer for a three year term will be taken up by the Council at the second meeting. The following Councilors' terms expire this year: the 9th District, 10th District, 11th District, and the 12th District. Councilors are elected by the House of Delegates for a three-year term. Will those districts whose Councilor terms expire please take note and instruct your delegate as to your desire for candidate.

CLARENCE E. SHERWOOD, M.D.,
Secretary.

April 28, 1943.

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FOR CHILDREN cont'd.:

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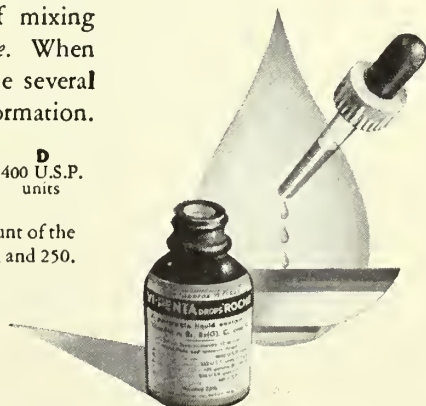
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News Items

The American College of Surgeons, holding in abeyance plans for a Clinical Congress this year, offered the last of twenty regional war sessions for physicians and surgeons of Montana, Washington, Oregon, and British Columbia on April 20 at Seattle.

The South Dakota state board of health has conducted clinics for immunization against typhoid fever in Ft. Pierre and Herried following the recent flood period. The municipal water supply systems in all areas affected have been under constant surveillance by members of the Division of Public Health Engineering preceding, during and after the floods.

Dr. Melvin W. Binger of the Mayo Clinic, Rochester, Minnesota was guest speaker at a recent meeting of the Winona County Medical Society. His subject was "Nephritis and Edema."

Capt. Jas. D. Morrison, M. C., was granted a furlough from Fort Geo. G. Meade, Maryland, to attend and present a paper at the Butte, Montana, meeting of eye, ear, nose and throat specialists. Dr. Morrison practised in Billings.

Dr. F. K. Waniata, Great Falls, Montana, has become associated with Drs. Irwin, MacGregor, Lord and Little where he will assist in clinical activities and continue his private practise.

Dr. Jno. S. Kilbride, who left Canby, Minnesota, in 1936 after 30 years of practise to join his son, Dr. Edwin A. Kilbride in Worthington, has reopened his office in Canby.

Dr. Dolson W. Palmer, former physician at the Fort Totten Indian Agency, North Dakota, and more recently with the veterans administration near Oakland, California, has removed to Cando, North Dakota, to take over the practise of the late Dr. Kristinn Olafson.

Dr. H. H. Parsons, a retired major in the United States Medical Corps who recently resumed private practise in Sidney, Montana, his earlier home, has accepted an appointment as surgeon in the government hospital at Oklahoma City, Oklahoma.

Dr. T. J. Bloedel, practising in Gaylord, Minnesota, for the past year, closed his office there on April first to become associated with Dr. Arthur Neumaier at Glencoe.

Drs. Daniel W. Wheeler, Peter S. Rudie, Mark Tibbetts and Lawrence R. Gowan, all of Duluth, Minnesota, and all of whom were lieutenant commanders in the Minnesota naval reserve, after twenty months on the staff of the Navy hospital at Bremerton, Washington, have been promoted to the rank of commander.

Capt. Thos. E. Corcoran, M. C., of Rock Rapids, Minnesota, has been reported missing in action in North Africa.

Dr. Fred W. Rankin, once head of a Mayo Clinic section in surgery, has been elevated to the rank of a brigadier general in the army medical corps which was the rank held by his father-in-law, the late Chas. H. Mayo, and Dr. Mayo's brother, the late Dr. William J. Mayo, in their service in the World war.

Dr. Emmett R. Samson of Stillwater, Minnesota, has been commissioned a lieutenant commander in the medical corps of the Navy and has entered the service at San Diego, California.

Dr. James R. Kingston of Coleraine, Minnesota, one-time practitioner at Deer River and later a member of the State Health Board, now in active service in control of a Southern Pacific malaria unit, has been promoted to lieutenant commander.

Dr. Milo H. Larson of Nicollet, Minnesota, has been ordered to the Army Air Corps at Carlisle Barracks, Pennsylvania.

Dr. Gaylord W. Anderson, head of the division of preventive medicine and public health, serving in a public health capacity in the office of the surgeon general of the army, has been made head of the army's division of medical intelligence, the so-called "health spies" who compile health, climatic and sanitation evidence with respect to all areas to which United States troops may be sent.

Dr. Edward A. Hackie of Hallock, Minnesota, a Canadian by birth, as the culmination of two years of effort has found it possible to enlist in the United States army and will assume military duties as a lieutenant at Camp Grant, Illinois.

Major Michael L. Mitchell is the new post surgeon and director of the medical division at Fort William Henry Harrison, Helena, Montana, succeeding Major Lester Besecker who became surgeon of the First special service.

Lieutenant Wm. M. Thebaut, for eight months medical officer at the main Montana navy recruiting station in Helena has been transferred to the naval hospital at Bremerton, Washington, the replacing officer being Lieutenant Walter Mauther who has been serving as post surgeon at the Bremerton marine barracks. The home of the former is Oakland, California; that of the latter, Milwaukee, Wisconsin.

Dr. Chas. J. Bresee, Great Falls, Montana physician, named to succeed the late Dr. Enoch M. Porter, Great Falls, on the state board of health.

Dr. Lester McLean, former Bismarck, North Dakota resident and at present city and county health officer at Vallejo, California, now heads a staff of twelve doctors, nurses and inspectors as chief of the new Vallejo health center dedicated in March.

Dr. Ralph Rossen, superintendent of the Hastings, Minnesota, State Hospital for the past five years, will leave for Bethesda, Maryland, for active duty as a past assistant surgeon Lieutenant Senior grade in the Navy. He has been given a military leave of absence.

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CAMEL COSTLIER TOBACCOS

BUY WAR BONDS AND STAMPS

Dr. R. R. Hendrickson, Bismarck, North Dakota, for the past eighteen months superintendent of the sanatorium at Sand Beach near Lake Park, has been commissioned a major in the United States public health service and will be stationed at Juneau, Alaska.

Dr. Byron L. Pampel, formerly of Livingston, Montana, has been re-appointed by the governor to be superintendent of the state hospital at Warm Springs. His administration of the institution is regarded as a progressive one.

Dr. John S. Floyd, Butte, Montana, has been appointed by the board of county commissioners to fill the post of county physician left vacant by the resignation of Dr. Jos. J. Kane.

Dr. Thos. E. Flinn of Redwood Falls, Minnesota, has been appointed county coroner, an elective office for which there were no filings and which was filled temporarily by a Redwood Falls resident non-professional who later resigned.

Dr. George Friedell of Ivanhoe, Minnesota, elected to the presidency of the Lyon-Lincoln Medical Association.

Dr. Frank M. Jolin, Coleraine, Minnesota, re-elected president of the Itasca County Hospital staff.

Dr. Herbt. H. James of the staff of Murray hospital, Butte, Montana, delivered a slide-illustrated lecture on "Cancer and its Control" to the members of the Red Cross home nursing class of Silver Bow County Women's Field Army for Cancer Control.

Dr. Arthur R. Kintner, Missoula, Montana, has addressed several bodies, among them the Rotary Club, on the advance of the sulfonamides in the field of infection treatment.

Dr. L. G. Dunlap, Butte, Montana, discussed progress in medicine and surgery before Rotarians at Anaconda in respect to medication of battle casualties, operations for cataract, blood transfusion and storage of plasma, fracture treatment for broken legs, employment of sulfa drugs for treating infection and the contributions of Dr. Herald Cox who was the JOURNAL-LANCET lecturer at University of Minnesota in 1942. Dr. Cox's work in manufacturing sera with eggs was explained.

South Dakota physicians who attended the New Orleans Graduate Medical Assembly meeting in March: Dr. O. Charles Ericksen, Sioux Falls, Drs. Wm. A. Delaney, O. T. Mabee, E. W. Jones and F. J. Tobin, Mitchell.

Dr. F. W. Hennings of Dickinson, North Dakota, and Miss Beth Barnes, formerly of Cannon Falls, Minnesota, and lately of Seattle, were married in Seattle and the couple is living in Pacific Beach, Washington, where Dr. Hennings for the last ten months has been a lieutenant in the naval medical corps.

Dr. Frank Darrow, Fargo, was elected president of North Dakota Medical association at the annual meeting in Bismarck. Dr. F. L. Wicks, Valley City, was elected president-elect. Dr. James Hanna, Fargo, was named first vice president and Dr. A. E. Spear, Dickinson, second vice president. Fargo was named 1944 convention city.

Neurology

Dr. Campbell Sansing, 70, formerly of Fargo, North Dakota, where he had served on the staff of the Veterans hospital between the period of his practising in Valley City and in Courtenay and his transfer to the government hospital in Muskogee, Oklahoma, died April 4 at his home in Blossom, Texas. He retired last August.

Dr. A. L. Lloyd, 76, of Rapid City, South Dakota, who had been in ill health for three years, died at his home March 27. He had practised in the state since 1898, successively at Leola, Custer, Newell, Belle Fourche, Rapid City and Nisland, returning to Rapid City six years ago.

Dr. Frank A. Moore, 70, pioneer physician and mayor of Yankton, South Dakota, and brother of Dr. D. V. Moore of Sioux City, Iowa, died March 22 after twenty years residence in Yankton, seventeen of which were spent in medical practise and the last three in office. The cause of death was coronary thrombosis.

Dr. Bertha Brainard McElroy, 49, of Jamestown, North Dakota, died at Rochester, Minnesota, March 12. Graduating from the University of North Dakota a Phi Beta Kappa and spending nine years as a high school teacher and principal she resigned to pursue a course in medicine, a lifelong ambition. Dr. Brainard, her marriage to Mr. Jno. E. McElroy having taken place only in 1941, was a graduate of Rush Medical college, city health officer of Jamestown, and a staff member of the student health service of Oregon State College, Corvallis, Oregon, after serving one year's internship at the Women's and Children's hospital in San Francisco and a year at Los Angeles General hospital. She was state president of the American Association of University Women and a member of many civic and professional organizations.

Dr. Francis E. Butler, 62, of Menomonie, Wisconsin, president of the Wisconsin State Medical Society and a practitioner in Menomonie for nearly forty years, died there March 12.

Dr. August Kuhlmann, 67, of Melrose, Minnesota, died April 4th, ending thirty-seven years of practise in that community.

Dr. Henry Porter Johnson, 88, of Fairmont, Minnesota, died March 31 after several invalid months. His career as a family physician dated back sixty-four years, all of which were spent in Minnesota. In addition to an active practise in medicine and surgery Dr. Johnson found time for postgraduate work, hospital management, service on boards of education and church bodies as well as fraternal affiliations and service to business clubs.

Dr. Anton Herman Luedtke, 73, of Fairmont, Minnesota, died March 18 at his home in that city. He was a graduate of the University of Minnesota Medical School and had served in World War I, leaving his practise at the age of nearly fifty years and attaining the rank of Major. His death was due to cancer.

MERCK INSTITUTE'S TENTH ANNIVERSARY

Leading scientists in government, universities, and industry stressed the tremendous contributions to victory made by the research laboratories of this country, at ceremonies commemorating the tenth anniversary of the opening of The Merck Institute for Therapeutic Research on April 26.

The Institute, a non-profit corporation under the laws of the State of New Jersey, was founded in 1933 for the purpose of conducting investigations into the causes, nature, and mode of prevention and cure of diseases in men and animals. The determination of the therapeutic value and safety of new drugs is one of its principal duties.

The tenth annual report, presented by the Director, Dr. Hans Molitor, pointed out that, since 1933, the size of the Institute has increased almost six times, and its personnel eighteen times. Vitamins and Chemotherapy are the principal fields of research. Since the outbreak of the war, only problems of immediate importance to the war effort were permitted to remain on the Institute's research program. Notable among these are Penicillin, the most powerful and least toxic germ killer ever discovered, and new antimalarial products.

George W. Merck, President of Merck & Co., Inc., presided at the dinner and introduced the speakers, each of whom emphasized the importance of continuous research in the fields of chemotherapy and nutrition during wartime as well as to meet the problems of postwar rehabilitation.

The Merck Institute was included in the Army-Navy "E" Award for Excellence in Wartime Production which was presented to Merck & Co., Inc., on February 9, 1943.

TWO NEW LEDERLE ITEMS

Hemostatic Globulin, a constituent isolated from blood and possessing enhanced power to clot blood (thrombic activity), has proved highly efficient in staunching the flow of blood from wounds. This originated in Lederle research. Its importance lies in the fact that the blood of many persons may be, or may become through disease, deficient in natural clotting ability. To such persons even minor wounds and cuts are dangerous through hemorrhage. Shaving, pulling of teeth and even the simplest of surgery present hazards to "bleeders" that may even be fatal. Hemostatic Globulin effectively erases this danger. When applied either as a spray or as a wet dressing, Hemostatic Globulin causes clotting of blood in the capillaries within as short an interval as five seconds. A severed vein or artery must be subjected to surgical treatment as heretofore, but dentists and surgeons find the new material invaluable in cases of stubborn bleeding.

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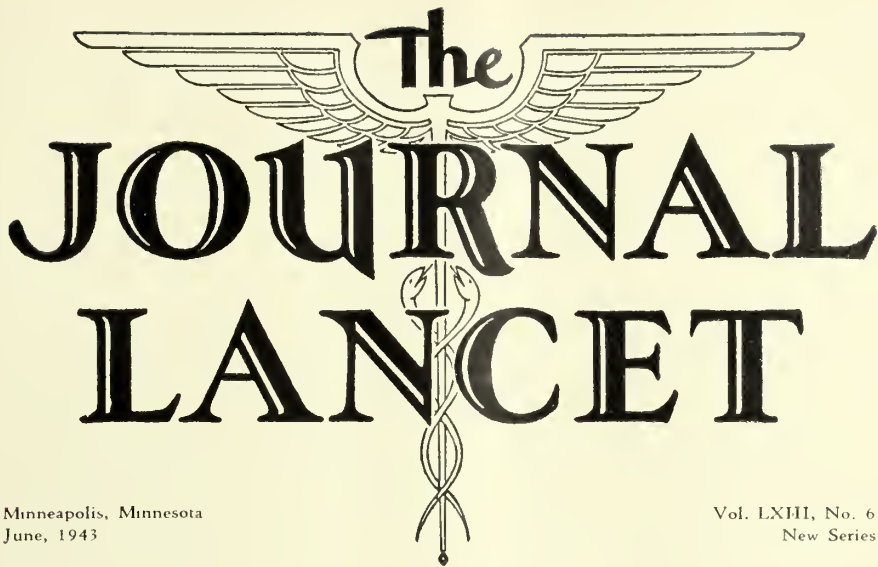
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The JOURNAL LANCET

Minneapolis, Minnesota
June, 1943

Vol. LXIII, No. 6
New Series

The Medical Management of the Patient with Arterial Hypertension*

S. Marx White, B.S., M.D., F.A.C.P.

Minneapolis, Minnesota

ANIMAL experimentation and newer methods of physiologic study of kidney function in man have, in the past decade, increased our knowledge of the hypertension problems to a remarkable degree. Whether our means of relieving the patient subject to this malady have been greatly increased, thereby, remains yet to be seen. In the meantime, we should continue to avail ourselves of all the methods by which amelioration of the process can be secured and by which diminution of its consequences can be brought about.

In order that his therapy may be basically sound and fully abreast of the times, it is requisite that the physician have a knowledge of the pathology and pathologic physiology of the disorders he treats. For that reason, the briefest possible discussion of our knowledge of hypertension, including recent trends, is presented.

It is generally accepted that increased peripheral resistance, the effective site of which is in the arterioles, is the predominant factor in the disorder. Increased force of the heart beat, called by Page¹ "cardiac augmentation" is a phenomenon familiar to all clinicians. Given sufficient time for its development, cardiac hypertrophy occurs without exception. Other factors which might be considered, such as increased viscosity and volume of the blood, and increased cardiac output, appear not to play a uniform or essential role. Page¹ states that these three are normal in experimental hypertension.

Arterial hypertension occurs in connection with many conditions, apparently unrelated. Page¹ has given a

*Presented at the meeting of the Kansas City Southwest Clinical Society, Kansas City, Mo., October 5, 1942.

classification of hypertension which I shall attempt to simplify for our consideration.

A. *Renal*: (a) Affections of the vessels, such as periarteritis nodosa, arteritis, anomalies, obstructions, thromboangiitis obliterans and Wilm's tumor. (b) Affections of parenchyma, acute nephritis, chronic nephritis, pyelonephritis, hydronephrosis, polycystic disease, toxemia of pregnancy, x-ray lesions and renal stones. (c) Affections of perinephric structures; perinephritis, tumors, hematoma. (d) Affections of the ureter; obstruction at the pelvis, in the ureters, prostate, urethra, etc.; pyelitis. B. *Cerebral*: Increased intracranial pressure, such as by trauma, tumor and inflammation; stimulation of the diencephalon, anxiety states, lesions of the brain stem. C. *Cardiovascular*: Heart failure, arteriovenous aneurysm, coarctation of the aorta, lead poisoning and polycythemia. D. *Endocrine*: Pheochromocytoma, pituitary adenoma, pituitary basophilism, acromegaly, hyperthyroidism, the menopause (natural or artificial) and arrhenoblastoma. E. *Unknown*: Essential hypertension, malignant hypertension.

It seems clear that some of the above act by toxic factors, others, principally through a nervous mechanism, and still others, through a humeral mechanism. How far we can go in finding a common denominator, mediated through the nervous system and/or by humeral factors, remains yet to be seen.

Attempts to correlate disturbances in the endocrine system with essential hypertension have failed so far, despite the occurrence of hypertension in certain disor-

ders involving that system. Animal experiments, however, show that the endocrines have a place in the sum total of the processes on which arterial tension depends. The role of the hypophysis is not yet clear, although there is evidence supporting the suggestion that it acts indirectly through a hormone to stimulate the adrenal cortex, and does, on occasion, excite a form of hypertension. The thyroid and gonads are shown to play no essential part. The incidence of hypertension in the menopause remains unexplained.

The fact that so-called emotional factors play a part in causing hypertensive reactions has been recognized for many years. Page¹ expresses the view that in maintaining the blood vessels in a reactive state, as well as in contributing towards the vaso-constriction by vasomotor impulses, it is possible that in some cases these emotional factors initiate the steps leading to hypertension of humeral nature, and may thus play a subsidiary though important role in the mechanism of hypertension.

Surgical removal of a portion or portions of the sympathetic nervous system, a mode of attack on the problem of hypertension begun by Rowntree and Adson,² was followed by various types of operation on the nervous system and on the adrenal gland by many surgeons, and the results have been followed up with careful study. There are reports of many cases of partial disappearance of hypertension and relief of symptoms. Recurrence of the hypertension is not uncommon. Relief of the ocular manifestations of malignant hypertension in certain instances has been gratifying. While the surgical attack on the sympathetic nervous system may have limited application, it is not a curative measure and is, fortunately, not being generally adopted.

Koch and Mies³ produced protracted arterial hypertension in rabbits by removal of the nerve of the carotid sinus and the aortic depressor nerves, but their work does not appear to have been followed up; and it seems clear that damage to the aortic depressor nerve and the carotid sinus are not a source of hypertension in man.

Turn for a moment to the pathology and pathologic physiology of our subject. Bell,⁴ summarizing the results of many years of study of the pathology, states that the form of arteriosclerosis seen in "primary hypertension" is characterized by the presence of a subintimal deposit of hyaline material; this change is seen particularly in the afferent arterioles of the glomeruli. It usually forms only a thin layer, but is sometimes very thick. There is also elastic intimal thickening in the small arteries. How widespread are the characteristic histologic changes of arteriosclerosis throughout the body, appears to be still controversial. Fishberg,⁵ studying 72 cases of essential hypertension, found arteriosclerosis present in the kidneys in 100 per cent, in the spleen in 66 per cent, in the pancreas in 49 per cent, in the liver in 30 per cent, in the brain in 19 per cent, and in gastrointestinal tract, skin and myocardium in small percentages only. He found none in the skeletal muscles and lungs. Histologic studies by many writers vary the picture, but this is fairly representative. Whether the intimal thickening in the arterioles, i. e., a pathologic process, antedates the development of hypertension, or whether the increased

intravascular pressure with arteriolar constriction is the primary factor, does not appear to be fully settled, as yet. Experimental work, of the type begun effectively by Goldblatt and followed up and confirmed by many others, seems to have established, however, that changes in the renal circulation are the primary cause. Hypertension begins promptly, as a rule, after the circulatory changes have been induced experimentally in animals.

From the physiologic side, based on studies of glomerular filtration rate and renal blood flow, the studies of Smith, et al⁶ indicate that in patients with arterial hypertension, the characteristic change in circulation in the kidney must be constriction of the efferent glomerular arteries, by which intraglomerular pressure is increased. Again, Page¹ states that the conditions for the liberation of renin from the kidneys involves the release of this substance, a large molecular protein, from the tubular cells of the kidney, and that this release can be brought about in animal experiments by reduction of pulse pressure, i. e., the partial conversion of pulsatile to a continuous flow. His statement, that blood from the renal veins of many patients with essential hypertension is rich in renin, suggests some such change in the circulation of the renal tubules.

These points should not be labored. They are introduced here chiefly to call attention to the studies now under way. They show that complete correlation of pathologic and physiologic data has not yet been attained, though it seems to lie very near. Studies of glomerular filtration rate, effective renal blood flow, clearance of various substances by the kidney, are yielding valuable information to the physiologist and the clinician. It is suggested that the physician, to keep his therapy up to date, must follow closely this field of work.

An enormous amount of experimental work has been stimulated by the discovery of Goldblatt, Lynch, Hanzal and Summerville,⁷ who were the first to produce chronic arterial hypertension in animals by application of adjustable clamp to the main renal arteries. Page⁸ has also produced a similar hypertension by compression of the parenchyma of the kidneys, either by the perinephric scar which results from application of silk or cellophane to the kidneys, or by preventing the hypertrophy which results when one kidney is removed.

Correlation of experimental and clinical observations in the study of arterial hypertension has been presented by Corcoran and Page.⁹ They point out that a substance, renin, derived from the kidneys, when activated by a substance present in normal plasma, forms an active vaso-constrictor substance, angiotonin. This substance, when injected in experimental animals or in man, produced the effects which characterize arterial hypertension in man, such as cardiac augmentation, arteriolar constriction, and constriction of the efferent glomerular arterioles in the kidney. While suggesting the possibility that angiotonin is involved in the pathogenesis of essential and malignant hypertension in man, they point out the part that the endocrine and nervous systems play in maintaining the blood vessels and heart in a state receptive to hypertensive stimuli. They maintain the attitude, also, that in some types of hypertension in man, the high state of

nervous organization may even make it a prepotent factor.

Search for a substance which would inhibit the action of the substances capable of producing hypertension in animals has been successful, both in the hands of Grollman, Williams and Harrison¹⁰ and of Page, et al.¹¹ This inhibitor substance, derived by extraction from the kidney, has been used in treatment of essential and malignant hypertension in man by Page.¹ Given by injection, it has caused striking remission of the hypertension and accompanying symptoms, of the ocular manifestations in the malignant phase, and of the circulatory disturbances in the kidney. Difficulties in administration have not as yet been entirely overcome; the workers do not consider it as yet a practical treatment.

Another result of the advance initiated by the experimental method of Goldblatt has been the search, in man, for cases in which hypertension caused by a unilateral renal involvement might be relieved by removal of the offending kidney. Crabtree and Chaset,¹² in a study of kidneys examined after unilateral nephrectomy, reported failure to correlate hypertension and renal vessel change, and they, therefore, discourage employment of nephrectomy in hypertensive cases. Braasch, Walters and Hammer,¹³ in discussing a large series of cases in which patients had been subjected to various renal surgical procedures, state that the discovery of a unilateral renal lesion in the presence of hypertension does not indicate that operation is advisable in every case, since other factors are often present which would contraindicate it. They found, however, that hypertension was relieved more often by unilateral nephrectomy than by conservative operation. The application of surgery in unilateral renal disease has been reviewed by Abeshouse.¹⁴ Among his conclusions, we find that, while in certain types of chronic advanced unilateral renal disease, there may be a causal relation to hypertension, the same type of lesion occurs in many patients without elevation of blood pressure; and that, as yet, there appears to be no justification for considering nephrectomy a panacea for the cure of hypertension in every case of chronic, unilateral disease of the kidney. I am already seeing too many cases in which unilateral nephrectomy has been advised without sufficient evidence or adequate study. I would advise that a diseased kidney which still retains some function should be left in place, rather than its removal, which places an unbearable burden on its remaining fellow.

In a recent report of the Council on Pharmacy and Chemistry, Goldblatt, Kahn and Lewis¹⁵ have reviewed the results of treatment of experimental hypertension in animals, and suggested certain relations to the results of treatment in man. It is recognized, of course, that the problem in the experimental animal may have little relation to the problems in man. The interest lies, however, in the fact that these experimental methods of approach are possible. The last paragraph is worthy of quotation, "The results so far observed from the treatment of experimental renal hypertension in dogs and rats, do not yet justify much optimism about the possible efficacy of such treatment for human hypertension. For the present, the most that can be said is that a faint note of hope

has been sounded for the possible medicinal treatment of the most common type of so-called essential hypertension associated with renal vascular disease. Progress in this respect will be hastened, because it is now possible to carry out tests on hypertensive animals before they are tried out on man. Empiricism has given way to experimental demonstration, but the final acceptance of the value of this contribution must and will depend on the results obtained in the treatment of human hypertension."

TREATMENT OF ESSENTIAL HYPERTENSION

It is difficult to appraise the results of medicinal treatment in essential hypertension. The effect of the confidence the patients have in the physician, the multiplicity of methods used at one and the same time, the unknown and sometimes unknowable factors operating in the environment, and the variable capacity of the physician for critical judgment, all together operate to produce confusion. Mistletoe, garlic and watermelon seeds, together with scores of other remedies which have had their advocates, have failed to produce the results necessary for acceptance by the Council on Pharmacy and Chemistry. The physician can no longer afford hit and miss drugging as suggested by the detail man whose product is not properly controlled.

The use of vitamins and of organ extracts, except possibly those of the kidney along lines similar to those developed by Page, does not seem to have made any effective contribution. Deprivation of sodium chloride in the diet has failed in the hands of most observers. Dietary restrictions, except such as prevent the frequent overfilling of the stomach or prevent obesity, have been generally abandoned. The concept held at one time, that a high protein diet played a part in producing hypertension, is no longer held. It has become recognized and is now supported by experimental evidence in dogs, that the reduction of overweight and obesity will often be accompanied by reduction in the degree of hypertension. The results are sometimes striking, but, on the other hand, may be nil. In any case, there is nothing to be lost by careful slow reduction of weight in the obese. A limit of average reduction of 4 to 6 pounds per month is usually desirable, for reasons which need not be discussed here. Even though considerable reduction in pressure should fail to occur, the reduction in the work of the heart is certainly an advantage. The use of thyroid products in these cases is contraindicated, except in the presence of definitely pathologic low metabolism, and in myxedema.

Drugs known to have some effect on arterial hypertension may be roughly classified into three groups: (1) Vasodilators. (2) Sedatives and hypnotics. (3) Empirical remedies. While certain of the known vasodilators, such as amyl nitrite by inhalation, and nitroglycerine under the tongue, are of great value in angina pectoris, their effect is evanescent, and, in general, they are useless in the treatment of hypertension. For the most part, sodium nitrite and erythrol tetranitrate are of little use here, often producing, when effective, disagreeable symptoms and vasomotor collapse. I have not been able to get results by the use of bismuth subnitrate, even though

used over long periods of time as proposed by Stieglitz. Rather than use the vasodilators in a case in which it is desired to lower blood pressure in an emergency situation, with normal or high hemoglobin values, I prefer the removal of 300 to 500 cc. of blood by venipuncture, which can be repeated as indicated and will have fewer undesirable effects.

The degree to which we use sedatives and hypnotics is largely a measure of failure in our management. It is not quite fair to say that the failure is more often on the part of the patient than of the physician. We, as physicians, must accept a certain part of the responsibility. It seems clear that any effect in reduction of hypertension is by diminution of nervous and muscular tension, and by aiding to secure relaxation, rest and sleep. The past decade has seen the development of so many barbital compounds that there is more confusion than certainty about them, but certain principles underlie their use. Some of the compounds are principally oxidized in the body; and others, usually producing a longer action, are principally excreted in the urine. Chief of these latter are barbital, phenobarbital, their more soluble sodium derivatives, and Ipral calcium. I do not use any of these primarily for the effect on blood pressure, but only from compulsion, when sedation or hypnosis is otherwise not procurable. Toxic and damaging effects are not uncommon, are in fact altogether too common. If the use of these remedies seems unavoidable, their continuance by the patient should not be allowed, except under frequent control, with examination for depressant effects on the cerebrum and on the blood making organs. The shorter acting barbiturates, oxidized largely in the body, require the same control, but are less likely to have cumulative effects. Those in most common use are amytal, alurate and neonal. It seems particularly unfortunate that the drug houses have wasted so much ingenuity in combining the barbital preparations with other remedies. The exhibition of the drugs should be kept separate and not in predetermined combinations. The bromides and chloral hydrate continue to be useful for sedation and hypnosis, on occasion, and I find myself using them more often, in the desire to get away from the barbital.

Among the empirical drugs, the greatest interest attaches to the revival of thiocyanate therapy, following the demonstration of Barker,¹⁶ that the level of the drug in the blood plasma can be determined, and the amount in the circulation thus carefully controlled. Previous to this demonstration, these drugs, sodium and potassium thiocyanate, had been in restricted use, but were discarded because of their toxicity. Even with the control of thiocyanate levels in the blood serum, great caution is necessary because of individual variation in susceptibility. The effective therapeutic level is generally stated to lie between 8 and 12 milligrams per cent; one should be on guard against toxic effects at levels from 15 to 20 milligrams per cent. However, I have seen severe toxic effects at a level of 10 milligrams per cent, and repeatedly found, as have others, that when toxic effects develop, the drug may be retained in toxic amounts in the circulation for many days, and even weeks, after its withdrawal. A few patients do not require the levels of 8

to 12 milligrams per cent for good effect. I have seen a very satisfactory reduction in blood pressure at persistently lower levels; in one instance, even as low at 5 milligrams per cent. This is especially true when the environment can be controlled and the patient trained in relaxation. The practice of giving the patient a supply of the drug and allowing him to go without frequent chemical control is pernicious. I have had a number of patients present themselves because of the toxic symptoms, when this practice has been followed by others. Even when under control, patients should be repeatedly and persistently warned to stop the drug immediately and present themselves for examination, if there is weakness, nausea, the development of purpuric spots, a skin eruption, or severe symptoms of vomiting, confusion and delirium. The repeated reports of convulsions, coma and death should emphasize to us the necessity for watchfulness.

While the treatment of symptoms is not the primary object in this paper, there is one on which a very recent report may be of interest. Marshall¹⁷ has used graded doses of histamine phosphate at intervals of three to seven days. Care was exercised to prevent development of tolerance or a high threshold. The systolic and diastolic blood pressures were temporarily reduced 20 to 40 mm. Hg. This reduction persisted for but a few hours, but the dizziness was alleviated until the time of the following treatment.

Much time might be given to the consideration of the treatment of the malignant phase of hypertension and its complications, but that would lead us too far afield. The earlier phases, which we call essential hypertension, yield to persistent and studious management to a degree so satisfactory in many patients, that special consideration is desirable. In 1935 and 1936, the writer^{18,19} outlined the concepts concerning essential arterial hypertension up to that time. Emphasis was given to the need for consideration of the psychological, emotional and environmental background in each patient. Guidance in relation to their daily lives, their problems, and their attitudes is necessary.

That there is a large group of patients with a demonstrable hyper-irritability of the vaso pressor mechanism, is a concept advanced by Von Monakow²⁰ in 1920. The management and training of these individuals is productive of a measurable control and reduction in the hypertension, and it is to this topic that the writer desires to direct special attention. Whatever the relation of circulatory conditions in the kidney may be to the development of essential hypertension, one objective in treatment is clearly indicated. It is to shorten the periods during which the blood pressure is up, and to lengthen the periods during which it may be decreased. Of greatest interest and importance in this connection is the discovery of hypertension in the early labile phase. Some of these individuals are presumably on the border of normal, exhibiting excessive pressor responses to certain stimuli of a so-called emotional character. Attempts have been made to devise tests, such as the inhalation of carbon dioxide and the application of cold to the hand and wrist, which would bring out the characteristic, or maximum pressor response on the part of any given individ-

ual. The cold pressor test of Hines and Brown^{21,22} gave promise of usefulness in discovering hyper-reactors, and while I still use it on occasion, one of its chief uses would appear to be in the discovery of hyper-reactors in groups of individuals, presumably normal in other respects. The skilled physician will find that there are few hypertensives or hyper-reactors, who do not manifest the tendency without the test, on the first examination, if this is properly done.

Patients appearing for examination in the doctor's office will often show an elevated pressure during the initial examination, and the physician should pay particular attention to this, attempting to learn the highest point of systolic and diastolic pressure readings. It is common to find this situation, when the blood pressure is taken immediately after the taking of the history. The procedure usually causes considerable stress and is about as good an effector of pressor hyperreaction as I know. In hyperreacting individuals and in hypertensives, it is seldom possible at the first examination, even by rest and relaxation, to get the same lowering of blood pressure as may be secured later, when a certain degree of confidence in, and understanding of the physician have been developed. It is important in the early contacts to develop the highest readings obtainable, as well as the lowest. In fact, these higher readings are of extreme importance as showing the degree of response that can be obtained. Often on the second interview, marked reduction in the figures may be shown. This is especially true in individuals in the earlier labile phase. In this second interview, and in fact at the time of any study in which an attempt is made to discover the lowest pressures to be obtained, it is necessary that several conditions be observed, and certain of them should be explained to the patient before he comes for study. 1. He must come on a day or at a time of day without preceding stress of business or social activity, without hurry, not after a full meal, and without subsequent appointments to be met shortly. Such a small thing as the fear that the parking meter will need another nickel soon, can prevent the desired relaxation. 2. The patient must be recumbent on a comfortable table in a room which can be partially darkened at will, is free from distracting noises, and is comfortably warm. He should not be exposed to chilling. 3. The observer should be unhurried and should have explained the purpose of the procedure before the study is begun. It seems too simple to require statement, but is a fact often overlooked, that the patient during the examination is usually anxious to know what the results may be. This of itself may interfere with any considerable drop in pressure. Therefore, he is told that such is the case, and that unless he can relax completely and dismiss this from his mind, the desired lowering of pressure cannot be obtained. A promise is given that at the end of the examination, he will be told what the exact figures are, both the highest and the lowest.

In the process of training, it is my custom to tell the patient, at the end of a session, what the entire series of blood pressure readings have been, using the exact readings, with an explanation for the difference. I have, at once, secured his interest in a procedure novel to him;

have secured his confidence; and have shown him something he does not know about blood pressure. The effect is usually profound, and the attempt at cooperation becomes real. At this point, it might be well to state why the exact readings are given. Many physicians disagree with this procedure. They claim that it causes worry and concern, and that it is better to reassure without too much frankness. However, the best education requires the truth, and the radical drops in pressure secured by relaxation in the examination room, give the patient an understanding of what he can do himself throughout his day, or at least in portions of the day, and this is the reason for the demonstration.

More than medicines, more than ablation of a portion of the sympathetic nervous system, or removal of a supposed renin-producing kidney, the great majority of hyperreacting patients require reassurance, education, and training in relaxation. If the physician is unable to accomplish these objectives, he is no more fitted to treat the hypertensive patient than is the internist fitted to perform a cholecystectomy or the surgeon fitted to treat a patient with coronary occlusion. A successful operation requires time and unhurried procedure. One practicing in the field under discussion must proceed in like manner. Each case is to be approached with a consideration of the patient's temperament, background of education and training, and capacity for understanding. The doctor is now a teacher, leader, trainer and mentor, and cannot drive.

For reassurance, it is necessary first to dispel many of the impressions current concerning hypertension, and to forestall as much as possible the misinformation soon to be brought to the patient, by friends and relatives, as well as by newspaper columnists. One must first attempt to convince the patient that the problems and course of some other patient, whose disorder has the same name, or who may have one or more of the same symptoms, are in no sense his problems and course. I forewarn against the suggestions and importunities with which the patient is sure to be pestered, immediately he spreads abroad the nature of his malady. I have often succeeded in getting an amused tolerance by the patient towards the many suggestions and directions to be brought from many sources, by the following suggestion: "Whenever your friends or relatives bring you this or that suggestion about diet or medicine, or some doctor's method of cure for your trouble, ask them this question, 'How long have you practiced medicine?'" Not many patients have ever thought of it, and some, even when told, cannot realize that only the informed and reliable physician, thoroughly acquainted with all of the problems in the case under consideration, can outline and pursue a proper course of treatment and management. The average patient is more than ready to follow the suggestions obtained without cost from a talkative neighbor. One of the suggestions I implant early is that one of the most vicious effects of neighborhood medicine and advice is to wreck many well thought out and intelligently conceived medical program, which would be otherwise effective.

One of the most effective measures in the management of hypertension, particularly in the earlier labile phases,

is to furnish the patient with knowledge of, and repeated experience in the lowering of blood pressure by relaxation. Brief recital is given of conditions under which pressure in the normal, but more so in the hypertensive, is elevated. Anger, fear, worry, scurry, too great concentration, over-exercise, fatigue, and an over-filled stomach, each act to raise the pressure. Equanimity, serenity, rest, relaxation and sleep contribute to its lowering. If the effect of these factors can be demonstrated on the patient himself, he will have an understanding of the benefit to be secured, and, through his own knowledge, will be ready to cooperate. This education by demonstration is begun early in the management, and requires, at least in the beginning, frequent repetition. A little treatise on relaxation by Edmund Jacobson²³ has been put out for popular reading, but it is very valuable for the physician, even more so than his earlier and more scientific book on Progressive Relaxation. Some patients learn quickly, some slowly and haltingly, and some try one's patience almost to the breaking point. I said "almost". At this juncture the physician requires equanimity as much as does his patient. It is sometimes necessary to let the patient do a little talking, in an attempt to find out why one's education does not take. All this takes time. The "busy doctor," who cannot give the time when needed, has no place in the management of essential hypertension.

The technic of relaxation requires that the subject be recumbent and comfortable in a room which is free from distraction and so arranged that it can be partially darkened at will. The blood pressure cuff is adjusted and allowed to remain throughout the period of study, which can be completed, as a rule, within 15 or 20 minutes. The subject is asked to dismiss the problems of the day and to relax as if he were about to take a nap. The physician's voice is low, and his movements unhurried. The patient is instructed to relax every part of the body, neck, back, arms and legs. Gentle palpation of muscle regions will often reveal that some parts are not relaxed, and this can be indicated to the patient. He may be asked to relax each part in turn. Frequent records of blood pressure are made as the time goes on. When it seems that good relaxation has been secured, it may be well for the physician to leave the room for a brief period; but in so doing, it is necessary to explain to the patient that he must remain relaxed, even upon the physician's return. It is well to explain that he will not be forgotten and left for an indefinite period.

By repeated exercises of this kind, the patient is trained in relaxation, and, at the end of the session, a recital of the pressure changes makes clear the benefits in the reduction of arterial pressure. At some sessions, the reduction may be unsatisfactory. This should be the occasion for inquiry. Environmental or personal reasons may be found. Persistent failure suggests the stabile phase of hypertension and may provide the guide to further and other measures.

Factors in the environment will often play a large part in preventing relaxation. Factors of crucial significance have been found in many cases. Elimination, or at least reduction in their influence, may play a vital role in man-

agement. The physician cannot change a patient's environment; but he can suggest changes, and he may point out ways in which needed changes may be brought about, or an unfavorable influence reduced. The degree and character of change must be left to the patient and to those immediately concerned. Details are not possible here, but a few principles may be stated. Each individual is geared to a certain tempo and method of most successful performance and I abandoned, long ago, attempts to change these. Hours of work may require modification. Work must be left in the place of working and not carried home. Hours of rest and relaxation must be detailed and scrupulously observed. Relaxation for a short period after meals has a most salutary effect, both on arterial pressure and on digestion. When an hour of relaxation, and better, an hour of sleep, can be secured after the noon lunch, it may act almost as a life preserver. An occasional—very occasional—vivacious individual can be induced to relinquish the role of entertainer on every possible occasion and assume the role of bystander and listener.

There are occasions on which it is advisable to begin management by a period of rest in bed. This period should be utilized to the full by the physician for training in relaxation. Demonstration of the advantages of relaxation can be made during it. Consecutive Saturdays and Sundays in bed have helped many to reorganize their drive, in preparation for lessening hyperreactivity. Vacations and weekends may require prolongation. It may require a bit of argument with a strained executive to convince him that over a ten, fifteen, or twenty year period, he would probably do better work, have better health and more money in the bank, if he worked ten, rather than twelve months out of the year.

A minor and sometimes major change in employment or position may be successfully engineered. Some patients have been willing to accept reduced incomes in order to slow up the progress of the hypertension. The most unhappy and strained individuals are those tied to an occupation or routine they do not like, not to say love. In younger and still adaptable individuals, a study of aptitudes, and the practice of occupational guidance may be worthwhile, this, of course, by trained practitioners in the field. A gross, unnecessary and shameful error may be made in answering the question of retirement. It is often advised unnecessarily and with distinct harm to the patient. Lessening the drive will often be of greater benefit than surrendering an objective and usefulness. This is particularly true in those individuals without great resources within themselves, or without a hobby.

Sleep has well-known arterial depressor effects. Fatigue from preceding emotional over-activity or stress is a common cause for restlessness and sleeplessness. To convince a patient of this sometimes requires argument and even demonstration. Many patients, tense from these causes, scheme to get tired enough to sleep, by going to bed later and later at night. They often require schooling in the three R's, relaxation, repose and rest. A short and not too brisk walk out of doors just before retiring at night, will sometimes release enough emo-

tional stress to accomplish the desired effect. Many people who have difficulty in getting to sleep, or who waken early, will find their problem solved, or solved at least, in part, by getting a mid-day nap or period of rest, and by getting to bed early, rather than staying up in the evening until the last dog is hung. Hot milk or other liquid may be taken on retiring, unless it increases or causes the discomfort of nocturia. A hot drink, taken under proper regulations, if one wakens during the night, will sometimes be an excellent somnifacient. When success has not been attained otherwise, sedatives and somnifacients may be employed with care. They may be useful in tiding a patient over a restless period of two or three nights, with the direction to abstain from them then until one or two restless nights have again been experienced, then repeated to get another good night's rest. The care necessary in their use may require explanation. This intermittent use may forestall the cumulative effect to be avoided especially with the use of the barbiturates and bromides.

Individualization is the master word in the entire program. Above all, the hyperreactor and hypertensive are not to be dismissed with a casual, "Forget it; it won't do any harm; you'll get over it after awhile."

The physician has a profound responsibility beyond that of surgical operation, subcutaneous injections and drugging. It is necessary that he assume his proper role, too easily forgotten and too often evaded, of teacher, mentor, philosopher and guide.

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DONATE DRUGS AND INSTRUMENTS FOR MARITIME DISASTER

To help the Medical and Surgical Relief Committee of America continue its vital work of providing emergency medical kits to Coast Guard patrol boats and Navy sub-chasers, an urgent appeal for drugs and instruments has been issued by the Committee to surgeons, physicians, and medical supply houses.

Among the items sorely needed to equip the emergency kits are artery clamps, splinter forceps, scalpels, probes, grooved directors, sulfadiazine tablets, sulfadiazine ointment 5%, sulfathiazole tablets, and sterile shaker envelopes of crystalline sulfanilamide. Any other spare medicines or surgical instruments are, of course, equally welcome.

Specially designed for sub-chasers and patrol boats, the medical kit is a small portable case filled with essential medications and emergency instruments. It is complete enough to cover accidents and war casualties until the ship reaches a base hospital. Many of these small craft carry a considerable complement of men, including often a pharmacist's mate. Appreciative letters

from their officers to the Committee indicate that the kit is a vital adjunct to the ship's equipment. This project represents an invaluable service not undertaken by any other organization. The Medical and Surgical Relief Committee of America, conducted for nearly 3 years by a nationwide group of distinguished physicians, has distributed over a half-million dollars worth of medical and surgical supplies, concentrated foods and vitamins to the people—civilian and fighting—of the United Nations.

Along with medical equipment, the patrol boat and sub-chaser emergency kit contains a simple fishing outfit, prepared bait, signalling mirrors, ready to be used in time of disaster when the crew must resort to life-rafts.

Contributions should be sent to Dr. Claude C. Kennedy, 807 Physicians & Surgeons Bldg., Minneapolis (At. 1030), or Medical and Surgical Relief Committee of America, 420 Lexington Avenue, New York.

Safety in Cataract Extraction*

Lawrence G. Dunlap, B.S., M.D., F.A.C.S.

Anaconda, Montana

AFTER more than 25 years in the practice of ophthalmology and, as one of my confreres expresses it, as one who also practices otolaryngology, I am a general practitioner in the specialty of eye, ear, nose, and throat. One's opinions are of necessity a composite picture of one's teachings, experiences, studies, observations, and own personal logic. One of your great past-presidents, the late Doctor George W. Swift, said that he had seen all of the complications of ophthalmic surgery and only then took to brain surgery. I have had all of the conceivable complications of ophthalmology, and, after more than 25 years, have evolved a system of examination, operative technic, and postoperative care in an effort to avoid complications. I claim no originality for this presentation and reiterate that the following statements form my own personal opinion at this particular time.

Certainly, every prospective cataract patient should have a complete ocular and physical examination, preferably done by the ophthalmologist. After a careful history, the light perception, projection, tension, and vision of the eyes having been determined, and an estimate of the visual fields made, the retinal function should be tested with a 1 mm. red light at 1 to 3 feet and with the 3 mm. red light at 20 feet, or as far away as it can be seen. It was my sad experience to operate on three cataract patients in succession, all of whom had no macular function, but this was not known until after the extractions. Rod O'Connor of Oakland then told me of the two-light test, which is made by holding a cardboard with two 1-inch holes 4 inches apart before a light bulb. If two lights are perceived simultaneously, macular function is present. Only one case in many years has failed to conform to this test.

Patency of the canaliculi and naso-lachrymal duct is determined by irrigations. I then examine the ears, nose, and throat, and still believe that dental infections should be cleared up before operation. The blood pressure is taken, and urine analysis made; and after all the findings, the patient, preferably in the company of a relative or close friend, is visited with, until all of his questions about the operation are answered. This visit ordinarily consumes one-half hour, but I think that very few, if any, cataract surgeons are so busy that they haven't time for this most human approach to the patient's problem. Actually, very few of us do such an enormous amount of cataract surgery that we can't take this time. Professor Emeritus, Walter R. Parker, of the University of Michigan, some years ago reported on 1,389 cataract operations which he did in 40 years. This is less than an average of 35 operations per year.

My practice is to give the patient 2 per cent mercurchrome to drop into the conjunctival sacs four times

daily for four days before operation, and then to do a preliminary iridectomy in my office surgery. This tells me how the patient reacts, and how his particular eye reacts to operative interference. A very narrow keratome intracorneal incision is made as recommended by O'Connor, Meyer Wiener, and others. Six per cent cocaine in adrenalin is used as an anesthetic. Atropine, metyrcaine, and merthiolate ointments are used after the narrow keyhole iridectomy. A patch is applied and the patient is asked to return the next day. In cases of irreducible high blood pressure, 500 to 1000 cc. of blood is removed by venesection one hour preoperative. In unruly patients, nembutal and O'Brien akinesis are used.

When the eye is quiet after a week or so, the mercurchrome is again used as before, the patient admitted to the hospital the afternoon before the operation, given a bath, the head washed and the brow shaved. The patient is encouraged to wander around his wing of the hospital, so that he may become orientated and know where various sounds and noises originate, and the locations of doors, windows, stairs, etc. This keeps him mentally adjusted to sounds during the period of binocular occlusion, thus reducing postoperative dementia. The patient is given a light liquid supper and one nembutal capsule before bedtime. On awakening the next morning, he is given one nembutal and a soapsuds enema. Blue Mass gr. 1 t.i.d. is given as an intestinal antiseptic before, and for a week after the operation.

The extraction is done early in the morning. I prefer my own thoroughly trained and experienced office nurse as my assistant and always rehearse the operation with her the day before. She then prepares the patient, sets up the operating table, and there are no questions to upset the surgeon at the time of the operation. Also, I believe that extra instruments should be laid out to take care of any possible emergency. O'Connor taught me to sharpen and test all of my cutting instruments personally. I also use his method of putting on a focal light over the left side of my forehead to angle at and focus on the eye while I wear magnifying lenses. This gives perfect illumination without depending on someone else to hold a light, and the angular position prevents reflected light shining back into the operator's eye from the cataract knife while making the incision.

Then, while I am scrubbing up and getting on sterile gown, etc., the nurse is dropping 6 per cent cocaine in adrenalin into the patient's eye. I also do an O'Brien akinesis with the greatest of satisfaction, then inject the superior lid with 2 per cent procaine, trim the lashes with ointment-covered scissors so that none fall loose, paint the exposed area again with tincture of merthiolate, and never irrigate the conjunctival sac. I then place O'Connor lid stitches by two wide superficial bites of the needle, 1 mm. above the upper lid margin; hugging the globe with tooth forceps, put in the Elschnig superior retractor

*Presented at the 30th annual meeting of the Pacific Coast Ophthalmological Society, Portland, Oregon, May 11-13, 1942.

stitch; check that the O'Brien has caught the facial nerve so that the lids cannot be squeezed or nipped together; then insert a mosquito forceps, one blade in the outer canthus and one blade on the skin; clamp together for 15 seconds; release the forceps; and do an external canthotomy. Just before beginning the operation, a retrobulbar injection is made through the conjunctiva, in the inferior temporal quadrant 4 cm. deep toward the muscle cone. The patient's head is elevated about 30 degrees. Despite the fact that I was taught to operate from the head of the table, I learned from Elschning that the physical comfort and vision of the surgeon is much better from the side of the table, so I face the patient and make the incision holding the knife in the left hand on the right eye and in the right hand on the left eye.

Years ago, before akinesis was an accepted and generally approved procedure, one day I had completed the corneal section and was just making a long conjunctival flap, when the patient squeezed and the lens presented under the conjunctival bridge. I then made a conjunctival bridge on the next case and thought I had stumbled on something new. However, Doctor Harry Woodruff of Joliet and Chicago kept me from reporting this "new" procedure, by referring me to an 1894 edition of de Schweinitz, where he described the conjunctival bridge method. I still use it, as the postoperative astigmatism rarely exceeds two diopters, whereas, in my hands, the corneal section or the conjunctival flap section is followed by an average of over twice as much postoperative astigmatism. Anyone who attempts to do a combined extraction under a conjunctival bridge will readily understand why the preliminary iridectomy is done.

Many years ago, the elder Fuchs laid down the dictum (with which many of you perhaps will differ) that all one-eyed patients with cataracts should be operated upon by combined extraction and the extracapsular method. If it is safer than the intracapsular method, I believe that all patients with cataracts, even those with two eyes, should be operated upon by this method. Contraindications to intracapsular operations include inexperienced and occasional operators, high myopia, increased intraocular tension, and hypermature cataracts, so why not stick to the extracapsular technic?

After making the corneal section which includes half the cornea, and after making a large and broad conjunctival bridge, a large semicircular cystotome incision of the anterior capsule is made with small jerky motions, from the lens equator at 3 to 12 o'clock or vice versa, or a large bite is taken out of the anterior capsule with a tooth forceps. The lens is then expressed with due respect for the laws of hydrodynamics, as illustrated so perfectly in William A. Fisher's book on Senile Cataract. The assistant, holding up the conjunctival bridge with a small squint hook, stands ready with a Fisher needle to push the lens when it presents under one side of the bridge. Then the anterior chamber is most thoroughly but most carefully irrigated with warm normal saline, to remove every last *possible* remnant of cortex that seems consistent with safety at this time. The bridge is smoothed down into place, stroking the cornea first, which procedure will usually reposit the iris nicely. Oth-

erwise, it is repositied carefully. The superior rectus suture is cut close to the point of insertion; the speculum is removed; meanwhile the lower lid is held down, while the assistant gently pulls out on the upper lid with the O'Connor lid stitches. Then 1 per cent atropine, metycaine, and merthiolate ointments are inserted, lid closed, and the O'Connor stitches plastered to the cheek with two strips of adhesive. A fluffy cotton patch wet with normal saline is applied and fastened with adhesive. With eyes gently closed as in sleep, merthiolate ointment is freely applied to the other eyelid and after a thin dressing, a Ring's mask is applied. The patient is then put to bed in semi-sitting position for the next four days. Nembutal may be given for sleep or distress. On the fourth day, the patient is allowed to use his unoperated eye; the operated eye is dressed with atropine, metycaine, and merthiolate ointments and a patch. He is also allowed out of bed and given an ounce of castor oil to clear the intestinal tract. The eye is dressed every other day until he is sent home on the eighth day, at which time the lid stitches are removed. The Ring's mask is kept over the operated eye for three weeks.

Using a dull knife, or inserting it upside down, or using instruments not in perfect condition for grasping or cutting, or what not, are all absolutely inexcusable. One of the most brilliant and illuminating movies on cataract surgery is the technicolor picture taken by Watson Gailey of Bloomington, and shown at the last Academy meeting in Chicago, demonstrating his mistakes. It is worth the time of everyone to study it. He spoke of hideous complications. Another recent paper discussed the complications of cataract surgery. I think this is the wrong psychological approach, and that technic and procedures should be stressed to prevent such complications.

From Doctor A. F. Ryan of Los Angeles, I learned a most valuable and important thing. The surgeon should not operate unless he has prepared himself personally for several days by refraining from coffee, alcohol, tobacco, loss of sleep, or mental worry. I believe it important for the surgeon to take a nembutal or seconal the night before the cataract operation, and a half one the next morning, as this quiets the surgeon's nerves and does away with tremor and irritability without sacrificing his good judgment. Naturally the operating room personnel must be absolutely quiet. This is why some operators consider it unfair to operate before a crowd.

One of my patients vomited and had an expulsive hemorrhage which necessitated enucleation, probably because the cocaine leaked into his nose. Another had an expulsive hemorrhage 10 hours after the operation, when she did her daily vomiting from a gastric ulcer, about which she purposely had not told me. Chronic gall-bladder infection and other abdominal conditions may cause such vomiting. Another patient had the corneal flap folded back on itself at the first dressing, and although the eye was saved, vision was practically nil. Three developed prolapsus iridis at the first dressing in forty-eight hours. Obviously, careful instillation of drops would have avoided the first complication, a careful history, the second, a conjunctival bridge, the third, and delayed dressings, the others.

My preoperative and postoperative directions consist of three typewritten pages and are reviewed by the nurses and hospital attendants, and also by myself, so that no step will be omitted. Also, because of the strict training which the surgeon should undergo before intraocular operation, every effort is made to schedule two or three operations at once and have them out of the way and off one's mind and worry list for another week or two.

I recommend to your review the masterly article on Cataract Complication, by Kirby, published in the May, 1941, *Archives of Ophthalmology*.

Please note that the foregoing remarks contain no

"shalls" or "musts" and are offered solely in the hope of making cataract extractions simpler and safer for some of you.

I have never heard of anyone losing more than a bead of vitreous. Ruedemann had seen everything up to feathers coming out of an eye.

As O'Connor says, "As to cataract operation itself, I've not much doubt that I've done more than 500, including my Philippine experience in 1907-08-09, which isn't many in 28 years of work. Of course, one has all the possible mishaps in his first 100. From there on it is more of the same, possibly—Piled Higher and Deeper."

Health Trends in University of Michigan Women Students*

Margaret Bell, M.D., F.A.C.P.

Claire E. Healey, M.D.

IS the average university woman as well equipped physically at the time of graduation as she was at the time of her entrance to the University? This is a question which we have frequently asked ourselves, but for which we have had no definite answer. In seeking the answer, we decided five years ago to study intensively a group of Senior women, making use of all statistical material which might reveal their comparative health status. It was realized that no clear cut and objective standards exist whereby "health status" can be judged. But it was hoped that, by a detailed study of a sufficiently large number of students and their records, a reliable indication of "health trends" might be obtained.

Data on which this study is based are tabulated in the following Series:

Series A—from the entrance medical examinations and histories of 2,000 Freshmen women who entered during the fall semesters of 1934-1937 inclusive (Student Group A).

Series B—from the entrance medical examinations and histories of 538 Freshmen women of Group A who entered the University during the fall semesters of 1934-1937 inclusive and who later completed four consecutive years of University work. (Student Group B).

Series C—from the reëxamination and record review at the end of the Senior year of the above 538 women who as Seniors had completed four consecutive years of University work. (Student Group B).

Comparison of Freshmen data concerning 538 Freshmen women who entered the University during the years 1934-1937 inclusive, and who later completed four consecutive years of University work (Student Group B),

*From the University Health Service, University of Michigan.

with the same items for the entire entering Freshmen classes of identical years (Student Group A).

Table I furnishes a comparative study of the family and personal histories of 2,000 Freshmen women who entered the University during the fall semesters of 1934-1937 inclusive, with 538 Freshmen women entering at the same time and later finishing four consecutive years of University work. The average entering age of the Freshmen over this four year period who later finished four consecutive years of University work was 17.7 years, while that of the entire entering Freshmen classes was 18.2 years.

Cardio-vasculo-renal disease, allergic disease, and cancer constituted the most frequent illnesses in the family histories of both groups. In each instance, the occurrence of these diseases was slightly higher in the family histories of the group finishing four consecutive years of University work than in the group constituting the entering Freshman class as a whole. Difference in the incidence of allergic disease was the most marked. In the four year group, 66.2 per cent of the students reported a family history of allergy, while the entire entering class reported an incidence of 59.7 per cent. In general, it will be noted from Table I, Series A and B, that the incidence of illness in the family histories of the four year group was, on the whole, slightly higher.

From an analysis of data in Table I, Series A and B, based on the student's history, it appears that the group which finished four consecutive years of University work had, on the whole, a lower incidence of previous illness. The consistency of the difference in the percentages involved is more notable than the amount of difference in respect to each separate condition. The four year group were in the habit of getting more sleep and indicated that they had less difficulty with their studies. The necessity, or probability of necessity, for outside

work for financial support was approximately the same in both groups.

From the data in Table II, Series A and B, based upon entrance physical examination, it appears that the group who finished four consecutive years of University work was in slightly better physical condition on entering than the entire entering group as a whole. Emphasis is again placed on the consistency of difference, rather than any marked variation in findings. One may also obtain from Table II, Series A and B, an indication of the general health of the two groups based on both the physician's and the student's estimate. Ninety-six and one-tenth per cent of the four year group considered

their health to be good or excellent compared with 94.6 per cent of the entering group as a whole. Sixty-three and two-tenths per cent of the four year group had a health rating of "A" compared with 57.8 per cent of the entire Freshman class. Seventy-eight and three-tenths per cent of the four year group were recommended for unlimited activity compared with 74.8 per cent of the entire group.

In summary, one may say that as judged by history of past illness, physical examination and status of health and hygiene on entrance, the Freshman who later finished four consecutive years of University work had a slightly better physical background than the entering classes as a whole.

Comparison of data for 538 women who finished four consecutive years of University work (Student Group B) as Freshmen and as Seniors.

The data concerning the physical examination of the Seniors who had been in the University for four consecutive years, compared with the examination of the same group as Freshmen brought out a few interesting facts. The data are recorded in Table II, Series B and C.

Forty-five and four-tenths per cent of the Seniors were considered "normal" in weight as against 41.4 per cent of the same group as Freshmen. Seven per cent underweight to 5 per cent overweight, using Diehl's height-weight-age tables, was considered a "normal" range. It is realized that there are fallacies in this method of judging so-called "normal" weights, but it does give a rough estimate of the trend.

The nutritional status of 56 per cent of these four year Senior women and 56.8 per cent of the same group as Freshmen was considered "average" by the examining physicians. The group as a whole had grown and increased in weight during their four years at the University, 89 per cent of the Senior group being over 62 inches in height as Seniors and 81.4 per cent as Freshmen, while as Seniors, 10.8 per cent weighed under 106 pounds as against 14.2 per cent of the same group as Freshmen.

Noticeably fewer Senior students had a normal visual acuity without lenses—40.1 per cent being normal on a basis of 20/20 for both eyes, compared with 55.5 per cent of the same group as Freshmen. As Freshmen, 24.0 per cent of these students had a thyroid gland which was enlarged in some degree, while as Seniors, 17.8 per cent had thyroid glands designated as enlarged. Sixty-six and eight-tenths per cent of these four year Seniors had had their tonsils removed cleanly, compared with 53 per cent so designated as Freshmen. Thirteen per cent of the Seniors had tonsil tags compared with 19.5 per cent of the same group as Freshmen. Six per cent of the Freshmen had septic tonsils while 3 per cent of the Seniors were so diagnosed. We should hope to have so obvious a defect remedied among all students.

Acne vulgaris is always a problem in this age group. Sixty-nine per cent of this group of students had no acne as Freshmen or as Seniors. Of the number who had acne, it was judged that the condition had shown no change in 7.1 per cent. Fourteen and five-tenths per cent had either shown improvement or the condition had

TABLE I.

Family and Personal History

Selected items from health histories from Freshmen entrance examinations 1934-1937 inclusive. Data Series A from 2000 Freshmen (Student Group A) compared with data Series B from 538 students from Group A who completed 4 consecutive years of University work (Student Group B). One item compared with Student Group B as Seniors, data Series C.

ITEM	Data Series A from Student Group A (Rate per 100)	Data Series B from Student Group B (Rate per 100)	Data Series C from Student Group B (Rate per 100)
Age on entering	18.2	17.7	
Family Health:			
Cardio-vasculo-renal disease	69.3	73.1	
Allergic disease	59.7	66.2	
Cancer	22.0	24.8	
"Sick" headaches	18.9	19.5	
Diabetes	15.8	17.6	
Gastrointestinal disorders	14.2	15.5	
"Nervous" trouble	15.7	14.7	
Tuberculosis	13.8	13.7	
Epilepsy or convulsions	1.6	1.9	
History of Past Illness:			
Rheumatic Syndrome	7.0	5.38	
Acute Infectious Disease:			
Scarlet Fever	20.3	20.4	
Measles	91.6	91.0	
Diphtheria	4.4	3.8	
Influenza	21.8	22.3	
Pneumonia	11.8	11.5	
Typhoid Fever	0.95	0.57	
Infantile Paralysis	0.55	0.38	
Frequent Colds, more than 3 yearly	18.7	21.0	
Frequent Sore Throats, more than 3 yearly	9.4	6.9	
Discharging Ears	5.9	5.9	
Deafness	2.0	1.3	
Tuberculosis	0.5	0.38	
Pleurisy	2.2	0.76	
Gastrointestinal Disturbance:			
Digestive upsets	5.0	4.8	
"Sour" stomach	2.8	1.9	
Gas on stomach	6.3	5.2	
Constipation	16.4	13.5	
Nausea and vomiting	4.8	4.2	
Allergic Disease:			
Asthma	2.0	3.2	
Hay fever	8.6	8.4	
Eczema	4.6	3.8	
Hives	7.0	6.7	
Appendectomies	9.6	8.2	
Nervous Disorders:			
Nervous breakdowns	1.4	0.57	
Nervousness	12.2	10.1	
Tendency to worry	15.4	12.6	
Vasomotor Disturbances:			
Fainting spells	1.8	1.3	
Dizziness	3.8	2.3	
Headaches	27.4	25.0	
Amount of Sleep:			
Under 8 hours	8.3	6.6	44.5
8 hours or over	91.7	93.4	55.5
Difficulty with Studies:			
Yes	29.8	25.3	
No	70.2	74.7	
Outside Work for Financial Support:			
Necessity	18.3	17.7	
Probability	33.0	33.2	

TABLE II.
Physical Examination and Health Status

Selected items from records concerning physical examination and health status. Data Series A from 2000 Freshmen entering during the years 1934-1937 inclusive (Student Group A) compared with data Series B from 538 students from Group A who completed 4 consecutive years of University work (Student Group B), and with Student Group B as Seniors.

ITEM	Data Series A from Student Group A (Rate per 100)	Data Series B from Student Group B (Rate per 100)	Data Series C from Student Group B (Rate per 100)
Visual Acuity without Lenses— Both eyes normal	55.5	55.5	40.1
Nose:			
Normal	80.0	83.0	
Nasal defects	20.0	17.0	
Teeth:			
Devitalized teeth with X-ray assurance	61.7	50.0	
Carious—one or more	42.1	37.4	
Tonsils:			
Out well	52.4	53.0	66.8
Septic	8.4	6.0	3.0
Tags	16.2	19.5	13.1
Thyroid Gland:			
Normal	74.0	76.0	82.2
Enlarged	26.0	24.0	17.8
Acne:			
None	72.8	76.1	77.5
Present	27.2	23.9	22.5
Acne as Fr.—no acne as Srs.			8.5
Acne as Fr.—improved as Srs.			6.0
Acne as Fr.—same as Srs.			7.1
Acne as Fr.—worse as Srs.			1.9
No acne as Fr.—acne as Srs.			7.5
No acne as Freshmen or Seniors.			69.0
Heart—Normal	92.9	94.6	95.5
Pulse—Normal (60-79)	40.9	42.7	33.0
Blood Pressure (Systolic):			
99 and under	12.2	13.7	8.9
100-109	31.9	31.3	20.9
110-149	55.5	54.6	69.9
150 and over	0.4	0.38	0.38
Weight Variations:			
Normal weight	40.7	41.4	45.5
Under—7% or more	27.9	26.2	30.6
Over—5% or more	31.4	32.4	23.9
Weight in Pounds (under 106)	14.83	14.2	10.8
Height in Inches:			
Under 62 inches	20.3	18.6	11.0
62 inches and over	79.7	81.4	89.0
Nutrition (Physician's estimate):			
Average	57.8	56.8	56.0
Under	22.0	22.0	27.1
Over	20.2	21.2	16.9
Hemoglobin (Tallqvist) (100% = 13.8 gm.):			
80% and over	86.0	85.8	
70% - 79%	13.2	13.0	
69% and under	0.81	1.2	
Hemoglobin (Sahli) (100% = 14.5 gm.):			
11.6 gm. and over			82.9
11.5 gm. and under			17.1
Health (Student's Estimate):			
Good or excellent	94.6	96.1	95.1
Fair	5.3	3.7	3.9
Poor	0.1	0.2	0.19
Health (Physician's Estimate):			
Good or excellent	86.8	87.4	89.6
Fair	13.0	12.1	9.9
Poor	0.2	0.5	0.58
Health Compared with Entrance (Student's Estimate):			
Improved			24.9
Same			62.6
Worse			12.5
Health Compared with Entrance (Physician's Estimate):			
Improved			36.0
Same			51.2
Worse			12.9
"A" Health Rating	57.8	63.2	78.3
"Unlimited Activity" recommendation	74.8	78.3	91.5

disappeared entirely. Seven and five-tenths per cent had no acne as Freshmen, but had developed it during their four years at the University. One and nine-tenths per cent had acne as Freshmen which had become worse by their Senior year.

The condition of hearts of these students as Seniors so far as could be judged by physical examination, was approximately the same as it was when they were Freshmen, although the blood pressure readings tended to be slightly higher and the pulse less frequently within "normal" range.

With only a few exceptions, pelvic examinations were done on all of these four year Senior women at the time of the Senior physical examination. Thirty-five per cent of these students had cervical lesions of varying severity. The largest percent of these lesions were cervical erosions. The question of the relationship of these findings to the promiscuous use of vaginal tampons by young women consequently becomes significant.

It was learned from an attempt at the comparison of data concerning results of laboratory procedures that much could be done in standardizing our methods. For example, the usual range of hemoglobin for women is considered to be 12-17 grams per 100 cc. of blood. However, standards used by different hemoglobinometers vary in the number of grams representing 100 per cent. Consequently, a reading of 80 per cent on a hemoglobinometer which was standardized so that 100 per cent was the equivalent of 13.5 grams would not be comparable to a reading of 80 per cent on a hemoglobinometer whose 100 per cent standard was 15.0 grams. Over the four year period included in this study, three different hemoglobinometers were used at the time of various examinations—Tallqvist, Sahli, and the Klett instrument. The picture is further complicated because the number of grams representing 100 per cent varies with different Sahli instruments. At the time of the entrance physical examinations, the Tallqvist was necessarily used because speed was important. This hemoglobinometer is standardized so that 13.8 grams is the equivalent of 100 per cent. Fourteen and two-tenths per cent of the entering Freshmen group had a hemoglobin estimate below 80 per cent. Since 1937, all of the hemoglobin estimations done at the time of the entrance examinations which were below 75 per cent on the Tallqvist have been checked on either the Sahli or the Klett instruments. At the time the same group was examined as Seniors, either the Sahli or the Klett were used and the hemoglobin was reported in grams. It was found that 17.1 per cent of these Senior students had readings below 11.5 grams per 100 cc. of blood. It is usual to follow cases with periodic examinations of hemoglobin and red blood cell counts.

In studying urinalyses it was found that about 8.5 per cent had an albuminuria, varying from a trace to a 4-plus at the time of the entrance physical examination. In only 0.79 per cent was the albumen found to be persistent on further detailed examinations. This procedure is mentioned in order to emphasize the fact that it is a very painstaking and time consuming task to establish the presence of a true albuminuria, either orthostatic or

TABLE III.

Selected items of illness experience and Health Service attention given 2000 Freshmen women entering during the years 1934-1937 inclusive (Student Group A) compared with the same items for 538 Senior women who had completed 4 consecutive years of University work during the years 1938-1941 inclusive and who were reexamined as Seniors (Student Group B); and also with the same items for 872 Senior women graduating during the years 1938-1941 inclusive after completing 4 consecutive years of University work. (Student Group C).

Note: Student Group B constitutes a portion of Student Group C.

ITEM	Student Grp. A. 2000 Fr. Women. Experience as Fr. (Rate per 100)	Student Grp. B. 538 Sr. Women. Experience as Srs. (Rate per 100)	Student Grp. C. 872 Sr. Women. Experience as Srs. (Rate per 100)
Dispensary Calls	1064	976	949
Hospital and Infirmary Days	84	124	93.5
Upper Respiratory Infections	64	46	48
Had Room Calls	14	—	11.5

pathologic, when the initial test is positive in such a large percentage of instances in women.

The student's subjective estimate of her own health as good or excellent, fair or poor, tended to be the same as a Freshman and as a Senior. As seen by Table II, Series B and C, the students by this rough standard rate themselves higher than did the physician following examination. For example, 96.1 per cent of the Group B Freshmen considered their health to be good or excellent on admission, while the examining physician considered 87.4 per cent of them to be in the good or excellent range. Approximately the same difference in percentage prevailed at the time of the Senior examinations. However, by subjective evaluations of health as Seniors, as compared with health as Freshmen, physicians were somewhat more optimistic than students. Twenty-four and nine-tenths per cent of the students thought their health had improved during the past four years, while the physicians considered 36 per cent of the students to be in better health on graduation than on admission. This is in line with the fact that the physicians gave 78.3 per cent of the Seniors "A" health ratings, as compared with 63.2 per cent at the time of the entrance physical examinations, while 91.5 per cent Seniors were recommended for unlimited activity, as compared with 78.3 per cent of the same group as Freshmen.

We believe that these figures carry some weight, for the University physicians have a fairly close contact with most of the women students who have been at the University for four consecutive years. By far the larger percentage have made free use of the Health Service facilities for all reasons concerning their physical and mental health. This fact will be brought out in the discussion of the data in Table III. The students considered the correction of physical defects to be the most important cause of health improvement. Healthful activity as evidenced by interest in sports is also a contributing factor to health improvement. Of the sports well enough learned while in the University so that the student felt she would be able to use them later for recreation, badminton, tennis, bowling, and golf had the largest number of

adherents; 42.6 per cent having learned badminton, 37 per cent tennis, 33.5 per cent bowling, and 25.1 per cent golf. Bowling and badminton showed the greatest increase in popularity over the four year period, during which these students were in the University.

In one respect at least, the hygiene of these students was distinctly worse. On admission, only 6.6 per cent of these four year Senior women were getting under eight hours of sleep, while as Seniors 44.5 per cent were averaging less than eight hours (table I, series B and C). Seventy-two and six-tenths per cent were going to bed after 11 o'clock. An inadequate amount of rest and sleep constitutes a real problem among college students. No college physician can consult with students day after day and not be convinced that much of the illness encountered is due at least in part to this one factor.

We considered the amount of outside work carried by the student to have some bearing on her health and hygiene. Fifty and nine-tenths per cent of these four year Senior women indicated when entering as Freshmen that outside work would be necessary, or probably necessary for their financial support. Actually, 48.3 per cent of these students did outside work for financial support at some time during their four years at the University. Twenty and one-tenth per cent earned more than 20 per cent of their entire expenses.

In summary, it may be said that the graduating group of Senior women who had been in the University four consecutive years were at least as fit physically as they were on entrance, their physical status having improved noticeably in some respects. Certain habits of hygiene, chiefly the marked tendency to get an inadequate amount of sleep and rest, had been acquired. If not corrected, these may well lead to a serious impairment of health and a loss of efficiency of function.

Comparison of data concerning illness experience of 2,000 Freshmen women entering during the years 1934-1937 inclusive (Student Group A) with the same items for 538 Senior women who completed four consecutive years of University work during the years 1938-1941 inclusive (Student Group B) and who were reexamined as Seniors; also with 872 Senior women who graduated during the years 1938-1941 inclusive after completing four consecutive years of University work (Student Group C). (Note: Student group B constitutes part of Student Group C).

The comparative data concerning these groups was relatively meager. It was concerned almost entirely with illness experience and amount of service rendered and brought out several interesting points, as seen in Table III.

The three above groups averaged approximately the same number of calls at the Health Service per year. There was no marked variation in the number of Hospital and Infirmary days, although the Senior groups had a slightly higher average than the Freshman group. There were noticeably fewer upper respiratory infections among the Seniors than among Freshmen severe enough to bring the student to the physician. Approximately 50 per cent of the Student Group B had had one or more eye refractions during their residence at the Uni-

versity. Approximately 90 per cent of the same group had had one or more partial or complete physical examinations, exclusive of the Freshmen and Senior examinations, 21.4 per cent having been examined three times. Approximately 90 per cent of the same group had their health rerated one or more times, implying at least a health conference and appraisal of their physical status. Eight and seven-tenths per cent of Student Group B had operations under Health Service supervision. These operations include chiefly tonsillectomies, submucous resections and appendectomies. The most frequent laboratory services were hemoglobin estimations and urinalyses, the group averaging 3.3 per student for both estimations over the four year period.

White blood cell counts came next with an average of 1.6 per student, followed by basal metabolic rates, for which the average was 0.6 per student, both over the four year period. On entrance, the average number of correctable defects for Student Group B was 2.5 per student. Approximately 79.5 per cent of these defects were corrected completely or partially. Of the defects which were partially corrected, the larger number such as hay fever, asthma, and some forms of dysmenorrhea, were incapable of complete correction. A few remediable defects were not completely corrected because of lack of complete understanding or appreciation of the significance of her health situation, on the part of the student.

Such a sampling of service given women students indicates the extensive amount of time and effort involved in their care. So far as it is possible to judge from statistics, the amount of medical attention given annually to the 538 women students who completed four consecutive years of University work (Student Group B) was considerable, but not appreciably more than that accorded the average woman student.

While the supervision of the health of the women students involves the care of many acute conditions, every effort is made to make the program as a whole educational. With the background of a thorough entrance physical examination and medical history, the physician is in a position to advise the student of her total health situation and to point out to her the unusual facilities she has at the University of Michigan for attaining and maintaining a state of physical fitness. Patience and skill on the part of the physician are necessary in mak-

ing such an original appraisal and in making necessary reappraisals at the time of later contacts. There is ample evidence that students learn through their Health Service experience what constitutes a good medical examination and adequate medical care. At the time of the Senior examination, every girl knows what the extent of her recheck should be and it is the unusual girl who does not request that a pelvic examination be included. At all Health Service contacts during her University experience, the student is well advised that the responsibility for making use of services within her reach at the University and of the facilities which will be within her reach after her graduation, rests entirely within herself. After the physician is assured that the student understands her total health situation and what procedures to follow to improve or maintain it, no student is followed unless her situation is acute or of such a nature that it may be detrimental to those with whom she comes in contact. The extensive use made by students of Health Service facilities is in a measure an index of the success of such an educational process. It is hoped that a wider significance of the program may be found in an intelligent attitude toward health and its maintenance and an intelligent use of available medical service after the student leaves the University.

CONCLUSIONS

1. The women at the University of Michigan who complete four consecutive years of University work have a slightly better physical background on entering than the entering classes as a whole.
2. The amount of medical attention required by women who complete four consecutive years of University work is considerable, but not appreciably more than that accorded the average woman student.
3. Under the conditions of adequate health service, the University experience is not hazardous to the health of women at the University of Michigan.
4. Seniors appear to have improved in regard to the condition of the thyroid gland, tonsils, skin, height and weight and knowledge of what constitutes adequate medical service. The physician's judgment of their total health situation indicates improvement.
5. Seniors appear to have lost a certain degree of visual acuity and desirable habits of sleep.

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Syphilis Serology in North Dakota

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THE total volume of work done in the North Dakota Public Health Laboratories has shown a significant increase during the past eight years. Although the factors accounting for this are of little interest in this paper, the fact remains that serologic blood tests for syphilis now constitute approximately 80 per cent of the total volume of laboratory work. This inordinate proportion of total activity devoted to syphilis serology can be explained as owing to (1) national and state educational and control programs for the eradication of venereal disease, resulting in a better understanding of such diseases by the general public; (2) the North Dakota Premarital Law; (3) the Selective Service Act of the National Defense Program; (4) realization by the medical profession of the importance of laboratory tests in the detection of syphilis.

Syphilis is generally considered as one of the most serious public health problems in the United States. Until about thirty-five years ago not even the cause of syphilis was known. However, since 1905 progress in knowledge of its cause, in methods of diagnosis, and in means of treatment has been rapid. In the days before the twentieth century, the clinical diagnosis of syphilis was based chiefly on the history of the case and the findings of a complete physical examination. Early in the twentieth century laboratory tests adaptable to general medical practice were introduced and assumed a place of importance in the diagnosis of syphilis. That adequately controlled serology is a necessary factor in the establishment or confirmation of a diagnosis of syphilis is now widely recognized.

Today serologic tests are the most widely used of all procedures in public health laboratories. There is a considerable proportion of cases in which a definite decision as to the presence or absence of syphilitic infection is impossible without a knowledge of the laboratory findings. The successful application of such laws as those governing premarital examination and prenatal examination depends upon the proper performance of serologic tests, as do the control of syphilis in industry and the recognition of latent disease.

In North Dakota approximately 95 per cent of all syphilis serology is being done in the public health laboratories. The results of a recent survey regarding the distribution of serologic work in the state are shown in Table I. One can clearly see that there is relatively little serology being done outside the public health laboratories. There are only four private clinics doing an appreciable amount of syphilis serology and one of these sends duplicate specimens to the public health laboratories for check. Seven hospital laboratories perform serologic tests only on blood donors when there is an emergency transfusion. Fifteen other hospitals which maintain laboratory service do not attempt any serology at all.

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TABLE I
Syphilis Serology in North Dakota

Routine Test Used	No. of Laboratories	Av. No. of Specimens per Month	Source of Antigen
Kahn standard and Kolmer simplified	2	5,000-5,500	Prepare Kahn, purchase Kolmer
Kahn standard and Kolmer (3-tube)	1	90-100	Purchase from commercial house
Kahn standard	1	100-120	Purchase from commercial house
Kahn standard	1	30-40	Purchase from commercial house
Kahn standard and Kolmer	1	35-45	Purchase from commercial house
Kahn standard	4	Only on blood donors	Purchase from commercial house
Kline standard	2	Only on blood donors	Purchase from commercial house
Mazzini	1	Only on blood donors	Purchase from commercial house
No test	15		

TYPES OF TESTS IN USE

At the present time in the United States there are two groups of tests employed for the diagnosis of syphilis: (1) complement-fixation and (2) flocculation or precipitation. Both tests are more or less dependent upon similar biologic factors, but they differ considerably in technical procedures.

"The original Wassermann test is so entirely different from some of the highly sensitive and efficient complement-fixation tests for syphilis which are in use at the present time that when the term 'Wassermann reaction' is used without a detailed explanation of the mechanism and technic involved in carrying it out, it can only create confusion and misunderstanding. There are now a great many modifications of the original Wassermann test which are known either by the name of the person who has worked out a definite modification or another to suit the taste or convenience of the user and to which he refers simply as a 'modified Wassermann test.'"¹

Today the term "Wassermann" is used in its generic sense to mean the serodiagnosis of syphilis by laboratory examination of a patient's blood serum or spinal fluid, using a "standard" serologic test. (This includes all serologic tests which are in common use and which have shown acceptable specificity and sensitivity in the various serologic conferences conducted under the auspices of the Committee on Evaluation of Serodiagnostic Tests for Syphilis.)

The complement-fixation test is based upon the Bordet-Gengou phenomenon (first reported in 1901) of the fixation of complement. The application of this phenomenon was first used in the diagnosis of syphilis by Wassermann and his confreres in 1906. The diagnostic value of the Wassermann reaction was soon amply confirmed.

During the next fifteen years much work was done with the Wassermann reaction, until Kolmer published his modification in 1922. Except for slight changes in the amount of serum employed, improvement in the sensitivity of the antigen, and the adoption of an improved method for titrating antigen in determining the optimum dose to employ, no important changes in the test have been made. Modified and refined to a great extent from the original, the complement-fixation test has been universally adopted as an amazingly sensitive and specific test for syphilis.

Soon after the development of the Wassermann reaction, Michaelis (1907) observed that a precipitate sometimes formed when the aqueous liver extract used in that test was added to syphilitic serum. Since this original work much has been done to further the use of precipitation tests. The development of precipitation tests has been very rapid—so much so that they are now almost universally used and in many instances have replaced the more complex complement-fixation test.

There are a number of such tests employed in the United States: the Kahn, Kline, Hinton, Eagle, Mazzini, etc.,—all carrying the name of the author. There is no fundamental difference between the various precipitation tests. The differences lie in the variability of adjustment to those factors which determine the sensitivity and specificity of the reaction. In 1922 Kahn first published a modified precipitation test which has attained national popularity. Most originators of the flocculation or precipitation tests have put great emphasis on the simplicity and ease of performance of these types of tests as compared with the complement-fixation tests.

Regardless of the procedure used, it has become apparent that three qualities are desirable in any diagnostic test for syphilis. First, it should be as nearly specific as possible, reducing false positives to a minimum. Second, it must be so sensitive that it will not fail to give a positive reaction when syphilis is present. Third, it must be adaptable—a method which can be applied accurately by all trained technicians instead of a mere technical trick which can be performed reliably only by its originator.

Serologic tests should be adaptable to the diverse, and at times unfavorable, conditions existing in ordinary practice. Tests which are reliable when performed with hemolyzed, anticomplementary, contaminated serums, or spinal fluid specimens are obviously of more value to the clinician than those which cannot be used under such conditions.

In laboratories performing serology routinely, such as public health laboratories, the use of at least one flocculation or precipitation test and one complement-fixation test for diagnostic work seems to be good practice. In recent years various surveys have shown that no one test for syphilis is satisfactory and that the serum diagnosis of syphilis is best served by testing every serum by at least two methods when conditions permit. Both complement-fixation and precipitation reactions are due to the same reagin, but owing to technical conditions, one test may give a correct positive and another a false negative reaction. For this reason it is felt advisable to use both a complement-fixation and a precipitation test rou-

tinely—each possessing the maximum of sensitivity consistent with specificity.

In North Dakota the public health laboratories have, for the past seven years, performed routinely on all blood specimens submitted the Kahn standard precipitation test and the Kolmer complement-fixation test. It has also been the policy of the laboratories to adhere strictly to the standard procedure as laid down by the originators of the tests. In no instance has any attempt been made to deviate from the standard technics as used in routine testing.

No test can be better than the laboratory conducting it. The efficiency of laboratory serologic tests on which the medical profession places major reliance in the diagnosis of syphilis is a problem of utmost importance. For this reason, too much emphasis cannot be placed on the subjects of sensitivity and specificity, especially the latter. This has become more significant in recent years with the functioning of premarital and prenatal laws. It is certainly far better to miss the serum diagnosis of occasional cases of chronic latent syphilis than to incur unnecessary risks of false positive reactions with all that these mean to the individuals concerned. No one can deny that occasional false positive reactions will occur in the best of laboratories, including those of the author-serologists. Kolmer,² one of the country's leading syphilologists, recently stated that the "harm done by a mistaken diagnosis of syphilis based upon a false positive reaction outweighs any number of false negative reactions. To inform the patient may do irreparable harm, as the 'syphilitic scars of the spirit' are more difficult to cure than the disease itself."

It is not necessary that the practitioner have a detailed knowledge of the principles and technics of the tests used; it is much more important that he have a knowledge of the character of the laboratory making the tests, the particular variety of the test, and the record of the laboratory for accuracy in both positive and negative cases. Properly performed tests, when positive, are a reliable evidence of syphilis.

EVALUATION STUDIES

The need for a system of gauging the efficiency of laboratory tests has been evident for a number of years. "In 1934 the Surgeon General of the United States Public Health Service appointed the Committee on Evaluation of Serodiagnostic Tests in the United States, consisting of two clinical pathologists (chosen by the American Society of Clinical Pathologists), two syphilologists, and two officers of the United States Public Health Service, to develop a method for the evaluation of serodiagnostic tests for syphilis in the United States. The plan decided upon was to collect samples of blood obtained from patients in various stages of syphilis, from normal nonsyphilitic persons, from patients with various diseases, and from pregnant nonsyphilitic women. These samples were then to be redistributed to the laboratories of participating serologists. The serologists participating in this evaluation study were those who had described an original serologic test or a modification of a preëxisting test."¹ Without going into detail, suffice it to say that the results of this first study showed that seven serologic

TABLE II
Results of the Interstate Evaluation of Serodiagnostic Tests,
North Dakota, 1938-1942

Year	Laboratory	Kahn Standard	
		Sensitivity	Specificity
1938	Control Bismarck	70.5	100
		71.8	100
1939	Control Grand Forks	77.4	100
		81.2	96.5
1940	Control Grand Forks	71.2	100
		72.1	100
1941	Control Bismarck	79.2	100
		73.4	100
1942	Control Grand Forks	80.7	100
		80.9	100

Year	Laboratory	Kolmer Complement-Fixation	
		Sensitivity	Specificity
1938	Control Bismarck	78.2	100
		61.6	100
1939	Control Grand Forks	83.4	100
		77.1	99.1
1940	Control Grand Forks	68.1	100
		73.6	100
1941	Control Bismarck	77.6	100
		74.4	100
1942	Control Grand Forks	84.9	100
		82.7	100

tests qualified as satisfactory, although far from perfect.

The following year a somewhat different evaluation study was carried out by the same agencies which planned the first one. Since the criterion by which any laboratory procedure may be expected to stand or fall is its efficiency in hands other than those of its originator, it was decided in this second project to send samples of each specimen to several laboratories, including the laboratory of the originator of the test under consideration. The result of such an evaluation would be a much better indicator of the efficiency of the various tests under everyday working conditions in the serologic laboratory. It was evident from the results of this study that only a comparatively few laboratories were performing serologic tests which could compare with those made by the originator.

The Assembly of Laboratory Directors and Serologists held in Hot Springs, Arkansas, October, 1938, recommended that, to qualify as satisfactory, a laboratory should attain a sensitivity rating not more than 10 per cent below that of the control laboratory, and a specificity rating of not less than 99 per cent. This recommendation was adopted, and since the 1939 survey a laboratory entered in the study cannot be rated as satisfactory unless these standard requirements are met.

In October, 1938, the Conference of Laboratory Directors and Serologists also requested that the Surgeon General assume the evaluation of serologic tests as a function of the Public Health Service. This plan was adapted by the Surgeon General and the Conference of State and Territorial Health Officers.

There are definite indications that this approach to the problem has been a helpful one. The need for cross-

TABLE III
Premarital Blood Tests, July 1, 1939, to December 31, 1942

Year	Total Blood Specimens	Positive Individuals		Total	Percent Positive
		Male	Female		
1939, 6 mo.	4,640	2	9	11	0.23
1940	9,152	17	18	35	0.38
1941	9,256	20	22	42	0.45
1942	6,799	14	19	33	0.48
Total	29,847	53	68	121	0.40

checking results under controlled conditions with other laboratories performing the same technical procedure is recognized. The annual survey is not the final answer to the problem, as many factors encountered in routine specimens are not present in the controlled group. However, such surveys constitute a definite step in the right direction and a foundation is being laid upon which a more comprehensive system can be erected.

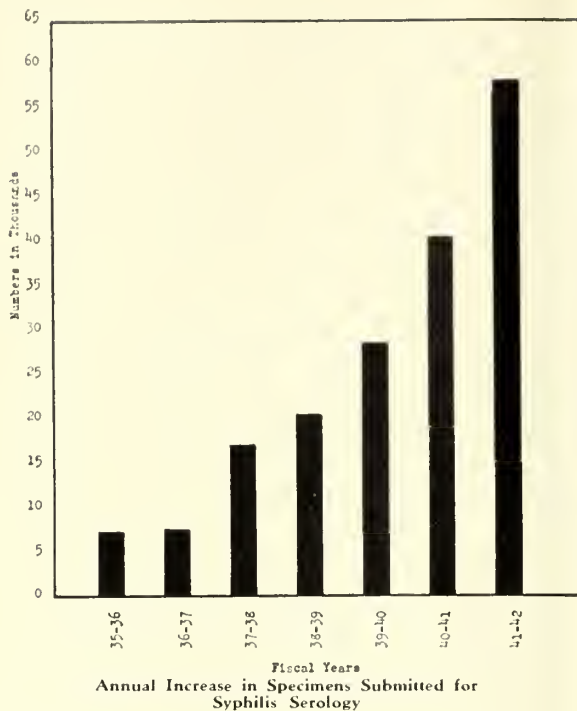
There is not the slightest doubt that these evaluation studies have greatly increased the efficiency of serologic tests in state laboratories throughout the country. It is also apparent that one or even several official evaluation studies do not finally establish the comparative value of any single test. In other words, although the results of official evaluation studies are no doubt of great value, they cannot be said to be absolutely final. Such results should be considered in the light of all that is known about the serologic diagnosis of syphilis.

The first serodiagnostic evaluation study in which most of the state laboratories participated (1937) demonstrated conclusively that far too many were operating at low levels of efficiency. Since that time the number of laboratories reporting satisfactory results has increased manifold.

Most of the laboratories failing to give satisfactory results did so because of one or all of the following factors: (1) the use of outmoded technics; (2) use of short cuts and time-saving devices; (3) inferior quality of essential ingredients; and (4) nonadherence to standard technics of the originators.

North Dakota has been entered in the evaluation studies since 1938. The results obtained in these surveys are shown in Table II. As noted, the sensitivity rating of the Kolmer test in the first study (1938) was low as compared to that of the control laboratory. Steps were taken to correct this fault and the results of subsequent studies indicate that that goal was achieved. The evaluation study was directly responsible for discovery of the defects in that particular test. The only other time North Dakota failed to qualify as satisfactory was in 1940, when the specificity of the Kahn test was not approved. It was apparent that specificity was sacrificed in favor of high sensitivity. This fault was also corrected, as is borne out by the fact that since then a 100 per cent specificity has been obtained with the Kahn test.

The results shown in Table II indicate that the performance of serologic tests in North Dakota shows a maximum of specificity and a high degree of sensitivity when compared with control laboratories. This can be



interpreted in a general way to mean that the physicians of North Dakota are receiving as reliable results on specimens submitted as is possible with current serologic tests.

VOLUME OF SEROLOGIC TESTS

Figure 1 shows the total number of blood specimens submitted to the public health laboratories for the diagnosis of syphilis from July 1, 1935, to June 30, 1942. It is apparent from this figure that there has been a significant increase in this phase of laboratory work.

On July 1, 1939, the North Dakota Premarital Examination law became effective. This has accounted in part for the increase in syphilis serology. The law provides that each applicant for a marriage license must submit to the licensing authority a certificate from a licensed physician and surgeon stating that the applicant has "been given such examination, including a standard serological test, as may be necessary for the discovery of syphilis." The law defines a standard serologic test as "a laboratory test for syphilis approved by the State Health Officer and performed by the State Department of Health."[†] Table III shows the number of blood specimens examined since the inception of the law and the number of individuals with positive serology. The number of positives is broken down into male and female.

Since November, 1940, when the first blood specimens were received from Selective Service draftees, a total of 55,987 have been examined. Of this total 292 selectees have been found to have positive serology. This is 0.52 per cent of the total number examined, or 5.2 infections out of every thousand examinations.

[†]Since paper was submitted for publication, the law has been amended to that serologic tests can be performed by any state public health laboratory approved by the North Dakota state health officer.

REPORTING RESULTS OF SEROLOGIC TESTS

The method of reporting the results of serologic findings in North Dakota has undergone several changes in the past few years. At one time the actual plus marks were used exclusively; i. e., a Kolmer or Kahn test would be reported as 4+, 3+, 2+, etc. Then the system of reporting was changed so that the combined routine tests (Kolmer and Kahn) were reported together as positive, doubtful, and negative. This meant that the technician was, in a sense, interpreting the laboratory findings. For example, if the Kahn test was negative and the Kolmer positive a report of doubtful would be sent out. However, during the past year the actual laboratory findings of each individual test are reported as positive, doubtful, and negative. This means that each test is reported separately, for example: Kolmer positive, Kahn negative, etc.

The recommendation that plus marks be dropped in the reporting of serologic tests for syphilis, and that the words "positive", "doubtful", and "negative" be used instead, was first made at the League of Nations Serologic Conference at Copenhagen in 1923. These designations were also used at the other conferences sponsored by the League of Nations and were later adopted by the American serologic conferences.

Moore³ has pointed out that the reporting of results of serologic tests in terms of plus marks is inaccurate and misleading. He states that "4+" does not necessarily mean "strongly positive," since all tests in current use are qualitative or only roughly quantitative; that is, they are performed with a fixed amount of whole serum related to the total bulk of the test and ranging from 0.1 to 0.025 cc. A test may be positive with as little as 0.00005 cc. of whole serum. In such a case, if plus marks are to be used in reporting, the result might properly be expressed as "4,000+" instead of "4+". He thinks it is obvious therefore that plus marks and the qualifying objective "strongly" should be eliminated from routine serologic terminology and should be replaced by the single word "positive". He goes on to say that though "positive" covers an extreme range of variation in terms of the amount of patient's serum employed in the test, the other symbols, "3+", "2+", "1+", and "±", which are commonly used to describe a "partially positive" or "doubtful" result, cover instead an extremely minute range of variation, this range being only between the limits of 0.2 and 0.02 cc. of whole serum in the Wassermann test. With this wide range there is no valid excuse for the attempt to report minute variations in the degree of positiveness and all such results should be expressed by the word "doubtful".

At the present time there seems to be no generally accepted basis for the classification into positive, doubtful, and negative results. From the literature one finds that each laboratory has its own definite basis for reporting, which may not agree with that of any other.

As mentioned before, North Dakota is now reporting results as positive, doubtful, and negative; 4+, 3+, and 2+ are considered as positive, 1+ and ± as doubtful, and — as negative. The only exception is that for the benefit of the clinicians who are interested in the treat-

ment of syphilis the actual readings of the test are given, i. e., Kahn test, positive (3+).

INTERPRETATION OF RESULTS

How to interpret laboratory reports is a question which is often asked of laboratory personnel. No set rules of interpretation can be postulated. A laboratory can only report its exact findings on any given case, leaving the evaluation of the result to the physician, who is conversant with the history and clinical findings. The laboratory report in general should be considered only as a portion of the evidence, contributory to the final diagnosis; such things as clinical findings and history play an important role. In carefully controlled serologic tests, the positive blood reaction is good evidence of syphilis, especially if other findings are in agreement. However, if syphilis is not suspected clinically, the physician should never jump to the conclusion that the disease is present. The presence of a positive blood in such cases may be the only evidence indicating a latent syphilis; therefore, repeat tests should be made to exclude the possibility of technical error and to determine whether the serologic condition is transient or persistent.

The terms positive, doubtful, and negative have the following laboratory significance: positive—complete fixation of complement in the Kolmer test or complete precipitation in the Kahn test; doubtful—incomplete fixation of complement; negative—no fixation of complement. However, to the clinician these terms have a different significance. On the back side of the laboratory report the following interpretation is printed:

1. A diagnosis of syphilis should not be made on the basis of a single positive serological reaction alone. If the serological result is not supported by the case history and clinical symptoms, one or more additional specimens of blood should be submitted and a note made that a check examination is desired. If the result of the check test confirms the original result, syphilis is indicated with a high degree of probability.

2. A doubtful serological reaction may or may not indicate syphilis. If the patient is known to have been infected with syphilis and particularly if he has been treated, a doubtful reaction may be regarded as positive. If there is no history or clinical evidence of syphilis, a doubtful serological reaction indicates the necessity of making a very careful examination of the patient. An additional specimen should be sent in and a note made that a check examination is desired. If the result of the check examination is likewise doubtful, the serological examination should be repeated in this and other laboratories; and if necessary, several different serological methods should be used before the possibility of syphilis is dismissed.

3. A negative serological report does not exclude the possibility that a patient has syphilis. Positive reactions are not usually found until the second to the fifth week after the appearance of the initial lesion and frequently not in the first stages of the disease or before secondary symptoms appear. Negative reactions may occur after treatment has been instituted. If there is reason to suspect syphilis, a negative reaction should be checked by a second blood specimen.

DISCREPANT SEROLOGIC RESULTS

In any laboratory where serologic tests are being run on a large scale, such things as false positives, false negatives, and contradictory results between two tests are always a serious problem with which to contend. Unfortunately, in most instances the physician fails either to follow up such cases or to give any adequate history which may help the laboratory in supplemental studies.

The false positive reactions are generally classified under two groups: (1) technical false positives due to some error in the performance of the test and (2) biologic false positives which occur in conditions other than syphilis. Technical false positives can be reduced to an absolute minimum by careful training and sincere thoughtfulness on the part of the technician. However, a diagnosis of syphilis in the absence of a history or clinical findings should never be made on the basis of a single positive test. In such cases the test should be repeated in the same laboratory, and if possible in another laboratory, with more than one type of test.

The biologic false positives generally present a more difficult problem. Diseases which definitely give false positive reactions for syphilis are yaws, relapsing fever, and trypanosomiasis. There are, however, certain other conditions which may give false positive serologic reactions. They are leprosy, malaria, tuberculosis, infectious mononucleosis, and febrile diseases. In the literature there are variable reports as to the incidence of false positives in the above-mentioned conditions and also differences in the type of test used. The two tests which are used routinely in North Dakota have in most evaluation studies been highly specific.

There is no justification for the assumption that there is no possibility of the presence of syphilis because of a single negative serologic reaction. It is a known fact that there are certain periods of syphilis when serologic reactions are negative. They are early primary syphilis, late syphilis, syphilis in early infancy, interstitial keratitis, and a limited number of neurosyphilitic and certain other cases under treatment. All of these false negative reactions are no doubt brought about because of the lack of sufficient reagin in the blood. Technical error could also account for false negative reactions, but these are not the common finding in properly controlled tests.

The bugbear of the serology of syphilis is a situation in which one test gives a positive and the other a negative reaction. This discrepancy in results obtained with different tests on the same serum is an unexplained phenomenon and is often referred to as the "serologic technicians' headache." Literature is replete with histories of such reactions and no attempt will be made here to explain such occurrences. Most serologists are agreed that the use of several serologic test methods increases the accuracy and lessens the danger of reporting false positive results. For this reason it is advisable to use one test which is found to be very specific in conjunction with a test of high sensitivity.

Syphilis serology is a never-ending attempt to approach perfection which at present shows no possible chance of achieving that goal. After obtaining the best in equipment, making the proper choice of a test, raising qualifications of the personnel, paying intelligent attention to details of the test, and constantly checking technic by means of evaluation studies, the laboratory must still report a certain percentage of contradictory results. The unpleasant task of interpreting reports is wholly the burden of the physician. Final judgment and responsibility rest fairly and squarely with the physician and he can

only expect the laboratory serologist to report reactions exactly as observed and not as he (the physician) expects or may desire.

NECESSARY PRECAUTIONS

In the collection of suitable blood specimens for syphilis serology several precautions are necessary. First, an ample specimen (at least 5 cc.) should be obtained. Hemolysis and contamination of the specimen with bacteria or foreign matter (drugs, disinfectants, dyes, etc.) and chylous specimens (collected too soon after a meal) must be prevented.

In North Dakota a certain percentage of hemolyzed specimens is always expected during the severe cold weather, owing to the freezing of the blood in transit. However, for a number of years blood specimens have been received badly contaminated or hemolyzed when temperature would have no effect. Shortly after the premarital law went into effect, hemolyzed specimens were a problem of great concern. In many instances, because of the condition of the blood specimens when received in the laboratories, there were delays which caused inconvenience to everyone concerned.

This condition was alleviated to a great extent in April of 1940, when the Venereal Disease Committee of the State Medical Association recommended that the Division of Laboratories of the State Department of Health purchase a number of Kimble venules. These tubes are furnished without charge to all licensed physi-

cians in the state on request to the Public Health Laboratories at Bismarck or Grand Forks.

The Kimble venule has introduced great simplicity and sterility into the process of taking blood specimens. Its design and construction eliminate all danger of infection to the patient or operator. The venule is ready for immediate use by the collector without any preliminary sterilization. The proper use of these tubes assures the laboratory of receiving a specimen free from bacterial contamination and hemolysis.

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Complaint and Situation in College Health Work*

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THE role of the psychological and emotional, in other words, the participation of the *total* personality in cases coming to medical attention, discloses itself most strikingly, through contrast between the original complaint made by the patient and the actual situation found to obtain. Emergent through this, also, is the functional place of psychiatry or mental hygiene as a natural, implicit, and integral element of the complete medical approach, whether to college students or others, a matter not yet as apparent or as clear as might be. By so many, psychiatry is still reacted to, consciously or unconsciously, as a rather separate, not explicitly medical concern, pertaining exclusively to a special group, the strikingly odd or mentally grossly disordered and not, human nature being constituted as it is, applying to all.

This point, of course, is not a new one.¹ However, in view of its really considerable importance and the rapid development of the concept of psychosomatic medicine, it was felt that the presentation of such a series of protocols from student case material would here be both

appropriate and opportune.

In this way, through allowing the cases to speak for themselves, as it were, the point in question, i. e., the significance of non-"physical" problems and issues in relation to states and complaints of ill health, would seem most simply and directly portrayable. These cases, incidentally, are not particularly exceptional or unusual, but rather quite representative of the experience of the student Mental Hygiene unit.

Case 1: Graduate woman student. Age 27. Presenting Complaint: Severe headache, fatigue, generalized pains, and fear that these were related to previous illnesses—rheumatic fever, Malta fever, injury in a fall, and "kidney stone." Situation: We find an impulsive, infantile, highly strung, hysterical, "self-willed", self-centered, "spoiled", unstable young woman who expects more than life can give her; who has over-estimated her ability; does not learn from experience; cannot accept her own limitations; and tries to force situations her own way. There is a background of family discord; and the patient is resentful toward her father, an osteopath, who opposed her going to college. Uncertain as to vocation, she changed from art to teaching. Thwarted in her social and marital aspirations, she returned to college, expecting to obtain a fellowship in botany, as well as opportunities to meet "ideal men." As before, she planned her affairs loosely and in conformity with her own wishes. Disregarding practical considerations and with limited finances, she

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again finds herself, when the plan is put into effect, in frustrating reality instead of the anticipated Utopia. No physical disorder can be found to account for her dramatic, hypochondriacal complaints, and further medical inquiry does not substantiate the previous illnesses as having been organic in nature. When the possibility of success began again to elude her, under stress of adjustment to a new reality situation, illness offered the only escape. The situation reveals itself essentially as a frustration collapse with great focus on physical symptoms. There is, further, much question as to this individual's suitability for, and real interest in, the present University project, which had clearly brought into relief her unpreparedness and uncertainty as to just what she wants and can make out of life. The distressing personality dynamics or, if you will, the psychiatric component, is here clearly obvious, as the story of the case is assembled—incidentally quite a far cry from the original complaint, "head-ache".

Case 2: A Jewish boy, a freshman in the College of Literature, Science and the Arts. Age 19. *Presenting Complaint:* "Chills", with generalized tremors and attacks of nausea and palpitation, related to eating. *Situation:* We find an extremely dynamic, immature, tensional and worrisome, explosive, egocentric youth of high pressure type, driven by insecurity and fear, with a "big-shot" complex. He enters aggressively into all manner of enterprises, and as part of his distorted scale of values, strives to play a Don Juan role in relation to sex exploits, a potency mechanism which is pretty much his basic trend in all fields. Fixation on physical aspects has been conditioned by an over-solicitous, worrisome mother and a hypochondriacal father who has similar "nervous spells." In the college environment, because of constant pressure to maintain and extend his "big-shot" status, he became increasingly tense, and his need for attention expressed itself in a negative way through being sick. His physical condition is normal except for a mild residual poliomyelitis defect, of which he was "proud", he stated, since it identified him with great individuals who had similar handicaps. Discovering himself only semi-effective, despite every exertion, he became confused and fearful of "losing face," and developed panic and anxiety reactions channeling into a type of hysterical attack, ready-made in his pattern, which satisfied his need for attention and served as an escape for possible defeat of his "big-shot" project.

Case 3: Male freshman in the College of Literature, Science, and the Arts. Age 19. *Presenting Complaints:* Fear of heart failure, pulsations in arms, headaches, dizziness, pains in joints, and chronic "colds". *Situation:* Here we find a sensitive, "soft", infantile, worrisome, fearful, insecure youth, taking life very seriously and anxious to do well, although intellectually not too bright. He had had a mild cardiac defect in early life, not at all serious or handicapping except under strenuous physical exertion, but much over-interpreted and over-emphasized medically, with resulting semi-invalidism and tendency to over-exaggerate and over-attend minor illnesses. He was over-protected by his mother, but pushed forward by his father with exhortations to "step out and be a man." With his background of over-dependence upon the home and retarded maturation, he soon found the college situation too much for him. His insecurity became heightened, and he developed marked feelings of inferiority, with striking lack of confidence. Not able to meet the situation alone, and in an intolerable dilemma between disappointing his parents and hurting himself, he found over-attention to mild "colds" and his "bad heart" the only approved escape. Although the actual organic handicap was minor, and the general physical findings were entirely negative, reassurance on those points alone, without exploration and appreciation of the dynamics involved, would be of no value whatsoever. In fact, such reassurance is not wanted or accepted, the symptoms being too precious to the patient himself. As the situation stood, it would have been intolerable for him to be well.

Case 4: South American male graduate student, holding a medical degree. Age 29. *Presenting Complaint:* Lassitude, heavy sensation in abdomen after meals, swelling of eyes, and fear of some obscure metabolic disorder. *Situation:* Here we have a shy, sensitive, "tender-minded", timid, withdrawing, basically schizoid, dreamy idealist, who recognized his own unsuitability for general practice after completing his medical training. He ap-

parently had a schizophrenic episode (dementia praecox) during his third year in the medical school, and although he has found a haven in a protected, scholarly vocation (research in botany), he still has periods of cloudy mental function and vague physical complaining. He then explains his "fatigue" and somatic discomforts on the basis of far-fetched, untenable physiological suppositions, in spite of the fact that detailed clinical and laboratory studies revealed normal findings. The present situation is one of moderately well-adjusted schizophrenia, with tensions and conflicts channeling into obscure and grotesque physical complaints and speculations. The presenting complaint, while seeming to point simply to physical pathology, is, in reality, the emanation of a serious chronic mental disease.

Case 5: Senior married woman. Age 29. *Presenting Complaint:* Inability to use the fingers of the left hand, because of numbness and weakness. *Situation:* This patient is a physically small, immature, highly strung, delicate, hypersensitive young woman, who was over-protected and "spoiled" by solicitous parents and brought up as a "child prodigy," because of her early talent as a violinist. Not well socialized in her early training, she lived like a "princess in an ivory tower," with a career as musician the magical center of her life. At the age of 21 she impulsively married a man she scarcely knew, and subsequently never made a satisfactory sex adjustment. The husband is a dominant type, rather an intellectual, and demands much attention and nursing, due to his own physical ailments. The patient's sense of frustration in the marriage crystallized the impasse between her golden fairy dream of a career and its realization. Difficulty which developed in the use of the fingers while practicing, grew into a fixation and was used as justification for abandoning plans for a professional career. Disappointed and disillusioned, unhappy and physically afraid of her husband, her sense of frustration and futility is made tolerable only by the conviction that the difficulty with her fingers, for which no organic basis is found, is the cause of her failure to realize her girlhood hopes. This complaint, then, offers the only acceptable solution to her impasse; and actually, seen in this light, cure is not entirely welcome, entailing as it does, the necessity of special work in a disturbing and confused milieu with, in addition, lack of personal preparedness and question of sufficient talent for its complete consummation.

Case 6: Sophomore girl in the College of Literature, Science, and the Arts. Age 19. *Presenting Complaint:* Chronic headaches, irregular menses, overweight. *Situation:* In this case we have a simple, childish, primitive, elemental, unformed, hysterical personality, not too bright, with physical characteristics suggesting endocrine dysplasia. Infantile, hyperemotional and undisciplined, seeking only her own pleasure, she is unreliable and irresponsible in all her behavior, including cooperation with respect to the treatment of her complaints. Wishes and desires, not permitted by conscience and reason, are given expression by using her complaints for attention and escape. Unstimulated by her rather colorless home life and the resigned attitude of her parents, yet lacking a real interest in education, she devoted herself in college almost exclusively to a round of trivial social activities and affairs with boys. When the academic and disciplinary pressures, incident to the University setting, made demands beyond her capacity and interest, her infantility and instinctive pattern of childish living became manifest in fugue states and increasing physical complaints, especially headaches. Clinically no outstanding somatic pathology is found. The situation is essentially an escape reaction in an individual who is constitutionally, that is, morphologically, psychologically, and emotionally, inferior.

Case 7: An 18 year old Jewish girl, a sophomore in the College of Literature, Science, and the Arts. *Presenting Complaint:* Diarrhea, weakness, lack of appetite, nausea, vomiting, irregular menses, and insomnia. *Situation:* In this case we find a very highly strung, tense, sensitive, introvert type—an unstable, hysterical, infantile, impatient young girl, quite dependent and in need of demonstrated affection and support. Precocious, and excessively focussed by her parents on intellectual attainments, she is serious and over-mature in some ways, yet basically very immature and childlike, never having learned how to play and get along with others of her own age, and having been kept from active participation by numerous early illnesses. Both parents are highly-strung and imposed adult perfectionistic stand-

ards. The father, a physician, is particularly lacking in understanding and insight. Home life was marked by many quarrels and scenes, and the patient felt very antagonistic toward her younger brother who, she felt, was favored over herself. Feeling socially inferior and isolated, the patient had dieted to lose 80 pounds in the past year, then felt quite desolate, when the coveted attention from the other sex still failed to appear. Physically weakened, worried over her studies, and feeling increasingly misunderstood at home, symptoms evidenced by a gastrointestinal upset finally brought a solution to her unbearable state, in the form of an acute illness which demands attention, ministrations, and release from responsibilities.

Case 8: Male freshman in the Engineering School. Age 19. *Presenting Complaint:* Diarrhea, fatigue, dizziness. *Situation:* We find an intelligent, in many ways attractive, but highly strung, extremely dynamic, impetuous, egocentric, naive, undisciplined personality of cyclothymic type, sensitive, ambitious, and with marked drive to succeed, to be "tops" and in a "big way," which had been the case in high school. He had been poorly trained by parents who understood him very slightly, and, aside from summary disciplinary attempts, had left him largely to his own devices; through their own limitations and ineffectuality they contributed but little to the home setting as a constructive sphere of influence. From the beginning of school in the fall, the patient had been operating under great pressure in the challenging, demanding, complicated and competitive university milieu, attempting many things with some initial success. The situation became one of progressive busyness and stress, tension and fatigue, culminating in a frank manic attack of manic-depressive type, ushered in by a mild gastrointestinal infection whose major symptom, diarrhea, represented the presenting complaint and which, with the effects of the stress and pressure of the patient's living, was undoubtedly of precipitating effect respecting the real trouble, i. e., the manic episode. That is, we have here a condition of acute mental disorder in an individual of special type, dynamics, and conditioning, caught up in a very trying and unhealthy life situation—a very different matter from diarrhea, and hardly inferable from that complaint alone, which, nevertheless, was a definite part of a pathologic whole.

Case 9: Married male graduate student. Age 32. *Presenting Complaint:* Discomfort and pain in lower abdomen, worse after meals; bowel movements "not right." *Situation:* This man is a sensitive, egocentric, opinionated, defiant and critical individual, compensating for his sense of inferiority and fear by an aggressive drive to impress others with his personal importance. In all his contacts, he is tense, touchy, and irritable, confessing that, at times, he is tyrannical and sadistic toward his wife, but attributing this entirely to his physical illness. His early family life was characterized by instability and discord, and he had frequent temper outbursts as a boy. After studying business administration, he had a checkered employment record because of his explosive nature and defensive attitude. He blamed his erratic performance and personality difficulties on his periodic abdominal discomfort, changing physicians often and playing the advice of one against another. His physical examination was negative except for some allergic reactions, and, although he had previously been given sensitization diets, he had no faith in them. When he returned to college he was still unsure and in a dilemma vocationally, but tried to hide this by insisting he had found a new interest in scholarly research. His hypochondriacal symptoms were again accentuated when, after several months, he began to sense his unpreparedness and unsuitability for a career in his newly chosen field of paleontology. He complained insistently and dramatically of his intense suffering and demanded immediate relief on a physical basis.

Case 10: Married male graduate student. Age 31. *Presenting Complaint:* Tremor of hands, insomnia. *Situation:* Here we find a shy, self-conscious, sensitive, tense, fearful, self-pitying, asthenic, introvert personality, egocentric and rigid, yet soft in response to life blows and obstacles. He is naive, idealistic and self-loving, yet dependent and must lean on somebody (usually a woman), childish in judgments and sulky in the face of obstruction. Physical examination is essentially negative. Functioning largely in an unreal world of phantasy, he over-estimated he strives to be a great, strong, admired person, as it were,

his intelligence and capacity. Despite fear of social situations, "Caesar with the soul of Christ." His wife, a wealthy "spoiled", "self-willed" girl, who had decided to marry him on an impulse, now looked down upon him for his unimportant position as a school teacher, and for his relative inadequacy as measured by other men in her social set. The climax of impending divorce was not alleviated by an unwanted pregnancy. Goaded by potency drive and strong desire to impress his wife and society in general, he set a high position in the scientific world as his goal, beginning by enrolling as a candidate for a Ph.D. degree, a plan about which, now that he has started it, the patient has serious misgivings. The present situation is one of acute frustration involving all fronts, personal, professional, vocational, and marital. His functional tremor and other complaints are largely a reaction to an excruciating dilemma and impasse, representing a focus and diversion from a life situation which calls for un-tangling rather than for treatment of specific physical symptoms.

CONCLUSION

The foregoing, it is hoped, has served to give concrete emphasis to the significance of the "mental" in health complaint situations. Considering the individual as an organic whole as opposed to the anomalous mind and body bifid of tradition, the point becomes only too obvious. Equally obvious is the necessity for the most careful scrutiny of *all* aspects of personal function, i. e., the psycho-affective as well as the so-termed, physical, if a true appreciation of the presenting case is to be achieved. And in the absence of such an approach, of course, fully adequate therapeutic procedure is impossible.

Also apparent is the fallacy, even danger, of accepting the presented complaint at its face value. So often is it merely a front or a focal point for pathology really quite different and more complicated. As is well known, at least theoretically, because of protective mechanisms or lack of awareness, or both, fundamental and essential psychologic and emotional elements are very frequently omitted or minimized by the patient—not to mention the effects of the blind spot the physician himself may have for these areas. Too, as we are all aware, there is the natural human tendency in the formulation of complaint to focus on the concrete physical as opposed to the seemingly less tangible psycho-emotional, albeit the latter may be basic to the occurring difficulty. And, through fear, there may be withholding even of certain physical aspects, where the implications are especially disturbing.

In short, to epitomize, just as the individual in health constitutes and operates as a biologic totality, with thoughts and feelings as well as tissues, so does he in ill health or disease; and this fact must be fully realized if medicine is to fulfill adequately its function as a curative science and art. Actually, this is a statement of the premise of psychosomatic medicine, perhaps the most forward of recent developments in medical thought.

In furthering this realization, the psychiatrist naturally can play, and has played, an important part, both by his own work and through his contacts with other physicians. And in this, of course, added significance becomes manifest for the psychiatric approach in college health work, as well as in other fields of practice.

¹Among others, the following references seem here particularly pertinent: Meyer, Adolf: The "complaint" as the center of genetic dynamic and nosology teaching in psychiatry. *New England J. Med.* 199:360-370 (Aug. 23) 1928. Muncie, Wendell, S.: The hospital psychiatric consultant. *The Mod. Hosp.* 43:3, 41-44 (Sept.) 1934.

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Variable Pulmonary Infiltration Association with Boeck's Sarcoid*

Case Report

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THE occurrence of marked and variable pulmonary infiltration in a case of Boeck's Sarcoid is considered noteworthy in view of increasing emphasis upon the visceral lesions.

W. M., male, age 47, married, office worker, was examined in June, 1942, by Dr. Paul Forgrave, with complaint of nodules under the skin of the upper left arm, of a few months duration. The past history included pneumonia in 1921. In 1931 the patient had Pasteur treatment following dog bite, at which time two inoculations were given in the right arm and the remaining twelve or fourteen in the left arm at a site corresponding to the nodules. The nodules were increasing in size and were not painful or discolored. The patient had no systemic complaints, was able to work without tiring and had had no pain in the chest, cough or hemoptysis. There had been 6 to 8 pound weight loss, regained during period of observation. The tuberculin patch test was said to be positive.

Examination showed a normal appearing individual. There were scattered nodules, two on the right arm, ten or twelve on the left arm over the area of the insertion of the deltoid. The nodules were in the subcutaneous tissue and apparently attached to the skin and were removed in January, 1943. There had been no recurrence two months later. Sections were examined by Dr. E. T. Bell, and diagnosis of Boeck's Sarcoid was made.

DISCUSSION

A case is reported in an adult male, in apparent good health, showing skin nodules of Boeck's Sarcoid. The x-ray films showed bilateral pulmonary infiltration. These were considered to be consistent with sarcoidosis by Dr. R. W. Morse before the tissue diagnosis was established.



Fig. 2. June 22, 1942, Clearing of infiltrated areas.

Noteworthy features are the extent of the infiltrations and their partial clearing and reappearance over a ten months period. The variable nature of the pulmonary infiltrations in the case reported is in keeping with Longcope's description¹ of the disease, as running a chronic relapsing course producing comparatively mild constitutional symptoms but sometimes causing great damage to many structures. Spontaneous recovery is common.

REFERENCE

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*Report and films supplied by Dr. Paul Forgrave, St. Joseph, Missouri, to whom the writer is indebted for permission to make this report.



Fig. 1. March 2, 1942, Areas of infiltration throughout both lung fields.



Fig. 3. January 23, 1943, Increased infiltration again noted.

AMERICAN STUDENT HEALTH ASSOCIATION MONTHLY NEWS-LETTER

Introduction of the Army and Navy specialized training programs into several hundred colleges is imposing new problems in health service administration. How these problems are being met will be the substance of forth-coming reports.

At the present time it appears that the immediate question is how to maintain adequate staffs. Recently a letter was sent to all schools holding membership in our Association inquiring into the availability of personnel that might be transferred to schools with depleted trained staffs. The replies received indicated: (1) That there are no surplus staff members immediately available for relocation in other health services, (2) There are many vacancies, particularly for physicians.

Dr. Stephen A. Forbes, formerly on the staff of Pennsylvania State College and of the University of Michigan, has recently assumed directorship of the Health Service at Wooster University.

A.S.H.A. DIGEST OF MEDICAL NEWS

The Diagnosis of Orthostatic Albuminuria. In the April, 1943, issue of *The Military Surgeon*, Hugh H. Young, John S. Haines and Charles L. Prince set up the following criteria for the diagnosis of orthostatic albuminuria:

1. There must be no history of renal disease in the past.
2. Normal blood chemistry (non-protein nitrogen, blood urea, total protein, and albumin-globulin ratio).
3. Normal kidney function (phthalein, urea clearance, and dilution and concentration tests).
4. No white blood cells, red blood cells or casts in the urine, except intermittently and in small numbers.
5. No elevation of blood pressure.
6. Negative plain x-rays and intravenous urograms.
7. Absence of albumin in the urine secreted and voided when in the recumbent position.

Persons whose condition meets these criteria should be acceptable for military service without question so far as their albuminuria is concerned.

Beta Hemolytic Streptococci Isolated from Public Room Floors. W. G. Walter and G. J. Hucker report in the November and December, 1942, issue of the *Journal of Infectious Diseases* isolating beta hemolytic streptococci from the floor sweepings in 22 of the 37 rooms investigated in 6 schools, a boy's dormitory, a theatre and a hotel. Physiological and serological tests done on 17 representative cultures resulted in classifying 7 in Lancefield's group A, 2 in group B, 1 in group C, and 7 possibly in group G. A seasonal variation was observed; from February until May hemolytic streptococci could be readily obtained from certain floors, but this was not the case during the cold months of the year.

Conservation of Rubber Gloves by Chemical Sterilization. K. P. A. Taylor in the October, 1942, issue of the *U. S. Naval Medical Bulletin* recommends the following methods as effective in sterilizing gloves without heat:

- (a) After use in ordinary surgical cases:
 1. Washing in running water and soap for 1 minute.
 2. Full immersion in 1:1000 mercuric chloride for 10 minutes.

3. Full immersion in 70 per cent alcohol for 1 minute.

- (b) After use in cases infected with tetanus, anthrax or gas bacilli:

1. Complete immersion in 1:1000 mercuric chloride for 18 hours or,
2. Complete immersion in 1:100 mercuric chloride for 1 hour on three successive days.

All of these methods according to the tests reported provide a reasonable margin of safety.

Limitations in Use of Tinted Eyeglasses. Blain in the September, 1942, issue of *L'Union Medicale du Canada* suggests that the use of tinted eyeglasses should be limited (1) to avoiding glare in foundries, motion picture studios, at high altitudes, on the sea or seashore, in deserts or snowfields, (2) to protecting persons with certain ocular diseases and those recuperating from eye operations. The vast majority of people do not need tinted glasses except on rare occasions, and, if such glasses are worn indiscriminately for indoor work, they may throw an increased burden on the eyes.

The Absorption of Sulfa Drugs. The *Journal of Clinical Investigation* of September, 1942, reported that sulfa drugs given as the sodium salt orally before a meal result in blood levels and amounts recovered in the urine nearly comparable to those obtained from intravenous injections. Absorption of the drugs given after a meal is slower and less complete. Peritoneal absorption of the sodium salt is rapid and nearly complete, sulfanilamide leading all others in this respect.

A Method for Evaluating "Flat-Foot". Tracy D. Cuttle in the January, 1943, issue of the *U. S. Naval Medical Bulletin* suggests a simple apparatus (as developed by Osgood) for measuring the strength of the "everters" of the feet as compared with that of the "inverters". By means of this test, feet are classified into four classes as follows: (1) inverters stronger than everters in the ratio of 5 to 4—symptomless, normal feet, (2) pull of inverters and everters approximately equal but slightly greater for the everters—symptomless, slightly pronated feet, (3) pull of everters definitely greater than of inverters—pronated feet with symptoms of foot strain, (4) pull of everters greater than that of inverters in ratio of 5 to 4—"acute flat feet."

Streptococcal Infection of Wounds Transmitted by

Surgeon. A. Fingerland reports in the *Zent. F. Chirurgie* of October 10, 1942, an epidemic of hemolytic streptococcal infection, involving, over a period of eight days, 7 cases with 5 deaths. All the cases had been operated upon by one surgeon, who was found to have just recovered from a cold and to be a carrier of streptococci (in the nasal secretions), which closely resembled the streptococci recovered from the patients. This surgeon had been engaged in giving verbal instructions to his assistant surgeons while he operated. Tests showed the type of two-layered calico mask worn by the surgeon to be practically worthless. The author recommends that surgeons operate in silence in order to avoid moisture droplet infection of the operative wounds.

Sulfathiazole for Impetigo. G. A. G. Peterkin and E. C. Jones in the March 13, 1943, issue of the *British Medical Journal* conclude that "Sulfathiazole seems to be the drug of choice in the local treatment of impetigo." Of 120 cases analyzed, 93 were cured in an average time of six to eight days. Recommended are a 10% sulfathiazole in cream, a 5% sulfathiazole in cream or a 5% sulfathiazole in 15% starch and 15% zinc oxide paste. Results with sulfadiazine, sodium sulfathiazole and sulfamethazine were disappointing.

Drinking Fountains. A. P. Hitchins and O. A. Ross in the *Journal of the American Water Works Association* of February, 1943, conclude that a high proportion of drinking fountains now in use are insanitary, and that certain types of these fountains are potentially more dangerous than the outmoded common drinking cup.

Epidemic of Influenza in 1943? In the *Science News Letter* of March 20, 1943, Dr. Thomas Francis, Jr., warns that a world-wide epidemic of influenza similar to that of 1918 is "a very definite possibility in 1943." Overcrowding is the hazard which Dr. Francis feels was an important factor in the production of the 1918 epidemic and which may prove an important factor in producing an epidemic of influenza in 1943. He particularly warns of the dangers of close contact and moisture-

droplet infection in our crowded war production plants, buses and trains.

As opposed to this forecast should be placed the following facts: (1) Preceding the 1918 influenza epidemic, there were several months of definitely increased incidence of influenza; such increased incidence has not been noted in recent months, (2) Unparalleled overcrowding, fatigue and unsanitary conditions have not resulted in influenza epidemics in England or other bombed or war-torn countries in the present war.

Passive Tetanus Immunity and Its Effect on Active Immunization. J. V. Cooke and F. G. Jones in the April 10, 1943, issue of the *Journal of the American Medical Association* conclude as the result of tests on 9 children with clinical tetanus and 30 children, age 8 to 15 years in good health and under orthopedic treatment, as follows:

1. Passive immunization with 1500 or less units of tetanus antitoxin produces immunity for only about three weeks.
2. Passive immunizations with 100,000 or more units resulted in the production of immunity for eight to eleven weeks (assuming that a titer of 0.01 units of passively introduced antitoxin is sufficient to guarantee immunity).
3. An attack of clinical tetanus did not produce antitoxin immunity upon recovery, nor did it produce primary antigenic stimulation comparable to that produced by a first injection of toxoid.
4. When passive immunity was produced with 10,000 or more units of antitoxin, the conversion of passive immunity to active by means of toxoid was possible only in eight to twelve weeks, irrespective of whether the toxoid injections were started at the time of antitoxin injection or delayed two, four or even six weeks.
5. The presence of any considerable quantity of heterologous antitoxin prevents the usual sensitization of the body cells by toxoid, and renders it inert as an antigen.

Book Reviews

Clinical Cardiology, with Special Reference to Bedside Diagnosis, by WILLIAM DRESSLER, M.D. New York: Paul B. Hoeber, Inc., 692 pages, 108 illustrations, 1942, price \$7.50.

In this book the author has presented the subject of clinical cardiology in a clear and concise manner. Particular emphasis is placed on the older and simpler diagnostic methods of clinical observations. While the new laboratory methods of diagnosis are mentioned, they are not gone into in great detail, as the author feels that for the general practitioner in the city and country, it is important to learn to arrive at sound decisions by using the simplest diagnostic methods and by accumulating clinical experience. For this reason the book should be of value to students and practitioners who wish to develop and improve their diagnostic acumen by clinical experience.

An appendix of forty pages on "Important Points to Remember" should be of invaluable aid to everyone interested in heart disease.

The Physiology of Domestic Animals, by H. H. DUKES and Others. Ithaca, N. Y.: Comstock Publishing Co., 5th edition, 721 pages, 168 figures, 1942.

The appearance of a fifth edition of this standard text is an indication of its usefulness in the field of veterinary education. The book is also useful as a concise source of reliable information about the comparative physiology of common domestic animals and man. Most of our detailed knowledge of physiology has been derived from studies on animals other than man, and, therefore, every textbook of physiology includes much information which is really comparative. But this book stresses the peculiarities of function which arise, for example, from the anatomical characteristics of the ruminants, from the absence of sweat glands in certain animals, and other similar problems. The problems of reproduction, including artificial insemination, of nutrition and digestion are particularly well handled. As a detailed account of everything known about physiology, this book is not as complete as many of the standard texts for medical students, but it is nevertheless a very useful supplement to such other books because of its coverage of so much material in comparative physiology. It is well arranged, well printed and adequately supplied with references to the basic literature.

The Year Book of Industrial and Orthopedic Surgery—1942, edited by CHARLES F. PAINTER, M.D. Chicago: The Year Book Publishers, Inc., price \$3.

The 1942 *Year Book* gives proper emphasis to war medicine, in addition to including the outstanding findings in the field of traumatic and orthopedic surgery during the past year. It is a handy book serving the respective interests not only of the doctor in civilian practice but also the physician attending the Armed Forces. The material, obtained from a number of authors, is presented in a clear and concise manner.

Osler's "Principles and Practice of Medicine," rewritten, revised, reorganized, 1942, by HENRY A. CHRISTIAN, M.D., F.A.C.P. New York: D. Appleton-Century Co., 14th semi-centennial edition, 1500 pages, price \$9.50.

The medical profession is fortunate in having had McCrea, and in now having Christian to carry on the Osler tradition in medical literature. Christian as the editor of the 14th semi-centennial edition of the *Principles and Practice of Medicine*, recognizes that there are advantages in such continuity of authorship. The value of single authorship lies in the circumstance that conclusions and opinions, both explicitly stated and implicit in choice of treatment of material, come within the observation of one widely experienced clinician. For Osler, McCrea and Christian, by the similarity of background, training, opportunities, and mental equipment may be considered to be a composite individual.

There has always been, in the Osler *Principles and Practice*, a proper balance between empiricism, experiment and proved clinical fact in the consideration of etiology, symptomatology, physical and laboratory data, and therapy. It is to be hoped that some one may always be at hand to carry on the tradition.

Diseases of the Liver, by S. S. LIGHTMAN, M.D., F.A.C.P.; Philadelphia: Lea & Febiger, 906 pages, 122 engravings and a colored plate, with index, 1942, price \$10.

This book is written for both student and practitioner. It should fulfill a great need in its field. Although the liver is the largest organ in the body, its functions are so various and its reserves so great, that even major disturbances of function from advanced pathologic states can often be diagnosed only with great difficulty. Physiologic experiments have shown that as much as 90 per cent of the organ can be destroyed without interfering greatly with the usual functions. This explains why liver diseases are frequently misdiagnosed. Even the most elaborate liver function tests may fall short of establishing liver dysfunction.

It is for this reason that this new book on liver diseases is most welcome. This book will prove exceedingly helpful in understanding the functions, the liver function tests, the pathological changes and the symptomatology of diseases of the liver. Treatment is also adequately discussed. In the first chapter, there is an excellent presentation of the structure of the liver functional unit, the lobule or hepaton, suggesting the analogy to the anatomical unit of the kidney, the nephron.

The commonest symptom of liver disturbances is, of course, jaundice. This subject is very thoroughly covered, although the basis for the various types of jaundice could stand clarification. An element of confusion is the inclusion of Chapter 15, which deals with acholuric or familial hemolytic jaundice. This disease properly belongs among diseases of the blood, since the presence of the jaundice is not the result of liver damage or liver insufficiency. The jaundice is due to excessive hemolysis resulting from defective blood formation. The topic of cirrhosis is given too much prominence. It comprises more than 100 pages in the book. There is considerable unnecessary repetition. The chapter on the liver in hyperthyroidism is very good. It is not generally appreciated how much the liver can be damaged in severe cases of hyperthyroidism.

As a whole, the book is well written and should prove helpful as a guide to a better understanding of the diseases of the liver. It can be highly recommended for students and practitioners alike.

News Items

Dr. Rudie J. Carlson has left Merrill, Iowa, to open offices in Sisseton, South Dakota, for the general practice of medicine and surgery.

Dr. Hans Jacoby, recently resident physician at the New York City Cancer Institute, is the latest acquisition to the staff of the Huron Clinic and Sprague Hospital, as roentgenologist, announced Dr. J. C. Shirley, Huron, South Dakota.

Drs. A. R. Varco and Jas. R. Thompson of Miles City, Montana, have dissolved their partnership with the retirement of Dr. Varco from active practice.

Dr. Neil T. Norris of Caledonia, Minnesota, where he is associated with Dr. Garnett B. Belote, has leased the Caledonia Hospital, operated for fifteen years by Mrs. Selma Browning.

Capt. G. Stein of the Army Air Force Technical Training Corps, stationed at Sioux Falls, South Dakota, and Dr. N. J. Nessa of that city presented a number of x-ray cases at a meeting of the Seventh District Medical Society at the Cataract hotel, May 11.

Dr. Harold W. Gregg of Butte, Montana, delivered an address, "Factors in Prognosis in Coronary Disease, Old Hearts Under the Strain of War" at the annual meeting of the Montana-Wyoming region of the American College of Physicians, held May 1 in Great Falls, and presided over by Dr. E. D. Hitchcock of Great Falls. Other speakers included Dr. Geo. E. Baker, Casper, Wyoming, on "Rocky Mountain Fever"; Dr. F. R. Schemm, Great Falls, "Water Balance in Consideration of Edematous Patients"; Dr. A. R. Foss, Missoula, "Glycosuria, Blood Sugar Curves"; Dr. Thos. F. Walker, Great Falls, "Chemoprophylaxis"; Dr. M. A. Shillington, Glendive, "Allergy"; Dr. Earl L. Hall, Great Falls, "Management of the Menopause with Special Reference to the Newer Synthetic Estrogens."

From the Army came Lt. Col. Scott M. Smith, base surgeon, with "Air Evacuations of Battle Casualties," and 1st Lt. P. B. Candela on "Use of Blood Groups in Tracing Racial Origins and Migrations." The U. S. Public Health Service was represented by Dr. Mason V. Hargett, Hamilton, past assistant surgeon, the topic—"Yellow Fever Prophylaxis." Dr. W. G. Richards, Billings, read a paper, "Hyperthyroid and the Neurotic, as Illustrated by Shakespeare's Characters of Macbeth and Hamlet."

Dr. Gilbert Cottam of Sioux Falls has been appointed superintendent of the South Dakota State Board of Health, a post so long held by the late Dr. J. F. D. Cook.

At the nineteenth annual meeting of the North Dakota Health Officers Association, Dr. H. G. Huntley of Kindred was elected president, Dr. Percy L. Owens of Bismarck, vice president and Dr. F. J. Hill re-elected secretary and treasurer.

(Continued on page 190)

The JOURNAL LANCET

Serves the *Medical Profession of*
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North Dakota Society of Obstetrics
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MINNEAPOLIS, MINNESOTA, JUNE, 1943

POSTWAR MEDICINE

In the last war, 31,251 physicians from civil life were commissioned in the Medical Corps, in addition to the 2,089 already in the service and in the reserves. Many of these went in as general practitioners and came out specialists, through the unusual opportunities they had to receive training and experience under competent guidance. Many enjoyed their first contact with group practice in the various hospital organizations, and not a few liked the service so well that they secured permanent commissions and became members of the regular establishment. But, as time went on, most of the others returned to their former locations and began to pick up the loose threads of their old connections, gradually finding their way back into the old grooves, and generally getting reestablished as best they could. It was not easy, and many who remembered the pleasures and advantages of group practice in the army tried the experiment in private life, with varying degrees of success. In some

states, like Iowa, for example, the idea became so prevalent that most communities of any size had from one to three or more such organizations, and it is entirely possible that many of them would have survived, had not the prolonged period of depression which followed the short postwar boom played havoc with their finances. Uncle Sam was no longer paying the bills. Ultimately, thanks to the comparatively short duration of our participation in the war, most of those who went into service found themselves fairly well rehabilitated in practice and would be willing to go again, if the addition of twenty-five years to their lives had not made them ineligible.

The situation in the present war is quite different. It will last much longer, and a vastly larger armed force will be necessary to bring it to a successful conclusion. Many more medical officers will be needed, not merely for the duration, but for years afterwards. This time we shall surely not demobilize down to peace-time strength as we did before, and leave the rest of the world to its

own devices. We shall have to maintain sizable forces in various parts of the world to keep order long after the whistle blows, and these will need their full quota of medical officers.

The inevitable increase in the size of the Veterans Administration and all its facilities will require a considerable augmentation of its medical personnel. However, the demands of private practice will be somewhat lessened by the fact that all veterans will be entitled to hospitalization and treatment for all ailments, whether service-connected or otherwise. Incidentally, all physicians from now on will need to know more about tropical diseases than has heretofore been the case. Right now, most of the fighting in which our forces are engaged is in the tropics, or in countries where tropical disease abounds, and some of it is bound to turn up here when they come back.

There are some bright spots in the outlook. Thanks to experiences gained in the last war, the organization of the medical personnel is now on a much better footing. The establishment of the Medical Administrative Corps to take care of most of the paper work leaves the medical corps much freer to carry on its professional duties, without spending a lot of time in making out reports, etc. The training and background of medical officers is being considered much more carefully in assigning them to duties for which they are especially fitted. The equipment furnished is much better and in more ample quantity. Medical science itself has advanced since the last war, so that medical officers can have the advantage of sulfa drugs, plasma and refinements of anesthesia technic, such as intravenous pentathol, in their work, to mention just a few. They will return to private life fortified by a world of experience.

At home, regardless of the fact that our numbers are being reduced and we are handicapped by shortages of supplies and equipment, we must do everything possible to maintain high professional standards, and keep our organizations functioning as well as they can. We are in the best position of any nation in the world to do this, and it is the least of the contributions we can make toward winning the war.

G. C.

MEDICAL INVESTMENT IN FREEDOM

The manner in which the medical profession has responded to the call to the colors is an heroic tribute to the great nation that United States citizens know theirs to be. One must pry far back in his memory to find a professional sacrifice to equal it.

Doctors are realists. They recognize that their earning years, limited usually by the natural period of vigor, now are cut by participation in the drama of war. So that when there is suggested an investment cushion upon which it is possible for the physician to rest his financial problems after the peace is won, the thought merits consideration. United States War Savings Bonds are just such a cushion.

War Bond dollars buy for the government medical supplies, without which all the effort of the army or navy doctors and surgeons would be sadly handicapped.

War Bond dollars normalize the national commercial temperature and reduce the inflation fever because when they are taken from the channels of trade they have no opportunity to be used for the purchase of scarce materials, driving prices upward. War Bond dollars are sane, disciplined, potent; indicated by the situation, prescribed for current and future distress. As the master of his dollars the physician is asked to devote them to the stirring and splendid service of buying United States War Savings Bonds; all the bonds that he possibly can.

M. H.

NEWS ITEMS

(Continued from page 188)

Dr. Thomas J. Kinsella was announced as the newly elected president of the Hennepin County Medical Society, at a meeting honoring 137 of its members now in the Armed Forces, held May 3.

Dr. W. H. Bodenstab of Bismarck, North Dakota, entertained fellow physicians and dentists of Bismarck and Mandan on the occasion of his completing fifty years of practice, most of them spent in the state.

Dr. Harry Dickey Sewell, associated with the Huron Clinic since 1919, has removed to Rochester, New York, to join the medical staff of the Eastman Kodak Company whose chief is a college classmate of Dr. Sewell.

Dr. J. J. Malee of Anaconda, Montana, completing military training at the medical field service school, Carlisle Barracks, Pennsylvania, about June 1, will be commissioned a captain and proceed to Barnes General Hospital in Vancouver, Washington.

Major L. D. Besecker, post surgeon and director of the medical division at Fort William Henry Harrison, Helena, Montana, for eleven months, has been transferred to the first special service force as force surgeon. Major Michael L. Mitchell, who replaces him and who has been successively at Brooklyn, New York, and Cleveland, Ohio, was in Montana ten years ago on CCC duty in Glacier National Park.

Captain E. Ted Keller, flight surgeon for a veteran bomber squadron at Guadalcanal and the Solomon Islands, spent a mid-May furlough at Rugby, North Dakota, where he practiced before entering service.

Dr. Nels N. Sonnesyn, Le Sueur, Minnesota, joined the staff of the Fitzsimmons General Hospital in Denver, Colorado, May 15th, as captain.

Dr. Arnold O. Swenson of West Duluth, recently promoted to lieutenant commander in the U. S. Navy, spent a leave at home on transfer from Bremerton naval hospital in Washington to Norfolk naval hospital in Portsmouth, Virginia.

Dr. Byrl R. Kirklin, director of the division of radiology at Mayo Clinic, Rochester, Minnesota, has been appointed x-ray consultant in the office of the surgeon general of the army with the rank of colonel, in which capacity he will leave for a tour of duty, reporting to Washington.

Lt. Col. Wm. J. Eklund, Duluth surgeon, veteran of World War I, has been appointed base surgeon of an overseas command with jurisdiction over a number of posts.

(Continued on page 192)



MARGIN OF SAFETY

IN A STUDY of various barbiturates, Allonal's hypnotic component, allyl-isopropyl-barbituric acid, was found to have a wide margin of therapeutic safety—twice that of barbital and nearly three times that of phenobarbital. Because of this relatively wide margin of safety—because it produces restful sleep, even in the presence of pain, Allonal deserves to be your routine sedative-hypnotic of choice. HOFFMANN-LA ROCHE, INC. • NUTLEY, N. J.

ALLONAL 'ROCHE'

MIGHTY CABLES MAKE THE GEORGE WASHINGTON BRIDGE SAFE

NEWS ITEMS

(Continued from page 190)

The office of the Minnesota state director of public institutions has announced the appointment of Dr. Henry Hutchinson, assistant superintendent of Moose Lake state hospital for the last five years, as superintendent of the Hastings state hospital.

Dr. V. J. LaRose of Quain & Ramstad clinic, Bismarck, was elected a representative director of the National Tuberculosis Association at a meeting of the board of the Association in St. Louis, the first week of May. He will serve for two years.

Dr. E. Mendelssohn Jones, St. Paul, was chosen president-elect of the Minnesota State Medical Association at its annual meeting in Minneapolis, May 16.

Necrology

Dr. William T. Thornton, 65, of Missoula, Montana, died April 29 at his home after a lingering illness. He had practiced in Missoula for twenty-six years and was credited with having performed 15,000 major operations since graduating from the American Medical College at Battle Creek, Michigan, in 1903.

Dr. Cynthia Estella Pingree Macnider, 85, of Jamestown, North Dakota, died May 4 at the Jamestown hospital, following an illness of nearly a year. She was a native of Denmark, Maine. Coming to North Dakota in 1888 shortly after graduation, she practiced there continuously, except for one year in Mississippi and two in California. She resided successively at Fort Yates, Emonsburg, Linton, Spiritwood, Bismarck and Jamestown.

Dr. Gulick O. Bundy, 86, of Barton, North Dakota, died May 1 in a hospital at Rugby. He was born at Spring Grove, Minnesota, and had been a resident of North Dakota about forty-three years, thirty of which were spent in Barton.

Dr. L. F. Hall, 55, of Helena, Montana, died there May 10. Dr. Hall was Lewis and Clark county health officer for some years, retiring from that office a year ago because of ill health.

Dr. Walter Byron Scott, 70, of Ray, North Dakota, died at his home May 12, after a long period of declining health. Dr. Scott came to the state forty-six years ago from Canada, settling at Crystal whence he removed to Ray. He performed his first appendectomy in a sod shack by candle-light, and in early homestead days made professional calls on skis and by saddlehorse. Dr. Scott held degrees in both pharmacy and medicine and at one time was the mayor of Ray.

Dr. E. T. W. Boquist, 51, of Minneapolis, chief medical officer at Minnesota Soldiers' Home where he had been stationed for a year, died suddenly there April 26.

Dr. William Vardenab Lindsay, 69, of Winona, Minnesota, died suddenly April 24 while making a professional call. He was health officer and member of the board of health for twenty-one years.

Advertiser's Announcements

DEFENSE INDUSTRIES AND TARBONIS CREAM

Industrial dermatoses including folliculitis, eczematoid dermatoses, defatted conditions, etc., are becoming a national problem today, as more and more people unexposed to factory conditions are exposed to chemical irritation, sulfonated mineral oils, resins, sulphurs, chlorines, strong detergents and abrasives in industry.

Where the industrial exposure is concerned, simple preventive ointments are not effective and the so-called chemical gloves are not advised because of their interference with perspiration and the possibility of tearing and losing their effectiveness entirely.

Tar preparations have long been recognized as effective in the treatment of eczema, seborrheic dermatitis, eczematoid dermatitis, and related skin conditions, as well as infantile eczema.

Tarbons Cream is essentially a tar ointment, but it is radically different from older tar preparations in that it is free from the irritating qualities previously associated with tar products. It is clinically nonallergic due to a special means of selection of the base tars, and a method of extraction that produces an active therapeutic agent that is nonirritating. It is carried in the vanishing type cream base that is beneficial in the frequently found defatted conditions of the epidermis accompanying dermatitis conditions.

Tarbons Cream is based on a formula, developed in the pharmacy of Johns Hopkins University, that has been in successful use in that hospital's dermatological and pediatrics departments for over eight years. Its composition is Liquor Carbonis, Detergens, Lanolin U.S.P. and Menthol in a cream base. It is greaseless, stainless, and odorless.

SCHERING MARKETS PRIODAX

A Tablet Preparation for Gall-Bladder Visualization

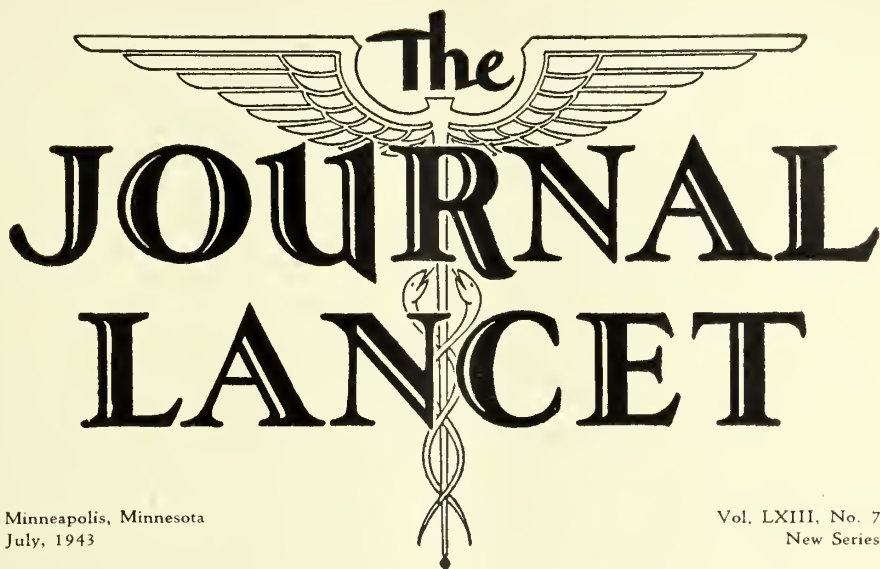
Priodax, a new type preparation in tablet form for x-ray visualization of the gall-bladder, is being distributed by Schering Corporation, Bloomfield, New Jersey. Research reports show clearly certain differences between Priodax and the several dyes in powder form now in use. As a tablet, Priodax can be swallowed whole, thus eliminating the obnoxious symptoms associated with powders. Patient reactions and nausea are infrequent. Because Priodax contains no phenolphthalein, severe diarrhea is rare. Vomiting, which often follows the use of the older preparations, is said to occur in less than 3 per cent of the cases who receive Priodax.

Chemically Priodax is beta-(4-hydroxy-3, 5-diiodophenyl)-alpha-phenyl-propionic acid containing 51.5 per cent of iodine firmly bound in a stable organic molecule. After being absorbed from the enteric canal, the iodine molecule passes through the liver and is excreted into the gall-bladder providing an excellent contrast medium for diagnostic x-ray visualization.

Because Priodax presents a concentration of iodine which is better tolerated by the patient, physicians have found that a single dose will almost invariably result in clear pictures. For the average adult, the dose is six tablets (3 grams). This amount is generally adequate even with considerable variations in weight of the patient. If the dose is to be adjusted to body weight, one tablet may be allowed for each twenty-five pounds. There is no contraindication to giving a double dose (six tablets at one time and six tablets several hours later, or six tablets on one day and six tablets the next), if this is desired. It has rarely been found necessary with Priodax.

The tablets may be swallowed whole with sips of liquid, such as water, fruit juice, or skim milk, either in immediate succession or at intervals as determined by the physician. This method of administration is generally found to be agreeable and convenient, and it assures that the entire dose is taken. The tablets should not be chewed.

Priodax Tablets are supplied in cellophane-protected envelopes of six tablets, each containing 0.5 gram (7.7 grains) of beta-(4-hydroxy-3, 5-diiodo-phenyl)-alpha-phenyl-propionic acid. Boxes contain 1, 5 and 25 envelopes.



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Transactions of the South Dakota State Medical Association

Sixty-Second Annual Session

Huron, South Dakota

May 27 and 28, 1943

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D. S. BAUGHMAN, M.D.	Madison
R. G. MAYER, M.D.	Aberdeen
PUBLIC POLICY AND LEGISLATION	
J. C. OHLMACHER, M.D.	Vermillion
The Council	
PUBLICATIONS	
R. G. MAYER, M.D.	Aberdeen
The Council	
MEDICAL DEFENSE	
W. H. SAXTON, M.D. (1944)	Huron
T. H. RIGGS, M.D. (1945)	Pierre
C. J. McDONALD, M.D. (1946)	Sioux Falls
MEDICAL EDUCATION AND HOSPITALS	
T. P. RANNEY, M.D. (1944)	Aberdeen
R. A. BUCHANAN, M.D. (1945)	Huron
E. M. STANSBURY, M.D. (1946)	Vermillion
MEDICAL ECONOMICS	
H. A. MILLER, M.D. (1944)	Brookings
C. E. ROBBINS, M.D. (1945)	Pierre
D. A. GREGORY, M.D. (1946)	Milbank
PUBLIC HEALTH	
A. TRIOLO, M.D.	Pierre
Sub-committee on Cancer	
JOHN L. CALENE, M.D. (1944)	Aberdeen
O. S. RANDALL, M.D. (1945)	Watertown

R. E. JERNSTROM, M.D. (1946) Rapid City
 GILBERT COTTAM, M.D., Supt. of State Board of Health Pierre

Sub-committee on Tuberculosis

LYLE HARE, M.D. (1944) Spearfish
 W. E. MORSE, M.D. (1945) Rapid City

Sub-committee on Mental Hygiene and Child Welfare

MYRTLE S. CARNEY, M.D. (1944) Pierre
 GOLDIE ZIMMERMAN, M.D. (1945) Sioux Falls
 M. W. PANGBURN, M.D. (1946) Miller

Sub-committee on Syphilis Control Program, U. S. P. H. Service

GILBERT COTTAM, M.D. (1946), Supt. of State Board of Health Pierre
 FRED P. BESTGEN, M.D. (1944) Rapid City
 ANTON HYDEN, M.D. (1945) Sioux Falls

NECROLOGY

R. V. OVERTON, M.D. (1944) Winner
 E. JOYCE, M.D. (1945) Hurley
 J. A. HOHF, M.D. (1946) Yankton

MEDICAL BENEVOLENCE

D. S. BAUGHMAN, M.D. (1944) Madison
 W. E. DONAHOE, M.D. (1945) Sioux Falls
 W. H. SAXTON, M.D. (1946) Huron

SPECIAL COMMITTEES

RADIO BROADCAST

W. E. DONAHOE, M.D. Sioux Falls
 S. M. HOHF, M.D. Yankton
 R. E. JERNSTROM, M.D. Rapid City

EDITORIAL

N. J. NESSA, M.D. Sioux Falls
 J. C. SHIRLEY, M.D. Huron
 J. C. OHLMACHER, M.D. Vermillion
 C. E. SHERWOOD, M.D. Madison
 GILBERT COTTAM, M.D. Pierre
 D. S. BAUGHMAN, M.D. Madison
 R. G. MAYER, M.D. Aberdeen

MEDICAL LICENSURE

G. W. MILLS, M.D. Wall
 F. H. COOLEY, M.D. Aberdeen
 F. J. ABTS, M.D. Yankton

ADVISORY WOMEN'S AUXILIARY

J. C. SHIRLEY, M.D. Huron
 C. E. SHERWOOD, M.D. Madison
 J. H. HAGEN, M.D. Miller

ALLIED GROUP

N. K. HOPKINS, M.D. Arlington
 E. A. PITTENGER, M.D. Aberdeen
 J. A. HOHF, M.D. Yankton

MILITARY AFFAIRS

WM. DUNCAN, M.D. Webster
 H. T. KENNEY, M.D. Watertown
 D. A. GREGORY, M.D. Milbank

RADIOLOGY

N. J. NESSA, M.D. Sioux Falls
 J. R. FUCHLOW, M.D. Rapid City
 J. H. LLOYD, M.D. Mitchell

SPAFFORD MEMORIAL FUND

FOR SCHOLARSHIP AT UNIVERSITY OF SOUTH DAKOTA

W. H. FAIRBANKS, M.D. Vermillion
Advisory to Departments of State Board of Health

OPHTHALMOLOGY AND OTOLARYNGOLOGY

WM. SAXTON, M.D. Huron
 H. D. NEWBY, M.D. Rapid City
 JOHN B. GREGG, M.D. Sioux Falls

ORTHOPEDICS

W. A. DELANEY, M.D. Mitchell
 G. E. VAN DEMARK, M.D. Sioux Falls
 F. W. MINTY, M.D. Rapid City

SOCIAL SECURITY

W. A. DAWLEY, M.D. Rapid City
 A. J. SMITH, M.D. Yankton
 R. A. BUCHANAN, M.D. Huron

MATERNAL AND CHILD WELFARE

W. E. DONAHOE, M.D. Sioux Falls
 E. T. LIETZKE, M.D. Beresford
 J. E. STUDENBERG, M.D. Gregory

ANNUAL MEETING OF THE COUNCIL OF THE SOUTH DAKOTA STATE MEDICAL ASSOCIATION

First Meeting of the Council
 May 27, 1943

The meeting of the Council of the South Dakota State Medical Association was called to order by the Chairman, Dr. D. S. Baughman, on Thursday evening, May 27, 1943, at the Marvin Hughitt Hotel at Huron, South Dakota.

The roll call was read by the Secretary, Dr. C. E. Sherwood. The following Councilors were present: Chairman, D. S. Baughman, and Councilors John L. Calene, H. R. Brown, C. E. Robbins, Wm. H. Saxton, J. H. Lloyd, W. E. Donahoe, R. E. Jernstrom, Wm. Duncan, R. V. Overton, N. J. Nessa, J. C. Ohlmacher, and C. E. Sherwood. The Councilors absent were: Councilors Geo. E. Whitson, E. M. Stansbury, and C. E. Lowe. Mr. Karl Goldsmith, legal advisor for the Society, was also present at this meeting.

The minutes of the last meeting were read by the Secretary. It was moved by Dr. Calene, seconded by Dr. Jernstrom, that the minutes be approved as read. The motion was carried.

A report of the Secretary-Treasurer was given, and it was moved by Dr. J. C. Ohlmacher, seconded by Dr. W. E. Donahoe, that the report of the Secretary be adopted and that the financial report be referred to the Auditing Committee for checking. The motion prevailed.

A report was given of the Farmers Aid Corporation funds. It was brought to the attention of the Councilors that the Inter-allied Council has petitioned the Court that the Farmers Aid Corporation be dissolved and the remaining assets be turned over to the Inter-allied Council for their disposal among the professional interests, and that the further assets, uncollected notes and accounts be marked off. Discussion ensued, but there was no formal action taken.

Mr. Karl Goldsmith gave an informal report on the recent legislative session and the legislation passed which affected the medical profession. Matters were discussed, but there was no formal action taken.

Dr. Wm. Duncan called to the attention of the Councilors the fact that Dr. W. H. White, osteopathic physician, styles himself as a physician and surgeon, and that he is practicing as an itinerant physician. Dr. Duncan also stated that this matter had been taken up by the State Board of Medical Examiners who referred it to the Attorney General for his opinion. The Attorney General ruled that the law regarding itinerant physicians does not apply to osteopathic physicians. Further discussion followed, but there was no formal action taken.

Mention was made of a recent circular letter sent out over the signature of Dr. W. R. Giedt, Assistant State Health Officer, in which he suggested that, in order to make people more health conscious, there should be more publicity given to the part the State Board of Health plays in matters of health in the various communities. He suggested that when clinics were given, the fact that the State Board of Health furnished the biologicals and help should be mentioned. Dr. Duncan felt that this thought was worthy of consideration of the Society.

The Chairman appointed an Auditing Committee consisting of Dr. H. R. Brown, Dr. R. E. Jernstrom, and Dr. Wm. Duncan.

There being no further business, a motion was made by Dr. Wm. Duncan, seconded by Dr. J. H. Lloyd, that the meeting adjourn. The motion was carried.

C. E. SHERWOOD, M.D., *Secretary.*

Second Meeting of the Council
 May 28, 1943

The second meeting of the Councilors was called to order by the Chairman, Dr. D. S. Baughman, on Friday afternoon, May 28, 1943.

The roll call was read by the Secretary, Dr. C. E. Sherwood. The following Councilors were present: Chairman, D. S.

Baughman, and Councilors John L. Calene, Wm. Duncan, R. V. Overton, H. Russell Brown, C. E. Robbins, Wm. H. Saxton, J. H. Lloyd, W. E. Donahoe, R. E. Jernstrom, C. E. Lowe, N. J. Nessa, J. C. Ohlmacher, and C. E. Sherwood. The Councilors absent were: Geo. E. Whitson, E. M. Stansbury, D. A. Gregory. Mr. Karl Goldsmith, legal advisor for the State Medical Association, was also present at this meeting.

The minutes of the last meeting were read by the Secretary. It was moved by Dr. C. E. Lowe, seconded by Dr. C. E. Robbins, that the minutes be accepted as read. The motion was carried.

The first item of new business was the nominations for Chairman. Dr. Wm. Duncan was nominated. There being no further nominations, a motion was made by Dr. John L. Calene, seconded by Dr. C. E. Lowe, that the nominations for Chairman be closed. The motion was carried, and Dr. Wm. Duncan was named Chairman.

The next item of business was the election of Secretary-Treasurer for a term of three years. Before any nominations were made, it was moved by Dr. R. E. Jernstrom, seconded by Dr. C. E. Lowe, that the salary of the Secretary-Treasurer would be \$600.00 per year, with the understanding that this salary may be raised after one year. The motion was carried.

The following were nominated for Secretary-Treasurer: Dr. R. G. Mayer of Aberdeen and Dr. Gilbert Cottam of Pierre.

At this time Dr. Cottam was paged, and asked whether or not, if elected, he would accept the position at the salary named. Dr. Cottam stated that if another man could be found, he would rather not accept this work, as he was very busy with his duties as Superintendent of the State Board of Health.

Discussion followed regarding the election of Dr. R. G. Mayer. It was moved by Dr. J. H. Lloyd, seconded by Dr. R. E. Jernstrom, that Dr. John L. Calene be authorized to call Dr. Mayer by telephone, asking whether he would accept the position if elected. Upon completion of the telephone call, Dr. Calene reported that Dr. Mayer would accept the appointment.

A motion was made by Dr. R. E. Jernstrom, seconded by Dr. J. H. Lloyd, that the nominations be closed, and that Dr. Mayer be named as the Secretary-Treasurer of the South Dakota State Medical Association. The motion was carried.

It was agreed on suggestion of the Secretary that the new Secretary take over his duties on July 1, 1943.

There being no further business, the meeting was adjourned.
C. E. SHERWOOD, M.D., *Secretary.*

**Report of the Auditing Committee,
South Dakota Medical Association
May 28, 1943**

1. Cash taken in and accounts received were checked against deposit slips and found correct.
2. All bills paid were checked against cancelled checks and the books and found correct.
3. Legislative account checked and found correct.
4. Benevolent fund checked and found correct.

The auditing committee, on behalf of the Council, wishes to thank the secretary, Dr. C. E. Sherwood, for his efficient accounting of the funds of the State Association.

H. R. BROWN, M.D.
R. E. JERNSTROM, M.D.
WM. DUNCAN, M.D.

Financial Report of Benevolent Fund

Deposited Savings Account 816, Northwest Security National Bank, Madison Branch.

Date	Cash Received	
Jan. 10, 1942—Minneapolis Draft 3108. Huron Branch. Total savings and interest Jan. 1, 1942..		\$694.87
Nov. 7, 1941—Rapid City Auxiliary		2.00
Oct. 8, 1941—Rapid City Auxiliary		4.00
Feb. 13, 1942—Madison District		45.00
May 12, 1942—Rapid City District		19.00
May 12, 1942—Huron District		30.00
May 12, 1942—Pierre District		20.00
May 12, 1942—Mitchell District		10.00

May 12, 1942—Watertown District	15.00
May 12, 1942—South Dakota State Med. Assoc.....	153.00
<hr/>	
May 12, 1942—Total	\$992.87
<hr/>	
May 15, 1942—Sioux Falls District	\$ 57.27
Yankton District	6.00
Collection box at meeting	2.60
May 23, 1942—Arnold Schyzer	20.00
March 31, 1943—Interest	14.68
April 10, 1943—South Dakota State Med. Assoc.....	145.00
Watertown District	10.00
April 12, 1943—Dr. Sherwood, prize bond auction ..	5.00
May 18, 1943—Sioux Falls District	5.75
May 21, 1943—Black Hills District	5.00
<hr/>	
Total	\$1,264.17

April 15, 1943—Series "F" Bonds—Maturity value	
1955, \$1,675.00, purchased for	\$1,239.50
Leaving a balance on hand of	24.67
<hr/>	
	\$1,264.17

CLARENCE E. SHERWOOD, M.D.,
Secretary-Treasurer.

Secretary's Report to the Council

Your secretary has endeavored to keep the members of the Association acquainted with things affecting the practice of medicine. To that end, during the year mimeographed bulletins were issued and sent out. Information relative to ration of tires, new cars, speed and other things affecting us as physicians was procured and passed on.

We were in touch with measures coming up in the recent session of the legislature, and, through our attorney, Karl Goldsmith, were able to accomplish some things and advise on wording of other things which might otherwise have worked to our detriment. A full resume of measures before the legislature affecting us has been sent to each of you in a bulletin.

The principal officers of the association acted in an advisory capacity to the governor in the matter of filling the vacancy left in the State Board of Health by the death of Dr. Cook.

We have contacted our representatives in Congress on numerous occasions relative to legislation there affecting us. It is our opinion that American medicine should be more strongly represented in Washington. We should endeavor to find out what is coming up there before it does. Most of the time, as our reporting system works, by the time we are informed of matters and we can contact our representatives, the matter is an accomplished fact.

The Annual Secretaries Conference in Chicago was attended in November as was the North Central Medical Conference in Minneapolis. Both of these conferences considered many problems of interest to the profession.

Only one meeting of the Council has been called this year due to the difficulties of travel, etc., but many conferences over the telephone and through the mail have been had with Councilors and officers of the Association on matters affecting the welfare of the medical profession.

And now for a personal note. I have enjoyed working with the various officers of the Association during the past six years. The contacts have meant much to me and I feel that I have come to know and have the friendship of many men that otherwise would have been impossible. However, the position of Secretary-Treasurer of this organization makes many demands on the time of its incumbent, which I have found increasingly harder to meet. I sincerely feel that I have made my contribution of time to the Association in serving it two terms and would, therefore, ask that when you have under consideration the election of Secretary-Treasurer for the next three years, my name be not considered.

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.

	May 1942	December 1942	May 1943
District 1	15	29	26
District 2	16	19	19
District 3	23	23	20
District 4	14	16	12
District 5	14	15	12
District 6	27	27	30
District 7	43	46	45
District 8	29	34	29
District 9	44	47	39
District 10	8	8	6
District 11	10	11	11
District 12	14	16	10
	257	291	259

**Report of Secretary-Treasurer
May 25, 1943**

May 12, 1942, balance on hand	\$1,943.77
Receipts:	
Back dues received for 1942 (37)	370.00
Exhibits, Sioux Falls convention	108.00
Social Security tax, C. E. Sherwood	12.00
Withholding tax, C. E. Sherwood	7.20
1943 dues, 260 members	2,600.00
	\$5,040.97
Disbursements:	
Committee expense	\$118.81
Speakers expense	179.66
JOURNAL-LANCET	578.00
Inter-allied Council	16.00
Stenographer	10.00
Hotel expense, annual session	45.88
Telephone	36.65
Office supplies	18.99
Postage	57.51
Karl Goldsmith—retainer	300.00
Karl Goldsmith—legislative	108.41
Social Security and withholding tax	31.20
A. M. A. Directory	15.00
Bond, Secretary-Treasurer	5.00
Council expense	211.34
C. E. Sherwood, Sec'y-Treasurer salary	1,200.00
Delegate, A. M. A.	122.50
Flowers, Dr. Cook	8.16
Benevolent Fund	145.00
Float and exchange	4.11
	\$3,242.22
Balance on hand, May 25, 1943	1,798.75
	\$5,040.97

LEGISLATIVE FUND

Receipts:	
Balance on hand May 12, 1942	\$276.38
Interest May 30, 1942	1.03
Interest Sept. 30, 1942	1.04
Interest Dec. 31, 1942	1.04
Interest March 31, 1943	1.04
	\$280.53
Balance on hand May 25, 1943	\$280.53
Savings Account 631, Northwest National Bank of Sioux Falls, Madison Branch.	

CLARENCE E. SHERWOOD, M.D.,
Secretary-Treasurer.

**HOUSE OF DELEGATES, SOUTH DAKOTA
STATE MEDICAL ASSOCIATION
May 28, 1943**

The meeting of the House of Delegates was called to order by the President, Dr. N. J. Nessa, on May 28, 1943, at the Marvin Hughitt Hotel in Huron, South Dakota.

The roll call was read by the Secretary and the following members were present: Chairman N. J. Nessa, John L. Calene,

H. Russell Brown, C. E. Robbins, Wm. H. Saxton, J. H. Lloyd, W. E. Donahoe, R. E. Jernstrom, C. E. Lowe, Wm. Duncan, R. V. Overton, D. S. Baughman, J. C. Ohlmacher, C. E. Sherwood, M. W. Larsen, M. M. Morrissey, J. C. Shirley, F. J. Tobin, O. J. Mabee, L. G. Leraan, L. J. Pankow, C. J. McDonald, F. J. Abts, and G. W. Mills. The following members were absent: Geo. E. Whitson, E. M. Stansbury, J. D. Alway, J. D. Whiteside, L. E. Jordan, B. T. Lenz, E. W. Jones, E. Stenberg, E. Joyce, R. B. Fleeger, F. C. Totten, and L. E. Lande. The Alternates absent were: E. A. Rudolph, F. H. Cooley, J. B. Vaughn, R. A. Buchanan, S. R. Wallis, W. J. Maytum, A. P. Reding, and F. W. Haas.

Following the reading of the roll call, the President appointed the following on the Reference Committees:

Committee on Nomination of Officers: Dr. J. L. Calene, chairman, Dr. H. R. Brown, Dr. G. E. Whitson, Dr. C. E. Robbins, Dr. W. H. Saxton, Dr. J. H. Lloyd, Dr. L. J. Pankow, Dr. J. C. Ohlmacher, Dr. G. W. Mills, Dr. R. V. Overton, Dr. C. E. Lowe, and Dr. Wm. Duncan.

Committee for Reports of Officers: Dr. Wm. Duncan, chairman, Dr. L. G. Leraan, and Dr. F. J. Tobin.

Committee on Resolutions and Memorials: Dr. C. J. McDonald, Dr. F. J. Abts, and Dr. D. S. Baughman.

Committee on Amendment of Constitution and By-Laws: Dr. M. M. Morrissey, chairman, Dr. M. W. Larsen, and Dr. C. E. Lowe.

Committee on Credentials: Dr. R. E. Jernstrom, Dr. C. J. McDonald, and Dr. C. E. Sherwood.

The President, Dr. Nessa, gave a brief address of welcome to the members of the House of Delegates, and also reported for the Committee on Scientific Work and Public Policy. He also submitted a report which was given to him by Mrs. Tollevs, State Commander of the Women's Field Army on the Control of Cancer.

The minutes of the 1942 Session were read by the Secretary. Dr. R. E. Jernstrom moved that the minutes be approved. The motion was seconded by Dr. F. J. Abts. The motion prevailed.

A report of the Secretary-Treasurer was given. The financial part of the report was audited by the Auditing Committee of the Council; this Committee consisting of Drs. H. R. Brown, R. E. Jernstrom and Wm. Duncan. Following the report of the Secretary-Treasurer, the report of the Auditing Committee was called for by the President. Dr. Brown, chairman of the committee, gave the report, stating that the committee approved the report of the Treasurer; and it was moved by Dr. J. C. Ohlmacher, seconded by Dr. John L. Calene, that the report of the Auditing Committee be adopted. The motion was carried.

The president called for reports of the various committees, the first being the Committee of Scientific Work and Public Policy. Because a full report had been given by Dr. Nessa, President, in his address to the members, there was nothing further to report at this time.

Dr. R. E. Jernstrom inquired about the radio programs on Public Health problems which have been sponsored by the State Medical Association. There was some informal discussion on this subject, and it was agreed that, should the members of the Association have any opportunity to obtain publications which may be used for radio broadcasts, this opportunity should be used to their advantage.

The Radio Committee report was made by Dr. W. E. Donahoe. He informed the members that as in the past, the radio programs had been carried on during the year, and that talks were given by Dr. Hummer over KSOO. He also mentioned that he thought Dr. Hummer should be sent a letter of thanks for his aid in these radio programs, and stated that the committee desired that these programs be continued, and that members contribute any papers they may have which might be presented over the radio.

The President asked for a vote on whether or not the members wished to have these radio programs continued, and the majority of the members agreed to continue the programs. It was moved by Dr. Wm. Duncan, seconded by Dr. L. J. Pankow, that the Secretary draft a letter of thanks to the reader of the papers used in the past for the radio programs, and that a letter of thanks also be sent to the radio station. The motion

prevailed. The report of the Radio Committee was referred to the Reference Committees.

The report of the Committee on Publications was given by Dr. C. E. Sherwood, chairman of the committee. Dr. Sherwood stated that the five-year contract with the JOURNAL-LANCET had expired, and that the Association had been paying two dollars (\$2.00) per subscription. The President suggested that this subject be transferred to the item of new business for discussion at that time. The report was referred to the Reference Committees.

Dr. L. J. Pankow, chairman of the Committee on Medical Defense, submitted the report of the committee and also read letters he received from Dr. W. H. Saxton and Dr. T. F. Riggs. These letters are filed with the report, but not as a part of it. The report was referred to the Reference Committees.

Dr. F. J. Tobin submitted the report of the Committee on Medical Education and Hospitals. The committee approves of Spanish and Portuguese being taught in the medical schools, in order that the doctors may be better educated. He gave, as a part of his report, a letter from the American Ethnological Association. He also submitted a letter received from Dr. Sherwood, and one received from Dr. T. P. Ranney. Dr. Ranney's letter is to be filed with the report, and not as a part of it. Dr. Tobin's report was referred to the Reference Committees.

At this time, Dr. Wm. Duncan mentioned medical education in connection with the Army and Navy, and stated that many of the doctors are not getting the training that is necessary. Dr. J. C. Ohlmacher also discussed this subject, and indicated that the Army and Navy have greatly reduced the requirements of pre-medical education as well as advanced training in medicine. Informal discussion continued, but there was no action taken.

The Medical Economics Committee report was given by Dr. Geoffrey Cottam. He informed the members that the committee had considered and approved the Health and Accident Insurance Policy offered by the Loyalty Group of Underwriters. There was some discussion on this subject, whereupon Dr. L. J. Pankow rose to the point of order, stating that this was to be a committee report rather than a discussion. The President stated that this subject would be transferred to the item of new business. The committee report was transferred to the Reference Committees.

A report of the Committee on Public Health was given by Dr. Sherwood in the absence of Dr. A. Triolo, chairman. The report was referred to the Reference Committees.

The committee report on Necrology was not given at this time. There was also no report of the Editorial Committee.

A report of the Committee on Medical Licensure was given by Dr. G. W. Mills, chairman. He stated that the Association had not taken any action to change any of the laws covering medical licensure. The committee suggested that a special committee be appointed to investigate legislation in other states. It was also suggested that a program demanding the national licensing of physicians whereby they would be allowed to practice in any state, would be satisfactory. Dr. Mills also informed the members of the change in the Basic Science Law which took place at the last legislative session. The report was referred to the Credentials Committee.

Dr. D. S. Baughman, chairman of the Advisory Committee, informed the President that there was no formal report to be made.

The report of the Allied Group was read by the Secretary and referred to the Committee.

Dr. Wm. Duncan, chairman of the Military Affairs Committee, gave an informal report, stating that the number of South Dakota physicians in the armed forces at the present time is fifty-nine. However, all of these physicians were not members of the State Medical Association. This report was referred to the Reference Committees.

There was no formal report given of the Radiology Committee or the Committee on Spafford Memorial.

No committee reports were necessary on the Advisory Departments of the State Board of Health.

Following the reports of all the committees, the next order of business was old business.

Dr. Sherwood, Secretary, called attention to the fact that at the meeting a year ago a motion was made by Dr. Stevens that the proposal for an increase in the dues of each member be tabled, and referred to the local Society and brought up at a later date. This subject was transferred to new business.

Dr. L. J. Pankow submitted a financial statement of the State Medical Association for the past three years, 1941, 1942, 1943. He called attention to the fact that the funds have steadily been decreasing, and that in order to remedy this, the dues of each member should be raised. It was moved by Dr. Pankow, seconded by Dr. C. J. McDonald, that the dues of the South Dakota State Medical Association be raised from \$10.00 per year to \$25.00 per year. Considerable discussion followed indicating that the members believed there should be an increase in the dues, but not to such a great extent.

Dr. Pankow again appealed to the members and made a motion to amend his first motion to read: "The dues of the South Dakota State Medical Association should be increased from \$10.00 per year to \$17.50 per year." The motion was seconded by Dr. C. J. McDonald.

Dr. H. R. Brown moved that the first motion of Dr. Pankow be amended to read: "The dues of the South Dakota State Medical Association should be increased from \$10.00 to \$15.00 per year." Dr. Pankow withdrew his motion to amend the first motion and seconded the motion made by Dr. Brown. The motion was carried by a vote of fourteen ayes and six nays.

The President then called for a vote on the original motion made by Dr. Pankow as amended. There were twelve ayes and six nays. The motion carried.

Dr. C. E. Robbins moved that Dr. B. M. Hart be made an honorary member from the fourth district. Dr. R. E. Jernstrom seconded the motion, and the motion prevailed.

It was moved by Dr. D. S. Baughman, seconded by Dr. R. E. Jernstrom, that Dr. R. S. Westaby also be admitted as an honorary member. The motion was carried.

Dr. C. E. Sherwood presented a resolution, to be acted upon by our House of Delegates, instructing our delegate to the American Medical Association to support a resolution sponsored by the National Medical Conference. This resolution asks that the American Medical Association create a committee on medical service, and that they maintain an office in Washington, D. C., with the employment of a full time executive director whose duties, in brief, should be to look after the interests of American medicine in Washington. Dr. Sherwood moved that the resolution be referred to the Committee on Resolutions for their action. Seconded by Dr. J. H. Lloyd.

Dr. L. J. Pankow moved that instead of referring the resolution to the Committee on Resolutions and Memorials, it should be referred to a special committee. There was no second to this motion, and the original motion of Dr. Sherwood was voted upon and carried.

A letter was brought to the attention of the members regarding U. S. Children's Bureau's program of Medical Care for wives and infants of enlisted men. Discussion followed, but no formal action was taken.

It was moved by Dr. L. J. Pankow that the meeting be adjourned to reconvene at 2:00 p. m. The motion was seconded by Dr. Wm. Duncan. The motion was carried.

MINUTES OF THE AFTERNOON SESSION OF THE HOUSE OF DELEGATES

The meeting of the House of Delegates reconvened at 2:00 p. m., May 28, 1943.

The roll call was read by the Secretary. The following members were present: Chairman, N. J. Nessa, John L. Calene, H. Russell Brown, C. E. Robbins, Wm. H. Saxton, J. H. Lloyd, W. E. Donahoe, R. E. Jernstrom, C. E. Lowe, Wm. Duncan, R. V. Overton, D. S. Baughman, J. C. Ohlmacher, C. E. Sherwood, M. W. Larsen, M. M. Morrissey, B. T. Lenz, J. C. Shirley, F. J. Tobin, O. J. Mabee, L. J. Pankow, C. J. McDonald, G. W. Mills, and L. G. Leraan. The following members were absent: Geo. E. Whitson, E. M. Stansbury, F. J. Abts, J. D. Alway, J. D. Whiteside, L. E. Jordan, E. W. Jones, E. Stenberg, E. Joyce, R. B. Fleeger, F. C. Totten, and L. E. Lande. The Alternates absent were: E. A. Rudolph,

F. H. Cooley, R. A. Buchanan, J. B. Vaugh, S. R. Wallis, W. J. Maytum, A. P. Reding, and F. W. Haas.

Dr. John L. Calene gave the following report of the Committee on Nominations of Officers:

President-Elect: Dr. N. J. Nessa and Dr. D. S. Baughman.

Vice President: Dr. Wm. Duncan and Dr. R. E. Jernstrom.

Councilor, Black Hills District No. 9: Dr. R. E. Jernstrom.

Councilor, Rosebud District No. 10: Dr. R. V. Overton.

Councilor, Northwest District No. 11: Dr. C. E. Lowe.

Councilor, Whetstone Valley District No. 12: Dr. Wm. Duncan, or Dr. D. A. Gregory, if Dr. Duncan is elected Vice President.

The place of meeting chosen by the committee was Huron.

Dr. R. E. Jernstrom withdrew his nomination for Vice President. Dr. R. V. Overton withdrew his name for Councilor for the Rosebud District No. 10 and placed the name of Dr. R. J. Quinn.

The members voted by ballot. Dr. Wm. Duncan and Dr. F. J. Tobin were appointed by the President as tellers. The results of the election are as follows:

President-Elect: Dr. D. S. Baughman, 18; Dr. N. J. Nessa, 2.

Vice President: Dr. Wm. Duncan, 19; Dr. R. E. Jernstrom, 2.

Councilor, District No. 9: Dr. R. E. Jernstrom, 17.

Councilor, District No. 10: Dr. R. J. Quinn, 20;

Dr. R. V. Overton, 1.

Councilor, District No. 11: Dr. C. E. Lowe, 19.

Councilor, District No. 12: Dr. D. A. Gregory, 19;

Dr. Wm. Duncan, 3.

The place of meeting chosen was Huron.

Mr. L. M. Cohen of the JOURNAL-LANCET was called on to say a few words to the members of the Council and House of Delegates.

Dr. Wm. Duncan gave an informal report on the Committee on Procurement and Assignment. He stated that at the present time there are 315 active practitioners in the state, and that there were 59 men in the armed forces from South Dakota. The Secretary called attention to the fact that 301 had paid the regular assessments for 1942.

Dr. Nessa, Chairman, called for the reports of the Reference Committees.

Dr. Duncan presented the report of the Committee on Reports of Officers and moved that the report be adopted. The motion was seconded by Dr. John L. Calene and carried.

The report of the Committee on Resolutions and Memorials was read. They recommend that the resolution relative to the establishment of a committee on medical service be approved, and that our delegate be instructed to support it at the meeting of the House of Delegates of the American Medical Association. They also recommend the continuance of the radio program. They disapprove of the report of the Inter-allied group relative to the proposed disbursement of F.A.C. funds. They approved Dr. Mills' suggestion that a study be made of the various state laws relating to medical licensure, and suggested that the American Medical Association sponsor the drawing up of a model licensure law to be introduced in each state legislature. They recommended the renewal of the five-year contract of the JOURNAL-LANCET at the two dollar rate. They recommended that the matter of the introduction of Spanish and Portuguese into the curriculum of medical schools be given further consideration, and that no action be taken at this time.

Dr. C. J. McDonald moved that the report of the Committee on Resolutions and Memorials be adopted. Dr. Baughman seconded the motion and the motion was carried.

Dr. M. M. Morrissey, chairman of the Committee on Amendment of the Constitution and By-laws, stated that there was no report to be made.

Dr. C. E. Sherwood, chairman of the Credentials Committee, reported that Sioux Falls was entitled to three delegates instead of two. He also informed the members that Dr. O. J. Mabee

of Mitchell, South Dakota, was an alternate in place of Dr. E. W. Jones, and that Dr. L. G. Leraan was the alternate in place of Dr. E. Stenborg. Dr. Sherwood moved that this report be adopted. The motion was seconded by Dr. J. H. Lloyd, and the motion prevailed.

At this time, the President called on Dr. Gilbert Cottam, superintendent of the State Board of Health, who spoke a few words to the members of the House of Delegates.

Dr. Cottam expressed his thanks to the members for their endorsement to the Governor just before his appointment as Superintendent. He gave the members a report on the activities of the State Board of Health Office, giving an outline of each Division, namely, the Division of Epidemiology, Division of Maternal and Child Health, Division of Crippled Children, Division of Engineering, Division of Public Health Nursing, Division of Vital Statistics, Division of Public Health Education, the Auditing Division, and the Division of Laboratories.

Dr. Cottam also outlined his plans for developing the State Department. One of the programs which he mentioned was the Cancer Program. The Auditing Department has budgeted a sum of money to cover the expense involved in making the pathological reports on various cancer cases. He expressed his desire to have the State Board of Health hold cancer clinics throughout the state.

Another of the programs mentioned was his plan to establish a legislative file. In this way he expects to be able to present worthwhile bills to the legislative body at the next session.

Dr. Cottam expressed the hope that he would be able to make arrangements to bring to the state a capable lecturer on tropical diseases, cooperating with the District Medical Societies in various parts of the state to hold special meetings at which he could be heard. Dr. Cottam regards the development of a tropical disease program as very important at this time, because there is sure to be a large amount of that type of disease brought back to South Dakota by the return of the soldiers.

Dr. Geoffrey Cottam explained the insurance policy to the members, which the Committee on Medical Economics considered and recommended. Dr. Cottam also called on Mr. Anthony, who is the salesman for the Insurance Company. Mr. Anthony explained the provisions of this policy. After some discussion, it was moved by Dr. Saxton, seconded by Dr. Calene that the policy be referred to the legal advisor, Mr. Karl Goldsmith for his consideration, and if found to be satisfactory, this policy would be referred back to the Society. The motion was carried.

There being no further business, the meeting was turned over to the new President, Dr. J. C. Ohlmacher.

A motion was made and seconded that the meeting adjourn. The motion prevailed.

C. E. SHERWOOD, M.D., *Secretary*.

REPORT OF COMMITTEE ON REPORTS OF OFFICERS

To the Officers of the South Dakota State Medical Association:

Your Committee on Reports of Officers has carefully reviewed the reports of the elective officers of the Association, and wishes to commend them for faithful and efficient service in performing the duties of their offices. We wish to call the attention of the Association to the report of the Secretary, Dr. C. E. Sherwood, who has indicated that he would prefer not to continue in that office, and to especially commend and thank him for the careful and efficient conduct of his office during the past few years.

WILLIAM DUNCAN, M.D., *Chairman*.

REPORT OF COMMITTEE ON RESOLUTIONS AND MEMORIALS

We approve the resolution presented, regarding the establishment by the American Medical Association of a committee on medical service.

We approve the continuance of radio programs.

We disapprove the disbursement of money still on hand in the Farm Aid Corporation as suggested by the inter-allied group, because some of this money is owing to persons not

members of any of the inter-allied groups, and recommend that this matter be given further consideration.

We approve the recommendations made by Dr. Mills regarding the advisability of our delegate to the American Medical Association suggesting a committee to study the various state licensure laws and to draw up a model licensure law to be presented to each state legislature.

We further recommend the acceptance and renewal of the contract with the management of the JOURNAL-LANCET.

We recommend that a study of the Spanish and Portuguese languages in medical schools be given further consideration.

F. J. ABTS, M.D.
C. J. McDONALD, M.D.
R. V. OVERTON, M.D.

REPORT OF COMMITTEE ON MILITARY AFFAIRS

The duties of the Military Affairs Committee were taken care of by the South Dakota Committee for Procurement and Assignment of Physicians.

South Dakota physicians have no quota to furnish the Armed Forces for 1943, and at present it is impossible to declare anyone available for military service, unless they are able to replace themselves by another physician.

The South Dakota physicians who are now in the Armed Forces are listed as follows:

Gelber, M. R., Aberdeen
Kruzich, S. J., Aberdeen
McCarthy, Paul V., Aberdeen
Schuchardt, I. P. L., Aberdeen
Bloemendall, G. J., Ipswich
Wayne, D. M., Redfield
Adams, M. E., Clark
Cooper, George M., Watertown
Rousseau, M. D., Watertown
VanHeuvelan, G. J., Pierre
Salladay, I. R., Pierre
Burgess, R. E., Gettysburg
Adams, H. P., Huron
Ferris, W. T., Chamberlain
Athey, G. L., Chamberlain
Jones, J. P., Mitchell
Tobin, L. W., Mitchell
Lovre, S. C., Humboldt
Billion, T. J., Jr., Sioux Falls
Craig, Allen, Sioux Falls
Fitzgibbon, T. G., Sioux Falls
Nietfeld, A. B., Sioux Falls
Duimstra, Fred, Sioux Falls
Thompson, Arnold, Sioux Falls
Zellhoffer, H. W. K., Sioux Falls
Bliss, R. J., Sioux Falls
Olson, Orland, Sioux Falls
Hanson, O. L., Jr.,
Valley Springs
Boyd, F. E., Flandreau

Andre, Hugo C., Vermillion
Dick, Fred, Vermillion
Hanson, H. F., Vermillion
Williams, F. E., Wakonda
Hill, W. H., Centerville
Sackett, R. F., Parker
Bushnell, J. W., Elk Point
Auld, M. A., Yankton
Hubner, R. F., Yankton
Malloy, J. F., Yankton
Kittelson, Otis, Yankton
Sherrill, Sion, Belle Fourche
Hayes, P. W., Hot Springs
Smiley, J. C., Deadwood
Zarbaugh, G. F., Deadwood
Davidson, H. E., Lead
Hummer, F. L., Lead
Soe, Carl A., Lead
Clark, B. S., Spearfish
Nyquist, Roy H., Ft. Meade
Sherman, K. E., Sturgis
Stewart, M. J., Sturgis
Lampert, A. A., Rapid City
Lemley, R. E., Rapid City
Merryman, M. P., Rapid City
McGonigle, J. P., Rapid City
Owen, Stanley, Rapid City
Duncan, C. E., Pollock
Catey, Robt., Mobridge
Pfister, Faris, Webster

WILLIAM DUNCAN, M.D., *Chairman.*

REPORT OF THE COMMITTEE ON MEDICAL DEFENSE

Your committee begs to report that each of us has made enquiry and has failed to find any evidence of any suits seriously threatened or instigated.

We further wish to call to the attention of the association that this condition is probably due to the fact that there is at present a definite shortage of Doctors of Medicine in the state, and not to any change in the nature of our patients or any great improvement in our abilities or techniques. This is mentioned so that the association here assembled will not lose sight of certain legislation that was proposed several years ago by this committee, in regard to medical defense, and to urge that this legislation be not forgotten or deemed entirely unnecessary because of present conditions of apparent safety.

L. J. PANKOW, M.D., *Chairman.*

REPORT OF COMMITTEE ON INTER-ALLIED ACTIVITIES

The committee of this association for the Allied Group wishes to report as follows.

On April 26, 1943, there was a meeting of the Inter-Allied Council held at Huron for the purpose of closing up the trusteeship of the old Federal Security Administration. There is a small amount of money still in the trust which is so small that it will not pay to divide it among the individual physicians, druggists and dentists of the state, so the court has been petitioned to divide the money among the state societies and let the societies use the money as their various controlling boards may deem advisable. The matter is still in the hands of the court so no definite report can be given at the present time.

Other than that the committee has nothing to report.

N. K. HOPKINS, M.D., *Chairman.*

REPORT OF EDITORIAL COMMITTEE

It has not been possible for the members of the Editorial Committee to meet in person. Through correspondence, each member has been advised of the report that is to be made and suggestions invited from each of them.

During the past two years there has been greater use made of our official Journal, the JOURNAL-LANCET, than previously. Besides the regular reports of our annual meeting, some advantage has been taken by our Secretary of the facilities offered by the JOURNAL-LANCET to send information to the membership. The ladies' auxiliary has contributed items of interest carried to the membership through the Journal. It is the desire of the Officers of our official Journal that greater use be made of the facilities offered.

The five year contract with the management of the JOURNAL-LANCET expires July 1, 1943. It is the opinion of the Editorial Committee that a new contract be entered into for a period of years at the rate of \$2.00 per member per year. This is the same fee schedule that has been in effect during the past two years.

J. C. SHIRLEY, M.D., *Chairman.*

REPORT OF THE ECONOMICS COMMITTEE

The only business to be considered by this committee is the matter of Health and Accident Insurance for members of the Society. In this connection, we point out that this has nothing to do with Society dues but it is strictly an individual consideration. However, at least 50 per cent of the membership must apply for policies before this Loyalty group will take over the job of carrying this insurance.

The amount of insurance may vary according to the desires of each member. The annual premiums begin at \$30.00 a year and go on up according to the amount of coverage.

Your committee recommends that the Society adopt this insurance for the following reasons:

1. The companies of the Loyalty group are financially sound.
2. They offer more protection and coverage than any other companies and the rates are more reasonable.
3. It protects all age groups up to age 70.

We recommend that we accept this program, on the condition that there be a rider attached, to the effect that the individual members have the privilege of continuing with their individual policies, in the event that the State Society drops below 50 per cent to make the agreement invalid.

GEOFF. COTTAM, M.D., *Chairman.*
C. E. ROBBINS, M.D.
HAROLD MILLER, M.D.

REPORT OF COMMITTEE ON PUBLIC HEALTH

I have contacted all the members of the Sub-Committees on Public Health in an attempt to present some kind of a report for the Council meeting. The answer has been practically the same from each one—"I regret that we have nothing to report. Due to the shortage of physicians it has been very difficult to find time for any outside activities or the holding of any meetings." They all assured me that they would cooperate in any manner possible. However, that is the extent of the cooperation that was given.

It has been very difficult for me to make the contacts that I no doubt should have made, because, as you know, with the extreme shortage of personnel in the Health Department, we have been kept busy with the ordinary details. I hope that in the future I shall be able to prod these committees along towards some sort of activity.

Dr. Cottam will be present at the meeting of the House of Delegates and I am sure that he will actively participate in any discussions concerning public health activities. I feel that the State Medical Association should continue with these committees, because it will offer an opportunity to consult with various groups concerning public health problems, and eventually the activities of the committees might, with a little prodding, bear fruit.

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REPORT OF COMMITTEE ADVISORY TO DEPARTMENTS OF STATE BOARD OF HEALTH

The advisory committees to the State Board of Health, namely the Committees on Ophthalmology, Orthopedics, and Maternal and Child Health, are used even though regular meetings are not held. Individual members are consulted on problems of inter-society relationships and policy. I would therefore suggest that the committees be continued.

Concerning the committee on Social Security, I really do not know what use has been made of it. Dr. Cook, I believe, had occasion to consult them relative to the medical care set-up and also in review of Aid to Dependent Children cases.

These committees have not met as a committee this year. However, the members have individually been consulted in several instances. I doubt if committee reports would be necessary.

A. TRILO, M.D., *Chairman.*

COMMITTEE ON MEDICAL LICENSURE

Your committee on Medical Licensure wishes to report that owing to the wide geographic distribution of its members no meetings were possible. As we knew only this month that we were on the committee, there has been insufficient time to make any extended study of licensing laws and licensing boards with a view to recommending any changes in our own.

In view of the fact that there is a strong tendency now in state legislatures to pass uniform laws governing matters that should be more or less uniform throughout the various states, it might be advisable that our delegate to the American Medical Association present to that body a suggestion for a committee to study the various state licensure laws, and to draw up a model license law, which could be presented to each state legislature. With such endorsement, most legislatures would make the necessary changes, and reciprocity would be greatly facilitated.

During the present emergency with the migration of populations, migration of physicians is being hampered somewhat by differing state license requirements. This is apt to bring about a demand on the part of the public for national licensing of physicians, so that the states would lose control of this function.

The same end could be attained through uniform state licensing laws and no state authority surrendered. At the same time, migration of physicians from one state to the other could be freely made, and we would not be put in the position of saying that a man who is a good doctor in one state is not a good doctor in any other state.

In 1942, there were five licensed to practice medicine by examination and five by reciprocity in South Dakota. In the last five years there have been a total of 45 licenses to practice issued in the state. Of those taking examinations, none has failed to pass.

There are now seventeen states that have basic science laws and require a basic science certificate as one of the prerequisites to obtaining a license to practice any healing art. Our law has now been in effect since July 1, 1939. No osteopath or chiropractor took the examination in 1942.

Seven physicians or medical students were issued certificates by reciprocity or endorsement and thirteen by examination, two having taken the examination and failed. Seventeen osteopaths and one chiropractor were issued certificates by reciprocity or endorsement.

G. W. MILLS, M.D., *Chairman.*

REPORT OF COMMITTEE ON EDUCATION AND HOSPITALS

The American Urological Association in its annual executive session, New York City, June 3, 1942, adopted the resolution recommending the teaching of a minimum of two years of Spanish and/or Portuguese, in all educational institutions which prepare students for the study of medicine, and that medical schools of the United States require for entrance a minimum of two years of Spanish and/or Portuguese. The purpose of this action is to establish a better mutual understanding between the Latin American and English-speaking countries of the Western Hemisphere, and to encourage the training of Latin American students, both undergraduate and postgraduate, in the schools of the United States and Canada. It is recognized that, previous to the present world crisis, the movement of South American students has been toward the European medical centers.

The Committee on Education of the South Dakota State Medical Association recommends the support of this action by the American Urological Association, and urges the adoption by this Association of the following resolutions:

Whereas, The close association of the physicians of the Western Hemisphere for the purpose of facilitating the interchange of scientific knowledge would afford one basis for mutual understanding and good will; and

Whereas, The South Dakota State Medical Association desires to contribute to the establishment of such a relationship; and

Whereas, The members of the South Dakota State Medical Association believe that one of the obstacles in the way of mutual understanding is the difference in languages;

Therefore, Be It Resolved, That the South Dakota State Medical Association in executive session, May 28, 1943, recommends:

(a) That all of the educational institutions of the United States which prepare students for the study of Medicine teach a minimum of two years of Spanish and/or Portuguese;

(b) That the medical schools of the United States require for entrance a minimum of two years of Spanish and/or Portuguese;

(c) That a minimum of two hours a week, during the scholastic year, of conversational Spanish and/or Portuguese be required as a part of the entire term of the medical curriculum;

(d) That attempts be made to encourage physicians who speak Spanish and/or Portuguese to conduct courses of lectures in these languages for students of Medicine;

(e) That an attempt be made by the medical schools of the United States, both undergraduate and postgraduate, to stimulate and foster by every means possible, including the student exchange program, the training in the schools of the United States and of Canada of Latin American students;

(f) That a copy of these resolutions be mailed to the Medical Department of the State University of South Dakota and to all educational institutions of the state which prepare students for the study of medicine.

F. J. TOBIN, M.D., *Chairman.*

REPORT OF COMMITTEE ON NECROLOGY

During the year just passed since our annual session, the Divine Ruler of the Universe has, in His inscrutable wisdom, seen fit to call from this earth a number of our brother physicians. May we here pause for a few moments to pay our respects to their memory. They have done their bit to make this world of ours a better place in which to live and have given unselfishly of themselves that suffering of humanity may be alleviated. Let us, as we pause, rededicate ourselves to that unfinished task—service to mankind, which they have left to us.

JOSIAH COATES LLOYD, M.D., Platte, S. D. Died May 25, 1942.

RAY ARTHUR KELLY, M.D., Mitchell, S. D., was born in 1882. Graduated from the University of Iowa College of Medicine in 1907. Licensed in 1908. Was a diplomate of the American Board of Otolaryngology. He was a member of the South Dakota State Medical Association at the time of his death, June 6, 1942.

THOMAS CRUICKSHANK, M.D., Vermillion, S. D.,

was born in 1864. Graduated from the Barnes Medical College in St. Louis in 1899, being licensed in the same year. He practiced in Vermillion for many years and at the time of his death, August 5, 1942, was retired. He was a member of the South Dakota State Medical Association.

THOMAS JEFFERSON CASE, M.D., Delmont, S. D., was born in 1862. Graduated from the Rush Medical College in 1889. Was licensed in 1920. He died Sept. 4, 1942.

LORENZO NELSON GROSVENOR, M.D., Huron, S. D. Graduate of Chicago Homeopathic Medical College 1889 and Rush Medical College in 1902. He practiced in Chicago prior to coming to Huron in 1913. Dr. Grosvenor was a Fellow of the American College of Surgeons, specialized in Eye, Ear, Nose and Throat. He was president of South Dakota State Medical Association in 1930, past president of the Tri-State Ophthalmological Society and a member of the Ophthalmological Society of Chicago, member and past president and secretary of the Huron District Medical Society and, at the time of his death, Superintendent of the Beadle County Board of Health. Dr. Grosvenor died November 26, 1942, in a hospital in Rochester, Minnesota, of a cardiac attack following an operation performed on Nov. 14, at the age of 74.

JOHN J. AHERN, M.D., Oldham, S. D., was born in 1868. He was graduated from the Physiological College of Indianapolis, Indiana, in 1896, licensed in Illinois in 1897 and in South Dakota in 1910. He was retired at the time of his death, January 14, 1943.

JOHN FRANKLIN DUFFERIN COOK, M.D., Pierre, S. D., was graduated from the University of Illinois College of Medicine in 1897. He was licensed in 1897 and for many years practiced medicine in Langford, South Dakota. He was a Fellow of the American College of Surgeons, the South Dakota State Medical Association and First District Medical Society. He was secretary-treasurer of the State Medical Association from 1925 to 1937, was president of the South Dakota State Medical Association in 1938 and, at the time of his death, was Superintendent of the State Board of Health and director of medical licensure. These positions he had held for several years. His death occurred in Pierre on January 27, 1943, of postoperative complications at the age of 71.

HENRY F. BRIGHT, M.D., Alcester, S. D., died March 22, 1943.

FRANCIS ALDEN MOORE, M.D., Yankton, S. D., was born in 1872. Graduated from the Minneapolis College of Physicians and Surgeons in 1898. Licensed in 1898. He retired in 1940 and died at his home in Yankton, March 24, 1943.

ALBERTUS L. LLOYD, M.D., Rapid City, S. D., was born in 1866. Graduated from Baltimore Medical College in 1898 being licensed in the same year. He was retired at the time of his death, March 27, 1943.

REPORT OF THE RADIO COMMITTEE

This is probably the only committee making a report wherein individual effort and time is expended. Regularly each and every Sunday a physician is at the studio for a fifteen minute medical broadcast under our auspices. We do not think the physicians of the state know enough of this program nor do they realize the significance of it, yet, as heretofore, we are going to ask this body to continue its radio program.

For the past year the broadcast has been from KSOO at Sioux Falls only, each Sunday afternoon. Aberdeen did not continue the program this year, nor was it possible to establish one in the Black Hills section.

As originally planned, the only papers read were from physicians of the state, but, as time went on, these papers became increasingly difficult to obtain, so the past year all papers have been obtained elsewhere.

Appended to this report is a letter from Dr. H. R. Hummer of Sioux Falls who has so faithfully radioed these papers. This

committee requests that letters of acknowledgment and appreciation be sent to Dr. Hummer, and also to the management of the KSOO station, and further recommends a continuance of the program.

WILL E. DONAHOE, M.D., *Chairman.*

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Sioux Falls, S. D., May 12, 1943.

W. E. Donahoe, M.D.,
City.

Dear Doctor Donahoe:—

Complying with your request I am sending you a line anent the matter of the weekly broadcasts sponsored by the State Medical Association, the State Board of Health and through the courtesy of Station KSOO. While unable to give, with any reasonable degree of accuracy, the value of these talks to the public, nevertheless it is my sincere conviction that considerable good has been done for many individuals in sending them to the medical fraternity when the greatest good might be accomplished for them and also in re-establishing that patient-physician relationship which has proven so valuable in the past and which might, in the future be entirely lost if we supinely permit the threatened regimentation. I feel that these broadcasts have nearly the same value to the public as the syndicated articles appearing in the daily press to which the name of Dr. Irving S. Cutter is attached. Comments from many individuals and numerous letters asking advice, reference to physicians and requesting copies of papers for educational purposes have given me the impression that a continuation of these broadcasts, which give so much to the public without cost to them, is strongly indicated. Sometimes it is a small hardship to give up personal engagements to meet the time of these broadcasts, but having done so for about three and one-half years it has practically become habitual. So long as these papers can be secured at a nominal cost, and so long as someone is willing to sacrifice his own time to read them, again without cost, I see no other course to pursue except the continuation of the present course. Accordingly, I so recommend.

Sincerely yours,

H. R. HUMMER, M.D.

(Appended to report of Radio Committee, May 28, 1943).

WOMAN'S AUXILIARY
TO THE SOUTH DAKOTA STATE
MEDICAL ASSOCIATION

Following the policy of the South Dakota State Medical Association, its women's auxiliary dispensed with the annual meeting and confined itself to a session of the advisory board and officers at Hotel Marvin Hughitt, Huron, May 28. Yearly reports were read and the terms of the officers renewed for a year. They are Mrs. John C. Hagin, Miller, president; Mrs. D. S. Baughman, Madison, president-elect; Mrs. G. S. Adams, Yankton, first vice president; Mrs. A. E. Rudolph, Aberdeen, second vice president; Mrs. E. S. Stenberg, Sioux Falls, recording secretary; Mrs. E. T. Stout, Pierre, corresponding secretary and treasurer. Present were Mmes. Hagin, Baughman; M. W. Larsen, Watertown; J. C. Shirley, Agnes Grosvenor, H. L. Saylor and B. T. Lenz, Huron; G. E. Burman, Carthage, chairman public relations and publicity; N. J. Nessa, Sioux Falls, bulletin; M. W. Pangburn, Miller, exhibits.

ADDRESS OF THE PRESIDENT

N. J. Nessa, M.D.

Sioux Falls, South Dakota

To the House of Delegates, Members of the Council, and Membership at Large of the South Dakota State Medical Association, . . . as your President, I bid you welcome and extend kind greetings.

Another year has rolled by since our society met in Sioux Falls during May, 1942, in conjunction with the South Dakota Inter-allied Professional Council. In my address as President-Elect at that time, I made mention of my apprehension that quite likely our annual meeting this year would prove to be different . . . and such it has proven to be . . . inasmuch as it was decided at the Councilor's Meeting held here in Huron on November 25, 1942, that the scientific part of this year's program should be omitted on account of the war, with its trail of sundry regulations which would prove so conflicting in arranging and securing the usual invited notable guest speakers from beyond our state border lines, also with the anticipated poor attendance of our membership due to difficulty of travel and the hardship of leaving their practices. This is the 62nd annual session of the South Dakota State Medical Association and our Secretary informs me as follows:

"I have made a search of the records of the State Association and find that it was organized as the Dakota Medical Association at a meeting in Milbank on June 3, 1882. It was incorporated as the South Dakota State Medical Association in 1891, and meetings were held every year with the exception of 1893 when no meeting was held. The next year's meeting was called for June 13, 1894, at Huron and was adjourned for one week same place, I presume because of lack of a quorum. Some of the early meetings were held with five and six in attendance. One meeting report read no business was transacted for lack of a quorum. Those days in the early eighties were no doubt trying because of the transportation difficulties."

So much for a past history of our organization.

It was my wish and hopeful expectation that I could have visited most of the integral societies during the past year . . . but a busy practice, no available assistance, and traveling regulations definitely precluded such ambition. I have, however, represented our society on two different occasions at a National Conference in St. Paul, Minnesota, for the purpose of becoming acquainted with and learning the facts regarding a pending resolution to be introduced at the coming A.M.A. delegates' meeting in Chicago. This matter will be brought up (under New Business) at this meeting for instruction to your delegate.

During the year, our dearly beloved President of the State Board of Health, who was also an ex-President of this society, Dr. W. F. D. Cook, passed on to the great beyond and thereby caused a vacancy in that office. Our genial and capable legal advisor, Mr. Karl Goldsmith, at that time suggested that the officers come to Pierre for consultation with the governor relative to the pending appointment to fill the vacancy, and also to give us

the opportunity to visit the legislative bodies as well. Your President-Elect, Secretary, Vice President, and myself made the trip and consulted with the members of the Health Department and the governor. It was felt that the salary for the office of President of the State Board of Health at \$3200 was too low, and we felt that a new bill should be introduced at this session which would properly remedy the same. As you quite likely know, the legislators did see fit to raise the salary to \$3600 a year. Dr. Cook's vacancy has only recently been filled by the governor, by the appointment of Dr. Gilbert Cottam of Sioux Falls for this position, and Dr. Cottam is also an ex-President of this society. I, personally, feel that the State Health matters will be carefully and well managed under this appointment.

I desire also at this time to give you a short resume of the Session Laws for 1943 of interest to our profession, as furnished by Mr. Karl Goldsmith. They are as follows:

SB 41 — Repeals the South Dakota Income Tax Law.

SB 19 — Changes the present law relating to pharmacies. It restricts the issuance of a permit to conduct a pharmacy to a pharmacist in good standing, registered under the laws of this state; provides for the transfer of such permits; and sets up certain sanitary requirements and the keeping of an adequate supply of pharmaceuticals, together with the necessary instruments and utensils to conduct a pharmacy.

SB 129 — Amends the Basic Science Law so that those exempted under the present law are exempted only so long as their treatments do not infringe, invade, encroach or intrude upon, or simulate the therapy of those required by the Act to obtain a Basic Science Certificate, and further providing that the exemptions in the present law shall apply only to those persons and to the extent specifically mentioned therein.

HB 32 — Requires osteopaths to pay an annual registration fee and to attend an annual clinic.

HB 145 — Raises the salary of the Superintendent of Public Health from \$3200 to \$3600 per year, but added the provision that he should receive no other pay or compensation from any source whatsoever.

HB 84 — Raises the maximum medical and surgical fees in compensation cases from \$100 to \$200.

HB 157 — Raises the minimum wages for women in towns or cities having a population over 2500 from \$12 to \$15 per week. The bill is expressly limited to expire at the close of the next legislative session.

HB 206 — Provides for the sterilization of certain of the inmates of the State Hospital at Yankton.

I am sure it has been the ambition of all past Presidents of this society to propose some service to the membership and profession which would prove helpful. I, myself, have such a desire, and it manifests itself in a report, which I hope will be favorably recommended by the Economics Committee and your vote in this House of Delegates.

It consists of an opportunity to all members of our State Society to be qualified to obtain non-cancelable Health and Accident protection, in a strong company, at a reduced rate, with liberal coverage and protection, with the only qualification necessary for obtaining same, a membership in this association. I cannot claim this idea all my own as it was your President-Elect, Dr. Ohlmacher, who called my attention to the matter, but I was thoroughly sold on the idea and turned it over to the proper committee for their report. If there is anyone in our society who is unable to secure such a policy or who is interested in obtaining additional protection, then here is his opportunity. We have heard a great deal about the "Four Freedoms" of late, namely, Speech, Worship, Want and Fear . . . but a recent writer, Herbert Hoover, also adds *Economic* freedom. Surely when a doctor is stricken with illness or accident to the extent of physical disability, this fifth or "Economic" freedom becomes a kind and benevolent guest.

Some loose talk is filtering through the press regarding "Social Security from the cradle to the grave" or "from the womb to the tomb." The politicians fostering this utopia, of course include medical service and supervision. Again quoting Hoover . . .

"When a government goes into business in competition with citizens . . . bureaucracy always relies on tyranny to win . . . and bureaucracy never develops

that competence in management which comes from the mills of competition. Its conduct of business inevitably lowers the living standards of the people. Nor does bureaucracy ever discover or invent. A Milliken, Ford, Edison, or Mayo never came from a bureaucracy. An inherent characteristic in a bureaucracy is the grasping spirit of more and more power. One of the illusions of our time is that we can have totalitarian economics and personal freedoms . . . but ten nations on the continent of Europe tried it and wound up with dictators and no liberty. Liberty has its greatest protection from local and not centralized government."

I also wish to pay tribute to the work in our state rendered by the Woman's Field Army dealing with the dissemination of knowledge relative to the control of cancer. Mrs. Tollevs, our state director, is an active and enthusiastic worker, and by the distribution of literature furnished from headquarters through her to the people, I am sure that a great benefit will result . . . as only by attacking this enemy of the human race by honest and truthful information can progress be attained.

In conclusion, I wish to thank you one and all most sincerely for the great honor and kind cooperation you have given me during the year to act as your humble president; and I extend to our incoming president, Dr. Ohlmacher, my best wishes for a coming successful year to our society. I thank you.

SOUTH DAKOTA STATE MEDICAL ASSOCIATION ROSTER -- 1943

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Bruner, J. E. Aberdeen
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Drissen, E. M. Britton
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*Krugich, S. J. Aberdeen
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Mayer, R. G. Aberdeen
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Murdy, Robert Aberdeen
Newkamp, Hugo Hosmer
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Bartron, H. J. Watertown
Bates, J. S. Sioux Falls
Brown, H. R. Watertown
Christensen, A. H. Clark

WATERTOWN DISTRICT No. 2

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Jorgenson, M. C. Watertown
Kenney, H. T. Watertown
Kilgaard, R. M. Watertown
Larsen, M. W. Watertown
Magee, W. G. Watertown
Maxwell, R. T. Clear Lake

McIntyre, P. S. Bradley
Randall, O. S. Watertown
Richards, Geo. Watertown
*Rousseau, M. C. Watertown
Schieb, A. P. Watertown
Sherwood, H. W. Doland
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Davidson, Magni Brookings
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*Engelson, C. J. Brookings

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Hofer, E. A. Howard
Hopkins, N. K. Arlington
Jordan, L. E. Chester
Kershner, C. M. Brookings
Miller, H. A. Brookings
Muggly, J. A. Madison
Peeke, A. P. Volga
Sherwood, C. E. Madison

Tank, M. C. Brookings
Tillisch, H. Brookings
*Torwick, E. E. Volga
Torwick, E. T. Volga
Watson, E. S. Brookings
Westaby, J. R. Madison
*Westaby, R. S. Flint, Mich.
Whitson, G. E. Madison
Willoughby, F. C. Howard

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Cowan, J. T.	Pierre
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Martin, H. B.	Harrold
Morrissey, M. M.	Pierre
Murphy, Joseph	Murdo

Northrup, F. A.	Pierre
Riggs, T. F.	Pierre
Robbins, C. E.	Pierre
★Salladay, I. R.	Pierre
★Schultz, S.	Phillip
Triolo, A.	Pierre
★Van Heuvelen, G. J.	Pierre

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SECRETARY	
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★Adams, H. P.	Huron

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Hagin, J. C.	Miller
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Lightner, C. M.	Alpena, Mich.
Pangburn, M. W.	Miller

Saxton, W. H.	Huron
Saylor, H. L.	Huron
Sewell, H. D.	Huron
Shirley, J. C.	Huron
Tschetter, J. C.	Huron
Tschetter, Paul	DeSmet

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Beukelman, W. H.	Stickney
Bobb, B. A.	Mitchell
Bobb, C. S.	Mitchell
Bollinger, Wm. F.	Parkston
Cochran, F. B.	Plankington

DeVries, A.	Platte
Delaney, Wm. A.	Mitchell
Dick, L. C.	Spencer
★Ferris, W. T.	Chamberlain
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Gillis, F. D.	Mitchell
Holleman, W. W.	Corsica
Hoyne, A. H.	Salem
Jones, E. W.	Mitchell
★Jones, J. P.	Mitchell
Jones, T. D.	Chamberlain
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Lloyd, J. H.	Mitchell

McGreevy, J. V.	Mitchell
Mabee, D. R.	Mitchell
Mabee, O. J.	Mitchell
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★Tobin, L. W.	Mitchell
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Weber, R. A.	Mitchell
Wilson, Frank D.	Chamberlain
Young, E. M.	Mitchell

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SECRETARY	
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★Billion, T. J., Jr.	Sioux Falls
Bliss, R. J.	Sioux Falls
Carney, Myrtle S.	Pierre
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Cottam, G. I. W.	Sioux Falls
*Cottam, Gilbert	Pierre
★Craig, Allen	Sioux Falls
*Craig, D. W.	Sioux Falls
*Culver, C. F.	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

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Erickson, E. G.	Sioux Falls
Fisk, R. R.	Flandreau
★Fitzgibbons, G.	Sioux Falls
Gage, E. E.	Sioux Falls
Gregg, J. B.	Sioux Falls
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Grove, A. F.	Dell Rapids
Hanson, O. L.	Valley Springs
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Hofer, E. J.	Freeman
Hyden, Anton	Sioux Falls
Keller, S. A.	Sioux Falls
Kemper, C. E.	Viborg
Kittleson, J. A.	Sioux Falls
Lamb-Barger, H. H.	Sioux Falls
Lanam, M. O.	Sioux Falls
Leraan, L. G.	Sioux Falls
★Lovre, S. C.	Humboldt
McDonald, C. J.	Sioux Falls
Mullen, R. W.	Sioux Falls

Nelson, J. A.	Sioux Falls
Nessa, N. J.	Sioux Falls
★Nietfeld, A.	Sioux Falls
Nilsson, F. C.	Sioux Falls
★Olson, Orland	Sioux Falls
Opheim, O. V.	Sioux Falls
Pankow, L. J.	Sioux Falls
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*Posthuma, Anne	Sioux Falls
Reagan, Resin	Sioux Falls
*Roberts, W. P.	Sioux Falls
★Sackett, R. F.	Rapid City
Sercl, W. F.	Sioux Falls
Stenberg, E. S.	Sioux Falls
Stevens, R. G.	Sioux Falls
Stevens, G. A.	Sioux Falls
Stone, J. G.	Montrose
Van Demark, G. E.	Sioux Falls
Volin, H. P.	Lennox
Zimmerman, Goldie	Sioux Falls
★Zellhoffer, H. W. K.	Sioux Falls

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Blezek, F. M.	Tabor
Brookman, L. J.	Vermillion
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Bushnell, Wm. F.	Elk Point
Bury, Chas. F.	Geddes
Conner, E. I.	Pasadena, Calif.
★Dick, Fred	Vermillion

Duggan, T. A.	Wagner
Fairbanks, W. H.	Vermillion
Greenfield, J. C.	Avon
Giedt, W. R.	Pierre
Haas, F. W.	Yankton
★Hanson, H. F.	Vermillion
Hohf, J. A.	Yankton
Hohf, S. M.	Yankton
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★Neisius, F. A.	Platte
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Stansbury, E. M.	Vermillion
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 Ewald, P. P. Lead
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 Phillips, Samuel Sanator
 Radusch, Freida Rapid City
 Richards, F. A. Sturgis
 Shapiro, B. Rapid City
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 ★Sherrill, S. Belle Fourche
 ★Smiley, J. C. Deadwood
 ★Soe, Carl A. Lead
 Spain, M. L. Hot Springs
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 ★Stewart, M. J. Sturgis
 Stewart, N. W. Lead
 Sundet, N. J. Kadoka
 Threadgold, J. O. Belle Fourche
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 Lande, L. E. Winner
 Malster, R. M. Carter
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 Harris, L. D. Mobridge
 Lien, H. D. Chicago, Ill.

Lima, Frank Mobridge
 Lowe, C. E. Mobridge
 Sawyer, J. G. Mobridge
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 Flett, Chas. Milbank
 Gregory, D. A. Milbank
 Hedemark, T. A. Revillo
 Jacotel, J. A. Milbank
 Judge, W. T. Milbank

Karlins, W. H. Webster
 Murphy, T. W. Bristol
 Peabody, P. D., Sr. Webster
 Peabody, P. D., Jr. Webster
 ★Pfister, Faris Webster

*Honorary or Affiliate Member.
 ★Member of the Armed Services.

ROSTER

South Dakota State Medical Association -- 1943

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Bates, J. S. Sioux Falls	Burman, G. E. Carthage	Crane, H. L. L'Orya, Peru
*Bates, W. A. Aberdeen	Bushnell, W. F. Elk Point	Crawford, J. H., Jr. Watertown
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Bestgen, Fred Rapid City	Calene, J. L. Aberdeen	*Culver, C. F. Sioux Falls
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Billingsley, P. R. Sioux Falls	Carney, G. J. Ft. Pierre	Curtis, J. E. Lemmon
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Bobb, C. S. Mitchell	Clark, J. C. Sioux Falls	Delaney, Wm. A. Mitchell

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Dulaney, C. H.	Canton	Lacey, V. I.	Aberdeen	Richards, G. H.	Watertown
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Duncan, Wm.	Webster	Lanam, M. O.	Sioux Falls	Riggs, T. F.	Pierre
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Flett, Chas.	Milbank	Lima, Frank	Mobridge	Schwartz, E. R.	Wakonda
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George, W. A.	Selby	McDonald, C. J.	Sioux Falls	Shapiro, Barnet	Rapid City
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Gillis, F. D.	Mitchell	McKie, John F.	Sturgis	Shirley, J. C.	Huron
Graff, L. W.	Britton	Mabee, D. R.	Mitchell	Smith, A. J.	Yankton
Greenfield, J. C.	Avon	Mabee, O. J.	Mitchell	Spain, M. L.	Hot Springs
Gregg, J. B.	Sioux Falls	Magee, W. G.	Watertown	Spirey, A. W.	Mobridge
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Grove, E. H.	Arlington	Marvin, Thos. R.	Faultkon	*Stewart, J. L.	Spearfish
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Haas, F. W.	Yankton	Mattox, N. E.	Lead	Stevens, G. A.	Sioux Falls
Hagin, J. C.	Miller	Maxwell, R. T.	Clear Lake	Stevens, R. G.	Sioux Falls
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Hanson, O. L.	Valley Springs	Maytum, W. J.	Alexandria	Studenberg, J. E.	Gregory
Hare, Lyle	Spearfish	Meyer, W. L.	Sanator	Sundet, N. J.	Kadoka
Harris, L. D.	Mobridge	Mihran, M. K.	Rapid City	Tank, M. C.	Brookings
*Hart, B. M.	Los Angeles, Calif.	Miller, H. A.	Brookings	Threadgold, J. O.	Belle Fourche
Hedemark, T. A.	Reville	Mills, G. W.	Wall	Tillisch, H.	Brookings
Hofer, E. A.	Howard	Minty, F. W.	Rapid City	Tobin, F. J.	Mitchell
Hofer, E. J.	Freeman	Morehouse, E. M.	Yankton	*Torwick, E. E.	Volga
Hickman, G. L.	Bryant	Morrissey, M. M.	Pierre	Torwick, E. T.	Volga
Holleman, W. W.	Corsica	Morse, W. E.	Rapid City	Totten, F. C.	Lemmon
Hohf, J. A.	Yankton	Morsman, C. F.	Hot Springs	Triolo, A.	Pierre
Hohf, S. M.	Yankton	Muggly, J. A.	Madison	Tschetter, J. S.	Huron
Hopkins, N. K.	Arlington	Mullen, R. W.	Sioux Falls	Tschetter, Paul	DeSmet
Howe, F. S.	Deadwood	Murphy, B. C.	Aberdeen	Van Demark, G. E.	Sioux Falls
Hoynes, A. H.	Salem	Murphy, Robert	Aberdeen	Vaughn, J. B.	Castlewood
Hultz, E. B.	Hill City	Murphy, Joseph	Murdo	Volin, H. P.	Lennox
Hummer, H. R.	Sioux Falls	Murphy, T. W.	Bristol	Wallis, S. R.	Armour
Hyden, Anton	Sioux Falls	Nelson, J. A.	Sioux Falls	Walters, S. J.	Watertown
Jackson, A. S.	Lead	Nessa, N. J.	Sioux Falls	Watson, E. S.	Brookings
Jackson, R. J.	Rapid City	Newby, H. D.	Rapid City	Weber, R. A.	Mitchell
Jacotel, J. A.	Milbank	Newkamp, Hugo	Hosmer	Weishaar, C. H.	Aberdeen
Jernstrom, R. E.	Rapid City	Nilsson, F. C.	Sioux Falls	Westaby, J. R.	Madison
Johnson, G. E.	Yankton	Northrup, F. A.	Pierre	*Westaby, R. S.	Flint, Mich.
Jones, E. W.	Mitchell	Ohlmacher, J. C.	Vermillion	White, W. E.	Ipswich
Jones, T. D.	Chamberlain	Opheim, O. V.	Sioux Falls	Whiteside, J. D.	Aberdeen
Jordan, L. E.	Chester	O'Toole, T. F.	New Underwood	Whitson, G. E.	Madison
Jorgenson, M. C.	Watertown	Overton, R. V.	Winner	Willen, Abner	Clark
Joyce, E.	Hurley	Pangburn, M. W.	Miller	Willhite, F. V.	Redfield
Judge, W. T.	Milbank	Pankow, L. J.	Sioux Falls	Willoughby, F. C.	Howard
*Kalayjian, D. S.	Parker	Parke, L. L.	Canton	Wilson, F. D.	Chamberlain
Karlins, W. H.	Webster	Peabody, P. D., Jr.	Webster	Wynegar, D. E.	Chattahoochee, Fla.
Kauffman, E. J.	Marion	Peabody, P. D., Sr.	Webster	Young, E. M.	Mitchell
*Keeling, C. M.	Springfield	Peeke, A. P.	Volga	Zimmerman, Goldie	Sioux Falls
Keene, F. F.	Wessington Springs	Pemberton, M. O.	Deadwood		
Kegaries, D. L.	Rapid City	Phillips, Samuel	Sanator		

* Honorary or Affiliate Member.

PHYSICIANS OF SOUTH DAKOTA IN ARMED FORCES OF THE UNITED STATES

Adams, H. P.	Huron	Fitzgibbon, T. G.	Sioux Falls	Olson, Orland	Sioux Falls
Adams, M. E.	Clark	Gelber, M. R.	Aberdeen	Owen, Stanley	Rapid City
Andre, Hugo C.	Vermillion	Hanson, H. F.	Vermillion	Pfister, Faris	Webster
Athey, G. L.	Chamberlain	Hanson, O. L., Jr.	Valley Springs	Rousseau, M. D.	Watertown
Auld, M. A.	Yankton	Hayes, P. W.	Hot Springs	Sackett, R. F.	Parker
Billion, T. J., Jr.	Sioux Falls	Hill, W. H.	Centerville	Salladay, I. R.	Pierre
Bliss, R. J.	Sioux Falls	Hubner, R. F.	Yankton	Schuchardt, I.	Aberdeen
Bloemendall, G. J.	Ipswich	Hummer, F. L.	Lead	Sherman, K. E.	Sturgis
Boyd, F. E.	Flandreau	Jones, J. P.	Mitchell	Sherrill, S.	Belle Fourche
Burgess, R. E.	Gettysburg	Kittelson, Otis	Yankton	Smiley, J. C.	Deadwood
Bushnell, J. W.	Elk Point	Kruzich, S. J.	Aberdeen	Soe, Carl A.	Lead
Catey, Robert	Mobridge	Lampert, A. A.	Rapid City	Stewart, M. J.	Sturgis
Clark, B. S.	Spearfish	Lemley, R. E.	Rapid City	Thompson, Arnold	Sioux Falls
Cooper, Geo.	Watertown	Lovre, S. C.	Humboldt	Tobin, L. W.	Mitchell
Craig, Allen	Sioux Falls	McCarthy, Paul V.	Aberdeen	Wayne, D. M.	Redfield
Davidson, H. E.	Lead	McGonigle, J. P.	Rapid City	Williams, F. E.	Wakonda
Dick, Fred	Vermillion	Malloy, J. F.	Yankton	Van Heuvelan, G. J.	Pierre
Duimstra, Fred	Sioux Falls	Merryman, M. P.	Rapid City	Zarbaugh, G. F.	Deadwood
Duncan, C. E.	Pollock	Nietfeld, A. B.	Sioux Falls	Zellhoffer, H. W. K.	Sioux Falls
Ferris, W. T.	Chamberlain	Nyquist, Roy H.	Ft. Meade		

Rocky Mountain Spotted Fever

A Nine Year Study of Wyoming Cases

George E. Baker, M.D., F.A.C.P.

Casper, Wyoming

INTRODUCTION

DURING the first week of May, 1941, the writer was called to see a patient, a middle-aged rancher, who had been brought to town for the purpose of medical care. He complained of a continuous, severe frontal headache, generalized aches and pains throughout his body most marked in the back and lower extremities, and a dry, hacking cough existent for a period of one or two days. This had followed a short period of two or three days during which he had not felt up to par and had noticed an unusual degree of fatigue. At the time he became ill, the patient had been engaged in lambing activities and had worked for long periods of time under inclement weather conditions, without an opportunity to change his clothes or bathe.

Examination revealed him to be quite ill. The temperature was 104° F. The pulse of 90 was full and bounding. The patient appeared anxious and yet displayed mental confusion. The face was flushed and the eyes injected. The fauces and oropharynx were reddened and bronchial accentuation was found. The spleen was palpable and tender. There were no changes in the superficial or deep reflexes, but muscle tonus over the body was definitely increased. Firm pressure over the calf muscles or movement of them caused the patient to wince from pain. He was markedly suntanned on the exposed portions of the body, but close inspection revealed the presence of a discrete, rose-red, petechial eruption involving the wrists and ankles only. No crawling or attached wood ticks were found. The patient admitted that for a period of several weeks prior to becoming

ill he had found them in large numbers on his clothes and person and had removed them without further precautions. Inasmuch as he had ranched in the present locality for a period of forty years and had never contracted tick-borne infections, it was his assumption that he was immune to them. He had never received tick vaccine for the purpose of protection against tick fever.

To physicians practicing medicine in the western endemic localities, the obvious diagnosis would be that of Rocky Mountain Spotted Fever, a disease commonly referred to as "tick fever" for the sake of brevity. Continued observation of the patient for a period of the next few days, during which time the petechial eruption spread over the remainder of the body, confirmed the diagnosis. This in turn was substantiated by special laboratory procedures. Had this particular patient presented himself for care to a physician not familiar with the manifestations of the disease, or had he contracted it in a locality where its presence was not anticipated, considerable confusion as to the nature of the illness might have ensued. Rocky Mountain spotted fever is no longer considered to be a medical curiosity, limited to the western states and portions of adjacent areas, but is known to be existent in many other sections of the country, far removed from its once supposed locale. Many of those who encounter it in the newly identified regions are unfamiliar with its manifestations. The subject of tick fever is an extensive one. No attempt should be made in a single article to deal with its many phases, but rather to emphasize those of major significance in a disease entity, which may well in time assume proportions of national importance.

SYMPTOMATOLOGY

Tick fever has a usual incubation period of from four to eight days, the extremes being two to twelve. The prodromal manifestations resemble those of any febrile illness, there being malaise, headache, anorexia and chilly sensations. They vary in degree, lasting an average of two or three days.

The disease usually has an abrupt onset, initial symptoms often appearing in the late afternoon or early evening. There is a definite chill, pronounced frontal headache, and severe aches and pains in the muscles, bones and joints. The latter are more pronounced in the back and lower extremities. Firm pressure over the calf muscles or free motion of them often elicits pain. Crawling or attached ticks are sometimes detected on the patient, but usually none are found. Indurated sites of former attachment may be palpated. Inspection of the bite areas reveals nothing unusual, with the exception of occasional discolorations from subcutaneous blood extravasation. There may be tenderness and palpability of the regional lymph nodes.

An initial, elevated macular, rose-colored eruption is sometimes found. Its presence is not distinctive. The characteristic petechial eruption first appears on the ankles and wrists twenty-four to forty-eight hours after the onset of the disease. It is the most reliable early manifestation. It may be overlooked in individuals of the dark-skinned races or ones severely tanned on the extremities from overexposure to the elements. It soon becomes sharply outlined in character and commences to spread from the initial locations in a centripetal fashion over the chest and abdomen, and then to the remainder of the body. It is always more marked on the extremities than elsewhere. Extension is complete in two or three days. The associated generalized aches and pains are then somewhat relieved, but the temperature remains elevated. The petechial eruption is thought to be the most classical finding in tick fever, but the disease must not be diagnosed alone from its presence. Some cases, particularly very mild ones, or those previously vaccinated, show no rash or only a slight one, others die from toxemia before its appearance, and yet others demonstrate atypical or bizarre eruptions. Petechiae do not disappear on pressure except during the initial stages of the disease. They are accentuated by tourniquet application. They may eventually involve the palms of the hands, soles of the feet, and mucosa of the inner cheeks and throat. A patient so erupted is truly speckled or spotted, having a rash which often covers the entire body. Petechiae may appear in successive crops, each of which has a life cycle of two weeks.

The eruption tends to remain discrete in milder cases of tick fever, but does not remain so in more severe ones. It is first rose-red and later bluish-red in color. The petechiae increase in size and become confluent, finally coalescing and then becoming purpuric. A mass of such areas may involve the entire body. If terminal gangrene ensues, with sloughing of the soft palate, scrotum or dependent portions of the body, the afflicted individual presents a sad and tragic appearance.

The eruption gradually fades as the temperature falls and the individual recovers, the process taking much longer in severe cases than in mild ones. There may be desquamation, either branlike in character or so complete that casts of body parts are exfoliated. Pigmentation remains at former petechial sites. It may be followed by formation of minute cicatrices. For several months after recovery from tick fever, overexposure to heat or cold often brings out temporary manifestations of the eruption. They last only a short while and clear when normal skin temperatures are re-established.

Temperature rises abruptly within the first 24 hours of the onset of the disease. There are but one or two slight remissions, a fastigium of 103° to 105° F. being reached by the beginning of the second week in mild cases, by the second or third day in more severe ones. With recovery from acute manifestations of the illness, it falls either by rapid or slow lysis, rarely by crisis unless the case is an abortive one. There may be slight temperature remissions in mild cases, but it is constant to slightly rising in more severe ones. It is sometimes distinctly remittent after the first few days, particularly in moderately severe protracted cases, but never ceases until terminal lysis has occurred. The temperature may be normal from the first, or subnormal in very severe forms of the disease, to rise sharply in the twenty-four hours preceding death, or it may be high from the first, then drop to normal and rise again before death occurs. If the temperature drops uneventfully to normal, and later shows a secondary rise without apparent justification, complications must be sought for.

Early in the disease the pulse is of good volume, and is slow, averaging 90 beats a minute. Early disproportion of pulse and temperature ratios is one of the characteristic findings of tick fever at its onset. When myocardial weakening ensues in severe cases as a result of toxemia, loss of strength and volume of the pulse occurs. It rises out of proportion to the temperature. As a result of cardiac involvements, the blood pressure falls, and the first heart sound becomes muffled and indistinct.

The respirations are at first normal or but slightly increased. With acceleration in severe cases, the respiration change accompanies alterations of the pulse and temperature ratio. Increase in rates often signifies the development of bronchopneumonia.

The above manifestations are considered to be the most typical ones in tick fever. There are other findings. They exist in various combinations, depending for their intensity upon the severity of the existent disease process.

Patients moderately or severely ill with tick fever are severely prostrated. The senses are dulled. Although afflicted individuals appear rational to superficial examination, close inspection reveals them to be mentally confused. There is amnesia; it may persist until the eruption is complete, or for some time afterward. Patients appear anxious and are concerned over their illnesses. The eyes are injected and the cheeks flushed. There may be photophobia. Nervous disturbances such as lethargy, restlessness or nervous irritability are frequent. Children are prone to convulsions and may succumb during them. Insomnia is at times troublesome. There can be active

delirium, particularly in severe cases during terminal stages of the illness. Muscular twitchings or fibrillatory tremors are common. Muscle tonus is definitely increased throughout the body. Aches and pains in the muscles persist throughout the disease. At times the distress from them is agonizing. When located in the muscles of the abdomen, an acute surgical condition can be simulated. Movement of the neck muscles often elicits slight stiffness.

The tongue is swollen and moist early in the disease. In severe cases it becomes dry and coated, with a darkened border and prominent papillae. The tongue often protrudes from the mouth when profound swelling ensues. It becomes fissured and covered by sordes if coma occurs. There is pharyngeal engorgement, accompanied by a dry, hacking, nonexudative cough, indicative of bronchial irritation. There is often profound chilliness. It is not shaking or chattering in character, but tends to be most persistent and drawn out, frequently lasting for a period of from two to four hours.

The skin is tender. Many patients complain bitterly of pressure from light bed coverings or drafts of air. As the disease progresses the skin becomes dark red, or bluish in more severe cases, the color changes being most evident on the back and thighs. An ill-defined bluish discoloration is often detected beneath the skin surfaces, when patients are examined under satisfactory light conditions. Dependent portions of the body, such as the scrotum or soft palate may slough in severe cases. Necrosis can occur, commonly affecting the prepuce, toes, fingers or ear lobes. Alopecia sometimes occurs; it may be permanent.

There is anorexia. Nausea and vomiting take place in some cases, the regurgitated material at times containing blood. Diarrhea occasionally occurs; the stools may be bloody. Constipation is usual and can be most obstinate and difficult to overcome. Sphincter control is often lost in severe cases. The spleen is enlarged and tender, the liver sometimes demonstrating similar findings. There is jaundice, which is nonobstructive in type and tends to deepen markedly in the terminal fatal stages.

Increased muscle tonus may result in an inability to void. At times there is incontinence. Urination can be distinctly painful. A lessened secretion of urine sometimes occurs. It is caused either by changes in the kidney or by a failing circulation and is frequently accompanied by edema. There may be total repression of urine formation at the end, in fatal cases of tick fever.

The blood findings are not unusual. There is a lowered red blood cell count and hemoglobin content later in the disease, resulting in a secondary anemia. The total white blood cell count averages 12,000 to 15,000. It may be as high as 30,000. A relative mononucleosis is common, the average being 10 to 12 per cent.

The urine may be highly colored and has an increased specific gravity. Old or debilitated individuals show albumin in varying amounts, together with acetone bodies and microscopic alterations. Younger persons or those who have previously enjoyed good health do not manifest urinary changes so frequently.

Blood chemistry studies in tick fever have never been

conclusively worked out. There are no significant spinal fluid findings. Demonstrations of the causative microorganism of the disease in blood smears are so inconstant that the results are not worth the time and energy expended in search for them.^{1,2,3,4,6,9,10,11,13}

DIAGNOSIS

Tick fever may be confused with various other infections, particularly when it appears unexpectedly in a locality or is encountered by those unfamiliar with its manifestations. It is not within the scope of this paper to discuss these conditions, with the exception of typhus fever. For the most part, confusing diseases can be ruled out by careful histories, examinations, and repeated observations of infected individuals, together with confirmatory laboratory studies. The three diagnostic procedures ordinarily employed are the infection test, Weil-Felix agglutination reaction and the protection or virus neutralization test. They are not dealt with in this article.

Typhus fever is a rickettsial infection, strikingly similar in many of its clinical manifestations to tick fever. It exists in two forms, the epidemic transmitted by the body louse, and the endemic, by the rat flea. Although both have been identified in the United States, the historic louse-borne type is essentially an Old World disease, and has not, as yet, become of major importance here. It is commonest in localities where human beings reside under conditions of crowding, when sanitation facilities are poor. Endemic typhus is present in many sections of the eastern and southern United States. It is most prevalent in individuals whose occupations bring them into rat-infested premises, for that reason being frequent among handlers of foodstuffs.

In studies of tick fever as related to typhus fever there are many interesting possibilities. The majority of army training centers, resettlement camps and alien isolation areas in the west are located in regions but recently reclaimed from their native state. There ticks abound. The bringing together of large numbers of individuals under conditions of concentration and crowding invites the development of typhus, should sanitation be faulty, or rat carriers be present.

Endemic typhus fever and tick fever resemble one another closely. Typhus appears for the most part during the late summer and fall, tick fever of the eastern type during the summer and early fall, of the western type in the spring and early summer. Endemic typhus fever usually occurs among food handlers who are urban residents. Tick fever appears for the most part in those having rural contacts. Even though the symptomatology is quite similar in both diseases, the general clinical features are intensified in tick fever: the incubation period is shorter; the onset more explosive and severe; the temperature rises more rapidly; although it recedes in both diseases by lysis, the fall is much slower. The petechial eruption appears first on the body in typhus, spreading from there to the extremities. In tick fever, the original site and manner of spread are the opposite. In tick fever, the eruption tends to be more extensive and cyanotic, being more profuse in distribution. The pulse tends to be higher in proportion to temperature, particularly in

severe cases. Nervous and mental symptoms are more profound and delirium is more often encountered, coma preceding a fatal outcome. In tick fever, convalescence is more slowly established.

Routine laboratory procedures do not furnish much assistance in differentiating the two diseases, agglutination with bacillus proteus strains tending to be positive at some time during the course of both. In order to establish absolute identification, it may be necessary to study the effect of virus on laboratory animals. Observations of the clinical pictures obtained by guinea pig inoculations, or of typical histological alterations produced in the brains of laboratory animals may be necessary. Cross immunity tests are sometimes used. Their significance depends upon the finding, that animals which have recovered from typhus fever remain susceptible to tick fever, and that animals which have recovered from tick fever remain susceptible to typhus fever, but not to further inoculations of tick fever virus.^{1,2,3,4,6,9,10,11,13}

PREVENTION

Tick fever could be eradicated were it possible to dispose of vectors of the disease, but the undertaking is an impossible one. Conditions favorable to ticks exist in all localities where the disease is found and allow hosts for both immature and adult forms to flourish in abundance. Vegetation and physical conditions exert an indirect influence, because they afford suitable surroundings for animals serving as tick hosts. Once established in a locality, ticks continue to thrive if there are sufficient numbers of wild or domestic animals present.

Prevention of exposure to infection is assured only by remaining out of localities where ticks abound, but this is not at all times possible or feasible. Those entering infested localities should wear trousers, gathered by some means at the bottom, in order to prevent vectors from crawling up the legs. Ticks do not jump on those who pass their vantage points; they lie in wait on low vegetation, not over a foot and a half above the surface of the ground, actively moving their numerous serrated legs, by which means they seek transfer to objects that brush by. Clothing should have a minimum of seams and openings, in order to prevent their ingress to the body surfaces. Smooth clothes prevent ticks from gaining footholds, yet those with a rough nap impede their progress, once they have gotten on the body covering. It is a good plan while in tick infested localities to occasionally pass the hand over the back of the neck in order to detect crawling ticks. They may gain access to the body by working themselves beneath the collar.

Clothing should be removed two or three times a day, and the body examined for the presence of crawling or attached ticks. Inasmuch as they hide away in body folds, crevices or hairy portions free from rubbing, a diligent search must be conducted. Camps should be located where rodents are few, preferably in places where no low grass, sagebrush or small bushes are growing. Wooded areas along creek banks and the vicinities of old trails and roads are best avoided. Ideal camping spots are usually where standing timber is present, with a minimum of low vegetation. Individuals must again inspect

their persons, clothing and bedding, before retiring for the night in the open. The precaution is most important when two individuals sleep in close proximity. The first individual may escape infection or be but mildly ill, the second one more seriously so, from reactivation of virus in the tick vector by blood ingestion from the first victim. While in tick infested localities, it is unwise to leave bedding spread on the ground during the day, as it attracts ticks, often from a considerable distance. After return from trips, clothes and bedding should be carefully gone over, aired and then removed to buildings not used for human habitation. Once ticks have taken up their abode in a location, eradication is apt to prove most difficult and uncertain.

When ticks gain access to the body surfaces they move slowly about for a variable length of time, during which they seek suitable locations for attachment. The process is not noticeable to victims, nor are they usually aware of crawling ticks. It is supposed that vectors of the disease are not actively infectious until several hours have elapsed, but little reliance can be placed in this contention. When located, attached ticks must be removed without delay. The procedure is one requiring considerable skill and perseverance, if it is to be safely accomplished. As a rule, the head of the tick is embedded beneath the surface of the skin, the body remaining free and protruding at an *angle* from it. The head is held firmly in place by the mouth parts, so that hasty or careless plucking often serves to remove the body alone, leaving the remainder in place to serve as a potential source of infection. Gentle traction may be successful in removing the tick. Close inspection then reveals it to be intact, often with a small fragment of epidermis caught in the mouth parts. Failing in this procedure, a small piece of epidermis in which the tick's head lies embedded must be elevated with a pair of tweezers, and a tentlike wedge of tissue snipped with a fine pair of scissors. This maneuver is accomplished quickly and insures complete removal. Resultant wounds from tick extraction are to be thoroughly cauterized, using iodine, phenol, silver nitrate or similar agents. A light dressing can then be applied. Care must be exercised so as not to crush ticks. If the accident occurs, the discharged contents should be thoroughly washed from the hands by means of soap and water, care being exercised not to irritate the skin. Since the virus is apt to be highly infectious, even on unabrased skin surfaces, precautions for its removal are most important. Removal of engorged ticks with bare hands is a dangerous practice.

Tick vaccine gives protection against tick fever. It is prepared by the Rocky Mountain Laboratory of the National Institute of Health, Division of Infectious Diseases, at Hamilton, Montana, and is dispensed to physicians desiring it, for the purpose of immunizing those who run the danger of being exposed to the disease. Tick vaccine is prepared in two types, the older one from tick tissues, and the more recent one from embryonic chick tissues. The chick-embryo type has not superseded the vaccine prepared from ticks; and, although it is less likely to cause reactions, evidence regarding its immunizing value is not so certain. Recommended dosage

of tick tissue vaccine for those who have never previously been vaccinated is 2 cc., repeated at an interval of from 7 to 10 days. If the particular locality is one in which serious cases of tick fever are known to originate, the second injection must be followed by a third, administered after the same time interval. Children receive a proportionate amount of material, 1 cc. being recommended for those 10 years of age or younger. Dosage of the chick-embryo type is slightly different, in that three injections of 1 cc. each, administered at the same time interval, are recommended. For individuals who have been vaccinated each of the past three years, two injections of 1 cc. each of either the chick-embryo or tick-tissue types, are suggested.

The degree of protection afforded by vaccine, and the duration of such protection varies with vaccinated individuals and the virulence of the infection to which they are exposed. As a rule, those vaccinated in the spring of the year retain a considerable degree of immunity for at least the remainder of that year. This is usually sufficient to afford full protection against relatively mild strains of the disease, but is progressively less effective as virulence of the virus is increased. Nevertheless, against even the more severe forms of tick fever, it is usually adequate to ameliorate markedly the usual stormy course of the infection, so as to insure ultimate recovery. It is probable that a certain proportion of individuals carry an indefinite degree of immunity into the second year, even against highly virulent strains of virus. The degree of protection appears to be greater in those who have been vaccinated for two or more successive years. Evidence does not indicate that any considerable degree is carried into the third year. In order to afford the greatest degree of protection possible, it is recommended that immunization be performed each year.

Intramuscular administration of vaccine is not known to bring about more than a slight constitutional reaction. The same precautions must be observed as with the injection of any biological product intended for an immunization procedure. Immediately there ensues a sensation of fullness at the site, followed by one of smarting or stinging. Itching may occur, exacerbated by scratching or rubbing the part. A generalized malaise is sometimes noticed, often with a slight febrile reaction. The manifestations are usually transitory, subsiding before subsequent administrations of the material. These usually result in much milder symptoms, or none at all.^{1,2,3,7,8,9,10,12,13}

TREATMENT

Treatment of tick fever is purely symptomatic and supportive in character. There is no specific, but its absence must not predispose to an attitude of helplessness and hopeless inactivity on the part of those caring for the disease. Carefully directed symptomatic care and supportive measures aid patients to eliminate toxins from their bodies, support them during the period of invasion, and assist them by every means possible to overcome their illnesses. Vigorous, yet well directed procedures, bring about successful outcomes in many patients who appear hopeless as regards recovery at the time first placed under care.

Bed rest with good nursing care are necessary from the beginning, in order to conserve strength as much as possible. At the onset of tick fever, patients frequently do not appear ill enough to make the precautions necessary, but the rapidity with which serious manifestations appear make those in attendance thankful that they had been insisted upon. Patients must be kept as quiet as possible, both mentally and physically. Baths, packs and simple sedation are often effective. If codein or morphine are indicated, they must be used as freely as necessary. Bath temperatures should be 70° F., or above, to be safely tolerated. Cold or tepid bathing is wrong, because it often results in shock to seriously ill victims of the disease.

The gastrointestinal tract needs careful watching. Regular elimination may be facilitated by mild enemas or cathartics. The diet should be nourishing, adequate and yet easily digestible. Frequent urinary examinations are indicated; they often disclose pathological alterations at their onset. Fluids must be given freely, by mouth, if tolerated, by other routes if there is excessive vomiting. Adequate amounts combat the ever present trend to acidosis.

It may be necessary to support the heart should myocardial weakening appear imminent. Care to the skin is important. Sponging with equal parts of witch hazel and alcohol in water, once or twice a day, often comforts and invigorates severely ill patients, and removes soreness from muscles. Patients are less mentally dulled and appear considerably stronger for several hours following the procedure. Mouth hygiene is important. Oral antiseptic washes rid the region of accumulated waste products, so that sufferers are made more comfortable during the acute phases of the illness.

Convalescent sera and transfusions have been resorted to, apparently without beneficial effect. Autohemotherapy has been used by some physicians, 10 to 20 cc. of citrated blood from the patient being administered intramuscularly, the procedure being repeated as often as necessary. Drugs without number have been lauded, from time to time, as specifics in the treatment of tick fever. It is agreed that the actions of the majority of them are so uncertain as to cause them to be generally discarded. Drugs of the sulfonamide series have little or no value in the management of tick fever, according to information available on them at this time. If bronchopneumonia, phlebitis or other complications due to secondary invaders appear, their use is certainly justified, the drugs of choice depending on the nature of the invading microorganisms. Recently, Topping has produced an immune serum in rabbits, using tick virus as the antigen. The rabbit serum has been shown to contain large amounts of antibodies. Satisfactory results have been achieved from its use, at first, in animal experimentation, and later, in an increasing number of human beings. Tick vaccine must never be used for treatment; it has no beneficial action when used for this purpose. In milder cases, its use is too drastic to be justified; in more severe ones it may prove dangerous as regards ultimate recovery.^{1,2,3,4,5,9,10,13,14}

NEOSALVARSAN IN METAPHEN SOLUTION

Tick fever appears to have a cyclic tendency, more cases appearing during some years than others. The reason for the trend is unknown, but it is believed to depend upon local and regional conditions. The number of individuals exposed, the abundance of ticks, the percentage carrying infection, the capability of virus to produce frank infections, and the possible relationship between the prevalence of ticks and animal hosts seem to play a part.

The highest incidence of tick fever in the western area is from the early spring into the early summer months. In the mountainous regions, it is highest during the late spring months, owing to delay in the advent of warm weather. In the eastern areas, the disease is more prevalent in the late spring and early summer months, but cases can occur in the fall of the year.

The virulence of tick fever varies greatly in different areas, but appears to remain fairly constant in any one region. Reasons for the variance are not known. It is supposed that repeated passages of the virus through successive animal hosts play a part. It is justifiable to speak of mild, moderately severe, or severe types of the disease, in view of the great differences in virulence of the infection in various localities and sections of the country.

The writer has had occasion to make extensive study of the various aspects of tick fever, inasmuch as he practices medicine in the western endemic area, in a section of Wyoming where the disease occurs with considerable frequency. Tick fever in this locality is moderately severe to severe in type. For a period of the past 17 years, from 1927 through 1942, during which accurate statistics on tick fever have been kept by the Wyoming State Health Department, the average mortality for the state has been 19.5 per cent; 1,070 cases have been reported, with 209 deaths. During the same period of time, mortality for our (Natrona) county has been 20 per cent. Both of the figures are considerably higher than those for the nation as a whole. It is believed that the mortality for the entire country approximates 12.5 per cent.

Symptomatic and supportive measures offer much in treatment of tick fever, but they are not sufficient in themselves to insure recovery. Prognosis depends ultimately upon the ability of infected individuals to withstand ravages of the disease, particularly in reference to myocardial and renal intoxication. Bad omens are confluent purpuric eruptions with terminal sloughing, marked temperature and pulse reactions, severe intoxication of the brain and central nervous system, and the development of complications, particularly in older or debilitated individuals, or those ill with intercurrent conditions.

In 1934, the late Dr. J. C. Kamp of Casper and the writer received encouraging reports of responses obtained by use of neosalvarsan dissolved in aqueous solution of metaphen, administered intravenously in the treatment of typhus fever. That year, we began original investigations with their use in the treatment of tick fever. In the spring and summer of 1934, we used them on nine moderately severe cases of the disease. None of the individuals succumbed to their illness. Response was grati-

fying enough to warrant their future use in all cases which came under our supervision.

Since that time, an average of three to four cases of tick fever have been under the writer's care each season. During the past eight years, all cases so treated have recovered. Local physicians and those practicing in other sections of Wyoming, also have resorted to use of the two drugs in combination, as an adjunct to care for individuals seen by them. Those contacted by the writer report equally gratifying responses, many of them joining him in the firm conviction, that neosalvarsan in metaphen solution has proven itself a definite therapeutic aid in treatment of the dread disease.

It is not thought that they exert specific action on the manifestations of tick fever, and it must be admitted that their approach is uncertain. Benefits derived from their use may be credited to direct action on rickettsiae in infected tissues. A combination of the bactericidal action of metaphen together with the spirocheticidal action of neosalvarsan, upon a microorganism which is bacterium-like in character, yet has staining properties similar at least to those displayed by spirochetes may be the secret of their success. It is certain that those treated show less evidence of intoxication, minimal damage of the heart and kidneys and a more discrete, brighter colored eruption, which does not become hemorrhagic, and is usually more sparse in distribution. There is less mental depression; the nervous symptoms are more mild. The entire clinical picture is less alarming in every respect. Convalescence is more rapidly established, being of shorter duration and accompanied by a minimum of complications. None of the individuals had ever received tick vaccine for the purpose of immunization against the disease.

In the performance of the procedure, 0.3 gram of neosalvarsan is dissolved thoroughly in 10 cc. of an aqueous solution of 1:1000 metaphen (Abbott). The mixture which results is yellow and turbid, and changes but little in appearance on standing. It is warmed and injected slowly by vein, the same precautions being necessary as with any chemotherapeutic agent intended for intravenous administration. Solution is administered and blood alternately withdrawn into the syringe until the entire amount has been given. The procedure usually consumes a period of from 5 to 10 minutes. No reactions, local or constitutional, either immediate or delayed, have thus far been noted.

Administration of the two drugs is repeated at three or four day intervals. Three or four injections have customarily been sufficient to ameliorate the clinical picture so as to insure ultimate recovery. Continued or recurrent manifestations would apparently justify additional administration of neosalvarsan in metaphen solution.

A word of warning appears indicated to those who might contemplate use of the two drugs in combination for treatment of tick fever. Should a case of the disease demonstrate severe renal injury as a result of the infection, careful consideration must then be given the question as to whether their use is justified. The inherent risks associated with drugs of considerable potency on an already damaged kidney must be weighed against bene-

fits to be derived from their administration. It has been customary for the writer to secure, first, morning specimens of urine for examination on the day the material is to be given. They have never shown sufficient alterations to indicate severe renal pathology. For that reason, neosalvarsan in metaphen solution has been given routinely at the time scheduled for its use.

SUMMARY AND CONCLUSIONS

Rocky Mountain Spotted Fever is widespread in distribution throughout the United States. It has possibilities for far greater dissemination, and is a disease of serious potentialities. Although the clinical picture is fairly typical, there is the possibility for confusion with other diseases. Prevention of infection may be secured by means of simple precautions and the use of vaccine. Treatment is essentially symptomatic and supportive. Neosalvarsan dissolved in aqueous metaphen solution has been used intravenously as an adjunct to treatment. As a result of satisfactory results obtained in a number of cases over a period of the past eight years, it is believed that the drugs in combination exert a definite beneficial action on the course of moderately severe cases of the disease.

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War Wounds of the Abdomen

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WHEN, through the process of evolution, man assumed the upright position, he exposed a large, soft, unprotected target to his enemy. Modern warfare has taken advantage of this inherent weakness and now directs its attention to this potential mark. On the training fields, on the battle ground, yes, even with the unprotected civilian, the abdomen is the bullseye of the bayonet and the bullet. Difficult as it is to understand the brutality of man, we are faced with facts that cannot be ignored. In self-defense, amidst trained hatred, we hear the command on our own training fields, "Gut 'em." Not a pretty picture and certainly a far cry from the art of healing, but in all corners of the world this problem faces the medical profession—we must meet it, and not now ask the reason "why".

Penetrating and explosive wounds of the abdomen have a terrific mortality rate. Let us not be misguided and lulled into security by a recent advertisement appearing in a national publication analysing the Pearl Harbor disaster with the following quotation, "Every man with an abdominal wound who reached the operating table alive is still alive." Although true at Pearl Harbor, this will not necessarily apply to the field of battle where ground exposure enters the picture.

The battlefield and the civilian front, both subject to high explosive missiles and the bayonet, call for the keenest judgment from first aid to surgical exploration. It is

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imperative to use care in the immediate attention to abdominal wounds, the combating of shock, relief of pain and, if necessary, the immediate control of hemorrhage. Careful and meticulous transportation of the abdominally wounded is essential to lessen risk.

On the field where intervals of time must elapse before surgery can be offered, or in massive civilian bombing where the injured are so numerous as to make immediate operative attention impossible, we must depend upon the administration of sulfanilamide as an adjunct to surgical measures. Anticipating wounds, every soldier is equipped with sulfanilamide as a part of his first-aid field kit.

Accepting the grave risk in all abdominal wounds as a foregone conclusion, the time to operate is always as early as possible, in keeping with a reasonable chance of the patient surviving surgical interference. To this end, a keen sense of surgical judgment must determine the verdict. Under no circumstances is the judgment of a good surgeon taxed more heavily than in arriving at a clear understanding of a desperately injured patient, with a penetrating wound of the abdomen.

Once in the operating room, practically all abdominal wounds call for exploration. Recognizing the grave danger involved, exploration, when undertaken, must be adequate even in the presence of hemorrhage and shock; complete and thorough intra-abdominal repair is essential.

I can well remember in the last World War how the French surgeon opened the abdomen from the ensiform

cartilage to the pubic bone to insure complete visualization of the abdominal field and how, after his repair was completed, he filled and washed the abdominal cavity with ether. Truly an astonishing revelation to an American eye-witness. I do not advocate such a radical approach, as an accepted rule, in all penetrating wounds of the abdomen, but I do make a plea for adequate inspection.

The immediate toilet of the average intra-abdominal exploration involves the difficult elimination of blood and fecal contamination. This is always messy but imperative. Every surgeon knows that the cleaning out of a blackout in the abdomen, where the site of bleeding and perforation is unknown, is an art in itself that requires systematic sponging, aspiration and, if necessary, a normal saline bath.

In massive injury to the bowel or in multiple perforations where anastomosis will involve time and shock, extraperitonealizing of the involved gut must be seriously considered as a life-saving procedure. The use of the Murphy button, with its time-saving technic, is too often a forgotten art. A proven blessing of the old school, it offers, without suturing, a quick, safe and dependable type of intestinal anastomosis.

To elucidate the repair of all possible injuries within the abdomen does not fall within the scope of this paper. In all contaminated cases, it is advisable to complete the surgical care with the instillation of sulfanilamide crystals into the abdominal cavity. This drug in the form of crystals is far more soluble than in the powdered preparation. Powdered sulfanilamide, sulfathiazole or sulfadiazine tends to cake and may act as a foreign body.

Reliance upon the sulfa drugs cannot take the place of good surgery, nor must it ever be the excuse for sloppy technic. I do not want to underestimate the very great value of instilling crystalline sulfanilamide in abdominal wounds and in the peritoneal cavity, but I do warn against too great a reliance on the drug without proper surgical attention. Eight grams of the sulfanilamide crystals can be instilled in the peritoneal cavity with safety.

Especially desirable, however, is the infiltrative, absorptive effect of sulfanilamide in abdominal wounds, where the explosive effect of a rapidly moving missile has exerted its action upon serous surfaces and condemned them to tissue death. All surgeons are familiar with the searing of peritoneal surfaces that have been subjected to explosive pressure, leaving behind an ideal culture medium for any and all bacterial invaders.

Drainage, as a rule, is contraindicated on the theory

that the entire peritoneal cavity cannot be reached. Experience has shown conclusively that the average closed case reacts better than one drained.

A summary of the generally accepted rules pertaining to the treatment of war wounds of the abdomen may emphasize the outstanding principles of this field of surgery. Obviously, only the highlights of so vast a subject can be elucidated; they may be stated as follows:

1. Adequate first-aid approach with control of hemorrhage is imperative.

2. Immediate transportation of abdominal wounds to the operating room. Where transportation is not available, or where great numbers of wounded make immediate operation impossible, the use of the sulfa drugs to build up resistance should be started at once.

3. In choosing cases for operation, where stress of time for any reason makes selection necessary, wounds of the upper abdomen stand less risk of fecal contamination than those of the lower abdomen.

4. All penetrating wounds of the abdomen call for a urinalysis before surgery to rule out or rule in the kidney, ureter or bladder injury.

5. X-ray is always indicated where possible and may be of inestimable value to analyse the possible course of a penetrating missile.

6. Shock must be combatted, and no war abdominal wound should be kept on the operating table over one hour; 40 minutes is the inside limit of safety.

7. Perforations of the intestine or hollow viscus call for the exploration of both the wound of entrance and exit. In other words, perforating wounds of hollow organs run in even numbers. The two exceptions to this rule are a nicking of a viscus, or the finding of the penetrating missile within its lumen.

8. Overlooking a perforation is an ever-present hazard. Complete visualization of the entire intestinal tract is warranted whenever possible.

9. Cotton suture for war surgery is being advocated with a sound basis of reasoning. It is inexpensive, compact and of proven value, even in infected wounds.

10. Drainage of the abdomen is to be avoided as a rule, but the instillation of sulfanilamide crystals in the peritoneal cavity and abdominal wound is indicated in all contaminated perforated abdominal injuries.

Finally, good surgery supported by ample transfusions of blood or plasma, use of sulfonamide therapy, with the aid of adequate preoperative first-aid assistance, and post-operative care, should lower the high mortality rate of perforated war wounds of the abdomen.

Practical Problems in Blood Grouping and Blood Transfusion*

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IN 1900 when Landsteiner discovered the iso-agglutinins causing fatal reactions after some blood transfusions, he laid the foundation for our extensive knowledge enabling us to give so many blood transfusions at present with relative immunity. Many reactions still occur, some of which we are able to obviate by newer discoveries, many of which have been made by Landsteiner and his co-workers. It was discovered that there were four main blood groups which were classified 1, 2, 3 and 4 by Jansky in Europe in 1907, and also by Moss in the United States in 1909. These two groupings were the same, except that the numbers 1 and 4 were transposed in the two groups, thereby leading to confusion and some mistakes. These groupings are rarely used any more and should be completely eliminated from use. All recent literature uses the International classification, which will be described below. Anyone who has noted the tags which the soldiers, sailors and marines have around their necks, will have noticed one of the letters of this classification stamped after the serviceman's name. The investigators in blood agglutinins have found the following factors:

CHART 1		
A	B	
A ₁	A ₂	
M	N	
P	Q	X
Rh		

All human red blood cells have been found to have either A or B, both of them, or neither of them, which results in the four main blood groups as listed in Chart 2.

CHART 2				
AB	A	B	O	
1	2	3	4	Moss classification
4	2	3	1	Jansky classification

In Chart 2 it will be noted that the International classification takes its name from the agglutinogens found in the red blood cells. The Moss and Jansky classifications are included for orientation. In these four main blood groups, the serum of every person contains the agglutinin against the agglutinin or agglutinogens not found in that person's red blood cells. This holds true only for the four main blood groups, as all the other subgroups listed in Chart 1 contain no natural agglutinins in blood serums, except in occasional rare reported cases. Agglutinins can be built up against the subgroups, however, which becomes a very important point to be discussed later.

CHART 3				
AB	A	B	O	International classification
o	b	a	ab	of Landsteiner
5%	40%	10%	45%	

In Chart 3 are noted the agglutinins in the corresponding sera as described above. The percentages given under

these groups are approximate percentages as found in the United States population. These blood characteristics are transmitted according to definite Mendelian laws, and it is interesting to note how these percentages vary throughout the world.

CHART 4 ¹				
	AB	A	B	O
United States	5%	40%	10%	45%
Chinese	10%	25%	35%	30%
English	5%	40%	15%	40%
Filipino	1%	15%	20%	64%
Bush Negroes, Dutch Guinea	0	0	17%	83%
Tibetans	25%	47%	13%	15%

The A and B when present are dominant over the O. An interesting speculation results when noting the groups of bush negroes of Dutch Guinea. Their progenitors apparently contain no A factor. Reviewing a little genetics, we find that a person's characteristics are all derived from his parents, and are transmitted through the genes, so that each person's characteristics, whether demonstrable or not, are his genotype. The demonstrable characteristics are the phenotype, thus a person of blood group B, which is the phenotype, can be either a BB or a BO, which is the genotype. Of course an O can be only an OO, because A and B are dominant. These are the genotypes and no method is known at present for the determination of genotypes.

CHART 5			
B	—	BB	BO
O	—	OO	OO

CHART 6 ²		
Parents	Children Possible	Children Not Possible
O x O	O	A, B, AB
O x A	O, A	B, AB
O x B	O, B	A, AB
A x A	O, A	B, AB
B x B	O, B	A, AB
A x B	O, A, B, AB	
O x AB	A, B	O, AB
A x AB	A, B, AB	O
B x AB	A, B, AB	O
AB x AB	A, B, AB	O

Chart 6 shows how these characteristics are transmitted and the children which can result from the union of certain types of parents. We see from this chart that children do not have to be of the same blood groups as their parents. In fact, when O and AB parents have children they cannot be of the same groups. They do, however, have one of the genes of each parent, and no matter how one crosses these genes, no children of O and AB parents will result in the same group as the parents. See Chart 7.

CHART 7			
One parent	AB	AB
			×
Other parent	OO	OO

This knowledge is important in paternity cases and baby mix-up cases. It should be remembered that these

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tests are exact in exclusion cases of a limited number of possibilities, and not determination cases, as one main blood group cannot be identified from another of the same type. You will recall the baby mixup case in Chicago a few years ago when Mr. and Mrs. B came home with a baby labeled W, and Mr. and Mrs. W came home with a baby labeled B.

CHART 8

	<i>Group</i>
Mr. B.	AB
Mrs. B.	O
Baby labeled W.	O
Mr. W.	O
Mrs. W.	O
Baby labeled B.	A

Blood tests revealed what is found in Chart 8, proving that the labels on the babies were correct.

Recently we were called to investigate a murder case, in which a man was found with his head crushed by an axe which was lying nearby. There was a pool of blood on the floor and blood on the axe handle and head. The dead man was found to be in Group B, as was the blood on the axe head. A suspect was found, who had many blood stains on his overalls. The suspect was found to be in Group A, and he claimed that the blood on his overalls was from a cut on his hand. He demonstrated the cut, and his alibi held good because the blood from the overalls also proved to be Group A. It was then decided to test the blood on the axe handle, which was found to be Group A. When confronted with this information the suspect confessed, thereby saving the county an expensive trial. It must be emphasized again, however, that any Group A person's blood on the axe handle would have given the same test, and the finding was only one of possibility or probability used in conjunction with other known facts. In paternity identification, in approximately 16 per cent of cases, and in about 40 per cent of cases of interchange of infants, when the main blood groups fail, the subgroups are often of valuable help; for instance, in Chart 9 we see that the M and N factors are of further help.

CHART 9²

<i>Parents</i>	<i>Children</i>
M x M	M
N x N	N
M x N	MN
M x MN	M, MN
N x MN	N, MN
MN x MN	M, N, MN

Using all the subgroups and the main groups, it is now possible to determine the paternity in approximately 40 per cent of cases, and settle about 70 per cent of the cases of interchange of infants.²

Applying the knowledge we have to transfusion reactions, we know now that the following are the causes of most of such reactions:

CHART 10

1. Pyrogens in apparatus.
2. Wrong blood type.
3. An O donor to a different blood type when the O blood has a high ab titre and the patient is very anemic.
4. Repeated transfusions of Rh-positive donor to a Rh-negative patient, possibly some other subgroups also.
5. An Rh-sensitized mother.

Apparatus for giving transfusions must be thoroughly

and properly cleaned, with boiling for five minutes in 5 per cent sodium hydroxide solution a very important step. We have had one recent series of 128 transfusions without any reaction; previously mild reactions were common, which we feel were due to small amounts of dry blood and pyrogens not removed from the apparatus. Using the wrong blood type is, of course, an inexcusable error. No. 3 of Chart 10 reminds us that O blood can give reactions, whereas this group has been called the universal donor.³ Why is Group O called the universal donor and Group AB the universal recipient? One of the fundamental precepts of serology is that when an agglutinin meets its corresponding agglutinin under favorable conditions, AND IN SUFFICIENT TITRE, agglutination results. The Widal test is a common example.

You will note in Chart 3 that O blood, the so-called universal donor, contains the ab agglutinin in its serum. The reason that the ab of this blood does not cause agglutination, when given to the A, B, AB of the other blood groups, is that it is usually diluted so that it cannot react IN SUFFICIENT TITRE. The reason that AB blood is the so-called universal recipient is because it has no agglutinin in its serum to react with the A and B agglutinin. And the ab, a, b agglutinins are sufficiently diluted so as to be unable to react on the patient's AB. If, however, the donor's serum is of a high titre and in sufficient amount, it could cause agglutination of the AB. This is one of the reasons why O blood is not always a universal donor, nor AB blood always a universal recipient. In preparing plasma, all the A, B, and AB factors are removed, leaving only the agglutinins a, b and ab. The plasma is pooled, thus diluting the strength of each one, and there is some deterioration in its strength on standing. These two factors, plus the dilution in the patient's blood, usually make plasma perfectly safe to administer in rather large amounts. However, cases⁴ have been reported where it is believed that these agglutinins have caused reactions. It will be recalled that the body contains no natural agglutinins against the subgroups. Wiener and Peters,⁵ in 1940, made a very important discovery of a new factor in blood which they called Rh. They called it Rh because they used blood of macacus rhesus monkey to produce the antibody in other animals. They found that 85 per cent of humans carried this antibody and 15 per cent did not. This has been verified in further studies.⁹

Cases of fatal reaction have been reported many times, though the blood was completely compatible as far as the four main blood groups were concerned.^{3,5,6} The Rh studies were applied to some of these cases, and it was found that an Rh-negative person can be sensitized to build up an antibody against Rh-positive blood by repeated transfusion of Rh-positive blood, even though in the same blood group.⁷ The old erroneous impression that a person's blood group changed after several blood transfusions probably had its origin in cases of Rh sensitization. This rarely occurs after the first transfusion, but usually becomes increasingly severe with each following one. This antibody is built up much the same way as typhoid antibody is built up after repeated typhoid

vaccine inoculations. This is of extreme importance in pregnant or postpartum women, and is important many years postpartum, as well. Given a susceptible Rh-negative woman, married to an Rh-positive man, she becomes pregnant and carries an Rh-positive child. Some of the child's Rh positive seeps through a defective placenta into the mother's blood, and immunizes her against the Rh factor. By diffusion, this antibody passes back into the fetus, causing hemolysis of its blood. If this reaction starts early, and is severe, the fetus dies in utero and a stillborn results. A certain number of these stillborns are hydrops fetalis; some are accompanied with hydramnios. Surviving infants have hemolytic anemia neonatorum, or icterus gravis type of erythroblastosis. A certain number of the survivors are unable to overcome the agglutinin and die. Henderson⁸ recently studied 53 cases of erythroblastosis and found the following: 20 per cent were stillborn, 45 per cent died, and 35 per cent recovered. Sixteen of the mothers had two cases each, and four mothers had three cases each. The latter bears out the impression that erythroblastosis is familial.

Within the past two years we had a case¹⁰ in the hospital which brought to us forcibly the danger of transfusion in a pregnant or postpartum woman. This woman, aged twenty-eight years, Para I, was brought in some 60 miles, with the diagnosis of partial placenta previa, because of severe hemorrhage after rupture of the membranes. She was delivered of a living male child, and a diagnosis of extensive premature separation of the placenta was made. Because of anemia and the possibility of infection due to several vaginal examinations, the attending physician advised a transfusion. The patient was Group AB (the so-called universal recipient). Blood was matched and cross-matched, and she was given 500 cc. from an AB donor. No reaction resulted until about four hours later, when she developed pain in the back, and a chill. The urine at first was black, filled with albumin and hemoglobin. She developed anuria, became jaundiced, and died approximately forty-six hours later in spite of all treatment. Blood was taken before death, rematched and cross-matched with the donor, and found to be compatible. At that time we were unable to check for the Rh factors, but our assumption is that it was the cause of this fatality.

This reaction can, however, probably be explained by the fact that the process builds up further agglutinin with each pregnancy. An important advance in the treatment of erythroblastosis has resulted from these investigations. The mother's blood should not be used in transfusing the baby, because further agglutinin will be added. The infant should have large amounts of compatible Rh-negative blood, and it is expected that in the future the percentage of survival in erythroblastosis will be greatly increased. We have at present a recently born infant¹¹ in the hospital who is recovering from erythroblastosis under this treatment. For about two weeks after birth the infant's nucleated cells were 18,000 per cubic millimeter, one-half of which were normoblasts. We are now using this mother's serum for Rh tests, because it is strong in the anti-Rh agglutinin.

Whenever possible, in pregnant or postpartum women or any person receiving repeated transfusions, the patient should be tested for anti-Rh agglutinin. A rather simple cross-match as described by Levine¹² and Wiener¹³ is probably as valuable or even more so, because it might pick up other irregular iso-agglutinins. This method is described below.

In a small clean test tube put 2 drops of the patient's serum with 1 drop of a 2 per cent suspension of the donor's cells in physiological saline. The cells should be washed once in saline solution. Incubate at 37° for 30 minutes and centrifuge slowly for 1 minute. Rh agglutination is usually not marked but a wrinkled or granular edge of the sediment is positive. Further inspection can be made by very gently shaking the tube as the agglutination is easily broken up.

Since this paper was written, the author had a personal conversation with Dr. Wiener in which Dr. Wiener described a biologic test for incompatibility. It is carried out by starting an intravenous injection of isotonic glucose or saline, and giving 50 cc. of the donor's blood in this solution. Wait one hour and draw 5 to 10 cc. of the blood into an equal amount of 2½ per cent sodium citrate in saline. Centrifuge or allow to settle out by standing, and if there is any definite yellow or orange tint to the supernatant liquid, it is probably unsafe to give the blood.

CONCLUSIONS

1. The old numbered classifications of blood groups should be discarded for Landsteiner's, the International classification of Ab, A, B, and O, which has universal usage and a scientific interpretation.
2. O blood is not always a universal donor, and blood of the same group is probably preferable in most cases.
3. In cases receiving multiple transfusions, or in pregnant or postpartum women, the Rh factor must be considered and guarded against.
4. More cases of erythroblastosis can probably be saved if Rh-negative blood is used.

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AMERICAN STUDENT HEALTH ASSOCIATION MONTHLY NEWS-LETTER

ARMY SPECIALIZED TRAINING PROGRAMS

Pursuing our stated policy of circulating reports from various schools on plans adopted to provide medical service for Army Specialized Training Programs, we quote the following from a letter dated June 11, 1943, from Dr. O. N. Andersen, General Director of the School of Health and Director of the Men's Health Service at Stanford University:

"Because of the proximity of regular Army facilities to the Stanford Campus, we have arranged, with the approval of the Army Medical Corps representatives, to supply only daily sick call, ambulatory service, and minor emergency service to the Army units stationed on the campus. At present there are approximately 1400 here in engineering, language area studies, psychology, and for reclassification.

The plan under which we are now operating has the following characteristics:

Dispensary service:

- (a) Treatment in dispensary by competent physicians of sick or injured persons, and all physical examinations and advice connected therewith, daily including Sunday.
- (b) Furnishing of medicines, surgical dressings, and other supplies incident to the foregoing, excepting vaccination and inoculation materials.
- (c) Routine laboratory procedures incident to diagnosis and treatment of ambulatory cases, including fluoroscopic examinations.
- (d) Treatment facilities of Stanford Physical Therapy Division.
- (e) Conduct of routine and special physical examinations, examinations of food handlers, inoculations, and sanitary inspections.

All hospitalization except severe emergency cases is at regular Army facilities in the area. Severe emergency cases are hospitalized in our local Palo Alto Hospital.

Army facilities also furnish specialized examinations, refractions and lenses, and routine dental work.

The cost to the Army for this service has been estimated to be approximately \$1.04 per soldier per month. However, this figure is subject to adjustment from time to time as our experience with costs increases. We understand there may be a re-examination and adjustment after each three-months period.

The physical education program has been patterned after the recommendations of the War Department Training Circular No. 87, which, no doubt, is being followed by most of the colleges with Army specialized training units. This calls for six hours per week, with specified requirements in four general areas, that is, combatives, team sports, gymnastics and obstacle course, and aquatics. Beginning with the summer quarter, one hour of the six will be devoted to a course in military hygiene."

PERSONAL ITEMS

Dr. Ruth Stephenson resigned as director of the Health Service, New Jersey College for Women, to enter war work with the Edward G. Budd Manufacturing Company in Philadelphia, June 1st.

President Carter Davidson of Knox College reports the appointment of Dr. George H. Musselman, for several years Medical Director of the People's Gas, Light and Coal Company of Chicago, as College Physician, Professor of Hygiene and Director of the Student Health Service.

Dr. B. I. Bell has recently been appointed Student Physician at the College of William and Mary, succeeding Professor L. Tucker Jones, who died December 1, 1942.

Succeeding the late Dr. Lee H. Ferguson, Dr. A. B. Denison has been appointed acting director of the Health Service at Western Reserve University.

Dr. Henry J. Pleasants, Medical Director of the West Chester State Teachers College the past two years, resigned June 1st.

Dr. Charles M. Rieber is on leave from Queens College for military service.

H. F. Kilander, former Professor of Health Education at Panzer College, is now with the Federal Security Agency as Nutrition Representative. Warren H. Southworth, D.P.H., succeeds him at Panzer.

Dr. Embree R. Rose is acting director of the Ohio University Health Service in the absence of Dr. E. Herndon Hudson, who is now a Lieutenant Commander in the Navy.

Dr. Eleanor Nelson, College Physician, is the representative in our Association from Mills College replacing Miss Edith Lindsay who is now on the faculty at Stanford University.

A.S.H.A. DIGEST OF MEDICAL NEWS

Enormous Doses of Chlorine Necessary to Kill E. histolytica Cysts in Water. F. J. Brady, Myrna F. Jones, and Walter L. Newton in the April 1943 issue of *War Medicine* conclude as the result of 1894 examinations of 1233 cultures that:

(1) The doses of chlorine now recommended for killing *Endamoeba histolytica* cysts in drinking water (3.77 mg. calcium hypochlorite per liter) cannot be relied upon.

(2) The use of 7.54 mg. per liter of calcium hypochlorite for 20 minutes killed the majority of cysts but not all.

Pandemic Influenza Not Distinct From Ordinary Epidemic Influenza. At the National Conference on Planning for War and Postwar Medical Services in New York City March 15, 1943, Dr. Thomas Francis, Jr., expressed the belief that pandemic influenza, such as we experienced in 1890 and 1918, is not a strange infection arising spontaneously in a population but rather a modification of our ordinary virus-caused epidemic influenzas. In this belief Dr. W. G. Smillie concurred, adding the

observation that our frequent exposure to ordinary epidemic influenza in community living in temperate climates built up a "mosaic of overlapping antigens which produces a relative degree of community immunity to epidemics." Dr. Smillie stated that when the 1918 epidemic of influenza struck the village of Okkak on the Labrador coast the population of the whole village was wiped out with the exception of the Moravian Missionary and his wife.

Supply of Physicians Greater in U. S. Than Elsewhere. In the May 1, 1943, *Journal of the American Medical Association*, Dr. Fishbein made the following estimate of the supply of physicians for the civil population:

In U. S. at beginning of war, 1 physician to every 700 persons.

In U. S. Jan. 1, 1943, 1 physician to every 1500 persons.

In Great Britain Jan. 1, 1943, 1 physician to every 3000 persons.

In Sweden Jan. 1, 1943, 1 physician to every 2500 persons.

In Germany, Jan. 1, 1943, 1 physician to every 8000 to 12000 persons.

Numbers of Immigrants Admitted to U. S. Much Below Quota. F. P. Keppel, a member of the two-man board of appeals set up to pass on applications for immigration stated, at the National Conference on Planning for War and Postwar Medical Services, "There seems to be a widespread impression that great hordes of unwashed and ignorant foreigners are beating at our doors. The facts are that, if every single application received in the year 1942 had been approved and if every single holder of a visa had been able to get here, the total would have been less than 10 per cent of the immigration under the quota system in a normal prewar year. But less than half the applications are actually approved, and a high proportion, I should say fully one-half of those who were granted visas, have not been able to use them."

American Longevity Continues to Increase. Tables are presented in the April, 1943, issue of the Metropolitan Life Insurance Company's Statistical Bulletin which show the following facts:

(a) In Continental U. S., for white males, the expectation of life at birth in 1941 was 63.39 years; the expectation at age 40 was 30.13 years.

(b) In Continental U. S., for white females, the expectation of life at birth in 1941 was 68.08 years; the expectation at age 40 was 33.53 years.

(c) In Continental U. S., for colored males, the expectation of life at birth in 1941 was 53.48 years; the expectation at age 40 was 25.41 years.

(d) In Continental U. S., for colored females, the expectation of life at birth in 1941 was 56.77 years; the expectation at age 40 was 27.64.

Sulfonamide Treatment of Shigella dysenteriae Infections. A. V. Hardy et al. in the April 30, 1943, issue of *Public Health Reports* state that, though prevailing medical opinion appears to favor the use of the poorly ab-

sorbed sulfonamides, their findings indicate that the use of the readily absorbed sulfonamide must also be considered. In these cultural and clinical studies, sulfadiazine appears to be a promising chemotherapeutic agent against the *Shigella dysenteriae* infections.

Ascorbic acid content of Tomatoes Differs with Variety of Tomato. Eugene C. Auchter stated in a series of lectures in Washington, March 11 and April 15, 1942, that studies made by the Department of Agriculture Regional Vegetable Breeding Laboratory at Charleston, S. C., had shown a variation in the ascorbic acid content of 33 varieties of tomatoes from 10 mg. per 100 grams to 22 mg.

Malaria a World-Wide Menace. Dr. L. T. Coggeshall at the National Conference on Planning for War and Postwar Medical Service held in New York City, March 15, 1943, stated "We must conclude that the potential danger of malaria during the present war is a greater worldwide menace than ever before." To combat this hazard, the speaker advised (a) at the first sign of malarial outbreaks in this country an all out effort by local, state and federal public health authorities (b) more training centers for malariologists and more opportunity for fundamental research in malariology.

Salmonella in Retail Meat Products. Cherry, Scherago, and Weaver in a recent investigation have found *Salmonella* in 5.2 per cent of a large variety of retail meat samples. Because they were able to isolate *Salmonella* from the mesenteric lymph glands of 10 per cent of apparently normal slaughtered hogs, the authors feel that the source of *Salmonella* in retail meats may often be the animals themselves. (*Am. J. Hyg.*, Mar. '43.)

Limitations of X-ray Film Inspection of Chest. J. A. Myers in a review of an article in the May 1943 *Journal of School Health* concludes as follows:

X-ray film inspection of the chest, alone, is an extremely unsatisfactory procedure for the following reasons: (1) It detects possible evidence of tuberculosis infection in not more than one-fourth to one-third of the persons actually infected. (2) It aids one in visualizing only 75 per cent of the lungs. (3) It misses extrathoracic lesions which may be eliminating large numbers of tubercle bacilli through urine or discharging sinuses. (4) Many cases are on record with tubercle bacilli in the sputum, whose x-ray films reveal no evidence of disease in the lungs. (5) It does not permit a diagnosis of etiology of pulmonary lesions, since shadows cast by tuberculosis often are identical with those cast by other diseases. Many persons have lost their positions and have been admitted to sanitariums because of this fact.

Survival of Tubercle Bacilli in Books. C. R. Smith in the *American Review of Tuberculosis* as abstracted in the *Journal of the American Medical Association* of January 23, 1943, reports, as the result of his experiments, that tubercle bacilli in sputum placed on the leaves of books remain alive, if the books are closed with the pages still wet and stored in a dark unheated cupboard, for two weeks to three and one-half months. Books used by patients with a positive sputum should not be used by others until they have been stored at least one month.

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VIRUS PNEUMONIA

Osler, borrowing the term that John Bunyan had applied to consumption, said that pneumonia was then the "Captain of the Men of Death." It is undoubtedly the most widespread and fatal of all acute diseases. The greatest progress in the past fifty years has been in the realm of infections and anything new must command our interest.

We must admit that the most conscientious observers felt that pneumonia was pretty much a self limited disease, with a fairly definite crisis on the eighth to the tenth day and that little could be done to shorten this period. In Germany the use of digitalis was popular, but it was usually administered symptomatically when the pulse showed weakness, when as a matter of proven fact it should have been given in heroic doses at the onset of the congestion. Ice cold compresses to the entire chest like a jacket, and generous amounts of cognac constituted the most widely used treatment in Sweden. At the

Postgraduate Hospital in New York, pneumonia patients were put on the roof where snow and wind were permitted to sweep over the unsheltered patients' beds, and for a few years this practice came into vogue in other parts of the country. The greatest reaction came with the advent of flu-pneumonia which definitely did not do well in a cold temperature. Then, typing came along and we had thirty-two varieties in this classification, and biological chemists scurried about to supply sera appropriate to each case. There was a gleeful cry of "Eureka"; but, with sufficient reserve, as becomes our scientific guild, no oxen were sacrificed. Then with dramatic suddenness the sulfozones were born and gave some promise of being a panacea in every form of infection. Now, with all this progress, we are finding a pneumonia that cannot be typed, that cannot be classified by any known organism, and that does not behave like any previously known pneumonia. It is due to a virus. It has an insidious, febrile onset with no significant findings for some days,

negative sputum, an unproductive cough and at first a peribronchial infiltration recognized by roentgenological study only. Later, this extends to a pseudofibrosis, also referred to as a "wire-grass" type of infiltration. We must be on the lookout for this condition. In spite of sera and sulfa drugs, the Metropolitan Life Insurance Company has reported considerable increase in pneumonia mortalities. It may be that this filtrable virus, through further animal inoculation studies, will furnish an explanation.

A. E. H.

WASSERMANN PROBLEMS

It is rare to meet a man these days who hasn't had a recent physical examination. There never was a time when so many people were being examined so many times for so many things. The name of Wassermann is approaching that of Santa Claus in household parlance, but Dr. Wassermann is not always the last authority on what a man has, any more than Santa is on what he is going to get.

Serological tests for syphilis should be and are included in all complete physical examinations. Doctors remaining in civilian practice who do a great many examinations for local defense industries are beset continually by problems in connection with routine blood tests.

Foremost, is the problem of false positives. There is nothing so embarrassing or time-consuming as the explanation of a false positive test turned up in the course of routine examinations. Benjamin S. Kline, M.D., of Cleveland, wrote an article for the *Ohio State Medical Journal* for May, 1943, which is brief, clear, and pertinent. There is also an excellent article "The Interpretation of Serologic Reactions" by George V. Kulchar, M.D., in the *California and Western Medicine* for December, 1941. No doubt there are others which have not come to our attention.

False positive reactions may be "technical" or "biologic". The former is due to error in technical performance and should be fairly easy to trace and exclude. The latter is also rare, but is usually due to some condition other than syphilis which, temporarily at least, provokes a positive response to some or all of the serological tests. Aside from yaws and leprosy, which we are little concerned with at the present time, malaria at some time in its course is very apt to produce positive serology. Mononucleosis is said to offend in as high as 20 per cent of cases. Vaccinia was reported as the cause of 16 per cent positive reactions in a group of 263 persons tested before and after primary vaccination. Scarlet fever, Rocky Mountain spotted fever, subacute bacterial endocarditis, lymphopathia venereum, are only a few of the many diseases which occasionally give rise to false positive reactions. To these must be added hyperproteinemia with increased serum globulin from any cause as a possible source of serological confusion.

Suggestions for following up the indeterminant reactions have been made by Moore, Eagle, and Mohr, and are briefly stated: First, by means of questioning, physical examination, blood smears, heterophile titer, and sedimentation rate, a search is made to disclose recent or

intercurrent infections. Then, a complete serological study is instituted, examining the spinal fluid where indicated. Positive tests with increasing titer usually mean early syphilis, whereas those which are less positive and have decreasing titers probably do not.

Pre-employment examinees occasionally remark that they have already had several blood tests within the month, and the question arises if we are not wasting time and material when the tests are made at the same laboratory. Inquiry at the Minnesota State Board of Health Laboratories indicates that it is less costly to repeat the tests than to check and clear the names of the thousands of negative reactors. In the positive or questionable cases, the record is always checked for previous serologic tests.

To use a Hibernianism, the "doubtful positive" is one of those rare conditions that we run into every day. There is, however, an orderly procedure, which followed, dispels the doubt.

L. M. D.

Book Reviews

Chemotherapy of Malaria, a review of the biological and statistical background of malaria, and of the literature on anti-malarial chemotherapeutic agents, by DR. JAMES H. WILLIAMS, Stamford Research Laboratories, American Cyanamid Company. New York, 1943, by Lederle Laboratories, Inc., 8½x11, bound in heavy blue paper, sent free on request to research workers in the malarial field.

Dr. Williams and the Lederle Laboratories have rendered a great service to the community in the publication of this valuable compilation.

For several centuries, malaria has been and still is mankind's "Public Enemy No. 1," whether considered from the standpoint of distribution, morbidity or mortality. For over 300 years quinine, or its source material (cinchona bark), has been the chief remedy for the disease, and it is unquestionably true that no drug in the history of mankind has relieved so much suffering or saved so many human lives. In recent years 90 per cent of the world's supply of quinine, and 95 per cent of our own requirements, have come from Java. The occupation of that island by the Japanese has, therefore, resulted in a serious situation for our Allies as well as for ourselves. Some useful synthetic remedies already have been developed and are now available, but the Surgeons General of the Army, Navy and Public Health Service have requested intensive and concerted efforts to find new and superior antimalarials.

Certain governmental laboratories, as well as those of many universities and research institutions, and pharmaceutical plants, are busily engaged in this task at present. Such investigations can be conducted intelligently, and without waste of time, energy and money through duplication and overlapping, only when based upon a thorough knowledge of what has already been done in this field. The literature on the chemotherapy of malaria is so extensive and so widespread that its compilation, classification and publication is a laborious, difficult and onerous undertaking. It is therefore a great boon to all workers in this field to have now placed at their disposal this thorough and scholarly review, and it will be warmly welcomed by organic and biochemists, pharmacologists, and members of the medical profession.

The work is presented in five parts: I. Introduction and Biological Background, II. Sulfonamide Compounds and Sulfones as Antimalarials, III. Amidines as Antimalarials, IV. Quinoline Compounds (exclusive of the cinchona derivatives) as Anti-

malarials, and V. Acridine Compounds as Antimalarials. Each part begins with an itemized Table of Contents, followed by a detailed discussion of individual compounds, with graphic formulas, tables, etc., and concludes with a bibliography of patents and literature references.

Essentials of Proctology, by HARRY E. BACON, B.S., F.A.C.S., F.A.P.S. Philadelphia: J. B. Lippincott Co., 361 pages, 168 illustrations, 1943, price \$3.50.

Essentials of Proctology, by Harry Bacon, will be accepted by proctologists who are personally acquainted with the author with a feeling of great satisfaction, because of the knowledge that the author is in a unique position by virtue of training and experience to present such a book. On the other hand, those physicians who are in the habit of referring to Dr. Bacon's original textbook, *Anus, Rectum, Sigmoid Colon*, will probably continue to use that book rather than the new abridged volume.

The innovation by the author of an index of symptoms and signs in the fly-leaves of the book is indeed a worthy contribution and will be appreciated by those who become accustomed to its use. This type of index could well be adopted in many other texts.

Dr. Bacon has carried out his systematic approach to the different subjects in the same careful manner as he has in his original text. The book is replete with excellent photographs and diagrams. It must always be kept in mind that in this particular volume the author has attempted to present his own ideas chiefly. This is in contrast to his original book in which he has so very ably presented the many and diverse ideas on the different subjects.

The chapter on lymphogranuloma venereum has been presented very well and it would do most physicians a great deal of good to recognize the fact that this disease is more prevalent than generally thought and can be recognized if its possibility is kept in mind.

The general practitioner in particular will find this book an excellent help-mate in treating ano-rectal diseases.

Brucellosis in Man and Animals, by I. FOREST HUDDLESON, D.V.M., M.S., Ph.D. New York: The Commonwealth Fund, revised edition, 379 pages, 39 illustrations and 3 colored plates, with index, appendix, and bibliography, 1943, price \$3.50.

Nine years ago Dr. Huddleson published his first treatise, *Brucella Infection in Animals and Man*, which was rewritten, greatly expanded, and published in 1939 as *Brucellosis in Man and Animals*. The appearance of a revised edition attests to the success of this book. This edition presents important changes that have been made in laboratory methods of diagnosis and new facts pertaining to the nature of the disease. Three co-authors have contributed to the book. A. V. Hardy wrote the section Brucellosis in the United States; J. E. Debono, of Malta, discusses Brucellosis in Malta; and Ward Gilner wrote the chapter on the eradication and control.

In addition to these subjects, Huddleson discusses the brucella organisms, their characteristics, methods of isolation and differentiation. The clinical aspects of the disease, as well as the various methods of diagnosis and treatment, receive clear and interesting presentation. Huddleson presents a chapter on brucellosis in animals, and a chapter on laboratory diagnosis, divided into three parts: serologic methods, allergic methods and the opsonocytaphagic test. Wisely, the author has left out superfluous laboratory procedures, limiting this section to methods that are of practical importance to the physician.

In an appendix, 26 cases of brucellosis are reviewed with clinical and laboratory findings. A bibliography of 485 references appears at the back of the book.

Tables and charts are well arranged and valuable. The book is easy to read, and should be of value to the physician interested in this important disease, as well as to the laboratory and experimental scientist.

News Items

Dr. S. A. Slater of Worthington, Minnesota, a past president of the Sioux Valley Medical Association, has been elected to the executive committee of the National Tuberculosis Association.

Dr. I. R. Vaughn, assistant director of the division of vital statistics of the South Dakota health department, will head the recently established division of public health education for that state.

Dr. Tula Wilhelmina Gronewald, a member of the staff of the North Dakota state hospital for the insane, at Jamestown, has been elected a member of the American Psychiatric Association. She spent five years at Ferguson Falls, Minnesota, before going to Jamestown in 1940.

Dr. Jno. F. Montroy, a native of New York state and for 18 months with the Indian service at Fort Thompson, South Dakota, has taken over the duties of physician at Fort Totten Indian Agency to fill the vacancy left by Dr. M. S. Burdick, resigned because of ill health.

Dr. Ralph R. Parker, director of the Rocky Mountain laboratory of the U. S. Public Health Service at Hamilton, Montana, and successor to Dr. Herald R. Cox, JOURNAL-LANCET lecturer for 1942 at University of Minnesota, was awarded the honorary degree of doctor of laws on May 23 by Massachusetts State College at Amherst, of which institution he is a 1915 graduate. Dr. Parker is a world authority on Rocky Mountain spotted fever. His research on that subject and on tularemia often have been cited as models to be followed by investigators who study similar diseases in different parts of the world. In the May 14, 1943, issue of *Public Health Reports*, Dr. Norman H. Topping, past assistant surgeon of the United States public health service, writing on Rocky Mountain spotted fever as studied in the division of infectious diseases, National Institute of Health, acknowledges gratefully the advice and assistance furnished by Dr. Parker. Since leaving college, Dr. Parker has spent all his professional life in his special branch of medical entomology, relating to ticks and tick-borne diseases. He was co-discoverer, with Dr. Roscoe Roy Spencer of Bethesda, Maryland, of a prophylactic vaccine, the use of which, in more than ten years, has proved its value in saving human lives endangered by the virus of the fever carried from animal to animal. He discovered the presence of bubonic plague among the rodents of southwestern Montana.

Dr. W. R. Geidt, assistant state health officer at Pierre, South Dakota, and recently acting superintendent of the board of health, has resigned to accept a position as epidemiologist for the state health department of Washington.

Dr. Theodore E. Bratrud of Minneapolis received the Marquette University alumni award for a paper submitted at an alumni clinic of the university's medical school. His topic was "Congenital Adrenal Hyperplasia." Dr. Bratrud is a member of the faculty of the University of Minnesota medical school.

Recent service transfers include Lt. Robert M. Catey of Mobridge, South Dakota, from reception center at Jefferson Barracks, Missouri, to station hospital at Camp Phillip, Salina, Kansas, thence to overseas service; Dr. G. Alfred Dodds of Valley City, North Dakota, from infirmary at Ft. Rosecrans, San Diego, California, to Seattle, Washington, point of embarkation; Lt. Col. Ralph B. Kettlewell of Sauk Centre, Minnesota, Divisional Surgical Officer, to A.P.O. from Los Angeles; Dr. Marvin Nerseeth of Klamath Falls and Chiloquin, Oregon, from Fort Lewis, Washington to Camp McQuade, California.

Lieutenant Julius Winer of Minneapolis, incorrectly reported at Dale Malry Field, Florida, is at Grand Central Palace induction station, New York City.

Dr. Virgil Lundquist of Willmar, Minnesota, graduated from University of Minnesota school of medicine March 18, is now stationed at Camp Farragut, Idaho.

Dr. R. Wynn Kearney, practicing as a physician at Mankato, Minnesota, for the last several years, was commissioned a captain in the medical corps on his enlistment and is attending Harvard University medical school for a surgery course before going into active duty.

Dr. Jno. G. Lamont, formerly of Minneapolis, now superintendent of Grafton (North Dakota) state school, attended the annual convention on mental deficiency in New York City, May 12 to 15.

Dr. P. O. C. Johnson of Watford City, North Dakota, has resumed medical practice after a period of ill health during which the city and McKenzie county were without the services of a resident physician.

Dr. Rudie J. Carlson of Merrill, Iowa, has removed to Sisseton, South Dakota, and will practice medicine and surgery at that point.

Dr. John G. Lohmann, physician and surgeon of Jasper, Minnesota, has purchased the equipment of Dr. Eugene F. McElmeel of Pipestone, Minnesota, a former associate, and will begin his practice at Pipestone, July 1, at which time Dr. McElmeel will enter upon a three year fellowship in ear, nose and throat work in Minneapolis. Both doctors have been in practice for six and a half years.

Dr. Orio K. Behr of Crookston, Minnesota, a member of the Crookston clinic, will assume the medical responsibilities of Dr. Geo. W. Bohl of Ada, dividing his time between the two communities. He has taken over the residence and office properties of Dr. Bohl, who will locate in the west.

Dr. Theo. O. Wellner of Anoka, Minnesota, has opened a practice in Rochester in the quarters formerly occupied by Dr. John A. Paulson.

Dr. Carl A. Peterson of Chisago City, Minnesota, who was the attending physician of the Minneapolis Symphony Orchestra on tour for two years, has added to his practice that of Dr. Lorin Olson. Dr. Olson has left to join the nation's fighting forces.

Dr. Joseph R. Lenz, of Morton, Minnesota, expects to divide his time between Morton and Fairfax with headquarters at Morton.

Dr. Aloys F. Branton of Willmar, Minnesota, has been re-elected executive secretary of the Minnesota Hospital Association which entertained Dr. Durval Vianna, director of the Miguel Couto Hospital of Rio de Janeiro, Brazil, at the association's annual convention at Hotel Nicollet, Minneapolis, the last week in May.

Dr. Wm. C. Fawcett of Starkweather, North Dakota, member of the state board of medical examiners and former president of the state medical society, was the subject of notice in the *Devil's Lake Journal* of May 18. This consisted of a picture of Dr. Fawcett and his four doctor sons, reproduced from *The Diplomat*, February issue, together with comment on the medical records and distinctions of all five men.

At Sioux Valley Medical Hospital, Sioux Falls, South Dakota, all members of the present active and associate medical staffs were re-elected for the coming year at the annual meeting of the board of directors, held May 24. On recommendation of the staff, Dr. Jno. A. Kittelson, president; Dr. Emil G. Ericksen, vice president, and Dr. Wm. F. Sercl, secretary, were approved as officers.

The Veterans' Bureau of the United States government has settled a ten-years suspense by fixing Sioux Falls as the site of the proposed new hospital for South Dakota. Other cities to the number of seven, all east of the Missouri river, which had sought the allocation, are Madison, Brookings, Watertown, Aberdeen, Pierre, Huron, Mitchell and Yankton. President Roosevelt approved the bureau's recommendation May 14.

Dr. Earl Carlson of New York, specialist in physiotherapy applied to spastic condition of muscles, conducted a clinic at the crippled children's school of Jamestown, North Dakota, June 3 and 4.

The state of West Virginia Merit System Council announces unassembled examinations for higher positions in the state health department, notably director of communicable diseases and assistant director of communicable diseases (venereal), applications for which will be received continuously. Information and blanks are obtainable at any local office of county or state departments of health or by writing the merit system supervisor, Robt. Bingaman, Atlas Building, Charleston 1, West Virginia.

The American College of Chest Physicians, through its executive secretary, directs attention to the proposed plan for a United States military tuberculosis commission to be appointed by the surgeon general of the U. S. Army looking toward world planning for tuberculosis control, the proponent being Dr. Chas. M. Hendricks of El Paso, Texas, chairman of the council on military affairs and public health of the College. Dr. Robert E. Plunkett, another distinguished member, has characterized tuberculosis as the delayed-action bomb of the diseases of war.

Dr. Fred L. Adair, formerly of Minneapolis, heads the list of members of the editorial board of the new *Quarterly Review of Obstetrics and Gynecology*, an abstract journal about to make its appearance, with Washington, D. C., as its place of publication.

Dr. James F. Craig of Circle, Montana, presided at the annual convention of the Montana Public Health Association at Bozeman, June 7 and 8. Out-of-state speakers included Dr. Erval R. Coffey of Washington, D. C., assistant surgeon general of the United States; Dr. Fred T. Ford, medical officer of the ninth civilian defense office at San Francisco; Dr. Carl P. Buck of New York City, field director of the American Public Health Association, and Dr. A. B. Price, venereal control officer of the public health service office at Denver.

Dr. John Brody of the Murray Clinic of Butte, Montana, delivered an address entitled "Practical Application of Oxygen Therapy" at a meeting of the Silver Bow Medical Society Monday, May 24, in the Finlen Hotel, Butte. Present were officers of the Montana State Medical Association, Dr. E. D. Hitchcock, Great Falls, president; Dr. J. R. Ritchey, Missoula, president-elect, and Dr. Thomas F. Walker, Great Falls, secretary.

Lieutenant Harold P. Adams of the medical corps of the U. S. Army who was on the staff of the Huron (South Dakota) Clinic before joining the service, visited in Huron en route from Philadelphia to Boise, Idaho, where he will work in surgery at Gowan Field.

Necrology

Dr. William M. Copenhaver, Jr., 37, of Helena, Montana, died May 23 following a series of operations and protracted periods of illness caused by injuries received in a motor accident eighteen months before. For six months prior to his death, he attempted to carry on his practice. He was born in Bristol, Virginia, came to Helena at the age of five and was a graduate of Helena public schools and the University of Minnesota, having transferred to the latter from Dartmouth college. Dr. Copenhaver was active in civic affairs, the Y.M.C.A., the Red Cross, the medical society and his church, in many of which he held important offices.

Dr. Olaf O. Haraldson, 58, of Minot, North Dakota, director of the Minot-Ward county public health unit and former Northwood physician, died June 6. He was stricken two days previous while en route with a party of Minot Shrine club members to attend a ceremonial at Grand Forks. Taken to the home of his brother at Northwood, he suffered a second stroke. He practiced at Watertown, South Dakota, and at Northwood before coming to Minot where he has been for twenty years.

Dr. Henrik Tillisch, 65, of Brookings, South Dakota, died June 20. He was born in Bergen, Norway, and came to this country at an early age. He received his pre-medical education at the University of Wisconsin and his medical degree from Northwestern University in 1901. He practiced for many years in Canby, Minnesota, removing to Brookings in 1926 where he was the senior member of the Brookings Clinic. He had been a member of the South Dakota State Medical Association since moving to the state. About eight months ago he had a coronary episode and was out of practice for several months. He had recently been in the office part time but died from another attack.



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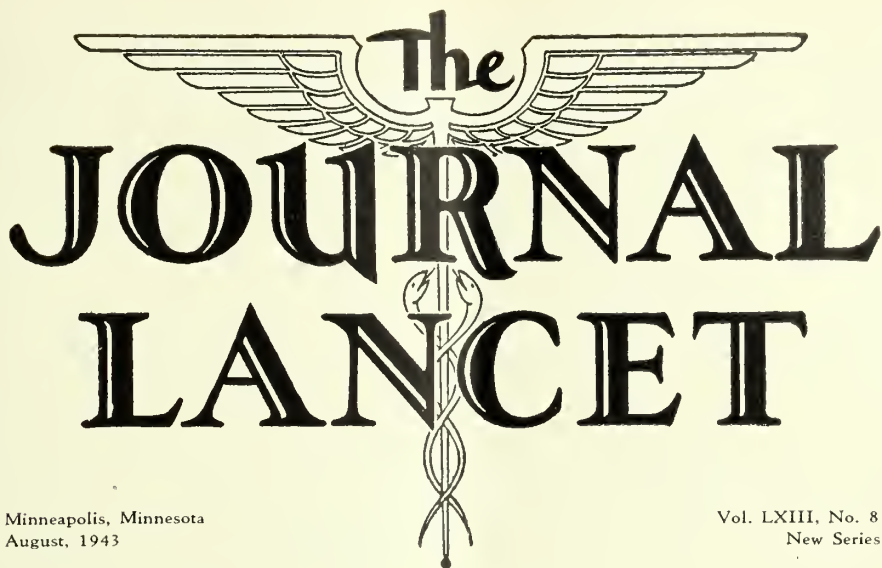


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The JOURNAL LANCET

Minneapolis, Minnesota
August, 1943

Vol. LXIII, No. 8
New Series

Transactions of the North Dakota State Medical Association

Fifty-Sixth Annual Session

Bismarck, North Dakota

May 10 and 11, 1943

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*Interim appointment by Council to fill vacancy caused by death of Dr. A. O. Arneson, McVille.

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G. W. HUNTER	Fargo
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(1943)

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(1943)

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PROCEEDINGS

of the
HOUSE OF DELEGATES
FIFTY-SIXTH ANNUAL MEETING
of the
NORTH DAKOTA STATE MEDICAL
ASSOCIATION

First Session, Sunday, May 9, 1943

The House of Delegates convened in the Rose room of the Patterson Hotel, Bismarck, North Dakota, and was called to order at 8:20 P. M. by the Speaker, Dr. John H. Moore.

Dr. C. C. Smith, Mandan, chairman of the committee on credentials, announced that sixteen delegates with proper credentials had registered.

The Secretary called the roll; fifteen delegates and one alternate delegate responded, and the Speaker declared a quorum present. The delegates present were: Doctors W. E. G. Lancaster, Fargo; G. W. Hunter, Fargo; J. B. James, Page; P. H. Woutat, Grand Forks; C. R. Tompkins, Grafton; W. A. Wright, Williston; D. J. Halliday, Kenmare; R. T. O'Neill, Minot; A. H. Reising, Wahpeton; C. J. Meredith, Valley City; R. H. Waldschmidt, Bismarck; O. T. Benson, Glen Ullin; C. C. Smith, Mandan; W. W. Wood, alternate, Jamestown; A. P. Nachtwey, Dickinson; G. C. Christianson, Sharon.

The Speaker introduced the President, Dr. A. R. Sorenson, who delivered the following address:

Mr. Speaker; Members of the House of Delegates. I am glad to welcome you here to this meeting, because, due to the changing conditions of the world today under which we are practicing, many important subjects will come up for discussion and settlement in this meeting. I am sure you will give your careful attention and study to these things, particularly the medical-economics side. The world is changing; the socialistic order is trying to come in—it may succeed. If we can govern and control the method of the practice of medicine from now on, we may escape a great deal of grief later on. I am sure you will have many things to settle and think of today—and not only today but in the future. You will undoubtedly be taking some of these thoughts with you. We will be much happier if they are settled by us rather than by some bureaucrat. I thank you for presenting this opportunity to me, Mr. Speaker.

On motion made by Dr. A. P. Nachtwey, Dickinson, seconded by Dr. R. T. O'Neill, Minot, and carried, the House dispensed with the reading of the minutes of the 1942 session and adopted the minutes as published and circulated in the September, 1942, issue of the JOURNAL-LANCET.

REPORT OF THE SECRETARY

Dr. L. W. Larson, Secretary, presented his report as printed in the Handbook, which was referred to the Reference Committee on Reports of the Secretary and Special Committees. The Secretary announced that the dues of a few members had been received since the Handbook was printed raising the number of paid-up members to 320. He also announced that the dues of one additional member had been cancelled because of Military Service.

The total membership for 1942 was 408. Of this number, 366 were paid-up members (one was admitted during the last half of the year and paid one-half the annual dues), 10 were Honorary Members and the dues of 32 members were cancelled because of military service. Table 1 shows the membership figures for 1939, '40, '41, and '42.

TABLE 1
Comparison of Annual Membership

	1939	1940	1941	1942
Paid memberships	394	387	374	366*
Honorary memberships	3	11	12	10
Dues cancelled, military service			14	32
Total	397	398	400	408

*One paid one-half year.

Membership dues for 1943 have been arriving satisfactorily. To date, 316 have paid their dues, 10 are Honorary Members and the dues of 58 have been cancelled because of military service. Table 2 shows comparative figures for 1943 and the preceding two years. The total is lower this year because one is eligible for Honorary Membership, three 1942 members have been forced to retire because of illness, 10 are active but delinquent; six members died; and 11 out-of-state members have failed to pay their 1943 dues, making a total of 31. A substantial number of the delinquents will undoubtedly pay their dues before the year is over.

TABLE 2

	May 5 1941	May 5 1942	April 20 1943
Paid-up members	339	352	316
Honorary members	12	10	10
Dues cancelled, military service		31	58
Total	351	393	384

Field Work. Again your Secretary is sorry to report that he has been unable to visit every district society in the state during the past year, mainly because of the burdens placed upon him as chairman of the Procurement and Assignment Service for Physicians in the state. Reports from the Councillors, as well as from District Society officers, indicate that the component societies, particularly the larger ones, are in good condition and have had good scientific programs during the past year. One observation merits comment and that is the very apparent interest in scientific programs which is being displayed by the older members of our profession, who are doing a magnificent job of taking over the medical practices vacated by their younger confreres who have gone into military service.

Distribution of Physicians. The past decade has seen a concentration of physicians in the larger centers throughout the United States. This trend has also been true in North Dakota, especially in the western two-thirds of the state. The entrance of a large number of our physicians into the service has not only depleted the reserve of physicians in the state but has seriously decreased the number of physicians available to the public in a few rural districts. This is true in spite of the efforts of the Procurement and Assignment Service to prevent such a situation. It is the duty of our organized profession to do what it can to relocate on a voluntary basis those few physicians who can be spared from their present locations in the larger centers.

Medical Economics. The greatly improved economic conditions in our state during the past two years have solved our problems in medical economics for the present. But we must recognize two possibilities in the future and be prepared to meet them. The first is the annual possibility of a crop failure, and the second is the apparent growth in support of some form of

socialized medicine. Unfortunately, we cannot control the elements and crop failures will occur, but the experience we gained during the recent drouth years will help us to weather that storm when it comes. The problem of socialized medicine is more difficult. It is a part of the "changing order" of which we hear so much these days. Change in our way of living is inevitable, but we, as an organized profession, must see to it that our National Legislators do nothing that will decrease the high standard of medical practice which is available to the American public today. To do this, there are many physicians throughout the land who believe that the American Medical Association should assume a more aggressive role in Washington, by the establishment of a Bureau whose duty it would be to inform congressmen and the public as to the facts of medical economics. The resolution covering this subject is worthy of your earnest consideration.

Prepayment Medical Insurance. Numerous plans, some sponsored by state medical societies and others not, are in operation throughout the country. Some of the former appear to be successful, although it is too early to be sure. The latter may become dangerous, because they are not always dominated by the medical viewpoint and are inclined to be more interested in the provision of cheap medical care for their clients than in good medical service. Attempts on the part of certain hospital insurance plans to include medical and surgical coverage should be scrutinized carefully, for they may eventually result in a control over the practice of medicine by groups of lay or professional individuals who have little regard for the effect their programs may have on the private practice of medicine.

Your Secretary was surprised to learn last November, while attending the conference of state secretaries in Chicago, that a survey conducted by the American Medical Association revealed considerable success on the part of Farm Security Administration medical care plans throughout the nation to provide medical care to Farm Security Administration clients, to the satisfaction of both clients and participating physicians. It is evident that the trials and errors of the Farm Security Administration plans in North Dakota have given government officials, as well as physicians, a good lesson in what "not to do." If the survey of the American Medical Association is indicative of the true sentiment throughout the country; if it is the policy of the Farm Security Administration to provide a sound medical care program for its clients; and if there is a demand for such a program in North Dakota by a substantial number of Farm Security Administration clients, our Association should consider the problem carefully and not be prejudiced by earlier experiences.

Our Committee on Medical Economics should continue its study of the various medical service plans which are in operation in scattered areas of the country. They are doing the spade work and providing the actuarial experience out of which may evolve some system of voluntary, medically controlled, health insurance which will satisfy our low-income-group citizens, even though it will not satisfy our politicians.

RECOMMENDATIONS

1. That Dr. A. B. Fields of Forest River be elected to Honorary Membership of our Association. Dr. Fields was licensed to practice medicine in Walsh county, in July, 1892. He is recommended for Honorary membership by the Grand Forks Medical Society.

2. That the President be authorized to appoint a small Committee on Nursing Education. This committee should study the problem of nursing education in North Dakota and cooperate with the State Hospital Association and the State Board of Nurses Examiners, so that they may have the benefit of our viewpoint, which I am assured they will welcome.

L. W. LARSON, M.D., *Secretary.*

REPORT OF THE TREASURER

Dr. W. W. Wood announced that his report had been incorporated in the report of the Council. He suggested that an investigation be made of the reported discrepancies between the subscription rates for the JOURNAL-LANCET for members of the Montana State Medical Association and members of the North Dakota State Medical Association. On motion duly made, sec-

onded and carried, the question of subscription rates for the JOURNAL-LANCET was referred to the editorial Committee on Official Publication.

REPORT OF THE CHAIRMAN OF THE COUNCIL 1942-1943

Dr. N. O. Ramstad, chairman, presented the following report which was referred to the Reference Committee on Reports of the Council, Councillors and Delegates to the American Medical Association:

Annual Meeting of the Council. First Session, May 18, 1942

The Council met in Jamestown during the 1942 Session of the North Dakota State Medical Association.

The Auditing Committee reported that it had examined the Treasurer's accounts and found them to be correct. The Treasurer's report was accordingly approved.

The contract with the JOURNAL-LANCET was renewed for three years. The annual subscription for the JOURNAL-LANCET remains at \$2.00.

The Chairman of the Council was authorized to send flowers and appropriate greetings to Drs. MacGregor and MacLachlan, former members of the Council, who were ill.

Second Session, May 19, 1942

The Council, with its newly elected members, met and organized. Dr. N. O. Ramstad was re-elected Chairman and Dr. G. M. Williamson was re-elected Secretary.

The bonds of the Secretary and Treasurer were ordered renewed. The Treasurer was instructed to invest \$3,000.00 of the Association funds in United States War Bonds.

The following budget for the fiscal year 1942-1943 was authorized, it being agreed that none of the amounts should be exceeded, without the approval of the Council.

Committee on Tuberculosis	\$ 50.00
Emergency Funds for the Council	250.00
Stenographic service, 1943 Session	150.00
Delegate to A. M. A.	200.00
President of the State Association	50.00
Emergency Funds for Chairman of the Council	100.00
Secretary of the State Association:	
Postage and office supplies	150.00
Telephone and telegraph	75.00
Travel expense	200.00
JOURNAL-LANCET	800.00
Allotment for Jamestown meeting	200.00

The salary of the State Secretary was set at \$1,200.00 for the coming year, to include his expense for stenographic help.

Drs. W. H. Long, H. D. Benwell, J. O. Arnson and G. W. Toomey were appointed to the Editorial Committee on Official Publication.

Drs. N. O. Ramstad, J. O. Arnson and L. W. Larson were authorized to edit and approve the transactions of the 1942 Session, to be published in the JOURNAL-LANCET.

Interim Session

The Council met in Fargo on January 6, 1943. The following business was transacted:

The problem of relocation of physicians to areas in the state in which there is a shortage of physicians was thoroughly discussed. The State Secretary was authorized to advertise in scientific journals, if necessary, to obtain physicians, it being understood that any such candidates must meet the professional and ethical qualifications demanded by the State Board of Medical Examiners.

A joint meeting was held with representatives of the State Dental, Veterinary, and Pharmaceutical Associations at which Mr. A. B. Crisler of the Federal Bureau of Narcotics discussed the advisability of enacting a uniform narcotic act and also a law to control the sale of barbiturates in North Dakota. The Council favored the introduction and support of these measures as did all the representatives of the other allied professions who were present.

It was decided not to send a representative of the state society to the Annual Industrial Congress in Chicago.

The deaths of Dr. G. B. Ribble, Councillor, and Dr. A. O. Arneson, First Vice President, were officially acknowledged with

deep regret. The State Secretary was instructed to send appropriate notes of condolence to Mrs. Arneson and Mrs. Ribble.

Dr. F. W. Fergusson of Kulm was appointed to succeed Dr. Ribble as Councillor for the Southern District until the next meeting of the House of Delegates. Dr. Wicks of Valley City was named First Vice President to succeed Dr. A. O. Arneson until the next meeting of the House of Delegates.

It was unanimously agreed that a meeting of the State Association, including a Scientific Program, should be held in 1943 in Bismarck.

The Council agreed that the State Association should not sponsor any medical legislation during the 1943 Session of the Legislature. It was agreed that several proposed bills to strengthen the State Health Department should be supported and that the Committee on Public Policy and Legislation should vigorously oppose any legislation that would increase the field of practice of the irregulars, or recognize any new form of irregular practice. Inasmuch as Dr. Fawcett, chairman of the Committee on Legislation, was ill, the Council authorized the State Secretary and Dr. H. A. Brandes to direct the activities of the Legislative Committee during the legislative session.

The Council unanimously agreed that no committee of the State Association should agree upon fees for medical work, such fees being the result of studies and activities sponsored by a committee, until the fee schedule has been approved by the Committee on Medical Economics. The State Secretary was instructed to notify each committee chairman to this effect.

Inventory of Property Owned by the Association as of March 31, 1943

Office equipment: typewriter, letter file, fan, ledger, mailing tray, staplemaster. Net cost	\$129.45
Less 12½% depreciation	16.18

\$113.27

N. O. RAMSTAD, M.D.,
Chairman of the Council.

REPORTS OF COUNCILLORS

The following reports of Councillors were referred to the Reference Committee on Reports of the Council, Councillors and Delegates to the American Medical Association.

First District

The CASS COUNTY MEDICAL SOCIETY, at the present writing, has 63 members in the group. These are full members and while all of them have not as yet submitted their 1943 dues, there is no reason to expect that they will not do so soon. Of these, 51 reside in Fargo.

Fourteen of the active members are now with the armed forces. Dr. Skelsey, one of the senior members, is stationed here locally at the Officers' Candidate School, commissioned as a First Lieutenant in the Medical Corps. No doubt his friends throughout the state will be interested in this.

At present the Society has one probationary member, one associate member and an application pending for probationary membership. During the past year, six new members were put on the roster. These are: Drs. E. L. Sederlin, now of Valley City, L. A. Nash, C. B. Darner, A. C. Burt, F. A. DeCesare, and M. J. Geib.

Dr. J. O. Sigurdsson of West Fargo, who was a probationary member in 1942, received a commission in the Army prior to election to full membership and his address is unknown. One member retired this year, Dr. T. P. Rothnem, who is now confined to his home because of ill health. One member, Dr. D. L. Peterson, discontinued practice about a year ago. As you know, Dr. R. E. Weible passed away last fall, while in active practice and while a member of our society. Drs. J. P. Aylen and Murdock McGregor also passed away, both of whom were in a retired status at the time.

Interest has been reasonably good in the Cass County Medical Society since the last state meeting. Presumably, due to increased and improved economic conditions, the problem of the care of indigent patients has not had as much discussion as previously. The scientific portions of the meetings have been outstanding. During the past year, several physicians from other centers have been on our programs.

Two steps were taken by the Society during the past two

meetings which are timely. Due to the curtailment of travel and the fact that the doctors are all much busier now, the society has made an effort to secure outstanding scientific programs to aid in keeping up with current medical trends. To date, this has been successful. The Society, likewise, is attempting to secure or enlist the interest of doctors from neighboring counties in these programs.

The Secretary has discussed the matter of making some arrangement with the members of the staff of the North Dakota Veteran's Hospital to join the State Society. This group will become more powerful nationally in the future and I suggest that steps be taken to have these men under the wing of organized medicine, both in North Dakota and nationally.

The RICHLAND COUNTY SOCIETY has had twelve active members. However, it has always been a rather active society. The Army has taken two members; namely, Dr. J. H. Hoskins, who is now in India, and Dr. L. T. O'Brien, who is in Alaska. Dr. C. T. Olson of Wyndmere is disabled and Dr. Durkee of Abercrombie passed away. The Richland County Medical Society now has only eight members.

Arrangements have been made to attend as many medical meetings of the Cass County Society this year as is possible. The members have been grouping together and sharing cars and have taken advantage of the meetings in Fargo. The present members are trying to hold the Society together so that when the rest of the men return, they will find a smoothly acting society.

Some of the members have stated that they would be glad to join up with the Cass County Society and become members of that society. The plan is to have a meeting soon at which this subject will be more fully discussed.

PAUL W. BURTON, M.D., Councillor.

Third District

GRAND FORKS DISTRICT MEDICAL SOCIETY has had a successful year; the chief reason is that it is well officered, with a real live President and Secretary, who are always on the job, providing interesting programs. This means good attendance and promotes good fellowship.

There are sixty-nine licensed physicians and surgeons in this district, seven of whom are serving in the Army. Five are Honorary Members, having been in practice more than fifty years; namely, Drs. Grassick, Burrows, Glaspel, Welch and Field. Another man has retired from practice; one belongs to the Traill-Steel Society and lastly we have one man who has never become a member—a good fellow, but he apparently prefers to go alone. There are 52 paid members and those, of course, serving in the Army remain in good standing for the duration.

I continue to advocate the amalgamation of the Traill-Steele Society with the Grand Forks District. There are but eight members in said society and regular meetings are not held. I hope that the boys there will unite. They would be benefitted by being in a larger society. As suggested in my report last year, I believe that a redistricting of societies in this state based on auto roads instead of county lines would be an improvement. Why not have a committee appointed to look into that question with authority to act or bring in a report at the next annual meeting.

Drs. Gerald Brown, E. A. Canterbury, V. M. Griffin, R. E. Mahowald, Louis Silverman, Fredrick Vollmer, F. Robertson and H. R. Ransom, all of Grand Forks, are serving in the Army.

G. M. WILLIAMSON, M.D., Councillor.

Fourth District

The NORTHWESTERN DISTRICT SOCIETY has had a very good year. We have six new members, and thirteen members are now in the service. The total enrollment is fifty-nine.

We have had a meeting every month during 1942 except May. At the meeting of January 29, officers were elected for the year.

February 26, our speaker was Dr. John E. Faber from the Mayo Clinic.

On March 26, we had a symposium on pneumonia at which Dr. P. H. Rowe discussed "The Pneumonia Program of the

State of North Dakota." Dr. P. J. Breslich spoke on "Newer Aspects of Pneumonia Immunology." Dr. R. E. Dyson gave a speech on "Atypical Bronchopneumonia."

On April 28, our speaker was Major Radl who spoke on "Selective Service System."

On June 25, Dr. Paul F. Dwan of the University of Minnesota, spoke on "Blood Substitutes."

The July and August meetings were both held at the picnic grounds of the Minot Country Club and Dr. Wheelon, who is famous for his picnic suppers, was in charge of the food at both meetings and served two delicious meals.

On September 24, Dr. Olaf Haraldson and Mr. Bavone of the Public Health Unit discussed "The Milk Situation" in Minot.

October 29, Dr. H. A. Carlson of Minot gave a splendid talk on the "Surgical Conditions of the Chest."

On November 19, the speaker was Dr. Fred Hoffbauer, of the University of Minnesota, who spoke on "Clinical Experiences with Brucellosis."

On December 17, we had a symposium on cancer at which Dr. W. W. Wall spoke on "X-Ray Therapy of Skin Cancer," Dr. R. Woodhull on "Cancer of the Uterus," and Dr. P. J. Breslich on "Pathology of the Above Types of Cancer."

The meetings have all been well attended, in spite of the fact that our members have all been exceptionally busy as are all civilian doctors everywhere.

ARCHIE D. McCANNEL, M.D., *Councillor*.

Fifth District

SHEYENNE VALLEY MEDICAL SOCIETY has had a further reduction in the number of its doctors during the past year. There are eight men in Valley City at present holding membership; of the four practicing outside Valley City, three are members.

Dr. R. K. Dodd, formerly of Wimbledon, has relocated at Lisbon.

Dr. Paul Cook entered the service in the early fall and after training at Las Vegas, Nev., is now at Randolph Field, Texas, taking the course at the Flight Surgeons School. Dr. Cook is a First Lieutenant.

Dr. R. G. White, formerly in charge of the district health office in Valley City, is now a member of the State Public Health Department and located at Bismarck. His place in Valley City has been taken by Dr. E. L. Sederlin, previously of Fargo. Dr. Sederlin has applied for membership in our Society and has the recommendation of the Cass County Society.

Dr. G. A. Dodds has been made a Major and is located at Seattle.

Our annual meeting was held January 11, at Mercy Hospital, preceded by a banquet served by the Sisters of the Hospital. The following doctors were elected to office:

President, Wm. Campbell, Valley City; vice president, F. L. Wicks, Valley City; secretary-treasurer, C. J. Meredith, Valley City; delegate, C. J. Meredith, Valley City; alternate delegate, L. Almklov, Cooperstown.

F. L. WICKS, M.D., *Councillor*.

Sixth District

During the past year our Society has had four interesting and well-attended meetings. Our paid-up membership, including those serving in the Army and the Navy, is sixty-seven. Good, helpful programs have been presented at each of the meetings. At the April, 1942, meeting the following program was given: (1) Paper on "Vomiting of Pregnancy," by Dr. C. J. Baumgartner; (2) Presentation of home-made instruments and equipment, including a respirator, by Dr. H. A. Wheeler of Mandan; (3) Report of the pediatric course at the Continuation Center, University of Minnesota, by Dr. A. M. Brandt.

At the September meeting, the program consisted of: (1) Paper by Dr. Joseph Sorkness of Jamestown on "Perineal Prostatectomy," which was discussed by Dr. V. J. LaRose and Dr. N. O. Brink; (2) A report by Dr. L. W. Larson on the present status of the Procurement and Assignment Program in North Dakota; (3) A review of the Pneumonia Program in the state by Dr. L. H. Fredricks.

At the December meeting, the program consisted of a symposium on Cancer of the Stomach: (1) Medical history and

diagnosis, by Dr. J. O. Arnson; (2) Multiple x-ray demonstrations and discussion of the diagnostic problems, by Dr. H. M. Berg; (3) The laboratory and pathological findings presented by Dr. L. W. Larson.

Dr. R. G. White transferred his membership from the Sheyenne Valley District Medical Society. Dr. E. Salomone was elected to membership.

Officers elected for the coming year were: Dr. R. H. Waldschmidt, president; Dr. M. S. Jacobson, vice president; Dr. W. B. Pierce, secretary and treasurer. Censors: Drs. F. B. Strauss, G. R. Lipp and W. H. Bodenstab. Delegates elected: Dr. C. C. Smith for 3 years, Dr. R. H. Waldschmidt for 2 years, Dr. O. T. Benson for 1 year.

In February the following program was presented: (1) Respiratory Infections in Children, by Dr. E. G. Vinje; (2) Tropical Diseases, by A. C. Groude, M.D.; (3) Relation of Physicians to the Selective Service, by Captain A. C. Fortney; (4) Relation of Physicians to the Procurement and Assignment Service, by Dr. L. W. Larson.

During the year, the business affairs of the Society have been efficiently administered, and harmony and good will have prevailed.

N. O. RAMSTAD, M.D., *Councillor*.

Seventh District

In the STUTSMAN COUNTY MEDICAL SOCIETY, at present, we have eighteen members that are fully paid up, two members in the service, Major R. D. Nierling and Major Jesse H. Roth, and two physicians of the county who are not members.

During the year, we lost one of our much esteemed and active members, Dr. Justin L. Conrad. The Lord, in His infinite wisdom, has seen fit to call the Doctor home. We will miss the service and guidance of Dr. Conrad in this Society.

During the year we have had mostly business meetings. This was due to the fact that it was our privilege to entertain the State Medical Society during their annual meeting. However, we had one very interesting meeting in March, 1942, at which time Dr. Kenyon of St. Paul was the speaker. He presented a very interesting pathological resume of common conditions.

The officers elected for the ensuing year are: Dr. George Holt, president; Dr. T. L. DePuy, vice president; Dr. E. J. Larson, secretary-treasurer; Dr. T. L. DePuy, delegate; Dr. W. A. Gerrish, alternate.

This year has been rather uneventful, and peace and harmony and good will prevail.

P. G. ARZT, M.D., *Councillor*.

Eighth District

Two meetings were held during the past year, one at Marion and the second at Oakes. The attendance has been good. Lieutenant Commander George Ribble, son of the late Dr. G. B. Ribble, of LaMoure, was a guest at the Marion meeting.

We have at present seven members. There are four other physicians in the district who are eligible for membership.

We lost, by death, one of the pioneer physicians of this district, Dr. G. B. Ribble of LaMoure.

F. W. FERGUSSON, M.D., *Councillor*.

Ninth District

The TRI-COUNTY SOCIETY met February 4, 1942, and discussed once more whether it was better to keep the Society going or split up and join larger societies adjoining. It was decided that, with a little more effort, we could hold more frequent meetings and we would try to have better programs.

Pursuant to this idea, six meetings have been held in the past year.

In April, Dr. Wallbank appeared and discussed the treatment of tuberculosis.

In June, Dr. Harry Fortin discussed fractures and the Kenny treatment of infantile paralysis.

In September the Society met to present Dr. Charlie MacLachlan with an electrically-driven wheelchair on behalf of numerous contributors throughout the state. While I do not know whether the Doctor's friends planned that his chair be used as a tractor, my latest report from Dr. Moore is that Doctor Mac was raking the lawn with it.

In December we met for election of officers.

In February we had a discussion of the legislative program and had a film furnished by John Wyeth & Company on peptic ulcer.

In April of this year, Dr. Archie McCannel appeared to discuss glaucoma as well as Army Medicine and Surgery.

At all of these meetings, dinner was served.

Respectfully submitted,
A. E. WESTERVELT, M.D., *Councillor.*

Tenth District

The SOUTHWESTERN DISTRICT, in spite of adverse circumstances, is still going strong.

We held three regular meetings during 1942, the fourth meeting, which was to be held in December, was postponed twice due to impassable roads, but was finally held February 27th of this year. At that time, the following officers were elected: President, Dr. Oscar Smith, Killdeer; vice president, Dr. Hans E. Guloién, Dickinson; secretary-treasurer, Dr. H. L. Reichert, Dickinson; delegate, Dr. A. P. Nachtwey, Dickinson; alternate, Dr. R. W. Rodgers, Dickinson.

Since 1940, when we had 26 members, our membership has dropped to 18. In spite of the decrease in numbers and the fact that half of our members are over 60 years of age, we think we are doing a good job in looking after the welfare of the 40,000 widely scattered people in our territory.

During the year, Dr. A. J. Gumper has left us to join the service of his country and Dr. M. W. Lyons has moved to Minneapolis.

There are three doctors in the territory who are not members of the Society: Dr. Iver Linson, who is in the Federal Indian Service at Elbowoods; Dr. William Schumacher, Jr., of Hettinger, who, due to poor health, is not in active practice, and Dr. Clarence A. Bush of Beach, whose application for membership has been laid on the table pending further action.

Repeated efforts of the F.S.A. to force upon us a plan of medical care for their members have so far been successfully opposed.

As long as there is a job to do, the Southwestern District Medical Society will be on hand to do it.

Respectfully submitted,
A. E. SPEAR, 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

At the time this report must be written, there are many points of uncertainty as to the relation of the School of Medicine of the University to the Specialized Training Division of the United States Army and Navy. Orders of this winter and spring indicate decided changes in the plans of that department, as you know, but full and detailed orders are not yet available. It is quite possible that many of these points will be cleared up by the time of the annual meeting.

In regard to the work of the past year, it can be said that the organization, points of view, and work of the school have all continued along the lines that are familiar to you. It might be emphasized that it has been the policy of the school to limit its admissions to candidates from our own state or reasonable territory, rejecting, at once, the applications of students from the state or reasonable territory of another medical school; also that it has always been the hope and effort of those connected with the school to take care of all promising candidates from North Dakota who care to begin their training here. With the great demand for admissions, as well as the limit to the possibilities of other schools to accept our students for their clinical work, we are compelled, even if we were otherwise inclined, to demand a high standard of entrance qualifications. All students finishing the two year medical curriculum at the University in 1942 are now continuing their training in other schools. The classes of this year are full. With only two exceptions, all of the 53 students of this year hold commissions in the Specialized Training plan of the Army or Navy that is just passing.

H. E. FRENCH, M.D.,
Chairman.

Necrology and Medical History

In hearty accord with the ideals and traditions of the traditional medicine, it seems fitting that we pause in the midst of our activities and decorously pay our tribute to the memory of those of our number who since last we met in annual session have finished their tasks; for "The night cometh when no man can work."

To friends and near of kin, we offer our meed of sympathy, coupled with the thought that Hope peers through the mists, sees the stars beyond and points the upward way.

MURDOCK MAC GREGOR

Dr. MacGregor was born in Kintail, Ontario, of Scottish parents, December 8, 1871, and died at the home of his son, Gordon MacGregor, at Dickinson, North Dakota, December 20, 1942. His academic studies were pursued in the schools of his native province and his medical degree was obtained from Trinity College (later merged with the University of Toronto), in 1897. He was licensed to practice in North Dakota the same year. He kept well abreast of the times by frequent graduate courses at Chicago, New York, Baltimore and other centers.

He began the practice of medicine at Emerado, N. Dak., in 1897, where he remained two years. Then he moved to Fessenden for nine years, and then to Fargo, where he made a permanent home.

Dr. MacGregor was very active in organized medicine, was charter member and first secretary of the Tri-County Medical Society, president of the Cass County Medical Society and of the North Dakota Medical Association. He was a member, for a number of years, of the State Board of Medical Examiners, and was one in the first group of North Dakota surgeons admitted to fellowship in the American College of Surgeons. For many years he was North Dakota Councillor for the College.

In the midst of a busy professional life, he found time to devote to social and economic problems and held many offices of trust and responsibility. He was held in high repute by his Fellows as an honorable, ethical, capable practitioner. Dr. MacGregor was a consistent member of the church of his choice and was active in its affairs. He is survived by a son, a brother and a sister.

His abiding worth is his monument.

RALPH E. WEIBLE

Dr. R. E. Weible was born in Warren county, Pennsylvania, December 21, 1878, and died at a Minneapolis hospital, November 8, 1942.

His father, James S. Weible, was a pioneer oil prospector and came with his family to North Dakota in 1894 and engaged, near Hunter, in wheat farming.

Dr. Weible was a graduate of Fargo High School, took college and medical work at the University of Minnesota, was graduated in medicine from Rush, Chicago, in 1901, and was admitted to practice in our state the same year.

He began practice at Grandin, North Dakota, where he remained for about a year. He then removed to Fargo, where he became associated with the late Dr. E. M. Darrow, and later was one of the founders of the Dakota Clinic of which he was president at the time of his death.

Dr. Weible was recognized as a surgeon of skill. He made many original contributions to the profession; he was a frequent and valued contributor to medical and surgical literature. Dr. Weible perfected himself in his art by frequent visits to medical and surgical centers at home and abroad. He was a Fellow of the American College of Surgeons.

Dr. Weible held many positions of trust and honor in medical, social and fraternal circles. He will be missed by the profession he honored, by the public whom he served, and by his associates.

He is survived by Mrs. Weible, two sons, one daughter and two brothers. To these he leaves a rich legacy of treasured memories.

Dr. Weible was one of those "whose sun went down in the sweet hour of prime."

JUSTIN L. CONRAD

Dr. J. L. Conrad was born at Greenbriar, Missouri, and died at Rochester, Minnesota, May 28, 1942.

He was a graduate of the College of Idaho and the Univer-

sity of Colorado. Thus equipped, he taught school for three years and then entered Northwestern University for the study of medicine. After graduation, he interned for two years at Wesley Hospital, Chicago, and six months at the Lees Lying-In Hospital at Chicago.

On coming to North Dakota he became associated with the Jamestown Clinic, July 3, 1930, where he remained, specializing in obstetrics and pediatrics. He is survived by his widow and three children.

GEORGE B. RIBBLE

Dr. G. B. Ribble was born at Detroit, Michigan, June 22, 1878, and died at Jamestown, N. D., October 20, 1942.

He graduated in Liberal Arts at the University of Minnesota in 1900 and in medicine in 1903. After interning at St. Luke's Hospital, St. Paul, Minnesota, he located at LaMoure, North Dakota, and there did his "Day's Work," giving 37 years of active service to the community he chose as his home and workshop.

He was County Health Officer for several terms and County Coroner for a score or more years.

Surviving him are a widow, two sons and a daughter to whom he has left a legacy of sweet and pleasant memories.

Dr. Ribble was a man of high ideals in professional and community life and lived his convictions. At his funeral services, it was said: "Dr. Ribble has been a good neighbor, an unselfish public servant and a trusted personal counselor to a great many in their troubles. Like his Master, 'he went about doing good.'"

A. O. ARNESON

Dr. A. O. Arneson was born October 26, 1879, at Beaver Creek, Minnesota, and died at his home in McVile, North Dakota, December 11, 1942.

He received his academic course at Augustana College, Sioux Falls, South Dakota, and his medical degree from the University of Minnesota.

He was admitted to practice in our state in 1904 and located at Northwood. Later he moved to Aneta and finally to McVile, where he made his permanent home.

Dr. Arneson was public-spirited and took a great interest in community welfare activities. A short time before his death he was elected for the third time as Representative of the 17th District. He was so favorably regarded that in 1937 the people of McVile and surrounding country held a countryside demonstration in appreciation of his services as a physician and citizen.

Surviving him are two sons and a daughter. To such as he, humanity is a debtor.

K. OLAFSON

Dr. K. Olafson was born of Icelandic parents at Edinburg, North Dakota, April 2, 1902, and quietly passed away at his home in Cando, North Dakota, during the night of December 1-2, 1942.

He was educated in the public schools and the state university and was later graduated in Medicine from the University of Manitoba, at Winnipeg. He interned at General and Grace hospitals, Winnipeg, and further at Ninette Tuberculosis Sanatorium. He practiced at Cando and Egeland, North Dakota, for eight years.

Dr. Olafson was a fine example of a native son giving the best of which he was capable, to those seeking his help among his own people.

He was honored by his fellows by being elected president of his district medical society and a member of the staffs of Mercy and General hospitals at Devils Lake. He was city health officer of Cando for many years.

He is survived by Mrs. Olafson.

BERTHA BRAINARD MC ELROY

Dr. Bertha B. McElroy was born January 8, 1894, in Anamosa, Iowa, and died at Rochester, Minnesota, March 12, 1943.

She came with her parents to North Dakota at an early age and "grew up" with the country. She was graduated in 1906 from the Arts Department, University of North Dakota, and was a member of Phi Beta Kappa. She was principal of Wall-halla High School for three years and head of the English Department of the Jamestown High School until 1927, when she began the study of Medicine at the University of North

Dakota, and in due time graduated from Rush Medical College. After interning in San Francisco and Los Angeles, she entered private practice at Jamestown, N. D., in 1933, continuing until 1940.

Dr. McElroy, in addition to her medical work, took an active interest in social and economic problems and held many offices of trust and responsibility in the interests of human welfare.

Dr. McElroy was progressive, could see beyond the clouds, and recognized that the best is yet to be. She was a finely poised, professional woman!

JAMES B. GRASSICK, M.D.,

Honorary Chairman.

GEORGE M. WILLIAMSON, M.D.,

Chairman.

Public Policy and Legislation

Due to the illness of its chairman, Dr. W. C. Fawcett, the Council appointed the Secretary to assume his duties during the 1943 Session of the State Legislature.

The Council decided, at its interim meeting in Fargo last January, not to sponsor any medical legislation this year. It approved a vigorous campaign of opposition to any legislation which would recognize naturopathy or increase the limits of practice of the irregulars. It approved the passage of several bills which were to be introduced at the request of the State Health Department and also a Uniform Narcotic Act.

The 1943 Legislative Session was one of the quietest in recent years so far as medical legislation was concerned. The biennial attempt to legalize the practice of naturopathy in North Dakota was soundly trounced in the House, 75 to 32.

A word of explanation is due on the Committee's activities relative to Senate Bills 57 and 63. The former was a bill to re-enact the present State Narcotic and Drugs Statutes to conform with the Federal Act, and the latter would have prohibited the sale of barbiturates except on written prescriptions. Both bills were written and suggested by representatives of the Federal Department for the Enforcement of the Harrison Narcotic Act. They were approved by our Council, and also by authorized representatives of the North Dakota State Pharmaceutical and Dental Associations. The bills were sponsored by the Legislative Committee of the Pharmacists and were introduced in the Senate. Protests soon developed from pharmacists throughout the state. As a result the bill (S.B. 63) to control the sale of barbiturates was withdrawn and the Uniform Narcotic Act (S. B. 57) was defeated in the House after it had passed the Senate by a large majority. There is a possibility that the Uniform Narcotic Act may have been included in the laws which were recodified and therefore, has become a state statute, but this will have to be determined for a certainty by the courts, it would seem. It should be emphasized that these two bills were not "Medical Bills"; they were not sponsored by our Association, but merely approved as good legislation. Any unpleasant or embarrassing circumstances which arose over this legislation were due entirely to differences of opinion as to the merits of the bills between some of those who were responsible for the introduction of the bills and the organization which they represented.

Our thanks go to Senator E. C. Stucke who, as usual, was a tower of strength in the Legislature in behalf of the medical profession, and to Dr. H. A. Brandes, who gave much of his time and energy as a "listening post" in the Capitol Building during the Session.

L. W. LARSON, M.D.,

Chairman.

Committee on Tuberculosis

There has been no unusual activity of the Committee this year. We decided to follow the same program we followed the year before. We have had excellent cooperation from the State Health Department and the North Dakota Anti-Tuberculosis Association.

J. O. ARNSON, M.D.,

Chairman.

Editorial Committee on Official Publication

A meeting of this Committee was held at Jamestown during the annual meeting there. However, no report can be made this year because the Committee will meet during the Session in May.

The Committee recommends that the present relationship between the JOURNAL-LANCET and the North Dakota State Medical Association, being satisfactory, be continued.

J. O. ARNISON, M.D.,
Chairman.

Committee on Pneumonia Control

The Committee on Pneumonia Control met with members of the State Department of Health in the Capitol Building at Bismarck on September 20, 1942.

Since establishment of the Pneumonia Control Program in December, 1939, there has been a marked improvement each year in the reporting of cases of pneumonia to the State Department of Health. During the three years preceding the establishment of the program, an average of 312 cases of pneumonia were reported to the Health Department annually. In 1940, the first year of the control program, 1284 cases of pneumonia were reported; in 1941, 1413 cases of pneumonia were reported; and in 1942, 2944 cases of pneumonia were reported to the Department of Health. Of these 2944 cases, 1926 patients were treated in the non-control group and 1018 patients were treated in the control group.

Mortality from pneumonia continues to decline in North Dakota. Before establishment of the control program, there were approximately 400 deaths annually from this disease in the state. In 1940, there were 288 deaths from pneumonia; in 1941, 200 deaths; and in 1942, 202 deaths were caused by pneumonia in spite of the great increase in the number of cases of the disease reported in that year. As in preceding years, the mortality rate in 1942 continued higher in the non-control group than in the control group of patients. There were 181 deaths in the non-control group, a mortality rate of approximately 2.1 per cent. The combined mortality rate for both groups was 6.8 per cent, compared to combined mortality rates of 16.5 per cent in 1941 and 22.4 per cent in 1940.

Eleven hundred eighty-five cases were diagnosed as lobar pneumonia; 1271 cases as bronchopneumonia; and the rest as virus, influenzal or non-specified types of pneumonia.

The predominant types of pneumococci found were Types 1, 2, 3, 6, 7, and 8. Typing stations were unable to type the organisms in many sputum samples this year because of the large number of cases of atypical bronchopneumonia or so-called "virus" pneumonia. The average dose of antipneumococcal serum was 73,971 units; the average dose of sulfapyridine was 14 grams; the average dose of sulfathiazole was 19.75 grams; and the average dose of sulfadiazine was 18.4 grams. The cost per patient of treatment under the program was \$5.60, as compared to \$25 per patient for each of the two preceding years.

The pneumonia control program, originally established for a trial period of six months, has been continued for three years through an appropriation from the United States Public Health Service. The United States Public Health Service will not continue the appropriation for the entire program unless the state supplies at least part of the funds. The program will have to be discontinued unless half the expense is born by the state.

The Committee feels that the pneumonia control program should be continued, and makes the following recommendations:

1. The State should assume the responsibility of providing part of the funds to continue the program.
2. The State Department of Health should continue to furnish serum, sulfadiazine and sulfathiazole, but should discontinue the supply of sulfanilamide and sulfapyridine.
3. Only Types 1, 2 and 3 antipneumococcal serum should be supplied by all typing stations. All other types of serum should be obtained from the Public Health Laboratories at Bismarck and Grand Forks.
4. The fee for roentgenograms of chests of children up to and including eleven years of age should be reduced to \$3.00 in order to continue the x-ray service for all patients in the control group of cases.
5. The typing stations should continue to be used as depots for distribution of serum and sulfonamide drugs and should continue to type sputum specimens, carry out sulfonamide determinations and perform blood cultures.

6. The conference for technicians of control stations should be held each year, in order to keep laboratory procedures standardized.

PAUL H. ROWE, M.D.,
Chairman.

Committee on Cancer

Cancer continues to be a leading cause of death in North Dakota, as elsewhere throughout the Nation. The slogan "Cancer is Curable" demands early diagnosis and modern treatment. The Women's Field Army of the Society for the Control of Cancer is emphasizing the early danger signs of cancer and the need for periodic health examinations. The diagnosis of early cancer is the responsibility of the physician once he is consulted by the patient. It will be made only by those physicians who are familiar with the symptoms and signs of early cancer and who always consider the possibility of cancer in every patient, regardless of age.

Your Committee is cognizant of these facts and continues to support the excellent work of the Women's Field Army in North Dakota and to urge all district medical societies to include papers and symposia on cancer in their programs.

L. W. LARSON, M.D.,
Chairman.

Committee on Fractures

A meeting of the Fracture Committee was held during the annual meeting of the State Association in Jamestown, North Dakota, on May 20, 1942. The Committee unanimously agreed to continue the program as outlined in our annual report to the House of Delegates in May, 1942.

A portion of the State Medical Association program was given over to the subject of fractures. On May 20, 1942, Dr. Stanley R. Maxeiner of Minneapolis presented a paper on "The Emergency Treatment of Fractures." He also conducted a symposium on fractures at our noon luncheon and this was very well received by members of the State Association.

We have had 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.

Medical Economics

During the past year, the physician has been mostly concerned with the successful prosecution of the war and his endeavors to keep up with the added burdens he has assumed. There has been little time or need for time to devote to problems in the economic sphere. Hence your committee has not met and no problems have been presented to it.

Consideration of economic questions has been largely put aside for the duration of the war, yet it must be remembered that in the postwar period we will probably acquire new and pressing problems which must be met. We, as physicians, must look ahead and take active measures to see that such problems as may arise are solved in a manner which will be in the best interest of the patient and the profession.

W. A. WRIGHT, M.D.,
Chairman.

Maternal and Child Welfare

Your Committee on Maternal and Child Welfare met in Grand Forks, North Dakota, on August 2, 1942.

Dr. Ralph Pray has resigned from the Committee, as he is now practicing in California. Dr. J. L. Conrad of Jamestown, a member of the Committee since its formation, died on May 28, 1942, and we take this occasion to express our sense of personal loss at his passing. Dr. Conrad was always very much interested in the problems of maternal and child welfare and gave freely of his time to furthering the work of your Committee. His wise counsel will be missed in its deliberations. Dr. T. L. DePuy of Jamestown was appointed a new member of the Committee by President Sorenson.

We had the rare good fortune to be addressed by Dr. James Grassick. In connection with the entire program of Maternal and Child Welfare, one pertinent quotation from his remarks should be emphasized, "Fundamentals of a good program are wise legislation, well trained physicians and nurses and a people made intelligent through education." In this one sentence Dr.

Grassick summed up the aims and aspirations of your Committee and we were most appreciative of his presence and wise counsel.

Representing the State Department of Health at this meeting were Viola Russell, M.D., Director of the Division of Maternal and Child Hygiene, and Carl J. Potthoff, M.D., clinician. Dr. Russell has since left the state to assume a similar position in the State Department of Health of Vermont. Your Committee wishes to express its appreciation for her services in North Dakota.

Particular attention was paid to the information revealed by preschool child health conferences, particularly with regard to old and new cases of rickets. Present studies will be compared with similar ones collected in 1937, and the comparative findings will be submitted to the Committee for consideration as to their value. The purpose is to determine how much corrective work on rickets and other remedial defects has been done through follow-up technique, and it was particularly recommended that this survey be developed at the conferences to be held in 1943.

We recommend that the attention of the State Medical Association be called to the recommendation of the American Academy of Pediatrics that diphtheria and smallpox immunizations be done during the first year of life.

A study of the Maternal Mortality Survey revealed several important facts:

1. The problem of the toxemias is one of more accurate classification. After this is done, the treatment must be individualized before there will be any further appreciable decrease in deaths due to this cause. Your Committee would again call attention to the importance of the study and adoption of the classification of the toxemias as presented by the American Committee on Maternal Welfare, Inc. While it is not always possible to accurately classify the toxemias when they are first seen, an attempt should nevertheless be made to do so, because this has an important bearing on prognosis and treatment.

2. Deaths from puerperal and postabortal infections show an increase. Case histories of fatal cases show for the most part that, while sulfon drugs are being used rather generally, blood transfusion is not employed as extensively as possible. We would again call attention to the fact that small and frequent blood transfusions are of the utmost importance in severe cases of sepsis and, while the sulfon drugs are most valuable, the best results will be obtained through a combination of sulfon therapy, small frequent blood transfusions and other supportive measures.

3. Deaths due to obstetric hemorrhage appear to be on the increase. Your Committee was impressed by the neglect of adequate treatment in placenta previa. This neglect frequently originates first with the patient in that she often reports after several hemorrhages have occurred. We urge careful and repeated blood examinations in all cases of obstetric hemorrhage and the prompt securing of donors suitably grouped and cross matched in advance of the need for transfusions. We would also call attention to the fact that blood serum and/or plasma should be available for immediate use in the emergency case.

Public Health Nursing in the field of maternal welfare came in for considerable discussion and the extension of present parturition nursing service was carefully considered. It was pointed out that in some areas, where the war emergency has still further depleted our already limited supply of physicians, certain patients may not be able to get important phases of their parturition care satisfied. Specifically, we referred to urinalysis, blood pressure readings, weight and hemoglobin determination. It is recommended that, in certain local areas, where the need is great, public health nurses be instructed to render these services to the pregnant woman in her home, but only upon the request of her physician. They would then be required to make their report in duplicate, one to the physician and one to the Maternal and Child Hygiene Division. It was felt by your Committee that potential or actual bleeders and incipient toxemias could thus be checked earlier and more frequently.

Considerable discussion was devoted to the question of post-graduate courses in Obstetrics and Pediatrics for physicians during the war emergency and the Director of the Division of Maternal and Child Hygiene was asked to query North Dakota

physicians as to whether they preferred these courses to be given at the Center for Continuation Study at the University of Minnesota or in various cities throughout North Dakota. This study is now under way and the results will largely determine the activities of your Committee in the future. It was felt that this phase of our work was very important and should not be neglected, but we wanted the opinions of our North Dakota physicians before starting a new schedule at this time.

The problem of neonatal mortality came in for careful study. A questionnaire has been prepared at the recommendation of your Committee by the Division of Maternal and Child Hygiene covering all cases of neonatal death and we urge upon our physicians the prompt completion of this questionnaire, whenever any neonatal death occurs in their practice. It is hoped, through a case study of these combined reports, to arrive at some conclusions which will result in the saving of infant lives.

JOHN H. MOORE, M.D.,
Chairman.

Supplemental Report on Medical Economics

The Committee received the following proposal from representatives of the Farm Security Administration.

"The Farm Security Administration requests of the North Dakota State Medical Association, through its Medical Economics Committee, approval for the organization of prepaid medical care plans, the exact provisions of which will depend upon local needs in any area or locality, but, in each instance in which such a plan is organized, operation of the plan will be delayed until approval is obtained from the State Medical Economics Committee.

"In any instances in which plans have already been organized, operation and solicitation of membership will be delayed until approval is obtained from the State Medical Association.

"It is further requested that the Economics Committee prepare agreements embodying such provisions as are here set forth and that the agreements be signed by the State Medical Association and the Regional Director of the F.S.A."

The Committee approved this proposal and recommends its adoption by the House of Delegates.

We met with Mr. Willson, Executive Secretary of the Public Welfare Board, and adopted plans for the general revision of all Welfare Board fee schedules. This will be done as quickly as possible.

Mr. Willson suggested that he would welcome the appointment of a Medical Advisory Committee to the State Public Welfare Board. We recommend that such a committee be appointed and that it consist of five members, three from the Economics Committee, one from the Committee on Crippled Children, and one from the Committee for the Blind.

The following suggested changes in fee schedules were presented:

The Pneumonia Committee recommended that the fee for x-rays in children under the age of 11 years be reduced to \$3.00. We recommend that the fee be retained at \$5.00 so that x-ray fees may be kept uniform throughout.

The Committee on Crippled Children recommended that x-ray fees be the same as that in the general Welfare Board fee schedule, viz.: 80 per cent of the Workman's Compensation Bureau schedule. We recommend that this fee schedule be adopted.

The following Resolution was passed and we recommend it for approval:

RESOLUTION

Whereas, a resolution will be introduced in the House of Delegates of the American Medical Association during their annual assembly convening June 7, 1943, in Chicago, Illinois, which provides for the creation of a committee to be known as the Committee on Medical Service, and

Whereas, the House of Delegates of the North Dakota State Medical Association in annual assembly May 9, 1943, are heartily in accord with the principles expressed in that resolution:

Therefore, Be It Resolved, that the House of Delegates of the North Dakota State Medical Association urge the House of

Delegates of the American Medical Association to adopt the resolution.

Be It Further Resolved, that the Constitution and By-Laws of the American Medical Association be amended if necessary in order that the aforementioned resolution can be adopted.

And Be It Further Resolved, that the Delegates of the North Dakota State Medical Association to the House of Delegates of the American Medical Association are hereby instructed to do all in their power to effect the adoption of the resolution and if necessary amend the Constitution and By-Laws.

Respectfully submitted,

W. A. WRIGHT, M.D.,

Chairman, Medical Economics Committee.

Joint Supplemental Report of Committees on Medical Economics and Maternal and Child Welfare

Your Committee on Maternal and Child Welfare submits the following from its meeting of May 9, 1943:

It was moved by Dr. Woutat and seconded by Dr. Hanna that the plan presented by Dr. Robert G. White, Director of the Division of Maternal and Child Hygiene of the North Dakota State Department of Health embodying the proposed plan of the Children's Bureau for Maternal and Infant Care for the Wives and Children of Men in the Armed Forces be rejected for the following reasons:

1. Said plan involves fixed obstetric and pediatric fees without regard to the individual merits of each case.

2. From information given us, no state in this district has been able to have a plan accepted by the Children's Bureau establishing a fee schedule above the maximum indicated in the proposed plan for North Dakota, thus allowing no opportunity for free negotiation between the physicians and the Federal agency administering these funds regarding the amount of said fees.

3. It tends to set up an artificial and false standard of obstetric and pediatric fees, contrary to the commonly accepted practice of organized medicine.

4. It seems reasonable to suppose that if this plan is accepted attempts might be made to extend similar arrangements to other fields of medical practice.

Appreciating the sacrifices being made by the men in the armed forces, we recommend to the medical profession of this state that the wives and children of men in the armed forces of the fourth, fifth, sixth and seventh grades be extended maternal and infant care as contemplated by the above mentioned program, without thought as to their ability to pay.

We also recommend that the action of this Committee together with a copy of the plan, whose rejection we recommend, be referred to the Committee on Medical Economics for their opinion and reference to the House of Delegates of the North Dakota State Medical Association.

Public Health

A meeting of the Committee on Public Health of the State Medical Association was called to order at 10:00 A. M., Sunday, March 7, 1943, in the offices of the State Department of Health, by the chairman, Dr. F. J. Hill. The following members of the Committee were present: Frank J. Hill, M.D., chairman; P. L. Owens, M.D., Bismarck; William Campbell, M.D., Valley City; H. B. Huntley, M.D., Kindred; Sam Chernauek, M.D., Dickinson.

An agenda was presented, which included special problems in communicable disease control in relation to our present national emergency.

Dr. F. J. Hill, Acting State Health Officer, presented statistics which pointed out the problems remaining to be solved in North Dakota. Attention was called to the Report on Health Achievements in North Dakota which appeared in the February issue of the *JOURNAL-LANCET*. In this article the medical profession is given much of the credit in making these health achievements possible.

The Committee selected Drs. Huntley, Owens and Hill to appear before the House of Delegates on behalf of various proposals.

After extensive discussion, the Committee recommended that the following resolutions be adopted:

1. That the State Department of Health request aid from the U. S. Public Health Service to make arrangements accept-

able to the medical profession, for the x-ray examination of all Mexicans employed at present in North Dakota.

2. That a resolution be prepared and sent to the Beet Growers' Association, and others concerned, that no Mexican laborer be hired, unless he can present a clean bill of health, particularly freedom from tuberculosis as determined by an x-ray examination.

3. That the House of Delegates give careful consideration to the provisions of Senate Bill No. 77, which is permissive legislation for providing fulltime health districts and request the members of the North Dakota State Medical Association to cooperate in promoting fulltime public health units.

4. That the State Department of Health be requested to organize immunization services in the counties without physicians, by utilizing private physicians from neighboring counties under compensation plans now operating in other counties, where immunization services are available.

F. J. HILL, M.D.,

Chairman.

Industrial Health

Industrial health has reached an all-time high in importance. This is due to the tremendous industrial expansion which has resulted because of our war effort. Briefly, the program for industry advocated by the Council of Industrial Health is to encourage more adequate medical service within industry, to investigate and record reports of occupational disease and injury, and to provide hygienic instruction to industrial groups on the prevention and control of communicable and occupational disease.

This Committee has obviously a most important duty to carry out, because the health of the war worker is second only to the health of the members of the armed forces.

Industrial health was first emphasized during the First World War and now, in this global war, it reaches its greatest field of usefulness. It must be appreciated that proper care of the sick and injured worker is a responsibility, not only of medicine but also of management and labor, and it is only by active cooperation between each of these three groups that the best results will be obtained. While the larger industries are well organized and functioning efficiently, the smaller plants still do not have similar advantages and their entire medical program is often provided by the general practicing physician.

The reported figures on time lost from industry may be interesting — first is the 15 per cent due to injury and occupational diseases, then comes the 85 per cent lost by illness arising outside the plant. Some of this is due to improper food, crowded unsanitary housing and the improper use of leisure time.

As stated in our report last year, North Dakota is not a highly industrialized state, however, what industries we do have, fall in the so-called smaller plant groups where the medical and health service is not organized as well as in the larger industries. The farmer has recently assumed the same importance as the defense worker in the war effort, and in this state the health of the farmer is essential to the production of food. As stated in our report of last year, agriculture is an occupation attended by serious risks, and the medical men of the state must be of sufficient numbers and so trained as to properly care for the health of the agricultural worker.

The Annual Congress on Industrial Health was held in Chicago in January of this year. Unfortunately, no member of your Committee was able to attend this meeting. Some of the subjects discussed included symposiums on employee-management cooperation for industrial health; women in industry; optimum hours of work; rehabilitation; medical relations in workmen's compensation; medical testimony; and nutrition in industry.

C. J. GLASPEL, M.D.,

Chairman.

Report of the Committee on Venereal Diseases

At the meeting of the Venereal Diseases Committee at Grand Forks November 8, 1942, at which the State Health Department was represented, and present were representatives of the United States Public Health Service, it was recommended that:

1. The fee for gonorrhea cases under treatment be raised from \$1.00 to \$2.00 (total not to exceed \$10.00).

2. The fee for treating infectious indigent cases of less than four years' duration, or cases not having had a total of forty treatments, should be \$2.75 for intravenous and \$1.20 for intramuscular treatments, when material is furnished by the state. When material is not furnished by the state, the fee should be \$3.34 for intravenous and \$1.67 for intramuscular injections.

3. Postgraduate courses in dermatology and syphilology should be arranged for at the University of Minnesota, as in the past.

4. Any proposed legislation should be discussed with the Committee on Public Policy and Legislation of the State Medical Association.

5. It was decided that a questionnaire be sent to the physicians of the state to get their opinion on some venereal disease problems. A review of the answered questionnaires indicated as follows:

- (a) A favoring of postgraduate courses, preferably in the various districts.
- (b) Routine serologic tests for: (1) all marriage license applicants; (2) all patients of doubtful diagnosis; (3) as part of every complete physical examination; (4) in all prenatal cases.
- (c) Only 50 per cent were in favor of routine serologic tests on all hospitalized patients.
- (d) More than 75 per cent of physicians answering believed that a prenatal blood test should be added to our present premarital law, and that reports from other State Health Department Laboratories should be accepted in administering the present law.
- (e) The present reporting and treatment forms, the outline of treatment presented by the cooperative clinical group, and the present arrangements for paying for diagnosis and treatment of indigents received approval of a vast majority of those answering the questionnaires.
- (f) Consultants for difficult cases, and follow-up services by lay or professional personnel employed by the State Health Department for those who are delinquent, was welcomed by the majority of physicians.

FRANK L. DARROW, M.D.,

Report of the Delegate to the American Medical Association

Dr. A. P. Nachtwey, Delegate, submitted the following report, which was referred to the Reference Committee on the 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 ninety-third annual session in Atlantic City, June 8 to 12, 1942.

There were 8238 physicians registered.

The transactions of the House of Delegates were marked by harmony and expedition. Reference committee reports were considered in a serious and earnest fashion and, with few exceptions, harmoniously and expeditiously dispatched.

The outstanding feature of 1942 was the attendance of physicians from Latin America. There were 140 physicians who registered from other American nations. Many of them participated in the program of various sessions and in the various scientific meetings. They added greatly to both the interest and glamour of the occasion.

The House of Delegates in Atlantic City was concerned largely with the problems of organization leading to improved functions of the organization, problems related to the war and medical service plans.

One of the general scientific meetings was devoted to addresses by the inter-American guests. Another was devoted to war problems, and a third to problems of general clinical importance.

Mr. Paul V. McNutt was the chief speaker at a dinner given to the House of Delegates by the Atlantic County Medical Society. Mr. McNutt's address was concerned solely with the utilization of man power as related to physicians needed in the service. He tendered great praise to the organization for the excellent work that had been done by the Committee on Medical Preparedness. While there were some shortages apparently

at that time, your Association committee has remedied this defect and is looking for no further immediate trouble in that regard.

There was an address by the President, Frank H. Lahey, of Boston, who paid high tribute to the officers of the Association and especially to your Secretary, Dr. Olin West, for their wholehearted cooperation in conducting the year's affairs.

Surgeon General James E. Magee of the United States Army addressed the House of Delegates and paid high tribute to the character of men in organized medicine who were in the Army.

The Committee on Distinguished Service Awards for the American Medical Association submitted three names to the Board of Trustees for the award of the Distinguished Service Medal. They were Dr. George W. Crile, Dr. Ludvig Hecton and Dr. Elliot P. Joslin. Dr. Ludvig Hecton received a majority of votes cast and was selected to receive the Distinguished Service Award of the American Medical Association.

Without opposition, the House selected as President-Elect, Dr. James E. Paullin of Atlanta, Georgia, who has long been identified with the Association's activities in field and graduate education.

The Scientific Exhibit was well attended and again and again one heard the comment that the Scientific Exhibit of the American Medical Association is the greatest postgraduate course ever assembled anywhere in the world.

The House of Delegates adjourned sine die 4:10 P. M. on June 11, 1942.

A. P. NACHTWEY, M.D.,
Delegate.

REPORT OF SPECIAL COMMITTEE 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 has continued the work of the Committee on Medical Preparedness. Its membership has been increased to ten, in order that every area in the state might be more adequately represented.

A year ago our Nation's effort to produce a large armed force was in its infancy. A staggering number of medical officers was demanded by the Army and Navy. Physicians, particularly in the younger age groups, were slow to enlist. Drastic measures to meet the shortage of medical officers had to be inaugurated. Directives were issued from National Selective Service Headquarters to local Selective Service Boards, whereby physicians, dentists and veterinarians were to be classified regardless of dependencies. Medical Officer Recruiting Boards were sent into each state during May to expedite the commissioning of medical officers. In spite of the fact that the Allotment Bill, which was signed by the President in June, countermanded the directive referred to above, and gave physicians the same provisions for deferment because of dependents as other citizens, the response in North Dakota was so prompt that the Recruiting Board was withdrawn in less than three months. Our quota of 29 was reached by September. It was 114 per cent in October.

Sixty-one North Dakota physicians are in Military Service according to government reports and reports of the District Medical Society secretaries. A list of their names can be found following the Alphabetical Roster of North Dakota physicians in this issue of the JOURNAL-LANCET.

The major function of this Committee has been to cooperate with the Procurement and Assignment Service for Physicians in determining the "availability" and "essentiality" of every physician in the state. In some instances, this has been a difficult task. A few mistakes have been made, particularly in permitting young physicians to apply for commissions, only to find when they had left for service that they could not be replaced at home. However, the medical profession in North Dakota should feel proud of the record it has made to date in providing our Armed Forces with Medical officers. There are very few areas in the state where the services of a physician are not available on comparatively short notice. A survey of such areas reveals that the inhabitants were none too loyal to their local physicians in prewar days.

The duties of this Committee in the future, as in the past, will be to provide the number of physicians for the Armed Forces demanded by the government, and also safeguard the medical care of the civilian population in the state. Recruitment of medical officers to date in 1943 has been largely limited to those few states that failed to reach their quotas in 1942, but states such as ours may be called upon to fill a quota during the late months of this year.

The relocation of physicians to those few areas in which there is a critical need for physicians has become a difficult problem. A few physicians who, a few years ago, would gladly have moved to some other location in the state, are now loathe to do so because of improved economic conditions in their own localities and the uncertainties incident to a change in location. The importation of physicians from other states presents numerous difficulties, particularly that of obtaining physicians who have the professional ability and physical stamina to carry on in a rural practice. Your Committee does not favor the establishment, in any area in North Dakota, of a health service such as is functioning in some states and in which a commissioned officer of the United States Public Health Service is assigned to an area and practices medicine under the sponsorship of a state defense or health authority, until all other attempts to solve the problem have failed.

L. W. LARSON, M.D.,
Chairman.

NEW BUSINESS

Dues

Upon motion duly made, seconded and carried it was agreed that the annual dues remain the same as last year, or \$10.00 per capita.

Nominating Committee

The President announced the appointment of Drs. P. G. Arzt, O. T. Benson and D. J. Halliday to the nominating committee.

Reference Committees

The Speaker announced the personnel of the Reference Committees as follows:

To consider the Reports of the Secretary and of Special Committees: A. H. Woutat, chairman, Grand Forks; G. C. Christianson, Sharon; G. W. Hunter, Fargo; R. T. O'Neill, Minot; W. A. Wright, Williston.

To consider the Reports of the Council, Councillors, and Delegate to the A. M. A.: O. T. Benson, chairman, Glen Ullin; D. J. Halliday, Kenmare; J. B. James, Page; W. A. Liebler, Grand Forks; J. P. Merrett, Marion; L. J. Seibel, Harvey; J. C. Fawcett, Devils Lake.

To consider the Reports of the Standing Committees: T. L. DePuy, chairman, Jamestown; W. E. G. Lancaster, Fargo; A. H. Reiswig, Wahpeton; C. C. Smith, Mandan; R. H. Waldschmidt, Bismarck; C. J. Meredith, Valley City.

Committee on Resolutions

A. P. Nachtwey, chairman, Dickinson; D. J. Halliday, Kenmare; C. J. Meredith, Valley City.

Committee on Credentials

C. C. Smith, chairman, Mandan; L. J. Seibel, Harvey; J. C. Fawcett, Devils Lake.

Adjournment

The first meeting of the House of Delegates was adjourned at 8:55 P. M. on motion made by Dr. R. H. Waldschmidt, seconded by Dr. G. Wilson Hunter and carried. It was agreed that the second session of the House would be called at 9:30 A. M., Monday, May 10.

SECOND SESSION of the HOUSE OF DELEGATES Monday, May 10, 1943

The Second Session of the House of Delegates was called to order by the Speaker, Dr. John H. Moore, at 9:45 A. M. in the Rose Room, Hotel Patterson, Bismarck, N. Dak.

The Secretary called the roll. Fifteen delegates responded, and the Speaker declared a quorum present. The following delegates and alternates responded: Doctors W. E. G. Lancaster, Fargo; G. W. Hunter, Fargo; P. H. Woutat, Grand Forks; C. R. Tompkins, Grafton; W. A. Wright, Williston;

D. J. Halliday, Kenmare; R. T. O'Neill, Minot; A. H. Reiswig, Wahpeton; C. J. Meredith, Valley City; R. H. Waldschmidt, Bismarck; C. C. Smith, Mandan; O. T. Benson, Glen Ullin; A. P. Nachtwey, Dickinson; L. J. Seibel, Harvey; G. C. Christianson, Sharon.

The Secretary read the Minutes of the First Session, which were approved as read.

Dr. D. J. Halliday, member of the Nominating Committee, presented the following report, moved its adoption and that the nominees be declared unanimously elected.

Dr. R. H. Waldschmidt stated that the Governor had repeatedly requested the Association to nominate six candidates for appointment to the State Board of Medical Examiners each year instead of only three candidates as has been the custom in the past. Dr. Waldschmidt suggested that the Nominating Committee respect the Governor's request this year. There being no further nominations, the motion of Dr. D. J. Halliday was seconded by Dr. R. T. O'Neill and carried unanimously. Those elected to office for 1943-1944 were:

President—Frank Darrow, Fargo.

President-Elect—F. L. Wicks, Valley City.

First Vice President—James F. Hanna, Fargo.

Second Vice President—A. E. Spear, Dickinson.

Speaker of the House—John H. Moore, Grand Forks.

Secretary—L. W. Larson, Bismarck.

Treasurer—W. W. Wood, Jamestown.

Delegate to A.M.A.—A. P. Nachtwey, Dickinson.

Alternate Delegate to A.M.A.—O. T. Benson, Glen Ullin.

COUNCILLORS:

Second District—J. C. Fawcett, Devils Lake.

Seventh District—P. G. Arzt, Jamestown.

Eighth District—F. W. Fergusson, Kulm.

Tenth District—W. H. Gilsdorf, New England.

Dr. F. L. Wicks, Councillor for the Fifth District, submitted his resignation, because he had just been elected President-Elect of the Association. Dr. A. P. Nachtwey moved that Dr. Wicks' resignation be accepted. The motion was seconded by Dr. C. R. Tompkins and carried.

Dr. D. J. Halliday moved that Dr. C. J. Meredith of Valley City be elected Councillor for the Fifth District to fill the unexpired term of Dr. F. L. Wicks, resigned (term expires in 1945). The motion was seconded by Dr. A. P. Nachtwey and carried unanimously. The Speaker declared Dr. C. J. Meredith elected Councillor for the Fifth District.

The Secretary announced that no invitations had been received for the 1944 Session. A general discussion followed in which it was emphasized that the Association may not be able to convene in 1944. Dr. A. H. Reiswig moved that Fargo be selected as the next meeting place. The motion was seconded by Dr. L. J. Seibel and carried unanimously.

REPORTS OF REFERENCE COMMITTEES

Report of Committee on Reports of Secretary and Special Committees

Dr. P. H. Woutat, chairman, presented the following report which was adopted as a whole on motion of Dr. Woutat, duly seconded by Dr. R. H. Waldschmidt and carried.

Your Committee to consider the report of the Secretary of the State Association, recommends the adoption of the Secretary's Report, including the recommendations that Dr. A. B. Fields of Forest River be elected to Honorary Membership in our Association and that the President of the State Association appoint a small committee on Nursing Education to cooperate with the State Hospital Association and the State Board of Nurses Examiners.

Your Committee wishes to commend the excellent work of the Secretary during the past year.

Your Reference Committee recommends the adoption of the report of the Committee on War Participation and wishes to commend the Committee for its work. We recommend that the Committee continue its policy of trying to maintain adequate medical personnel to care for the people of the state.

Council, Councillors, and Delegate to A.M.A.

Dr. O. T. Benson, chairman, presented the following report, which was adopted section by section and as a whole, on motions of Dr. Benson, duly seconded and carried.

1. *Report of Chairman of Council.* Your Reference Committee has carefully considered the report of the Council as submitted by its chairman, Dr. N. O. Ramstad. It heartily approves the investment of State Association Funds in war bonds and commends the thoughtful action of the Council in sending notes of condolence to the widows of Drs. A. O. Arneson and George B. Ribble, who were valued and respected members and officers of our Association.

We find the affairs of the State Association have been efficiently administered by the Council. Your Reference Committee recommends the adoption of the report of the Council.

2. *Reports of Councillors.* Your Reference Committee is pleased to note that all the Councillors report harmony and good will prevailing in their districts.

The report of Dr. Williamson, Councillor for the Third District, in which he suggests the amalgamation of the Traill-Steele County Society with the Grand Forks Society and the report of Dr. Paul Burton, Councillor for the First District, in which he suggests the amalgamation of the Richland County Society with the Cass County Society, were carefully considered by your Reference Committee. We believe that the question of redistricting the state should receive careful consideration on the part of the House of Delegates in the near future, because of the apparent difficulty which some of the smaller societies are experiencing in maintaining interest in their society.

The question raised in the report of Dr. Burton, Councillor for the First District, relative to arrangements which might be made whereby the members of the medical staff of the North Dakota Veterans Hospital could join the State Association was carefully considered by your Reference Committee. It was agreed that these physicians should be encouraged to affiliate with organized medicine, but that no special concessions be made to them.

Your Reference Committee believes that the reports of the Councillors indicate that all the district societies are well organized so that interest and enthusiasm is being maintained.

The statement of Dr. Spear, Councillor for the Tenth District, which reads, "If there is a job to do, the Southwestern Society will handle it," would appear apropos for all the district societies, according to the reports of the Councillors.

Your Reference Committee recommends the adoption of the reports of the Councillors for the First, Third, Fourth, Fifth, Sixth, Seventh, Eighth, Ninth and Tenth Districts, as amended. These Councillors are as follows: Drs. Burton, Williamson, McCannel, Ramstad, Arzt, Wicks, Westervelt and Spears.

3. *Report of Delegate to the American Medical Association.* This Committee believes that the report of Dr. Nachtwey, delegate to the A.M.A., is outstanding in that it contains a concise, interesting report of the deliberations of that governing body. This Committee recommends the adoption of the report of Dr. Nachtwey.

Report of Reference Committee to Consider the Reports of Standing Committees

Dr. R. H. Waldschmidt, chairman, presented the following report, which was adopted section by section and as a whole, on motions of Dr. Waldschmidt, duly seconded and carried, after discussion:

1. *Report of Committee on Medical Education.* Your Reference Committee recommends the adoption of the report of the Committee on Medical Education.

2. *Report of 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 to take this occasion to commend Dr. James Grassick for the excellent manner in which he prepares the reports on Necrology.

3. *Report of the Committee on Public Policy and Legislation.* Your Reference Committee recommends the adoption of the report of the Committee on Public Policy and Legislation. It also wishes to commend Drs. Stucke and Brandes for their excellent efforts in behalf of the Medical Profession during the last session of the Legislature.

4. *Report of Committee on Tuberculosis.* Your Reference Committee recommends the adoption of the report of the Committee on Tuberculosis.

5. *Report of the Editorial Committee on Official Publication.* Your Reference Committee recommends the adoption of the report of the Editorial Committee on Official Publication.

6. *Report of Committee on Pneumonia Control.* Your Reference Committee recommends the adoption of the report of the Committee on Pneumonia Control except that the \$3.00 fee for x-rays of the chests of children be changed to \$5.00 as recommended by the Committee on Medical Economics.

7. *Report of the Committee on Cancer.* Your Reference Committee recommends the adoption of the report of the Committee on Cancer.

8. *Report of the Committee on Fractures.* Your Reference Committee recommends the adoption of the report of the Committee on Fractures.

9. *Report of the Committee on Industrial Health.* Your Reference Committee recommends the adoption of the report of the Committee on Industrial Health.

10. *Report of the Committee on Venereal Disease.* Your Reference Committee recommends the adoption of the report of the Committee on Venereal Disease.

11. *Report of the Committee on Medical Economics with its Supplemental Report.* Your Reference Committee recommends the adoption of the report of the Committee on Medical Economics as printed in the handbook, and also the supplemental report of the Committee on Medical Economics as presented at the First Session of the House of Delegates. Your Reference Committee moves the adoption of this portion of the report.

12. *Report of the Committee on Maternal and Child Welfare.* Your Reference Committee recommends the adoption of the report of the Committee on Maternal and Child Welfare as printed in the Handbook.

13. *Joint Report of Committees on Maternal and Child Welfare and on Medical Economics.* Your Reference Committee recommends the adoption of the Joint Report of the Committees on Maternal and Child Welfare and Medical Economics, pertaining to the emergency maternity and infant care program for wives and dependent children of service men in the fourth, fifth, sixth and seventh grades.

14. *Report of the Committee on Public Health.* Your Reference Committee recommends the adoption of the report of the Committee on Public Health with the following amendments:

1. That paragraph two under Resolutions be amended to read "The State Health Department prepare a resolution and send it to the Beet Growers Association and others concerned, that no Mexican laborer be hired unless he can present a clean bill of health, particularly freedom from tuberculosis as determined by an x-ray examination."

Your Reference Committee believes that as a public health measure these individuals should not be admitted into the United States until it is known that they are free from tuberculosis as determined by an x-ray examination.

2. That paragraph three in reference to Senate Bill No. 77, providing permissive legislation for fulltime health districts, and requesting the cooperation of the North Dakota State Medical Association in promoting fulltime health units, be not approved.

Committee on Resolutions

Dr. A. P. Nachtwey, chairman, presented the following report, which was adopted on motion of Dr. Nachtwey, duly seconded and carried:

Your Committee on Resolutions begs leave to submit the following report: Your Committee gave careful and long consideration to the Resolution to be presented to the House of Delegates of the American Medical Association at its next Annual Meeting for establishment of a committee on Medical Service. Your Committee approves this Resolution in toto and moves its adoption.

NEW BUSINESS

Redistricting of Component Medical Societies

Dr. A. P. NACHTWEY: Dr. Hunter brought up the amalgamation of the Societies. Would any special recommendation be made on this at this meeting?

Dr. O. T. BENSON: Drs. Burton and Williamson made a suggestion, but the inference was that it was up to the Society to decide this.

Dr. FRANK DARROW: Would you not recommend that there should be a redistricting of the Association?

Dr. O. T. BENSON: Yes, We thought that should be left to the House of Delegates. Dr. Williamson suggested that a committee be appointed. We thought that the Council was authorized to act as a committee as a whole, to redistrict the societies of the State Association. We thought that should be discussed here.

Dr. G. WILSON HUNTER: Could we have a statement from Dr. Reising, who is a member of the Richland County Society?

Dr. A. H. REISWIG: We discussed that before, in our society. We feel that most of the members would like to become members of the Cass County Society. Some of the local men raised the question of having some sort of a committee to deal with the problems of the local society, but according to Dr. Burton, this could be left to the society anyway. For instance, we had a little trouble with an irregular coming in; our society got busy and took care of him. Some of the members wondered if we joined the Cass Society, could we get that service. We are sure that it would be beneficial for our members, because we have not a very large membership and have not been having very many meetings. We have, most of us, been attending the meetings of the Cass Society.

SPEAKER: May I clarify the point that Dr. Benson raised, by calling your attention to your Constitution and By-Laws? Dr. Benson is perfectly correct. It is the function of the House of Delegates, not a province of the Council. One point deals with the organization of the various district societies and then in Section 2, of Chapter 12 of the By-Laws, it states "Charters shall be issued only upon approval of the House of Delegates and shall be signed by the President and the Secretary of this Association. The House of Delegates shall have authority to revoke the charter of any component district society, whose actions are in conflict with the letter or spirit of this Constitution and By-Laws." In Dr. Williamson's district they have been having some difficulty. The Traill-Steele Society wants to continue with some of their own problems, but many of the members feel it may not work out. It is the problem of this House to solve this.

Dr. FRANK DARROW: Then it is up to the individual society to get together and request a new Charter.

SPEAKER: I think that is entirely correct. If the society would come to Cass and request a change in the charter, this body would issue that charter upon the request of the delegates. The same thing holds true with the Grand Forks and Traill-Steele Districts. Does that answer the question? It is the function of this House of Delegates, but we have no request for such a change in charter before us, as Dr. Darrow has said. It would be my feeling that at present the situation should remain as it is, and let a request come from a local community.

Dr. L. J. SEIBEL: I do not believe it is the right thing to do, to let the members drift away and then finally kill the Society.

SPEAKER: That is right.

Dr. G. C. CHRISTIANSON: I would like to speak for the members of the Traill-Steele Society. I would like to take issue with the statement of Dr. Williamson that we do not hold regular meetings. We do hold these meetings. We have four meetings a year and have outside speakers for our programs. They are educational programs. One of the issues that come up before our group is distance. I am about 60 or 75 miles away from Grand Forks, but as far as I am concerned, I could drive those miles to meet with the Grand Forks District. However, our members are made up of older men who have practiced 30 or 40 years. Last summer, the question was brought up as to whether we should join the Grand Forks group, and the older members were very much against it at that time. I think the only way anything could be done about it would be in redistricting, because if it is just left up to the Society to join, I do not think they will.

SPEAKER: Thank you very much for your remarks. I am very glad you brought that up. This makes two expressions of opinion from members of the societies under question, and the very pertinent remarks of Dr. Seibel. I feel from what has been said here, that this House probably would not want to take any action at this time to force an amalgamation. Certainly, we know that the Traill-Steele Society has been very active. They

have had their programs regularly. And while they are always welcome to come to the meetings of the Grand Forks Society, I do not think that the House of Delegates would want to force such an amalgamation.

Dr. W. E. G. LANCASTER: Could not the House take action to make it permissible for any Society to change, if they want to?

SPEAKER: That is all worked out. The initiative should come from the society. We have issued charters, and as long as the societies are fulfilling their functions and would like to continue to do so, any change should be up to them.

Dr. L. J. SEIBEL: Suppose the society acts on it, and the majority are for retaining its organization. Is it proper for the few to drift away?

SPEAKER: I can only answer that from what little knowledge I have been able to pick up in the last few years, sitting up here, I think probably that the majority still rules, and, when a majority decides that they want to keep their society, I have seen nothing to indicate that this House of Delegates would attempt to over-rule the majority's wishes. The problem of the minority comes in, not only in the local society but in this State Association. It came in on one of the objections that Dr. Nachtwey's committee made to a resolution. There are always a few who do not quite come in. We have, in a democratic body like this, to be governed by the wishes of the majority.

Dr. A. H. REISWIG: It is quite often true that those who do not want to join up with the other society do not attend our own meetings, except when such a problem comes up. I think this should be discussed within our own society, so that if the majority votes for it, we would be cleared.

Dr. P. H. WOUTAT: It seems to me that the small district societies should be maintained, primarily for handling their local situations which differ a little in such states as ours. Problems in our part of the state differ from those in the western part of the state. If the reason these societies wish to join is purely to present better scientific programs, there is nothing to prevent any member from attending any scientific program and meeting. I think if these small societies have problems, they would rather thresh these out and then, if they care to, attend scientific meetings of some of the other societies.

Dr. DARROW: There is always a little financial obligation, even to a scientific session. Perhaps these members of other societies want to bear their part of it. I think this could be handled on a local basis and this problem could be solved. The question that came to my mind was, whether it would change the delegate proposition, and there you have a real problem. They might not have enough in their society to add the extra delegate, which would be necessary for the House of Delegates.

SPEAKER: That is true. It may be one of the reasons why a society wishes to retain its own identity.

Dr. FRANK DARROW: We do have an arrangement in Fargo whereby the men from Moorhead may come to our meetings and pay a small fee, because they insisted that they share the financial burden of putting them on. The members from Richland Society, no doubt, wish to bear the burden financially also, and that is why this question came up.

SPEAKER: I feel, from listening to this most excellent discussion, that it is the consensus of this House of Delegates that nothing should be done at this time, regarding the recommendation to amalgamate these societies. Is that your feeling?

Dr. O. T. BENSON: Is that also true about redistricting?

SPEAKER: Yes.

Dr. G. W. HUNTER: Would it be in order to suggest that the larger society make it a practice to send out notices to all adjacent societies? In the past year, we have adopted the practice of sending out notices of our meetings to every society within a radius of sixty miles, even including those in Minnesota. We have had an excellent response and the men have come from Fergus Falls, Devils Lake, Wahpeton, Breckenridge, Crookston and several other points. We feel it is a good practice and we have had better meetings as a result.

SPEAKER: I might call your attention to the Constitution and By-Laws which state that the function of the House of Delegates is to give diligent attention to and foster the scientific work and spirit of the Association. I think that this discussion is pretty much a matter of local invitation and the function of

the various local societies. Any further discussion on this point?

Dr. D. J. HALLIDAY: Would it be out of order to have the House of Delegates appoint a special committee to give a year's study and bring in a report next year as to what individual members of the various societies think of this matter?

SPEAKER: It would seem a little easier, now that this has been crystallized by this discussion, for the representatives of the smaller societies to take this matter up within their societies. There has not been a request from any interested society for amalgamation, and if the matter could sort of develop along for a year, it would not take an extra committee to bring this to the House next year. It would come in very properly under items of business. But, if you feel that it is important enough at this time to make a special study of it; if you feel that the situation is important enough to make a special study of redistricting, then I think it is important enough to move the appointment of a committee.

Dr. D. J. HALLIDAY: We are only expressing our own opinions. We are not getting the view of the men who do not attend these district meetings. They may wish to attend the larger society meetings.

SPEAKER: This body may appoint a committee, if you wish to present it that way.

Dr. L. J. SEIBEL: Have not we been discussing this for the past few years? We have in our Tri-County Society. It is not a new problem at all.

SPEAKER: No, it is an old problem, but it is having an excellent discussion this morning. It may be that out of this discussion something may develop in regard to redistricting, but I do not think we need to be in a hurry about it. We have enough objections raised this morning to redistricting, so I feel very sure that this House would not want to ride rough-shod over the wishes of the members of any society.

Dr. G. C. CHRISTIANSON: I would like to ask, so I can carry back the information to our society, what is the reason for the larger society wanting the smaller society to join them. Is there someone here that would give a reason for it? What are the advantages?

Secretary LARSON: I think that the two councillors who suggested this did so because they were a little bit concerned over just how thriving your society and Dr. Reisweig's society are. Perhaps they are shooting too high; perhaps they are trying to apply the standards set by such large societies as the Cass and Grand Forks County societies to your smaller district societies.

Dr. FRANK DARROW: I think it was more of an invitation; not a request.

Secretary LARSON: It was an invitation, I am sure. They are not trying to railroad any society into joining a larger society. They are a little concerned lest these small societies die out, and it is perfectly proper for them as Councillors to worry about that. If you people feel that you are getting along all right, then a change should not be made.

Dr. A. H. REISWIG: I know that at first some of the members in our society were against joining up with the Cass County Society, but some of them are now for it. What Dr. Darrow brought up is correct; the members did not want to sponge on other societies and wanted to carry their share of the burden. If arrangements could be made whereby we could attend the meetings and still have a society at home, we would like to have this done.

Secretary LARSON: No member of a large society should make a member of a smaller society feel that he is sponging. We are tickled to death here in Bismarck to have anyone attend from any other society.

SPEAKER: The delegates from the small society certainly have the floor of this assembly at their disposal. I am sure that they would feel they have been adequately heard in the House. If that point can be brought out, it would do much to solve this problem.

Dr. C. R. TOMPKINS: I do not have the special problem at this time but I do have the advantage of having been a member of a smaller society, the Tri-County Society, and am a member of a larger society, the Grand Forks Society, at this time. I think I have a little insight into the way these men

feel about their situation. In the first place, the Tri-County Medical Society always functioned very well, I thought, while I was there. And, I want to say, that we were always made to feel very welcome to attend the Devils Lake District Society meetings at any time we were able to do so. I think that holds good for all the societies. I think, too, that the local problems can better be handled by their own society; personally, I would be in favor of having them consider rather seriously before uniting with a larger society. They have all the privileges of the scientific meetings held in the larger societies, as they are always welcome without a special card being sent to them. I am sure that holds good for all societies. I do not think this is the best time to consider redistricting societies. After the war, we might have quite a change in the number and location of medical men in the state. It may be that when these men come back from war, there may be more in some of the smaller communities and it may work out that four or five years from now, there would be plenty of men in the local districts where they do not have them now. I am sure it would be wise not to do too much about it at the present time. Any man who would like to attend any scientific meeting is very welcome to attend. I can not see where redistricting the societies is going to make any more or better scientific meetings, and because of the change in the districts which might occur, it might be better not to do the redistricting until later.

Remarks by the President

I have enjoyed the Session here with you. I know that things have been very well thought out and worked out. The suggestion that I have to make is that you take home these discussions to your local societies and at the next district medical meeting go over these matters with your district society, and present to them the problems that have been presented here. Only by careful thought and study by the individual societies of reports of these groups, transmitted to the Central Association, can we work out a suitable and economical problem for this society. That is my Benediction.

Adjournment

On motion made by Dr. Waldschmidt, seconded by Dr. Tompkins and carried, the House of Delegates adjourned sine die at 11:15 A. M.

SPECIAL SESSION OF HOUSE OF DELEGATES

Monday, May 10, 1943

A special meeting of the House of Delegates was called by the President of the Association, Dr. A. R. Sorenson. The House was called to order by the Speaker at 12:55 P. M. in the main dining room of the Patterson Hotel, Bismarck, North Dakota.

The Secretary called the roll. Thirteen delegates responded and the Speaker declared a quorum present. The following delegates and alternates responded: Drs. C. C. Smith, Mandan; C. R. Tompkins, Grafton; W. A. Wright, Williston; C. J. Meredith, Valley City; W. W. Wood, Jamestown; W. E. G. Lancaster, Fargo; A. P. Nachtwey, Dickinson; L. J. Seibel, Harvey; R. T. O'Neill, Minot; R. H. Waldschmidt, Bismarck; O. T. Benson, Glen Ullin; D. J. Halliday, Kenmare; A. H. Reiswig, Wahpeton.

The Speaker announced that the purpose of the Special Session was to receive a supplementary report of the Nominating Committee, which was made necessary by a request from Governor Moses, that six physicians be named as candidates for the three vacancies on the State Board of Medical Examiners instead of only three names as has been the usual custom.

Report of Nominating Committee

Dr. P. G. Arzt, chairman, presented the names of six nominees for the three vacancies on the State Board of Medical Examiners, which will occur on July 1, 1943. They are: Drs. Paul Rowe, Minot; G. M. Williamson, Grand Forks; W. A. Wright, Williston; A. D. McCannel, Minot; C. J. Meredith, Valley City; C. R. Tompkins, Grafton.

Dr. Waldschmidt moved the adoption of the Nominating Committee Report. The motion was seconded by Dr. Halliday and carried. The Special Session adjourned at 1:15 P. M.

SCIENTIFIC PROGRAM**Monday, May 10, 1943**

- 1:00 P. M.—Colored Sound Movie, "Peptic Ulcer."
 2:00—"Recent Advances in the Treatment of Hypertension," Dr. O. A. Sedlak, Fargo, North Dakota.
 2:30—"The Laboratory of the Physician and the Small Hospital," Dr. W. A. Wright, Williston, North Dakota.
 3:00—"The Roentgen Manifestations of Acute Abdominal Diseases," Dr. Leo Rigler, professor of radiology, University of Minnesota.
 3:50—"Sulfonamide Therapy in General Practice," Dr. W. W. Spink, associate professor of medicine, University of Minnesota.
 4:30—"Herniation of the Intervertebral Disc," Dr. William Peyton, professor of surgery, University of Minnesota.
 5:30 to 8:00—Smoker and Smorgasbord Supper—Exhibit Hall, Memorial Building.
 8:00—"The Celiac Syndrome in Children," Dr. R. E. Dyson, Minot, North Dakota.
 8:45—"A Reconsideration of Focal Infection as a Cause of Disease of the Eyes," Dr. W. L. Benedict, Mayo Clinic, Rochester, Minnesota.
 9:30—"Etiological Investigations in Dysphemia, and Its Symptom (Stuttering)," Bryng Bryngelson, Ph.D., director of speech clinic, University of Minnesota.

Tuesday, May 11, 1943

- 8:00 A. M.—Colored Movie, "Skin Grafting of War Wounds and Observations on Wound Healing."
 9:00—"Hemorrhagic Diathesis of the Newborn: Vitamin K Prophylaxis and Therapy," Dr. L. G. Pray, Fargo, North Dakota.
 9:30—"Acute Pulmonary Lesions and Their Early Diagnosis," Dr. Leo Rigler, professor of radiology, University of Minnesota.

- 10:15—Presidential Address—Dr. A. R. Sorenson, Minot, North Dakota.
 10:30—Intermission to visit Exhibits. Lunch served in Exhibit Hall.
 11:15—Introduction of New President, Dr. Frank Darrow, Fargo, North Dakota, and Installation.
 11:20—"Neuropsychiatric Emergencies," Dr. P. K. Arzt, St. Paul, Minnesota.
 12:00 P. M.—"The Use of Small X-Ray Films in Tuberculosis Case-Finding," Dr. H. L. Hiebert, director of division of tuberculosis control, State of Kansas.
 1:00—Round Table Luncheon—Hotel Patterson.
 Subjects for Discussion: "Problems in Sulfonamide Therapy," Dr. W. W. Spink, leader; "Cranio-Cerebral Injuries," Dr. William Peyton, leader.

INSTALLATION OF PRESIDENT**Tuesday, May 11, 1943—11:15 A. M.**

Dr. A. R. SORENSON: Gentlemen, at this time we have the pleasure of inaugurating our new President, Dr. Frank Darrow. If I am not mistaken, this is the first time in the annals of the North Dakota Medical Association that there has been a father and a son to hold the office of President. I will ask Dr. Ramstad and Dr. Williamson to escort Dr. Darrow to the platform.

Dr. WILLIAMSON: Dr. Sorenson, I am very happy to bring Dr. Darrow to this position, and I hope, Dr. Darrow, that you will enjoy your duties and I know the Association will benefit by having you as President.

Dr. FRANK DARROW: Thank you very much. It certainly is a great pleasure for me to be in this position. I am afraid that we can not have three generations of Darrows as President, because both my sons turned out to be daughters. However, I can assure you, I will do all in my power to follow in the footsteps of the illustrious predecessors in the office. I believe we can now go on with the Scientific Program.

PRESIDENTIAL ADDRESS*

Dr. A. R. Sorenson
Minot, North Dakota

To the Members of the North Dakota State Medical Association and Guests: I want to take this opportunity to thank the Medical Association for the privilege of heading the Association for one year. I assure you I have enjoyed it very much and hope I have done some little thing during my term of office on behalf of the Medical Association. I would also like to thank the Sixth District Society and the Committee on Arrangements for the most splendid entertainment they have given us.

Since the last meeting of the North Dakota State Medical Association, there has been a great change (upheaval) in the lives of all American people, due to the rapid progress of the war efforts. This change is reflected in all the phases of our daily lives and in no phase more than in the care and prevention of illness and injuries both in civilian and military life. Upon those of us who are unfortunately unable to serve with the Armed Forces, because of age or physical disability, will devolve the added burdens of caring for the civilian population. There can be no doubt but that these added burdens will be arduous for many. However, I believe that every doctor who remains in his post at home can justly regard himself as an American soldier and, as such, will make all the sacrifices and extend himself to the limit of his powers to fulfill his duties when called upon to do so,

*Presented before the North Dakota State Medical Association, Tuesday, May 11, 1943, 10:15 A. M.

just as the soldier in the field accepts his obligations even to the sacrifice of his all.

What part North Dakota physicians have played in answering their country's call and what part must yet be played by those remaining at home can best be realized by giving a few statistics. At the outbreak of the war, there were 460 medical doctors in North Dakota serving approximately 300,000 people—a ratio of 1 to 800, which was the ratio generally prevailing in the United States. Of our number, 61 have enlisted in the Army or Navy, leaving 400 to care for the civilian population. This would not seem like a great change in ratio, but when one considers that those who remain are mostly in the advanced age group and some are handicapped by physical disability, notably that of cardiac origin, it can be readily understood that many will have to accept added responsibilities which will tax their physical powers to the utmost. No one believes for a moment that any man will shirk his duties. Undoubtedly, a few more men will be called from our ranks, but, in view of the fact that we have at this time exceeded our quota, it is not likely that enough more will be taken to hamper us seriously.

On the brighter side of the picture, I can say that our state is particularly fortunate in the distribution of its medical and hospital facilities. I would like to go into this in a little more detail, as I believe that it is necessary

for each one of us to be familiar with the picture, not only for our own information but in order to answer questions put to us by lay people and particularly to answer the argument frequently put forth that, in view of the so-called medical shortage, the bars be let down for the cults. If you will call before your mind's eye a picture of our state, I will give you a geographical distribution of its hospital facilities which, of necessity, includes the medical facilities. Beginning in the northwest corner and traveling the northern tier of counties, you will find the following cities and towns provided with hospitals: Williston, Ambrose, Noonan, Powers Lake, Kenmare, Minot, Bottineau, Rolette, Rolla, Rugby, Devils Lake, Grafton, Park River, and Grand Forks. Then in the middle tier: Northwood, Carrington, New Rockford, and Harvey. In the southern tier: Fargo, Wahpeton, Valley City, Jamestown, Bismarck, Dickinson, and so forth. You can see from this that medical and hospital facilities are so strategically situated that no one need suffer for want of medical care, with the possible exception of some counties in the Missouri Valley where two counties with a combined population of 14,000 are without a doctor. I mention this specific case, as it is being used as an example of the inadequate medical care. However, this situation is temporary—due to the illness of the one doctor who, single-handed, served these people for years. He expects to resume practice again. But despite his absence, inquiry reveals that there has been no great hardship worked upon the inhabitants, as autos and good roads render it rather simple to transport the ill to hospitals within easy driving distances. As a matter of fact, a great number did this very thing even with a practitioner in residence. Taking it all in all, our state is in a very good medical position, and there is no need to import alien physicians or to admit the cults and to practice indiscriminately. These are the points which I would like to impress upon you, so that you may intelligently combat adverse criticism of our profession.

Now what about conditions after the war. There are, without question, plans being made by lay uplifters, to govern the practice of medicine in the new order under which we are expected to live and work. An appeal will be made to the economic side of the population to establish a system of practice that will guarantee to everyone medical and hospital care from the cradle to the grave at nominal cost to the patient. Who will supplement the costs is not stated, but it will be the well known taxpayer who is already being ground to dust between the millstones of extravagance above and ideology below. We must ever be on guard to protect our rights and preserve a system which has given to the American people a medical care superior to and in greater abundance than any other country in the world. There must, of necessity, be some changes, for as the times change, we must adapt ourselves to new conditions, but this does not mean that we must surrender our medical freedom and become servants of a socialistic order. We will welcome ever-changing methods for the advancement of medicine; we will accept new orders of financial arrangements such as hospital insurance and prepayments; but we will forever hold fast to the idea that we are free men, who have

the right to live and work as we see fit within the limits of precedents set down by our illustrious predecessors. Furthermore, we should try to safeguard to the people, the right of free choice of medical attendant, which we all know by experience means so much to them and is the very basis of our present mode of practice. The fulfillment of these aims should not be left to a handful of chosen officers but should be accepted by each physician as a personal responsibility. I urge each and everyone of you to become students of the economic side of practice; talk these matters over between yourselves and in your society meetings; pass your thought on to your central association; for only by free discussion and summed-up results of good thinking, can we arrive at a solution of these problems which will be fair to all concerned.

I want, particularly, at this time, to call to your attention the "National Physicians Committee for the Extension of Medical Service." This committee is composed of fellow physicians of the highest caliber, who are not only devoting a great deal of time to the study of economic problems as they affect us, but who are also doing a great deal of actual practical work to preserve to us the benefits of our present system of practice. I will read to you extracts from their latest bulletin which will give you some idea of what is being done:

"PROGRESS REPORT:

- (a) Under war conditions, with food rationed and all business and industry operating under strict priorities, medicine has retained its autonomy and the right of self-administration through Procurement and Assignment Service.
- (b) Continuous, intensive and systematic efforts of so-called 'Social Planners' to enact Compulsory Health Insurance legislation have been thwarted. No such legislation has been enacted.
- (c) The National Physicians' Committee, through physician and professional committees, in more than three hundred ninety congressional districts, interviewed more than 800 congressional candidates prior to the election on November 3rd, 1942.

It is estimated that more than 300 congressmen out of 435 in the House of Representatives publicly pledged themselves: (1) to preserve professional status for physicians; (2) as unalterably opposed to compulsory health insurance; (3) to avoid—at any cost—the sacrificing of the sacred doctor-patient relationship.

Almost unbelievable progress has been made. We approach a time of final determinations. The efforts of the National Physicians' Committee must be sustained and intensified. It should have, at this time, the unqualified moral support of and financial aid from every practicing physician."

No doubt you have all been circularized by this committee, but I am afraid many of you have not fully appreciated what it is doing. Therefore, I urge you to get behind it and give it your financial support. If you have not already contributed, do so at once. Send whatever you can afford, be the sum large or small. You can spend it in no more useful cause.

This struggle will be carried on for many years to come, well past the time that some of us older members will be in the fray—so to you younger men who will follow us—may I quote from the immortal poem "In Flanders Fields" these words:

*To you from falling hands we throw the torch—
Be yours to hold it high.*

NORTH DAKOTA STATE MEDICAL ASSOCIATION ROSTER - 1943

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Heffron, M. M.	Bismarck	Maercklein, O. C.	Mott	Roth, J. H.	Jamestown
Heinzeroth, Geo. E.	Turtle Lake	Mahowald, R. E.	Grand Forks	Rowe, P. H.	Minot
Henderson, R. W.	Bismarck	Malvey, Kenneth	Bottineau	Ruud, H. O.	Grand Forks
Hendrickson, G.	Enderlin	Matthaei, D. W.	Fessenden	Ruud, M. B.	Grand Forks
Hetherington, J. E.	Grand Forks	Mattson, Roger H.	McVille	Rystad, Olaf H.	Grand Forks
Hetzler, A. E.	Mandan	Mazur, B. A.	Fargo	Sand, Olaf	Fargo
Hill, F. J.	Bismarck	Meadows, R. W.	Carrington	Sasse, Ernest G.	Lidgerwood
Hill, S. W.	Regent	Meredith, C. J.	Valley City	Savre, M. T.	Northwood
Holt, George H.	Jamestown	Merrett, J. P.	Marion	Schatz, George	West Fargo
Horsman, A. T.	Devils Lake	Meunier, H. J.	Oakes	Schoregge, C. W.	Bismarck
Hoskins, J. H.	Wahpeton	Miller, H. H.	Wahpeton	Schumacher, N. W.	Hettinger
Hughes, Bernard J.	Rolla	Miller, H. W.	Casselton	Schwinghamer, E. J.	New Rockford
Hunter, G. Wilson	Fargo	Miller, Samuel	Ellendale	Sederlin, E. L.	Fargo
Huntley, H. B.	Kindred	Mitchell, George	Milnor	Sedlak, Oliver A.	Fargo
Irvine, Vincent S.	Park River	Moffat, George	Crosby	Seibel, L. J.	Harvey
Irkin, Paul	Mohall	Monteith, George	Hazelton	Serhus, L. N.	Rolette
Ivers, G. U.	Fargo	Moore, John H.	Grand Forks	Sihler, W. F.	Devils Lake
Jacobson, M. S.	Elgin	Moore, M. J.	New Rockford	Silverman, Louis	Grand Forks
James, J. B.	Page	Moreland, J. W.	Carpio	Sinner, Bernard L.	Fargo
Jensen, August F.	Grand Forks	Morris, Arthur C.	Fargo	Skarshaug, H. J.	Washburn
Johns, Stephen M.	Huntington Park, Calif.	Moyer, L. B.	Bismarck	Skelsey, Albert Wesley	Fargo
Johnson, C. G.	Rugby	Mulligan, V. A.	Langdon	Skovholt, H. T.	Williston
Johnson, J. A.	Bottineau	Murray, K. M.	Scranton	Smith, Cecil C.	Mandan
Johnson, M. H. D.	Watford City	Muus, O. H.	Grand Forks	Smith, Clinton	Devils Lake
Johnson, O. W.	Rugby	Nachtwey, A. P.	Dickinson	Smith, Oscar M.	Killdeer
Johnson, P. O. C.	Watford City	Nash, Leo A.	Fargo	Solomone, E. J.	Elgin
Joistad, A. H.	Fargo	Nelson, L. F.	Bottineau	Sorenson, A. R.	Minot
Jones, Carlos S.	Williston	Nelson, Woodrow	Minot	Sorkness, Joseph	Jamestown
Kaess, A. J.	Fargo	Nesse, S. A.	Nome	Soules, Mary E.	Boston, Mass.
Kaufman, M. I. H.	Velva	Nichols, Arthur A.	Fargo	Spear, A. E.	Dickinson
Keller, E. T.	Rugby	Nichols, Wm. C.	Fargo	Spielman, George H.	Mandan
Kellogg, I. W.	Fairmount	Nickerson, Bernard S.	Mandan	Stafne, Wm.	Fargo
Kelsey, C. M.	Minot	Nierling, R. D.	Jamestown	Stickelberger, Josephine S.	Oberon
Kermott, Louis H.	Minot	Nuessle, Robert F.	Bismarck	St. Clair, Robert T.	Northwood
Kjelland, Andrew A.	Hatton	O'Brien, L. T.	Wahpeton	Stolinsky, A.	Boise, Idaho
Klein, A. L.	Fargo	Oftedal, Axel	Fargo	Stone, Oral H., Jr.	Bottineau
Knudson, K. O.	Glenburn	Oftedal, Trygve	Fargo	Stratte, Jos. J.	Grand Forks
Knutson, O. A.	Buxton	Olesky, E.	Mott	Strauss, F. B.	Bismarck
Kohlmeyer, F. C.	Lakota	Olson, C. T.	Wyndmere	Swanson, J. C.	Fargo
Korwin, J. J.	Williston	O'Neill, R. T.	Minot	Swingle, Alvin J.	Mandan
LaFleur, H. A.	Mayville	Orr, August C.	Bismarck	Tainter, Rolfe	Fargo
LaMont, John G.	Grafton	Ostfield, J. R.	Fargo	Thompson, Andrew M.	Wahpeton
		Owens, P. L.	Bismarck		

Thompson, Roy C.	Wilton	Vollmer, Frederick J. ..	Grand Forks	Wheeler, H. A.	Mandan
Thorgrimson, G. G.	Grand Forks	Vonnegut, Felix F.	Hague	White, Robert G.	Valley City
Timm, John F.	Makoti	Wagar, Wm. D.	Michigan	Wicks, F. L.	Valley City
Tompkins, C. R.	Grafton	Waldren, G. R.	Cavalier	Williams, Mark F.	Linton
Toomey, G. W.	Devils Lake	Waldren, Henry M., Jr. ..	Drayton	Williamson, Geo. M. ..	Grand Forks
Tronnes, Nels	Fargo	Waldren, Henry M., Sr. ..	Drayton	Winn, W. R.	Fargo
Urenn, B. M.	Fargo	Waldschmidt, R. H.	Bismarck	Witherstine, W. H.	Grand Forks
Vance, R. W.	Grand Forks	Wall, Willard W.	Minot	Wold, H. R.	Grafton
Van De Erve, Herbert. ..	Carrington	Wallbank, W. L.	San Haven	Wolfe, F. E.	Oakes
Van Houten, J.	Valley City	Watson, E. M.	Fargo	Wood, Wm. W.	Jamestown
Van Houten, R. W.	Oakes	Weed, F. E.	Park River	Woodhull, Robert B. ..	Minot
Veitch, Abner	Cavalier	Weible, Ralph Darrow ..	Fargo	Woodward, F. O.	Jamestown
Vigeland, J. G.	Brinsmade	Welch, W. F.	Larimore	Woutat, P. H.	Grand Forks
Vinje, Edmund G.	Beulah	Westervelt, A. E.	Bowdon	Wright, W. A.	Williston
Vinje, Ralph	Beulah	Westley, Martin D.	Cooperstown	Yeomans, T. N.	Minot
Vinje, Syver	Hillsboro	Weyrens, Peter J.	Hebron	Youngs, Nelson A.	Grand Forks

NORTH DAKOTA PHYSICIANS IN MILITARY SERVICE

Arneson, Charles A.	Bismarck	Garrison, M. W.	Minot	Nuessle, Robert F.	Bismarck
Beck, Charles	Harvey	Geib, M. J.	West Fargo	O'Brien, L. T.	Wahpeton
Brown, G. F.	Grand Forks	Gerber, L. S.	Crosby	Parnall, Edward	Minot
Burt, A. C.	Fargo	Gilsdorf, A. R.	Dickinson	Radl, R. B.	Bismarck
Canterbury, E. A.	Grand Forks	Greengard, M.	Rolla	Ransom, H. R.	Grand Forks
Christianson, H. A.	Jamestown	Griffin, V. M.	Grand Forks	Reed, Paul	Rolette
Clark, Ira D. Jr.	Casselton	Gumper, A. J.	Dickinson	Robertson, F. O.	East Grand Forks
Cook, Paul T.	Valley City	Halverson, C. H.	Minot	Roth, J. H.	Jamestown
Cronin, Donald J.	Minot	Haugrud, Earl M.	Fargo	Schatz, George	West Fargo
Darner, C. B.	Fargo	Hawn, Hugh W.	Fargo	Sigurdsson, J. O.	West Fargo
Devine, J. L. Jr.	Minot	Haynes, G. H.	Lisbon	Silverman, Louis	Grand Forks
Dillard, J. R.	Fargo	Henderson, R. W.	Bismarck	Sinner, Bernard L.	Fargo
Dodds, G. A.	Valley City	Hoskins, J. H.	Wahpeton	Skelsey, A. W.	Fargo
Downing, W. M.	Minot	Ivers, G. U.	Fargo	Stone, Oral H. Jr.	Bottineau
Driver, Donn R.	Bismarck	Johnson, C. G.	Rugby	Swingle, Alvin J.	Mandan
Durnin, W. G.	Bottineau	Johnson, M. H. D.	Watford City	Veitch, Abner	Cavalier
Elofson, C. E.	Fargo	Keller, E. T.	Rugby	Vinje, Ralph	Beulah
Fawcett, D. W.	Devils Lake	Mahowald, R. E.	Grand Forks	Vollmer, Frederick	Grand Forks
Fischer, V. J.	Towner	Miller, Samuel	Ellendale	Weible, Ralph D.	Fargo
Fortney, A. C.	Fargo	Mitchell, George	Milnor	Williams, M. F.	Linton
Fulton, A. M.	Minot	Nierling, R. D.	Jamestown		

Epidemic Encephalitis in North Dakota and Minnesota 1941*

Studies on Etiology, Epidemiology and Serum Treatment

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IN previous studies^{1,2,3} of epidemic and endemic⁴ encephalitis and of epidemic encephalomyelitis in horses,⁵ we have isolated consistently, by special methods,⁶ alpha or green-producing streptococci that manifested specific affinity for the nervous system of inoculated animals.

Antiserums prepared with streptococci isolated in these studies were found to be of distinct value in the treatment of epidemic and endemic encephalitis,^{2,7,8,9,10} and epidemic encephalomyelitis in horses.¹¹ Streptococcal vaccines were shown to have beneficial action in treatment of persons who had chronic encephalitis,^{12,13} and to have protective action against encephalomyelitis in horses.

The underlying reasons for the occurrence of these

epidemics are obscure. Evidence of contact infection in epidemics previously studied, and in the epidemic which occurred in North Dakota and Minnesota in 1941, was slight. Encephalitis of human beings and of horses, in studies of which the encephalitic type of streptococcus is demonstrable, not infrequently occurs in winter in the absence of vectors, such as mosquitoes, flies and ticks. Changeability or mutability of pneumococci and streptococci from one type to another, associated with changes in size and tropism, have been abundantly demonstrated.^{14,15} Moreover, streptococci, regardless of original source, as kept in chick-embryo medium, have been found to change seasonally^{16,17} and to acquire specificity corresponding to that of the streptococci at hand in persons and in nature, even in outdoor air, during current epidemics of influenza, poliomyelitis and encephalitis. A suggestion as to at least one of the underlying factors in

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nature that might lead to such changes in properties of micro-organisms was found in a series of experiments in which streptococci were exposed to high frequency fields. Arthrotropic types of streptococci became neurotropic, and vice versa, in cataphoretic velocity, agglutinability and virulence, depending on the degree of exposure to this form of radiant energy.¹⁸ Thus, it was thought that some fundamental influence might be operative in causing comparatively harmless streptococci normally present in persons, animals and fowl, and in nature, to mutate, and, in the case of encephalitis, to acquire neurotropic virulence and to result in the occurrence of encephalitis in endemic or even epidemic distribution. Since streptococci have been shown to be airborne,¹⁹ the infection may readily be spread over vast areas by this means.

From these and other studies we had come to feel that filtrability of the inciting agent or virus of encephalitis did not necessarily imply that it was wholly unrelated to micro-organisms, such as streptococci. We decided, therefore, to study the epidemic as opportunity was afforded, from both the streptococcal and virus standpoints, in the hope that knowledge might be forthcoming which would explain the nature of the infectious process, and which might lead to methods for specific prevention and treatment of the disease. Since it had been shown that the sulfonamide drugs have no preventive or curative action in experimental encephalitis, or in streptococcal infections due to alpha or green-producing streptococci, we decided to use the encephalitis antistreptococcal serum in the treatment.

METHODS

The methods used for the isolation and cultivation of streptococci, for maintenance of specificity, for animal inoculation, for agglutination, precipitation and cutaneous tests, for the preparation of vaccines and antisera and for the demonstration of virus were like those used in other similar studies.²⁰

The material used for the skin tests was prepared in the following manner: Nine parts of slightly acidulated water were added to one part of antiserum in order to precipitate the euglobulin. The solution then was centrifuged. A 10 per cent solution of the sedimented euglobulin was prepared in physiologic salt solution and 0.2 per cent of phenol was added as a preservative.

The cutaneous tests were made by injecting as superficially as possible into the skin of the forearms of the patients 0.03 cc. of the solutions of euglobulin from the encephalitis, poliomyelitis and arthritis antistreptococcal serums, and normal horse serum diluted 1:10, and noting the reaction, if any, which occurred in from five to ten minutes. The size of the maximal flare of erythema was outlined with pen and ink and then traced on transparent paper, and from the latter the area of erythema in square centimeters was determined.

Primary cultures were routinely made in autoclaved dextrose-brain broth, a medium especially favorable for the isolation of highly sensitive and highly specific types of streptococci, and in autoclaved chick-embryo medium layered with paraffin oil, favorable for the production of virus and also for isolation of streptococci. Blood-agar plates were used to determine the type and number of

viable aerobic organisms, but not to isolate pure cultures for experiments on animals and for other tests. Pure cultures of the streptococcus were obtained from mixtures in contaminated original material and from mixed primary cultures in dextrose-brain broth by appropriate inoculation of animals, by making subcultures in rapid succession in dextrose-brain broth (in which the streptococci often outgrew contaminants) and by making serial dilution cultures alternately in tubes of dextrose-brain broth and dextrose-brain agar.²¹ If the mediums used had been prepared a week to ten days previously, they were first steamed in the autoclave at a pressure of 1 or 2 pounds and cooled, before inoculation.

To obtain material for cultures and other studies, the nasopharynxes of well or ill persons were swabbed through the mouth with cotton-wrapped aluminum wire swabs bent to a suitable angle. The adherent material was washed off in 2 cc. of gelatin (0.2 per cent) Locke solution. From this suspension, cultures were made, and the centrifuged clear supernatant fluid was used for precipitation tests.

Specimens of milk and cream were obtained in a sterile manner from previously unopened containers. Specimens of water supplies were obtained from flamed openings of water faucets or pumps, or after large amounts of water had been allowed to flow in a steady stream.

The brains of animals that had succumbed to spontaneous encephalitis, or that were anesthetized were removed in an aseptic manner and culture were made at once or after preservation in a 50 per cent solution of glycerol. Cultures were made, not by planting small pieces of tissue into ordinary mediums which usually produces negative results, but by inoculating tubes and bottles of dextrose-brain broth with varying amounts of the emulsified tissue (1 gm. or more), made with mortar and pestle in a nonstacked bacteriologic hood or by shaking pieces of tissue with glass beads and solution of sodium chloride in sealed bottles, and of filtrates of emulsions of large amounts of brain tissue in physiologic salt solution. At necropsy of animals that died after inoculation of the streptococcus or virus, cultures were made routinely by inoculating pipettes of the brain or pieces of macerated brain tissue into tubes of dextrose-brain broth.

In making cultures from water and milk or cream, usually not less than 60 cc. of water and 2 cc. of samples of pasteurized and raw milk or cream were inoculated into dextrose-brain broth.

An attempt was made to determine the nature of the underlying cause of this widespread epidemic. Samplings of indoor air and stationary and mobile samplings of outdoor air were made in and remote from the region of the epidemic. Air was drawn through or blown over exposed surfaces of dextrose-brain broth, dextrose broth, chick-embryo medium and distilled water. Oiled spun glass and oiled glass beads contained in tubes screened at both ends were exposed to currents of air on improvised weather vanes for stationary sampling, and on the front of an automobile, on trains or on an airplane for mobile sampling. Cultures were made in dextrose-brain broth and dextrose-brain agar of the material exposed,

and precipitation tests were made with the water exposed to the air (after it had been rendered isotonic) and with saline washings of the oiled spun glass and glass beads after exposure.

All inoculated mediums were incubated at 35° C. and animals were inoculated with young, freshly isolated cultures in dextrose-brain broth, to determine specific virulence, and with old cultures of the streptococci in chick-embryo medium and with corresponding filtrates to detect the presence of virus. One-tenth of a cubic centimeter of culture of the streptococci diluted 1:200 or 1:10,000 or more was routinely inoculated intracerebrally into rabbits. To demonstrate the presence of virus in material not badly contaminated, such as an emulsion of the brain of persons, animals and fowl that had died of encephalitis, washings of air, water from first rains, lakes, rivers, wells and supplies, animals, chiefly guinea-pigs and mice, were inoculated intracerebrally, intralingually and in the pads, under ether anesthesia. Guinea-pigs were inoculated with 0.1 cc. intracerebrally, with 0.5 cc. intralingually and with 0.5 cc. in each of two or four pads. Mice were inoculated with 0.03 cc. intracerebrally, with 0.2 cc. intralingually and in the pads, or with 1.2 cc. intraperitoneally. Monkeys were inoculated intracerebrally with 2 to 3 cc. of a 5 per cent emulsion or filtrate of emulsion of the brain of a person, animals or fowl that had died of epidemic encephalitis, and of the brains of mice, guinea-pigs and rabbits that had died of experimental encephalitis, and with these amounts of washings and filtrates of washings of air and dust from air-conditioning filters. The same amounts of appropriate dilutions of cultures were used to inoculate other animals. Badly contaminated material, such as emulsion of mosquitoes and flies, stagnant water, sewage, and suspensions of filter dust and soil from bottoms of lakes where ducks and fish were dying was used to inoculate guinea-pigs and mice intralingually and in the pads. Only rarely was there swelling or apparent tenderness of pads, and swelling and tenderness of the tongue never was observed after the inoculation.

The presence of encephalitis in animals that had died of the spontaneous disease during the epidemic, and in animals after inoculation of suspected material and material known to contain virus was determined by symptoms, time of death, congestion of brain tissue with absence of lesions elsewhere, by reisolation of the streptococcus, and by the presence of characteristic microscopic lesions in the brain.

Agglutination tests were made almost wholly with suspensions of streptococci that had been freshly isolated in dextrose-brain broth and then preserved in dense suspension in glycerol and solution of sodium chloride. The thoroughly shaken mixtures of serum and streptococci were kept at 49 to 50° C. for eighteen hours, at which time readings were made (instead of after being kept at 37° C. for one or two hours and then in the refrigerator over night, as is usually done.)²² The higher temperature in studies such as these is often necessary to obtain evidence of specificity of streptococci.

Precipitation tests were made by superimposing cleared material and serum of persons and animals suspected of

containing antigen on the respective antiserums in small precipitation tubes. Clouding at the interphase, after incubation for one and a half hours at 35° C. and after refrigeration over night, was considered as a positive reaction. Readings were made under the edge of the shade of a 75 watt electric light in a dark room against a non-reflecting black velvet background.

RESULTS OF STUDIES ON ENCEPHALITIS AFFECTING HUMAN BEINGS

The symptoms and findings in cases of encephalitis in the center of the epidemic were generally severe, and strikingly similar to those seen during studies of the St. Louis epidemic. Headache, severe and often uncontrollable, nausea, vomiting and fever were the cardinal symptoms. Lethargy, delirium associated with loss of sphincteric control, persistent general weakness, vertigo, blurred vision, backache, ataxia, occasionally nystagmus or hemiplegia, localized spasms and even generalized convulsions occurred. Ocular palsy was not observed and neurologic findings were minimal. No age group appeared immune. Males, regardless of age, as in cases of epidemic poliomyelitis, were stricken more often than were females. At the outskirts of the epidemic, the disease was usually mild and many cases of the abortive form of the disease were observed. There was little or no evidence of contact infection. Cases occurred commonly on farms in outlying districts. Polymorphonuclear leukocytes were present in predominating numbers in the cerebrospinal fluid at the onset of symptoms, whereas lymphocytes later predominated in the differential count. Gram-positive diplococci, sometimes in chains of two or three, were demonstrated in the sediment of the freshly drawn cerebrospinal fluid in 50 of 73 cases, and the streptococci were isolated in dextrose-brain broth in 17 of 49 cases in which cultures were made. There was great reduction in number and sometimes disappearance of the cells and diplococci during storage of the cerebrospinal fluid, even for a period of twenty-four or forty-eight hours. Laboratory technicians at the hospitals before our arrival in the epidemic zone often found diplococci in the properly stained smears of sediment of freshly drawn cerebrospinal fluid of patients who were acutely ill.

A DIAGNOSTIC SKIN TEST

In previous studies,²³ it was found that intradermal injection of the euglobulin fraction of the serum of horses immunized with streptococci was followed immediately (five to ten minutes) by an erythematous-edematous reaction at the site of injection, in cases in which the infection was due to streptococci, antigenically identical or similar to the streptococci with which the injected antibody was prepared. Four groups of patients first tested in this epidemic reacted strongly to the euglobulin fraction of the serum of horses immunized with the streptococci isolated in previous epidemics (Table I).

The degree and incidence of reactions to the encephalitis streptococcal euglobulin were greater in the group of contacts than they were in the group of noncontacts in the epidemic zone. These findings suggested to us that a subclinical, but presumably immunizing infection by the streptococci occurred commonly among contacts and

TABLE I
Cutaneous reaction to euglobulin fraction of serum of horses that had been immunized with streptococci isolated in cases of encephalitis and with equine encephalitis virus

Subjects tested		Reaction to the euglobulin fraction of the serum of horses that had been immunized with*:											
		Streptococci from encephalitis affecting:						Equine encephalitis virus, western type		Streptococci from:			
		Human beings			Horses					Influenza		Polio-myelitis	
		Cases	Average area, sq. cm.†	Area of 3 sq. cm. or more, per cent of cases‡	Average area, sq. cm.†	Area of 3 sq. cm. or more, per cent of cases‡	Average area, sq. cm.†	Area of 3 sq. cm. or more, per cent of cases‡	Average area, sq. cm.†	Area of 3 sq. cm. or more, per cent of cases‡	Average area, sq. cm.†	Area of 3 sq. cm. or more, per cent of cases‡	
Persons ill with	Encephalitis	Group 1†	26	5.63	72					2.43	33	1.9	23
		Group 2†	19	5.23	77	6.75	74	4.34	60	1.84	33		
		Group 3†	9	4.82	86	5.56	88	5.52	66	2.09	22		
		Group 4†	18	5.48	85	5.12	77	4.38	72	3.72	50	1.96	11
		Polio-myelitis in Minnesota, Illinois and New Jersey		23	3.45	13			0	0			8.63
	Other diseases in area of epidemic		9	1.14	22	4.04	33	1.40	22				
Well persons	Contacts in epidemic zone		43	3.7	53					2.05	13	0	0
	Noncontacts in epidemic zone		20	1.61	15					1.25	0	0	0

*Reactions to the euglobulin fraction of arthritis, ulcerative colitis and antistreptococcal serums and to equine antiviral serum were slight; their average area was less than 1 sq. cm. and in no case was the area 3 sq. cm. or more.

†These groups have been used to designate cases observed in four different localities in Minnesota and North Dakota in the epidemic that occurred in 1941.

‡The average area of the reaction and the percentage of cases in which the area was 3 sq. cm. or more were not determined in all cases. The number of cases in which these data were determined was sufficient to permit, for the sake of brevity, the omission of the number of cases on which the figures are based.

less often among noncontacts within the epidemic zone. The high degree and high incidence of reactions to the poliomyelitis euglobulin among persons having poliomyelitis, and the low incidence of reactions among persons having encephalitis is a further indication of the reliability of the skin test.

It occurred to us that, since this simple test appeared to be a measure of specific antigen and to be of diagnostic value in encephalitis as it occurred in human beings, testing patients simultaneously, before and after therapeutic injection of the antistreptococcal serum, with the euglobulin of the serum of horses immunized respectively with the streptococci isolated from patients and horses during attacks, and with equine encephalomyelitis virus, might throw light on the nature of the relation between the streptococci and virus. A striking parallelism in reactions was obtained. The reactions were strongly positive before (Table I) and mainly negative after therapeutic injection of the encephalitis antistreptococcal serum, which indicated antigenic similarity of streptococci and the virus of equine encephalomyelitis (western type).

Eight patients who had had encephalitis for from one to six days were given parallel intradermal injections of the three types of euglobulin, before and after receiving therapeutic intramuscular injections of the encephalitis antistreptococcal serum prepared with streptococci obtained from persons who had epidemic encephalitis. The average reaction to the euglobulins from antisera prepared respectively, with the streptococci obtained from persons who had encephalitis, with the streptococci obtained from horses that had encephalomyelitis, and with equine encephalomyelitis virus (western type) was 4.77, 6.49 and 6.54 sq. cm., respectively, before injection of the antistreptococcal serum; one to eight hours after one therapeutic injection it was 0.82, 1.57 and 1.52 sq. cm., respectively; one to five days after two or more thera-

peutic injections it was 1.54, 0.38 and 0.39 sq. cm., respectively. After ten days—with or without serum sickness—the reactivity of the skin to each of the euglobulins had completely disappeared. Three different brands of equine encephalomyelitis antiviral serums were used with comparable results. In contrast, the reactivity of the skin to the streptococcal euglobulin persisted for two to four weeks in cases in which the patients were not treated with the encephalitis antistreptococcal serum.

SERUM TREATMENT

It has been found that the euglobulin prepared from the encephalitis antistreptococcal serum is diagnostic, and the whole serum is curative in encephalitis,^{2,8,9} regardless of type of disease. The clinical results of the use of the serum in treatment have been reported in abstract in a preliminary report²⁴ and are set forth in detail in a paper now in press.²⁵ Suffice it to state here that the mortality in the group of 70 patients treated with the encephalitis antistreptococcal serum was 4.3 per cent, whereas in the control, untreated, but otherwise comparable group of 27 patients it was 26 per cent. Similarly, Finnigan and Abel,⁷ in a group of cases observed during the epidemic of encephalitis in St. Louis, reported a mortality rate of 13 per cent in 15 cases in which serum therapy was used in contrast to 35 per cent in 20 control cases in which serum was not administered.

In agreement with the results of experimental studies, we found no definite evidence that the sulfonamide drugs favorably influenced the disease. Fever and strongly positive skin and precipitation reactions were still present, and the streptococci were demonstrated in the cerebrospinal fluid in some cases after the administration of full doses of one or more of these drugs for as long as ten days. Clinical response in these and in nearly all cases, especially when the serum was given early, was often so prompt and striking as to suggest specific neutralization of toxin or antigen.

TABLE II

Isolation in dextrose-brain broth or chick-embryo medium of streptococci from persons, animals and fowl that had symptoms of, or that died of encephalitis

Material cultured	Specimens or cases	Incidence of isolation of streptococci	
		Number	Per cent
Persons having symptoms of acute encephalitis	Nasopharynx	114	100
	Stool	23	52
	Cerebrospinal fluid	49	35*
Animals or fowl having symptoms and lesions of encephalitis	Blood, nares, and brain of horses	18	72
	Brain of chickens	15	80
	Brain of wild ducks	15	87
	Brain of sheep, dog, hog, goose, pheasant, mink, hat and fish	15	87
	Feces of ducks and chickens	13	85

*Diplococci or streptococci were found in stained films made immediately of the sediment of fresh cerebrospinal fluid in 50 of 73 cases.

The intradermal injection of the euglobulin fraction of the antiviral serum (western type) was found diagnostic in cases of encephalitis observed in this epidemic and in which, according to neutralization tests, the disease was found to be due to equine encephalomyelitis virus (western type). Hence, it is suggested that antiviral serums, now available commercially for treatment of encephalomyelitis in horses, of the type indicated by the cutaneous test, be used in treatment of persons, in instances in which the antistreptococcal serum is not available.

RESULTS OF STUDIES OF AFFECTED PERSONS, ANIMALS AND FOWL ON INDIVIDUAL FARMS

The symptoms in sheep, a hog, dog and mink consisted mainly of varying degrees of congestion of eyes, lacrimation, tremors, muscular spasms, ataxia, lethargy or coma and weakness or paralysis, whereas those in chickens, turkeys, wild ducks, a goose and pheasant consisted of a progressive weakness of muscles of legs, neck and wings and of lethargy in the terminal stages, with minimal evidence of involvement of cerebral cortex. The illness in the fowl had usually been diagnosed as "limber neck" or "botulism" and in some instances improvement occurred with change of water and food.

On farms in the epidemic area in which the disease affected persons, animals and fowl, cultures in dextrose-brain broth made of material obtained from patients and contacts and from affected animals or fowl, and cultures from flies, from milk obtained in a sterile manner from cows, and from the respective water supplies usually yielded the streptococci. The cutaneous test with the euglobulin of encephalitis antistreptococcal serum was consistently positive in the case of patients and contacts. The precipitation test was often positive with the encephalitis antistreptococcal serum and the blood serum and cleared extracts of nasopharyngeal swabbings of patients, filtrates of emulsions of flies, and sometimes with water obtained from epidemic areas.

Control studies made on farms where no cases of encephalitis occurred generally proved negative.

TABLE III

Isolation in dextrose-brain-broth or chick-mash medium of streptococci from air, milk, water, mosquitoes and flies in relation to epidemic encephalitis, 1941

Source of material cultured	Samplings	Incidence of isolation of streptococci	
		Number	Per cent
Air of rooms occupied by persons having acute encephalitis	51	31	61
Outdoor air within epidemic zone	147	114	78
Outdoor air remote from epidemics	102	54	53
Outdoor air at high levels (1,000 to 2,000 feet) during airplane flights	During epidemic	78	60
	After epidemic	78	34
Milk supplies of cities where cases of encephalitis occurred	Pasteurized	28	96
	Raw	26	100
Milk obtained from individual cows on farms where encephalitis occurred	33	19	58
Water, epidemic zone	Supplies, cities and farms	48	29
	Lakes, rivers and so forth	34	26
Water supplies remote from epidemics	33	0	0
Mosquitoes within epidemic zone	9	8	89
Flies within epidemic zone	14	12	86

ISOLATION, VIRULENCE AND HEAT RESISTANCE OF THE STREPTOCOCCI

As shown in Tables II and III, streptococci were isolated consistently from the nasopharynx, stools, cerebrospinal fluid and brain of patients, from the brains of animals and fowl and from the feces of ducks and chickens that died of encephalitis, and from air, raw and pasteurized milk, water, mosquitoes and flies. The streptococci, regardless of type of material from which they were isolated, produced alpha or green type of hemolysis on blood-agar, were gram-positive, were much alike morphologically and in cultural characteristics, and usually had high neurotropic virulence.

It must not be thought that the streptococci were present in large numbers or that they were readily isolated from material such as cerebrospinal fluid and emulsions of brain of persons, animals and fowl that died of the disease. The methods usually employed by others did not suffice for their isolation, and prolonged search and special staining methods were often necessary for their demonstration.

The mortality rate, incidence of cardinal symptoms, and the incidence of isolation of streptococci from the brain of rabbits that died after intracerebral inoculation are recorded in Table IV. The incidence and type of symptoms after inoculation with the streptococci and those after inoculation with emulsions and filtrates of emulsions of the brains of animals that died of spontaneous encephalitis were strikingly similar, but the period of incubation after inoculation with material containing virus was longer and the lesions were more typical than following inoculation with the streptococcus.

In keeping with the relatively common occurrence of respiratory infections associated with encephalitis affecting human beings, severe congestion of the mucous membrane of the trachea and bronchi and a variable degree

TABLE IV
Symptoms, mortality and isolation of streptococci from brains of rabbits after intracerebral inoculation with streptococci isolated in studies of encephalitis, 1941

Source of streptococcus	Strains or samplings	Inoculated	Per cent that died	Rabbits						Cultures from brain	
				Per cent showing symptoms						Number	Per cent yielding streptococci
				Circum-cornical congestion and edema	Tremors	Spasms	Ataxia	Lethargy	Paralysis		
Nasopharynx, cerebrospinal fluid and stool of persons with symptoms of acute encephalitis	50	60	60	55	58	55	40	12	13	41	80
Nares and blood of horses with symptoms of, and brains of animals and fowl that died of encephalomyelitis	14	42	55	26	48	43	29	19	26	28	46
Emulsions and mosquitoes and flies in epidemic zone	4	11	45	45	64	45	36	36	0	3	67
Water supplies in epidemic zone	14	28	46	43	61	50	50	21	4	12	42
Milk supplies in epidemic zone	44	52	54	38	62	54	48	15	10	34	68
Air of rooms occupied by persons or stalls occupied by horses having symptoms of acute encephalitis	19	31	65	26	52	35	19	13	10	32	56
Outdoor air in epidemic zone	35	75	41	59	69	51	21	11	9	39	76
Outdoor air remote from epidemics	83	132	23	8	20	8	2	0	2	36	25
Emulsions or filtrates of emulsions of brains of animals that died of spontaneous encephalitis	21	23	39	22	26	30	22	26	22	8	13

of hemorrhagic edema of lungs were found in rabbits that died after experimentally produced encephalitis.

The streptococci isolated in these studies also revealed high neurotropic virulence for mice. The mortality rate following intracerebral inoculation with the different groups of strains varied from 45 to 96 per cent, and after intraperitoneal injection it ranged from 31 to 90 per cent. Altogether, 80 strains were injected intracerebrally into 140 mice, of which 84 (60 per cent) died. Cultures were made from the brains of 51 mice that died. The streptococci were obtained in 40 (78 per cent) of these cultures. One hundred fifty-three strains were injected intraperitoneally into 340 mice, of which 224 (66 per cent) died. Cultures were made from the brains of 125 of these mice and the streptococci were obtained in 60 (48 per cent) of the cultures.

Owing to the high incidence of isolation of streptococci from samples of pasteurized milk (Table III), indicating high resistance of the streptococci to heat, samples of pasteurized milk were repasteurized at 63° C. (145° F.) and 73° C. (163° F.), and suspensions in autoclaved milk of streptococci freshly isolated from different sources in the epidemic zone were heated at these temperatures for 30 minutes under carefully controlled conditions. One hundred thirty-eight strains were tested. Fifty-eight (42 per cent) yielded the encephalitic type of streptococcus in dextrose-brain broth cultures after being heated to 63° C. but none yielded streptococci after being heated to 73° C. The strains that resisted pasteurization in milk had high neurotropic virulence and were agglutinated specifically by the encephalitis antistreptococcal serum. These experiments indicate that it might be well to consider whether the present method of pasteurization of milk is adequate.

AGGLUTINATION OF THE STREPTOCOCCUS

As shown in Tables V and VI, there was a consistently high incidence of specific agglutination by the encephalitis antistreptococcal serum of pure cultures of the strep-

tococcus isolated from persons who had encephalitis, from contacts and from noncontacts at the time of the epidemic, from animals, fowl and fish that died of encephalitis, and of the streptococci isolated from air, water, milk, mosquitoes and flies in relation to the epidemic. This was not true of streptococci isolated from nasopharynges of well persons which were reswabbed nine months later, or of streptococci isolated from outdoor air remote from the epidemic. The agglutinins in the encephalitis antistreptococcal serum for nearly all strains, regardless of source, were removed specifically by absorption tests with the streptococci isolated during studies of encephalitis.

Agglutinins for the streptococci increased in the serum of patients during convalescence, as shown by the consistent increase in agglutinating titer of the serums of 88 patients for each of eleven strains of streptococci from encephalitis, for five of the six strains from encephalitis contacts, and for only one of nine strains from poliomyelitis contacts.

PRECIPITATION REACTIONS WITH ENCEPHALITIS ANTISERUMS

Extracts of nasopharyngeal swabbings of patients, convalescents, contacts and noncontacts within the epidemic zone, and of noncontacts remote from the epidemic, and the serum of persons, chickens, ducks and a goose, hog and dog that had encephalitis were subjected to precipitation tests. As summarized in Table VII, material from patients uniformly gave a much higher incidence of clouding at the interphase with the two encephalitis antistreptococcal serums and with the antiviral serum (western type) than with control antistreptococcal serums and antiviral serum (eastern type). Interestingly, precipitation did not occur with serums obtained after recovery or with cleared extracts of nasopharyngeal swabbings obtained from poliomyelitis contacts remote from encephalitis, but there was a specific reaction with the poliomyelitis antistreptococcal serum in the case of the poliomyelitis contacts. Cleared extracts of nasopharyngeal

TABLE V

Agglutination by encephalitis antistreptococcal serum of streptococci isolated from persons, animals and fowl that were ill with or that died of epidemic encephalitis, 1941

Source of streptococci	Cases or strains	Cultures tested	Percentage incidence of specific agglutination by:			
			Streptococcal antisera*			
			Encephalitis	Poliomyelitis	Influenza	Arthritis
Nasopharynx of patients	44	98	89	7	3	0
Stool of patients	12	14	71	0	7	0
Cerebrospinal fluid of patients	16	18	89	6	0	0
Nasopharynx, contact nurses at hospitals during epidemic of encephalitis, 1941	19	24	83	4	0	4
Nasopharynx, noncontact nurses at same hospitals remote from encephalitis, some having mild respiratory infections, May 20, 1942	35	35	14	0	29	0
Blood, nares and brain of horses ill with or that died of encephalomyelitis	8	24	71	13	4	13
Brain of chickens and geese that died of encephalitis	17	26	69	15	4	0
Brain of sheep, hog, dog, mink, wild ducks, pheasant, bat and fish that died of encephalitis	23	58	72	21	3	0

*No agglutination with antiserum of ulcerative colitis, normal horse serum and antiviral horse serum, western or eastern type.

TABLE VI

Agglutination by encephalitis antistreptococcal serums of streptococci isolated from air, water, milk, mosquitoes and flies in relation to epidemic encephalitis (1941)

Streptococci isolated from:	Samplings	Cultures tested	Percentage incidence of specific agglutination by:					
			Streptococcal antisera*					
			Encephalitis	Poliomyelitis	Influenza	Arthritis		
Indoor air, cases of encephalitis	13	13	92	8	0	0		
Outdoor air within epidemic zone	63	145	79	14	2	3		
Outdoor air remote from epidemics	43	75	16	17	10	17		
Outdoor air at high levels, during airplane flights	During epidemic	11	43	79	9	7	0	
	After epidemic	11	23	17	13	13	17	
Milk	Individual cows where cases occurred		12	17	71	6	0	6
	Supplies during epidemic	Pasteurized	35	50	80	18	0	2
		Raw	16	22	82	14	0	0
Water supplies, epidemic zone	15	19	74	5	5	5		
Mosquitoes, epidemic zone	7	7	86	0	0	0		
Flies, epidemic zone	11	20	75	10	0	0		

*No agglutination with antistreptococcal serum of ulcerative colitis, equine encephalomyelitis antiviral serum and normal horse serum.

TABLE VII

Precipitation reaction between streptococcal and viral antisera and extracts of nasopharyngeal swabbings and the serum of persons and the serum of animals and fowl having symptoms of encephalitis, 1941

Antigens	Strains	Percentage incidence of positive reactions with antisera*							
		Streptococcal				Viral equine encephalomyelitis			
		Encephalitis		Poliomyelitis	Arthritis	Influenza	Western	Eastern	
Human	Horse								
Patients having encephalitis	Nasopharynx†	114	78	72	21	5	0	49	9
	Serum	67	73	61	25	0	0	34	3
	Cerebrospinal fluid	29	69	76	10	3	0	49	0
Serum of persons convalescent from encephalitis	19	11	0	0	0	0	0	0	
Nasopharynx,‡ contact nurses at hospitals during epidemic of encephalitis, 1941	37	65	49	5	8	0	29	5	
Nasopharynx,‡ noncontact nurses at same hospitals remote from encephalitis, some having mild respiratory infections, May, 1942	41	2		5	5	27	0	0	
Nasopharynx,‡ well noncontacts within epidemic zone	25	52	28	8	0	0	16	0	
Nasopharynx,‡ poliomyelitis contacts within epidemic zone of encephalitis	56	57	22	75	2	0	30	9	
Nasopharynx,‡ poliomyelitis contacts remote from encephalitis	15	13		60	0	0	0	0	
Serum of persons convalescent from poliomyelitis	10	10		20	0	0	0	0	
Serum of chickens, ducks, geese, hog and dog having symptoms of encephalitis	18	61	39	61	11	0	33	0	

*No positive reactions to antisera of ulcerative colitis and to normal horse serum.

†Cleared washings in gelatin Locke solution of nasopharyngeal swabbings.

swabbings of poliomyelitis contacts within the epidemic zone of encephalitis gave positive reactions to both the encephalitis and poliomyelitis antisera.

As shown in Table VIII, washings of indoor and outdoor air, water from supplies, lakes and rivers, and extracts of emulsions of flies and mosquitoes gave a high incidence of positive precipitation reactions with encephalitis antisera prepared with streptococci from epidemic encephalitis in human beings and horses, respectively, and equine encephalomyelitis virus (western type). With only one or two exceptions, this was not the case with

corresponding samplings obtained remote from the epidemic.

The finding of specific types of streptococci and streptococcal antigen in the air throughout the epidemic zone and their absence in air remote from epidemics are new and of epidemiologic importance.

ENCEPHALITIS IN GUINEA-PIGS AND MICE PRODUCED WITH "NATURAL" VIRUS AND WITH VIRUS DERIVED FROM THE STREPTOCOCCUS

The incidence of deaths from encephalitis in guinea-pigs and mice after inoculation with emulsions, or with

TABLE VIII

Precipitation reaction between streptococcal and viral antisera and washings from air and filter dusts, water supplies and filtrates of emulsions of flies and mosquitoes in relation to epidemic encephalitis, 1941

Source of material used as antigen		Specimens	Percentage incidence of positive reactions with antisera*					
			Streptococcal				Viral	
			Encephalitis		Poliomyelitis	Arthritis	Equine encephalomyelitis	
Human	Horse	Western	Eastern					
Washings in water from	Indoor air within epidemic zone	16	63	75	13	25	50	13
	Indoor air remote from epidemics	16	6	0	0	0	0	0
	Outdoor air in epidemic zone	165	60	56	22	17	33	7
	Outdoor air remote from epidemics	82	9	1	1	11	4	0
	Dust from air-conditioning filters in epidemic zone	9	67	56	0	0	22	0
Water supplies	Within epidemic zone	49	55		12	4	35	0
	Remote from epidemics	49	12	4	8	4	2	0
Water from lakes, rivers, and so forth	Within epidemic zone	46	67		17	11	43	4
	Remote from epidemics	29	0	0	0	4	0	0
Extracts of emulsions of	Flies in epidemic zone	16	81	50	13	0	38	19
	Mosquitoes in epidemic zone	14	92	86	29	7	64	21
	Mosquitoes remote from epidemics	8	13	0	13	0	0	0

*No positive reactions with antistreptococcal serums of influenza and ulcerative colitis and normal horse serum.

TABLE IX

Encephalitis in guinea-pigs and mice after intracerebral inoculation of emulsions or filtrates of emulsions of brains of a patient, animals and fowl that died of encephalitis, 1941

Material inoculated	Patients, animals or fowl	Guinea-pigs					Mice			
		Inoculated	Per cent that died of encephalitis	Cultures from brain		Inoculated	Per cent that died of encephalitis	Cultures from brain		
				Number	Per cent yielding streptococci			Number	Per cent yielding streptococci	
Emulsions or filtrates of emulsions of brain of a patient, animals* and fowl* that died of encephalitis	Patient	1	23	61	10	30	44	50	20	40
	Horses	3	37	68	18	50	139	64	64	52
	Birds, chickens, ducks, goose, pheasant	36	147	42	56	45	181	38	68	39
	Hog, dog, sheep, bat, mink	9	51	63	20	55	116	66	37	54
	Fish	6	27	42	12	42	38	58	17	24
Total	55	285	52	116	46	518	53	206	45	

*Diagnosis confirmed by characteristic lesions in sections of brains.

filtrates of emulsions, of brain material obtained from a patient, animals and fowl that died of encephalitis, and the incidence of isolation of streptococci from the brains of the guinea-pigs and mice that died are summarized in Table IX.

The experimental production of encephalitis with virus from the brain of different species of animals and fowl is in accord with the demonstration by Cox, in this same epidemic, of equine encephalomyelitis virus (western type) in the brain of a prairie chicken,²⁶ ground squirrel and deer, and of viral neutralizing antibodies in the serums of persons, geese, turkeys, wild ducks and horses not known to have been ill.²⁷

As shown in Table X, a relatively high death rate from encephalitis occurred in guinea-pigs and mice after inoculation with material from nature which was shown to contain the streptococci—such as emulsions or filtrates of emulsions of mosquitoes and flies, water from supplies, and filtrates of old cultures in chick-embryo medium of washings of outdoor air—and after inoculation with virus

produced from the streptococci far removed from original source.

In these experiments and in the experiments with emulsions of brain tissue of animals that died of spontaneous encephalitis (Table IX), it was not certain whether the symptoms and lesions produced in the animals were due to the streptococci, to virus derived from the streptococci, or to "natural" virus. However, experiments were done to determine whether the effects obtained in guinea-pigs and mice were due to the streptococci as such, far removed from virus, or to virus derived from the streptococci. In these experiments the streptococci were separated from original source by making subcultures in dextrose-brain broth in rapid succession, and by making serial dilution cultures alternately in dextrose-brain broth and dextrose-brain agar.²¹ Original material from which the streptococci were isolated was diluted many billion times in all instances.

Encephalitis developed in guinea-pigs and mice after inoculation with streptococci isolated primarily from

TABLE X

Encephalitis in guinea-pigs and mice after inoculation of material from nature and of experimental virus derived from streptococci far removed from original source

Source and type of material inoculated		Specimens or strains	Inoculated	Guinea-pigs			Mice			
				Per cent that died of encephalitis	Cultures from brain		Inoculated	Per cent that died of encephalitis	Cultures from brain	
					Number	Per cent yielding streptococci			Number	Per cent yielding streptococci
Material containing streptococci and/or virus	Emulsions or filtrates of emulsions of mosquitoes	11	48	48	14	43	43	46	29	38
	Emulsions or filtrates of emulsions of flies	5	22	55	10	30	32	63	19	31
	Emulsions and filtrates of washings of dust from air-conditioning filters in epidemic zone	6	28	50	12	8	13	23		
	Water supplies of persons and horses that had encephalitis	7	45	69	10	60	94	39	16	19
	Filtrates of old chick-embryo cultures of washings from outdoor air containing the streptococcus	10	31	39	6	50	54	28	18	22
Pure cultures of the streptococci, far removed from original source, from nasopharynx and cerebrospinal fluid of patients with encephalitis; outdoor air; brains of animals that died of encephalitis; emulsions of mosquitoes and flies; water supplies	Dextrose-brain broth cultures from nasopharynx and cerebrospinal fluid	6	17	18	4	0	26	35	11	18
	Single colony cultures in dextrose-brain agar or dextrose-brain broth	15	43	52	15	40	194	51	125	29
	Filtrates of old cultures in chick-embryo medium	22	66	45	13	15	87	51	26	35
Controls: inert filtrates or emulsions of brains, chick-embryo medium, and so forth		47	89	0	43	0	234	0	107	2

nasopharynx, from outdoor air, from the brain of one person and from brains of animals that died of spontaneous encephalitis, from mosquitoes and flies, and from water supplies, and after inoculation of filtrates of old chick-embryo cultures of the streptococci (Table X).

In four instances, virus that was highly effective for guinea-pigs developed in vitro in chick-embryo cultures from streptococci that were isolated from the brain of a horse that died of encephalomyelitis, and which—by extremely high dilution—was separated from original material.

Thus, a young dextrose-brain broth culture of the streptococci that had been subcultured three times, twice from single colonies, was subjected to a serial dilution culture. At intervals of about twelve seconds, approximately 2 cu. mm. of inoculum was transferred from tube to tube, each of which contained approximately 20 cc. of medium, with the inoculating wire which was not heated between transfers. Pure cultures of the streptococci were obtained from the 136th, 144th, 194th and 198th tubes or dilutions, respectively. Each was inoculated into a tube of chick-embryo medium, in all of which the virus developed.

The incidence of isolation of the streptococci from the brains of guinea-pigs and mice that died of encephalitis after inoculation with virus derived from the streptococci was similar to that of isolations of streptococci from animals that died of encephalitis after inoculation with "natural" virus. Results such as these were not obtained after inoculation with control material (Table X).

In order to determine whether the virus phase of the streptococci might develop in persons, animals and fowl on breathing or swallowing the streptococci shown to be in the air in the epidemic zone, young dextrose-brain broth cultures of the streptococci—also far removed from original source—which had been isolated from air at high levels during an airplane flight within the epi-

demie zone, and from cerebrospinal fluid or brain of individuals having encephalitis, were nebulized into the air of cages in which mice were kept, and were added to the running water in which goldfish and rainbow trout were kept. As a control, sterile dextrose-brain broth was nebulized into cages containing the same number of mice and was added to running water, in the same amount as the culture, where the same number of fish were kept. The details of these experiments will be published elsewhere. It is sufficient to state here that the streptococci invaded the brains of mice and fish and that transmissible encephalitic virus was obtained from the brains of mice and fish that were made to breathe and perhaps swallow the streptococci, whereas inoculation with the brains of control mice and fish proved innocuous, and cultures of emulsions of their brains remained sterile.

Twelve strains of "natural" encephalitic virus obtained from the brains of animals that died of encephalitis and from other material have been passed serially through guinea-pigs and mice. Three of these virus strains were isolated from water supplies where cases of encephalitis occurred, two were obtained from emulsions of flies that were caught where cases of encephalitis occurred, two were obtained from emulsions of mosquitoes caught within the epidemic zone, two were obtained from washings of air in rooms of patients who had encephalitis, and three were obtained from washings of outdoor air within the epidemic zone. Thirty-four (45 per cent) of 76 animals inoculated in the first passage; 33 (59 per cent) of 56 animals inoculated in the second passage; 20 (57 per cent) of 35 animals in the third and fourth passages, respectively, and 2 (100 per cent) of 2 animals in the fifth and sixth passages, respectively, died of encephalitis.

Twelve strains of experimental virus produced from streptococci far removed from original source have likewise been passed serially through guinea-pigs and mice. One of these strains of streptococci was isolated from the

brain of a patient who died of encephalitis, one representing five cultures was isolated from the brain of a horse that died of encephalomyelitis, one was obtained from flies where a case of encephalitis in man had occurred, and four were obtained from washings of outdoor air within the epidemic zone. Thirty (91 per cent) of 33 animals inoculated in the first passage; 31 (76 per cent) of 41 animals inoculated in the second passage; 10 (63 per cent) of 16 animals inoculated in the third passage; 6 (86 per cent) of 7 animals inoculated in the fourth passage; 4 (80 per cent) of five animals inoculated in the fifth, and 2 (100 per cent) of 2 animals inoculated in the sixth passage died of encephalitis.

The incidence of isolation of the streptococci from the brain of animals that died of encephalitis in these two groups of passage experiments was approximately the same and about as that in the case of animals that died after primary inoculation with material that contained virus.

The "natural" and experimental virus strains were found to be approximately equally resistant when the respective brain and cord tissues were preserved in 50 per cent glycerol.

ENCEPHALITIS INDUCED IN MONKEYS

Emulsions or filtrates of emulsions of the brain of one patient and of animals and fowl that died of spontaneous encephalitis, emulsions or filtrates of brains of rabbits, guinea-pigs and mice that died of experimental encephalitis, and highly diluted suspensions of five strains of streptococci (far removed from virus) isolated from them, were injected intracerebrally into 17 monkeys in forty-one instances. Seven of thirty-seven specimens used were obtained from outdoor air, three were filtrates of washings from dust of air-conditioning filters, fifteen were obtained from spontaneous encephalitis affecting persons and animals and twelve were obtained from fowl directly or after several animal passages. Cardinal symptoms of encephalitis developed in twenty-five instances after forty-one inoculations, including each of the five strains of streptococci, and 9 of the 17 monkeys inoculated died. After death, streptococci were isolated from the brains of 6, and virus—effective in guinea-pigs and mice—was obtained from the brains of 5. Reinoculations were never made until long after the monkeys had recovered completely.

Cutaneous tests were made on nine monkeys having active symptoms of encephalitis, with the euglobulin from the three types of antisera, together with suitable controls. All of the monkeys reacted to each of the three encephalitis euglobulins but not to control euglobulins. The reactivity of the skin to reinjection of each of the three euglobulins disappeared promptly in four monkeys after several daily intramuscular injections of 0.5 cc. per kilogram of body weight of the encephalitis anti-streptococcal serum, and all four recovered. Immunity to reinjection of encephalitis virus was noted in five instances but all of four monkeys that had recovered from encephalitis died of flaccid paralysis after inoculation with poliomyelitic virus. Each of these four monkeys reacted specifically to the encephalitis euglobulin during

attacks of encephalitis, and specifically to the poliomyelitic euglobulin during attacks of poliomyelitis.

MICROSCOPIC LESIONS

Infiltrative and degenerative lesions associated with varying degrees of neuronophagocytosis and gliosis, characteristic of encephalitis, were found in the brain of a patient who died of encephalitis, and in the brains of all animals and fowl that had symptoms and that died of encephalitis, or that were anesthetized during the active stage of the disease. A striking difference was found; this consisted of the distribution and proportion of the different types of lesions in the patient and animals, on the one hand, and in fowl, on the other hand. In the patient, horse, sheep, hog, dog, mink and fish the lesions were widely disseminated, sometimes involved the meninges of sulci and choroid plexus and ependyma in localized regions, whereas in chickens, wild ducks and the goose and pheasant, in which paralysis was the outstanding clinical manifestation, severe degeneration of ganglion cells, associated often with pronounced neuronophagocytosis, was largely limited to the pons and medulla and there were usually only slight lesions of the cerebral cortex.

COMMENT AND CONCLUSIONS

This report is based on a clinical study of patients treated with the encephalitis antistreptococcal serum and on bacteriologic studies of material obtained during the epidemic of encephalitis in North Dakota and Minnesota in 1941. The encephalitis antistreptococcal serum had beneficial action in treatment, and the euglobulin fraction of the antistreptococcal and antiviral serums proved diagnostic and of value in determining the amount of the antistreptococcal serum to be injected for best results.

Alpha, or green-producing, streptococci and virus were demonstrated consistently in persons, animals, fish and fowl that had encephalitis, and in a wide range of material from nature, including outdoor air. The incidence of isolation of the streptococcus was especially high from those materials in which virus was most readily demonstrated. The streptococci and equine encephalomyelitis virus (western type) are similar antigenically, but are very different in growth requirements. Special mediums sufficed for the consistent isolation of the streptococci but not for the propagation of the virus, as such. For this, the living cells or other conditions in the tissues of susceptible animals were necessary, but as symptoms developed the streptococci also grew in cultivable and demonstrable form.

Virus has been produced experimentally from the streptococci in vivo and in vitro by suitable injections of the streptococci and of filtrates of old chick-embryo cultures of the streptococci, and by causing mice and fish to breathe the streptococci.

The results of our studies indicate that epidemic encephalitis is due primarily to a highly specific neurotropic type of streptococcus, and as such infection occurs a virus phase of the streptococcus develops.

It is likely that various factors, such as the consumption of contaminated water and milk, and perhaps bites by mosquitoes and flies, were causative of infection in

individual cases, but that more fundamental factors, such as mutation of the streptococci and virus and their ready means of spread by air, were responsible for the occurrence of this epidemic of encephalitis over such a vast area.

It would seem that specific vaccination, in addition to sanitary measures, such as more adequate purification of water supplies and pasteurization of milk at higher temperatures than now practiced, may be necessary for the prevention of outbreaks of encephalitis. However, since from 2,000 to 5,000 persons would need to be immunized during epidemics to protect one from contracting the disease, a practical impossibility by present methods, the use of the diagnostic and therapeutic antistreptococcal serum in the early stages of the disease is strongly indicated.

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Observations on Selenium Poisoning in South and North America*

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FOLLOWING a description of numerous cases of selenium poisoning from natural sources,^{1,2} several investigators³ have been observing such cases and many patients have been referred to the writer's clinic for study. Many of these cases were determined to be due to selenium poisoning. In the selenium areas, it is thus shown the symptoms of the poisoning can be recognized by the general practitioner even though the selenium syndrome is not yet well understood.

The opportunity to make a South American tour to investigate the disease there was presented to the writer in 1941. Inasmuch as samples, mostly grains, from various parts of the world analyzed for selenium content

*This review has been released for publication by the War Department Manuscript Board, which assumes no responsibility, other than censorship, for the contents, and permits no published reference to it.

have shown appreciable amounts, the South American investigation was considered to be highly interesting. Argentine wheat samples in shipload lots usually show a little less than one part per million of selenium, which would indicate a widespread, low-grade selenium content of soil, or a few areas of rather high selenium content, or both.

SELENIUM SOILS IN ARGENTINA

Selenium occurs in the United States, Canada, and Mexico in the upper Cretaceous and lower Tertiary formations and is a great source of damage to animals and humans. In Argentina the sides of the Andes Mountains present great deposits of Cretaceous strata, mostly resembling the Niobrara, which in the United States is the greatest offender, being widespread, highly toxic, and

particularly available to range plants and grasses and other farm products. The level portion, or Pampas, of Argentina, extending from the Andes to the sea, is largely covered with loess, originating from the components of the Andes Mountains. In places this loess probably reaches a depth of nearly one thousand meters; in other places, notably along the rivers, it is absent, owing to erosion to deeper layers of strata which are similar to those on the sides of the Andes. The stratigraphy of the South American countries is in a very jumbled state; geographical studies are extremely difficult and as yet very incompletely correlated. However, many of the suspected strata contain fossils. In particular the noded scaphites of the upper Cretaceous are contemporary with those in the toxic deposits of the Cretaceous in the United States. A study of all available maps shows that these deposits, of possible toxicity, are quite widespread throughout Argentina. On personal tour, there seemed to be more Cretaceous deposits than the stratigraphical maps of the country show. As that strata compares to that of known toxicity in the United States, it was necessary to determine the presence of selenium, and in the event of its presence, its effect on the animals and humans in these areas.

Now in the United States, Canada, and Mexico certain plants grow only in the presence of selenium and convert it from the inorganic forms of its original state to the organic forms which may be taken up by other plants and which may be used for animal and human food. These plants, the loco weeds, are members of the *Astragalus* group and are easily recognized. Also by the odor of these plants some idea of the selenium content may be gained. The presence of these plants in the suspected selenium-bearing strata of the Argentine was everywhere evident, and thus it could be determined that without doubt, selenium occurred in fair concentration in various portions of Argentine soils. Any Argentine gaucho or estancia owner can show you loco weeds, and knows the effects of these toxic selenium-bearing plants on his livestock. Probably the greatest offender in the Argentine is the *Astragalus bergi*, which is similar to *Astragalus racemosus* of the western United States, except that its leaves are slightly broader and the pods are shaped more like common pea pods. Many other varieties of *Astragalus* are found in Argentina and nearby countries of South America, where there are many reports of toxicity to livestock. A fine collection of *Astragalus* are on display in the Botanical Institute, Immigrants Hotel, Buenos Aires; Senor Professor Malfino there can give many interesting facts about livestock losses from these toxic plants.

After inspection of thousands of cattle in the great municipal stockyards in Buenos Aires, where many cases of typical selenium hooves could be observed and observations made on the regions these cattle came from, it was very clear that selenium poisoning in Argentina is a problem similar to that in the United States. In one area in the southwestern portion along the Patagonian border, there have been some rather heavy livestock losses due to acute selenium poisoning, probably caused by ingestion of *Astragalus bergi*. Throughout Argentina

descriptions of both acute (loco disease) selenium poisoning and chronic (alkali disease) selenium poisoning are common and coincide closely with descriptions of western stock men in the United States. As in our western stock country, many wierd and fantastic treatments of the affected animals have been developed. One Argentine estancia owner, for example, is certain that by inclosing the animal's head in a tent and burning the loco weed in this tent, beneficial results are obtained. In another area of the Argentine, all new livestock, particularly horses, are caught upon entering the area and their mouths and noses thoroughly rubbed with macerated loco weeds. After this treatment, the Gaucho then believes the animals will not eat the weed.

SELENIUM SOILS IN PERU

In Chile the writer observed several toxic areas containing typical toxic *Astragalus* plants. In Peru a town of about 17,000 people largely isolated from the rest of the world by geographical barriers, was particularly observed. This town lies in a basin of Cretaceous deposits. Owing to irrigation facilities, most of its foodstuffs are grown in this localized area and used to a large extent by the populace. The strata components of this area were probably in the upper Cretaceous age and closely related to the Niobrara deposits in the United States. On investigation and inquiry among the doctors in this town, it was enlightening to find that a large majority of the populace, and especially newcomers to this area, complained of the typical symptoms of selenium poisoning described by the writer's first two articles on the subject.^{1,2} Animals from this area also show signs of chronic selenium poisoning. Throughout the middle plateau of the Andes in Peru, particularly between the regions of Cuzco and Juliaca, there were many evidences of selenium-bearing strata, as evidenced by the plants and geographical formations. A survey was made in the regions of the properties of the Cerro de Pasco Copper Corporation and it is the writer's opinion there is a great possibility of inoculation of the soil by the volatilized selenium from the smelters in addition to selenium naturally present in the soils. Also, *Astragalus* plants found in these properties, which undoubtedly contain selenium, are known by the natives to be toxic to animals.

SELENIUM POISONING

Further studies on this interesting problem in South America were halted by the difficulties in shipping samples obtained, owing to the onset of the present war. As soon as these samples are available for analysis, further reports will be made. A conclusion of the writer, made after seeing selenium poisoning in its various phases throughout most of North and South America, is that its economic importance is much greater than heretofore realized. It is his opinion that the loss to the livestock industry lies not so much in the stock killed by the poisoning, but in the subclinical chronic low-grade poisonings which are so common and widespread.

All stockmen know that in certain years feed will be good but that their cattle will not do well; and the common expression, "The grass has no strength in it this year," is often heard. In the writer's opinion, a more

careful examination will usually show a higher selenium content that year.

Another well-known fact is that certain areas in the range countries throughout North and South America, for example, the Sand Hills region of Nebraska, are famous for their large, fat beef cattle. The grass and available food for stock is certainly no better there than in other areas, but it will be noted that the geology of the regions indicates no available selenium.

Throughout the huge selenized areas of those countries which are largely used for livestock raising, the

total loss in weight and growth of cattle alone, produced by chronic low-grade subclinical selenium poisoning, must be of tremendous economic importance, hitherto unrecognized.

It is the writer's opinion that human selenium poisoning is common, widespread, and in certain localities of importance to the general public health.

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Securing and Retaining Nursing Service During the War Crisis*

Hospitals, like all employers today, are confronted with the problem of securing and retaining help at this time, and, unlike most employers, hospitals must think in terms of both professional and non-professional help.

Hospitals fortunate enough to have schools of nursing, now expecting to admit additional students in conformance with our government's plans for student nurse recruitment, will receive much nursing help, when these students, of necessity, are called upon to take more and more nursing responsibility. Under *adequate supervision* this will work no hardship.

However, to insure this supervision, to secure and retain a supervisory staff, is another problem. We all know that our armed forces are absorbing the graduate nurses in increasing numbers. We know that the best nurses are needed, as are the best troops, if we are to win this war. As our army increases in size so must the numbers of our nurses be augmented to care for this tremendous military establishment of ours. At the same time the battle for health on the home front must not be neglected.

This battle for health going on in hospitals whose schools form a proving ground for the basic training of nurses, will be a losing one if we lose sight of the plan for adequate supervision for the student nurse, and for the paid non-professional and volunteer non-professional groups, now in hospital service.

The recognition of head nurses and supervisors who are responsible for this direct supervision as key people in the hospitals is of utmost importance. The efficiency with which they run their respective departments is in direct proportion to their ability to orient and instruct new, transferred, and displaced help. We need not enumerate the increasing numbers of new people who must be introduced daily to the hospital situation. Hospitals, then, must recognize that head nurses and supervisors need aid in order to direct these "green" helpers as well as put them to work in the shortest possible time, at the

same time being fully aware of the safety of the patient, personnel and equipment.

A plan to orient and instruct inexperienced workers has been used by industry for about twenty years. At first designed to train a person on the job in industrial plants, it has recently been adapted to needed hospital instruction programs by the Training Within Industry Service, Bureau of Training of the War Manpower Commission.

First introduced in the states of Nebraska, Iowa, North and South Dakota, and Minnesota, which make up a field district for T.W.I., under the direction of E. L. Olrich, the Training Within Industry Service offers to hospitals, at no cost to the institutions, a course called Job Instruction Training.

The plan, briefly is this: Selected representatives from various hospitals are given a thirty-two hour Institute, over a five-day period, in how to instruct a person to do a job correctly, quickly, and conscientiously. Each key person attending this institute (chief dietitian, director of nursing, nursing instructor, administrator, or any other department head) who has given evidence of interest and ability is given a certificate of recognition by our government.

This certification qualifies him or her to instruct groups of ten key people by giving ten-hour training sessions, in his or her own institution.

Much of the best instruction in hospitals today must of necessity be done on the job. The rapid turnover of personnel leaves no other alternative. A planned method of job instruction will help solve a large percentage of such personnel problems.

The Job Instruction Training method has been used in leading hospitals of Minnesota, Iowa, Maryland, New York, Massachusetts, Ohio and many other states, including those on the Pacific Coast. The participating hospitals have written of the profit derived from this training.

For further information write to your district director, or to C. R. Dooley, Director, Training Within Industry Service, Bureau of Training, War Manpower Commission, Washington, D. C.

*This article has been written expressly for publication in the *Journal-Lancet* by the War Department Manuscript Board and is released by E. L. Olrich, District Director of WMP Office for Emergency Management, through Ellen L. Aird, Associate Training Specialist.

AMERICAN STUDENT HEALTH ASSOCIATION MONTHLY NEWS-LETTER

HEALTH SERVICE AND THE WAR PROGRAM

The past year has witnessed many changes in health service duties and policies to adapt them to present needs. The following monthly report of the Health Service to the University of Michigan, kindly contributed by its Director, Dr. Warren E. Forsythe, is illustrative of the multiple functions of a modern health service.

"The part played by the Health Service of the University war program to July 1, 1943, is summarized herewith:

1. *Training the Medical Corpsmen.* During the spring of 1942, as an early effort at preparing students for some particular military service, members of the staff arranged an evening course to give students some idea of the duties of enlisted men in the medical services. This was set up under advice of Army Medical Corps Officers. It was elected by about 25 students during one semester, but the course was discontinued upon the advice of the resident Medical Officer.

2. *Preliminary Selective Service Examinations to Students.* At the request of Selective Service Board No. 1 here, preliminary examinations of students were done. In most instances, these were for students registered elsewhere and whose examinations were transferred to Ann Arbor. The number examined was 441.

3. *Enlisted Reserve Corps Examinations.* Student applicants for admission to the Army, Navy, and Marine Corps were given the very complete final type examination here at the request of these services. The number examined was: Army 745, Navy 234 and Marine 47.

4. *Assistance to Army Medical Corps Officers.* Before the real outbreak of war activities and since, the department has given space and other assistance to the Medical Corps personnel stationed here for duty with the R.O.T.C. and non-student military matters.

5. *Contract Medical Service.* During the Spring Term, about 400 students in the Specialized Training program were given medical care upon contract with the Army. This was based upon the service to which regular students were entitled, with some modifications. Experience with these groups required about 10 per cent more hospitalization; otherwise it was about as for other students.

6. *Personal Advice to Students.* There were many services to students in the way of determination of health conditions in relation to standards for volunteer services in particular.

7. *Service in War Related Organizations.* Many members of the staff were variously engaged in activities of Red Cross Emergency Medical Service, and other civilian organizations.

The Director is Chief of Emergency Medical Service for Washtenaw County, and the Health Service building with the entire staff has been organized as a Casualty Station for service in case of disaster from enemy action."

PERSONAL ITEMS

The medical staff of Queens College now consists of Dr. Ruth I. Cudmore and Dr. Nathan A. Goldstein. Dr. Goldstein is substituting for Dr. Charles M. Rieber who is in military service.

The new director of Student Health at Long Island College of Medicine is Dr. Duncan W. Clark, succeeding Dr. Ernest E. Keet, Jr.

Dr. John E. Beck is Acting Director of the Department of Student Health at the University of Virginia.

Dr. J. D. Farris, formerly College Physician at Eastern Kentucky State Teachers College, is now University Physician at Emory University.

Dr. A. O. Swenson, physician at Duluth State Teachers College, is now on duty in the Navy.

There is a number of attractive positions open in health services according to inquiries made through the office of the Secretary-Treasurer.

A.S.H.A. DIGEST OF MEDICAL NEWS

A Safe and Efficient Nasal Vasoconstrictor. Fabricant, N. D., and Van Alyea, O. E., report in the January (1943) issue of the *Am. J. of Med. Sciences* that upon 104 human subjects the use of 0.1 per cent Privine H Cl as a nasal constrictor was effective and unaccompanied by unwanted side-actions such as tingling, smarting, burning, apprehension, insomnia, tremor, palpitation, urinary retention and skin eruptions. A 0.1 per cent solution of Privine H Cl is isotonic and has a pH of 6.2 which is approximately that of the nasal mucus of a normal human being. It is not detrimental to ciliary activity.

Immunizing Potency in Man of a Purified Antigenic Material Isolated from Eberthella Typhosa. Morgan, H. R., Favorite, G. O., and Horneff, J. A., in the *J. of Immun.*, May, 1943, report "A purified antigenic material isolated from *E. typhosa* cultured in a synthetic medium in total dosage of 0.1 mg., administered by subcutaneous injection in man, has been demonstrated to produce mouse-protective antibody in greater amounts than 2.5 ml. of 2 standard bacterial vaccines. This response was attained with less local constitutional reactions than those following the use of the bacterial vaccines."

Renal Glycosuria in Selectees and Volunteers. In a study of 45,650 consecutive selectees and volunteers aged 18 to 45 years, the authors found glycosuria in 367 cases (0.8 per cent). Further study of these 367 cases by repeated urine examinations and sugar tolerance tests of those repeatedly positive, resulted in classification of the cases into three groups, i. e. (1) 208 cases of diabetes mellitus; (2) 126 cases of transient glycosuria; (3) 33 cases of renal glycosuria. "The diagnosis of renal glycosuria was made when the subject had a normal blood sugar curve and specimens of urine contained varying amounts of sugar after the ingestion of 100 mg. of dextrose." There were no symptoms referable to the disease. Joslin, Fitz, and Wilder are quoted as offering a good prognosis, a normal life expectancy and no tendency to

progress to diabetes mellitus in these cases. (Harry Blotner and Robert W. Hyde, *J.A.M.A.*, June 12, 1943).

Smallpox Rapidly Disappearing in U. S. The May (1943) issue of the Statistical Bulletin of the Metropolitan Life Insurance Company reports new low records for smallpox in this country. For the first time in history, the number of smallpox cases fell below 1000, and the smallpox deaths totaled less than 10 for the country as a whole. It is pointed out that the number of cases in relation to population is still generally high in the states west of the Mississippi.

Rose Hips and Evergreens as Source of Vitamin C. Studies of the fruit of the rose reveal the following facts: (a) with stalk and flower residues removed, the weight is approximately 1 gram; (b) an average rose hip contains about 10 mg. of vitamin C; (c) 3 of these rose hips contain as much vitamin C as will a good orange; (d) on the dry basis 4.91 per cent of rose hip material is ascorbic acid; (e) the rose hip crop of Alberta Province alone is estimated at half a million tons per year, which might yield 5000 tons of ascorbic acid (enough to give 140 million people 100 mg. of ascorbic acid daily for a year).

The same workers found that there are 103 to 317 mgs. of ascorbic acid in each 100 grams of fresh evergreen leaves. The vitamin C content of evergreen leaves is thus only about one tenth that of rose hips, but is from 3 to 5 times higher than that of orange juice. Hunter and Tuba, *Canad. M. A. J.* 48:30, 1943).

Experimental Production of Stones in the Bladder. Hector Alfonso Davalos, Jr., in the May (1943) issue of the *J. of Urol.*, reports producing stones in the urinary bladder of rabbits by means of a two-step procedure. The first step includes instillation of 2 to 5 cc. of a 1:1000 alcoholic solution of salicylic acid daily for four days into the urinary bladder in order to produce a chemical cystitis. The second stage includes the instillation of 2 to 4 cc. of a 24 hour culture of *Proteus bacilli* intravesically every fifth day, in order to maintain a chronic infection in the bladder.

The *Proteus* culture used was one from a patient with urinary lithiasis. It was selected because of its ability to split urea in the urine, liberate ammonia, produce a sudden increase in the urinary pH, and favor the precipitation of phosphates and carbonates.

Epidemic of Sonne Type Dysentery Stopped by Sulfaguanidine. Lt. J. C. Scott in the *J.A.M.A.* of June 26, 1943, reports the abrupt stopping of an epidemic of Sonne type dysentery among a group of mentally handicapped children by giving 0.5 gram of sulfaguanidine three times a day by mouth to all well children, and personnel exposed. No toxic signs or symptoms were noted.

An Outbreak of Ringworm of the Scalp. The May (1943) issue of *City of New York, Department of Health Quarterly Bulletin* reports an outbreak of ringworm of the scalp affecting "several scores" of children in certain schools in the Borough of Queens. Transmission is considered to be by means of brushes, combs, hats and towels. Diagnostic measures recommended are (1) examination of hairs and scales microscopically of preparations made in 20 per cent potassium hydroxide (2) ex-

amination of hair for characteristic fluorescence in ultraviolet light filtered through a Wood filter. (3) culture of diseased tissues, hairs or scales. Recommended treatment includes (1) topical antiparasitic application (2) manual epilation (3) x-ray irradiation.

Nail Polish Dermatitis. W. H. Guy and F. M. Jacob in the June 12 (1943) issue of the *J.A.M.A.* point out the frequent occurrence of simple dermatitis with edema of the eyelids associated with a dermatitis of varying severity involving the neck. Such cases have been frequently proven by patch tests to have been caused by allergy to both colored and clear nail polish. All cases cleared promptly when soothing lotions were used and the nail polish discontinued.

Required Hygiene Teaching in High School. The New York State Board of Regents, by new regulations just distributed, (a) make it the duty of school trustees and boards of education to provide a satisfactory program in health and safety in accordance with the needs of all pupils from the kindergarten through the high school; (b) require that in junior and senior high school grades, health must be taught by teachers with approved preparation; (c) require that some member of each faculty with approved preparation must be designated as health coordinator.

This extension of the teaching health and safety to the high school will be accompanied by the provision of one unit of credit for the new program.

Sensitivity to Sulfonamides. Data accumulated by the Committee on Chemotherapeutic and Other Agents of the National Research Council indicate that toxic effects as the result of sulfonamide therapy occur approximately as follows:

(a) Percentage of sulfonamide-treated patients showing any toxic reaction (including fever, rash, anemia, leukopenia, acute agranulocytosis, renal complications, hepatitis): sulfathiazole, 19%; sulfapyridine, 16%; sulfanilamide, 12%; sulfadiazine, 6.5%. (b) Percentage of sulfonamide-treated patients showing fever or skin eruption only: sulfathiazole, 10%; sulfanilamide, 10%; sulfapyridine, 8%; sulfadiazine, 3 to 4%.

There is at present no simple test for detecting sulfonamide sensitivity other than giving a test dose of the drug.

Use of Sulfadiazine in Controlling an Outbreak of Scarlet Fever. The *Bumed News Letter* of June 11, 1943, reports that an outbreak of scarlet fever at a Naval Activity was brought promptly under control by the prophylactic use of daily doses of 1.0 gram of sulfadiazine, over a period of several weeks. The command was divided into two groups, one group starting the prophylactic sulfadiazine immediately, the other group starting only after a wait of three weeks. The incidence of new cases of scarlet fever dropped sharply in the first (treated) group during the first three weeks but continued high in the second (untreated) group. As soon as diazine treatment was also instituted in the second group, the same sharp drop in incidence of new cases occurred as occurred in group 1. After 12 days treatment of both groups, a complete remission in the scarlet fever occurred.



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CORONER OR MEDICAL EXAMINER

When the word coroner was first used to designate an official whose duty it was to investigate cases of sudden death to determine the cause, little was it known how appropriate that title might appear in this day and age when so many coroners' cases are coronary cases. The term seems to have stemmed from the Latin for crown, when it was a crown officer's duty to investigate, apprehend and arrest law violators. When the office of coroner was created, it became his specialty to investigate the mysterious deaths. In many of the United States now, a coroner takes over the duty of sheriff on demise of the latter, indicating a vestigial retention of this earlier and broader concept of his functions as an officer of the crown.

In several of the states, the office of coroner has been replaced by that of "medical examiner," in evident rec-

ognition of the fact that the office needs the acumen of a man of medical training. In the majority of our states, however, no such qualification is actually required by law. It is our purpose here and now to contend for the necessity of this further change. We can readily see how the coroner may logically supplant a sheriff in certain medico-forensic cases, but, by no stretch of imagination, can the reverse be true. A layman is not properly qualified to investigate the circumstances of a death supposedly due to any but so-called natural causes. This calls for more than intuition and "hunch." It requires a perspicacity that can be attained only through scientific study and professional experience. There may be a shortage of physicians, but surely not to the degree that any county should have to forego the services of a man of medical training in this important office.

A. E. H.

CLIMATIC PHYSIOLOGY, DOG DAYS, AND LUNACY

Medical literature recently has been greatly taken up with the dramatic effects of plasma and sulfonamides, the treatment of military and industrial emergencies, and with tropical diseases. Because human biological processes continue to function best under conditions of alternating work and rest, it seems wise at this time to sit down for a few minutes and think about the weather. If it is any balm to your driving conscience, you may call it climatic physiology.

The human body through its capillary system and sweat glands regulates heat loss and maintains optimum body temperature very well for a period of about ten days of excessive heat. Then the cellular combustion rate declines. With this decline, there is impairment of efficiency in vital processes, mental activity, and immunity to disease. It is after the first ten days of a heat wave that instances of heat exhaustion are most frequent. People living continually in tropical climates are retarded in growth, development, and fertility. Experimental work with mice has shown that the minimal lethal dose of hemolytic streptococci for animals maintained in a temperature of 91° F. is one-fourth of that for those kept at 65°. Another thing that one hesitates to mention above a whisper is that thiamine requirements are found to be twice as high at 91° as at 65°.

On the other hand, according to C. A. Mills, the energizing effect of the cooler weather of northern states is such that there is a high incidence of degenerative diseases, hypertension, neurasthenia, goitre, etc. Now is a good time to decide whether you would rather burn out in a whirlwind of activity or spend your days taking quinine and fighting vectors under a palm tree.

It is also interesting to note the effect of storm or cyclonic conditions on the prevalence of acute infections such as appendicitis, upper respiratory infections, and rheumatic fever. Comparison of weather charts and health reports bears out this association in North America and the Philippines where cyclonic conditions are found. Acute infections in the storm tracks of the United States are four times those of southern hemisphere countries, such as Australia, where temperatures are the same but cyclonic disturbances are rare. Interesting studies of the physiological effects of climate have appeared from time to time in monographs and articles, but the subject is still full of speculation.

The dog days of late summer are attended by mood disturbances and irritability, but their importance, like that of the summer moon, is intangible. Nowhere in readings on climatology does one find any reference to the moon, but last night it was full and shone beautiful across the hills and fields. It wasn't a harvest moon or a June moon, but it was nevertheless a nostalgic, compelling, heart breaking, vacuum-producing moon for one person. She left the gay gathering of soldiers and their friends to go out and sit alone with it. She said she went out there because it was so beautiful, but she seemed to be held there by something more. The same moon that shone last night over the wooded hill was shining over Guadalcanal, and the moon seemed very near.

That's another thing that's affecting us this summer, but like the weather, there's not much to do about it. Unless it is to go back to work. L. M. D.

MILITARY SERVICE OPPORTUNITY

Realizing the civic interest of the medical profession and reminding that the young manhood of the Northwest—so far as uniformed men are concerned—flows through Minneapolis, Mrs. F. Peavey Heffelfinger, chairman of Women's Activities, Minneapolis Defense Council, asks for assistance for the Military Projects Division. This division, in response to the invitation of the military authorities to install much needed recreation rooms for the Armed Forces, already has built and equipped twenty-seven such rooms and fourteen more are in process of being furnished.

Sponsorships to date include Navy Mothers' Club, Veterans of Foreign Wars, American Legion Auxiliary, Jewish War Veterans, Edina Women's Club, Colonial Dames, B'nai B'rith and Rotary Club. Many organizations have donated funds in varying amounts. Contributions of work and time have been made by labor organizations. Merchants have sent materials and furniture at much less than cost.

Inasmuch as there are medical detachments assigned to both arms of the service, and hospitals corps attached to all units, there is logic in the request to medical groups that they consider contributing lounge rooms, recreation rooms and day rooms with a touch of home atmosphere. No money is available from the army and navy for this phase of morale maintenance. Any medical body desiring to participate should call the Military Projects Division of the Minneapolis Defense Council at Main 5275 or visit the office in Citizens Aid Building, Minneapolis. Meanwhile, doctors are invited to call at the recreation rooms and/or any of the hundreds of other service spots (which run from extra-coffee-ration dispensaries to concrete tennis courts) and acquaint themselves with the work.

Book Reviews

Physiological Regulations, by E. F. ADOLPH. Lancaster, Pa.: JACQUES CATTELL PRESS, 502 pages, 46 tables, 186 figures, 1943, price \$7.50.

This is primarily an exhaustive and scholarly treatise on the comparative physiology of water balance and associated phenomena. It begins with a critical but interesting and informative account of factual data about osmotic phenomena, and ends with a philosophical, or perhaps theoretical, attempt to integrate these data into an intelligible whole. Such an undertaking can never be complete, or completely adequate, but it is clearly desirable.

Adolph has shown very clearly how inadequate are the naive attempts to account for physiological regulations in terms of direct adaptations which have sometimes been suggested in the past. He has emphasized the interrelations of variables in living systems. This book is not easy reading, but it will constitute interesting reading for the physician or biologist who expects to get no practical instructions for treating patients but is satisfied with broadening his background of factual knowledge and un-

derstanding of physiological processes as they relate in one way or another to osmotic regulation. A word should be said about the importance of osmotic regulations. They are so important to medicine, to physiology and to life itself that they are frequently ignored. This is because when they are upset more than a very little life is impossible for higher animals. The tremendous importance of the problem is ignored simply because it is taken for granted. The ingestion of water is harmless even in relatively large amounts, only because the normal organism is able to excrete it. And when it cannot be excreted, as in severe nephritis, the physician does not ordinarily think of the disturbance as one in osmotic regulation, but as kidney disease. From a practical viewpoint the kidney disease is of great importance, to be sure, but it is no more important in guiding treatment than is a thorough knowledge of the principles of water and salt balance in health and disease. Only by an understanding of the latter can a completely intelligent system of management be achieved.

Adolph's book is not apt to be a popular one, but it is a very useful one, and represents a type of which there should be many more in various fields of normal and pathological physiology. Medical science today needs such scholarly integrations of knowledge.

Allergy Anaphylaxis and Immunotherapy, by BRET RATNER, M.D. Baltimore: The Williams & Wilkins Co., 834 pages, 1943, price \$8.50.

Twenty years ago an increased interest in the field of immunology gave us much new knowledge concerning anaphylaxis and, soon after this, improved methods of taking care of the allergic patient were revealed. With time, however, the practice of allergy began to drift away from the fundamental facts originally established. In this book, the author makes a great contribution, for he places the field of allergy anaphylaxis and immunotherapy on a scientific basis. Many of the laboratory investigations and much of the clinical research which has continued but has been more or less ignored by those interested in allergy are revealed. No longer need the physician carry out procedures without knowing the principles behind them, even though they be in the field of anatomy, pathology, physiology, chemistry, bacteriology or immunology. The gap in medical literature, namely the absence of a monograph correlating the up-to-date scientific and practical facts of allergy, has been filled by this book and for this reason it is highly recommended for students, investigators, and practicing physicians.

Laugh at the Lawyer Who Cross-Examines You: A Courtroom Antidote, by CHARLES L. CUSUMANO. New York: Old Faithful Publishing Co., 375 pages, 1943, price \$3.

This is not a technical book but a compilation of admonitions, cautions and warnings regarding conduct on the witness stand and the considerations on which that conduct is based. Thirteen pages are devoted to medical testimony. According to the author, doctors testify on (1) their qualifications, (2) condition of patient and services rendered, (3) opinions, (4) value of services. Since most doctors' appearances in court are as expert witnesses for plaintiffs in accident cases, the book concentrates on such testimony. The first problem of the doctor is to show the causal relationship between the accident and the alleged injury to the plaintiff. The next most important question asked is whether or not a particular injury is a permanent one; another question may be whether or not a certain condition resulting from an accident may give rise to other conditions not yet apparent. Other possible lines of inquiry—Was the condition due to an earlier injury aggravated by this accident or was it due entirely to the original accident? Was a blow caused by a sharp or a blunt instrument? In the hands of another or self-inflicted? (This being testimony of a medical-mechanical nature the answers, coming from a doctor testifying as an expert, are admissible.) Can the injury be explained from the x-ray introduced in evidence?

The author suggests a few guiding principles. If the amount of the physician's bill as testified to is made too great, it an-

tagonizes the jury, leading them to suspect a "frame-up" or a "shake-down". All questions of an hypothetical nature should be faced squarely and answered at once with common sense, but if they involve internal injuries the physician may take time for investigation and research. If a broken bone will cause permanent limitation of the use of a joint, the doctor should say so unhesitatingly. Questions regarding prognosis call for study of other case histories and, if possible, the citing of examples that are a matter of record. If an injury is complicated, it is advisable to call a specialist, obviating the possibility of a general practitioner having to admit inexperience with such cases. The original record or chart, complete, should be brought into court, excerpts tending to arouse suspicion. Above all, opines the writer, the physician is not to be intimidated but to "speak up," frankly and promptly and in simple terms.

The Inner Ear, including Otoneurology, Otosurgery and Problems in Modern Warfare, by JOSEPH FISCHER, M.D., Staff member, Beth Israel Hospital, Boston, and LOUIS E. WOLFSON, M.D., instructor in Ear, Nose and Throat, Tufts Medical School. New York: Grune & Stratton, Inc., 421 pages with 77 figures and 7 tables, 1943, price \$5.75.

This is an excellent treatise on the anatomy, general physiology, applied physiology, functional tests and disease of the labyrinth and its central pathways. Also, there are chapters on war trauma and the role of the ear in aeronautics. Each chapter is followed by an extensive list of references. The book can be highly recommended to all clinicians who are interested in the ear, whether they be otologists, neurologists or internists.

Principles and Practice of War Surgery, by J. TRUETA, M.D. St. Louis: C. V. Mosby Co., 425 pages, 144 illustrations, 1943, price \$6.50.

The essentials of treatment of war wounds, according to five basic principles (prompt surgical treatment, cleansing of the wound, excision of the wound, provision of drainage and immobilization in a plaster-of-Paris cast) are elaborately covered. Dr. Trueta makes no claim to being the first to describe these principles, but considers his main contribution to be the combining of established principles into a single, logical method of treatment.

The book includes discussions on wound healing, infections, shock, transfusions, chemotherapy, skin grafts and other surgical problems, with emphasis on biological methods of treatment. Clear, detailed descriptions and drawings, photographs and radiographs make understanding easy. The work is a valuable aid, not only to the military surgeon, but to the civilian surgeon and general practitioner as well. It is based chiefly on experiences in the treatment of 1,073 patients by Dr. Trueta and his colleagues in Barcelona in the Spanish Republican Army during the recent civil war, and more than 200 patients treated at Wingfield-Morris Orthopaedic Hospital, Oxford, England.

Human Neuro-Anatomy, by OLIVER S. STONG and ADOLPH ELWYN. Baltimore: The Williams & Wilkins Company, 422 pages, 1943, price \$6.

This is an excellent work on the anatomy of the human nervous system. It is somewhat unusual, in that the authors have incorporated some practical physiology and clinical applications in their discussions of the anatomy. This approach certainly lends a dynamic pattern to the purely anatomical descriptions. There has been no sacrificing of anatomical detail. The illustrations are excellent and numerous. The descriptive style is simple and easy to follow, and the physiological discussions have been well summarized and are brief and up to date.

This book should prove most valuable as a textbook for students. Though some of the functional and clinical concepts may be a little advanced for students during their basic years, the correlated information will be appreciated later when the student enters his clinical training and has need for a review of certain neuroanatomical concepts. As a reference book for those especially interested in the nervous system, this publication should prove invaluable.

Navy Doctors and Hospital Ships

An official release by the Office of War Information

EDITORIAL NOTE: On May 18th, the day on which the newspapers carried the story of the dastardly sinking of the Australian hospital ship Centaur by a Japanese submarine, periodicals in the Northwest received a news bulletin which the United States government, through the Minneapolis regional office of OWI had sent under the head "97 Per Cent of Navy and Marine Wounded Recovered from Injuries."* Of this release the following, having a navy application, is a liberal excerpt:

The success of a certain hospital ship, which must remain unnamed, is one of the navy's proudest achievements. She was at Pearl Harbor when the Japs struck, and hundreds of the wounded were treated aboard her. The doctors, nurses, and splendid equipment on the vessel were responsible for saving many lives. This ship has a remarkable record—during an extended period beginning with the Solomon islands offensive in August, 1942, the floating hospital cared for 4,039 patients—men wounded by machine gun bullets, shell fragments; men terribly burned, lacerated. Many fell on Guadalcanal, others in sea engagements and aerial combat. Among these 4,039 cases, only seven deaths occurred—a mortality rate of 0.18 per cent.

What the mobile surgical units are to land forces, hospital ships are to our sea fighters. These ships are staffed by the most expert surgeons and doctors. Their equipment is the equal of the equipment in the best metropolitan hospital. Each ship has dispersed operating and dressing rooms so that if one is put out of action by damage to the ships, others will be available. The ships carry specialists in surgery, medicine, eye, ear, nose and throat, dentistry, physiotherapy, urology, and psychiatry. They are used not only by naval forces but by land forces. Lying close in to shore, wounded are transferred to these ships from field hospitals. Often patients are aboard the ships a few hours after being hurt. Each such vessel carries below decks a complete field hospital, with tents, portable operating unit, power plant and ambulance. These stations are taken ashore in boats and can be set up in time to serve any casualties resulting from shore operation.

Battleships and aircraft carriers have their own hospital units, all complete. Smaller war vessels, however, may depend on the hospital ship. Radio informs the hospital ship that wounded men are to be transferred. A boat is sent. Patients are wrapped well in blankets and transported in the Stokes stretcher—a shallow wire support, made in the shape of a man's body with compartments for the legs. These stretchers permit patients to be moved from ship to ship comfortably.

*Figures are from Pearl Harbor to March 31, 1943.

The navy's hospital ships today include the Solace and the Relief, having 500 beds each. Three more have recently been launched to be operated by a naval medical staff. Another three, to be operated by the navy, but manned by army doctors, will be completed in the near future.

Then there are the special boats used by the navy to rescue men from sinking vessels or aircraft disasters over water. When an aircraft goes down, fast rescue craft which skim along shallow creeks to the scene bring survivors ashore at speeds of 50 or 60 miles an hour.

There are specially constructed one-man packs containing all necessary equipment for the battalion aid stations, which can be strapped to the back of the hospital corpsman permitting him to have both hands free for climbing down the side of hospital ships or debarking from ambulance boats. For loading stretcher-cases aboard hospital ships, hoists are used which lift a number of wounded at once. As much as two days are saved this way in getting aboard the casualties for transportation out of the war area.

Of all navy and marine personnel wounded only 2.6 per cent died subsequently. Fifty-three per cent were returned to duty. Still under treatment as of March 31 were 43.5 per cent. Invalided from service were 0.9 per cent.

The breakdown of the figures shows: Naval officers wounded, 61.6 per cent returned to duty; 35.9 per cent were still under treatment; 0.2 per cent were invalided from service; only 2.3 per cent died.

Of naval enlisted men wounded, 60.4 per cent returned to duty; 35.4 per cent were still under treatment; 1.4 per cent were invalided from the service; and 2.8 per cent died.

Of marine officers wounded, 46.8 per cent returned to duty; 51.6 per cent were still under treatment; and 1.6 per cent died. None was invalided.

Of marine enlisted men wounded, 41.5 per cent returned to duty; 55.9 per cent were still under treatment; .4 per cent were invalided from service; and 2.2 per cent died.

The particular problems met by doctors in the navy are studied at the various naval medical training centers, the naval hospitals located in many parts of the country. Navy doctors not only serve on combat ships; they also serve in amphibious commands, where they must adapt themselves both to land and sea operations; they serve with air units and with paratroops.

News Items

Dr. Harold A. Reif joins the staff of the Nicollet Clinic, Minneapolis, August 1st, in the Department of Urology, succeeding Dr. G. J. Thomas, who has left for California. Dr. Reif comes from Cleveland General Hospital and the Western Reserve University. While in Cleveland, he was associated with Dr. H. R. Trattner, well known urologist of that city. Previous to his being in Cleveland, he was associated with Dr. W. M. Copp-ridge, urologist, Duke University, Durham, North Carolina. Dr. Reif's position with the Western Reserve University was that of Demonstrator in Urology.

Frank J. Hill, M.D., M.P.H., who has been acting state health officer for North Dakota during the past eighteen months, has been appointed state health officer by the North Dakota public health advisory council for a term of four years. June 21, Dr. Hill conferred with the commissioners of Burke and Ward counties, looking toward a union with several adjacent counties to form a public health district as authorized by the 1943 state legislature.

Dr. Lunsford D. Fricks tendered the Helena, Montana, city council his resignation as city-county health officer to become effective August 31. Dr. Fricks relinquishes the position because poor health necessitates a change of climate.

Dr. Frederick W. Orvedahl has left Preston, South Dakota, after a residence of five years, to join four other physicians in a clinic at Winton, Wyoming.

Dr. Jno. J. Stratte, of Grand Forks, North Dakota, having recently completed an internship at Ancker Hospital, St. Paul, will open a general medical practice at Warren, Minnesota, in which his father, Dr. Jos. I. Stratte, will assist him in surgery.

Dr. Francis J. Pelant, practicing in New Ulm, Minnesota, since 1916, has moved to Owatonna.

Drs. Thomas J. B. Shanley and John R. E. Sievers of Butte, Montana, attended the meeting of the International College of Surgeons in New York City.

Dr. Leonard W. Brewer of Missoula, Montana, has been appointed to assist in screenings for the selective service of Missoula county.

Dr. Elvin L. Sederlin, district health officer with headquarters at Valley City, North Dakota, has instituted a series of child-health conferences in Barnes county. Dr. Sederlin has just returned from taking a course in public health administration at Johns Hopkins University.

Lt. Comdr. Everett N. Jones, of Boise, Idaho, at one time on the staff of Holy Rosary Hospital, Miles City, Montana, and later practicing at Wolf Point, received an official citation for meritorious service during a South Pacific naval engagement in which the heavy cruiser on which he was serving sustained heavy damage from Japanese aircraft, the commander remaining at his station until certain that all the injured had reached the safety of the upper decks.

Dr. Robert Spratt of Butte, Montana, lately returned from a wedding trip with his bride, the former Helen Frisbee, daughter of Dr. and Mrs. Jno. B. Frisbee of Butte, has been commissioned a lieutenant, junior grade, in the United States Naval Reserve and reported for active duty at the naval hospital, Seattle, Washington, July 10.

Dr. William C. Bernstein, whose practice had been at New Richland, Minnesota, prior to 1940 and at St. Paul since, is one of a group of University of Minnesota Memorial Hospital doctors called to service July 1, and is stationed at Knoxville, Tennessee.

Dr. Myrtle Carney of Sioux Falls and Ft. Pierre, South Dakota, supervisor of public nursing and the state child health program for more than five years, is joining her husband, Dr. Jas. G. Carney, who is physician at the Dupont defense plant in Pasco, Washington. Other fields in which Dr. M. Carney practiced are Armour and Mitchell.

Dr. Henry O. Grangaard of Ryder, North Dakota, has taken residence at Proctor, Minnesota.

Dr. Russell R. Heim, Hennepin county coroner, delivered the address of welcome to the delegates to the sectional meeting of the National Association of Coroners in Curtis Hotel, Minneapolis, July 9.

Dr. E. T. Bell, chief of the department of Pathology, University of Minnesota, was to have read a paper, "The Medical Legal Autopsy from the Standpoint of the Pathologist" at the conference of coroners, but conflict with a speaking date at the 65th annual scientific session of the Montana State Medical Association at Billings caused a postponement of the Minneapolis appearance until the day following. Dr. Bell was the principal speaker at the Montana association's banquet.

Dr. James Grassick, Grand Forks, North Dakota, the dean of the state's physicians, celebrated his ninety-third birthday on June 30. He began his practice in Buxton in 1885.

Service transfers involving northwestern physicians include removal of Capt. J. G. Sawyer of Moberg, South Dakota, from O'Reilly General Hospital at Springfield, Missouri, to 45th Evacuation Hospital at Camp Gordon, Georgia; of Lt. Col. D. N. Monseratte of Helena, Montana, from the station hospital at Camp Beale, California, to San Anselmo; of Capt. A. R. Gilsdorf of Dickinson, North Dakota, from the station hospital at Raine Field, Washington, to March Field, Riverside, California; of Maj. Louis Sperling from Philadelphia to Kennedy Hospital, Memphis, Tennessee; Dr. R. F. Hubner of Yankton, South Dakota, from Station Hospital at MacDill Field, Tampa, Florida, to Ardmore, Oklahoma; Dr. T. W. Ferris of Chamberlain, South Dakota, from the naval recruiting station at Salt Lake City, Utah, to that of San Francisco, California. Major Mortimer A. Lasky of Brooklyn is executive officer of the army air base surgeon's office at Great Falls, Montana. Dr. M. Greengard, formerly of Rolla, North Dakota, is now at the station dispensary, Ft. Barry, California.

The Montana State Medical Association annual meeting was held July 7 and 8. It was preceded directly by the semi-annual midsummer meeting of the Montana Academy of Oto-ophthalmology, Dr. W. R. Morrison, president. In conjunction with the state society's meeting, the women's auxiliary of the State Medical Association assembled, with Mrs. Eben J. Carey of Wauwatosa, Wisconsin, president of the women's national body, as honor guest.

Dr. Arild Hanson of the department of pediatrics, University of Minnesota school of medicine, spoke on nutrition and rheumatic fever when the South Dakota state health department's division of maternal and child health conducted its second annual institute in pediatric dentistry the week of June 21. A series of one-day meetings was held in Aberdeen, Huron, Rapid City, Yankton and Sioux Falls.

The sanitary engineering division of the South Dakota state board of health, in addition to the board's "Health Highlights," now in its third issue as a monthly, has begun to publish a Milk Plant News Letter in the opening number of which it warns milk plant operators, city milk inspectors and local health officers that less than 15 per cent of the state's milk plants have the equipment for properly carrying out pasteurizing. It is the purpose of the department to assist the plant operators to increase their knowledge of sanitary procedures.

The National Foundation for Infantile Paralysis set up at the University of Minnesota a special unit to study exactly what happens in the human body when infantile paralysis strikes, and the methods of treating the disease. The Foundation has approved a grant of \$175,000 for the five-year period July 1, 1943, to June 30, 1948.

Building space and basic laboratory facilities are already available. The unit will be under the general direction of a committee composed of members of the departments of physiology, neuropsychiatry and pediatrics in the Medical School of the University. Dr. Maurice B. Visscher, head of the department of physiology, will be in charge of administration.

Much progress has already been made at the University of Minnesota in the treatment of infantile paralysis. It is a logical place for the further development of studies of the physiological problems involved in the disease and the methods of its treatment.

These problems will require the coordinated efforts of physiologists, biochemists, pharmacologists, pathologists, anatomists, neurologists, pediatricists, orthopedists and physical therapists. Ample funds have been provided to secure technical assistance to conduct clinical investigations.

The different departments of the Medical School will set up a coordinated program which will investigate the mechanics involved in the effects of various treatment procedures, the disturbances in the nervous system which produce the many different kinds of symptoms found in infantile paralysis, the nature of the chemical changes produced in the cells by the infantile paralysis virus, and other related problems.

The funds which make this and other research programs of the National Foundation possible are raised annually in January through the celebration of President Roosevelt's birthday.

A complete bibliography of all scientific literature that ever has been published pertaining to infantile paralysis is being compiled by the National Foundation for Infantile Paralysis and is expected to be ready for publication in book form in the early part of 1944.

The Association of Military Surgeons of the United States will hold its fifty-first annual convention in Philadelphia at the Bellevue-Stratford Hotel, October 21-23. The convention will assemble doctors from all the current war fronts where United States armed forces are fighting and from the great base hospitals where rehabilitation of the wounded is in progress.

Physicians attending will have an opportunity to study army and navy treatments of casualties at two of the nation's leading military hospitals, the U. S. Naval Hospital, Philadelphia, and the U. S. Army Hospital at Valley Forge, near the site of George Washington's winter headquarters in the bitter season of 1777-78.

The Medical Division of the Office of Civilian Defense recommends that hospitals throughout the United States should make complete plans for the immediate establishment, when needed, of gas cleansing stations for the care of injured persons who have been exposed to war gases. The local chief of emergency medical service is responsible for the development of such stations, with the advice of the senior gas officer of the community. The primary purpose is the protection of hospital staffs and patients from contamination by injured persons who have been exposed to vesicant agents. Contaminated persons who are not disabled are expected to cleanse themselves in the nearest private home or in other local facilities.

Midwest Leads in Hospital Comfort Items Made for Army and Navy by Red Cross Volunteers

American Red Cross volunteers have produced the staggering total of 3,102,072 articles for the use of the United States Army and Navy hospitals and the able-bodied men in the armed forces within the past eight months.

Exceptions to military regulations were the comfort articles distributed to the men in hospitals: bathrobes, hot water bag covers, pajamas, pneumonia jackets, sleeveless sweaters, afghans, bedroom slippers, bed shirts, bedside bags, pillows, pillow covers, quilts and socks.

Predominant on the list for Army were: wristlets, turtle-neck sweaters, rifle mitts, cap-mufflers and other warm apparel.

Navy needs were met with watch caps, "Iceland" sweaters, helmets, sea boot stockings and scarves.

The Midwestern Area contributed the greatest amount of hospital equipment with a total of 221,781 articles. In the majority of cases, every area either equalled or exceeded its quota.

Necrology

Dr. William Crozier Fawcett, 65, of Starkweather, North Dakota, died June 21 at his home. He settled in North Dakota 42 years ago, practiced first at Drayton and arrived in Starkweather the same day the first train arrived. He was a charter member of the Devils Lake district medical society and served two terms, 1924 and 1935, as president of the state association. He was also a member of the state medical examining board, serving as its president for five years of a seven-year tenure. Four sons are doctors, Donald W., Newton W. and John C. of Devils Lake, and Lt. Robert M. who left five days before his father's death to join an army medical unit training at Carlisle Barracks, Pennsylvania.

Dr. Frank Eugene Towers, 92, of Minneapolis where he practiced medicine for fifty-six years, died June 1 at Minneapolis after an illness of three months. He was former president of Hennepin County Medical Society and, a generation ago, county coroner. His wife, who preceded him in death by sixteen years, was a widely known woman physician of Minneapolis.

Dr. George P. Connolly, 84, of Minneapolis, died June 5 at Franklin Hospital. He had practiced medicine in the state 45 years, including 23 years in his native city, Minneapolis, prior to his retirement thirteen years ago.

Dr. Joseph P. LaPointe, 52, Harvey, North Dakota, died June 25 at Harvey, where he had practiced for 13 years. He was a native of Montreal, Quebec.

Dr. Edward W. Jones, 64, Mitchell, South Dakota, died suddenly in bed at Mitchell of a heart attack July 6. He was a 1906 graduate of Northwestern University Medical School, Fellow of the American College of Surgeons, long examining physician for the Milwaukee railroad, past president of the South Dakota State Medical Association and of the Mitchell District Medical Society. In World War I he served overseas in the medical corps, rising to a captaincy. His son, Dr. John Paul Jones, is with the Armed Forces.

Dr. Homer Augustus Davis, 85, of Missoula, Montana, died at his home, June 27. He was a graduate of Dartmouth Medical college, entering in 1890 and taking up practice on graduation. He retired in 1928 after 36 years of continuous practice, during which time he was never ill in bed. After his retirement he lived at Rapid City, removing to Casper, Wyoming, in 1934, thence to Arlee, Montana, a year later, and having come to Missoula in September, 1942.

Dr. John L. Rothrock, 80, St. Paul, died July 5 at Miller Hospital after an illness of four months. For three years, beginning in 1896, he was assistant health commissioner of St. Paul, and for some years he was an associate professor of obstetrics and gynecology at the University of Minnesota medical school.

Dr. Frederick L. Ecker, 70, of Parker's Prairie and Bertha, Minnesota, died suddenly May 3 at Dalton, Georgia. He was born in Byron, Minnesota, practiced at one time in Benton Harbor, Michigan, and spent summers in Bertha.

Dr. Carl Abraham Fjelstad, 71, formerly of Minneapolis and for three years house physician at Mudbaden, Minnesota, died May 16 at Spokane, Washington.

RED CROSS SCHOLARSHIPS IN SOCIAL WORK OFFERED

Seventy-five Red Cross scholarships are available to selected persons eligible for training in approved schools of social work, Red Cross Home Service announced today. These are being made available to provide the organization with a larger number of home service workers.

The need for trained personnel in home service activities has increased with the rapid rise in requests for Red Cross assistance from servicemen and their families, it was pointed out. Requests for financial assistance, help in filing claims for Government benefits as well as for other special Red Cross services have jumped from a national average of 500 daily before Pearl Harbor to more than 4,000 per day, according to nation-wide report from home service chairmen.

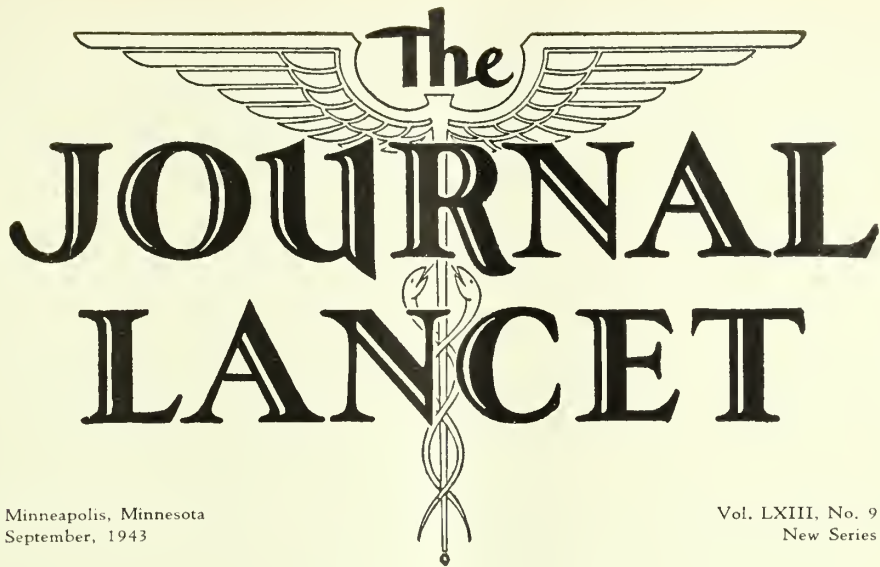
The scholarship plan is expected to help relieve the shortage of trained personnel required by the Red Cross in fulfilling its obligations to the men of the armed forces and their families. Upon completion of the scholarship, students will be assigned to home service positions as executive secretaries, supervisors, and case workers in local chapters, and to area home service positions as field representatives.

Candidates for scholarships must be between the ages of 22 and 40 years. They must be graduates of an accredited college and acceptable for admission to schools of social work accredited by the American Association of Schools of Social Work.

Scholarships provide full tuition and an allowance of \$65 a month toward maintenance for a period of one academic year.

The scholarship plan is under the immediate supervision of the home service directors in each of the four Red Cross area offices: Eastern Area, 615 North St. Asaph Street, Alexandria, Virginia; North Atlantic Area, 300 Fourth Avenue, New York City; Midwestern Area, 1709 Washington Avenue, St. Louis, Missouri; Pacific Area, Civic Auditorium, Larkin and Grove Streets, San Francisco, California.

Dr. H. W. Sybilrud, for twenty years physician and surgeon at Bricelyn, Minnesota, has been stationed with the U. S. Marine Corps in the South Pacific area for some time. He volunteered on February 4, 1941, and for a year and a half beginning October was at San Diego, California. July, 1942, he was promoted from lieutenant commander to commander. Mrs. Sybilrud is at Blue Earth, Minnesota.



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New Series

Transactions of the Montana State Medical Association

Sixty-fifth Annual Session

Billings, Montana

July 7 and 8, 1943

OFFICERS, 1943-44

J. P. RITCHEY, M.D., Missoula	President
E. D. HITCHCOCK, M.D., Great Falls	Past President
J. C. SHIELDS, M.D., Butte	President-Elect
M. G. DANSKIN, M.D., Glendive	Vice President
T. F. WALKER, M.D., Great Falls	Secretary-Treasurer
J. H. IRWIN, M.D., Great Falls	Delegate to A. M. A.
E. M. GANS, M.D., Harlowtown	Alternate Delegate

COUNCILLORS

R. D. KNAPP, M.D.	District No. 1 (1946)
CHARLES HOUTZ, M.D.	District No. 2 (1946)
J. H. GARBERSON, M.D.	District No. 3 (1945)
L. W. ALLARD, M.D.	District No. 4 (1945)
A. D. BREWER, M.D.	District No. 5 (1944)
E. A. WELDEN, M.D.	District No. 6 (1945)
F. B. ROSS, M.D.	District No. 7 (1946)
J. H. IRWIN, M.D.	District No. 8 (1945)
H. W. GREGG, M.D.	District No. 9 (1944)
A. C. KNIGHT, M.D.	District No. 10 (1946)
S. A. COONEY, M.D.	District No. 11 (1944)
A. R. FOSS, M.D.	District No. 12 (1944)

COMMITTEES

LEGISLATIVE COMMITTEE

HOSPITAL COMMITTEE

(3 years)

R. L. TOWNE, M.D. (1945)	Kalispell
R. W. MORRIS, M.D. (1946)	Helena
F. K. WANIATA, M.D. (1944)	Great Falls

PUBLIC INSTRUCTION AND HEALTH COMMITTEE

AND PUBLIC RELATIONS COMMITTEE

(1 year)

M. A. SHILLINGTON, M.D. (1944)	Glendive
L. W. BREWER, M.D. (1944)	Missoula
R. G. LEMON, M.D. (1944)	Glendive

CANCER COMMITTEE

(1 year)

J. H. GARBERSON, M.D. (1944)	Miles City
R. F. PETERSON, M.D. (1944)	Butte

J. H. BRIDENBAUGH, M.D. (1944)	Billings
J. M. NELSON, M.D. (1944)	Missoula
L. G. DUNLAP, M.D. (1944)	Anaconda

HISTORY OF MEDICINE COMMITTEE

(1 year)

E. D. HITCHCOCK, M.D. (1944)	Great Falls
T. F. WALKER, M.D. (1944)	Great Falls
J. H. IRWIN, M.D. (1944)	Great Falls

ORTHOPEDIC COMMITTEE AND ADVISORY COMMITTEE TO

STATE BOARD OF HEALTH

(1 year)

L. W. ALLARD, M.D. (1944)	Billings
A. D. BREWER, M.D. (1944)	Bozeman
J. K. COLMAN, M.D. (1944)	Butte
F. R. SCHEMM, M.D. (1944)	Great Falls
W. E. LONG, M.D. (1944)	Anaconda

DENTISTS, PHARMACISTS AND NURSES COMMITTEE

(1 year)

B. K. KILBOURNE, M.D. (1944)	Helena
B. R. TARBOX, M.D. (1944)	Forsyth
F. K. WANIATA, M.D. (1944)	Great Falls

PROGRAM COMMITTEE

(3 years)

T. F. WALKER, M.D. (1945)	Great Falls
M. A. SHILLINGTON, M.D. (1945)	Glendive
H. W. GREGG, M.D. (1944)	Butte

MEDICAL INSURANCE AND LEGAL AFFAIRS COMMITTEE

(2 each year, 4-year term)

P. E. KANE, M.D. (1946)	Butte
J. C. MacGREGOR, M.D. (1947)	Great Falls
GEORGE JESTRAB, M.D. (1946)	Havre
F. B. ROSS, M.D. (1946)	Kalispell
J. H. BRIDENBAUGH, M.D. (1947)	Billings
E. R. GRIGG, M.D. (1947)	Bozeman
A. T. HAAS, M.D. (1947)	Missoula

MEDICAL PUBLICATIONS COMMITTEE
(1 year)

A. R. FOSS, M.D. (1944)	Missoula
A. J. KARSTED, M.D. (1944)	Butte
S. A. COONEY, M.D. (1944)	Helena

MEDICAL ECONOMICS COMMITTEE
(3 years)

J. C. SHIELDS, M.D. (1944)	Butte
J. H. GARBERSON, M.D. (1944)	Miles City
F. F. ATTIX, M.D. (1946)	Lewistown
M. A. SHILLINGTON, M.D. (1946)	Glendive
R. B. DURBIN, M.D. (1946)	Great Falls

POSTGRADUATE COMMITTEE
(1 year)

A. R. FOSS, M.D. (1944)	Missoula
S. V. WILKING, M.D. (1944)	Butte
A. R. KINTNER, M.D. (1944)	Missoula

FRACTURES COMMITTEE
(1 year)

H. H. JAMES, M.D. (1944)	Butte
T. B. MOORE, JR., M.D. (1944)	Kalispell
I. A. ALLRED, M.D. (1944)	Great Falls
H. J. HALL, M.D. (1944)	Missoula
D. J. COOPER, M.D. (1944)	Big Sandy

TUBERCULOSIS COMMITTEE
(1 year)

F. I. TERRILL, M.D. (1944)	Galen
P. L. ENEBOE, M.D. (1944)	Bozeman
E. M. LARSON, M.D. (1944)	Great Falls
J. L. MONDLOCH, M.D. (1944)	Butte
W. GORDON, M.D. (1944)	Billings

ADVISORY BOARD, WOMEN'S AUXILIARY
(3 years)

J. P. RITCHEY, M.D.	Missoula
E. D. HITCHCOCK, M.D.	Great Falls
J. C. SHIELDS, M.D.	Butte
C. H. NELSON, M.D.	Billings
D. T. BERG, M.D.	Helena

EXECUTIVE COMMITTEE

J. P. RITCHEY, M.D.	Missoula
E. D. HITCHCOCK, M.D.	Great Falls
W. E. LONG, M.D.	Anaconda
T. F. WALKER, M.D.	Great Falls
J. C. SHIELDS, M.D.	Butte

INDUSTRIAL HYGIENE COMMITTEE
(3 years)

A. T. HAAS, M.D. (1946)	Missoula
HAROLD SCHWARTZ, M.D. (1946)	Butte
J. B. FRISBEE, M.D. (1946)	Butte
L. M. FARNER, M.D. (1946)	Helena

MEDICAL MILITARY PREPAREDNESS AND DEFENSE ACTIVITY
COMMITTEE (1 year)

F. L. ANDREWS, M.D. (1944)	Great Falls
R. V. MORLEDGE, M.D. (1944)	Billings
W. A. LACEY, M.D. (1944)	Havre
F. L. UNMACK, M.D. (1944)	Deer Lodge
J. G. LAPIERRE, M.D. (1944)	Butte

ROCKY MOUNTAIN CONFERENCE COMMITTEE
(1 appointed each year, 5-year term)

T. F. WALKER, M.D. (1945)	Great Falls
T. L. HAWKINS, M.D. (1944)	Helena
H. W. GREGG, M.D. (1948)	Butte
C. H. NELSON, M.D. (1946)	Billings
J. R. SOLTERO, M.D. (1947)	Lewistown

NOMINATING COMMITTEE

F. F. ATTIX, M.D. (1944)	Lewistown
L. G. DUNLAP, M.D. (1944)	Anaconda
H. T. CARAWAY, M.D. (1944)	Billings

MATERNAL AND CHILD WELFARE COMMITTEE
(3 years)

F. L. McPHAIL, M.D. (1944)	Great Falls
D. L. GILLESPIE, M.D. (1944)	Butte
G. A. CARMICHAEL, M.D. (1946)	Butte
T. L. HAWKINS, M.D. (1944)	Helena
L. W. BREWER, M.D. (1946)	Missoula
P. L. ENEBOE, M.D. (1946)	Bozeman

E. A. HAGMANN, M.D. (1944)	Billings
R. L. TOWNE, M.D. (1944)	Kalispell
W. A. MEADOWS, M.D. (1946)	Sunburst
A. L. GLEASON, M.D. (1946)	Great Falls
B. C. FARRAND, M.D. (1946)	Jordan
E. A. WELDEN, M.D. (1946)	Lewistown
J. DIMON, M.D. (1946)	Polson
MAUDE GERDES, M.D. (1945)	Billings

STATE INSTITUTIONS COMMITTEE

HAROLD GREGG, M.D. (1944)	Butte
W. E. LONG, M.D. (1944)	Anaconda
J. I. WERNHAM, M.D. (1944)	Billings

ANNUAL MEETING OF THE COUNCIL OF THE
MONTANA STATE MEDICAL ASSOCIATION

July 7, 1943

The meeting of the Council of the Montana State Medical Association was called to order by President E. D. Hitchcock at the Northern Hotel in Billings, Wednesday, July 7, at 8:30 P. M. The following councillors were present: Doctors J. H. Garberson, E. A. Welden, H. W. Gregg, A. R. Foss, A. D. Brewer, L. W. Allard, J. H. Irwin, L. G. Dunlap, and S. A. Cooney.

The Council chose Dr. E. D. Hitchcock as Chairman. Minutes of the last meeting were read and approved. 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. Hitchcock appointed Dr. Allan Foss and Dr. Harold Gregg as an auditing committee to audit the books of the Association.

It was moved by Dr. Dunlap, seconded by Dr. Gregg, and unanimously carried, that Mr. Toomey be retained as attorney for the Association for the ensuing year at a fee of \$300.

Dr. E. D. Hitchcock requested that the Council recommend to the House of Delegates that \$200 be made available for stenographic work in connection with the work of the Historical Committee, *The Pioneer Physician*. It was moved by Dr. Irwin, seconded by Dr. Gregg, and unanimously carried, that the Council recommend to the House of Delegates that \$200 be made available for the above mentioned purpose.

It was moved by Dr. Dunlap, seconded by Dr. Gregg, that the Council recommend to each society that the secretary of the society be asked to keep the history of the society from 1900 on.

The Councillors present reported upon conditions in their respective districts, each of them calling attention to the fact that in their district, peace and harmony prevailed; that regular meetings were held; and scientific programs were a regular feature of their meetings.

Dr. Gregg of District No. 9 reported that he had received a complaint from Dr. Farnsworth of Virginia City, that certain physicians were consulting with osteopaths. Dr. Gregg read a letter from Dr. Farnsworth which he submitted to the Council. After a general discussion, the Council decided to follow Dr. Allard's suggestion that those doctors mentioned in Dr. Farnsworth's letter be talked to by the Councillor from their district, who should call their attention to the fact that such consultations were considered unethical.

Dr. Dunlap called attention to the marked shortage of physicians in the State Hospital at Warm Springs, and the lack of funds to efficiently carry on the work of this institution. He likewise called attention to the shortage of physicians in the State Tuberculosis Sanatorium at Galen, as well as the extra burden carried by the doctors in Anaconda, brought about by the increase in employees of the Anaconda Copper Mining plant there.

Dr. Garberson read a letter from Dr. Smith of Glasgow in which Dr. Smith brought up the constitutionality of the Thompson law and expressed his opposition to the provision of this law. It was regularly moved, seconded, and unanimously carried that the Secretary be instructed to get the opinion of our counsel, Mr. Toomey, as to the constitutionality of this law.

Dr. Allan Foss read a letter from Dr. Klein, Secretary of the State Board of Medical Examiners, in which Dr. Klein called attention to the fact that Attorney Paul Keller of Helena had

rendered valuable service during the session of the Legislature in securing the passage of the new Medical Practice Act, and brought out that the Board of Examiners had no legal right to pay Mr. Keller for his services. It was moved by Dr. Dunlap, seconded by Dr. Cooney, that the Association pay Mr. Paul Keller \$200 for legal services rendered in securing the passage of the new Medical Practice Act. Motion was unanimously carried.

Likewise, Dr. Klein requested the Council to inform him as to their wishes regarding the amount of the annual re-registration fee. It was moved by Dr. Irwin, seconded by Dr. Gregg, and unanimously carried that the Council recommend to the House of Delegates that it recommend to the Board of Examiners that the annual re-registration fee be \$5.00.

There being no further business, the meeting adjourned.

Secretary's Report to the Council

The past year has been rather a quiet one in so far as activities coming under the jurisdiction of the Council are concerned.

There have been no new county societies established in the state, nor have any of our county societies gone out of existence.

The membership in the Association was four hundred sixty-four (464) as of June 1st. This includes those members who are in the armed services and are, therefore, exempt from paying dues. As you are aware, the dues at the last meeting were increased from \$8.00 to \$10.00 per year. In so far as we can determine, this has not resulted in the loss of any members, although total receipts for the past year are about \$475.00 less than during a similar period of the preceding year.

Expenditures to date have been \$99.00 less than during the same period last year.

I am herewith submitting an audit report of the Medical Association for the period June 15, 1941, to June 22, 1943, inclusive. This report was prepared by Mr. William B. Finlay, Certified Public Accountant, of Great Falls, Montana, and I respectfully request that the same be made a part of this report and incorporated in the minutes.

The matter of a state journal need not be discussed at this meeting since, agreeable to the instructions of the Council and the House of Delegates at the last meeting, a contract was entered into with the JOURNAL-LANCET for five years.

Mr. E. G. Toomey, our counsel, was of great service to the Association during the last session of the Legislature. Many requests for his opinions were made by the officers of the Association, and his advice and assistance in Legislative matters were found to be most valuable. It is urgently recommended that his services be retained for another year.

THOMAS F. WALKER, M.D., *Secretary.*

FINANCIAL REPORT

June 15, 1941, to June 22, 1943, inclusive

RECEIPTS

June 15, 1941, Balance of cash on deposit in Great Falls National Bank			\$1,228.11
	6-15-41	6-15-42	
	to	to	
	6-14-42	6-22-43	
Blaine County Medical Society	\$	\$	8.00
Cascade County Med. Soc.	376.00		438.00
Chouteau County Med. Soc.	32.20		40.00
Fergus County Med. Soc.	88.00		
Flathead County Med. Soc.	160.00		246.00
Gallatin County Med. Soc.	144.00		180.00
Hill County Med. Soc.	80.00		70.00
Lake County Med. Soc.	56.00		10.00
Lewis & Clark County Med. Soc.	308.00		206.00
Madison County Med. Soc.	72.00		50.00
Mount Powell Med. Soc.	168.00		168.00
Musselshell County Med. Soc.	40.00		50.00
Northcentral Montana Med. Soc.	142.00		106.05
Northeastern Montana Med. Soc.	224.00		70.00
Park-Sweetgrass Med. Soc.	80.00		90.00
Silver Bow County Med. Soc.	400.00		426.00
Southeastern Montana Med. Soc.	264.00		290.00
Western Montana Med. Soc.	424.00		274.00

Yellowstone Valley Med. Soc.	416.00	446.00	
Interest on Government bonds	150.00		
Loan, Great Falls National Bank	1,000.00		
Sundry—Schedule No. 1	487.66	465.47	
Total Receipts	\$5,111.86	\$3,633.52	8,745.38
Total to be accounted for			\$9,973.49

DISBURSEMENTS

	6-15-41	6-15-42	
	to	to	
	6-14-42	6-22-43	
Interest Paid, Great Falls National Bank	\$ 21.00	\$ 41.67	
Secretary's salary	600.00	550.00	
Telephone and telegraph	89.81	277.15	
Supplies and expense	85.75	188.35	
Traveling expense	83.14	85.00	
Bank charges	6.67	4.32	
Postage	41.95	27.96	
Flowers	26.20	41.00	
Medical Economics Committee	27.51	14.77	
Delegate to A.M.A.	160.95	219.00	
Officer's meeting	166.50	72.20	
1941 Annual Convention	986.85		
Procurement and Assignment Committee	120.04	74.65	
Cancer Control Committee	29.15		
Loan, Hospital Service Assn.	1,000.00		
Attorney's retainer, Toomey, McFarland and Chapman	300.00	300.00	
Subscriptions, JOURNAL-LANCET	490.00		
Auditing expense	115.00		
Secretary's bond	20.00	20.00	
Safety deposit box	3.33	3.60	
Dr. T. F. Walker (see Schedule No. 1)	121.82		
Refund of dues	10.00		
1942 Annual Convention	11.00	1,231.68	
Equipment, viewing box		81.64	
1943 Legislature expense		175.27	
Executive Committee		8.44	
Total Disbursements	\$4,516.67	\$3,416.70	\$7,933.37
Balance of cash on deposit in Great Falls National Bank, June 22, 1943			2,040.12
Total accounted for			\$9,973.49

Schedule No. 1

	6-15-41	6-15-42	
	to	to	
	6-14-42	6-22-43	
Refund, Thos. F. Walker, M.D.		\$121.82	
Traveling expense refund (Western Airlines)		2.31	
General Electric X-ray Corporation		25.00	
Borden's Milk Co.		50.00	
Sego Milk Co.		50.00	
Mead Johnson & Co.		50.00	
Lederle Laboratories		50.00	
Refund, Procurement & Assignment Com.		13.53	
Sandos Chemical Works, Inc.		25.00	
Riggs Optical Co.		50.00	
American Optical Co.		50.00	
Physicians & Hospitals Supply Co., Inc.			\$50.00
E. R. Squibb & Sons			50.00
Eli Lilly & Co.			50.00
Schadell Sanitorium			50.00
Upjohn Co.			25.00
Cutter Laboratories			50.00
Phillip Morris Co.			50.00
Morning Milk			50.00
Refund, traveling expenses (Dr. T. F. Walker)			38.47

John Wyeth & Bro.	50.00
Error in posting by Great Falls Natl. Bank	2.00
Total	\$487.66 \$465.47

RECONCILIATION OF ACCOUNT WITH THE
GREAT FALLS NATIONAL BANK
June 22, 1943

Balance as per bank statement, June 22, 1943	\$2,112.32
Less: Outstanding Checks, viz.:	
June 16, 1943—	
To Dr. E. D. Hitchcock, Ck. No. 269, \$34.97	
June 21, 1943—	
To Dr. J. P. Ritchey, Ck. No. 270, 37.23	72.20
Balance as per Cash Book, June 22, 1943	\$2,040.12

INVESTMENT ACCOUNT

Negotiable Promissory Notes—Hospital Service Association of Montana, dated July 24, 1941, due on demand with interest at 6%	\$1,000.00
U. S. Treasury Bond, No. 16127H (Held as security by Great Falls National Bank on loan of \$1,000.00.)	\$5,000.00
Equipment: Viewing Box (purchased July 13, 1942)	\$ 81.64

SECRETARY-TREASURER'S FIDELITY BOND

Thomas F. Walker, M.D.	\$4,000.00
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THOMAS F. WALKER, M.D., *Secy.-Treas.*

PROCEEDINGS

of the
HOUSE OF DELEGATES
SIXTY-FIFTH ANNUAL MEETING
of the

MONTANA STATE MEDICAL ASSOCIATION

First Session, Wednesday, July 7, 1943

The session of the House of Delegates was held in the Northern Hotel in Billings, Montana, July 7 and 8, 1943. The session was called to order at 9:00 A. M. Wednesday, July 7, by the President, Dr. E. D. Hitchcock. A roll call of delegates showed present the following delegates:

Chouteau County—None.
Cascade County—Drs. J. H. Irwin, F. L. Andrews, F. D. Hurd, R. J. McGregor.
Gallatin County—Drs. R. E. Sigler, A. D. Brewer.
Hill County—None.
Fergus County—Drs. F. F. Attix, J. R. Soltero.
Flathead County—None.
Lake County—None.
Mt. Powell—Drs. F. I. Terrill, L. G. Dunlap.
Northcentral—Dr. H. F. Schraeder.
Northeastern—Dr. H. B. Cloud.
Park-Sweetgrass—None.
Silver Bow County—Drs. H. W. Gregg, R. F. Peterson, R. C. Monahan, J. C. Shields.
Southeastern—Drs. M. G. Danskin, B. C. Farrand.
Madison—Dr. R. B. Farnsworth.
Lewis and Clark County—Drs. D. T. Berg, R. W. Morris.
Western Montana—Drs. W. J. Marshall, C. A. Farabough, A. M. Blegen, A. D. Brewer.
Yellowstone—Drs. L. W. Allard, R. V. Morledge, J. H. Bridenbaugh, J. I. Wernham, C. H. Nelson, H. T. Caraway, Wayne Gordon.

A majority of the delegates being present, the House of Delegates proceeded with the business of the Association. It was moved, seconded, and unanimously carried that the reading of the 1942 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. It is incorporated with and constitutes a part of these minutes.

REPORT OF SECRETARY

Aside from routine matters, the problems brought about by a session of the legislature have required the most attention of your officers and committees.

As you doubtless know, there were introduced in the Senate three measures by the chiropractors. It was the opinion of the Executive and Legislative committees that the passage of such measures would result in grievous harm to the citizens of our state. Therefore, strenuous efforts to secure the defeat of these measures were made by the above mentioned committees.

Owing to the fact that the chairman of the Legislative Committee was away, the above mentioned measures had been approved by the Judiciary Committee of the Senate, before your officers and members of the Legislative Committee got busy. However, we were able to have these measures recalled by the Judiciary Committee. At a hearing before this committee your officers and members of the Legislative Committee gave evidence which resulted in the committee turning in an adverse report on two of these measures. After much delay the report of the committee was adopted and the measures definitely killed. One bill introduced by the chiropractors was passed. This, however, had to do only with penalties invoked for violation of the Chiropractic Act. Since it was no concern of ours, we did not oppose this bill which was passed.

At a meeting of the Executive and Legislative committees held at the Montana Club early in the session, the committees went on record as unanimously endorsing the new Medical Practice Act which had been introduced by the State Board of Medical Examiners. Members of the Executive and Legislative committees appeared before the committee of the House to whom the new Medical Practice Act had been referred. These members were successful in combating an amendment asked for by the chiropractors, which would have taken all the teeth out of the bill insofar as the chiropractors were concerned. After considerable delay the new Medical Practice Act was passed by both houses without any amendments whatsoever.

In order to kill the chiropractic bills and secure the passage of the new Medical Practice Act it became necessary, in the opinion of the officers and members of the Legislative Committee on the job, to withdraw opposition to the Board of Health Bill. This bill had behind it one of the strongest lobbies of the session. We had opposed this bill before the committee in the Senate to which it had been referred and had their promise to turn in an adverse report, although the bill had passed the House without a dissenting vote. However, when it became quite evident that the final killing of the chiropractic bills and the passage of the Medical Practice Act to the House were tied up because of our opposition to the Board of Health bill, we decided to withdraw such opposition after having consulted with Mr. Toomey.

We did, however, secure an amendment to this bill. As originally introduced, it provided that the Board of Health should consist of three doctors, President of the Food Control Board, and the President of the State Board of Pharmacy. We withdrew our opposition to the bill only after the sponsors had consented to amend it so that five doctors would be on the Board, together with the other two above mentioned members. We were somewhat handicapped in our opposition to the bill by the fact that the State Board of Health had expressed no official opinion regarding this bill.

Your Secretary greatly regrets that the pressure of other matters made it impossible for him to accompany the other officers on their annual trip which was this year considerably shortened due to the need to conserve rubber and gasoline.

THOMAS F. WALKER, M.D., *Secretary.*

It was regularly moved, seconded, and unanimously carried that the report be adopted as read.

The Secretary, Dr. Thomas F. Walker, then read the following report of the Council to the House of Delegates:

The Council of the Montana State Medical Association in regular session at Billings, Montana, July 6, 1943, recommends to the House of Delegates:

1st. That the House of Delegates make available to the Medical History Committee the sum of \$200 for stenographic work in connection with the work on *The Pioneer Physician*.

2nd. That the House of Delegates make available \$200 to pay Attorney Paul Keller for his efforts during the session of the Legislature in securing the passage of the new Medical Practice Act introduced by the State Board of Medical Examiners.

3rd. That Mr. E. G. Toomey be retained as counsel for the Montana State Medical Association for the calendar year 1944 at a fee of \$300.

4th. That the House of Delegates recommend to the State Board of Medical Examiners that the annual re-registration fee be \$5.00.

Respectfully submitted,
E. D. HITCHCOCK, M.D., *President of Council.*

The House of Delegates proceeded to ballot upon the various recommendations made by the Council. It was regularly moved, seconded, and unanimously carried:

1st, That Mr. Paul Keller be paid \$200;

2nd, That \$200 be made available to the Historical Committee;

3rd, That Mr. E. G. Toomey be retained as Counsel for the Montana State Medical Association for the calendar year of 1944 at a fee of \$300;

4th, That it be recommended to the State Board of Medical Examiners that the annual re-registration fee be \$5.00.

Dr. E. D. Hitchcock appointed the following committees: Neurology, Drs. M. A. Shillington, L. W. Brewer; Resolutions, Drs. J. C. Shields, J. H. Bridenbaugh.

Dr. Allen Foss reported for the Auditing Committee that the Secretary's books were found to be in order as shown by the audit of Mr. William B. Finlay, Certified Public Accountant, of Great Falls, Montana. It was regularly moved, duly seconded, and unanimously carried that the report of the Auditing Committee be accepted.

REPORTS OF STANDING COMMITTEES

The following committees made their reports which are incorporated in and become a part of these minutes:

Child Welfare and Maternal Health

DR. G. A. CARMICHAEL, Chairman

The 1941 report of the U. S. Bureau of Census credits Montana with the lowest maternal mortality rate ever recorded for any state in the Union—16 maternal deaths per 10,000 live births. The U. S. rate for the same year is 32 deaths per 10,000 live births. The maternal death rate has steadily declined for the past 10 years. In 1932 the rate was 66; in 1936—55; in 1940—31; and in 1941—16.

The provisional rate for 1942 is 23. In this year there were 27 maternal deaths and 6 deaths associated with pregnancy. Infection, toxemia and hemorrhage together caused 78 per cent of all maternal deaths. The separate percentages are given below:

Infection	10 deaths, or 37.0%
Hemorrhage	6 deaths, or 22.2%
Toxemia	5 deaths, or 18.5%

The remaining puerperal deaths (6, or 22%) were assigned to a variety of causes.

If Montana rates are to be further reduced, greater attention must be given to these three large factors: infection, hemorrhage, and toxemia. Infection in obstetrics can be decreased by a return to more conservative methods of delivery; by less frequent vaginal manipulation; by more early consultations (before the optimum time for radical delivery has passed), and by more frequent early blood transfusion. Regarding hemorrhage it may be said that, among these 27 maternal deaths reported for 1942, there were 12 patients whose death questionnaire showed some type of hemorrhage during the natal or postnatal period. For only 2 of these 12 patients was blood transfusion reported as part of the therapy and blood plasma was given in one other case. None of the six patients whose deaths were considered due to hemorrhage, received a blood transfusion according to reports given.

Three patients in 1942 died following abortion. Deaths from abortion, induced, spontaneous, or therapeutic, can be reduced to a minimum by conservative methods of treatment. No pa-

tient who has missed a menstrual period and is bleeding vaginally should be examined vaginally without taking strict sterile precautions. All patients with abortions who show fever should for purposes of management be considered infected, as they were probably induced by self or by another person, regardless of a negative history. There should be no intra-uterine manipulations such as dilatation and curettage, uterine irrigations, or uterine packings in any febrile patient who is even suspected of having an abortion, unless uterine bleeding is so severe that such intervention is absolutely necessary. Even then, the uterus should not be violently or roughly curetted, but loose tissue should be gently removed with ring forceps and, if bleeding continues, packing may be necessary. Blood which is lost during the abortion must be replaced if the patient's resistance is to be maintained. Plasma should be always available for the early treatment of severe bleeders.

Deaths from toxemia will decrease when our prenatal care improves and when patients are given better attention during labor, delivery, and postpartum.

Three of the 27 maternal deaths followed ectopic pregnancy. Here again, blood transfusion or plasma must be used in preparing patients for operation and during operation itself, if mortality rates are to be reduced. More attention must be given to diagnosis. Every woman in the child-bearing age with a history of irregular vaginal bleeding must be suspected of the possibility of an ectopic gestation. Two of the three patients with ectopic pregnancy in 1942 died before operation.

Nine, or 33.3 per cent, of the 27 maternal deaths were preceded by some type of operative procedure. The nine operations are listed below:

Cesarean section	2
Mid forceps	2
High forceps	1
Low forceps	1
Laparotomy for tubal pregnancy	1
Manual dilatation of the cervix	1
Dilatation and curettage	1

Selection of necessary obstetrical operations requires expert consideration of all the aspects of each particular case, by persons who are qualified by experience and training. Expert skill and judgment is essential to the successful execution of the operation chosen. Anything less will result in unnecessary manipulations and a higher maternal and fetal death rate. It is highly recommended, therefore, that consultation be obtained before all obstetrical operative procedures excepting simple outlet forceps.

Of the six deaths associated with pregnancy, three followed pneumonia, two followed nephritis and one followed an auto accident in which the patient suffered complete severance of the spinal cord. None of these deaths were included in the estimation of the maternal death rate for 1942.

The physicians of Montana can take pride in the record of recent years. Our goal should be to maintain this record and not let it be a happy accident for one or two years. The Committee expresses appreciation of your cooperation given in making this study, through the return of questionnaires on maternal deaths. Interest is evidenced by more complete notations which give data necessary to interpret true cause of death. The questionnaire in itself is of limited value without additional notes, and we urge that every physician receiving a questionnaire endeavor to give all pertinent factors influencing the case.

Attention is also called to the importance of assigning the proper cause for death on the death certificates, filing a birth certificate for every live or still-born infant, and completing the data requested on the birth certificate in full. These records form the only basis for accurate study of our problems.

INFANT MORTALITY

In 1941 the U. S. Bureau of Census reported the infant mortality rate for Montana as 37 infant deaths per 1000 live births as compared with a rate of 47 in 1940, and 30 for the U. S. in 1941. There were still 16 states with rates lower than the Montana rate in 1941. The provisional 1942 rate shows further reduction with a rate of 34 per 1000 live births, but figures for the first five months in 1943 show an upward trend.

The basic problem remains the same. Sixty per cent of these infant deaths occur during the neonatal period and approxi-

mately half of these are premature or immature infants. It is recognized that infants weighing 1000 grams or less have practically no chance of survival regardless of care, but approximately one-third of the infants weighing 1000 to 2000 grams may be saved if given the full benefits of modern nursing and medical care, and 90 per cent of the infants weighing 2000 grams or more may be saved.

There are now facilities for premature care in practically every center in the state. The incubators which were built by the Montana State Board of Health have proved to be most efficient. Demands for more of these incubators have been made in a number of areas, but war conditions have precluded the probability of building these at present. But incubators alone cannot save these infants. The Nursing Consultant in the Maternal & Child Health Division of the Montana State Board of Health, who is trained in care of premature infants, has demonstrated the use of the incubator and nursing technics to nursing staffs in hospitals and discussed procedures with physicians in these areas. Observations during the past year emphasize the need for better nursing technics not only for care of premature infants but for normal newborn as well. Physicians must give closer supervision if these infants are to be given better chances for life and well being. Standards for care must be developed and carried out. With limited nursing personnel and limited qualifications of many now serving in the hospitals, eternal vigilance is imperative if we are to avoid such hazards as epidemic diarrhea in our nurseries, which has occurred elsewhere.

Too few infants are placed on artificial feeding before discharge from the hospital without any attempt to establish lactation or teach the mother technic of breast feeding.

Too few hospitals and physicians have availed themselves of the services offered through the State Board of Health in this program, when there are premature infants in the nursery to serve as teaching material for demonstration of technics by trained nursing consultant.

The infant mortality rate in Montana can and should be lowered, but there will be no appreciable change until we take concerted action regarding care of the infant during the neonatal period—especially in the first day and first week of life.

The stillborn rate remains practically the same and this program, of course, is primarily related to prenatal and natal care. Attention is called to the fact that as of July 1, all infants born dead after 20 weeks of gestation, must be registered as still births instead of after 24 weeks, as heretofore.

PREMATURE PROGRAM

The general aspect of this program has already been mentioned from the state-wide point of view. Detailed outlines of technics have been prepared for use in hospitals. In addition, a more intensive program was initiated in Great Falls, in cooperation with the Deaconess and Columbus hospitals and in conjunction with the Cascade City-County Health Unit. A qualified supervisor was appointed from the state staff to set up and carry on a premature care demonstration. It was the plan to have premature nurseries in each hospital, training not only nursing personnel of these hospitals but also graduate nurses from other hospitals and private duty nurses. It has not been possible to date to carry out the plans as originally outlined, primarily because of limited nursing personnel. However, this supervisor, in addition to assuming responsibility for the premature care in each hospital as requested, has worked with supervisors of obstetric services and the newborn nursery to study and improve technics of nursing care. It is hoped that, with modifications, it will be possible to carry out the original plan for a premature center as a demonstration of how this problem may be met and to provide facilities for training of other nursing personnel.

MATERNITY HOSPITAL LICENSING

Rules and regulations for maternity hospitals and homes have been formulated by the Division of Maternal and Child Health of the Montana State Board of Health in cooperation with your committee. These have been distributed to all the institutions taking obstetrical cases in the state, as well as to all the physicians.

It is the intention of the proper authorities to conduct four types of inspection of all institutions applying for license—

namely, medical inspection, nursing inspection, sanitary inspection, and fire inspection. Thus far, about 60 medical, 120 nursing, and 50 sanitary inspections have been completed. Licenses will not be granted until all four inspections are accomplished and the institution has been found to come up to at least the minimum standards of its particular class.

A survey of the inspections already made indicates that the same difficulties are being encountered in a large number of different institutions. The following factors are important from the medical standpoint:

(a) Hospital superintendents state that they have great difficulty in getting physicians to complete their obstetrical records.

(b) Hospital authorities again complain of the physicians' failure to cooperate in observing the rules of the obstetrical and newborn departments. Physicians still enter nurseries, delivery rooms and operating rooms without caps, masks, and gowns.

(c) Consultation on all operative obstetrical cases is not yet routine among the various hospitals.

(d) Too often, no examination of the newborn is made by the physician and care of these infants is relegated to the nursing staff without adequate medical supervision.

(e) Breast nursing is not being stressed and urged sufficiently during the hospital stay. This requires unnecessary artificial feeding and creates additional nursing problems.

The physicians of Montana are respectfully and earnestly asked to cooperate in correcting the above factors. The work of nurses in the hospitals can be greatly lessened if the physicians will meet and establish common technics and procedures for obstetric and new-born care. The rule of consultation before operation must be the result of a concerted action on the part of the hospital medical staff. The various staffs are hereby asked to meet and see that such regulations concerning consultation are passed and become hospital routine.

It is further recommended that the medical staff be thoroughly familiar with the rules and regulations governing maternity hospitals and the standards recommended, so that responsibility for meeting these standards will be shared with hospital administrators and nursing personnel. The medical staff should be fully cognizant of the technics being used and conditions under which care is given to patients hospitalized by them and should assume full responsibility for bringing standards of care to optimal level. This becomes increasingly more important under present conditions, when nursing personnel is being depleted and is often inadequate. The procedures must be studied and modified to meet existing conditions if patients are to be protected.

POSTGRADUATE EDUCATION

Postgraduate courses in obstetrics and pediatrics were not planned this year because of national conditions. However, a number of men have signified their desire for continuation of this program and indicate that they feel this type of instruction is more than ever necessary.

Many physicians are now doing obstetrics and pediatrics who have not engaged in this practice to any extent for a number of years. The so-called "refresher" courses, therefore, have increasing value at this time. Under present conditions many physicians cannot avail themselves of postgraduate opportunities in more distant centers and with heavy case loads have limited time for reading. The postgraduate sessions offer an opportunity for reviewing normal obstetrics and pediatrics and recent developments in modern methods and technics.

Local medical societies should meet regularly and offer a planned program for medical discussions including problems of obstetrics and pediatrics. The Assistant Director of the M.-C.-H. Division is a qualified obstetrician, and his services are available for local meetings. Discussion of the maternal mortality study were presented by him to the Cascade County Society and the Southeastern Medical Society during the past year. When in the area, he is also in a position to discuss individual case problems with physicians who may desire his consultation on such cases.

EMERGENCY MATERNITY AND INFANT CARE PROGRAM

This program was initiated in Montana the latter part of April, at which time all physicians and hospitals of the state were advised of the plan and procedures to be followed in order

to make application for medical and hospital care of wives of enlisted men of the fourth to seventh payroll grades. Federal funds for this program were requested by the State Board of Health only after physicians and hospitals were canvassed to determine whether a sufficient number wished to participate in this program. In making this special appropriation, the government has recognized that the allowance for these wives is not adequate to pay for medical and hospital care, and the wives of men who are serving in the armed forces should not be obliged to turn to charity for care, or be considered indigents. Physicians, as a whole, have also recognized their obligations to the men who are in service, as these men must be assured that in their absence their wives and families will receive adequate care.

The details of this program are known to you, but the committee wishes to call attention to some of the problems encountered in setting up the administrative details and in the administration of the program. This program is on a nation-wide basis under the administration of the U. S. Children's Bureau. Your committee met with the staff of the Montana State Board of Health, which is responsible for the administration of the program in Montana, to advise regarding the modifications necessary to meet conditions in this state, which would also be acceptable to the U. S. Children's Bureau. Your committee can report that every effort was made to formulate a plan that would be acceptable to the medical profession in the state, and every effort was made to administer this program with the minimum of "red tape" and clerical work. All of the funds must be used for medical and hospital care and cannot be used to cover administrative costs. Your cooperation is sought with regard to the following difficulties:

(1) While applications were accepted on a retroactive basis in the initiation of the program, so that the patients would not be deprived of the benefits, it is absolutely necessary for physicians to file applications without delay. Funds are allotted on the basis of applications on file at the beginning of each month. Authorization must be forwarded to hospitals so they may know the basis on which a patient is admitted, as the plan does not permit use of private room facilities. All payments must be made to the hospital or to the physician, no payment can be made to the patient. If the hospital has not received authorization, payments may be accepted in advance and difficulties encountered. Privilege of phone or wire to the State Board of Health in an emergency is allowed, with cost of payment of same, so there is no excuse for retroactive applications.

(2) While initial authorization for hospital care is given for 14 days to eliminate additional applications, in some cases it is believed that 10 days of hospital care should be adequate for a normal obstetric case; and your cooperation is sought to keep costs at a minimum by arranging for discharge at the end of the 10 day period.

(3) There has been a considerable amount of unnecessary correspondence due to the failure of physicians to inform themselves of the procedures and to file application blanks correctly. Application blanks have been distributed to physicians only. The patient has free choice of physicians; and no physician is required to participate in the program if he does not wish to do so.

(4) Physicians should advise their patients who may be eligible of the plan, as there is some question of distrust on the part of the public and the patient if this is not done. All men in the armed forces are informed of the program so that their wives will be advised. The law includes all wives and infants of enlisted men in the fourth to seventh grade payroll without regard to economic need and without investigation (there are a limited number of wives with more than the \$50 a month allowance). If the patient is in good economic circumstances, she should be advised that it is hoped the money will be adequate to care for those in need, and in all probability she will want private room facilities which will exclude her from benefits. Application must be made for both hospital and medical care (except in home deliveries). The patient cannot assume responsibility for one and expect to have the other paid by the State Board of Health.

(5) Physicians must assume full responsibility for verification of the serial number from the allowance card shown by the

patient, otherwise ineligible cases may be accepted. If the patient does not have the card, the number must be obtained by the State Board of Health before authorization is made.

(6) The one matter of most serious consideration is the complaint made by several applicants that the physician has advised them that there would be additional fees, as the fee allowed by the state was not sufficient to cover his charges. In filing the request for authorization, the physician signs an agreement that he will not accept any supplementary fees from the patient or family. The patient also signs an agreement that she understands that she is not to make any payments to physicians or hospital. Since federal funds are used for this service, the State Board of Health is responsible for administering these funds in accordance with the written agreements with the U. S. Children's Bureau. Violations of these agreements would constitute misuse of federal funds. Your Committee recommends that the Montana State Medical Association go on record as approving disqualification for participation in the plan of any physician known to violate the agreement regarding supplementary fees.

(7) The regulations under which the plan is administered require that a summary of medical record be submitted by the physician, and a summary of hospital record by the hospital, before claim vouchers are approved for payment. These records are brief summaries and your Committee urges full cooperation in preparation of these reports.

Upon motion duly made, regularly seconded, and unanimously carried, this report was adopted.

Legal Affairs Committee

DR. P. E. KANE, *Chairman*

Tuberculosis Committee

DR. F. I. TERRILL, *Chairman*

The war will, without question, result in an increase in the tuberculosis rate. This is, and will be, caused by conditions that result from the over-crowding, poor housing, and general war strain that is occurring in most of our industrial cities. This problem is not only present in the large cities; it is also present in some of our own Montana communities.

The Medical Research Council in England has already shown the rapid rate of increase in tuberculosis that has resulted since the beginning of the war. The postwar problem of tuberculosis control must and will be met in this country. It is necessary that we in Montana be prepared, when this conflict is over, to keep abreast of the rest of the nation. We have all the tools necessary to control tuberculosis, but intelligent education of the people, and, I might add, of the physicians, is necessary. It is a medical problem and one that must be solved by this group.

If it were possible to skin test every man, woman, and child in this state and then x-ray the positive reactors, we would have an accurate knowledge of the open cases that exist; we would know who were contacts and would be able to more accurately observe them for evidence of an activation. Then, if the active cases could be isolated in an institution and kept there until they were no longer a source of infection, the problem would be solved. It would be necessary, for a period of time, to continue the checks so that new cases would be discovered.

At the present time, such a plan is possible; and I can assure you that it will come, if not initiated by the physicians, then by the federal government.

So far, most of the tuberculosis control has been through lay organizations such as the State Tuberculosis Association. Organizations of this kind have supplied a very worthwhile beginning to tuberculosis eradication, but they have gone as far as it is possible for lay persons to go, and it is necessary that this work be taken over by professional workers.

It is the hope of this committee that a full discussion of the problem take place at this meeting and, if possible, that recommendations be made to the committee as to what course should be followed for a future policy of the State Medical Society.

The committee first feels that there should be a tuberculosis control officer in the state. This individual should be a physician especially trained in the prevention of tuberculosis. In the past, this work has been carried on by public health nurses, and

in the future much of the work will of necessity be done by this group. There should be, however, a supervisor of the program and a field worker who is a well-trained physician.

Into what department this work would be placed is a problem and one that must be decided either now or at the next meeting. The most logical organization to control this work would be the State Board of Health. The only objection to this would be that indirectly, in the future, the program might be dominated by the federal government. It is, however, the opinion of the committee that a Tuberculosis Medical Control Officer should be added to the State Board of Health. It would be the duty of this officer to carry out tuberculosis finding surveys and to follow up all known cases of the disease.

During the last few years, advances have been made in the method of taking x-rays for mass surveys. The development of the miniature film (4"x7") and of the 35 mm. film has so reduced the cost of a chest x-ray that large groups can be studied at a minimum cost. In fact, whole nations, notably Sweden, have been x-rayed. It is within the realm of possibility and should be one of our aims to x-ray every individual in this state.

Such a program could be carried out under the direction of a Tuberculosis Control Officer by using either a miniature x-ray unit or a 35 mm. unit installed on a truck. These complete units were being manufactured before the war and will be available after the war is ended.

It is anticipated that such a program might not have the approval of individuals owning large x-ray units, but it is more likely that such a program would stimulate interest in health and would result in more x-rays being taken by private physicians.

This question should be discussed at this time because it is felt that a tuberculosis case finding program will sooner or later be initiated, if not one sponsored by the medical organization, then one by the government.

To finance a permanent tuberculosis control unit would require appropriation from the State Legislature, and if such a program is sponsored by this organization, then at the next legislative assembly the plan should be submitted to the State Appropriation Committee, probably by a combined committee of the Medical Tuberculosis Committee and the Medical Legislative Committee.

It is requested by the State Tuberculosis Committee that Tuberculosis Committees be appointed in each local society. These committees would approve any local program that was undertaken. In this way it would be possible to keep programs under control by the medical men, instead of having a government-dominated program.

After a general discussion of this report it was, upon motion duly made, regularly seconded, and unanimously carried, adopted.

Dr. Caraway then moved that the Association go on record as favoring the State Board of Health creating a Division of Tuberculosis with a State Control Officer. Motion was seconded by Dr. Gregg, and, upon ballot, was unanimously carried.

There being no further business to come before the meeting of the House of Delegates, upon motion regularly made, duly seconded, and unanimously carried, the House adjourned.

Cancer Committee

DR. J. H. GARBESON, *Chairman*

Your Cancer Committee has functioned through the year to a great extent in cooperation with the Women's Field Army. A meeting was held at the Florence Hotel on the last day of the 1942 meeting, in conjunction with the meeting of the Women's Field Army Committee. Since that time, cooperation has been extended to the Women's Field Army in their program of placing educational literature in the schools and in conjunction with their publicity campaign.

It is recognized that there is a definite need for further education as to the early diagnosis and treatment of cancer among the medical profession. Until such education has been accomplished, the educational work among the laity can be only partially successful. However, there is a question as to whether this work can be carried on among the members of the medical

profession to the best advantage during the period when our members are already overtaxed due to war conditions.

Upon motion duly made, regularly seconded, and unanimously carried, this report was adopted.

Dentists, Pharmacists and Nurses Committee

DR. B. K. KILBOURNE, *Chairman*

The Dental Society reports that 50 dentists from Montana are now in the armed forces. This means much additional work for the remaining group in order to meet the demands from the public for services. The annual meeting was held in Helena in May, and registration was in excess of the number expected. The Director of Public Health Dentistry for the State of Utah addressed this meeting of the dentists and also the meeting of the Montana Public Health Association, which was held at Bozeman on June 7 and 8. The Dental Association sponsored the bill which is included in the Session Laws of Montana as Chapter 125 of the Session Laws of 1943. This bill provides for the establishment of a Division of Dental Health in the State Board of Health. The bill was passed, signed by the Governor, and becomes effective July 1, 1943. It is hoped that, through the activities of this Division, the dental health needs of the people of the state of Montana will be more adequately appreciated and provided for.

The State Board of Pharmacy held only a one day annual meeting in June. This Board supported a bill passed by the 1943 Legislature and included in the Session Laws of Montana as Chapter 225 of the Session Laws of 1943. This provides that the President of the State Board of Pharmacy and the President of the State Board of Food Distributors be appointed by the Governor as members of the State Board of Health. The Board of Pharmacy wished to call to the attention of the medical profession that much confusion could be prevented, if the medical men, in writing prescriptions for narcotics, barbiturates, or any sulfa compounds would specify on the original prescription whether or not it should be refilled, in order that the druggist may comply with the federal law. The federal law requires that such prescriptions cannot be refilled without direct authorization from the physician. So far, the pharmacists have experienced very little difficulty in obtaining necessary drugs, with the exception of some of the arsenicals, for the Army has first priority on the supply of arsenicals.

Since a discussion of the supply of and demand for nursing service is to be presented by the President of the State Nurses Association to this body, no resume will be given of the nursing activities and situation by this committee.

Upon motion duly made, regularly seconded, and unanimously carried, this report was adopted.

Executive Committee

DR. E. D. HITCHCOCK, *Chairman*

The Executive Committee of your State Association met on two occasions during the past year.

A meeting was called during the Legislative session and met with the Legislative Committee. This meeting was very helpful in formulating procedures to combat the chiropractic bills introduced in the Senate. The State Board of Health Bill came in for consideration as well as the Medical Practice Bill introduced by the Board of Medical Examiners. A second meeting was called in Helena, to consider the appointment made to the State Board of Health, and the position of the State Medical Association in relationship to the proposed referendum on the State Board of Health Bill.

I deeply appreciate the help and wholehearted cooperation of each member of this committee.

Upon motion duly made, regularly seconded, and unanimously carried, this report was adopted.

History-of-Medicine Committee

DR. E. D. HITCHCOCK, *Chairman*

Your Committee on the History of Medicine wishes to make the following report: We have met on several occasions to review the material gathered on *The Pioneer Physician*. The material is fairly complete, but there is considerable reviewing to

be done to place it in proper shape. Recently we placed this material in the hands of Judge Lew Callaway who is a noted Montana historical authority and who is now working in his spare time on the book. The only expense to be incurred is for stenographic work, and we respectfully request an appropriation of \$200.00 for the coming year.

It is quite impossible to set a time for publication and this must await the conclusion of the war and the return of normal times.

Upon motion duly made, regularly seconded, and unanimously carried, this report was adopted.

Medical Economics Committee

DR. J. C. SHIELDS, *Chairman*

A meeting of the Medical Economics Committee was called to order July 7, 1943, by Dr. Shields, chairman.

A request from the Committee on Maternal Health and Child Welfare was received, to the effect that they would like the section on minimum fees amended to read: "Except in the case of a child one year of age or under in which the minimum fee shall be \$10.00." A motion recommending to the House of Delegates that this change be made, as above, was adopted, with the provision, however, that it apply only to cases coming under the plan for federal benefits, that is, cases involving soldiers' families.

The following recommendation to the House of Delegates was also adopted: "The orthopedic rehabilitation fee as acted on by the Orthopedic Commission allows \$100.00 for reduction of dislocation of hip, of which \$50.00 is to be paid at the time of operation and the remaining \$50.00 is to be paid in installments of \$25.00 over a period of months. This fee schedule will be applicable to cases coming under the orthopedic commission."

Heeding the advice of our President, the Economics Committee will study the Wagner-Murray-Dingell Act for the enlargement of social security benefits and sick benefits, and for the payment of the the costs of hospital, surgical, and medical services.

Upon motion duly made, regularly seconded, and unanimously carried, this report was adopted.

Medical Publications Committee

DR. A. R. FOSS, *Chairman*

The Medical Publication Committee wishes to advise that our contract with the JOURNAL-LANCET as official publication for our society will not terminate during the coming year. The JOURNAL-LANCET has been very satisfactory and no change is necessary at the present time.

Upon motion duly made, regularly seconded, and unanimously carried, this report was adopted.

Postgraduate Committee

DR. A. R. FOSS, *Chairman*

The Postgraduate Committee of your Society has not functioned during the year 1942-43, and, therefore, has no report to make.

Public Instruction and Health Committee and Public Relations Committee

DR. LEONARD W. BREWER, *Chairman*

The Committee on Public Relations and on Public Instruction and Health, which, by appointment of Dr. Hitchcock is this year a combined committee, wishes to report for the year that it has been entirely inactive.

Committee on State Institutions

DR. H. W. GREGG, *Chairman*

I beg to submit the following report from the Committee on State Institutions. Unfortunately, the Committee has not been as active as it should have been during this year of extreme stress.

Dr. Pampel had his difficulties in this legislative year, and I believe that he may personally report some of his suggestions. He wishes that the delegates may understand certain present conditions at the State Hospital. Dr. Pampel has only four doctors who are registered in the state, including himself. He

was unable to get more and has taken a graduate of a grade B school as an intern; a man 35 years old, of pleasant personality and appearance, very capable, who cannot register in Montana because of his training. Dr. Pampel regrets that he is unable to get more registered men, but the exigencies of the situation have made this alternative necessary. Dr. Pampel believes that, in this non-election year, any attempt on the part of the Medical Society to influence any appropriations for the next legislative year would be untimely.

Dr. Terrill from the State Hospital for Tuberculosis tells me that he has nothing of importance to report to the delegates at this time.

Upon motion duly made, regularly seconded, and unanimously carried, this report was adopted.

Advisory Board Women's Auxiliary

DR. J. I. WERNHAN, *Chairman*

Your Advisory Board of the Women's Auxiliary begs to report as follows:

The formation of the Women's Medical Auxiliary was first discussed by the Medical Association at the annual meeting in Great Falls in 1929. At that time, approval was given for the formation of a State Auxiliary but the following years interest subsided. However, there was one unit formed in Western Montana centering around Missoula. This unit has been successful and active.

This pioneer unit has been an incentive for the formation of other units, as has been done in Lewis & Clark county and in Cascade county. This year Flathead and Yellowstone counties have organized.

The summation at the present date is that there are five units formed and active, covering thirteen counties. A state-wide organization will be formed as soon as there are a few more units organized.

The object of the Auxiliary is to assist the medical profession and the doctors in their chosen profession, in the education of the public along medical lines, and to assist in any possible way.

Your Committee recommends that the Association lend its support and good will to the Women's Auxiliary of the Montana State Medical Society.

Upon motion duly made, regularly seconded, and unanimously carried, this report was adopted.

Nominating Committee

DR. F. F. ATTIX, *Chairman*

Your Nominating Committee respectfully submits the following names in nomination for election for state officers of the Montana State Medical Association:

President—Dr. J. C. Shields, Butte, Montana; Dr. S. A. Cooney, Helena, Montana.

Vice President—Dr. M. G. Danskin, Glendive, Montana; Dr. P. E. Logan, Great Falls, Montana.

Secretary-Treasurer—Dr. T. F. Walker, Great Falls, Montana; Dr. M. A. Shillington, Glendive, Montana.

Delegate to A.M.A.—Dr. J. H. Irwin, Great Falls, Montana; Dr. Alfred Karsted, Butte, Montana.

Alternate Delegate to A.M.A.—Dr. E. M. Gans, Harlowton, Montana; Dr. W. H. Stephan, Dillon Montana.

Councillors—Dr. R. D. Knapp, Wolf Point (incumbent); Dr. O. G. Benson, Plentywood; Dr. Charles Houtz, Havre (incumbent); Dr. D. J. Almas, Chinook; Dr. F. B. Ross, Kalispell (incumbent); Dr. W. W. Taylor, Whitefish; Dr. L. G. Dunlap, Anaconda (incumbent); Dr. A. D. Knight, Philipsburg.

Names available to Governor Ford for appointment to State Board of Health—Dr. C. J. Bresee, Great Falls; Dr. R. L. Towne, Kalispell; Dr. M. D. Winter, Miles City; Dr. M. A. Shillington, Glendive; Dr. J. W. Craig, Circle; Dr. F. L. Unmack, Deer Lodge; Dr. E. M. Gans, Harlowton; Dr. C. R. Monahan, Butte; Dr. A. T. Haas, Missoula; Dr. C. C. Seerley, Bozeman.

Fracture CommitteeDR. R. B. RICHARDSON, *Chairman*

No report received.

Medical Military Preparedness and Defense ActivityDR. F. L. ANDREWS, *Chairman*

Dr. F. L. Andrews, chairman, gave a verbal report saying that no meetings had been held by the committee during the year. He gave a brief report of the activities of the O.C.D. in Great Falls.

Rocky Mountain ConferenceDR. T. F. WALKER, *Chairman*

Dr. Walker reported that no meetings of the Rocky Mountain conference would be held this year and probably not for the duration.

Orthopedic CommitteeLOUIS W. ALLARD, M.D., *Chairman*

As chairman of the Orthopedic Committee of the Montana State Medical Association, I present for your committee the following report of our activities during the past years. Due to the fact that the other members of the committee are not present at this conference, the responsibility of this report must be assumed entirely by the chairman.

Our committee has been reduced to two active members present in this state, Dr. Colman and Dr. Allard.

With sadness and regret we report the death of one of the oldest members practicing orthopedics in this state, Dr. E. M. Porter, Great Falls; and with solicitation we report the illness of another esteemed member of our committee, Dr. E. S. Porter of Lewistown. We understand Dr. Porter is gradually improving and we hope he will soon be back to active duty.

Dr. John R. Vasco of Great Falls is serving with the Armed Forces for the duration.

Dr. Colman of Butte sent word he will be unable to attend this meeting because of urgent duties at home.

During the past year Dr. J. K. Colman and myself have been in conference with either Dr. Margaret Smith or Dr. Thomas M. Leonard of the Crippled Children Division of the State Board of Health. Due to ill health, Dr. Smith resigned from the State Board in 1942 and her duties have been carried on by Dr. Thomas Leonard.

Our relations as Orthopedic Surgeons and as members of this committee with the State Board of Health have been pleasant. Together we have worked in the interests of the crippled children in Montana.

Before Dr. Smith resigned from the State Board of Health, there was presented for our consideration certain changes in the fee schedule which was intended to place the fee schedule on a more equitable and satisfactory basis.

These changes are as follows:

1. When a physician has left our service previous to July 1, 1942, patients of that surgeon, for whom the maximum fee has been paid, will be eligible for care under another surgeon of the staff at 50 per cent of the original operative fee scale. This replaces the old ruling that when the maximum fee scale has been paid, no charge may be made, irrespective of the number of surgeons employed.

2. In order to obviate further occurrence of having a large number of patients left without funds for further treatment, hereafter, when two or more major operations are necessary in the total treatment of one patient, such operations requiring more than one operative period, not more than 50 per cent of the operating fee will be paid until the case is discharged as maximum correction. If the maximum fee has been paid before July 1, 1942, and the attending surgeon leaves our service, Number One comes into effect.

3. When a maximum fee has been reached and a period of two years or more has elapsed since the last payment, and more surgery is necessary, up to 50 per cent of the maximum fee will be allowed for this additional care.

4. The maximum fee for osteomyelitis or tuberculosis of the bone will be limited to \$100 for a period of one year; aspiration of abscess, \$10.

5. In the treatment of nonoperative club-foot, \$50 will be allowed for the first six months' care; \$25 for the subsequent

three months; with a maximum of \$75 for one foot and \$100 for two.

6. \$50 will be allowed for the repair of soft palate cleft. In complete cleft, \$50 will be allowed for first operation if tandem, but \$100 may be charged if complete closure is obtained in one operation; \$50 may be charged for each succeeding operation, with a maximum of \$200. The fee for lip repair is \$50.

7. On closed reduction of congenital hip, \$50 will be allowed for the first six months, \$25 for each subsequent three months, with a maximum of \$100 for single hip and \$125 for double. Open reduction: \$75 for single hip, \$150 for double. Shelf operation: \$100 per hip.

After considerable correspondence and discussion, Dr. Colman and I agreed to the changes, provided they were acceptable to the House of Delegates Committee of the State Medical Society.

SECOND SESSION OF THE HOUSE OF DELEGATES

Thursday, July 8, 1943

The adjourned meeting of the House of Delegates convened at 9:00 A. M., Thursday, July 8th.

Report of the Delegate to the American Medical Association

Dr. J. H. Irwin, delegate to the American Medical Association, gave the following report: Cold rainy trip—still cold in Chicago on arrival. Stood in line thirty minutes to register at the Palmer House and then had to wait four hours for a room engaged four months ago. Met a goodly number of delegates who had already arrived, and had a pleasant time renewing acquaintances.

Meeting opened at 10 A. M. Monday with nearly all delegates present and, before the day was ended, every state in the Union had its entire delegation present, the only absent delegates being Porto Rico, Panama Canal, Alaska, Hawaii, and the Philippine. There has not been a full showing of states before during my tenure of office.

Following the usual opening procedures, the first order of business is always election of Distinguished Service medal, and Dr. Joslyn of Boston received this honor which, I am sure you all agree, is well deserved.

We then listened to addresses by the Speaker of the House, President and President-Elect. All these are printed in full in the *Journal of the A.M.A.*, and I urge you to read them, for they present the ideas and thoughts of most doctors in the United States today.

The business of the House of Delegates is conducted largely through reference committees, and under the order of new business, numerous resolutions were offered—some by individual delegates, but mostly resolutions passed at various state associations and asking the support of the A.M.A. These are regular reference committees and, as each resolution is introduced and read, it is referred to one of these committees. The afternoon of the opening day is devoted entirely to these committees; and all members are urged to appear before any of them to present any ideas they may have, to question, and to argue either pro or con. These reference committees remain in session until all are heard and then make up a report of their conclusions to present to the House of Delegates. In the majority of cases, the reports and conclusions of the committees are adopted by the House of Delegates, but if any member of the House of Delegates does not agree with the report, he may then present his case and, at times, I can assure you a very spirited debate develops.

First quote—*Journal A.M.A.*, June 19, by the President, Brigadier General Fred W. Rankin, "In the national fulfillment of our altruistic objectives it must be recognized that two essential provisions are required, namely; professional and financial facilities. It must also be recognized that the successful attainment of these objectives cannot be accomplished if, in the implementations of any plan or proposal, the professional facilities are subjugated to the authoritative management, traditionally dictated by political whimsy, of some legislative council controlling the financial provision. These two provisions are

interdependent and cannot be distinctly separated in approaching our objectives. The successful application of the former requires certain facilities supplied by the latter, which in turn can be guided intelligently only by professional knowledge. These vastly significant facts must be sincerely appreciated by all parties, both medical and non-medical, concerned with this problem, in their approach to its solution."

Second quote—President-elect James E. Paullin: "It is recommended that the House of Delegates approve the action of the Board of Trustees in making plans to meet these problems and authorize the development of a permanent Committee on Planning of Postwar Medical Services to cooperate and collaborate with other agencies concerned with these problems."

Surgeon General Norman T. Kirk of the U. S. Army was introduced and gave a very interesting talk on his experiences in Tunisia. He was fortunate enough to be there at the climax, and his talk is printed in full on page 552 of the *Journal of the A.M.A.* for June 19.

George M. Morris, President of the American Bar Association, was introduced and I here quote part of his speech: "I happen to be a member of the committee which reorganized the American Bar Association in 1936. At that time, the American Bar Association instituted a House of Delegates, almost a direct adoption of the House of Delegates which has been so successfully conducted by the American Medical Association. I made a study, not only of the constitutional background of this organization, but of its regulatory background, and here I am today a good deal like a boy who has read about a famous man, never thinking he would meet him, and suddenly stepping around the corner, meets the famous man whom he knows all about."

"In connection with the formulation of our procedure and fundamental concepts in the American Bar Association, the experience of the American Medical Association was an invaluable aid. It always seems an anachronism to me, but nevertheless it was true, that here were the lawyers who would be expected to be the pioneers in a legislative group like this, taking their lessons from their brother professionals, the medics, on how to do the job that the lawyers themselves ought to know how to do."

A report of the Board of Trustees on Hospital Corporations engaging in the practice of medicine and a report of the joint meeting of the Board of Trustees and the National Hospital Association is given in full and I urge all pathologists and radiologists to read and study this on pages 528-534 in the *Journal of the A.M.A.* of June 19th.

Numerous resolutions were introduced and, following the usual procedure, were referred to committee for consideration. The afternoon of Monday was given over to committee meetings. These resolutions are printed in full in the June 19th *Journal* and the reports of committees on same are printed in the June 26th *Journal*.

Six or seven of these resolutions bear on the same line of thought: better informing of M.D.'s in general regarding medicine and medical matters; better information to the public regarding medical affairs, and especially new procedures, new doings and appliances, with as true an idea as possible of their worth and limitations; better contact with Congress, in order that the medical profession may rightly be heard and her side of questions up for legislation be presented. The ultimate outcome of three sessions discussing this question was the creation of a Council on Medical Service and Public Relations, composed of six members geographically distributed in the United States, President, Past-President, and Secretary, and a member of the Board of Trustees. The duties of the Council shall be—(I quote): "(a) To make available facts, data, and medical opinions with respect to timely and adequate rendition of medical care to the American people; (b) To inform the constituent associations and component societies of proposed changes affecting medical care in the nation; (c) To inform constituent associations and component societies regarding the activities of the Council; (d) To investigate matters pertaining to the economic, social and similar aspects of medical care for all the people; (e) To study and suggest means for the distribution of medical services to the public, consistent with the principles

adopted by the House of Delegates, and (f) To develop and assist committees on medical service and public relations originating within the constituent associations and component societies of the American Medical Association.

In the exercise of its functions, this Council, with the cooperation of the Board of Trustees, shall 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.

Dr. Herman L. Kretschmer of Chicago was elected President-elect; Dr. John W. Ames of Denver elected Vice President; Olin West, Secretary; Dr. Josiah J. Moore, of Chicago, Treasurer; H. A. Shoulders, Speaker of the House; R. W. Fouts, Vice Speaker.

San Francisco was chosen as the meeting place in 1946.

Election of Officers

The next order of business was the election of officers. No names in addition to those submitted by the Nominating Committee having been submitted, the House of Delegates proceeded with the ballot.

Dr. S. A. Cooney withdrew his name as a candidate for President-elect, and upon motion regularly made, duly seconded, and unanimously carried, the Secretary cast a ballot of the House of Delegates for Dr. J. C. Shields of Butte.

Dr. P. E. Logan withdrew his name as candidate for Vice President, and upon motion regularly made, duly seconded, and unanimously carried, the Secretary cast a ballot of the House of Delegates for Dr. M. G. Danskin of Glendive.

Dr. M. A. Shillington of Glendive withdrew his name as a candidate for Secretary, and upon motion regularly made, duly seconded, and carried, the Secretary cast a ballot of the House of Delegates for Dr. Thomas F. Walker of Great Falls. The ballot was then distributed for the election of the officers with the following results:

Delegate to A.M.A.:	
Dr. J. H. Irwin, Great Falls	20 votes
Dr. Alfred Karsted, Butte	8 votes
Alternate Delegate to A.M.A.:	
Dr. E. M. Gans, Harlowton	20 votes
Dr. W. H. Stephan, Dillon	7 votes
District No. 1—Dr. R. D. Knapp	21 votes
Dr. O. G. Benson	4 votes
District No. 2—Dr. Chas. Houtz	18 votes
Dr. D. J. Almas	5 votes
District No. 7—Dr. F. B. Ross	18 votes
Dr. W. W. Taylor	6 votes
District No. 10—Dr. L. G. Dunlap	12 votes
Dr. A. C. Knight	12 votes

Since Dr. Dunlap and Dr. Knight received the same number of votes for Councillor of District No. 10, the ballot was again spread and the vote taken for Councillor in this District. Upon this ballot Dr. A. C. Knight received 21 votes and Dr. Dunlap 12 votes.

The House of Delegates unanimously chose the following doctors whose names should be submitted to the Governor for selection of two physicians to fill the existing vacancies on the State Board of Health:

- Dr. C. J. Bresee, Great Falls.
- Dr. R. L. Towne, Kalispell.
- Dr. M. D. Winter, Miles City.
- Dr. M. A. Shillington, Glendive.
- Dr. J. W. Craig, Circle.
- Dr. F. L. Unmack, Deer Lodge.
- Dr. E. M. Gans, Harlowton.
- Dr. C. R. Monahan, Butte.
- Dr. A. T. Haas, Missoula.
- Dr. C. C. Seerley, Bozeman.

Miss McCoy of the Red Cross briefly reviewed the activities of the Red Cross in recruiting nurses for the armed forces of the United States.

Mrs. Frances McDonald, President of the Montana Nurses Association, addressed the House of Delegates, asking for their aid and assistance in recruiting nurses to carry on nursing serv-

ices for the civilian population in Montana, emphasizing the great shortage of nurses.

The President declared the next order of business the selection of place for the 1944 session of the Montana State Medical Association. An invitation was extended to the Association by the Silver Bow County Medical Society to hold its next annual session in Butte. Upon motion duly made, regularly seconded, and unanimously carried, it was resolved to accept the invitation of the Silver Bow County Medical Society.

There being no further old or unfinished business to come before the House of Delegates, the President asked for any new business to be presented.

Dr. Sid Cooney of the Lewis & Clark County Medical Society proposed that the association permit him to go ahead and secure petitions to refer the Board of Health bill passed at the last session of the Legislature to the voters at the next general election.

After a general discussion it was moved by Dr. Gregg, seconded by Dr. Caraway, that the question of the referendum on the Board of Health bill be referred to the Legislative Committee, with power to act after consulting with the State Board of Health. By standing vote, this motion was carried by a vote of 13 for and 11 against. The Legislative Committee subsequently reported that it was their opinion that no action should be taken toward securing petitions for a referendum.

There being no further business to come before the House of Delegates, upon motion regularly made, duly seconded, and unanimously carried, the House adjourned.

SCIENTIFIC SESSION

Wednesday, July 7, 1943

The Sixty-fifth Annual Scientific Session of the Montana State Medical Association was called to order by President E. D. Hitchcock at the Northern Hotel in Billings, Montana, at 11:00 A. M., Wednesday, July 7th.

Dr. Hitchcock introduced President Cedric H. Nelson of the Yellowstone Valley Medical Society, who welcomed the members of the Montana State Medical Association to Billings.

Dr. Nelson's address of welcome was followed by the installation of Dr. J. P. Ritchey as President of the Association.

Dr. Ritchey then gave the Presidential Address, which is incorporated as a part of these minutes.

PRESIDENTIAL ADDRESS

J. P. Ritchey, M.D.

Missoula, Montana

I am grateful indeed for the high honor you paid me in naming me your president-elect. Your action in so doing caused me a good deal of self-searching; it made me feel humble; and it made me desire to meet the responsibilities of the office of president in a manner worthy of your confidence and esteem.

I have lately visited a number of the component societies of this association in company with Dr. Hitchcock, your president, and part of the time with Dr. Caraway, State Procurement and Assignment Officer, and Dr. Cogswell, State Health Officer. The courtesy and friendliness with which we were met made a deep impression upon me. A wide diversity of viewpoints was expressed, and such expression was received with tolerance and good feeling by everyone; but the essential unity and singleness of purpose of the profession of this state was evident. The vast extent of territory and of human need served was brought home to us. I believe that such visits are a highly useful activity on the part of the state officers and I hope the custom may be continued.

The year now closing has been marked by tragedy, by whirlwind changes and adjustments, by toil, labor and suffering beyond human imagining. As regards our state

association, the year has seen the number of physicians who have obtained commissions in the armed services reach a total of 122, or about 25 per cent of our membership, and some of these have already given their lives. It has seen the physicians at home adjust themselves to their increased burden and extend themselves to give a still adequate medical service to our people. It has seen the Women's Auxiliary to the Medical Association of Montana grow in strength, by the addition to it of several new local Auxiliaries. For this we are glad, not only because the Auxiliary is an added source of strength to us, but also because it increases good feeling and unity among its members and among ourselves. The year has seen the state legislature show a considerable measure of confidence in our state association, in its integrity of purpose and in the soundness of its advice. Nationally, it has seen a demonstration of the indispensability of the medical profession. Nationally, also, it has seen Washington court decisions characterize group medical service as a business and the attempt of organized medicine to maintain its standards of practice as being in restraint of trade; but up to date our profession is still unhampered by legal enactments creating a country-wide system of government-controlled medical practice. It has seen a recent meeting of the house of delegates of the American Medical Association at which, if I read the published proceedings correctly, there was manifested a sense of change, a feeling of urgency, a taking counsel together and a getting ready for new and extended action.

As regards the immediate future, one purpose, to win this war, dominates all other purposes and draws them into itself. Still more of our members will be entering service; still fewer will remain at home to serve essential civilian needs. The 42,000 American physicians in service at the end of 1942 will be augmented, it is said, to 53,000 by the end of 1943. Almost 6,000 persons are being graduated as physicians each year. Forty-five hundred of these will enter the medical corps. The other 1200, men not physically qualified for service, and women, will be available for civilian practice. These will partially offset the loss of 2500 physicians by death each year.

Civilian physicians will continue to have the same need of postgraduate study, including refresher courses. As present limitations make extended travel difficult or impossible, all national meetings are discontinued. We fall back, then, upon local, state and interstate meetings and study courses, with military medical personnel participating and cooperating. Some such meetings have already been held, and more are to follow.

In these times we have a special duty, that of being on guard against epidemic disease and of cooperating with health departments to this end. We have also to cooperate with and advise lay agencies concerned with the maintenance of health. In industry, we are concerned with guarding the older men against becoming unnecessarily incapacitated and from loss from unaccustomed overloading and overstrain.

One might say that with this matter of winning the war our hands are full, and that we may let the postwar future take thought for itself. But, as we look about us

and ahead, we see vast upheavals. We perceive that prodigious forces are loosed. We see our country profoundly disturbed and changing. As physicians, we should be blind indeed to believe that our ways will continue to remain, in all respects, the ways to which we have been so long accustomed. Neither the inertia of a long established system of practice, nor the desire to choose one's own physician, nor the recognition by government and people of the value of the services furnished by the medical profession in and out of the armed forces will suffice to stay the hand of change. The members of this association are therefore thinking seriously of postwar problems. I'd like to mention two of these.

The first is the delicate and difficult one of the re-assimilation into practice of returning medical officers. It is expected that demobilization will be slow. Many medical officers are likely to be needed for use in rehabilitating foreign lands laid waste by the war. Many officers may even prefer to remain in the service more or less indefinitely, as they have become more at home in it and the readjustments to private practice become in their eyes more formidable with the lapse of time. For others, the return to private practice will be a welcome escape from a regimented existence endured for the sake of duty. The desires and the choices of the young men who have never had the experience of private practice, but who entered the service directly from college, are somewhat unpredictable. The enormous increase in the number of veterans, all of whom will have access to the medical care of the Veterans' Administration, further complicates the picture.

The task, however, remains. Some observers expect that in communities, such as our larger Montana cities, the total number of men desiring to practice will approach a number double that of prewar days. If this be even partially true, and in any case, the task will call for all the wisdom, patriotism, sense of justice and unselfishness we have. It is a job for the component societies and for every one of us individually. But it is particularly a job for the state association, in that it must assume leadership both in planning and execution. And it is a job that will not be bungled. A fitting welcome to these men, a happy and harmonious solution of this situation, resulting in continued unity and good will within our ranks, will also redound to our credit with the public and add weight to our counsel in all other postwar socio-medical affairs.

The other problem of the postwar period is still more grave. It is the future status and form of medical practice. Thus far we have not been the object of legislation regimenting our activities as has the profession in England and other European countries. But the expectation of such legislation is upon us, as is also the necessity of reacting to that expectation wisely and with maximum effect.

In difficult times like this, it is well to take a look at basic considerations or principles. As they appear to me, these are four:

The very first consideration, I take it, is that we exist as physicians for just one purpose, to heal the sick and to keep people well.

A second consideration is that what is good for the health of the people is good for us, and, vice versa, what is good for us professionally is good for the people and for their health.

A third consideration is the fact that in our hands, only, are the medical knowledge, judgment, science and skill without which our civilization as it is could not exist; without these, this war could not be fought and won, and our vast military forces could not even be kept in the field.

The fourth consideration follows naturally: That while we are not economists nor sociologists, the medical profession and its organizations ought to be constantly and freely consulted and advised with in all matters of public policy and legislation affecting the care of the sick and the maintenance of health, if such public policy and legislation are to be at bottom sound, because any resulting plan must function primarily medically, as well as financially and socially. If these considerations be valid they would seem to point the direction in which we ought to move.

Deserving of reference in this connection is the statement made by Justice Miller of the United States Court of Appeals of the District of Columbia, in which he said that the failure of the professional groups to insist upon and to secure the legislative recognition of the distinction between professional practices and the generally accepted methods of trade and business may perhaps have been responsible for the action of Congress in including the practice of medicine in the activities governed by the Sherman Antitrust Law.

It may be said, however, that, as a state association, we must follow the example and leadership of the American Medical Association. This is indeed true, and it may be that the American Medical Association is about to enlarge greatly its public activities, in which case it will point the goal and lay down the pattern of our own endeavors. It is fair to say, however, that our state association, as a constituent association of the American Medical Association, is responsible in some measure, however small, for the policies and actions of the American Medical Association. It is also fair to say that the American Medical Association cannot do for us what we must do for ourselves. It is only our state association that is chiefly and immediately concerned with the voters of Montana, with our state legislature and state administration, and with our two representatives and our two senators in Washington.

It is probably not practicable for this association to put on an intensive and extensive publicity campaign to inform the public as to these matters. But this fact is no proper cause for discouragement. It points merely to another fact: That it will be more fruitful for us to think, not in terms of the great things we might accomplish had we more leisure, more means and more opportunity, but rather in terms of what, at the least, is within our power to accomplish, given a sense of urgency suitable to the situation in which we find ourselves. If it be asked, "What things are these?" I will say:

It is within our power to inform ourselves thoroughly, through appropriate committees of this association, and

also individually, regarding all pending legislation.

It is within our power to use our best endeavor to inform the public in ways actually available to us; and it is not unlikely that the American Medical Association will be able to add to the ways available to us.

It is within our power to bring home to the representatives and senators from Montana a full realization of our vital interest in this legislation and of our determination that, to the best of our ability, such legislation shall preserve for the people what is essential for first-class medical service, and for ourselves what is essential for our best functioning as physicians; and we can earnestly and persistently persuade them that our views are sane, wise, and conceived in the best interests of all.

It is within our power fully to cooperate with and help strengthen the hands of the American Medical Association and other national organizations that are working to achieve the same ends.

It is within our power more fully to cooperate with, and furnish leadership for, all other agencies, public and private, lay and professional, that are concerned with the health of the people.

And finally, every one of us may constitute himself a committee of one on public relations, to uphold the credit and honor of our state association, and, in his contacts, to help establish in the minds of our fellow citizens a conviction of the good faith and unselfish aims of the medical profession.

Mrs. Eben J. Carey, President of the Women's Auxiliary of the American Medical Association, was introduced by Dr. E. D. Hitchcock, and was kind enough to favor the Association with a few remarks.

Dr. Earl Wheeden, President of the Wyoming State Medical Association, was also presented by Dr. Hitchcock.

Dr. Hitchcock then declared the meeting adjourned until 2:00 P. M.

The official program follows:

Wednesday, July 7th

9 to 11 A. M.—Assembly Room—Meeting of the House of Delegates.

11:15—Ballroom—Call to Order by President E. D. Hitchcock, M.D. Address of Welcome by Cedric H. Nelson, M.D., Billings. Installation of J. P. Ritchey, M.D., as President. Presidential Address by J. P. Ritchey, M.D., Missoula.

12:15—Luncheon Meetings—(1) Presidents and secretaries of county societies. (2) Alumni groups.

2:00 P. M.—Ballroom—"A Treatment of Eye Diseases by the General Practitioner," William M. Bane, M.D., Denver, Colorado.

3:00—"Hematuria and its Significance," L. W. Howard, M.D., Great Falls, Montana.

3:30—"The Management of Breech Presentation," G. A. Carmichael, M.D., Butte, Montana.

4:00—"A Discussion of Some of the Newer Drugs," I. J. Bridenstine, M.D., Terry, Montana.

7:00—Banquet. The annual banquet was held in the ballroom of the Northern Hotel at 7:00 P. M., Dr. Allard acting as toastmaster. Lt. Col. E. S. Murphy of the Surgeon General's Office addressed the Association on "Contributions of Medicine in the Present War," and read a fable, "Isadore, the Indian."

Dr. E. T. Bell, Professor of Pathology, University of Minnesota, gave an address on "Diseases of the Kidney."

Thursday, July 8th

9 to 11 A. M.—Assembly Room—Meeting of the House of Delegates.

11:15—Ballroom—"Symptoms Associated with Chronic Gastritis," Wayne Gordon, M.D., Billings, Montana.

12:15—Assembly Room—Panel Discussion Luncheon. Panel Discussion—Dr. E. T. Bell, Professor of Pathology, University of Minnesota, "Carcinoma of the Breast."

2:00—Ballroom—"The War-Time Spread of Communicable Diseases," Major A. P. Ormond, M.D., Great Falls, Montana.

3:00—Reports of Women's Auxiliaries of the Montana State Medical Association and by Women's Field Army for the Control of Cancer.

Mrs. H. W. Peterson of the Women's Field Army for the Control of Cancer, briefly addressed the Association. Mrs. Eben J. Carey, President of the Women's Auxiliary of the American Medical Association addressed the Association.

Mrs. Frances McDonald, President of the Montana State Nurses Association, spoke regarding the part the Medical Association could play in cooperating with the Nurses Association to maintain adequate nursing facilities for the civilian population during the war.

3:30 P. M.—"The Sex Hormones and Their Relationship," H. O. Drew, M.D., Billings, Montana.

4:00—"Gastro-colic Fistula," H. M. Blegen, M.D., Missoula, Montana.

Necrology Committee

DR. M. A. SHILLINGTON, *Chairman*

Since our last meeting, death has come to nine members of the Montana State Medical Association. Two of these men gave their lives while in the Armed Forces. These two were Dr. Leo P. Martin of Missoula, and Dr. Harold Malee of Butte. The remainder completed years of service in the practice of their profession and succumbed to illnesses of varied nature.

Cascade County—DR. E. M. PORTER died early in 1943 after an extended illness, at the age of 65. Dr. Porter was one of the founders of the Great Falls Clinic in Great Falls and was one of the most talented and dexterous surgeons in the Northwest. His interest during the latter years of his life was centered upon orthopedic surgery. He was an active participant in the Crippled Children's program in the state, and for many years was a member of the State Board of Health. Dr. Porter was a member of numerous national scientific societies and was well known throughout the state of Montana. His death is deeply mourned by his associates and his many friends throughout the Northwest.

Fergus County—DR. A. W. DEAL died early in 1943 of multiple sclerosis, after several years of invalidism. He is survived by his wife and three daughters, one of whom is in the WACS.

DR. J. C. DUNN died after an operation late in 1942, after having practiced from 1911 to 1936 and subsequently having been appointed to the post of Superintendent at the Asylum at Warm Springs.

DR. CHAS. WALLIN died January 1943 of acute leukemia. Dr. Wallin started practice in 1908 at White Sulphur Springs and subsequently had been at Lewistown. For the last three years of his life he was full-time Health Officer.

Missoula County—DR. LEO P. MARTIN was killed in an airplane crash by burning at the Walla Walla Air Base shortly after entering the Air Corps Medical Service. Dr. Martin had begun his practice in Nebraska and subsequently had lived in Philipsburg, Montana, and Missoula, for the three years before his death. He had been well known in recent years for his work as Parachuting Physician for the Forest Service, having gone to the help of various persons in medical need in isolated forest areas.

DR. W. T. THORNTON died in 1943 after two years of invalidism due to myeloma. Dr. Thornton graduated in medicine in 1902. He practiced in Western Montana for 38 years. He first built a hospital at Stevensville, and ten years later moved to Missoula where, with his brother, he built the present Thornton Hospital. His life was devoted, nearly exclusively, to surgery, leaving a record of 15,000 operative cases.

Silver Bow County—DR. HAROLD MALEE died of illness while serving in the Army Medical Corps early in 1943. He had been in practice in Butte for about six years and interned at the Murray Hospital, having been associated with the Clinic later. He is survived by his widow and two children.

Yellowstone County—DR. ANDREW CLARK died at the age of 78 in Billings, of old age, early in 1943. He was graduated in medicine at a Canadian medical school in 1892. Mrs. Clark, who was also an M.D., preceded him in death by a few years. He is survived by two daughters.

DR. H. A. HANLEY graduated from Creighton Medical School. He died in Billings following a coronary thrombosis. He had been in general practice in Billings since 1916. He is survived by his widow and three children.

Resolutions Committee

DR. J. C. SHIELDS, *Chairman*

The committee submitted the following report, which, upon motion regularly made, duly seconded, and unanimously carried, was adopted:

The House of Delegates of the Montana State Medical Society desires to express to their guest speakers, Dr. E. T. Bell, Dr. William M. Bane, and Major A. P. Ormond, the local Medical Society, the local Nurses' Association, the Northern Hotel, and the press, their appreciation for their invaluable contribution toward the success of our Annual State Meeting.

There being no further business to come before the Scientific Session, President E. D. Hitchcock declared the Sixty-fifth Annual Session of the Montana State Medical Association adjourned.

EXHIBITS

No commercial exhibits were displayed this year owing to difficulties arising because of war conditions.

SCIENTIFIC EXHIBITS AND HOBBY SHOW

The Scientific Exhibits and Hobby Show were arranged by Dr. M. A. Shillington of Glendive. A list of the exhibits and hobbies shown follows:

Scientific Exhibits

Dr. E. D. Hitchcock, Great Falls—Bone sarcomata x-rays and specimens.

Dr. J. H. Bridenbaugh, Billings—Results of Roentgen therapy on bone tumors.

Dr. S. A. Olson, Glendive—Fractures treated by Boehler technic.

Dr. David T. Berg, Helena—Plaster models of normal and pathological specimens.

Hobby Exhibits

Dr. Faus P. Silvernale (deceased), Great Falls—Wood work (courtesy of Mrs. Silvernale).

Dr. I. J. Bridenstine, Terry—Wood work.

Dr. J. H. Garberson, Miles City—Bows and arrows.

Dr. J. C. Powers, Billings—Stamp collection.

Dr. R. G. Brogan, Roundup—Marquetry, oil paintings, and lathe work.

Dr. Henry O. Drew, Billings—Clay models and sculptured pieces.

Membership as of August 3, 1943

Society	Total Members	In Army
Cascade County Medical Society	52	10
Chouteau County Medical Society	4	0
Fergus County Medical Society	16	4
Flathead County Medical Society	27	4
Gallatin County Medical Society	19	0
Hill County Medical Society	13	3
Lake County Medical Society	10	3
Lewis & Clark County Medical Society	28	10
Madison County Medical Society	6	1
Mt. Powell Medical Society	24	2
Musselshell County Medical Society	6	1
Northcentral Montana Medical Society	16	3
Northeastern Montana Medical Society	15	1
Park-Sweetgrass Medical Society	13	4
Silver Bow Medical Society	55	11
Southeastern Montana Medical Society	33	2
Western Montana Medical Society	56	18
Yellowstone Valley Medical Society	67	20
	459	97

REPORT OF THE SECOND ANNUAL MEETING OF THE WOMAN'S AUXILIARY TO THE MONTANA STATE MEDICAL ASSOCIATION

The second annual convention of the Woman's Auxiliary to the Montana State Medical Association was called to order by the president, Mrs. David T. Berg, in the Northern Hotel, Billings, Thursday, July 8, 1943, at 11:00 A. M.

The president introduced Mrs. Roy V. Moreledge, member of the newly organized hostess auxiliary of Billings, who delivered the address of welcome.

Mrs. E. L. Hitchcock, Great Falls, responded as representative of the state auxiliary.

Dr. Hitchcock, Great Falls, president of the Montana State Medical Association, spoke on the importance of the auxiliary to the state association, discussed certain pending legislation that has to do with public health and public welfare, and declared the goal for the coming year a complete organization of auxiliaries to every medical society in the state.

The president introduced Mrs. Eben J. Carey of Wauwatosa, Wisconsin, president of the Woman's Auxiliary to the American Medical Association, Mrs. P. E. Logan, Great Falls, president-elect of the state auxiliary, Mrs. Wernham, chairman of convention, and her committee, and Mrs. P. E. Griffin, president of the hostess auxiliary.

Mrs. T. L. Hawkins, chairman of credentials, gave the following report:

Number of state board members	2
Number of state officers	4
Number of national officers	2
Number of members	31
Number of guests	21
Total number present	52

The secretary read the minutes which were approved without correction.

The treasurer's report showed a balance of \$101.95 on June 1, 1943. The report was filed with the secretary without question.

The president called for reports of the state officers, of the chairmen of standing committees, and of county presidents as follows:

State—President, Mrs. David T. Berg; vice president, Mrs. J. M. Nelson; corresponding secretary, Mrs. T. L. Hawkins; program and public relations, Mrs. J. P. Ritchey; legislation and archives, Mrs. L. F. Hall; Hygeia, Mrs. Leonard Brewer; press and publicity, Mrs. T. L. Hawkins.

County Presidents—Western Montana, Mrs. J. M. Nelson; Lewis & Clark, Mrs. T. L. Hawkins; Cascade, Mrs. Robert Holzberger; Flathead, Mrs. F. B. Ross; Yellowstone Valley, Mrs. P. E. Griffin.

The following recommendations were approved by the 1943 annual meeting of the Woman's Auxiliary to the Montana State Medical Association.

I. That each county auxiliary amend its constitution to read: (a) that the fiscal year shall be from May 1st to May 1st; (b) that county, state and national dues become payable to the county treasurer on October 1st, and dues become delinquent if not paid by November 30; (c) that associate members be required to pay county, state and national dues, and that they serve on committees.

II. That article I under By-Laws in the State Constitution be changed to read: The president, president-elect, vice president, secretary, treasurer, the four directors, the chairmen of standing committees, and the county presidents shall constitute an Executive Council to conduct all necessary business of the auxiliary between annual meetings. Such business may be conducted by mail.

III. That the president, vice president and treasurer work out a financial plan for the expenses of the state auxiliary to be presented at the midyear board meeting.

IV. That the recommendations for program and public relations made by Mrs. J. P. Ritchey, Missoula, be recommended to the state chairmen of these same committees, to be incorporated to as great extent as possible in their plans for 1943-1944. These recommendations are as follows:

1. An informational course covering all state institutions having to do with the care of the sick: (a) Hospital for the Insane—Warm Springs; Dr. Holmes of War Springs suggested as speaker. (b) Tuberculosis Sanitarium—Galen; "Fighting Tuberculosis in the Rockies," by Esther G. Price, published by the Montana Tuberculosis Association. (c) School for the Blind—Great Falls. (d) School for the Feeble-minded—Boulder. (e) Hamilton Laboratory; there are movies showing life cycle of the tick—probably showing could be arranged. (f) State Board of Health, its departments and workings: (1) Bureau of Vital Statistics, (2) Hygienic Laboratory, (3) Division of Foods and Drugs, (4) Division of water and sewage, (5) Division of maternal and child welfare, (6) Division of Communicable Diseases, (7) Administration, (8) Division of Industrial Hygiene, (9) Division of Services for Crippled Children—to include hospitals for same.

2. Biographies and other books of historic value in medicine: *As I Remember Him* (Hans Zinnser), *Life of Sir William Osler* (Harvey Cushing), *Fatal Partners—War and Disease* (Ralph Major, M.D.), *Madame Curie* (Eve Curie), *An American Doctor's Odyssey* (Victor Heiser), *Papers and Speeches* (John Chalmers De Costa), *Medicine at the Crossroads* (Bertram M. Bernheim), *A Family Doctor's Notebook* (I. J. Wolfe, M.D.), *For Daughters and Mothers* (Valeria H. Parker, M.D.), *The Doctor's Wife* (Dr. Rock Sleyster), *Triumph Over Pain* (Rene Fülöp-Miller), *Medicine Marches On* (Edward Podolsky, M.D.), *A Surgeon's Life*—the Autobiography of J. M. T. Finney (of Johns Hopkins group, and the growth of the institution and its personnel), *Life of Edward Jenner*, and *A Surgeon's Autobiography* (Hugh Young).

3. (a) Build up group consciousness and loyalty to each other; (b) Build up consciousness of the Auxiliary as a working unit in the community—identify Auxiliary with the com-

mercial club as a city organization to be of service to community.

4. Plan one meeting with special speaker on some phase of medicine, health or public health, and invite the Woman's Club or other groups to attend.

5. Don't forget the social function in the Auxiliary.

The chairman of the nominating committee presented the following slate:

President-Elect—Mrs. J. M. Nelson, Missoula.

Vice President—Mrs. P. E. Griffin, Billings.

Treasurer—Mrs. A. A. Dodge, Kalispell.

Directors—Mrs. Pat Murphy, Missoula, and Mrs. David T. Berg, Helena.

The meeting recessed for luncheon. Miss McCoy of the Red Cross spoke briefly on the need for more nurses to serve the armed forces. Mrs. Ralph Spitzer sang two solos accompanied by Mrs. W. J. Jameson on the piano.

The session reconvened at 2:15. The president introduced Mrs. E. J. Carey, who spoke on the aims of the Auxiliary, ideas for program and public relations, service to community, accomplishments of the Doctors' Aide Corps in other states, and ways of helping in the defense effort. Mrs. Carey asked the assembly to take the Auxiliary pledge by repeating it in unison.

The president asked for nominations from the floor. Since there were no further nominations, the candidates were unanimously elected and were introduced to the assembly.

Mrs. J. P. Ritchey, Missoula, having been introduced by Mrs. J. M. Nelson of Missoula, expressed the appreciation of the Auxiliary and asked for a rising vote of thanks to Mrs. D. T. Berg.

The second annual convention was declared adjourned.

MRS. T. L. HAWKINS, Secretary.

MRS. DAVID T. BERG, President.

MONTANA STATE MEDICAL ASSOCIATION ROSTER--1943

MEMBERSHIP BY DISTRICTS

CASCADE COUNTY MEDICAL SOCIETY

Dr. L. L. Howard, Pres.....	Great Falls	★Hall, Cecil M.	Great Falls	★McGregor, J. F.	Great Falls
Dr. R. C. Davis, V.-Pres.	Great Falls	Hall, E. L.	Great Falls	McGregor, R. J.	Great Falls
Dr. Earl L. Hall, Sec.-Treas.	Great Falls	Hitchcock, E. D.	Great Falls	★McPhail, Malcolm ..	Great Falls
		Holzberger, R.	Great Falls	★Nagel, Chas. E.	Great Falls
Allred, I. A.	Great Falls	Howard, L. L.	Great Falls	★Peterson, C. H.	Great Falls
Anderson, C. E.	Great Falls	Hurd, F. D.	Great Falls	Richardson, R. B.	Great Falls
Andrews, F. L.	Great Falls	Irwin, J. H.	Great Falls	Russell, R.	Fort Shaw
Bateman, H. W.	Choteau	★Johnson, A. C.	Great Falls	Schemm, F. R.	Great Falls
Blankenhorn, C. E.	Great Falls	Keenan, F. E.	Great Falls	Setzer, Geo. W.	Malta
Bresee, C. J.	Great Falls	Larson, E. M.	Great Falls	Shephard, H. C.	Hughesville
★Craig, F. H.	Great Falls	Layne, J. A.	Great Falls	Strain, Earle	Great Falls
Crary, L. S.	Fairfield	Little, C. F.	Great Falls	Templeton, C. V.	Great Falls
Davis, R. C.	Great Falls	Logan, P. E.	Great Falls	★Vasco, John R.	Great Falls
Durnin, R. B.	Great Falls	Lord, B. E.	Great Falls	Walker, Dora	Great Falls
Fuller, H. W.	Great Falls	MacGregor, J. C.	Great Falls	Walker, T. F.	Great Falls
★Gibson, H. V.	Great Falls	★Magner, Chas.	Great Falls	Waniata, F. K.	Great Falls
Gleason, A. L.	Great Falls	Mayland, L. L.	Great Falls	Weisgerber, A. L.	Great Falls
Greaves, J. P.	Great Falls	McBurney, L. R.	Great Falls	Williams, W. T.	Malta
		McGregor, H. J.	Great Falls		

CHOUTEAU COUNTY MEDICAL SOCIETY

Dr. C. F. Bassow, Pres.	Ft. Benton	Dr. E. L. Anderson, Sec.-Treas.	Ft. Benton	Bassow, C. F.	Fort Benton
Dr. D. J. Cooper, V.-Pres.	Big Sandy			Cooper, D. J.	Big Sandy
		Anderson, E. L.	Fort Benton	Worstell, Gaylord	Fort Benton

FERGUSON COUNTY MEDICAL SOCIETY

Dr. C. W. Wilder, Pres.	Lewistown	★Dismore, A. B.	Stanford	Herring, J. H.	Lewistown
Dr. J. J. Elliott, V.-Pres.	Lewistown	★Eck, Raymond	Lewistown	Johnson, R. G.	Harlowton
Dr. F. F. Attix, Sec.-Treas.	Lewistown	Elliott, J. J.	Lewistown	Porter, E. S.	Lewistown
Alexander, J. L.	Winnett	Freed, Hazel	Stanford	Soltero, J. R.	Lewistown
Attix, F. F.	Lewistown	Gans, E. M.	Harlowton	Welden, E. A.	Lewistown
Deal, A. W.	Lewistown	★Gans, E. W.	Harlowton	Wilder, Curtis W.	Lewistown
		★Gans, Paul J.	Lewistown		

FLATHEAD COUNTY MEDICAL SOCIETY

Dr. F. B. Ross, Pres.....	Kalispell	Cockrell, E. P.	Kalispell	Martin, Chas. J.	Libby
Dr. M. O. Burns, V.-Pres.	Kalispell	Conway, W. Q.	Kalispell	Moore, T. B., Jr.	Kalispell
Dr. A. A. Dodge, Sec.....	Kalispell	★Delaney, J. R.	Kalispell	Munro, A. T.	Kalispell
Dr. J. Arthur Lamb, Treas.	Kalispell	Dodge, A. A.	Kalispell	Ross, F. B.	Kalispell
★Borkow, M.	Whitefish	Griffis, L. G.	Kalispell	Simons, John B.	Whitefish
Brassett, A. J.	Kalispell	★Holcomb, M. D.	Whitefish	Stewart, Robt. M.	Whitefish
Brown, J. W.	Whitefish	Huggins, H. D.	Kalispell	Taylor, W. W.	Whitefish
Burns, M. O.	Kalispell	Kell, W. L.	Columbia Falls	Towne, P. L.	Kalispell
Cairns, J. M.	Libby	Lamb, J. A.	Kalispell	★Weed, V. A.	Kalispell
Clark, C. A.	Eureka	Lees, A. T.	Whitefish	Wright, G. B.	Kalispell
		Liest, J.	Big Fork		

GALLATIN COUNTY MEDICAL SOCIETY

Dr. R. A. Williams, Pres.	Manhattan	Eneboe, Paul L.	Bozeman	Scherer, R. G.	Bozeman
Dr. A. D. Brewer, V.-Pres.	Bozeman	Grigg, E. Roy	Bozeman	Seerley, C. C.	Bozeman
Dr. E. J. Kearns, Sec.-Treas.	Bozeman	Heederks, B. J.	Bozeman	Seitz, R. E.	Bozeman
		Kearns, E. J.	Bozeman	Sigler, R. R.	Bozeman
Bole, W. S.	Bozeman	Keeton, R. G.	Bozeman	Smith, C. S.	Bozeman
Bradbury, J. T.	Willow Creek	Maillet, L. L.	Three Forks	Whitehead, C. E.	Bozeman
Brewer, A. D.	Bozeman	Phillips, J. H.	Bozeman	Williams, R. A.	Bozeman
Craft, Chas. B.	Bozeman	Sabo, F. I.	Bozeman		

HILL COUNTY MEDICAL SOCIETY

Dr. Chas. Houtz, Pres.....	Havre	Benke, R. A.	Chester	Lacey, Wm. A.	Havre
Dr. W. F. Hamilton, V.-Pres.	Havre	Forester, W. L.	Havre	★MacKenzie, D. S., Jr.	Havre
Dr. Geo. Jestrab, Sec.-Treas.	Havre	Hamilton, W. F.	Havre	MacKenzie, D. S.	Havre
		Hoon, A. S.	Chinook	McCannel, W. A.	Harlem
Almas, D. J.	Chinook	Houtz, C. S.	Havre	★Sussex, L. T.	Havre
★Aubin, F. W.	Havre	Jestrab, G. A.	Havre		

LAKE COUNTY MEDICAL SOCIETY

Dr. G. E. Armour, Pres....	St. Ignatius	Dimon, J.	Polson	Mathews, T. A.	St. Ignatius
Dr. J. E. Law, Sec.-Treas.	Polson	French, E. J.	Ronan	★Tanglin, W. G.	Polson
Armour, G. E.	St. Ignatius	Koehler, H. L.	Polson	Teel, H. M.	Polson
★Brooke, J. M.	Ronan	★Lipow, E. G.	Dixon	Venneman, F. W.	St. Ignatius

LEWIS & CLARK COUNTY MEDICAL SOCIETY

Dr. David Berg, Pres.....	Helena	Flinn, J. M.	Helena	★McCabe, James	Helena
Dr. E. L. Gallivan, V.-Pres.	Helena	Fricks, L. D.	Helena	McElwee, Wm. R.	White Sulphur Springs
Dr. Edythe Hershey, Sec.-Treas.	Helena	Gallivan, E. L.	Helena		
		Hall, L. F.	Helena	★Mears, Claude	Helena
Bayles, R. G.	Townsend	★Hawkins, Thos. L.	Helena	★Monserrate, D. N.	Helena
Berg, David T.	Helena	Hershey, Edythe	Helena	Moore, O. M.	Helena
★Campbell, Robt.	Helena	★Jump, C. F.	Helena	Morris, R. W.	Helena
Cashmore, W. F.	Helena	Kilbourne, B. K.	Helena	Nash, F.	Townsend
Cooney, S. A.	Helena	Klein, O. G.	Helena	★Shearer, Beryl C.	Helena
Copenhaver, Wm. M.	Helena	Leonard, T. M.	Helena	Thompson, J. G.	Helena
★Farner, L. M.	Helena	★Lindstrom, E. H.	Helena	★Whitlinghill, I. A.	

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. M. R. Snodgrass, Pres.	Anaconda	Downey, R. E.	Warm Springs	Malee, J. J.	Anaconda
Dr. J. L. O'Rourke, V.-Pres.	Anaconda	Dunlap, L. G.	Anaconda	Noonan, J. H.	Anaconda
		Getty, R. W.	Galen	O'Rourke, Leo J.	Anaconda
Dr. L. G. Dunlap, Sec.....	Anaconda	★Grossboll, A. N.	Philipsburg	Pampel, B. L.	Warm Springs
Dr. Gladys Holmes, Treas.	Warm Springs	★Harpo, D. T.	Deer Lodge	Place, B. A.	Warm Springs
		Holmes, G. V.	Warm Springs	Scanlon, J. J.	Deer Lodge
Anderson, G. A.	Deer Lodge	Kargacin, Tom J.	Anaconda	Snodgrass, M. R.	Anaconda
Bolton, LeRoy	Deer Lodge	Knight, A. C.	Philipsburg	Terrill, F. I.	Galen
Crowley, L. S.	Warm Springs	Larson, Eloise	Livingston	Unmack, F. L.	Deer Lodge
		Long, W. E.	Anaconda	Willits, A. J.	Anaconda

MUSSELSHELL COUNTY MEDICAL SOCIETY

Dr. R. E. Brogan, Pres.....	Roundup	★Bennett, A. A.	Roundup	Fouts, E. R.	Ryegate
Dr. E. R. Fouts, V.-Pres.	Ryegate	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. L. L. Elliott, Pres.....	Cut Bank	DuBois, W. L.	Conrad	Powell, C. D.	Vancouver, Wash.
Dr. W. C. Robinson, V.-Pres.	Shelby	Elliott, L. L.	Cut Bank	Power, H. W.	Conrad
Dr. W. L. DuBois, Sec.-Treas.	Conrad	Meadows, W. A.	Sunburst	Robinson, W. C.	Shelby
		Neraal, P. O.	Cut Bank	Rogers, R. V.	Browning
Bosshardt, O. A.	Ontario, Calif.	Olsen, N. A.	Cut Bank	Schraeder, H. F.	Browning
Cannon, P. S.	Conrad	Paterson, W. F.	Conrad	★Spatz, J. M.	Cut Bank
		★Peterson, W. M.	Plentywood	Whetstone, S. D.	Cut Bank

NORTHEASTERN MONTANA MEDICAL SOCIETY

Dr. O. G. Benson, Pres. Plentywood	Cockrell, T. L. Hinsdale	Mittleman, Edw. J. Wolf Point
Dr. H. B. Cloud, V.-Pres. Wolf Point	Habel, Wm. P. H. Wolf Point	Munch, C. J. Culbertson
Dr. R. E. Ryde, Sec.-Treas. Glasgow	Knapp, R. D. Wolf Point	Ryde, R. E. Glasgow
Agneberg, N. O. Glasgow	Knierim, F. M. Glasgow	★Schweizer, H. W. Ft. Worden, Wash.
Benson, O. G. Plentywood	Krogstad, L. T. Wolf Point	Smith, A. N. Glasgow
Cloud, H. B. Wolf Point	Larson, C. B. Glasgow	Studer, D. J. Faribault, Minn.

PARK-SWEETGRASS MEDICAL SOCIETY

Dr. A. M. Lueck, Pres. Livingston	Bennett, Dan R. Livingston	Lueck, A. M. Livingston
Dr. Paul L. Greene, V.-Pres. Livingston	Claiborn, D. R. Big Timber	★Paul, F. W. Big Timber
Dr. Dan R. Bennett, Sec.-Treas. Livingston	Cogswell, W. F. Helena	★Pearson, J. A. Livingston
	Greene, P. L. Livingston	Townsend, G. A. Livingston
	★Harris, W. E. Livingston	★Walker, R. E. Livingston
Baskett, L. W. Big Timber	Leard, S. E. Livingston	Windsor, G. A. Livingston

SILVER BOW COUNTY MEDICAL SOCIETY

Dr. R. F. Peterson, Pres. Butte	Hill, R. J. Whitehall	Rodes, C. B. Butte
Dr. J. E. Garvey, V.-Pres. Butte	Horst, C. H. Butte	★Routledge, Geo. L. Dillon
Dr. S. V. Wilking, Sec. Butte	James, H. H. Butte	Saam, S. F. Butte
Dr. C. R. Canty, Treas. Butte	Joesting, H. C. Butte	Saam, T. W. Butte
	Kane, P. E. Butte	Schwartz, Harold Butte
Atkins, D. A. Butte	★Kane, R. C. Butte	Schwartz, S. E. Butte
Brody, John Butte	Karsted, A. Butte	Shanley, T. J. B. Butte
★Bush, T. F. Butte	★Kroeze, R. Butte	Shields, J. C. Butte
Canty, Chas. R. Butte	Lapierre, J. C. Butte	★Sievers, A. R. Butte
Carmichael, G. A. Butte	Lhotka, J. F. Butte	Sievers, J. R. E. Butte
Casebeer, H. L. Butte	MacPherson, G. T. Butte	Smetters, McCormick Butte
★Casebeer, R. L. Butte	McGill, Caroline Butte	Smith, L. W. Butte
Coleman, J. K. Butte	★Monahan, R. C. Butte	Spurck, P. T. Butte
★Donich, G. M. Butte	Mondloch, J. L. Butte	Stanchfield, H. Dillon
Floyd, J. S. Butte	★Morgan, R. N. Butte	Steinberg, S. S. Butte
Frisbee, J. B. Butte	O'Keife, N. J. Butte	Stephan, W. H. Dillon
Garvey, J. E. Butte	★Pemberton, C. W. Butte	Thorkelson, Jacob Butte
Gillispie, D. L. Butte	Peterson, R. F. Butte	Ungherini, V. O. Butte
Gregg, H. W. Butte	Poindexter, F. M. Dillon	Wilking, S. V. Butte
★Hale, D. E. Butte		Williams, Frank Butte

SOUTHEASTERN MONTANA MEDICAL SOCIETY

Dr. R. D. Benson, Pres. Sidney	Garberson, J. H. Miles City	Parke, Geo. F. Glendive
Dr. B. R. Tarbox, V.-Pres. Forsyth	Harper, R. D. Sidney	Pratt, S. C. Miles City
Dr. R. G. Lemon, Sec.-Treas. Glendive	Haywood, Guy T. Forsyth	Randall, R. R. 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
Bridensine, I. J. Terry	Hunt, J. H. Glendive	Shillington, M. A. Glendive
Craig, J. W. Circle	★Lemon, R. G. Glendive	Tarbox, B. R. Forsyth
★Dale, E. Wibaux	Lindeberg, S. B. Miles City	Thompson, J. R. Miles City
Danskin, M. G. Glendive	Morrill, R. A. Sidney	Varco, A. R. Miles City
Denman, H. Baker	Noonan, E. F. Wibaux	Weeks, S. A. Baker
Farrand, B. C. Jordon	Olson, S. A. Glendive	Winter, M. D. Miles City

WESTERN MONTANA MEDICAL SOCIETY

Dr. Leonard Brewer, Pres. Missoula	Frogner, G. S. Thompson Falls	★Murphy, J. E. Missoula
Dr. A. T. Haas, V.-Pres. Missoula	George, E. K. Missoula	Nelson, J. M. Missoula
Dr. Wm. E. Harris, Sec.-Treas. Livingston	★Gordon, Donald A. Hamilton	★Noble, P. C. Polson
	Haas, A. T. Missoula	★Ohlmack, J. P. Missoula
Alderson, L. R. Missoula	Hall, H. J. Missoula	Pease, F. D. Missoula
Blegen, H. M. Missoula	Harris, W. E. Missoula	Peterson, R. L. Hamilton
Bourdeau, C. L. Missoula	Hayward, Herbert Hamilton	Preston, S. N. Missoula
Bourdeau, E. J. Missoula	★Hesdorffer, M. B. Missoula	Rennick, P. S. Stevensville
Brewer, L. W. Missoula	Hiemstra, W. Missoula	Rew, A. W. Thompson Falls
★Bussabarger, R. A. Missoula	Holmes, J. L. Missoula	Richards, J. L. Polson
★Cummings, I. K. Missoula	★Honeycutt, C. F. Missoula	Ritchey, J. P. Missoula
Doyle, W. Superior	★Keys, R. W. Missoula	★Sale, G. G. Missoula
★Duffalo, J. A. Missoula	King, W. N. Missoula	★Stephan, Louis B. Missoula
Farabaugh, C. L. Missoula	Kinter, A. R. Missoula	Svove, C. R. Somers
★Fatic, G. F. Hot Springs	Koessler, H. H. Missoula	Tefft, C. C. Hamilton
J. W. Fennell Missoula	Lowe, F. H. Missoula	Thornton, C. R. Missoula
Ferret, A. Missoula	Marshall, Wm. J. Missoula	Trenouth, S. M. Missoula
Flynn, J. J. Missoula	★Martin, L. P. Missoula	Turman, G. F. Missoula
Foss, A. R. Missoula	McPhail, W. N. Missoula	★Weber, R. D. Missoula
★Fredrickson, C. H. Missoula	★Morrison, W. F. Missoula	Wirth, R. E. Missoula
	★Murphy, E. S. Missoula	

YELLOWSTONE VALLEY MEDICAL SOCIETY

Dr. Cedric H. Nelson, Pres.	Billings	Drew, H. O.	Billings	★McIntyre, H. E.	Billings
Dr. Phillip E. Griffin, V.-Pres.	Billings	Dunkle, Frank	Billings	Morgan, H. G.	Red Lodge
	Billings	Farr, E. M.	Billings	Morledge, R. V.	Billings
Dr. H. T. Caraway, Sec.	Billings	Ferree, V. D.	Bridger	★Morrison, J. D.	Billings
Dr. Albert E. Stripp, Treas.	Billings	Fisher, M. L.	Hardin	Morrison, W. R.	Billings
Adams, E. M.	Red Lodge	Gerdes, Maude M.	Billings	Movius, A. J., Jr.	Billings
Allard, L. W.	Billings	Gordon, Wayne	Billings	Movius, A. J., Sr.	Billings
★Anderson, M. O.	Hardin	★Graham, J. H.	Billings	Nelson, C. H.	Billings
Appleman, R. W.	Worden	Griffin, P. E.	Billings	Neville, J. Vernon	Columbus
Beltzer, Chas. E.	Washoe	★Hagmann, E. A.	Billings	Olemik, John M.	Red Lodge
Benson, Theo. J.	Fromberg	Hall, E. C.	Laurel	Power, J. C.	Billings
★Biehn, R. H.	Billings	Hamerick, Fred	Crow Agency	★Rathman, Omer C.	Billings
Blackstone, A. V.	Absarokee	Hammerel, A. L.	Billings	Richards, W. G.	Billings
Bridenbaugh, J. H.	Billings	★Hammerel, J. J.	Billings	★Russell, Leland	Billings
★Brunkow, B. H.	Billings	★Hayes, J. D.	Mammoth Hot Springs	Schubert, J. W.	Hardin
Burdick, M. S.	Crow Agency	★Hodges, D. E.	Billings	★Shaw, John A.	Billings
Caraway, H. T.	Billings	★Hynes, John E.	Billings	★Smith, W. P.	Columbus
Carey, W. R.	Crow Agency	★Knese, L. A.	Yellowstone County	Souders, S. M.	Red Lodge
★Chapple, R. R.	Billings	Kronmiller, L. H.	Billings	Stripp, A. E.	Billings
Clark, A. E.	Billings	Labbitt, L. H.	Hardin	Unsell, David H.	Billings
Culbertson, H. H.	Creston	Leeper, D. D.	Laurel	Vye, T. R.	Laurel
★Currie, Robt. W.	Billings	★Levitt, Louie	Worden	Weedman, W. E.	Billings
DeCanio, John	Crow Agency	MacDonald, D. J.	Billings	Werner, S. L.	Billings
DeMers, J. J.	Huntley	★McHeffy, Geo. J.	Billings	Wernham, J. I.	Billings

★Member in the Armed Forces of the United States.

ROSTER

Montana State Medical Association -- 1943

Adams, E. M.	Red Lodge	Bourdeau, E. J.	Missoula	Cooney, S. A.	Helena
Agneberg, N. O.	Glasgow	Bradbury, J. T.	Willow Creek	Cooper, D. J.	Big Sandy
Alderson, L. R.	Missoula	Braslett, A. J.	Kalispell	Copenhaver, W. M.	Helena
Alexander, J.	Winnett	Breece, C. J.	Great Falls	Craft, C. B.	Bozeman
Allard, L. W.	Billings	Brewer, A. D.	Bozeman	Craig, J. W.	Circle
Allred, I. A.	Great Falls	Brewer, L. W.	Missoula	★Craig, F. H.	Great Falls
Almas, D. J.	Chinook	Bridenbaugh, J. H.	Billings	Crary, L. S.	Fairfield
Anderson, C. E.	Great Falls	Bridenstine, I. J.	Terry	Crouse, S. A.	Roundup
Anderson, E. L.	Fort Benton	Brody, John	Butte	Crowley, L. G.	Warm Springs
Anderson, G. A.	Deer Lodge	Brogan, R. E.	Roundup	Culbertson, H. H.	Creston
★Anderson, M. O.	Hardin	★Brooke, J. M.	Ronan	★Cummings, I. K.	Missoula
Andrews, F. L.	Great Falls	Brown, J. W.	Whitefish	★Currie, R. W.	Billings
Appleman, R. W.	Worden	★Brunkow, B. H.	Billings	Danskin, M. G.	Glendive
Armour, G. E.	St. Ignatius	Burdick, M. S.	Crow Agency	★Dale, E.	Wibaux
Atkins, D. A.	Butte	Burns, M. O.	Kalispell	Davis, R. C.	Great Falls
Attix, F. F.	Lewistown	Burns, W. J.	Sheridan	Deal, A. W.	Lewistown
★Aubin, F. W.	Havre	★Bush, T. F.	Butte	DeCanio, J.	Crow Agency
Baskett, L. W.	Big Timber	★Bussabarger, R. A.	Missoula	★Delaney, J. R.	Kalispell
Bassow, C. F.	Fort Benton	Cairns, J. M.	Libby	DeMers, J. J.	Huntley
Bateman, H. W.	Chouteau	★Campbell, Robt.	Helena	Denman, H.	Baker
Bayles, R. G.	Townsend	★Cannon, P. S.	Conrad	Dimon, J.	Polson
Beagle, J. S.	Sidney	Canty, C. R.	Butte	★Dismore, A. B.	Stanford
Beltzer, C. E.	Washoe	Caraway, H. T.	Billings	Dodge, A. A.	Kalispell
Benke, R. A.	Chester	Carey, W. R.	Crow Agency	★Donich, G. M.	Butte
★Bennett, A. A.	Roundup	Carmichael, G. A.	Butte	Downey, D. E.	Warm Springs
Bennett, Dan R.	Livingston	Casebeer, H. L.	Butte	Doyle, W. J.	Superior
Benson, O. G.	Plentywood	★Casebeer, R. L.	Butte	Drew, H. O.	Billings
Benson, R. D.	Sidney	Cashmore, W. F.	Helena	DuBois, W. L.	Conrad
Benson, T. J.	Fromberg	★Chapple, R. R.	Billings	★Duffalo, J. A.	Missoula
Berg, D. T.	Helena	Claiborn, D. R.	Big Timber	Dunkle, F.	Billings
★Biehn, R. H.	Billings	Clancy, D. F.	Ennis	Dunlap, L. G.	Anaconda
Blackstone, A. V.	Absarokee	★Clancy, John	Ennis	Durnin, R. B.	Great Falls
Blakemore, W. H.	Baker	Clark, A. E.	Billings	Dyer, R. H.	Sheridan
Blankenhorn, C. E.	Great Falls	Clark, C. A.	Eureka	★Eck, Raymond	Lewistown
Blegen, A. M.	Missoula	Cloud, H. B.	Wolf Point	Elliott, J. J.	Lewistown
Bole, W. S.	Bozeman	Cockrell, E. P.	Kalispell	Elliott, L. L.	Cut Bank
Bolton, L. R.	Deer Lodge	Cockrell, T. L.	Hinsdale	Eneboe, P. L.	Bozeman
★Borkow, M.	Whitefish	Cogswell, W. F.	Helena	Farabough, C. A.	Missoula
Bosshardt, A. O.	Ontario, Calif.	Colman, J. K.	Butte	★Farnier, L. M.	Helena
Bourdeau, C. L.	Missoula	Conway, W. Q.	Kalispell	Farnsworth, R. B.	Virginia City

Farr, E. M.	Billings	*Honeycutt, C. F.	Missoula	Martin, C. J.	Libby
Farrand, B. C.	Jordan	Hoon, A. S.	Chinook	*Martin, L. P.	Missoula
*Fattic, G. R.	Hot Springs	Horst, C. H.	Butte	Mathews, T. A.	St. Ignatius
Fennell, J. W.	Missoula	Houtz, C. S.	Havre	Mayland, L. L.	Great Falls
Ferree, V. D.	Bridger	Howard, E. M.	Miles City	McBurney, L. R.	Great Falls
Ferrett, A.	Missoula	Howard, L. L.	Great Falls	*McCabe, J. J.	Helena
Fisher, M. L.	Hardin	Huene, H. J.	Forsyth	McCannel, W. A.	Harlem
Flinn, J. M.	Helena	Huggins, H. D.	Kalispell	McElwee, Wm. R.	White Sulphur Springs
Floyd, J. S.	Butte	Hunt, J. H.	Glendive	McGill, Caroline	Butte
Flynn, J. J.	Missoula	Hurd, F. D.	Great Falls	McGregor, H. J.	Great Falls
Forster, W. L.	Havre	*Hynes, J. E.	Billings	*McGregor, J. F.	Great Falls
Foss, A. R.	Missoula	Irwin, J. H.	Great Falls	McGregor, R. J.	Great Falls
Fouts, E. R.	Ryegate	James, H. H.	Butte	*McHefly, G. J.	Billings
*Fredrickson, C. H.	Missoula	Jestrab, G. A.	Havre	McMahon, E. S.	Butte
Freed, H.	Stanford	Joesting, H. D.	Butte	*McPhail, F. L.	Great Falls
French, E. J.	Ronan	*Johnson, A. C.	Great Falls	McPhail, Malcolm	Great Falls
Fricks, L. D.	Helena	Johnson, R. G.	Harlowton	McPhail, W. N.	Missoula
Frisbee, J. B.	Butte	*Jump, C. F.	Helena	Meadows, W. A.	Sunburst
Frogner, G. S.	Thompson Falls	Kane, P. E.	Butte	*Mears, Claude	Helena
Fuller, H. W.	Great Falls	*Kane, R. C.	Butte	Mittleman, E. J.	Wolf Point
Gallivan, E. L.	Helena	Kargacin, T. J.	Anaconda	*Monahan, R. C.	Butte
Gans, E. M.	Harlowton	Karsted, A. J.	Butte	Mondloch, J. L.	Butte
*Gans, E. W.	Harlowton	Kearns, E. J.	Bozeman	*Monserrate, D. N.	Helena
*Gans, P. J.	Lewistown	Keenan, F. E.	Great Falls	Moore, O. M.	Helena
Garberson, J. H.	Miles City	Keeton, R. G.	Bozeman	Moore, T. B., Jr.	Kalispell
Garvey, J. E.	Butte	Kell, W. L.	Columbia Falls	Morgan, H. G.	Red Lodge
George, E. K.	Missoula	*Key, R. W.	Missoula	*Morgan, R. N.	Butte
Gerdes, Maude M.	Billings	Kilbourne, B. K.	Helena	Morledge, R. V.	Billings
Getty, R. W.	Galen	King, W. N.	Missoula	Morrill, R. A.	Sidney
*Gibson, H. V.	Great Falls	Kintner, A. R.	Missoula	Morris, R. W.	Helena
Gillespie, D. L.	Butte	Klein, O. G.	Helena	*Morrison, J. D.	Billings
Gleason, A. L.	Great Falls	Knapp, R. D.	Wolf Point	*Morrison, W. F.	Missoula
*Gordon, D. A.	Hamilton	*Knese, L. A.	Yellowstone County	Morrison, W. R.	Billings
Gordon, Wayne	Billings	Knierim, F. M.	Glasgow	Movius, A. J., Jr.	Billings
*Graham, J. H.	Billings	Knight, A. C.	Philipsburg	Movius, A. J.	Billings
Greaves, J. P.	Great Falls	Koehler, J. L.	Polson	Munch, C. J.	Culbertson
Greene, P. L.	Livingston	Koessler, H. H.	Missoula	Munro, A. T.	Kalispell
Gregg, H. W.	Butte	*Kroeze, R.	Butte	*Murphy, E. S.	Missoula
Griffin, P. E.	Billings	Krogstad, L. T.	Wolf Point	*Murphy, J. E.	Whitefish
Griffis, L. G.	Kalispell	Kronmiller, L. H.	Billings	*Nagel, C. E.	Great Falls
Grigg, E. R.	Bozeman	Labbitt, L. H.	Hardin	Nash, F.	Townsend
*Grosboll, A. N.	Philipsburg	Lacey, W. A.	Havre	Nelson, C. H.	Billings
Haas, A. T.	Missoula	Lamb, J. A.	Kalispell	Nelson, J. M.	Missoula
Habel, W. P.	Wolf Point	Lapierre, J. C.	Butte	Neraal, P. O.	Cut Bank
*Hagmann, E. A.	Billings	Larson, Eloise	Great Falls	Neville, J. V.	Columbus
*Hale, D. E.	Butte	Larson, C. B.	Glasgow	*Noble, P. G.	Polson
*Hall, C. M.	Great Falls	Larson, E. M.	Great Falls	Noonan, E. F.	Wibaux
Hall, E. C.	Laurel	Layne, J. A.	Great Falls	Noonan, J. H.	Anaconda
Hall, E. L.	Great Falls	Leard, S. E.	Livingston	*Ohlmach, J. P.	Missoula
Hall, H. J.	Missoula	Leonard, T. M.	Helena	O'Keefe, N. J.	Butte
Hall, L. F.	Helena	Leeper, D. D.	Laurel	Oleinek, John M.	Red Lodge
Hamernick, F.	Crow Agency	Lees, A. T.	Whitefish	Olson, N. A.	Cut Bank
Hamilton, W. F.	Havre	*Lemon, R. G.	Glendive	Olson, S. A.	Glendive
Hammerel, A. L.	Billings	*Levitt, L.	Worden	O'Neill, R. T.	Roundup
*Hammerell, J. J.	Billings	Lewis, G. A.	Roundup	O'Rourke, J. L.	Anaconda
Harper, R. D.	Sidney	Lhotka, J. F.	Butte	Packard, L. R.	Whitehall
*Harpo, D. T.	Deer Lodge	Liest, J.	Big Fork	Pampel, B. L.	Warm Springs
*Harris, W. E.	Livingston	Lindeberg, S. B.	Miles City	Parke, Geo. F.	Glendive
Harris, W. E.	Missoula	*Lindstrom, E. H.	Helena	Paterson, W. F.	Conrad
*Hawkins, T. L.	Helena	Little, C. F.	Great Falls	*Paul, F. W.	Big Timber
*Hayes, J. D.	Mammoth Hot Springs	*Lipow, E. G.	Ronan	*Pearson, J. A.	Livingston
Hayward, H. C.	Hamilton	Logan, P. E.	Great Falls	Pease, F. D.	Missoula
Heetderks, B. J.	Bozeman	Long, W. E.	Anaconda	*Pemberton, C. W.	Butte
Herring, J. H.	Lewistown	Lord, B. E.	Great Falls	*Peterson, C. H.	Great Falls
Hershey, E.	Helena	Lowe, F. H.	Missoula	Peterson, R. L.	Hamilton
*Hesdorffer, M. B.	Missoula	Lueck, A. M.	Livingston	Peterson, R. F.	Butte
Heywood, Guy	Forsyth	MacDonald, D. J.	Billings	*Peterson, W. M.	Plentywood
Hiemstra, W.	Missoula	MacGregor, J. C.	Great Falls	Phillips, J. H.	Bozeman
Hill, R. J.	Whitehall	*MacIntyre, H. E.	Billings	Place, B. A.	Warm Springs
Hitchcock, E. D.	Great Falls	*MacKenzie, D. S., Jr.	Havre	Poindexter, F. M.	Dillon
Hogebohm, C. F.	Baker	MacKenzie, D. S.	Havre	Porter, E. S.	Lewistown
*Hodges, D. E.	Billings	MacPherson, G. T.	Butte	Powell, C. D.	Vancouver, Wash.
*Holcomb, M. D.	Whitefish	*Magner, Chas.	Great Falls	Power, H. W.	Conrad
Holmes, G. V.	Warm Springs	Maillet, L. L.	Great Falls	Powers, J. C.	Billings
Holmes, J. T.	Missoula	Malee, J. J.	Anaconda	Pratt, S. C.	Miles City
Holzberger, R. J.	Great Falls	Marshall, W. J.	Missoula		

Preston, S. M.	Missoula	Shanley, T. J. B.	Butte	Towne, R. L.	Kalispell
Randall, R. R.	Miles City	*Shaw, J. A.	Billings	Townsend, G. A.	Livingston
*Rathman, O. C.	Billings	Shepherd, H. C.	Hughesville	Trenouth, S. M.	Missoula
Rennick, P. S.	Stevensville	Shields, J. C.	Butte	Turman, C. F.	Missoula
Rew, A. W.	Thompson Falls	Shillington, M. A.	Glendive	Tyler, K. A.	Galen
Richards, J. L.	Polson	Sigler, R. E.	Bozeman	Ungherini, V. O.	Butte
Richards, W. G.	Billings	Simons, J. B.	Whitefish	Unmack, F. L.	Deer Lodge
Richardson, R. B.	Great Falls	Smetters, M.	Butte	Unsell, David H.	Billings
Ritchey, J. P.	Missoula	Smith, A. N.	Glasgow	Varco, A. R.	Miles City
Robinson, W. C.	Shelby	Smith, C. S.	Bozeman	*Vasko, J. R.	Great Falls
Rodes, C. B.	Butte	Smith, L. W.	Butte	Vennemann, S. W.	St. Ignatius
Rogers, R. V.	Browning	*Smith, W. P.	Columbus	Vye, T. R.	Laurel
Ross, F. B.	Kalispell	Snodgrass, M. R.	Anaconda	Walker, Dora V. H.	Great Falls
*Routledge, Geo. L.	Dillon	Soltero, J. R.	Lewistown	*Walker, R. E.	Livingston
Rowen, E. H.	Miles City	Souders, S. M.	Red Lodge	Walker, T. F.	Great Falls
Rundle, B. S.	Circle	*Spatz, J. M.	Cut Bank	Waniata, F. K.	Great Falls
*Russell, L. G.	Billings	Spurck, P. T.	Butte	*Weber, R. D.	Missoula
Russell, R.	Fort Shaw	Stanchfield, H.	Dillon	*Weed, V. A.	Kalispell
Ryde, R. E.	Glasgow	Stanberg, S. S.	Butte	Weedman, W. F.	Billings
Saam, S. F.	Butte	Stephan, W. H.	Dillon	Weeks, S. A.	Baker
Saam, T. W.	Butte	*Stephan, L. B.	Missoula	Weisgerber, A. L.	Great Falls
Sabo, F. I.	Bozeman	Stewart, R. M.	Whitefish	Welden, E. A.	Lewistown
*Sale, G. G.	Missoula	Strain, E.	Great Falls	Werner, S. L.	Billings
Sandy, B. B.	Ekalaka	Stripp, A. E.	Billings	Wernham, J. I.	Billings
Scanlon, J. J.	Deer Lodge	Studer, D. J.	Faribault, Minn.	Whetstone, S. D.	Cut Bank
*Schearer, B. C.	Helena	*Sussex, L. T.	Havre	Whitehead, C. E.	Bozeman
Schemm, F. R.	Great Falls	Svore, C. R.	Somers	*Whitlinghill, I. A.	
Scherer, R. G.	Bozeman	*Tanglin, W. G.	Polson	Wilder, C. W.	Lewistown
Schraeder, H. F.	Browning	Tarbox, B. R.	Forsyth	Wilking, S. V.	Butte
Schubert, J. W.	Hardin	Taylor, W. W.	Whitefish	Williams, Frank	Butte
Schwartz, H.	Butte	Teel, H. M.	Polson	Williams, R. A.	Manhattan
Schwartz, S. E.	Butte	Tefft, C. C.	Hamilton	Williams, W. T.	Malta
*Schweizer, H. M.	Poplar	Templeton, C. V.	Great Falls	Willits, A. J.	Anaconda
Seerley, C. C.	Bozeman	Terrill, F. I.	Galen	Windsor, G. A.	Livingston
Seitz, R. E.	Bozeman	Thompson, J. G.	Helena	Winter, M. D.	Miles City
*Seivers, A. R.	Butte	Thompson, J. R.	Miles City	Wirth, R. E.	Missoula
Seivers, R. E.	Butte	Thorkelson, J.	Butte	Worstell, G.	Big Sandy
Setzer, G. W.	Malta	Thornton, C. R.	Missoula	Wright, G. B.	Kalispell

* Member in the Armed Forces of the United States.

South Dakota Public Health Association Meeting

The annual meeting of the South Dakota State Public Health Association will be held in the Marvin Hughitt Hotel, Huron, South Dakota, on Tuesday, September 21, 1943, at ten o'clock A. M., with George L. Hickman, M.D., Bryant, South Dakota, president, in the chair. The following program will be presented:

"Problems of the Public Health Officer"—A. Triolo, M.D., Director of the Division of Maternal and Child Health and Crippled Children, South Dakota State Board of Health.

"Vital Statistics and Public Health Education"—Mr. I. R. Vaughn, Director, Division of Public Health Education and Assistant Director of Department of Vital Statistics, South Dakota State Board of Health, Pierre, South Dakota.

"Tropical Diseases" (motion pictures and comments)—M. Fernan-Nunez, M.D., F.A.C.P., since 1927 Professor of Pathology and Tropical Medicine, Marquette University School of Medicine, Milwaukee, Wisconsin, whose formal address on the same subject will be given at 8:00 P. M.

(With the return of members of the armed forces from service in tropical and semi-tropical countries, a new public health problem has arisen. While the general health of the troops has been exceptionally good and the diseases which can be prevented by immunization have been notably low in incidence, the fact remains that through unavoidable exposure to the bites of insects and other modes of transmission, many individuals have contracted diseases which hitherto have been almost entirely confined to areas other than those in the northern latitude of the United States.

Our problem is to be able to recognize and treat these diseases when they are brought back here, for they constitute a disability to the person who suffers with them, and a source of danger to the community in which he lives. We must become

familiar with these tropical diseases, in order to know and treat them, but more important yet, to be able to keep them from being transmitted to others.

Fully realizing the importance of this problem, the services of an outstanding specialist in tropical medicine have been secured by the State Board of Health and United States Public Health Service for talks in various centers in the state under the auspices of the local district medical societies. The other places and dates are: Aberdeen, Alonzo Ward Hotel, Monday, September 20; Sioux Falls, City Hall, Wednesday, September 22; Pierre, Jr. High School Auditorium, Thursday, September 23; Rapid City, St. John's Hospital, Friday, September 24.

All licensed physicians, registered nurses, hospital personnel, (including senior students) and public health workers, also army, navy, Indian Service, and veteran administration physicians, and nurses are cordially invited to attend these meetings at whichever place is most convenient. There is no charge for admission.

Dr. Fernan-Nunez, a native of the United States, is a graduate of the University of Madrid, the London School of Tropical Medicine, and the Universities of Paris and Edinburgh. He is an accomplished and interesting speaker.)

"Follow-up Technic in Tuberculosis"—W. L. Meyer, M.D., Superintendent, South Dakota State Sanatorium for Tuberculosis, Sanator, South Dakota.

"Public Health in South Dakota"—Gilbert Cottam, M.D., Superintendent.

All persons interested in public health matters are invited and urged to attend this meeting without any obligation to join the organization.

G. L. HICKMAN, M.D., President.
J. D. CURTIS, M.D., Vice President.
GILBERT COTTAM, M.D., Acting Sec.-Treas.

Induction and Stimulation of Labor with Ergot*

Claude J. Ehrenberg, M.D., Minneapolis, Minnesota
Lt. Com. U.S.N. John A. Haugen, M.C., El Toro, Cal.

ONE hundred years ago, ergot was called "pulis parturiens," because of its wide use in the stimulation of labor. Subsequently, because of accidents the use of ergot was discouraged. Presently, for a number of reasons, it may be a propitious time to revalue the oxytocic properties of this complex drug, both before and during labor. First, recent improvements in the methods of extraction,¹ and, more recently, the isolation of the principle therapeutic oxytocic alkaloid^{2,3,4,5} (ergonovine) permit of accurate standardization for the first time in the long history of ergot. Second, moisture and other factors responsible for the deterioration of ergot preparations have been determined and may be avoided.⁶ In the third place, side effects, such as the pressor action of posterior pituitary extract on the blood pressure, and such as the hemolytic effect of quinine are absent with ergot. These are important considerations in certain conditions, such as the toxemias or the anemias of pregnancy.

Our experience with ergot for inducing labor began eight years ago and for stimulating lagging labor, some months after. Continued use of this medication has changed in no way an opinion expressed in 1939,⁷ that, "contrary to obstetrical opinion, small doses of ergot are tolerated by the pregnant woman with no ill-effect, and selected doses of carefully standardized powdered ergot are safe and effective in inducing labor." To this statement, we would append, "and for stimulating labor."

Ergot is a complex substance.⁸ At least ten alkaloids have been isolated from it, in addition to histamine, tyramine, iso-amylamine, choline, acetylcholine, ergosterol, and a number of amino acids. Of these substances, three of the alkaloids are important therapeutically: ergotoxine, ergotamine (gynergen), and ergonovine. These alkaloids are smooth muscle stimulants, particularly of the uterus, and, more particularly, of the gravid uterus. It has been pointed out that there is little or no essential difference in the action of the three alkaloids so far as the uterus itself is concerned, but because ergotoxine and ergotamine are not readily absorbed from the gastrointestinal tract while ergonovine is, the latter has become the most important, therapeutically. It has also been suggested that the same differences apply when the drugs are used intramuscularly.

It is known that ergot from different places in the world varies widely as to the alkaloid content. However, it has been shown that the proportion of alkaloids to each other in various samples of ergot deviate but slightly.^{9,10} Therapeutic reliability, then, may be expected with any ergot that has been standardized for one or two of the alkaloids, such as ergotoxine and ergonovine, if the extraction process has been complete and if deterioration is prevented. Thompson has shown that the factor responsible for deterioration is moisture and maintains that dry powdered ergot in the presence of less than 5 per cent of moisture will remain stable indefinitely. This pre-

cludes, immediately, any liquid preparation of ergot for therapeutic purposes.

The question may well be asked—if ergonovine contains approximately all of the therapeutically oxytocic activity in ergot, and can be administered orally, and does not deteriorate, why would its employment not be preferable to the whole ergot? Burn,¹¹ Rothlin,¹² and recently Bickers,¹³ have demonstrated that the oxytocic activity of ergonovine is prolonged by the presence of the other component alkaloids of ergot. On the other hand, little is known of the possible synergistic, antagonistic or additive effects of the other components of whole ergot, which might be desirable or undesirable in its therapeutic employment.

We have continued to use whole ergot for two reasons: (1) because isolated active principles generally have shown no superiority to the parent substance, and (2) because, in the development of natural history, it might seem philosophically correct to use whole substances as found in nature.

The product used by us during this time has been dried, powdered ergot, standardized according to the United States Pharmacopoeia No. XI,¹⁴ after extraction to exhaustion as recommended by Thompson. This preparation, known as U.S.P. Ergota Preparata, is defatted and is standardized to possess the equivalent of 0.5 mg. (1/128 gr.) ergotoxine ethanesulphonate per gram. The capsules furnished us[†] are of two sizes, the 12 grain ergot equivalent capsule used for labor induction, and the 6 grain ergot equivalent capsule used for stimulation. The 12 grain ergot equivalent capsule contains 0.4 mg. (1/160 grain) total ergot alkaloids, calculated as ergotoxine ethanesulphonate, in which is present ergonovine (Hampshire-Page assay) 0.11 mg. (1/600 grain). The 6 grain ergot equivalent capsule contains one-half of the above amounts.

Further experience with the parturient and intrapartum use of ergot reaffirms our earlier observations, that, in the dosages used, it possesses no pressor and anti-diuretic action as is the case with posterior pituitary extract. This fact is obviously of extreme importance in handling the patient with toxemia of pregnancy, when induction of labor may become a necessity and when stimulation may be desirable. Moreover, ergot does not exert the intravascular hemolytic effect that is produced with quinine. Failure to appreciate this fact led, in one case, to a fatal issue for both the mother and the baby.

Two technics, generally, have been employed in the induction of labor cases. First, the medical induction, which pertains to the patient while still at home. One ounce of castor oil in one-half glass of root beer is taken before breakfast. A light breakfast is eaten and, immediately after breakfast, a grain XII ergot equivalent capsule is taken. If no painful contractions are present in two hours, a second capsule of ergot is taken. Labor

*Originally presented at the University of Minnesota Center for Continuation Study Course in Obstetrics, May 5, 1943.

†Capsules Ergot (Upsher Smith) furnished through the courtesy of the Upsher Smith Company, Minneapolis, Minnesota.

	SECOND SERIES	FIRST SERIES	TOTALS
Ergot and Castor Oil	84	142	226
Ergot and castor oil plus posterior pituitary extracts	20	25	45
Ergot and rupture of membranes	56	26	82
Ergot and bag or bougie	2	2	4
			357
Ergot and castor oil:			
Successful	59 (70%)	111 (78%)	170 (75.2%)
Unsuccessful	25 (29%)	31 (22%)	56 (24.8%)
Ergot and castor oil plus posterior pituitary extracts:			
Successful	16 (80%)	17 (68%)	33 (73%)
Unsuccessful	4 (20%)	8 (32%)	12 (27%)
Ergot and rupture of membranes:			
shortest latent period	10 minutes	40 minutes	
Longest latent period	5 days	24 hours	
Average latent period	2 hrs. 35 min. (excluding long case)	4 hrs. 45 min.	
Maternal mortality	0	0	0
Infant mortality	3 (all proven prepartum intrauterine deaths)	3 (1 intrauterine death, 2 operative delivery)	2 (corrected)

is considered to have been induced, if it begins within twenty hours of the ingestion of castor oil. Second, the surgical induction, which pertains only to the hospitalized patient and which is merely a modification of or addition to the technic of rupturing and draining the bag of waters. The patient is prepared surgically, is given a cleansing enema, and is given a 12 grain ergot equivalent capsule. In one hour, the membranes are ruptured with a membrane hook inserted through a vaginal speculum.

We believe that the addition of ergot shortens the latent period. With either type of induction, if labor is slow and lingering, stimulating doses of ergot—as presently to be described—are used after four hours. Further additions have sometimes been made to the therapy, in the form of pituitrin, either hypodermically or intranasally if toxemia of pregnancy is absent.

The results obtained in the second series of cases is shown with those reported previously:

The first attempts to stimulate labor with ergot were made with gr. XII ergot equivalent capsules. Although the results were generally satisfactory, a few patients developed tumultuous contractions. It was then decided to reduce the dosage for stimulation to grain VI ergot equivalent, after which this undesirable feature has not occurred. Undoubtedly, higher proportions of the stimulated cases would have been successful with the larger dosage, but it was felt that the employment of ergot in these circumstances must always remain within the limits of ascertained safety. On the other hand, the ergot has been repeated after a four-hour interval for as many as four doses, and its administration has not been considered a contraindication to the employment of posterior pituitary extract or the employment of intravenous calcium and parathormone. Cases in which other oxytocics were used have been considered unsatisfactory. The result in those labors stimulated with ergot are as follows:

Total cases receiving ergot stimulation	192
Total cases receiving ergot and other oxytocic stimulation	28
Total cases receiving ergot and intravenous calcium levulinate with parathyroid extract	11

Total cases receiving two or more doses of ergot	36
Maternal mortality	0
Infant mortality (all operative deliveries)	3

A discussion of the indications for induction of labor would serve no purpose in this report. However, some mention of primary uterine inertia would seem necessary. Of the three major factors in labor—the passages, the passengers, and the powers—almost nothing is known of the last. No instrument or method has as yet been devised, which records adequately or objectively the intensity of the uterine contraction during labor. Lagging labor, then, was diagnosed purely on the basis of clinical judgment, a quality which is recognized at once as being widely variable among individuals. Neither time limits, according to arbitrary standards placed on the interval or length of the uterine contractions, nor subjective pain sensation of the patient have been considered the index to uterine inertia. Rather, it has been these, plus those indefinable objectivities ascertained through repeated experiences of examination and observation, which have been used as the guide for stimulating a particular labor.

Secondary uterine inertia due to fatigue, or dystocia due to cephalopelvic disproportion must be considered as definite contraindications to uterine stimulation with ergot.

SUMMARY

Ergot may be accurately standardized in the light of recent contributions to the knowledge of ergot. Used in small dosages, it is safe and effective for inducing labor and for stimulating a lagging labor.

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The Minnesota Multiphasic Personality Inventory*

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IN psychiatry, as in other fields of medicine, increasing need is being felt for the development of objective measurement devices. A signal accomplishment in this respect has been the tests for intelligence the value of which is no longer a matter for dispute. In the more involved field of personality traits, however, the need has become especially apparent, particularly for scales with known limits of error designed to measure abnormal components of personality.

It is impossible, except grossly or in special cases, to reduce human traits to such physical measurements as space, weight, temperature, time and the like. But it is possible to arrive at certain kinds of measures of behavioral reactions of individuals, in comparison with those of groups of people selected for their common possession of one or another trait. Examples of such behavioral reactions would be the response to an association word, a problem in algebra, or to individual inquiries about attitudes towards religion, sex, health and the like. Indeed, the subjective evaluations we all make of those about us are really so determined. We see a person who has an opportunity to spend money for a purpose which appeals to most others, but he refuses to do so; this is one unit in our minds by which he is denoted to be stingy. If, then, he subsequently reacts more times in a similar way, we judge him as stingy in proportion to the number of such times and to the importance of the individual times he has so reacted.

To a considerable extent, diagnostic judgment in psychiatry proceeds likewise; the patient is observed and his behavior assorted. For example, he posturizes, he appears to listen, he says irrelevant things, he smiles enigmatically. These are heavily weighted behavior items or signs of schizophrenia and, if all are present, it is pretty safe to assume him to be schizophrenic. Final decision cannot be made, however, until he is shown not to score heavily on other behavior points, indicating other diagnoses or negating the significance of the first observations.

There are several ways of observing the symptoms or bits of behavior that one uses to form a psychiatric judgment. One may passively observe a patient as he moves and speaks or one may actively interfere with the patient by bodily manipulation or by social restriction, meanwhile observing the results. The most common and useful manner of discovering significant points in a cooperative patient, however, is to ask specific questions or make specific statements and note the response. For each response, a judgment is made as to whether it is common and normal or symptomatic. The latter approach is also that most widely used in psychometric evaluation.

*From the Departments of Neuropsychiatry and of Psychology, University of Minnesota Medical School. Supported in part by a grant from the Graduate School, University of Minnesota.

Objective measurement must, in the first instance, eliminate the examiner's variability in manner of presenting the statement or question to the patient. This does not assume that a particular examiner is incapable of reliable presentation, but it is a recognition of the fact that not all examiners are reliable and unbiased. The most common way of removing the influence of an examiner is to print the question or statement, present it to the patient without comment, and permit him to react. It is essential to note that neither the personal nor the printed examination guarantees truth or candor on the patient's part. Both methods must rely on what a patient does. It is true that a subjective personal examination permits the examiner to intuitively follow certain leads but, in the objective examination, many more and carefully prepared items can be presented. The essential truths about the patient may be subtly discovered through the patient's inability to mislead consistently through a maze of items cunningly designed to bring out the truth.

There have been a number of reasons for failure to evolve a clinical scale. A chief point was that the psychologists working on scale developments were in greater part academic teachers and naturally tended to adapt their instruments to the school student. Furthermore, adequate validity and flexibility needed the cooperative efforts of psychiatrists and psychologists working in a psychiatric clinic treating a wide variety of borderline cases.

With the completion of the housing and staff of the Psychopathic Unit of the University Hospitals, an unusual opportunity was provided for such research and the *Minnesota Multiphasic Personality Inventory* was begun.¹ The basic principles of the approach to the problem were similar to those established twenty years before by Woodworth.² Details differed, however. More items were used, simple wording was stressed, the question was changed to a positive statement, usually in the first person. Also, instead of a forced restriction of the patient to two answers, he was permitted to answer that he did not know. From more than a thousand items initially selected, five hundred and fifty have been retained for the final inventory. Each of the five hundred and fifty items is printed on a separate card and the whole collected into a box with three index cards marked "True," "False," and "Cannot Say." The patient takes the cards one at a time and places them behind the index card that he feels most nearly represents his attitude toward the statement. Sample statements are: (1) "Often I feel as if there were a tight band about my head," (2) "It is always a good thing to be frank," (3) "The future seems hopeless to me." A classification of the five hun-

dred and fifty items follows:

1. General health (9 items)
2. General neurologic (19 items)
3. Cranial nerves (11 items)
4. Motility and coordination (6 items)
5. Sensibility (5 items)
6. Vasomotor, trophic, speech, secretory (10 items)
7. Cardiorespiratory system (5 items)
8. Gastrointestinal system (11 items)
9. Genitourinary system (5 items)
10. Habits (19 items)
11. Family and marital (26 items)
12. Occupational (18 items)
13. Educational (12 items)
14. Sexual attitudes (16 items)
15. Religious attitudes (19 items)
16. Political attitudes—law and order (46 items)
17. Social attitudes (72 items)
18. Affect, depressive (32 items)
19. Affect, manic (24 items)
20. Obsessive and compulsive states (15 items)
21. Delusions, hallucinations, illusions, ideas of reference (31 items)
22. Phobias (29 items)
23. Sadistic, masochistic trends (7 items)
24. Morale (33 items)
25. Items primarily related to masculinity-femininity (55 items)
26. Items to indicate whether the individual is trying to place himself in an improbably acceptable light (15 items).

The *Minnesota Multiphasic Personality Inventory* is the first inventory measuring common specific clinical syndromes, in contrast to the earlier schedules designed for either the more general concept of "neuroticism" or special states like "inferiority". The scales now available for scoring in the *Minnesota Multiphasic Personality Inventory* are Hypochondriasis, Depression, Hysteria, Psychopathic Personality, Paranoia, Psychasthenia, Masculinity-Femininity of Interests, Schizophrenia, and Hypomanic Trends.³ Some of these are in a more advanced stage of development than are others.

These scales have been compiled by comparing the responses of clinically diagnosed patients with those of persons not under the care of a doctor. It is important to note that the particular items characterizing a symptom complex are identified by the contrasting tendency for normal and abnormal patients to respond "True" or "False", without regard to the verbal content of the item. This procedure assures that the given abnormal group differs from normals in the way the item is responded to, and for scoring, no assumption is made or needs to be made regarding the import of the item.

Three tests to indicate whether or not the cards are carefully and reliably sorted are provided. These validating scores help to eliminate cases where the patient does not understand the items, tries to place himself in too favorable a light or is not cooperative.

For final interpretation, the various responses are translated into a standard scale system. On this, the average value is always 50 and a value high enough to be safely

called borderline is 70. All the scores are arranged so that a score higher than 50 is in the direction usually regarded as abnormal, although scores below 50 may have some significance. A typical result is given in figure 1.

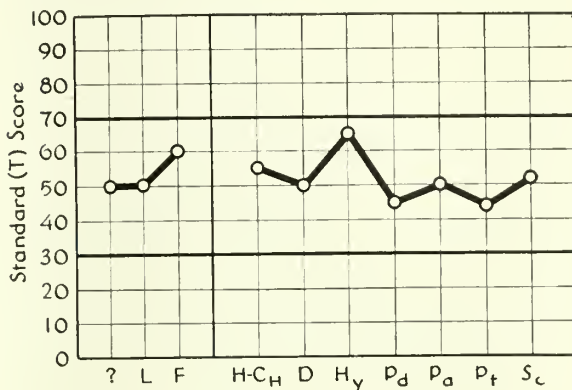


Fig. 1.

This is an essentially normal profile. No score is as high as the borderline. The three scores at the left are the validating scores, and, being within average range, they may be disregarded. The key to the remaining symbols is as follows:

- | | | | |
|------------------|--|----------------|---------------|
| H-C _H | Hypochondriasis | P _a | Paranoia |
| D | Depression | P _t | Psychasthenia |
| H _y | Hysteria | S _c | Schizophrenia |
| P _d | Psychopathic deviate
(Psychopathic personality) | | |

Although none of these scores is as high as the borderline in the example given, the highest point is hysteria; this is frequently seen in young intelligent persons. Even in these normal cases, where the hysteria score is the highest point, a careful review of the person's history will usually elicit examples of personal problems being solved by physical symptoms. Also, if this person could be placed under sufficient strain to produce a neurosis, his most probable reaction type would be hysteria.

Examples of abnormal curves will be given below. Such curves may be high in one or nearly all components according to the complexity of the psychological system. It must be repeatedly stressed that persons called normal by default of critical examination are common among us. Thus, abnormal curves may be discovered among persons who for one reason or another have shown no disablement. Similarly, some who are psychologically disabled have relatively normal curves. A few of these may have abnormalities not yet measured on the profile, but more often they are persons who have been placed under unusual environmental stress.

To illustrate the use of the *Multiphasic Personality Inventory* in the matching of groups, a series of 100 cases of psychopathic personality is available. These records were obtained at the Federal Reformatory, El Reno, Oklahoma, by H. D. Remple, psychologist, and released to us for study through the courtesy of Dr. John W. Cronin and the United States Public Health Service.

All the cases were diagnosed by the reformatory staff as Constitutional Psychopathic Inferior. This diagnostic class has been known to include a heterogeneous group of personalities. It thus becomes of interest to study the Oklahoma cases with regard to consistency of the personality profiles.

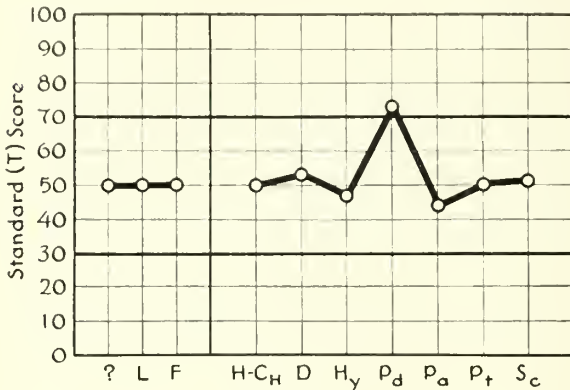


Fig. 2.

For the diagnosis, Constitutional Psychopathic Inferior, (or in more recent terminology, Psychopathic Personality) the profile in figure 2 is typical. The history given with this case is summarized as follows:

This is an 18-year-old single white male serving 2 years and 11 months under the Dyer Act. He has served terms in the Boys Industrial School and the State Reformatory where his record was poor. While acting as a trusty, he and two other youths became intoxicated, slugged a man, took his car and escaped from the institution. He was considered to be inefficient, lazy, indifferent, untrustworthy and an agitator. He had an eighth grade education and has been employed chiefly as a farm worker. His father is a law-abiding farmer. His mother died when he was 2 years of age, and the father later remarried.

The neurological examination was negative. Mental tests revealed normal intelligence: Army Alpha mental age 14.3, I.Q. 103, superior to 55 per cent. It was the reformatory psychiatrist's opinion that he was an alert but unstable and irresponsible youth, lacking in definite vocational interests and with no evidence of a frank psychosis. He was diagnosed as a Constitutional Psychopathic Inferior. It was felt that he was a definite custodial risk and a source of disciplinary difficulties.

The outstanding high point of the profile is at P_d (psychopathic personality). In this case there are no other high points that seriously confuse the diagnosis. If other high points occur in these cases, the tendency is for them to be at P_a or S_c (paranoia or schizophrenia). From psychiatric experience, this is an expected finding and is illustrated on the composite curve made from the average scores for the whole group of 100 prisoners (fig. 3).

If these persons are measured soon after being caught, D is likely to be high. This depression is apparently dy-

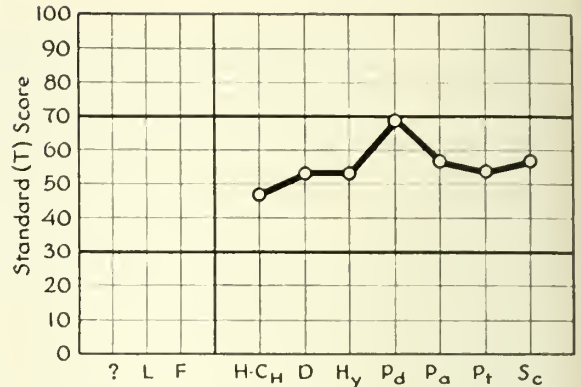


Fig. 3.

namically related to the revulsion of feeling coming with the discovery of the acts leading to the patient's difficulty.

Although from 55 to 65 per cent of the 100 cases had profiles clearly enough similar to figure 2 to warrant the diagnosis, some were definitely of other types. Figure 4 will serve to illustrate the point. The following is a summary of the case report:

This is a 20-year-old single white male serving five years under the Dyer Act after parole violation. He completed the tenth grade in school but never made a satisfactory adjustment during this time. He was a chronic truant and showed nomadic tendencies. He has been employed as a service station operator and garage man. His father, a successful real-estate agent, was recently killed in an automobile accident. His mother is employed by a doctor. The parents were separated at the time of the father's death.

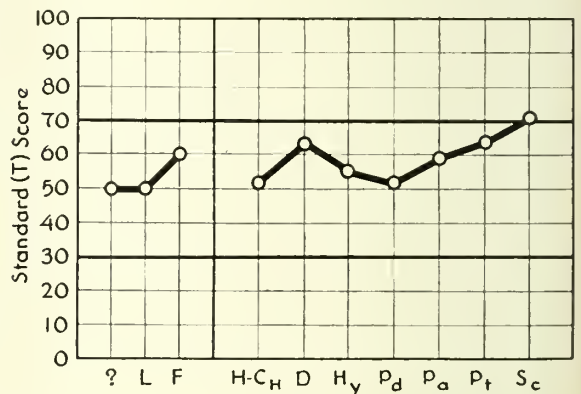


Fig. 4.

Neurologic examination was essentially negative except for slightly hyperactive deep reflexes. Psychologic tests showed superior intelligence: Army Alpha mental age 18.4, I.Q. 132, superior to 94 per cent.

It was the opinion of the reformatory psychiatrist that he was an unstable, irresponsible individual, lacking in vocational interests and with possible latent homosexual characteristics. There was no evidence of a frank psychosis. Diagnosis was made of a Constitutional Psycho-

pathic Inferior. It was thought that he would have difficulty making a satisfactory institutional adjustment and that he should be guarded against homosexual assault.

This case appears to belong more to the schizoid than to the predominantly psychopathic personality type. Cases with significant abnormality other than Pd made up the majority of the records not clearly belonging to the main type. Only about 10 per cent of the records could be confused with clearly normal records.

This brief summary of a sample group from another institution shows the progress that has been made in the establishment of an objective method of group evaluation. The chief scale in the above evaluation was still in preliminary form. A new and more reliable Pd scale has now been developed which accentuates the above findings. Other scales as they are evolved will afford more inclusive personality evaluations for general purposes of group comparison and individual analysis.

UNIVERSITY OF MINNESOTA CASES

A 50-year-old housewife described a variety of "nervous spells" which occurred several times daily. In some of these she would shake so severely that she was unable to walk or stand; in others one side of her body would become numb, she would lose her voice and "almost pass out." This latter type of spell was very frightening to her. In addition, she complained of marked fatigue, loss of weight, constant headache, poor vision, dizzy spells, ringing of the ears, night sweats, hot flashes, and vague pains in the extremities.

During the past six years, because of increasing nervousness, she made frequent visits to the family physician who blamed her trouble onto the "change of life." In December, 1940, another physician found that she had syphilis. The patient was acutely distressed at this discovery and soon thereafter began to have the above described nervous spells. Though she received fairly adequate antiluetic therapy, the symptoms continued to progress; she was referred to the University Hospitals for study on September 23, 1942.

The past history gave no evidence of previous psychiatric breakdown or of other serious physical diseases. However, the patient had numerous and scattered complaints. The history indicated that the patient had been "nervous and fidgety" from childhood. For years she had exhibited neurotic tendencies in the form of fear of high places and fear of automobiles. She blamed this temperamental handicap on an unhappy childhood. She had very little schooling. Her father was an improvident drunkard. She and her mother lived in various mining camps of the west until she married at the age of 18. Her married life was uneventful, except that her husband developed arthritis ten years ago. Now he is severely handicapped and thus a burden and worry to her.

The general physical examination was negative. The positive neurologic findings of unequal fixed pupils, partial loss of deep sensibility in the lower extremities and slurred speech suggested a diagnosis of early taboparesis. This was supported by the spinal fluid findings: Kline and Kolmer 4+; colloidal gold curve 555531000. The mental examination revealed no evidence of psychosis. Her memory and orientation were intact.

The nervous spells described in the history were frequently observed in the hospital; they were lessened by the use of phenobarbital and further decreased by reassurance. The patient had been convinced that her condition was hopeless and she was anxious over the consequences of the "dread disease" from which she suffered.

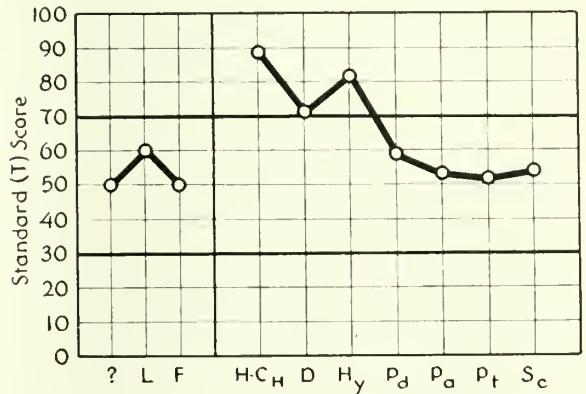


Fig. 5.

Figure 5 shows the test profile of the Minnesota Multiphasic Personality Inventory taken on admission. It illustrates the mixed type of neurotic reaction commonly seen in this hospital. The hypochondriacal score of 89 fits perfectly with her long list of complaints and her evident concern over her health. Consistent with the hysterical score of 82 are the shaking attacks, numb spells and aphonia which almost certainly are hysterical in origin. The depressive score (71) is also somewhat high. If it stood alone we would be inclined to interpret it as evidence of a predominantly depressive reaction. But in combination with higher hypochondriasis and hysteria scores we have found it to be a characteristic accompaniment of severe neuroses.

The indication in a test result of this type obtained on any patient is emphatically that the patient should *not* be regarded and treated exclusively as a neurotic patient. Rather, such a patient must be clinically evaluated, making due allowance for her neurotic temperament and its effect on any somatic symptoms that may be present. Conversely, a careful evaluation of the role the somatic problem plays in the neurotic complex must also be made. In other words, a neurotic score indicates the presence of a neurotic temperament but does not prove the absence of organic disease. Conversely, we have already shown that stable persons, even though suffering from widespread organic disease, score little higher on hypochondriasis and hysteria than do the normal.

In this case, concurrent therapies were instituted for the somatic and the psychic components. Either one alone might leave the patient incapacitated. The prognosis, like the diagnostic formulations, is dependent upon a combination of the separate futures for the two conditions as well as their interrelation.

A 58-year-old male came to the hospital for psychiatric study because of nervousness, anxiety, loss of confidence,

inability to concentrate, inability to work, occasional mild headaches and a morbid desire to pull out his hair (trichotillomania). Although he had been partially incapacitated for many years, psychiatric consultation was not previously considered necessary by the patient or his relatives.

The present illness began five years previously when the drug company for which the patient was working changed hands, and the nature of the patient's work was changed from the purchasing to the adjustment department. Although he was unable to cite any tangible reason, he became afraid that he would lose his position. Shortly thereafter, the company's business increased in volume with a resultant increase in the patient's work and duties. He then became concerned over his lack of ability to complete his work and soon found that it was difficult for him to concentrate on mental tasks. He, therefore, requested and was granted a leave of absence. He returned to work after two months but was still unable to function at his job. Rather than be discharged he resigned and moved to another city. After spending the summer at a lake cottage he improved remarkably. He then worked for a period of time in a relative's toy factory, but was restless and inefficient. He later returned to his former place of residence but he was unsuccessful in finding work. As a result of this disappointment, he developed a complete recurrence of his nervousness, anxiety, inability to concentrate and trichotillomania. He lost interest in his surroundings and would sit around the home wringing his hands. Only occasionally did he complain of headache or insomnia. It was because of these persisting complaints that he presented himself for psychiatric care.

His past history was essentially negative. As he was a member of a large family he had been forced to go to work after finishing the eighth grade. He had received a series of increases in pay at his various jobs and had worked 17 years for his last employer. He was happily married and took a mild but normal interest in various social activities and had been active in several fraternal organizations. His only disappointment occurred shortly after he was married; at this time he wanted to return to school to study pharmacy but was financially unable to do so.

The general physical and neurological examinations were essentially negative as were also the laboratory studies. At the first interview the patient appeared somewhat tense and moderately agitated. He moved his hands about constantly and picked at his scalp until it had become almost bald. Other than this he displayed no signs of severe emotional fluctuations. At times he appeared almost apathetic. He denied any profound depression or suicidal desire. His answers to questions, although brief, were adequate and to the point. He was unable to offer any explanation for the development of his symptoms. In fact, he stated that this question had bothered him a great deal. There was no pronounced intellectual disturbance.

In spite of the above symptoms, the patient did not appear to be depressed, so that the diagnosis was not clear at first. Although the patient was severely maladjusted and somewhat incapacitated by his apparent

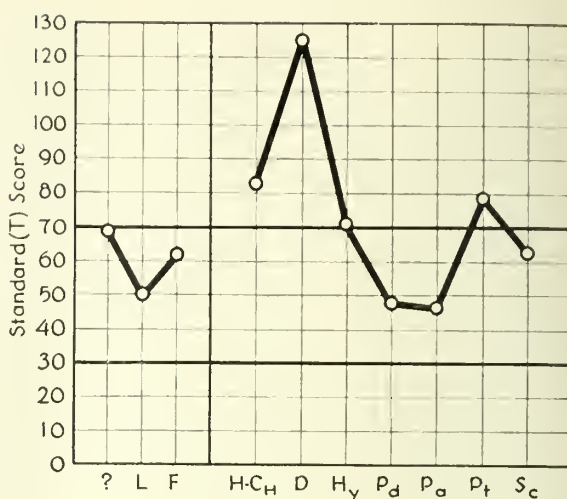


Fig. 6.

anxiety reactions, he did not seem to be psychotic. Therefore, his condition was temporarily regarded as a severe anxiety state. The Minnesota Multiphasic Personality profile (Fig. 6), to the surprise of the staff, revealed an exceedingly high score for depression, 125. The case was further shown to be an involved one, in that the hypochondriacal and psychasthenic scores were also definitely in the abnormal levels. In view of this new information, the patient was interviewed more thoroughly in respect to his emotional depression and now much new and significant information was forthcoming. It was discovered that he was and had been much more depressed than he appeared to be on casual examination. He stated that for many years he had felt very unhappy and extremely unworthy of his wife and family. The future to him had become quite hopeless. He often felt that his presence was not desired by others and he therefore refused to accompany his family on any social functions. During the past year he had also noticed a marked difficulty in thinking, which had become progressively worse. The findings obtained from the subsequent interviews necessitated a change in our diagnosis from that of anxiety state to one of agitated depression. The condition thus seems much more serious than was first appreciated. The patient has been receiving rather intensive therapy including reassurance, re-education, hydrotherapy and mild sedation with the result that he has become much less agitated. His speech defect has vanished and he has started to take at least a minimal interest in the ward activities. The trichotillomania has also disappeared and his hair has begun to return. However, he still remains profoundly depressed, although his appearance and ward behavior might lead one to become falsely optimistic about his progress.

COMMENT

The *Minnesota Multiphasic Personality Inventory*, in the role of a clinical aid, applies not alone to the case obviously needing neuropsychiatric consultation, but also to any clinical problem in which psychic factors could play a part in diagnosis or therapy.

The negative or normal profile obtained on such a case is a reassurance to the clinician, which relieves him in part from disturbing concern with psychological factors. An abnormal profile, especially if several scales are above the borderline, indicates in all cases the advisability of psychiatric referral.

To further illustrate, a recent medical patient showed lack of reasonable cooperation and concern, when his symptoms suggested a bleeding gastric ulcer. Ordinarily, such a case would not be likely to receive prompt psychiatric attention. In this case, the multiphasic profile, which was obtained by clerical help alone, gave strong evidence of a probable psychiatric disorder. The result was a profile with moderate depression and definite psychopathic personality. With this cue, the patient was interviewed and after considerable resistance admitted to quasi-malingering in order to obtain drugs. It became clear, as the history developed, that the addiction was on the basis of psychopathic personality and the ulcer problem became a minor one. As in the case of most patients with psychopathic personality, psychotherapy was not effective and shortly after discharge the patient committed suicide by overdosage with a barbiturate.

These cases serve to show the objective complexity of the personalities with which we are dealing in the psychiatric field. In psychiatry, as in other fields of medicine, rapid progress can not be made in therapeutic effort and in research until the clinician is relieved of the labor and prolonged procedures necessary for diagnosis. In a proportionate degree, as direct and reliable diagnostic technics are developed, the present overemphasis of psychiatric time spent on the diagnostic formulation will be relieved in favor of more constructively active time on therapy and management.

In the foregoing description of the development of the *Minnesota Multiphasic Personality Inventory* there is no intention of minimizing the imperfection of the particular device. From the outset, we have recognized that this whole approach might be inadequate. The results have gratifyingly vindicated the method and promise fruitful future development.

With the *Minnesota Multiphasic Personality Inventory* in its present form, a few cases still show abnormal test records in the absence of symptoms or disability brought out by other types of examination. A somewhat larger number of patients has easily observable disabilities but relatively normal test profiles. Whether these latter are successfully dissembling, inadequately questioned by the test, or have traits not yet measured has not been determined. It is likely that several sources of error exist.

Nevertheless, making cautious allowance for present imperfections, the validity of the scales is surprising. One should hardly expect to assay an individual's personality accurately and completely in a single behavior test session of an hour or two. It does not seem likely that an individual's personality could be more simply and quickly surveyed than could his physical system,—a complete physical evaluation being hardly possible in several times the test period employed for the Inventory.⁴

REFERENCES

1. Hathaway, S. R., and McKinley, J. C.: A Multiphasic Personality Schedule (Minnesota): I. Construction of the Schedule, *J. Psychol.* 10:249-254, 1940.
2. Woodworth, R. S.; quoted from Franz, S. I.: *Handbook on Mental Examination Methods*, The Macmillan Company, New York, 1919.
3. Hathaway, S. R., and McKinley, J. C.: *The Minnesota Multiphasic Personality Inventory, Manual and Test Materials*, The Minnesota Press, 1942.
4. Sets of test materials for the Minnesota Multiphasic Personality Inventory are manufactured and sold by the University of Minnesota Press, Minneapolis. Recording sheets for fifty patients are included. The cost is \$15.00.

A REPORT ON THE HEART PROGRAM OF THE BUREAU FOR CRIPPLED CHILDREN MEDICAL UNIT (Abridged)

Division of Social Welfare

February 16, 1942, to February 15, 1943

Malvin J. Nydahl, M.D.†

The Social Security Act passed in 1935 authorized the appropriation of Federal funds for services for crippled children.

The child with rheumatic fever or heart disease may be included in the definition of a crippled child.

The child must reside in the limited area which is served, but legal residence is not required. This area includes Scott, Dakota, Carver, McLeod, rural Ramsey, and rural Hennepin counties. Minneapolis and St. Paul residents are not accepted. The area had to be limited because of lack of funds, and because the Children's Bureau has advised the state agencies to start the programs in limited areas, and do intensive work in these areas until funds are available to expand the program.

Emphasis is given to the care of children with rheumatic fever or rheumatic heart disease. However, chil-

†Head, Bureau for Crippled Children, Dept. of Social Security, Division of Social Welfare, State of Minnesota.

dren with other types of heart disease which offer a reasonable expectation of improvement from treatment are also eligible for care.

Diagnostic services are available to all children living in the designated area. Treatment is given only when the family is unable to provide adequate private care. The approval of the family physician must be obtained before the child is referred to the heart clinic.

A clinic is held each Friday morning at the Children's Hospital, St. Paul, to provide diagnostic services and follow-up care. Hospital care is provided for the children during acute illness, at Children's Hospital, St. Paul, under the direct supervision of the heart clinician of the Bureau for Crippled Children. Convalescent care is also given at the Children's Hospital under the same supervision as hospital care.

As seen from the table below, from February 16, 1942, to February 15, 1943, there were 52 hospital admissions of 36 hospital patients, and 133 visits were made to the weekly heart clinics by 47 clinic patients. Ten cases were in the hospital on February 15, 1943.

	1942	1943	Total
Total number of cases.....	83		
Number of Hospital Patients	31	5	36
Number of Hospital Admissions	45	7	52
Number of Hospital Discharges	39	9	48
Number of Clinic Patients ..	44	3	47
Number of Hospital Visits	112	21	133

News-Letter

of the American Student Health Association

PLANS FOR THE HARD OF HEARING

EDWARD KING, M.D.
Cincinnati, Ohio

The return of the men from the war will offer new problems to those who are interested in the prevention and amelioration of deafness. How great these problems will be is difficult to estimate at the present time, but we must be prepared to do all in our power to classify these men properly and to aid them in fitting themselves into the civilian life which awaits them.

The medical departments of the Army, Navy and Air Corps are aware of the dangers to the hearing from high explosives, continuous exposure to noise, such as airplane engines, as well as the diseases which produce ear disabilities, and they are doing everything possible to prevent deafness. The otologist will be called upon to diagnose and decide the amount of disability.

The American Society for the Hard of Hearing, through its many branches located in all the principal cities in the country, is laying plans for the care of those who are disabled. Through this organization, with its thirty years of experience in the prevention and amelioration of deafness, the proper handling of the hard of hearing problem is assured. This organization has the personnel, the experience and the vocation to carry on a great work and deserves our utmost confidence and support.

The problem must be faced by Student Health Services as well as others. Nearby branches of the American Society for the Hard of Hearing can be of great service in developing the programs.

ASHA DIGEST OF MEDICAL NEWS

Poliomyelitis. In the July 10 (1943) issue of the *Journal of the American Medical Association*, Dr. P. M. Stimson summarized our present-day knowledge in regard to the prevention of poliomyelitis in the following instructions:

"In the presence of the disease in a community:

1. Avoid the use of any water that is possibly contaminated with sewage, either for drinking, swimming or washing utensils. We know that sewage can carry the virus considerable distances and for an appreciable time.
2. Avoid exhaustion from exertion or chilling. We know that overexertion and chilling during the incubation period tend to augment the oncoming disease.
3. Avoid injury to the mucous membranes of the nose and throat, such as that resulting from a tonsil operation. We know that poliomyelitis exposures in the early posttonsillectomy period are liable to result in severe—even fatal—infections, usually of the bulbar type.
4. Treat every minor illness as a possible case of poliomyelitis, particularly if there is fever, headache and some spasm of the neck, spine and hamstrings. We know that very mild cases of poliomyelitis without recognizable paralysis are much more numerous than paralytic cases. Suspected patients should be kept quiet in bed for sev-

eral days, and until passed as well by a competent examiner.

5. Strive for proper sanitary conditions and, in particular, destroy flies and their breeding places. We know that flies can carry the causative virus of poliomyelitis, although it has not yet been proved that they can carry enough to infect human beings.

6. Avoid unnecessary physical contacts with other people, wash hands carefully before eating, and don't put unclean objects in the mouth. We know that many healthy people carry the virus in their intestines and that for some cases, perhaps most, the port of entry of the infection is the mouth.

7. Don't prescribe or take drugs or chemicals that are intended to protect against the disease. As yet we know of none that will do this."

Though poliomyelitis is occurring in California and Texas in much larger numbers than is usual, the tendency for this disease to increase through June, July and August and reach its peak late in September should be recognized.

The State of the Salmonella Problem. S. Bernstein in the June (1943) issue of the *Journal of Immunology* makes the following points regarding the Salmonella group of bacilli:

(a) Salmonella bacilli may produce three quite different clinical pictures in the human, i. e., Salmonella fever, Salmonella septicemia and Salmonella gastroenteritis.

(b) In Salmonella fever, the fever and malaise are the dominating symptoms and usually last from one to three weeks; leukopenia occurs in some cases and the disappearance of eosinophiles is common; blood cultures are often positive early in the disease; Salmonella organisms are occasionally found both in the urine and in the sputum; bronchitis and bronchopneumonia are not infrequent complications.

(c) In Salmonella septicemia, the history may reveal an attack of diarrhea preceding the onset by a few weeks; there is a high remittant fever and positive blood culture.

(d) In Salmonella gastroenteritis, there is an incubation period of eight hours to more than twenty-four hours between the consumption of the contaminated food and the first symptoms. Vomiting is usually the first symptom; diarrhea is less severe than in dysentery and not characterized by bloody stools or tenesmus. The fever usually subsides after three or four days and recovery is complete in less than a week, as a rule.

(e) In all Salmonella infections, sulfaguanidine is considered useful, particularly in infections with *S. cholerae suis* and *S. paratyphoid A*.

(f) Smoked fish has been found responsible for several outbreaks; fish have been shown to be contaminated by sewage.

(g) There is some evidence that rat excreta have contaminated food.

(h) The hands of human carriers are an important source from which food material may become contaminated.

(i) Salmonella have been found in Chinese egg preparations.

(j) Salmonella multiply rapidly in the cream filling of pastries but do not survive in pure fruit fillings of pies.

(k) Salmonella bacilli are resistant to low temperatures and, as a result, outbreaks of infection related to ice cream have repeatedly occurred.

Aqueous Base Yellow Fever Vaccine. In the March 26 (1943) issue of *Public Health Reports*, Hargett, Bur-russ and Donovan state (a) that the earlier used yellow fever vaccine contained 10 to 40 per cent embryo extract (extract of 10 to 11 day old chick embryos infected with the attenuated 17D strain of yellow fever virus) in a human blood serum diluent; (b) the new U.S.P.H.S. vaccine is an aqueous extract (75 per cent rather than 10 to 40) and contains no serum diluent; (c) that more than 600,000 doses of this more potent, serum free, aqueous extract vaccine have been released for general use without encountering unfavorable reactions.

Sulfathiazole Powder in Pharyngeal Infections. In the April (1943) issue of *Archives of Otolaryngology*, M. S. Freeman recommends the use of 1 to 2 grams of sulfathiazole powder in cases of acute pharyngitis. The powder is applied with a compressed air powder syringe until it thickly cakes the pharyngeal mucosa. Eating and drinking is forbidden for two hours following treatment. From one to four treatments at twenty-four hour intervals were required.

Infections of Nose and Throat in Young Adults. Rhoads and Afremow in the April (1943) issue of the *Archives of Internal Medicine* report that hemolytic streptococci were found responsible for about two-thirds of the attacks of tonsillitis, pharyngitis, laryngitis and sinusitis in young adults.

Radiation Therapy of Acute Subdeltoid Bursitis. Brewer and Zink in the July 17 (1943) issue of the *Journal of the American Medical Association* state "that the treatment of choice for acute subdeltoid bursitis is (roentgen) irradiation." If there is no improvement within forty-eight hours, such treatment may be considered a failure and more radical procedures undertaken. Immediately following treatment and for eight to twenty-four hours, there may be an aggravation of symptoms, but in 11 of the last 14 cases treated by the authors, resumption of duty was possible within forty-eight hours.

In chronic bursitis, only 30 per cent show any improvement under roentgen treatment and only an occasional patient is actually cured. If definite symptomatic relief does not occur within ten days after treatment, the method must be considered a failure.

Thyroid Extract in Furunculosis. Barnes reports in the April (1943) issue of the *Journal of Clinical Endocrinology* the following observations on 16 college students 17 to 25 years of age, who were suffering from furunculosis:

(a) The basal metabolic rate or basal temperature was below normal in each case. (b) Thyroid 1 grain a day

was given and further boils did not develop during the period of this therapy. The theory of the treatment is as follows: In myxedema, the blood flow per minute and the skin temperature are reduced but are restored to normal by proper thyroid medication. In these cases of poor peripheral circulation, thyroid medication should improve the circulation in the skin and thus aid in the healing process of the furunculosis.

The Terminology of Malaria. The *American Journal of Public Health* announced in an editorial in the July (1943) issue that it had adopted a terminology based upon etiology. It will use the term *Vivax malaria* to designate Benign tertian, *Falciparum malaria* to designate Malignant tertian (Aestiv-Autumnal), *Malariae malaria* to designate Quartan, and *Ovale malaria* to designate that associated with the presence of the *Plasmodium ovale*. The 1942 edition of the *Standard Nomenclature of Disease and Operations* has also adopted an etiological classification for malaria.

Sore and Bleeding Gums in Naval Personnel. C. C. Ungley and J. S. F. Horton reported in the *Lancet* of March 27 (1943) their findings on 51 patients with sore and bleeding gums as follows: (a) The daily intake of ascorbic acid estimated from dietaries ranged from 16 to 80 mg. with an average of 37 mg. (b) Clinical evidence of scurvy or "subscurvy" was lacking. (c) Though the patients were "unsaturated" with ascorbic acid they were no more so than healthy controls. (d) About 85 per cent of the patients had Vincent's stomatitis. (e) Local causes, infections, calculus, etc., were apparently sufficient to account for the condition in all cases. (f) Ascorbic acid was therapeutically ineffective. (g) No relation to nicotinic acid deficiency could be demonstrated.

Efficacy of Vaccination Against Influenza Type A. In this experiment, 44 persons received allantoic fluid vaccine and 28 persons were followed as controls. All inhaled a recently isolated Type A influenza virus. Of the 28 controls, 10 came down with clinical influenza; of the 44 vaccinated persons (27 of whom had been vaccinated four months prior to the inhalation exposure) only one came down with clinical influenza.—W. Henle, A. Henle, and J. Stokes, Jr., March (1943) *Journal of Immunology*.

Transmission of Jaundice by Intranasal Instillation. G. M. Findlay and N. H. Martin in the May 29 (1943) *Lancet* report producing jaundice in three human volunteers by instilling into the nose nasal washings in saline from three patients who were in the preicteric or early icteric stages of jaundice, following injections of icteric strains of yellow fever vaccine. The incubation period was 28 days, 30 days, and 50 days.

Treatment for Epidemic Keratoconjunctivitis. H. S. Gradle and G. H. Harrison report in the July 10 (1943) issue of the *J.A.M.A.* that sodium sulfathiazole desoxyephedrine used as eye drops reduced the acute conjunctivitis stage of this disease in 50 cases to 3 to 7 days. The solution contains 1 per cent sodium sulfathiazole, stabilized by 0.8 per cent of sodium sulfite to which has been added 0.1 per cent of desoxyephedrine. It is stable, non-irritating and buffered to a pH of 9.0.

LIST OF PHYSICIANS LICENSED BY THE MINNESOTA STATE BOARD OF MEDICAL EXAMINERS
ON APRIL 10, 1943, BY EXAMINATION MARCH 22, 23, 24

Name	School	Address
Anderson, David Mahlon	U. of Minn., MB. 1943	San Francisco City & Co. Hosp., San Francisco
Anderson, Harold Clifford	U. of Minn., MB. 1943	New Haven Hospital, New Haven, Conn.
Anderson, Horace Alfred	U. of Kansas, M.D. 1941	Mayo Clinic, Rochester, Minn.
Anderson, Richard William	U. of Minn., MB. 1943	U. S. Marine Hospital, Seattle, Wash.
Anderson, Warren Rouvel	U. of Minn., M.B. 1942	Cambridge, Minn.
Anderson, William Theodore	U. of Minn., MB. 1943	St. Luke's Hospital, Duluth, Minn.
Batdorf, B. Niles	U. of Minn., M.B. 1942	Mpls. General Hospital, Minneapolis, Minn.
Bennett, James Gordon	Harvard U., M.D., 1939	Mayo Clinic, Rochester, Minn.
Blake, Paul Swenson	U. of Minn., MB. 1943	University Hospital, Minneapolis, Minn.
Carlisle, Joseph Dyer	U. of Minn., M.B. 1942	32 Queen Ave. S., Minneapolis, Minn.
Carlson, Catherine Dorothy	U. of Minn., MB. 1943	Infirmiry for Women & Children, N. Y. C.
Chadbourne, Wayne Alfred	U. of Minn., MB. 1943	U. S. Navy Hospital, Seattle, Wash.
Christensen, Llewellyn Eckhoff	U. of Minn., MB. 1943	Detroit Receiving Hosp., Detroit, Mich.
Cohen, Ellis Nahum	U. of Minn., MB. 1943	Detroit Receiving Hosp., Detroit, Mich.
Cooper, John P.	U. of Minn., MB. 1943	Good Samaritan Hosp., Los Angeles, Cal.
Corman, Morris D.	U. of Minn., M.B. 1941, M.D. 1942	317 - 14th Ave. S. E., Minneapolis, Minn.
Davis, George Richard	U. of Minn., MB. 1943	Ancker Hospital, St. Paul, Minn.
Delmore, Robert Joseph	U. of Minn., MB. 1943	St. Francis Hospital, Pittsburgh, Pa.
Devney, James William	U. of Minn., MB. 1943	Cinc. General Hospital, Cincinnati, Ohio.
Dixon, Frank James, Jr.	U. of Minn., MB. 1943	U. S. Navy Hospital, Great Lakes, Ill.
Edwards, Lloyd Gideon	U. of Minn., MB. 1943	St. Joseph's Hospital, St. Paul, Minn.
Eilert, Mary Louise	U. of Minn., MB. 1943	U. of Chicago Clinics, Chicago, Ill.
Englund, Elvin Frederick	U. of Minn., M.B. 1942	Mpls. General Hospital, Minneapolis, Minn.
Felton, Arthur Joseph, Jr.	U. of Minn., M.B. 1943	Wm. J. Seymour Hospital, Eloise, Mich.
Ferguson, Wilson Joseph	Washington U., M.D. 1941	Mayo Clinic, Rochester, Minn.
Frey, William Burton	U. of Minn., MB. 1943	Milwaukee Hospital, Milwaukee, Wis.
Frykman, Howard Martin	U. of Minn., MB. 1943	St. Mary's Hospital, Duluth, Minn.
Gilinsky, Irvin Lloyd	U. of Minn., MB. 1943	San Diego Co. Hospital, San Diego, Cal.
Godwin, Bernard Eugene	U. of Minn., MB. 1943	St. Elizabeth's Hospital, Washington, D. C.
Gridley, John Willis	U. of Minn., MB. 1943	Miller Hospital, St. Paul, Minn.
Grogan, John Melby	U. of Minn., MB. 1943	Kansas City General Hosp., Kansas City, Mo.
Hestenes, Erling Gerhard	U. of Minn., MB. 1943	Ancker Hospital, St. Paul, Minn.
Johnson, Georgia L.	U. of Minn., MB. 1943	Milwaukee Co. Hospital, Wauwatosa, Wis.
Jorgens, Joseph	U. of Minn., MB. 1943	Mpls. General Hospital, Minneapolis, Minn.
Kaster, John David	U. of Minn., MB. 1943	Milwaukee Co. Hospital, Wauwatosa, Wis.
Knutson, Julian Roland Borck	U. of Minn., MB. 1943	University Hospital, Minneapolis, Minn.
Larson, Kenneth R.	U. of Minn., MB. 1943	St. Joseph's Hospital, St. Paul, Minn.
Lytle, Francis Theodore	U. of Minn., MB. 1943	Presbyterian Hospital, Chicago, Ill.
McGauvran, Theodore Edgar	U. of Manitoba, M.D. 1925	Marshall, Minn.
Magraw, Richard Mueller	U. of Minn., MB. 1943	Ancker Hospital, St. Paul, Minn.
Moe, Allan Eugene	U. of Minn., MB. 1943	University Hospital, Minneapolis, Minn.
Morgan, Loran Brown	U. of Minn., MB. 1943	St. Luke's Hospital, Denver, Colo.
Moyer, John Burroughs	U. of Minn., MB. 1943	Wm. J. Seymour Hospital, Eloise, Mich.
Nachtigal, Beatrice Kelber	U. of Minn., M.B. 1942	63-50 Wetherole St., Rego Pk., Queens, N. Y. C.
Navratil, Donald Raymond	U. of Minn., M.B. 1942	520 Wash. Ave. S. E., Minneapolis, Minn.
Nelson, Bernette Genevieve	U. of Minn., MB. 1943	Mpls. General Hospital, Minneapolis, Minn.
Nelson, Bernice Antoinette	U. of Minn., MB. 1943	Mpls. General Hospital, Minneapolis, Minn.
Nelson, Carl Gilbert	U. of Minn., M.B. 1942	Mpls. General Hospital, Minneapolis, Minn.
Neuenschwander, Harold Lawrence	U. of Minn., MB. 1943	Wm. J. Seymour Hospital, Eloise, Mich.
Nolte, Mark Edward	U. of Minn., MB. 1943	U. S. Navy Hospital, Seattle, Wash.
O'Malley, Valentine	U. of Minn., MB. 1943	Milwaukee Co. Hospital, Wauwatosa, Wis.
Olson, Albert Jarl	U. of Minn., MB. 1943	San Francisco Co. Hosp., San Francisco, Cal.
Olson, Carlton Kent	U. of Minn., MB. 1943	Mpls. Gen. Hospital, Minneapolis, Minn.
Pennington, Mary Helen	U. of Minn., MB. 1943	Detroit Receiving Hospital, Detroit, Mich.
Peterson, Elroy Russell	U. of Minn., MB. 1943	New Haven Hospital, New Haven, Conn.
Pulford, James Hartman	U. of Minn., MB. 1943	Detroit Receiving Hospital, Detroit, Mich.
Quist, Henry William, Jr.	U. of Minn., MB. 1943	Mpls. General Hospital, Minneapolis, Minn.
Raths, Otto Nicholas, Jr.	St. Louis U., M.D. 1942	1171 Summit Ave., St. Paul, Minn.
Reid, James Wilson	U. of Minn., MB. 1943	Miller Hospital, St. Paul, Minn.
Rice, Roberta Geraldine	U. of Minn., MB. 1943	U. of Ill. Res. & Ed. Hosp., Chicago, Ill.
Riegel, Gordon Stannard	U. of Minn., MB. 1943	Rochester Gen. Hospital, Rochester, N. Y.
Schoeneberger, Paul Bernard	U. of Minn., MB. 1943	Wm. J. Seymour Hospital, Eloise, Mich.
Skinner, Abbott	Harvard U., M.D. 1942	1501 Summit Ave., St. Paul, Minn.
Skubi, Kazimer B.	Rush Med. Col., M.D. 1940	University Hospital, Minneapolis, Minn.
Smith, Paul McClay	U. of Minn., MB. 1943	Wilkes-Barre Gen. Hosp., Wilkes-Barre, Pa.
Sterner, Donald Carl	U. of Minn., MB. 1943	Bethesda Hospital, St. Paul, Minn.
Ulvestad, Harold Sigurd	U. of Minn., M.B. 1943	Ancker Hospital, St. Paul, Minn.

BY RECIPROCITY

Donoghue, Francis Edmund	Columbia U., M.D. 1940	Mayo Clinic, Rochester, Minn.
Garner, Fay Lorenzo	U. of Neb., M.D. 1942	Miller Hospital, St. Paul, Minn.

NATIONAL BOARD OF MEDICAL EXAMINERS

Dumais, Alcide Fernand	Boston U., M.D. 1940	Mayo Clinic, Rochester, Minn.
Hurley, Joseph Patrick	Tufts Col., M.D. 1940	Mayo Clinic, Rochester, Minn.

ON MAY 7, 1943, BY EXAMINATION APRIL 20, 21, 22

Name	School	Address
Anderson, Franklin Carl	U. of Minn., M.B. 1942	115 Third St., Cloquet, Minn.
Bianco, John James	Temple U., M.D. 1941	Mayo Clinic, Rochester, Minn.
Christensen, Norman Anton	Rush Med. Col., M.D. 1941	Mayo Clinic, Rochester, Minn.
Cluxton, Harley Ernest, Jr.	Johns Hopkins, M.D. 1941	Mayo Clinic, Rochester, Minn.
Ellison, Adam Brown Curry	Rush Med. Col., M.D. 1941	Mayo Clinic, Rochester, Minn.
Fortner, Lucille Lanier	U. of Ore., M.D. 1940	Mayo Clinic, Rochester, Minn.
Giebink, Robert Rodger	U. of Minn., M.B. 1942	4404 Harriet Ave., Minneapolis, Minn.
Hamm, Robert Snyder	Ohio State U., M.D. 1940	Mayo Clinic, Rochester, Minn.
Haugseth, Ellsworth Kenneth	U. of Minn., M.B. 1943	Twin Valley, Minn.
Hohm, Theodore Arthur	U. of Chicago, M.D. 1941	Huron, S. D.
Johnson, Frank Waters	Rush Med. Col., M.D. 1942	5610 Dorchester Ave., Chicago, Ill.
Kemper, Clarence McDaniel	U. of Colo., M.D. 1941	Mayo Clinic, Rochester, Minn.
Larson, Keith Delmar	Northwestern, M.B. 1940, M.D. 1941	Mayo Clinic, Rochester, Minn.
Lobitz, Walter Charles, Jr.	U. of Cincinnati, M.B. 1940, M.D. 1941	Mayo Clinic, Rochester, Minn.
Mason, Eugene Edear	Baylor U., M.D. 1940	Mayo Clinic, Rochester, Minn.
Multhauf, Cyril Joseph	Marquette U., M.D. 1941	Mayo Clinic, Rochester, Minn.
Murphy, Jack Tullus	Northwestern, M.D. 1942	Mayo Clinic, Rochester, Minn.
Notier, Victor Anthony	Rush Med. Col., M.D. 1941	Mayo Clinic, Rochester, Minn.
Quattlebaum, Frank Walter	U. of Georgia, M.D. 1939	Mayo Clinic, Rochester, Minn.
Rogers, James Del	Northwestern, M.B. 1941, M.D. 1942	Mayo Clinic, Rochester, Minn.
Rosenblatt, Henry Dennis	U. of Minn., M.B. 1942	809 Portland Ave., St. Paul, Minn.
Snider, Gordon Gaskill	U. of Ill., M.D. 1941	Mayo Clinic, Rochester, Minn.
Stratte, John Joseph	Rush Med. Col., M.D. 1942	Warren, Minn.
Taylor, Douglas Hamilton	U. of Ore., M.D. 1942	Mpls. General Hospital, Minneapolis, Minn.
Thomes, Arthur Boyd	U. of Minn., M.B. 1942	University Hospital, Minneapolis, Minn.
Tinkham, Robert Grey	U. of Minn., M.B. 1942	25 Seymour Ave. S. E., Minneapolis, Minn.
Tongen, Lyle Aaron	Washington U., Mo., M.D. 1942	Walhalla, N. D.
Watson, Theodore	U. of Minn., M.B. 1943	Miller Hospital, St. Paul, Minn.

BY RECIPROCITY

Calmonson, Marvin	Rush Med. Col., M.D. 1938	Mayo Clinic, Rochester, Minn.
Johnson, Aldridge Francis	U. of Ark., M.D. 1942	Greenwood, Ark.
Levin, Jules Darrell	U. of Wis., M.D. 1938	University Hospital, Minneapolis, Minn.
Murdoch, James William, Jr.	U. of Neb., M.D. 1942	826 S. 36th, Lincoln, Neb.

NATIONAL BOARD OF MEDICAL EXAMINERS

Tice, Arnold	U. of Iowa, M.D. 1941	Mayo Clinic, Rochester, Minn.
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ON JULY 17, 1943, BY EXAMINATION JUNE 15, 16, 17

Boonen, Jack Carleton	U. of Minn., M.B. 1943	St. Mary's Hospital, Duluth, Minn.
Burklund, Edwin Carl	Northwestern, M.B. 1942, M.D. 1943	1000 Univ. Ave. S. E., Minneapolis, Minn.
Colberg, Arthur J.	U. of Minn., M.B. 1922, M.D. 1923	2343 Carter Ave., St. Paul, Minn.
Conley, Robert Hanten	U. of Minn., M.B. 1942, M.D. 1943	Watertown, S. D.
Coulter, Harold Eugene	U. of Minn., M.B. 1942, M.D. 1943	Lamberton, Minn.
Flynn, Bernard Francis	Loyola U., M.D. 1943	2117 - 6th Ave. E., Hibbing, Minn.
Gaarde, Frederic William, Jr.	U. of Minn., M.B. 1942, M.D. 1943	718 - 5th St. S. W., Rochester, Minn.
Galligan, Margaret Mary Durkin	U. of Minn., M.B. 1942, M.D. 1943	1910 Franklin Ave. S. E., Minneapolis, Minn.
Geurs, Benjamin R.	U. of Minn., M.B. 1942, M.D. 1943	Hamel, Minn.
Horns, Richard Coburn	U. of Minn., M.B. 1942	University Hospital, Minneapolis, Minn.
Ide, Arthur Wheaton, Jr.	U. of Mich., M.D. 1943	Ancker Hospital, St. Paul, Minn.
Kaplan, Harold Arthur	U. of Minn., M.B. 1943	Ancker Hospital, St. Paul, Minn.
Kern, Carroll E.	Indiana U., M.D. 1940	Mayo Clinic, Rochester, Minn.
Kirklin, John Webster	Harvard U., M.D. 1942	1104 - 7th St. S. W., Rochester, Minn.
Lick, William Joseph, Jr.	U. of Minn., M.B. 1942	587 Dayton Ave., St. Paul, Minn.
Lofgren, Karl Adolph	Harvard U., M.D. 1941	Mayo Clinic, Rochester, Minn.
Luckemeyer, Carl Joseph	Marquette U., M.D. 1943	St. Mary's Hospital, Duluth, Minn.
Lund, Curtis Joseph	U. of Wis., M.D. 1935	University Hospital, Minneapolis, Minn.
McCarthy, Austin Michael	U. of Minn., M.B. 1942	Mpls. General Hospital, Minneapolis, Minn.
Michels, Roger P.	U. of Minn., M.B. 1942, M.D. 1943	801 Becker Ave. W., Willmar, Minn.
Milnar, Frank Joseph	Marquette U., M.D. 1942	412 Otis Ave., St. Paul, Minn.
Neander, John Frederick	U. of Minn., M.B. 1943	1242 Earl St., St. Paul, Minn.
Padgett, Harold Owen	Baylor U., M.D. 1939	Mayo Clinic, Rochester, Minn.
Poore, Thomas Nelson	U. of Minn., M.B. 1943	St. Mary's Hospital, Duluth, Minn.
Rinehart, Robert Earl	U. of Oregon, M.D. 1942	Mayo Clinic, Rochester, Minn.
Rives, Hugh Farrar	U. of Arkansas, M.D. 1938	Mayo Clinic, Rochester, Minn.
Roth, Robert Russell	U. of Illinois, M.D. 1941	Mayo Clinic, Rochester, Minn.
Schulze, John William	U. of Minn., M.B. 1942, M.D. 1943	Hutchinson, Minn.
Shonyo, Elwyn S.	Rush Med. Col., M.D. 1937	Mayo Clinic, Rochester, Minn.
Troxil, Elizabeth B.	U. of Minn., M.D. 1943	Mpls. General Hospital, Minneapolis, Minn.
Vigeland, George Norman	Northwestern U., M.B. 1941, M.D. 1942	628 Grand Ave., St. Paul, Minn.
Whelan, Joseph L.	U. of Minn., M.B. 1942, M.D. 1943	20 First St. S. W., Chisholm, Minn.
Whitlock, Gerald Frederick	Washington U., Mo., M.D. 1941	Mayo Clinic, Rochester, Minn.

BY RECIPROCITY

Baird, Joe William	U. of Neb., M.D. 1930	Mayo Clinic, Rochester, Minn.
Westphal, Kean F.	Northwestern U., M.B. 1937, M.D. 1938	1947 Grand Ave., St. Paul, Minn.

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MINNEAPOLIS, MINNESOTA, SEPTEMBER, 1943

UNDULANT FEVER

Under the caption "Look for Malta Fever" we discussed the increasing prevalence of this disease in an editorial, January first, 1934. Since that time we have been conscious of its increasing spread in the United States. In the year preceding that editorial there were 72 cases of undulant fever in Minnesota and no deaths. Last year, there were 257 cases, 206 males with one death and 51 females with no deaths. The last seven years, particularly, have seen a steady and alarming climb in these figures. During the years 1932 to 1942, inclusive, the records show a grand total of 1264 cases with 22 deaths. These figures are authentic, having been compiled at our request, through the kindness of Dr. Orianna McDaniel, director of the division of preventable diseases, and Dr. A. J. Chesley, executive secretary of the Minne-

sota department of health. They also have statistics on the occupational hazards, with milk and meat handlers naturally leading the list, but many cases represent employments apparently unrelated to any known source, including 142 children and students.

When our valiant soldiers return from the battle fronts of the world, those who served in the medical corps around the Mediterranean area may bring us some first hand information that will help to combat this rising affliction here at home. If they bring back with them, however, a mascot in the shape of a *brucella melitensis* infested goat, we hope their delight at seeing the Statue of Liberty will prompt them, forthwith, to give it up as a suitable burnt offering on Quarantine Island at the joy of their safe deliverance.

A. E. H.

THE SUNSET SLOPE

Geriatric medicine has been the subject of many excellent articles appearing in the past two years. The care of the aged has always been accepted as a part of every doctor's work but it is now becoming more and more a specialty and, therefore, arouses our interest. The reasons for such a designation and allocation are several. In the first place, those doctors who were adept at caring for the aged and who studied the problem found themselves faced by the fact that there are now more septagenarians on the hoof than there used to be. Furthermore, they found that these needed different and special care, and had different and special problems from children and young adults. There are two important sides to geriatric care; the diagnosis and treatment of organic changes and disease particular to senescence, and the mental care and prevention of those psychic changes of involution which characterize many old people.

Physically, one is dealing with a body in which there is a degree of dehydration, shrinking, sclerosis, inelasticity, loss of strength and tone, and changes in colloidal structure. There are also atrophies, postural changes, and functional weaknesses dependent on the foregoing factors and on lowered metabolism. The involution of the circulatory system alone may account for senescent changes such as drying and hardening of the skin from an impoverished blood supply. The senile dermis fails to some extent in its important function as a heat regulator and thus we find that older people do not tolerate temperature extremes. It is the old folks who are apt to have heat strokes and who must draw a shawl over their shoulders when they sit in front of the fire on a winter evening. The physiologist and biochemist recognize these changes but do not shed much light on them. According to Dr. A. J. Carlson of Chicago, more time should be spent on their study and less on their enumeration. And speaking of senescent vascular changes, one writer has paraphrased an easily recognized quotation, saying, a man is as old as his ability to disperse cholesterol.

Of course there is no definite time when old age sets in, but the aging process starts early. One writer, Dr. G. M. Davidson, remarks in a lecture on "Passing the Meridian of Life" that grace and agility of movement begin to dwindle in the early thirties. That, you say, may be true of some people, but not of you. Well—good for you! It must be admitted, however, that as far as others are concerned, there comes a time when mental processes begin to deteriorate. Concentration is poor, memory flags, there is less externalization of ideas, and a period of psychological crystallization approaches.

Let it be remarked here as a hopeful note that mental senescence does not come to everyone. Hundreds of mentally alert octogenarians who are doing active and even brilliant work can be named. Dr. E. B. Allen in a paper read at the organization meeting of the American Geriatrics Society is convinced that prophylactic measures taken before the onset of psychological involution could do a great deal to increase the happiness and usefulness of those whose old age finds some degree of physical retirement necessary. According to Dr. Starke Hathaway of Minnesota, salients in the personality profile as

demonstrated by the Minnesota Multiphasic Personality Inventory would give definite leads for the prophylactic psychotherapy in pre-senescence. It is in this field that geriatrics has its greatest appeal.

L. M. D.

Book Reviews

Outline of Roentgen Diagnosis, an Orientation in the Basic Principles of Diagnosis by the Roentgen Method, by LEO G. RIGLER, M.D. Philadelphia: J. B. Lippincott Co., 196 pages with index and pictorial atlas of 254 illustrations, price \$6.50.

Although Dr. Rigler offers the second edition of his book on the same basis as the first one in 1938, as an outline for the teaching of roentgen diagnosis, the work has always been more than that. It is a convenient reference for any physician doing all or part of his own roentgenographic work in regard to doubtful diagnostic matters and points of technic. The outline form compels brevity and conciseness, and the author has mastered this particular method of presentation, avoiding the semblance of dogmatism inherent in such a technic.

Information concerning the new procedures of roentgenkymography, body section roentgenography, and myelography for investigation of defects of the spinal canal is given in the second edition, and discussion of older, standard methods has been augmented by addition of proved and useful data.

The advantages of fluoroscopy have been presented and elaborated—a subject which needs intelligent stimulation. The dangers to be avoided, particularly by those not specializing in roentgen work and who often, out of ignorance, endure needless exposure, are rightfully stressed.

Those who have not become acquainted with the first edition should hasten to read the second; those who have learned to depend upon the first edition, should obtain this rewritten text.

A Manual of Allergy, by MILTON B. COHEN, M.D. New York: Paul B. Hoeber, Inc., 156 pp., 1942, \$2.

This is a short, rather concise book intended to summarize for the busy practitioner the important features to study in allergic patients. Much attention is given to the type of history-taking which is necessary in determining allergic conditions. This book cannot be considered a textbook of allergy, but is merely a compendium which lights the high spots on this particular field. It is of value, of course, because of its conciseness, especially for the family physician who has most of these problems to consider.

Nutritional Deficiencies, by JNO. B. YOUMANS, A.B., M.S., M.D. Philadelphia: J. B. Lippincott Co., 385 pp., 1941, \$5.

Exploration for a better world today calls for international food conferences and the compilation of literature looking toward a full understanding of nutrition. More and more physicians will be asked to give advice on nutritional problems. Clinical observations and scientific investigations of the past and present are expected to disclose the answers to questions that are confronting all countries. Much has been written. True and false claims have been made. This leads to confusion. The physician can expect to be called upon to say how much vitamins influence our lives, what protein does, where calcium, iron and iodine fit in. Failure to clarify the situation might easily disconcert and discourage great groups on whose cooperation and understanding governments depend, and retard advances in the study of nutrition. This new book goes a long way toward straightening out the diagnosis and treatment of nutritional deficiencies. It is therefore most timely and should be read by practising physicians who have a concern for this generation and for those who will want food knowledge in the years to come.

A Guide to Practical Nutrition, a series of articles, sponsored by the Philadelphia County Medical Society, edited by MICHAEL G. WOHL, M.D., and JNO. H. WILLARD, M.D. Reprinted from *Philadelphia Medicine*, 1941-1942. Publication and distribution made possible through a grant-in-aid from Jno. Wyeth & Bro., Inc.; 6¾ x 9¾, bound in heavy gray paper, 100 pp., 1943. Sent with the compliments of the Society.

Food shortages, lack of buying power, or ignorance may be the cause of poor nutrition but in this country, the greatest of these is ignorance. Public illumination is not a simple problem but one which will require diligent attack from all possible angles before solution is approached. This book is an excellent contribution to the educational campaign now being carried on by many interested agencies.

Twelve authors, all distinguished in their own fields, have written chapters on the different normal food requirements and on the special needs for childhood, pregnancy, and old age.

Complete food tables, vitamin and mineral charts, and a cross-index make this a good reference book for the physician who should take a leading part in the dietary education of the public.

Rehabilitation of the War Injured, a Symposium edited by WILLIAM BROWN DOHERTY, M.D., and DAGOBERT D. RUNES, M.D.; New York, Philosophical Library; 684 pages, numerous black and white illustrations; 1943; price \$10.

This symposium includes over fifty articles by leading English, American and Russian authors, presenting sections on neurology and psychiatry, reconstructive and plastic surgery, orthopedics, physiotherapy, occupational therapy and vocational guidance, the legal aspects of rehabilitation, and neurologic lesions in survivors of shipwreck. Most of the material has been published previously in prominent medical journals and books. The papers are concise, each concerning itself essentially with only the one phase of the subject which presents the most difficulty in rehabilitation. The book is well illustrated with photographs and drawings and the inclusion of lists of references adds to its value.

Eye Hazards in Industry, *Extent, Cause and Means of Prevention*, by LOUIS RESNICK. Published for the National Society for the Prevention of Blindness, by Columbia University Press, 321 pages. New York, 1941. Cloth, price \$3.50.

This book contains information concerning the eye accidents which may affect the industrial worker, and points out the benefits, both to the worker and his employer, to be obtained by better eye protection.

The author's conclusions are, that the only safe method of preventing eye injuries, in industry, is for all employees as well as visitors to wear goggles during the entire time they are in the plant. He quotes the results in certain plants where this rule has been in effect. Anyone interested in this subject will find this book of great service.

The 1942 Year Book of General Medicine, edited by GEO. F. DICK, M.D., J. BURNS AMBERSON, JR., M.D., GEO. R. MINOT, M.D., WM. B. CASTLE, M.D., WM. D. STROUD, M.D., and GEO. B. EUSTERMANN, M.D. Chicago: Year Book Publishers, Inc., 848 pages with index, 1942, \$3.

The *Year Book of General Medicine* maintains the high standard of excellence set by the previous publications. The outstanding articles from recent medical literature, noting salient observation in the fields of infectious diseases, pulmonary conditions, blood dysaemias, kidney, heart and vascular disorders and disturbances of the digestive system and metabolism have been ably abstracted by the six recognized clinical leaders who have compiled this volume. The emphasis has been properly placed upon matters of practical application by the non-specializing practitioner. No better compendium of postgraduate education could be desired by the busy medical man than that comprised in this handy, compact, well documented and indexed book.

News Items

Dr. Robt. G. White, formerly of Valley City, North Dakota, and Bismarck, at which latter point he has served as director of maternal and child hygiene for the state department of health, became director of the Burke-Minot-Ward district public health unit, with offices at Minot, August 1, succeeding the late Dr. Olaf Haraldson.

Dr. George F. Campana, formerly of New Rochelle, New York, recently licensed to practice medicine in North Dakota, has been appointed state epidemiologist and director of the division of preventable diseases by North Dakota state health officer, Dr. F. J. Hill.

On July 29, the Watertown, South Dakota, *Public Opinion* published the picture of a bacteriologist in the laboratories of E. R. Squibb & Company examining the penicillium mold from which is extracted the potent germ fighter, penicillin.

The farthest advanced general hospital set up by the American army up to May, 1943, was established near the Tunisian front by the University of Minnesota unit and was put together in less than three weeks time partly out of salvage from army junk piles. The Red Cross credits the University of Minnesota men with accomplishing miracles with gasoline drums, bits of glass, wire, and iron from salvage dumps. The hospital was almost entirely under canvas.

Dr. T. E. McGavran, a practitioner formerly of Velva, North Dakota, and Marshall, Minnesota, has taken up the practice of Dr. Roy W. Pence, Minot, North Dakota, whose ill health causes him to move to southern Texas.

Changes in the Montana State Board of Health personnel find Dr. Charles J. Bresee of Great Falls, succeeding Dr. George F. Turman of Missoula, resigned, and Dr. R. C. Monahan of Butte filling the post of Dr. Enoch M. Porter, of Great Falls, deceased.

Dr. Howard R. Wold of Grafton, North Dakota, has taken over the practice of Dr. David H. McKeague at Maddock, North Dakota.

Dr. Gilbert Cottam, superintendent of the South Dakota State Board of Health, announced the opening of a branch laboratory at Rapid City, South Dakota, during July.

Dr. Vincent S. Irvine, formerly of Grafton, Lankin and Park River, North Dakota, has succeeded to the practice of Dr. Ernst G. Sasse of Lidgerwood. He practiced at Park River for twenty years.

Drs. J. C. McKinley and S. R. Hathaway of the department of neurology and psychiatry of the University of Minnesota medical school discussed a technic for the easy characterization of abnormal mental traits at the annual meeting of the Southern Minnesota Medical Association, August 23, at Austin, Minnesota.

Dr. Fredk. W. Freyberg of Conde, South Dakota, has removed to Mitchell, where he began his medical career many years ago.

Dr. Walter F. Ramsey, Children's Hospital, St. Paul, toured the North Shore of Lake Superior for three weeks in behalf of the Medical and Surgical Relief Committee seeking donations of instruments for army, navy, and coast guard stations. He was accompanied by Mrs. Ramsey and made his headquarters at Lutsen, Minnesota.

Dr. L. D. Fricks, city-county health commissioner for Helena, Montana, from September, 1942, until May, 1943, has been succeeded by Dr. R. J. Shale, lately of Tampa, Florida, and at one time health officer at Ontonagon, Michigan.

Dr. George H. Stidworthy of Deerfield, South Dakota, was tendered a birthday party by his friends on his 82nd birthday. He practiced at Viborg for 50 years. Among the guests present was the first baby delivered by Dr. Stidworthy.

Captain Sidney C. Stenerodden of Grand Forks, North Dakota, is attached to an American portable hospital in mandated New Guinea, near Morobe. Captain Stenerodden is a graduate of the University of North Dakota school of medicine. He has been in the service since June, 1942, and in the South Pacific since September.

Dr. Bernard I. Saliterman, formerly of Janesville, Minnesota, and lately practicing in Minneapolis, has joined the army with the rank of captain and has been assigned to the hospital base at the Presidio, San Francisco.

Dr. Leonard L. Kallestad, Hutchinson, Minnesota, has received a war department appointment as orthopedic surgeon in the unit of ten specialists formed by Dr. Charles Rea of St. Paul. Dr. Kallestad's station is Knoxville, Tennessee. Dr. Gerhard F. Knutson of Belview, Minnesota, has received a similar appointment from the war department and has left for the Smokey Mountains of Tennessee.

Dr. Martin G. Ericsson, formerly of Long Prairie, Minnesota, who for the past several years has been in Cedar Falls, Iowa, reported to Carlisle Barracks, Pennsylvania, August 25, for preliminary training, entering the service with rank of captain.

Captain John J. Scanlon of the U. S. Army medical corps paid a visit to his home city, Anaconda, Montana, accompanied by his wife and small son while on leave from his post at San Antonio, Texas.

Dr. Roger P. Hentz, manager of the veteran's administration facility at St. Cloud, Minnesota, will be transferred to Fort Custer, Michigan, on September 1, and will be succeeded by Dr. J. A. Pringle, now assistant medical director of the neuropsychiatric division of the veteran's administration medical center in Washington, D. C.

Lt. Desmond M. Thysell of Minneapolis, is at the Naval Base Hospital in Waukegan, Illinois.

Dr. Frank W. Bilger, who practiced medicine 34 years in and near Hot Springs, South Dakota, has been appointed contract surgeon with the rank of first lieutenant in the U. S. Army medical service and, after training at Fort Robinson, Nebraska, will be assigned to duty at the Black Hills Ordnance Depot at Provo.

Captain B. L. Sinner, M.C., of Fargo, North Dakota, has been transferred from Station Hospital at Camp Crowder, Missouri, to the Fourth Auxiliary Surgical Group, at Lawson General Hospital, Atlanta, Georgia.

Major R. D. Nierling, M.C., of Jamestown, North Dakota, has left the Station Hospital at Camp Carson, Colorado, for Camp Barry at Banning, California.

Captain Alvin J. Swingle, M.C., of Mandan, North Dakota, has left Camp Barry, California, and is with the 58th General Hospital which was shipped from an eastern seaport early in August.

Captain Loren F. Wasson, M.C., of Alexandria, Minnesota, is attached to the 309th Fighter Control Squadron at Bradley Field, Connecticut.

Dr. Rudy E. Hultkrans has left Minneapolis to enter the army medical corps with the rank of captain. He has been assigned to the staff of the Army and Navy hospital at Hot Springs, Arkansas.

The British Information Services, with an office at 360 North Michigan Avenue, Chicago, has issued a booklet on British health services in wartime, which contains many chapters of interest to the medical profession.

Dr. Caroline F. Helmick of the division of maternal and child hygiene of the North Dakota State Board of Health, held a series of meetings for the examination of pre-school children throughout the Devils Lake area, the first 18 days of August.

Dr. Chas. F. Culver, for 40 years a general practitioner at Sioux Falls, South Dakota, has removed to the Rio Grande Valley district of Texas, where he will take residence in September after a short stay in Minnesota.

Dr. R. S. Madland, Fairfax, Minnesota, received his appointment in the Medical Corps of the Army, with the rank of Captain. He was at Carlisle Barracks, Pennsylvania, for a six weeks training period, then went to the Springfield, Missouri, O'Reilly General army hospital.

The *Annals of Allergy*, which is to be published once every two months by the American College of Allergists, took its place in the field of medical literature last month. In its editorial pages it introduces itself and gives an interesting account of the incorporation of the College. The first number contains an article on army allergy, reporting the experience with allergy clinics in the Fourth Army Command. Dr. Duttin of El Paso discusses allergy as etiological factor in some cases of appendicitis. De-allergization versus Hyposensitization is the subject of a paper by Drs. Urbach and Gottlieb of Philadelphia. Titles of other articles appearing in this issue are "Some of the Factors to be considered in the etiology of Bronchial Asthma," "Vernal Conjunctivitis," "Ragweed Pollen Extract," and "Molds and their Relation to Allergy." The last is a report of a committee of allergists for the study of unknown causes of hay fever and asthma.

Necrology

Dr. Alfred J. Willits, 69, of Anaconda, Montana, died July 26, at his home, following an extended illness. Dr. Willits practiced in Anaconda for 30 years, 23 years of which he was chief of staff of St. Ann Hospital. He was a past president of the Mount Powell Medical Society and at one time was on the faculty of the Northwestern University School of Medicine.

Dr. George J. Gordon, 69, of Minneapolis, died July 25, of a heart ailment which had forced his retirement two years ago. He was a graduate of Jefferson Medical College, Philadelphia, and had practiced in Minneapolis for more than 40 years.

Dr. Lawrence F. Dugan, 45, of Faribault, Minnesota, died in Faribault, July 17, after 13 years residence there.

Dr. Cephas Swanson, 67, of Minneapolis, a native of Carver, Minnesota, died at Minneapolis July 20. He was the head physician of the Scandinavian-American fraternity.

Dr. William D. Wagar, 68, Michigan, North Dakota, died July 25 at Michigan. He was a graduate of the University of Minnesota Medical School, class of 1898.

Dr. A. R. Johnson, 44, Isanti, Minnesota, died July 25 at Asbury Hospital, Minneapolis, following an appendectomy. He was a graduate of University of Minnesota Medical School, class of 1929.

Dr. Charles P. Arzt, 73, St. Paul, a native of Germany and an 1895 graduate of the University of Minnesota, died July 29th at his home in St. Paul.

Dr. Manley H. Haynes, 54, Menahga, Minnesota, died August 8, at Menahga. He was a graduate of the University of Minnesota.

Future Meetings

The Omaha Mid-West Clinical Society will hold its annual session in Omaha October 25-29. Among the speakers scheduled are Dr. Jennings C. Litzenberg, of Minneapolis, and Dr. Eben J. Carey, Dean of the School of Medicine, Marquette University, Milwaukee. Dr. J. D. McCarthy, Medical Arts Building, Omaha, is secretary and director of clinics.

The Mississippi Valley Medical Society will convene September 29 and 30 at Quincy, Illinois. Dr. Samuel F. Haines of the University of Minnesota will speak on treatment of parathyroid insufficiency.

Medicine's methods of meeting the new and complicating factors brought on by mechanized modern warfare will highlight the sessions of the three-day convention of the Association of Military Surgeons of the United States at the Bellevue-Stratford Hotel, Philadelphia, October 21, 22, 23.

Classified Advertisements

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Medical secretary,—ten years experience,—available. Member of the Medical Record Librarians Association. Medical secretarial position wanted. Gladis Damschen, 19 Shirley Court, Minot, North Dakota.

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Advertiser's Announcements

SCHERING AWARD COMPETITION WINNERS

The subject in the second competition of the Schering Award was "Endocrinology in War Medicine" or certain approved alternate subjects. The Committee of Judges announces these results:

1st prize: One full year's scholarship to Elizabeth L. Brown, Class of 1943, New York Medical College, "Endocrines in the Nervous System," (Miss Brown was the 3rd prize winner in the Schering Award Competition of 1941). 2nd prize: One-half year's scholarship to Eugene B. Brody, Class of 1944, Harvard Medical School, "Hormone Factors in Personality." 3rd prize: \$100.00 to Roslyn Wiener, Class of 1945, University of Michigan Medical School, "Role of Hormones in Pregnancy and Parturition."

The Schering Award Competition is offered annually by the Schering Corporation and is sponsored and administered by a special committee of the Association of Internes and Medical Students. The competition is now in its third year. A large number of excellent manuscripts were submitted. The following students have warranted honorable mention: N. G. Demy, Marquette University; N. Josephson, Yale Medical School; S. Kafka, Middlesex University; G. V. Mann, Johns-Hopkins; L. W. Pratt, Johns-Hopkins; A. Segaloff, Wayne University; A. J. Sawyer, University of Vermont; G. Turteltaub, Middlesex University; E. W. Amyes, College of Medical Evangelists; C. Cohen, Loyola University; and A. P. Rosen, Long Island College of Medicine.

The Committee of Judges comprised these outstanding American investigators in the fields of endocrinology, medicine and chemistry:

R. G. Hoskins, Director of Memorial Foundation for Neuro-Endocrine Research, Harvard Medical School; E. P. McCullagh, Section of Endocrinology and Metabolism, the Cleveland Clinic; E. C. Hamblen, Associate Professor and Chief of the Endocrine Division, Department of Obstetrics and Gynecology, Duke University School of Medicine; E. Novak, Associate Professor of Obstetrics, University of Maryland School of Medicine and College of Physicians and Surgeons; H. M. Evans, Institute of Experimental Biology, University of California; F. C. Koch,

Chairman of the Department of Biochemistry, University of Chicago; E. L. Sevringhaus, Professor of Medicine, University of Wisconsin Medical School; E. Shorr, Assistant Professor of Medicine, Cornell University Medical College, and the New York Hospital.

At the present time, plans for the Schering Award Competition of 1943 are being formulated.

TETANUS IMMUNIZATION OF MILITARY PERSONNEL

All military personnel, on induction, are being immunized against tetanus either, as in the Army, by three injections of fluid toxoid, or as in the Navy and Marine Corps, by two injections of alum precipitated toxoid (New Eng. J. Med. 227:162, 1942). In addition, a small or stimulating dose is injected prior to departure for a theater of operations and an emergency dose is given to those wounded or burned in battle or incurring other wounds likely to be contaminated with *Clostridium tetani*. According to recent report (Am. J. Pub. Health 33:53, 1943), since June, 1941, when the present tetanus immunization program was adopted, there have been but four cases reported from the entire Army, and none of these were in immunized individuals. Although perhaps too early in the present war to draw any conclusions, it is of particular interest that no cases of tetanus have been reported from battle casualties.

For civilian use, especially in children, it is of decided advantage to accomplish simultaneous immunization against tetanus and diphtheria. Combined Diphtheria Toxoid-Tetanus Toxoid, Alum Precipitated, Lilly, is designed for prophylaxis only, affords effective immunity against both diseases, and avoids risk of serum sensitization which may follow use of an antitoxin.

CHANGE IN CASEC MEASUREMENTS

Casec now measures six packed level tablespoonfuls instead of 12 level tablespoonfuls, as formerly, so that directions to the patient should be amended accordingly. Casec is indicated in colic and loose stools in breast-fed infants, and in fermentative

diarrhea, malnutrition, celiac disease and for premature infants. Mead Johnson & Company, Evansville, Indiana, U.S.A.

SQUIBB VITAMIN K CONCENTRATE

If the patient cannot retain material when given by mouth, or if the prothrombin time shows no improvement, a duodenal tube or T tube may be used for administration. (The solution should not be given by injection). In this case, 2 cc. to 4 cc. Solution Vitamin K Concentrate Squibb are mixed with or followed by a solution of bile salts or acids (3 to 6 Procholon Tablets may be used) in 200 cc. of warm water. One or two such treatments are usually sufficient.

For curative treatment in cases of severe hemorrhage characterized by low prothrombin content of the blood, 4 to 8 capsules or 2 cc. to 4 cc. of the solution may be administered with bile salts or acids (Procholon Tablets) for one to three days. If the patient cannot retain the material, the solution should be administered by duodenal tube.

Squibb Vitamin K Concentrate is biologically standardized on vitamin K deficient chicks and its activity expressed in Ansbacher (Squibb Institute for Medical Research) units. One Ansbacher unit is the amount of anti-hemorrhagic factor necessary to reduce the blood-clotting time of the K-deficient chick to normal within six hours after administration.

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The JOURNAL LANCET

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New Series

Studies on Conditioned Reactions and their Clinical Implications*

E. Gellhorn, M.D., Ph.D.†
Chicago, Illinois

EARLIER investigations from this laboratory attempted an analysis of the effects of insulin hypoglycemia and other forms of "shock therapy" involving different types of convulsions, by the study of the effects of these procedures on autonomic centers. It was found that insulin hypoglycemia,¹ metrazol² and picrotoxin convulsions,³ as well as convulsions induced electrically^{4,5} by application of a current to the brain, lead to a greatly increased excitability of the sympathetic centers located in the medulla oblongata and in the hypothalamus. Studies on the action of metrazol on the sympathetically innervated nictitating membrane of the cat indicated that the period of increased sympathetic excitability was by no means restricted to the time when convulsions occurred, but was evident even hours after the convulsions had ceased. These observations made it seem probable that the various forms of shock therapy may exert chronic functional effects which may last longer than the acute effects on the sympathetic nervous system, thus far studied. It is not unlikely that such chronic functional action on the brain is responsible for, or involved in, the reported improvement of mental patients subjected to these procedures.

The work described in this paper is an attempt to study the chronic physiological effects of various forms of "shock therapy" on normal animals. The ideal method for studying the chronic effect of insulin hypogly-

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†Department of Physiology, University of Illinois College of Medicine. (Aided by grants from the John and Mary R. Markle and the Josiah Macy, Jr., Foundations.)

cemia and experimentally induced convulsions would be a complete analysis of the behavior of the animal before and after these procedures have been applied. The study of some forms of conditioned behavior is a simplified, but apparently adequate, procedure. Instead of using the conditioned reflex of Pavlov, a more natural escape reaction was selected.

The experiments were performed on rats which were placed in an apparatus consisting of two compartments, A and B, separated by a low partition. The bottom of these compartments consisted of a grid which could be charged through a General Electric variac. At first, the unconditioned response was established through application of a few shocks. It consisted of two integrated movements: one in which the rat in response to the electrical stimulus jumped from compartment A to compartment B; the other in which the animal turned back. Then the conditioning process was begun by sounding a bell two seconds before the electrical stimulus was applied. The sound continued to the end of the electrical stimulation. As a rule not more than 20 to 30 stimuli were applied in one session. The experiments were performed daily or on alternate days until a conditioned response of 80 to 100 per cent was established. This response was then maintained for three successive days, to insure a thorough retention of the conditioned response. This was accomplished by subjecting the animals to seven to twelve conditioned stimuli (bell) reinforced by unconditioned stimuli (shock) before applying the test series of ten non-reinforced conditioned stimuli.

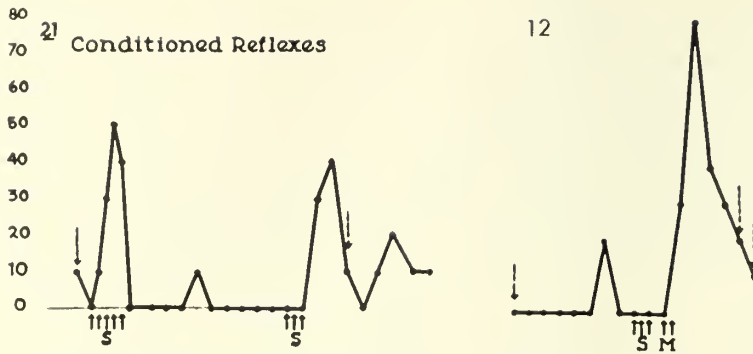


Fig. 1. The influence of electrically induced convulsions on the recovery of inhibited conditioned responses. Experiments on rat 21 illustrates the effect of electroshock indicated by arrow. Experiment on rat 12 shows that, after three ineffective convulsive shocks, two convulsions elicited by metrazol resulted in recovery of the conditioned response. The large interrupted arrow indicates inhibition of the conditioned response by lack of reinforcement.

Thereafter, the conditioned response was inhibited by the daily application of ten unreinforced conditioned stimuli (inhibition by lack of reinforcement in the sense of Pavlov). However, this test was always preceded by one or, in the majority of the experiments, two reinforced stimuli. In the latter case, one was applied while the animal was in compartment A, and the other while in compartment B in order to avoid the formation of positional habits.

This procedure led with great regularity to a loss of 80 to 90 per cent of the conditioned responses in about three to four days. After this level had been established for at least six days, the rats were subjected to electroshock, metrazol, insulin hypoglycemia, anoxia and various control experiments.

RESULTS

Figure 1 shows the effect of electroshock on the re-establishment of inhibited conditioned reactions. It is evident from this figure that after the application of several electroshocks the behavior of the rat was altered. It was no longer in the inhibited state, but responded to the conditioned stimulus. The effect was temporary and had completely disappeared a few days later. After a period of about twenty days had passed, during which the conditioned reaction was absent, the electroshock treatment was repeated and again led to a restitution of the conditioned reaction for a number of days.

A similar effect was obtained by the use of metrazol as a convulsant, as is indicated in Figure 2. Here again the conditioned reaction rises from an insignificant level to as high as 60 per cent but falls gradually after a few days to the original level. The second graph of Figure 1 is particularly interesting since it shows that in one case in which three electroshocks were inadequate to restore the conditioned reaction, the administration of metrazol produced a very marked effect since the conditioned reaction was restored to 80 per cent.⁶

An extensive series of experiments was carried out with insulin hypoglycemia under similar conditions.⁷ Here again, insulin was injected after the conditioned reaction had been inhibited and had remained either completely or almost completely inhibited for some time. Figure 3

shows that insulin coma may restore the conditioned reaction in a manner similar to that described for electroshock and metrazol. In addition, Figure 3 shows that repeated comas properly timed cause a cumulative effect and may maintain the conditioned reaction for longer periods of time. This phenomenon is clearly shown in Figure 4 in which at first insulin coma produced only a temporary recovery of the conditioned reactions. However, several comas effected a permanent recovery of the conditioned reaction and, as indicated in the insert of Figure 4, this complete recovery persisted even after the interruption of the testing for 30 days. Similar results were obtained in several other animals.

Figure 4 is interesting from still another point of view, inasmuch as it shows that the restitution of inhibited conditioned responses by insulin depends on the syndrome observed in hypoglycemia. Depending on the dose of insulin used and the duration of hypoglycemia, insulin may lead either to a depression, a coma, or convulsions in rats. The depression is characterized by the absence of spontaneous movements, diminished tone of extremities, slow righting reflexes and salivation. At this stage a rat reacts to pain but not to slight pressure. We speak of insulin coma when the righting reflexes and the reaction of painful stimuli were abolished. Insulin convulsions are characterized by clonic-tonic discharges. In general, these three stages follow each other gradually, but occasionally an animal will convulse without having shown a distinct comatose phase.

The investigation showed clearly that insulin depression is, in general, ineffective to bring about a restoration of inhibited conditioned reactions. Insulin coma maintained for about seven minutes was the most effective "therapeutic" procedure, and convulsions were in general little effective as demonstrated in Figure 5.

From the above it follows that metrazol and electrically induced convulsions as well as insulin coma will result in a definite change in behavior of rats, inasmuch as these procedures restore inhibited conditioned reactions. That this interpretation of the data is correct is indicated by several series of control experiments. First, it was shown that rats which had been conditioned and then inhibited never showed a spontaneous recovery of the inhibited reaction. This is illustrated by Figure 1 in which the second shock was applied many days after the first, but no recovery resulted after the temporary effect of the first shock had passed off. Secondly, the restitution of the response to the conditioned stimulus was specific. If, for instance, a rat had been conditioned to the sound of a door bell and was then inhibited by lack of reinforcement, the recovery of this reaction by insulin coma, metrazol, or electroshock was specific to the stimulus of the door bell, since this rat failed to react to another acoustic stimulus or to a light. Thirdly,

Effect of metrazol on conditioned reflexes

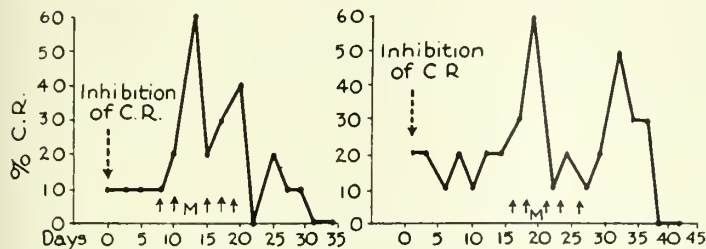


Fig. 2. The arrows indicate that convulsions had been induced by injection of 55 mg./kg. metrazol subcutaneously.

it was found that if animals were subjected to insulin coma prior to the conditioning, the conditioned stimuli failed to produce any effects. Therefore, it seems to follow from these experiments that the various forms of shock treatment mentioned will restore inhibited conditioned reactions in rats. This restoration is temporary after one or two comas or convulsions. It may be permanent if a coma is administered repeatedly at proper intervals.

The experiments reported in this paper are of interest for a functional understanding of "shock therapy" of mental diseases. The fact that excessive insulin comas in animal experiments⁸ lead to hemorrhage and other anatomical changes in the central nervous system does by no means indicate that these procedures act through the damage which they inflict on the central nervous system under rather excessive conditions. Our observation, that often a single coma may restore inhibited conditioned reactions, as well as the reversibility of this effect, suggest that insulin coma causes functional intracerebral changes. The "permanent recovery" after repeated comas is of particular interest. Not only have such animals restored specifically their previously inhibited conditioned reactions, but they display also fundamental changes in personality. Placed in the apparatus they show signs of great alertness. They react to the conditioned stimulus with even greater promptness than was displayed by them at the end of the period of conditioning. Moreover, the repeated application of conditioned stimuli over many days causes, in spite of the complete absence of reinforcing unconditioned stimuli, no weakening in the conditioned response.

The application of experimental physiological observations to human pathology is always a hazardous undertaking. This holds particularly true for the problem of mental disease. It seems, however, to be justified to assume that insulin coma and other procedures of "shock therapy" will influence acquired conditioned processes in the human brain in a manner similar to that demonstrated in the experiments described in this paper. Since the role of conditioned reactions for behavior is undisputed, no fundamental objection seems to exist to interpret the changes in personality seen after successful shock therapy on a physiological basis.

The experiments described thus far raise the question whether or not the various procedures used in our experiments have a specific influence solely on inhibitory intra-

cerebral processes, or whether excitatory processes are likewise influenced. In order to study this problem the effect of insulin coma on the rate of conditioning was investigated. It was found that rats, when only partially conditioned and then subjected to two insulin comas, show a much higher degree of conditioning than similarly treated control animals which were given injections of sodium chloride instead of insulin. Apparently, insulin coma influences not only inhibitory but also excitatory processes involved in conditioning (Table).

It was stated repeatedly that insulin coma and convulsions induced by metrazol and electric shock cause an increased excitability of sympathetic centers. This action was thought to be responsible for the improvement observed in mental patients subject to the so-called "shock treatment," as well as for the recovery of inhibited conditioned reactions. It is now of interest to point out that not all rats in which conditioned reactions had been inhibited by lack of reinforcement will show a restitution of these reactions when subjected to insulin coma or experimental convulsions. Figure 6 is a case in point. It shows that in this animal neither insulin coma, nor two periods of anoxia, nor a combination of insulin coma and electric shock produces a significant increase in the conditioned response. Three further electric shocks were likewise ineffective. It was then thought that it might be possible to increase the responsiveness of the sympathetic centers by the administration of thyroxin. sympathetic centers by the administration of thyroxin. A total number of eight injections was given which resulted in some increase in general excitability of the animal.

Toward the end of the period of thyroxin administration two electroshocks were administered. As the graph shows, this procedure resulted in a considerable restoration of the conditioned response. In another animal which was likewise unresponsive to insulin coma and electroshock, the administration of thyroxin alone without any further "shock treatment" resulted in the restitution of the previously inhibited conditioned reaction. These experiments strongly support the hypothesis, that the restitution of inhibited conditioned reactions, is a result of increased excitability of sympathetic centers. It is of interest to point out that the central action of thyroxin has been clearly established by the work of Gellhorn and Feldman,^{8a} who showed that the sympathico-adrenal response to metrazol and electroshock is greatly increased after the administration of thyroxin. Since this effect was observed under conditions in which the peripheral action of adrenalin was not potentiated by thyroxin, it was clearly proven that thyroxin administered in relatively small doses increases the reactivity of the centers of the sympathico-adrenal system.

It will be the task of further investigations to show how the increased excitability of sympathetic brain centers alters intracerebral processes involved in the formation of conditioned responses, as well as in the removal of inhibited conditioned reactions, but it may be said that the profound influence exerted by the hypothalamus on

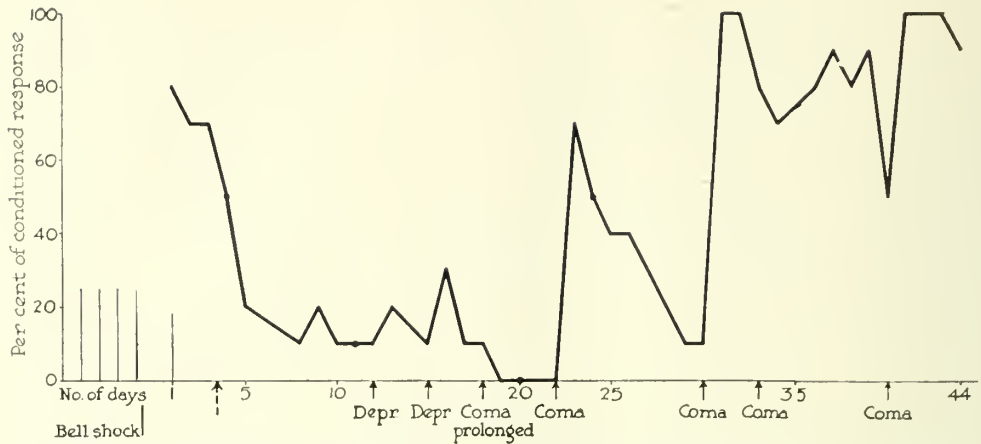


Fig. 3. Effect of insulin hypoglycemia on the restoration of previously inhibited conditioned reactions. Vertical lines at the beginning of the graph show the number of reinforced conditioned stimuli (bell plus shock) which established the conditioned response. It was maintained for three days at 70 to 80 per cent and then inhibited by lack of reinforcement. On the 12th day 4 units/kg. of insulin were given intraperitoneally, on the other days marked by an arrow 5 units/kg. were administered. The experiment showed that hypoglycemic "depressions" were unable to restore the conditioned reaction, but coma caused recovery. Note the cumulative effect of three comas given between the 30th and 40th day.

cortical processes is well established on the basis of experimental as well as clinical investigations.^{9,10}

The close relationship of anoxia to hypoglycemia as far as brain metabolism is concerned, as well as the fact that anoxia likewise leads to an excitation of sympathetic centers, was the basis for a study of the effects of anoxia on inhibited rats. Here again, the rats were first conditioned to the bell and then inhibited. After the inhibition had lasted for at least six or eight days, the rats were subjected to anoxia by exposure to lowered barometric pressure. In the majority of the experiments, the barometric pressure was gradually lowered to 280 mm. Hg. and the rats stayed at that level for five minutes. This procedure was not as regularly effective as was insulin coma. However, in a number of instances, a recovery was obtained which was very considerable not only in degree but also in duration.

It was mentioned in the introduction that the various procedures used in shock therapy had in common the excitatory effect on *central* structures of the sympathetic system, and it was implied that this action is largely responsible for the restoration of inhibited conditioned reactions. A number of experiments seemed to confirm this interpretation, since drugs such as adrenalin and atropin which act largely on the peripheral structures of the autonomic system did not lead to a restitution of the previously inhibited conditioned reactions. Rats in which conditioned reactions had been inhibited were injected repeatedly with atropine and also with adrenalin. Neither of the two drugs was effective, although in the same animals insulin hypoglycemia, electroshock, or metrazol restored the conditioned reactions for various periods of time.‡

In order to obtain a further insight into the factors responsible for the restoration of inhibited conditioned reactions, experiments were performed with pentothal and alcohol. It had been claimed by several authors that the

‡Large doses of atropine which increase the blood sugar have been found effective in two instances in restoring inhibited conditioned reactions. This fact is being investigated at the present time.

action of insulin hypoglycemia and metrazol was due to a reduction in brain metabolism. However, neither alcohol nor pentothal had any effect on the conditioned reaction of our rats, although insulin coma produced the typical effects on them. Since both narcotics and alcohol reduce the metabolism of the brain, it seems likely that the action of insulin coma and other shock procedures as studied in rats with inhibited conditioned reactions is not due to their metabolic effects on the brain.

Rosen and Gantt¹¹ reported recently that metrazol convulsions altered conditioned reflexes in dogs. They observed that ten metrazol convulsions lead to an impairment of the differentiating ability of the animals, as shown by the study of positive and negative conditioned reflexes which had been previously established. In order to ascertain whether this result would hold true for the experimental arrangement used in our studies, experiments were performed in which two or three conditioned reactions were successively established.¹² Of these conditioned reactions, one or two were inhibited by lack of reinforcement, whereas one reaction was not inhibited and was maintained at approximately 100 per cent. When electroshocks or insulin comas were administered to these animals, it was found invariably, as illustrated by Figure 7, that the positive conditioned reaction remained unaltered, whereas the inhibited (negative) conditioned reaction rose to a high positive level. Thus, it is seen in Figure 7, that following insulin convulsions, the conditioned reaction to light rose from 0 per cent to 70 per cent; the reaction to the sound which had been varying between 0 per cent and 20 per cent prior to the insulin convulsions rose to 100 per cent. The positively conditioned reaction to the bell, however, which showed a variation between 90 per cent and 100 per cent prior to the insulin coma remained at 100 per cent during the period when the inhibited conditioned reactions rose considerably. Moreover, the positively conditioned reaction to the bell did not fall to a lower level than 80 per cent when the inhibited conditioned reactions to sound and

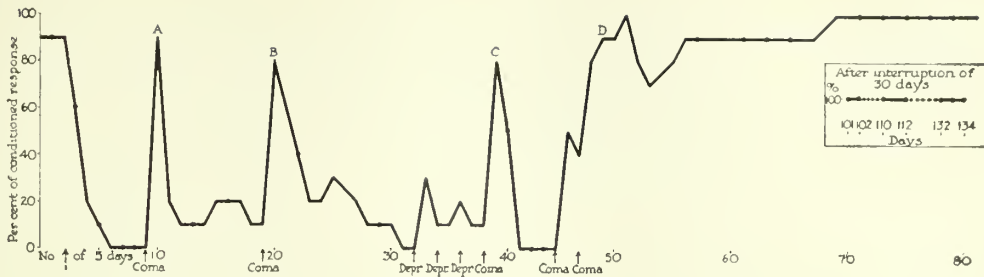


Fig. 4. General arrangement as in Fig. 1. Insulin "depressions" were ineffective whereas even a single coma caused temporary recovery. (A, B, C). Permanent recovery was effected by two comas induced on the 44th and 46th days.

light fell again to the preconvulsive level of 0 per cent. In other experiments in which two conditioned reactions were employed, one of which was completely inhibited so that the response to the conditioned stimulus was 0 per cent whereas the other was maintained at approximately 50 per cent, it was observed that, here again, both inhibited reactions became more positive after administration of insulin coma, and that the partially inhibited reaction was more fully restored than the completely inhibited reaction. A dedifferentiation, as Rosen and Gantt have observed, would lead one to expect not only an increase in the response of previously inhibited reactions but also a diminution in the response of positively established conditioned reactions. The fact that this diminution was never seen in our observations, as well as the previously reported results that insulin coma enhances the establishment of conditioned reactions, suggests that insulin coma as well as other forms of shock therapy diminish intracerebral inhibitory processes and enhance those excitatory associative processes which are the basis of learning. The dedifferentiation observed by Rosen and Gantt is undoubtedly a sign of impaired brain activity. It appears, however, from our own results that this is not necessarily a characteristic of the action of metrazol or insulin on the brain but rather the result of so frequently repeated convulsions or comas that brain damage actually occurs.

Numerous clinical questions as well as problems of an experimental nature are raised by the investigations reported in this paper which cannot yet be answered adequately. Suffice it to say, that our studies have given ground for the assumption that the conditioned reflex method is a useful tool for an analytical study of the procedures commonly applied at the present time in the therapy of mental diseases. §

SUMMARY

An escape reaction produced by application of an electrical stimulus to the grid on which the animal stands was conditioned in rats by using various sensory stimuli (the sound of a door bell, a sound of 250 vibrations per second, and a light) as conditioned stimuli. After the conditioned reactions had been established, they were inhibited by lack of reinforcement. Spontaneous recovery of inhibited conditioned reactions was never observed. It was, however, found that various forms of "shock

§A fuller evaluation of the physiological basis of shock therapy is given in the last chapter of my book on "Autonomic Regulations," New York, 1943.

therapy" lead to either a temporary or permanent recovery of previously inhibited conditioned reactions. When insulin is given, insulin coma is far more effective than either a precomatose insulin hypoglycemia or insulin convulsions. Anoxia induced by exposure to a low barometric pressure of 280 mm. Hg. produces similar effects which, however, are far less regular than those obtained by insulin coma, electroshock, or metrazol convulsions. It is assumed that the effect of these procedures is linked up with a stimulation of sympathetic centers in the brain, which in turn alter fundamentally those intracerebral processes which are the basis of the conditioned reactions. In support of this assumption, it is shown that drugs acting on the peripheral autonomic structures have no effect on restitution of inhibited conditioned reactions.

TABLE
Effect of Insulin Hypoglycemia on Partially Conditioned Rats

(A) CONTROLS					
Animals	No. of Bell + Shock Applied for Partial Conditioning	Amount Saline Injected	No. of Bell + Shock Applied after 2nd Saline Inj.	Total No. Bell + Shock Applied	Conditioned Response on Testing
Average of 8 animals	75	0.5 cc.	20	95	20%
(B) INSULIN-INJECTED RATS					
Animals	No. of Bell + Shock Applied for Partial Conditioning	Amount Insulin Injected in u./kilo Wt.	No. of Bell + Shock Applied after insulin Coma	Total No. Bell + Shock Applied	Conditioned Response on Testing
Average of 8 Animals	75	4 to 10 u./kilo	15	90	82.5%

That the action of hypoglycemia is not due to a depression of the brain metabolism, as such, is suggested by the fact that alcohol and narcotics, such as pentathol, which depress oxidative brain metabolism are ineffective as far as the restitution of inhibited conditioned reactions is concerned. In further support of the hypothesis is the fact that animals which are refractory to insulin coma and electroshock treatment may show clear-cut positive effects after a "treatment" with thyroxin, which increases the excitability of sympathetic centers in the brain. The investigations reported in this paper seem to indicate that the study of conditioned reactions is a useful tool for the analysis of the actions of procedures used in the treatment of functional mental diseases.

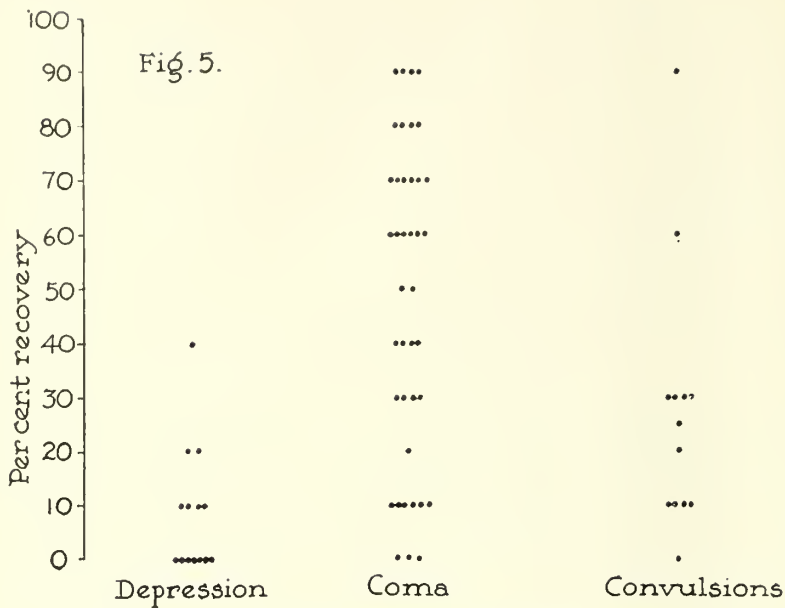


Fig. 5. Relative efficiency of insulin "depression", coma, and convulsions on the restitution of previously inhibited conditioned responses. The ordinate refers to the increase in the percentage of the conditioned response following administration of insulin.

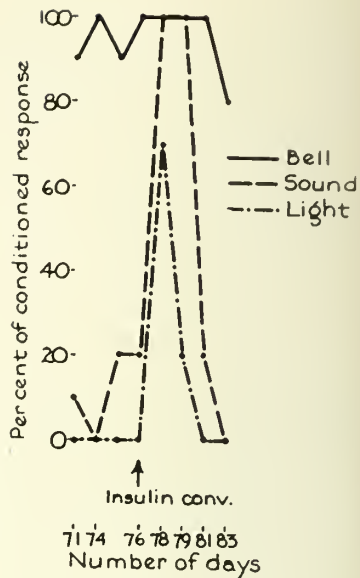


Fig. 7. Effect of insulin convulsions on positively and negatively conditioned reactions. The inhibited reactions are temporarily restored, but the positively established reaction to the bell remains unchanged.

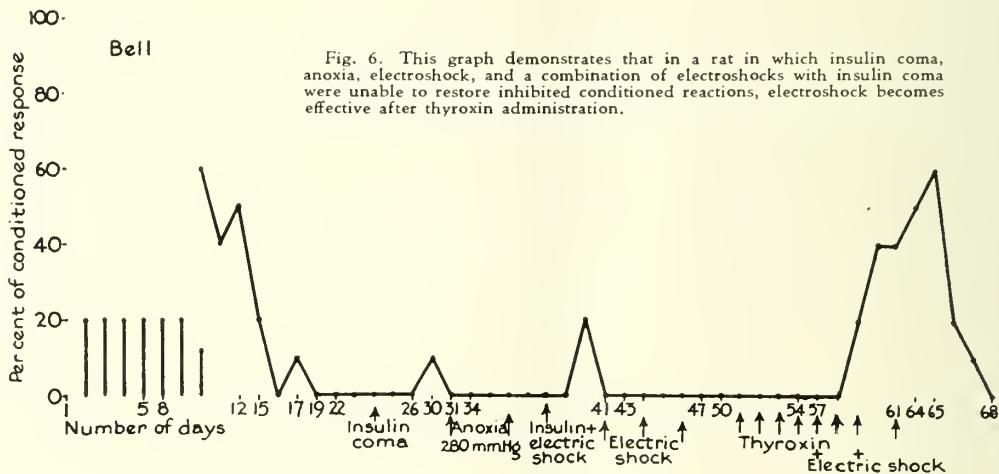


Fig. 6. This graph demonstrates that in a rat in which insulin coma, anoxia, electroshock, and a combination of electroshocks with insulin coma were unable to restore inhibited conditioned reactions, electroshock becomes effective after thyroxin administration.

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Wagner-Murray-Dingle Social Security Plan

S. 1161 H. R. 2861

Analysis of Bill by

J. C. Shields, M.D.†

Butte, Montana

This Bill was introduced into the Senate and into the House of Representatives, June 3, 1943, and has had two readings. It is designated as amending the Social Security Act, and is of great importance to all taxpayers.

The system proposed to be created will be financed in general from a trust fund established by a 6 per cent withholding tax from the employee, and a 6 per cent contribution from the employer on all wages and salaries up to the first \$3,000 paid or received after December 31, 1943.

Included in this proposed bill will be a system of *public employment offices, increased old age and surviving insurance, temporary and permanent disability insurance, protection to individuals in the military service, and increased unemployment benefits under a federalized unemployment system.* It is estimated that these provisions of the Bill would add approximately 25 million persons to the 37 million now carrying cards.

The Bill provides that—(a) Sec. 960—Every employer shall pay a tax of 6 per cent up to \$3,000 on wages paid to individuals, and, (b) Sec. 961—Every employee shall pay a tax of 6 per cent, deducted from wages on earned income, up to \$3,000 per year. Total from payrolls, 12 per cent. (c) Sec. 963—Every self-employed individual shall pay a tax of 7 per cent, up to \$3,000, on the market value of his services per year. (d) Sec. 962—Federal, state, and municipal employees (under certain conditions) shall pay a tax of 3½ per cent. The estimated total annual revenue from this Bill would be \$12,000,000,000.

The Bill provides (Sec. 969): The establishment of a Trust Fund, known as "Federal Social Insurance Trust Fund." Into this fund, all Social Security Taxes will be paid, \$12,000,000,000 annually.

MEDICAL

The Bill provides (Sec. 913): (a) There is hereby established within the Trust Fund a separate account to be known as the "Medical Care and Hospitalization Account." The managing Trustees shall credit to this account (1) one-fourth of the Social Security Taxes for medical, laboratory, and hospitalization benefits, and (2) three-sevenths of the self-employed service taxes.

In other words, on the basis of the above estimates, a minimum of \$3,000,000,000 would be transferred each year from the Trust Fund to the Medical Care and Hospitalization Account.

The Bill provides (Sec. 901): (a) Every insured individual, and (b) every dependent entitled to benefits shall be entitled to receive general medical, special medical, laboratory and hospitalization benefits. This provides a

†Chairman, Committee on Medical Economics, Montana State Medical Association. (Presented for him at meeting of Western Montana Medical Society with Senator Murray, at Missoula, August 24, 1943.)

total coverage of 30 days of hospitalization in any one year. This may be increased to 90 days each year, if funds are available.

ADMINISTRATION

The Bill provides (Sec. 903): (a) The Surgeon General of the Public Health Service is hereby authorized and directed to take all necessary and practical steps to arrange for the availability of the benefits provided under this title. (b) In carrying out the duties imposed upon him by subsection (a) of this section, the Surgeon General is hereby authorized to negotiate and periodically to re-negotiate agreements or cooperative working arrangements with appropriate agencies of the United States, or of any state or political sub-division thereof, and with other appropriate agencies, and with private persons or groups of persons to utilize their services and facilities, and to pay fair, reasonable, and equitable compensation.

The Bill provides (Sec. 904): There is hereby established a National Advisory Medical and Hospital Council to consist of the Surgeon General and sixteen members appointed by him.

This council has no authority. All authority and power are vested in the Surgeon General.

The Bill provides (Sec. 905): (1) Any physician qualified by a state can furnish medical services in accordance with such rules and regulations as may be prescribed by the Surgeon General. (2) Every individual shall be permitted to select or to change physicians in accordance with rules and regulations as may be prescribed by the Surgeon General. (3) Services which are deemed to be special services shall be those designated by the Surgeon General. (4) Payments to physicians may be made on a fee schedule approved by the Surgeon General, on a per capita basis, on a salary basis, or a combination or modification of all these bases, as approved by the Surgeon General. (5) The Surgeon General may prescribe the maximum number of individuals for whom any physician may provide services. (6) The Surgeon General may distribute the available patients among the available doctors on a pro rata basis.

The Bill provides (Sec. 907): (a) The Surgeon General shall publish a list of institutions found by him to be suitable for hospitalization. (b) Hospitalization benefit means an amount determined by the Surgeon General after consultation with the Council, and after approval by the Social Security Board; not less than \$3.00, and not more than \$6.00 for each day of hospitalization not in excess of 30 days, and not less than \$1.50 and not more than \$4.00 for each day of hospitalization in excess of 30 days in a period of hospitalization; and not less than \$1.50 and not more than \$3.00 for each day of care in an institution for the care of the chronic sick.

SUMMARY

This is the method and manner for the medical care and hospitalization of more than 110,000,000 people, and is placed upon the *shoulders of one man*, the *Surgeon General of the Public Health Service*.

This is the *machinery to place in the hands of one man*, the *Surgeon General of the Public Health Service*, the expenditure of \$3,000,000,000 annually.

FINANCIAL ASPECTS

What is \$3,000,000,000? If you were to drop three silver dollars into a great vault each minute since the year 1, A.D., to the present time, 1943, you would have approximately \$3,000,000,000.

What can be done with \$3,000,000,000, one-fourth, or 25 per cent of the tax to be levied as a withholding tax in this Wagner-Murray Bill?

What can be accomplished?

We can understand this only by comparisons.

For the ten year period from 1924 to 1933, both years inclusive, the total revenue of the government of the United States from all sources was \$35,412,944,412, or a yearly average of \$3,541,294,441.

For the five year period beginning April 1, 1931, to March 31, 1935, the total revenue of the German government was \$15,725,840,000. This represents an average income rate of \$3,145,168,000 per year.

In 1938, the total expenses of the pre-war government of France, for all purposes, were \$3,130,777,635.

In 1940, the total expenses of the Japanese Empire were \$1,999,773,180.

The Wagner-Murray-Dingle Bill provides for placing in the hands of *one man* a sum of money *three times* the amount of the *normal non-war expenses of Japan*, *approximately equal to the pre-war expenses of the Government of France*, and *approximately the average annual national income and expenditures of the United States Government from 1924 to 1933*.

What could the Surgeon General do? It is estimated that at the present time there are available in the United States for civilian practice 120,000 physicians. The Surgeon General could—

- (a) Allocate 20 per cent for administration costs—\$600,000,000;
- (b) Hire all of the 120,000 physicians at an average salary of \$5,000 a year—\$600,000,000;
- (c) Hire all hospital beds not owned by the government, for 365 days each year at \$5.00 per day—\$671,683,950;
- (d) Pay \$2.50 per day for every government-owned hospital bed for 365 days each year—\$959,750,162.50;
- (e) Spend for drugs and medicines \$168,565,887.50.

Total—\$3,000,000,000.

The Bill provides (Sec. 1111): For the purpose of encouraging and aiding the advancement and dissemination of knowledge and skill in providing benefits under this Act, and in preventing illness, disability, and premature death, the Surgeon General is hereby authorized and directed to administer grants-in-aid to non-profit institutions and agencies engaging in research or in undergraduate or postgraduate professional education.

The amount of money for this purpose shall be 1 per cent of the total amount expended for benefits from the Trust Fund, exclusive of unemployment insurance benefits, or 2 per cent of the amount expended for benefits under Title IX.

Assuming that out of \$3,000,000,000, \$600,000,000 is spent for administration, and \$2,400,000,000 is paid out in benefits, the Surgeon General would have 2 per cent of this sum, or \$48,000,000 each year to spend for medical education and medical research. What could be done?—

- (a) Assume the total costs of operating the sixty-six accredited medical colleges in the United States—\$21,491,248;
 - (b) Subsidize 22,000 medical students to the extent of \$700 per year for a period of four years—\$15,400,000;
 - (c) Spend for other educational research each year, \$11,180,752.
- Total—\$48,000,000.

OR:

- (a) Duplicate all existing medical facilities—\$22,000,000;
 - (b) Pay 20,000 additional medical students \$700 per year during a period of four years—\$14,000,000;
 - (c) Spend on other research, \$12,000,000.
- Total—\$48,000,000.

The Bill provides (Sec. 912): That the Surgeon General and the Social Security Board shall study and make recommendations for providing dental, nursing, and other needed benefits; and for determining the costs, the division of costs, and the manner in which the money should be raised in payment for these benefits.

CONCLUSION

Under this system, every physician would become a Federal officer, just as truly as our Federal judges and Federal marshals.

The expenditure of \$3,000,000,000 annually, and the medical and surgical care of 110,000,000 people is placed solely and absolutely in the hands of the Surgeon General of the Public Health Service.

This outline briefly analyzes the medical and hospital services provided under this Bill, into which goes only \$3,000,000,000, or one-fourth of the proposed amount to be raised, \$12,000,000,000, by the Wagner-Murray Bill.

If this Bill becomes a law, there will be an added 12 per cent tax on the amount of the payroll of all employed persons over and above the 20 per cent now being deducted from our monthly paychecks.

Do we wish an added 12 per cent tax? Do we wish all medical, surgical and hospital services directed by one man from a bureau in Washington?

Our attitude heretofore has been that any money obtained from the Federal Government in Washington did not come from our own pockets. With the increased rate of Income Tax, particularly the monthly deduction of the payroll, we now realize where the Government obtains the money which it spends.

We expect changes, not only in government and laws, but also in the individual. It is one of the laws of nature, and, while it is true, and also desirable, it is *your duty and mine to control and to direct these changes*.

REMARKS ON SENATE BILL 1161*

J. P. RITCHEY, M.D.,

President, Montana State Medical Association,
Missoula, Montana

I submit that the present 20 per cent withholding tax on payrolls, necessary as it is, is a tremendous burden for the taxpayers to carry, in addition to state, municipal and the numerous special taxes in force, and that the burden of it far exceeds any tax burden that the people of this country have ever previously assumed.

I submit further that to add to this incredible burden at this time a further tax of 12 per cent (12 billion dollars each year) upon the amount of all payrolls is an undertaking both critical and serious.

I submit further that this would be war-time legislation, and that war-time, with its intense preoccupations with the conduct of the war, and with a great part of the country's voting population under arms, is scarcely the time to place upon the country a permanent arrangement with such far-reaching consequences. As the one outstanding example of war-time legislation, as such, we think of the Prohibition Amendment of 1918, of its sorry course, and of its final repudiation.

I submit further that this proposed legislation, particularly as it applies to the medical care of our people, is revolutionary legislation, seeking to accomplish at a stroke what can only be accomplished by day to day changes and adjustments over an extended period of time. Such changes and adjustments have constantly been made over the past many years, and are proceeding at the present time at an accelerated pace, with the medical profession cooperating with all other agencies, public and private, lay and professional, that are concerned with the health of our people. These progressive changes and adjustments are steadily raising the standards of medical care, increasing the amount of such care available, and decreasing, well toward the vanishing point, the minute proportion of our population not receiving such care.

The medical profession has always accepted its responsibility for the care of the sick and the maintenance of the health of the people. It has acted upon its own initiative. It has been essentially self-governing. It has accepted over the years the necessity of an increasing degree of socialization of medical care. And by socialization in this talk, I mean simply and solely making accessible to every person, regardless of his ability to pay, the best in medical and hospital care according to his need. This socialization has been voluntary on the part of all concerned. It has worked. It will attain a high degree of perfection in operation if allowed to develop naturally and gradually, and if allowed to remain voluntary and cooperative.

Under this proposed legislation all this would be changed. The medical profession would no longer be primarily responsible for the care of the sick and the maintenance of the health of our people. By the specific terms of this bill, this responsibility would be placed on one man, the Surgeon General of the Public Health Service, and on him alone. The medical profession would have no initiative; the Surgeon General would furnish the initiative. The medical profession would not be self-

*Presented at a meeting of the Western Montana Medical Society with Senator Murray, August 24, 1943.

governing: the Surgeon General would have absolute, autocratic power to dictate each doctor's conduct of his practice in each and every particular as he might see fit. The socializing trend of medical care would no longer be voluntary: it would be compulsory. The practice of medicine in all its aspects, including medical education, would become State Medicine indeed.

It may be of comparatively minor importance, what may happen to the 120,000 physicians as such, in this country, to their way of life and to their method of practice. But is it not of the greatest importance to the 130,000,000 citizens, what happens to their medical care? Is it a good thing for these 130,000,000 that the primary responsibility for their medical care be removed from the physicians and be placed on the shoulders of one man, the Surgeon General? Is it a good thing for our people that the medical profession be deprived of their primary initiative and that this initiative be given to one man? Is it a good thing for our people that the doctors no longer govern themselves but become hired men subject to the orders of one man, the Surgeon General? Is it a good thing for our people, a democratically governed people like unto no other people on earth, that the voluntary democratic process be removed, root and branch, from so large a segment of their daily life as is included in their medical care, and be replaced by a bureaucratic administration from above, under the absolute dictatorship of one man, the Surgeon General? Is it a good thing for our people to put all their funds for medical and hospital care, and all their funds for the education of future physicians, three billion dollars annually, into the hands of any one man to dispense as he may see fit? Is it a good thing for our people that from 20c up, out of every dollar they pay out in taxes for the purchase of medical and hospital care, be spent instead for salaries of an army of perhaps four or five hundred thousand lay administrators and for office room for them? Is it a good thing for our people that their physicians, who have up to this time attained recognition, each according to his ability in diagnosing and curing diseases, should now have their way smoothed for them, each in the degree to which he may care to and be able to build up political influence? Soberly and in all good faith, I do not believe that political influence and political pressure can be dissociated from the workings of the kind of State Medicine which this bill stands for, regardless of the good intentions of its sponsors. And would it be remarkable if, under such influences, the incentive for intensive postgraduate study and training should be lessened for many physicians?

In closing, may I address you, Senator Murray, as follows? As a member of a learned profession, the profession of law, you are in a position to appreciate, and do appreciate, the distinction between professional attitudes and practices, on the one hand, and the commonly accepted methods of trade and business on the other. May I say to you then, that the main preoccupation, by and large, of the members of the medical profession is and always has been the ultimate good of their patients? That this is the case is abundantly proved in many ways, not the least of which are the way in which physicians have conquered disease after disease, and the way in which physicians have consistently raised the standards of medical education and practice. It is in the perspective of this preoccupation with the good of our patients that we have studied and judged Senate Bill 1161. It may matter little what happens to us physicians as individuals; but it matters tremendously what happens to us as the medical shepherds of 130,000,000 patients. You, Senator Murray, must do as you must. What we, as guardians of the good of our people, would like to see you do is to withdraw your sponsorship of this proposed legislation.

The Medical Aspects of Civilian Defense*

Fred T. Foard, M.D.,

Regional Medical Officer,

Office of Civilian Defense, 9th Civilian Defense Region.

PUBLIC health workers and members of the medical profession have been most cooperative in developing an operable plan of medical care which we hope will never be used, but which will be urgently needed if our country should be attacked.

The U. S. Office of Civilian Defense was created by Executive Order No. 8757 on May 20, 1941. It is principally a planning agency and was created to assist state and local government agencies in perfecting plans for combatting enemy action. The plan involves the creation of Auxiliary Fire Service; Auxiliary Police Service; the organization of an Emergency Medical Service, which includes among its specific functions the setting up of a system of Base Hospitals, provisions of medical equipment, provision of plasma, protection of water supplies against sabotage and providing, where possible to do so, for alternate water supplies; the establishment of medical care and facilities in state and local evacuation programs and other important services. The task of organizing the several protective services for civilian protection has been difficult. It has required the tireless effort of a nucleus of paid workers on Federal, state, and local levels, and an army of volunteer civilian workers approximately equaling in number the total personnel of our military forces. There are approximately 6,000,000 civilians who are actively participating in Civilian Defense work as enrolled members of state and local Civilian Defense organizations. Next to the Army and Navy these workers constitute the third line of defense, and upon them we must depend for such protective measures as will be available to the entire civilian population of the country. And of the entire population more than 68,000,000 people reside within 350 miles or easy bombing distance of our Atlantic, Pacific or Gulf Coasts.

With this background of the overall Civilian Defense Program, I shall now refer specifically to the Division of Emergency Medical Service and some of the several functions for which, from an organizational standpoint at least, it is responsible.

BASE HOSPITALS

Usually hospitals are large buildings and are excellent targets for bombs. In London, for instance, about 80 per cent of all hospitals existing before the war have been partially or completely abandoned because of the effect of incendiary or high explosive bombs. It has been necessary, therefore, to provide base hospital facilities for all patients needing hospitalization, including casualties resulting from enemy action. In anticipation of possible enemy action on the Pacific Coast, and in view of the fact that the hospitals of the Pacific Coast are filled to about 90 per cent of capacity at the present time, we are profiting by experiences met within English cities and, applying the plan found effective in England, have made arrangements with hospitals located in the interior for

the hospitalization of patients whom it may be necessary to evacuate from coastal cities. These base hospitals include county hospitals, privately owned hospitals, state institutions, and, in a few instances, reconditioned C.C.C. Camps or other buildings which could at least house the chronically ill or custodial patients who may have to be evacuated from coastal areas. Bed space for about 12,000 emergency patients has been provided in the Sacramento and San Joaquin Valleys and in already existing hospitals or other suitable buildings located in Southern California at considerable distances from the larger cities and industrial centers. To meet this emergency more than 7,000 Government owned hospital beds with mattresses are now stored in California ready for immediate use if and when they are needed. Base Hospital facilities to accommodate as many as 3,000 persons have been provided, if the evacuation of patients should be necessary from west of the Cascade Mountains in Oregon and Washington to safer areas on the interior. This plan includes base hospital beds as far east as Boise, in Idaho, and Butte, Helena and Great Falls, in Montana. The plan for moving patients by ambulance, railway and, if necessary, by water, has been worked out for most of the cities along the coast and could be placed into operation within a few hours.

AFFILIATED BASE HOSPITAL UNITS

Because so many physicians have gone into military service, there is already a shortage of medical personnel to care for civilian populations; yet it is essential that we be in position to give proper medical care to persons who may be injured as a result of enemy action, as well as to patients who may have to be removed from Casualty Receiving Hospitals along the coast. To provide for this emergency we are now in the process of recruiting medical personnel to form Affiliated Base Hospital Units, each of which will be made up of fifteen members to include a Chief and Assistant Chief of Medical Services, two general internists, a Chief and Assistant Chief of Surgical Services, four general surgeons, two orthopedic surgeons, one dental surgeon, one Pathologist and one Radiologist. These units will be formed from the staffs of hospitals approved by the American Hospital Association. This program has been approved by the Surgeons General of the Army and the U. S. Public Health Service, and the Governing Board of the Procurement and Assignment Service. Medical personnel chosen to make up these units will include only physicians who are above military age and therefore are not eligible for military service; women physicians, physicians within military age who have been rejected for military service because of physical defects, and physicians who have been declared essential by Procurement and Assignment and are temporarily exempt from military service. Physicians who accept invitations to join Affiliated Hospital Units will be commissioned in the Reserve Corps of the U. S. Pub-

*Read before the Montana Public Health Association, June 8, 1943.

lic Health Service with ranks varying from P.A. Surgeon, corresponding to Captain in the Army, to Senior Surgeon, which corresponds to Lieutenant Colonel in the Army. They will remain on inactive duty until such time as an acute emergency arises and will then be called to active duty by the Surgeon General, USPHS. If called to active duty they will remain on active status only until the acute emergency is over, when they will return to private practice. Members of units who may wish to enter military service will be permitted to resign from the Reserve Corps of the Public Health Service. At the present time 195 of the leading hospitals in the country have been invited to form these units, and of this number 49 are in the Ninth Civilian Defense Region, with 27 located in California, 6 in Oregon, 13 in Washington, and 3 in Utah. Invitations for the formation of units will be forwarded in the near future to one or more hospitals located in Phoenix and Tucson, in Arizona; Reno, Nevada; Boise, Idaho; and Great Falls, Montana. By organizing these Units in each of the principal cities of the Western States it is expected that even though an emergency should occur necessitating the evacuation of patients from the coast to the interior, it will not be necessary to remove physicians very far from their home town. If they should be moved from their usual residence, it will be to care for patients who may be evacuated to Base Hospitals in the interior. They will not be called to active duty in any capacity other than for the care of military or civilian casualties.

BLOOD PLASMA

Military authorities are agreed that the four principal factors responsible for the great reduction in the death rate among military casualties in this war as compared to the death rate in World War I, are:

1. The use of sulfa drugs in the prevention and control of infection;
2. Placement of medical field hospitals directly behind the front lines;
3. The rapid transportation of casualties to hospitals where proper treatment facilities are available, and
4. The prompt use of blood plasma in the treatment of shock.

Through the organization of Emergency Medical teams to work out of hospitals and well equipped Casualty Stations in all target area cities, it is expected that any casualties that may occur as a result of enemy action will be quickly transferred to Receiving Hospitals for prompt medical attention. To assist in the treatment of these patients, or in the treatment of casualties which may occur from natural disasters such as the Cocomanut Grove Fire in Boston, the U. S. Public Health Service and the Office of Civilian Defense have accumulated blood plasma reserves, along the Pacific Coast, either through outright purchase or through grants to hospitals for the development of blood banks, in the amount of about 24,000 units. This plasma can be immediately made available to any part of the Region where it may be needed. It is stored in hospitals from San Diego, Calif., to Seattle, Wash. To meet any need for plasma over and above the amount available in any city or community, authority has been granted to use the Civil Air Patrol

to immediately transport plasma by air to any point in the Region.

EMERGENCY MEDICAL SERVICE

This is concerned with the organization of physicians, nurses, nurses aides, and other auxiliaries to work with Local Chiefs of Emergency Medical Service. Teams are composed of a physician, one nurse, and two auxiliaries, and serve as mobile field units to work out of hospitals or improvised emergency centers known as Casualty Stations. The duties of these teams are to render first aid at the scene of the incident and to segregate casualties having minor injuries from those having serious injuries who should be sent directly to hospitals.

Every hospital of a community is considered to be a Receiving Hospital for casualties, and every hospital should form one or more medical teams, preferably from members of its resident staff, who may be dispatched on immediate notice to points of incidents. These emergency medical teams have been organized in all of the leading hospitals along the Pacific Coast and from time to time are called upon to participate in practice drills with the view of perfecting their method of operation. Because of the serious nature of high explosive bombs and the urgent need to get many of these patients to hospitals for immediate care, the Emergency Medical Team, after the fire services, is the most important field unit of the entire Civilian Defense Organization. The lives of many people depend upon the rapidity with which these teams can respond to calls and upon their skill in handling and dispatching casualties.

MEDICAL EQUIPMENT AND SUPPLIES

Early in the Civilian Defense program it was anticipated that medical equipment and supplies would be needed by local communities for use by Mobile Medical Teams and in Casualty Stations in Target Areas. Funds were allotted the O.C.D. for the purchase of this equipment and orders were placed through the Army Procurement Service for instruments, dressings, hospital beds, cots, stretchers, First Aid pouches, etc. However, the needs of the Army and Navy had to be supplied first, and many months passed before equipment for Civilian Defense activities could be furnished. Within the past sixty days, however, medical equipment has been or is now in the process of being shipped to approximately 180 priority towns and cities along the Pacific Coast.

DISTRIBUTION OF NARCOTICS

For the immediate care of bomb victims in England the use of morphine was found to be indispensable. Early in the war local supplies were inadequate and the problem of relieving pain, particularly of casualties in the field who were seriously injured or trapped in demolished buildings became acute. To forego such an emergency in this country, a plan has been worked out with the U. S. Commissioner of Narcotics whereby supplemental supplies of morphine are now being issued to priority cities in proportion to the amount of medical equipment allotted these cities. This morphine will be deposited with all Casualty Receiving Hospitals out of which Mobile Medical Teams will operate, with local Chiefs of

E.M.S., and with a few private physicians who are members of Mobile Medical Teams operating out of Casualty Stations located in isolated places where hospitals are not available. Only hospitals and physicians holding narcotic licenses will be furnished morphine. The hospital or the physician, as the case may be, will be responsible to the Commissioner of Narcotics for morphine issued to them.

PROTECTION AGAINST THE USE OF WAR GASES

To be prepared for the possible use of war gases by the enemy, every effort is being made to educate the public as to what to do in a gas attack. Programs are also being held in order to instruct physicians as to methods of treating persons affected by war gases. The O.C.D. plan for protection against war gases provides for the appointment of an experienced chemist, as Gas Consultant, on the state level in each state. This State Gas Consultant is responsible for the development of gas protective programs on the local level in all cities and towns in target areas. The Chemical Warfare Service of the U. S. Army has, for the past year, been conducting Gas Specialist Schools at Occidental College in Los Angeles, Stanford University at Palo Alto, and the University of Washington in Seattle. These special courses are designed to instruct local gas officers in methods of identifying the various war gases, methods of decontaminating areas affected by gas, in the instruction of the public against contamination, in methods of cleansing persons who are gassed and also wounded. Several hundred lay gas officers have completed the five day course given at these Civilian Protection Schools.

For training the medical profession, a special course for physicians was recently conducted in cooperation with Stanford University Medical School in San Francisco. Participating in this course of instruction were Medical Specialists in Chemical Warfare whose services were made available to the Office of Civilian Defense from the National Research Council. The six medical schools in the Region were invited to send representatives from their faculties to this school with the understanding that those taking the course would return to their respective schools and conduct a similar course of instruction for medical students, for other faculty members of the schools they represented, and to deliver special lectures on the treatment of gas casualties before local medical societies. This course of instruction, designed primarily for the medical profession and planned to eventually reach a majority of the practicing physicians of the region, was very well received. Faculty members were present from the medical schools at the Universities of Utah, Oregon, California, Stanford, Southern California, and the School of Medical Evangelists in Los Angeles. Also attending were Chiefs of Emergency Medical Service from five states, and Chiefs of Emergency Medical Service in target area cities. Army Medical Officers also attended.

Too much stress cannot be placed upon the importance of educating the general public as to what to do in a gas attack to protect themselves, and of making it possible for every physician to know how to properly treat gas

casualties. War gases have already been used by the Japanese against civilian populations in China, and there would be no hesitancy on the part of the Japanese to use war gases against military or civilian populations of this country if by doing so they would strengthen their chances of winning the war. In any event, we should be just as well prepared against the possible use of gas as we are against attacks by high explosives or incendiary bombs.

NURSES AND NURSES AIDES

Because of the continued great demand for graduate nurses for the military services, the country is rapidly approaching a crisis in the nursing field. Particularly is this so in our industrial cities to which many thousands of industrial workers with their families have migrated and where there is now a very definite shortage of both experienced Public Health nurses and registered nurses for hospital or private duty. Special nursing in some localities is a service which is gone for the duration. Except in extreme cases of severe illnesses special nursing should not be requested or permitted, as there is too great a demand for nursing service from other sources. In line of importance, our first responsibility is to provide nursing service for our military forces. Secondly, we must have graduate nurses to work in teaching and supervisory positions in our training schools and private hospitals. Of equal importance is the necessity for providing experienced Public Health nurses for our official Public Health agencies, including city, county, and state departments of health. In the Public Health field, I do not feel that we have made the adjustments that should be made. I refer particularly to the widespread use of school nurses, many of whom are well trained and thoroughly experienced in Public Health nursing yet are devoting their entire time to school nursing work and in some instances are employed for only nine to ten months of the year. For the duration of the war at least there should be no such thing as a specialized school nursing position in areas where there is a shortage of Public Health nurses for general duty. School nurses should be integrated into the general nursing program of the official Public Health agency operating in the community in which they are employed. If this were done and there should be a surplus of nursing personnel for general duty, those not needed should be given leave of absence by their employers for the duration of the war and be released for duty in the armed forces or for Public Health nursing positions in areas where they are more urgently needed.

ADDITIONAL TRAINING FACILITIES

To facilitate the training of more nurses a plan is now being considered, and is in the process of being worked out, whereby at least one-third more nurses might be trained by approved training schools without altering the quality of instruction to be given. Briefly, this plan involves the inclusion of all intramural training within two, rather than three, years. During the third year of instruction senior student nurses would be housed outside of the nursing quarters but would return daily for practical instructional work on wards and in special services under supervision, or would be assigned for their third

year of training either to approved private hospitals having no training schools or to Army or Navy hospitals approved by the training school for third year instructional work. Nurses enrolling under this plan and agreeing to serve with the military forces after graduation would have tuition paid by the Government and a reasonable monthly stipend for laundry, etc., (about \$15.00 per month) during their training period. A larger monthly stipend would be provided for those living away from the hospital in which they were receiving their third or senior year of training. Such a plan, in that it would vacate quarters ordinarily occupied by student nurses after the second year, would make possible the enrollment of one-third more nurses than could otherwise be accepted by training schools. It would also make available to military hospitals a great many senior student nurses who would relieve graduate nurses in the military services for foreign or other duty.

NURSES AIDES

Too much praise cannot be given to the many thousands of women who are volunteering for training as nurses aides. The course itself, which requires about 150 hours to receive the certificate, is the longest and one of the most exacting of all the special courses given in connection with the war program. With respect to the number of persons involved, there is more service and less glamour connected with this program than with any of the many voluntary services of the Civilian Defense organization.

The latest report has not been received, but as of April 1st there were 89,104 volunteer nurses aides trained or in training in the United States. In the Ninth Region as of April 1st there were a total of 7,824 nurses aides, divided by states as follows: Arizona 315, California 5,268, Idaho 199, Montana 81, Nevada 76, Oregon 414, Utah 360, and Washington 1,192. These women are making it possible for many hospitals to operate efficiently, which otherwise would be greatly handicapped for nursing service, or would be turning patients away. The American Red Cross is doing a marvelous job in recruiting nurses aides, and the nurses aides themselves are contributing a service which, during this time of war, is almost indispensable. The recruiting program is by no means complete. We need graduate nurses for our military forces, for our training schools and for supervisory positions in our private hospitals, for our Public Health agencies and for industry. It is only through the Nurses Aide program that graduate nurses may be made available to fill these key positions.

WAR SECURITY AID

In February of 1942 the President made available from his Emergency Fund, the sum of \$5,000,000 to the Administrator of the Federal Security Agency for providing temporary aid to civilians injured by enemy action.

This fund is also available for providing medical and hospital care and benefits to dependents of persons injured while in the performance of their duties as Civilian Defense workers. The requirements are that the individual, to receive protection, must be a member of the Citizens Defense Corps. If the worker is injured either in the process of receiving prescribed training, in practice drills, or in the performance of actual duties during blackouts, he will be eligible for full medical and hospital care on the same basis as provided under the Workman's Compensation Act, of the state in which the injury occurred. This program covers all persons assigned to Emergency Medical Teams including physicians, nurses, nurses aides, auxiliary workers, First Aid workers, ambulance drivers, etc. Also, it covers Auxiliary Firemen, Auxiliary Police, Air Raid Wardens, and others who are registered members of the protective services. It is absolutely essential, however, that every Citizens Defense worker, for protection, must conform to the above mentioned requirements. Therefore, from the standpoint of protecting its workers, the most important officer of a Citizens Defense Corps is the Personnel Officer who has the responsibility of knowing that all Civilian Defense workers are properly registered in the Citizens Defense Corps.

In conclusion, may I again emphasize that the task of organizing the Emergency Medical Service has been, and is still, a difficult one. Probably equally difficult has been the organization and training of Auxiliary Fire and Police Services, Wardens, Public Utility Squads, and others of the protective services who are expected to serve efficiently in time of emergencies. And once organized as individual units, much will depend upon how well these services are coordinated, each with the other.

Speaking for the Medical Service only, I feel that much progress has been made in the development of a workable program in many of our cities, yet there is still much to do to bring these programs to the degree of perfection at which they should be able to work. Improvement can be made only by practice drills repeated over and over again and every person who has volunteered his services as a member of the protective services, whether it be Emergency Medical, Fire Protection, Police Protection, or other, should realize the responsibility which he has assumed. By volunteering their services to act in an emergency, they have assumed an obligation to be prepared, and being prepared means to act on a team and in unison as a team. Every member should know his place and exactly what he is to do. Such team work can be acquired only by practice. That the United States will be attacked from the air is the belief and the prediction of many of our higher military authorities. The threat to bomb our Pacific Coast has been made by the highest Japanese military authority, and we should be ready to meet any emergency which may result from the fulfillment of his promise.

The Emergency Maternity and Infant Care Program*

Administered by State Health Departments

Edith P. Sappington, M.D.†

San Francisco, California

AS the size of the armed forces increases, the security of an even greater group of women and children is dislocated. Most of the women are young and not yet financially stable; many are pregnant. They try to follow their husbands to training areas in spite of overcrowded living quarters and insufficient funds. Their physical care is an ever increasing problem to the already strained medical and hospital facilities of these areas.

In response to this problem, the Children's Bureau, United States Department of Labor, in March 1942, announced the availability of limited funds for the medical and hospital obstetric and pediatric care for wives and infants of servicemen. A program for such services has been operating in the state of Washington in a limited area since 1941.

Reports from 36 states show that medical and hospital obstetric care was provided for over 16,000 mothers. As of March 6, 1943, almost \$650,000 of the Social Security grants-in-aid for maternal and child health services had been expended for the operation of these programs in some 30 states in this country, providing maternity care for approximately 10,000 wives of enlisted men.

Congress, recognizing the great need for continuing these services and extending them into all states, included in the First Deficiency Appropriation Act, 1943, which was approved on March 18, 1943, an appropriation of \$1,200,000 for the period ending June 30, 1943, "for grants to states, including Alaska, Hawaii, Puerto Rico, and the District of Columbia, to provide, in addition to similar services otherwise available, medical, nursing, and hospital maternity and infant care for wives and infants of enlisted men in the armed forces of the United States of the fourth, fifth, sixth, or seventh grades, under allotments by the Secretary of Labor and plans developed and administered by state health agencies and approved by the Chief of the Children's Bureau."[‡]

Congress has recently appropriated \$4,400,000 more for the continuation of the programs during the fiscal year ending June 30, 1944.

Under this plan how long the wife has lived in the state does not matter. How much money the family has does not matter. Race or color does not matter.

Forms for requesting care are made available to the wives of enlisted men by the state health departments through local health and welfare agencies, local American Red Cross chapters, prenatal clinics, military posts, and through local practicing doctors of medicine.

The wife fills out and signs her part of the application, including her husband's serial number. Her doctor

*Presented at the annual convention of the Montana Public Health Association, at Bozeman, June 7, 1943.

†District Medical Director, Children's Bureau, U. S. Department of Labor, San Francisco Regional Office.

‡This excludes the families of commissioned officers; of master, first, technical, platoon, and staff sergeants; and of chief, first, and second-class petty officers.

completes and signs the application and forwards it to the state director of maternal and child health or his authorized deputy. The form includes a statement by the doctor (or hospital) that the services authorized will be rendered for the amount paid by the state health department without payment from the patient or the family.

In an emergency, medical or hospital care may be given before an application is sent in. The application, however, should be completed as soon as possible and forwarded to the state health agency.

The state director of maternal and child health promptly notifies the patient and attending physician, or clinic, and the hospital (if the patient is going to a hospital) whether or not the care is authorized.

In states providing these services, the patient can expect the following:

Complete medical service for maternity patients during the prenatal period, childbirth, and six weeks thereafter—including care of complications, operations, and postpartum examination—and for the newborn infant.

Health supervision for infants usually provided in child-health conferences.

Nursing care in the home through the local health department—including whatever bedside nursing care is necessary—for the mother, before, during, and after childbirth and for the baby during the first year of life.

Hospital care in wards or at ward rates for maternity patients and infants. The funds cannot be used in part payment for more expensive hospital accommodations. A minimum stay in the hospital of ten days after childbirth is arranged if possible. Hospital care may be authorized in any hospital, including Army and Navy hospitals, in which the maternity and pediatric services have been approved by the state health agency.

Referrals for social services by the medical-social-service staff of the state agency to cooperating state and local departments of welfare and other public and private agencies for help in meeting individual problems that interfere with medical care, such as unsatisfactory living conditions, separation from husband and family, inadequate income and lack of proper food.

As of June 30, 1943, thirty-eight states have approved plans in operation and approval of other state plans is pending. All sections of the country are represented. All plans now provide services on a state-wide basis.

Difficulties (though surprisingly few of them) have been encountered by most states. When physicians have understood that the plan is a temporary war expedient and that they are free to refuse to participate if the stipulated terms are not agreeable to them, most misunderstanding has been cleared. Most, if not all, physicians practicing obstetrics are fully cooperating with the state health agencies in making these services available.

Adherence to the flat case rates has obviated fee difficulties in almost all regions. There has been some quibbling about fees, but it has been very little. A professional failing—procrastination in securing authorization for cases—has occurred rather frequently but, on the whole, the simpler the setup the more smoothly and satisfactorily it has functioned.

Hospitalization has been the major problem. The facilities even in normal times have been inadequate in quantity and often in quality in places in which they are most needed, and now loss of both professional and unskilled personnel, complicated by a capacity census, presents nearly insurmountable obstacles. In many instances, it has been impossible to find an institution able even to approximate the standards required for participation. In cases in which the state department of health can main-

tain a friendly consultation service to the available hospitals, much can be done to mitigate hazards to mothers and infants, even without many physical changes.

The administration of the plan has been the responsibility of the maternal and child-health divisions of the various states, and has demanded much time and personal direction.

The state health agencies and the Children's Bureau have on file hundred of case histories and personal appeal letters demonstrating the needs of wives of servicemen, which it is hoped will be taken care of fully in the near future, through the extension of the program for emergency maternity and infant care into the few states that have been unable to establish these services up to the present time.

TRANSACTIONS OF
THE MINNEAPOLIS ACADEMY OF MEDICINE

Founded January 17, 1920

Stated Meeting Held at the Minneapolis Club, December, 1942

Dr. Roy E. Swanson in the Chair

THE USE OF
SULPHOCYANATE IN HYPERTENSION

Inaugural Thesis

L. RAYMOND SCHERER, M.D.

In 1903, Pauli began some experiments with the sulphocyanate ions. He reported his results in 35 cases, each of which received 15 grains daily of the sodium sulphocyanate. He stated that the drug exerted a satisfactory sedative action and included headache, vertigo, and tabetic pain among the phenomena that seemed to be controlled by it. He also reported a marked reduction of blood pressure and the disappearance of symptoms associated with hypertension.

Nichols in 1925 made quite a detailed study of the sulphocyanates, from both pharmacologic and therapeutic standpoints. He noted that solutions containing sulphocyanate are turned a dark red color on the addition of a drop or two of ferric chloride and decolorized by the addition of mercuric chloride. These color reactions were not obtained if the solutions were markedly alkaline. Sulphocyanates were found to be normal constituents of the saliva, tears and gastric juice. The estimated amount in the saliva was about .01 per cent. The drug when given was excreted unchanged through the kidney. Pollock was able to obtain from the urine the same amount that was ingested.

Experiments with guinea pigs (Nichols) revealed that lethal doses of sulphocyanate varied from 200 to 300 mgs. per kilogram of body weight when given intraperitoneally. The animals became sluggish, developed diarrhea, occasional hemorrhage from the anus, and later, evidence of spinal irritation and finally coma—death usually occurring within two or three days.

Bernard stated that sulphocyanate acted as a direct muscle poison, abolishing muscular activity. In dogs, Lodholz found that 100 mgs. per kilo of body weight injected intravenously usually caused immediate and permanent cardiac arrest; in those dogs not dying immediately, a marked rise in blood pressure was noted.

With the first general use of this drug following the preliminary favorable reports, many severe toxic manifestations were obtained. These included profound weakness, disturbance of the gastrointestinal tract, dermatitis and nervous phenomena, including psychosis. The drug, as a result, fell into disrepute and was largely discarded and considered unsafe.

Barker in 1936 aroused further interest in sulphocyanate by describing a technic (a modification of Schriber's) for determining the amount of sulphocyanate in the blood. His original observations were made on 45 patients; 35 of this group showed a fall in systolic and diastolic blood pressures when blood levels above 5 or 10 mgs./per cent were obtained. Slight toxic manifestations were noted in many of these but did not become disturbing until they were raised above 10 to 15 mgs./per cent. These manifestations became more marked, Barker stated, in levels above 20, but none were serious until concentrations of from 35 to 50 mgs./per cent were obtained. The dosage for maintaining levels of from 6 to 10 mgs./per cent varied from 60 to 720 mgs. daily.

Further observations on the pathologic effect of sulphocyanates were reported in 1941 by Lindberg, Wald and Barker. They determined blood cholesterol, serum proteins, erythrocyte counts and hematocrit readings on 12 normal dogs, each receiving 5 grains daily. When toxic levels were maintained, there was a significant fall in cholesterol and in serum proteins.

Cholesterol, 170 - 120 - 100.

Serum protein, 7 - 4.5 - 4.1.

Hematocrit, 37 - 24 55 - 32 47 - 18.

Red blood cells, 5.3 - 3.48 6.3 - 4.8 5.95 - 2.97.

There was a reduction in the erythrocyte count and an increase in the sedimentation rate of the red cells. They stated that such phenomena did not occur with the therapeutic doses given to humans, although a secondary type of anemia is not uncommon in long continued use of this drug. Tissue studies made on these dogs showed that KSCn permeates all tissues in essentially the same concentration. There were significant liver and bone marrow changes. In the less toxic cases Lindberg found that the normal matrix was replaced by fat. In the more severe toxic states he demonstrated that the fatty marrow was replaced by a clear eosin staining gelatinous material, not unlike that found in benzol poisoning. Examination of the liver showed diffuse intracellular fatty vacuolization of marked degree with little tendency to regeneration. The icterus index remained normal. Other organs showed no gross or microscopic change. The adrenals were entirely normal. Blood chemistry studies were all within normal limits. They concluded that there was nothing in their studies to indicate how the cyanates function in reducing blood pressure.

Caviness, et al. (1942), inserted a unique idea as to the function of sulphocyanates. They studied 241 persons to whom the drug had never been administered and found their blood concentrations of sulphocyanate ranged from .31 to 2.55 mgs./per cent. They found individuals with normal blood pressure generally had a concentration of 1.2 mgs./per cent. They repeated these determinations and found quite a constancy in this level from week to week. They stated that hypertensive individuals seem to have the lowest figures, and that the hypotensive individuals had the higher concentrations. They concluded that this drug acts as a depressor substance, which conclusion accounts for the therapeutic use of the drug which heretofore has been used empirically.

I, personally, have made only a few determinations on normal individuals and have found only traces of the sulphocyanate—too small to measure by the modification of Schrieber's technic as described by Barker. Caviness' determinations were made by the use of an Evelyn photoelectric colorimeter, using blood serum. In a personal communication, Dr. Binger of the Mayo Clinic stated that they have made no determinations on normal individuals, but Dr. Osterberg was going to do so.

I have made use of KSCn. for approximately four years, both in private practice and more recently at the Heart Clinic at the University of Minnesota. In this report I wish to present my own observations on the effect of KSCn. upon 60 individuals with hypertension.

Table I: *Grouping into decades and result.* 41 showed moderate to marked improvement objectively, 19 showed slight or no improvement in blood pressure reading, 37 showed moderate to marked subjective improvement, 10 showed slight or no relief of symptoms, 13 were asymptomatic.

TABLE I
Result of Sulphocyanate Therapy

Decades	No. of Cases	Subjective Improvement	Objective Improvement	Toxic
20 to 30	3	2 Marked 1 Asymptomatic	1 Marked 1 Moderate 1 None	0
30 to 40	6	5 Marked 1 Moderate	1 Marked 5 Moderate	0
40 to 50	16	6 Marked 5 Moderate 2 Slight 3 Asymptomatic	3 Marked 8 Moderate 3 Slight 2 None	2
50 to 60	17	8 Marked 3 Moderate 5 Slight 1 Asymptomatic	7 Marked 3 Moderate 4 Slight 3 None	2
60 to 70	13	5 Marked 1 Moderate 2 Slight 5 Asymptomatic	4 Marked 3 Moderate 4 Slight 2 None	4
70 to 80	4	1 Moderate 1 Slight 2 Asymptomatic	1 Marked 3 Moderate	2
80 to 90	1	1 Asymptomatic	1 Moderate	1
Totals	60	60	60	11

The average systolic fall in blood pressure was 37 mm. The average diastolic fall in blood pressure was 17.5 mm. The maximum systolic fall in blood pressure was 80 mm. The maximum diastolic fall in blood pressure was 45 mm. The minimum for both was 0.

Seven of this group had decompensated and were digitalized before cyanates were commenced. In this small group, the KSCn. worked equally as well in reducing hypertension as in the non-decompensated group.

Fifty-one out of the 60 had electrocardiographic studies and 23 of these tracings showed myocardial damage, not including left axis deviation or those showing depressed RT interval in lead I with left axis deviation.

In consideration of the hereditary tendencies in hypertension, a positive family history was noted in 30 patients. In 9 it was

TABLE II
Toxic Phenomena

Case No.	Age	Symptoms	Dose in Grains	KSCn Level
12	53	Nausea, Anorexia, Weakness	6	7
13	81	Confused, Anorexia	6	8
14	68	Weakness, Anorexia	6	3.2
17	47	Dermatitis, Nausea, Vomiting	5	20.6
20	60	Confusion. Patient had cerebral vascular accident	6	13.5
28	62	Weakness. Unsteady gait	2.5	6.4
29	55	Confusion, Weakness, Anorexia, Persistent Depression	10 5	14.4
38	75	Dermatitis	4.5	7.9
45	62	Weakness	4	10
46	46	Severe Dermatitis on exposed parts	3	20
53	74	Nausea, Confusion, Staggering gait	3	4.2

negative. In 21 it was not stated.

Thirty-four patients complained of headaches—31 received complete relief, 1 was improved and 2 received no relief.

Forty-one in the series had notes on fundus examinations. Thirty of these had retinal vessel narrowing (grades 1 to 3) and 7 of these also had retinitis. The response to the drug was not necessarily related to the degree of retinitis.

In the group of 11 having toxic phenomena, as shown in Table II, 6 demonstrated decreased renal function by either the P.S.P. test or urea nitrogen determination.

CASE HISTORIES

Mrs. J. (No. 17). Age 47. Examined Feb. 5, 1941. Known hypertension since 1925. Recent examination elsewhere with diagnosis, grade 4 hypertension with retinitis and beginning renal insufficiency. Patient complained of severe headaches, nervousness and fatigue, also insomnia. She had peculiar attacks of localized paresthesia. B.P. 254/155 on Feb. 19. KSCn started, 5 grains daily. March 4, 1941, KSCn level 20.6 mg./per cent. B.P. remained unchanged. No toxic phenomena. Drug reduced to 2 grains daily.

March 17, 1941. Patient reported by telephone that she had nausea, vomiting and diffuse rash on neck and arms. The drug was discontinued.

March 27, 1941. KSCn. level still 17.2 mg./per cent. Same rash present. No other toxic phenomena. Patient reports no headaches, comfortable and sleeping well.

April 10, 1941. Having received no cyanates for three weeks, her KSCn. level is 12.9 mg./per cent—still some dermatitis. Patient feels well. B.P. 240/140.

On April 20, 1941, patient had cerebrovascular accident and expired.

* * * * *

Mr. G. (No. 29). Age 55. Salesman. Negative hypertensive family history. Known hypertension since 1931. Severe anginal attack in May, 1939. Occasional occipital headaches.

Examination. Sept. 22, 1939. B.P. 220/150. Retinal vessels narrowed grade 2 to 3. No retinitis. The heart quite markedly enlarged to the left. E.K.G. shows left axis deviation with T negativity in leads 1, 2 and 4. P.S.P., 32 per cent in 1 hr. Urea Nit., 14.7 per cent.

Treatment: KSCn. started Sept. 22, 1939—5 grains b.i.d. for four days, then 5 grains a day. Patient returned home. Oct. 7, 1939, local physician sent in specimen of blood and stated B.P. was 210/140. KSCn level 6.7 mg./per cent. Patient was instructed to take 10 grains for three days, then return to 5 grains. Oct. 20, 1939, patient re-examined. B.P. 185/105. KSCn level 14.4 mg./per cent. Patient was drowsy and seemed somewhat confused—complained of marked fatigue and anorexia. Personality change present. Drug discontinued.

Jan. 31, 1940, patient re-examined. Still somewhat depressed and wife stated change of personality is persisting. B.P. 230/120.

* * * * *

Mr. Z. (No. 42). Aged 60. Seen April 1941. Known hypertension since 1918. **Symptoms:** Asymptomatic except for occasional abdominal pain referred into left arm. Recent examination elsewhere showed B.P. 210/110, 240/155. Retina showed moderate narrowing of vessels. Urine and blood urea normal. E.K.G. negative.

Treatment: Phenobarbital, gr. $\frac{1}{2}$ t.i.d. for three weeks. B.P. 200/120, 220/130. May 26, 1941—KSCn 3 gr. b.i.d. June 12, 1941—B.P. 200/130, 210/140. KSCn level 10.8 mg./per cent. Patient complained of frequent anginal attacks not related to effort. Drug discontinued. Later this patient had a coronary thrombosis.

* * * * *

Miss L. (No. 59). Examined Nov. 12, 1942. Known hypertension for 10 years (insurance examination). Frontal and occipital headaches began two months ago and awakened her in the morning. Complained of cold lower extremities.

Examination: B.P. 210/130. Urine—negative. P.S.P., 67 per cent in 1 hour. Urea N. 17.5 mg./per cent. E.K.G. shows deeply negative T₃. Fundus examination shows grade 2 sclerosis of the retinal vessels with moderate edema. The brachial vessels were thickened but normal in pulsation. No pulsation was present in femoral, posterior tibial, and dorsal pedal vessels. B.P. in lower extremities could not be obtained. Intravenous urogram was negative. Chest x-ray revealed the heart to measure 11.2 cm. in transverse diameter. Transverse diameter of chest was 22.0 cm. "The aortic arch is small. In the oblique view, the distal part of the arch and the descending aorta are not visualized. There is slight scalloping of the posterior part of several of the ribs." A diagnosis of coarctation of the thoracic aorta with secondary severe hypertension was made.

Nov. 30, 1942. B.P. 210/130. KSCn. level 4.3 mg./per cent. Headaches completely relieved.

Dec. 7, 1942. KSCn. level 10.8 mg./per cent. B.P. 210/130.

* * * * *

Mrs. A. (No. 11). Age 50. Positive hypertensive family history. Known hypertension 13 years. Toxemia with three pregnancies. Ca. of sigmoid removed in 1927.

Symptoms: Severe occipital headaches in morning for four years. Retrosternal pain and dyspnea with effort for two years. Fatigue prominent for three years. Unable to carry on any activity.

Examination: Retinal vessels showed grade 2 sclerosis, no retinitis. B.P. 205/128 after use of phenobarbital. E.K.G. shows left axis deviation. P.S.P., 62 per cent one hour.

Treatment: KSCn. started Feb. 23, 1940—3 grains b.i.d.

March 6, 1940, B.P. 160/105; KSCn. level 7.8 mg./per cent. Headaches relieved. April 8, 1940, B.P. 150/100; KSCn. level 7 mg./per cent. May 6, 1940, B.P. 140/90; KSCn. level 7 mg./per cent. This continued throughout 1941.

October 13, 1942, B.P. 170/110; KSCn. level 5.2 mg./per cent. Occasional morning headaches. Cyanates increased to 3 grains t.i.d. Dec. 7, 1942, B.P. 150/100. Patient able to carry on active secretarial work for the past two years.

SUMMARY AND CONCLUSIONS

1. Out of 60 hypertensive individuals treated with KSCn., 41 obtained significant lowering of the systolic and diastolic blood pressures.

2. Thirty-seven having subjective symptoms were completely relieved of these. Ten had slight or no relief.

3. Toxic phenomena appeared in 11, one of which was rather severe. These tended to appear at lower concentrations than usually described.

4. KSCn. very definitely should not be used unless careful clinical and laboratory observations can be made at frequent intervals.

5. Further studies should be carried on, particularly in attempting to determine the basis for the action of the drug.

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Discussion

Dr. C. A. McKINLAY: We are indebted to Dr. Scherer for the study of these cases. Personally, I am impressed by the fact that 18 per cent of the cases reported had some toxic manifestations, and that it is the kind of treatment which may carry quite a wallop. Undoubtedly, some cases show marked reduction of blood pressure, but I am unable to speak from much experience with the use of this drug.

Dr. REUBEN A. JOHNSON: I believe that Dr. Rudolph Loge-feil was the first local physician to use potassium thiocyanate here in Minneapolis in the treatment of hypertension, which may be of interest to the members of this society. He used a German proprietary called Rhodan. This was before the appearance of the article by Dr. M. Herbert Barker, of Chicago, in the *Journal of the American Medical Association*, several years ago, in which the importance of chemical control of the blood level of the drug for satisfactory results was emphasized. Dr. Loge-feil reported some brilliant but variable results. This drug is undoubtedly one of our most effective agents for the continued control of hypertension in selected cases.

The treatment of hypertension was the subject of a round table discussion at the Boston meeting of the American College of Physicians in the spring of 1941. Dr. O'Hare of Boston discussed the use of thiocyanate, and the criteria which he uses for selection of cases appealed to me, and I have followed his rules in this matter since that time. He restricts the use of this drug to patients under the age of 60, and to individuals who show no important involvement of the cerebral or heart circulation, or kidney insufficiency. There must also be a real hypertension present, and when he was pinned down as to what he considered a real hypertension, he had levels of 200 systolic, and 120 diastolic and above in mind. I feel sure that in one of my patients two attacks of coronary thrombosis were precipitated by the use of this drug. Her systolic blood-pressure ranged at about 220 and 230 mm. of mercury, and she was anxious to have something done. Within two weeks after starting the drug, when the systolic blood-pressure was around 170, she had an attack of coronary thrombosis. She made a complete recovery. Later on she wanted to try it again, and again she had a similar vascular accident with fortunately a good recovery; she is still living in reasonably good health.

One wonders whether the application of this drug earlier in the disease might not be advantageous. Perhaps the life expectancy of individuals destined to become severe hypertensives would be extended if the drug were used earlier in the course of the disease. Possibly broken courses might be advantageous. It is most interesting to learn of the extreme variability in the rate of excretion of this drug shown by individuals. Dr. Scherer mentioned a tenfold variation in the rate of excretion, and Dr. O'Hare noted a sixfold variation. This variability in the rate of excretion is manifested by other drugs. For example, I had in the office on the same day, two individuals of about the same age, with approximately the same type of cardiac disease, both fibrillating; one requiring two cat units a day for complete digitalis control, and the other requiring only one cat unit in five days for an equal effect. Recently Hines and Eaton of the Mayo

Clinic have been using potassium thiocyanate in the treatment of migraine, and the preliminary report on their results seems convincing, that this drug has a distinctly beneficial action in the control of migraine.

Dr. A. E. CARDLE: Did you notice any change in the electrocardiogram after giving the drug?

Dr. L. RAYMOND SCHERER: This was not routinely checked, but on the few cases that it was, there was no change in the electrocardiogram.

In considering Dr. Johnson's remarks I do not believe that renal insufficiency should be a definite contraindication, but the drug should be used much more cautiously, as the concentration of the drug in the serum tends to increase much more rapidly in these cases. I am not convinced, also, that elderly individuals should not be given a careful trial on the drug, as I have had several past 70 receive marked symptomatic and objective improvement without toxic effects. I am sure some individuals have idiosyncrasies to the drug which are not related to the usual toxic effects seen.

Dr. JAY C. DAVIS: Do you know whether or not Dr. Barker

has run the thiocyanate blood levels on people without hypertension?

Dr. L. RAYMOND SCHERER: No, I do not know. I wrote to Dr. Barker about this but he did not reply. I wrote to Dr. Binger at the Mayo Clinic, and he replied that they had made no such studies, but Dr. Osterberg had planned on doing so.

Dr. REUBEN JOHNSON: In evaluating the toxic symptoms of potassium thiocyanate, one must bear in mind that we are dealing with a particular group of cases where circulatory disturbances may produce such symptoms as dizziness, headaches, nausea, etc., and these may occur as a part of the disease picture independent of action of any drug, and it is therefore difficult to know always that the drug is responsible for the symptoms.

Dr. JAY C. DAVIS: Some might have had personality changes without any drug at all due to cerebral arteriosclerosis.

Dr. L. RAYMOND SCHERER: I agree with Dr. Davis that this group of individuals may have personality changes on a vascular basis, but I have felt it wise to discontinue the drug if any unusual change in personality made its appearance.

Stated Meeting, Held at the Minneapolis Club, January, 1943

Dr. Roy E. Swanson in the Chair

BRONCHIAL ADENOMA

Inaugural Thesis

THOMAS LOWRY, M.D.

Benign adenoma of the bronchus is a disease relatively new to clinical medicine. With the exception of a few case reports, the now considerable literature of the condition has all appeared during the past eleven years. Within that period, the more general use of bronchoscopy has been largely responsible for the increasing frequency with which bronchial adenoma is recognized; and the rapid advance of thoracic surgery has made possible (at least in many instances) effective treatment of what was formerly only a pathological curiosity. My purpose, after reviewing briefly the earlier work on the subject, is to present four of our own cases, all of which have so far been treated bronchoscopically by local removal, and to outline the difficulties confronting us at present in the diagnosis and management of this tumor.

Historical: Prior to 1932, adenoma of the bronchus was not clearly distinguished as an entity. Occasional cases were discovered at necropsy. As bronchoscopy became more frequently employed (at first, in this country, through the influence of Jackson and his school), these tumors were found during life and a few were locally removed through the bronchoscope. Some were considered to be carcinomata; and, indeed, because of their peculiar cytological features, many adenomata continue to be difficult of microscopic identification even by pathologists familiar with them. Others were called "vascular adenoma," "adenomatous polyp," or were thought to be inflammatory polypi with epithelial metaplasia.

In 1932, Wessler and Rabin established adenoma of the bronchus as an entity, by their review of 12 cases with analysis of the clinical and pathologic characteristics of the disease. They felt that these tumors were benign, but that malignant degeneration could and probably did occur. The general experience since the appearance of their report has indicated that distant metastasis occurs extremely rarely, if ever, in proven cases. About 150 instances of bronchial adenoma have been recorded in the literature since 1932, and it is now well recognized as a clinical entity having several distinctive characteristics.

I should like now to present some illustrative cases. These patients were observed at the University Hospitals, and I should like especially to express my appreciation to Dr. Leo Rigler for his permission to use the roentgenological material in connection with them.

CASE REPORTS

Case 1. The first patient, a 36 year old American housewife, was seen in the Out-Patient Clinic in August 1940. She presented a history of cough for two years, productive of thick

purulent sputum, varying in amount from 1 ounce to ½ cup in twenty-four hours. This had not been foul, but there had been hemoptysis of 2 ounces or so of bright red blood on four or five occasions during the two-year period. She had not lost weight and had had no fever as far as she knew. Examination of the chest showed slightly diminished expansion of the right side of the thorax. There were decreased breath and voice sounds over the lower third of the right lung posteriorly. No rales were heard and there was no impairment of resonance on percussion. The remainder of the examination was negative. Routine urine and blood examinations showed no abnormalities.

Her x-ray revealed increased density in the medial portion of the lower right lung field. This was interpreted as probably indicating an area of atelectasis or "drowned lung" in the medial segment of the right lower lobe. A bronchogram was made and showed obstruction of a branch of the right lower lobe bronchus with a rounded filling defect in the lipiodol shadow. At bronchoscopy, done by Drs. Robert Priest and L. R. Boies, a pedunculated, polyp-like mass was seen. This was smooth, movable and covered by glistening mucous membrane. Biopsy revealed adenoma of the bronchus, and, at a subsequent bronchoscopy, the mass was removed in toto. It was attached by a long pedicle.

Three months later, the patient had gained 7 pounds and was coughing much less, but still raised ½ ounce or so of purulent sputum per day. A bronchogram in April 1941 showed filling of several saccular bronchiectatic pockets distal to the point of obstruction which were not reached by lipiodol injection before removal of the adenoma.

This patient went through a normal pregnancy and was delivered in July 1941. Since then her symptoms have continued to be mild, consisting of a slight cough with less than 5 cc. of purulent sputum daily and no hemorrhages. Bronchoscopy in April 1942 showed recurrence of the adenoma in the right lower lobe bronchus. Lobectomy was refused and therefore tissue was again removed locally.

When last seen, in November 1942, the patient was in good health, had maintained her weight, and her symptoms were still in abeyance.

* * * * *

Case 2. The second case was studied in more detail. It presented a more difficult problem. The patient was a 29 year old, single waitress, admitted to the University Hospital in May, 1940. She had had a febrile illness three months earlier, said to be pneumonia involving the left lower lobe. At that time she was hospitalized for three weeks. Following this, she had felt well, but a dry cough had persisted, and during the month prior to admission she had noted anorexia and daily afternoon fever with a weight loss of over 20 pounds. The week before

entry she had a small hemoptysis. There was no history suggesting aspiration of a foreign body. On examination we found an acutely ill young woman, with a fever of 101.6°, pulse 140, respirations 24. There was evidence of obstruction of the left main bronchus, with dullness, diminished expansion and diminished breath sounds over the whole left lung. The mediastinum was displaced to the left. The significant laboratory finding was leucocytosis of 23,000 with 88 per cent polymorphonuclears. The diagnosis was obstruction of the left bronchus with atelectasis and infection of the distal lung. X-ray showed density through the lower half of the left lung and, as you see, the planigram established the nature of the obstruction with virtual certainty.

Bronchoscopy was done by Dr. Logan Leven and the tumor was visualized as a smooth round pink mass in the left main bronchus. Following gentle instrumentation, it bled freely and seemed to disappear from view, so that no tissue could be obtained. Following the procedure, the entire left bronchial tree became occluded by blood clot and a "drowned lung" resulted. The patient became very ill, with temperature of 105°. Bronchoscopy was repeated for removal of the clot, but this only started fresh bleeding and the attempt was abandoned. As the clot absorbed, she improved gradually and the lung cleared. She left the hospital about five weeks after admission. At that time, the tumor was much smaller and the obstruction correspondingly relieved.

The patient gained weight rapidly after leaving the hospital and had very little cough. Only occasionally was there a small amount of purulent sputum. The only symptom was dyspnea on moderate exertion. She was followed in the Out-Patient Department until February 1941. The situation did not change appreciably. It was felt that the tumor should be removed, if possible, before it grew sufficiently to occlude the bronchus again. Accordingly, the patient was re-admitted, and at this time the bronchial mass was removed through the bronchoscope by Dr. Leven. Only slight bleeding and no untoward reaction occurred. In this patient, there is undoubtedly much permanent lung damage in the form of bronchiectasis and fibrosis. At present, rales are audible throughout her left lung. Further observation will be necessary to decide whether radical surgical methods will be required to manage this residual bronchiectasis. However, at present she has no cough and very little sputum and has gone through two winters without difficulty. Therefore, at present the symptoms hardly justify a pneumonectomy.

* * * * *

Case 3. This was a 32 year old married white garage mechanic, admitted in August 1941. He had had pneumonia four times between the ages of 10 and 31. For one year, a cough had been present, productive of one cupful daily of purulent sputum which was sometimes blood-streaked and slightly fetid. Examination showed a well-developed and well-nourished man. There was reduced expansion of the right hemithorax. On percussion, dullness was elicited over the lower half of the right lung posteriorly, with diminished breath sounds, a few coarse rales and a transient expiratory wheeze in this area. Examination was otherwise normal. The laboratory findings were within normal limits.

X-ray of the chest showed consolidation in the right lower lobe with some evidence of atelectasis. Bronchoscopy revealed a smooth rounded pink mass obstructing the right lower lobe bronchus, which bled easily and proved to be an adenoma. It was removed locally and subsequent bronchography showed extensive bronchiectasis in the previously obstructed area.

The patient's symptoms disappeared in one month. He has been seen periodically since and his cough has not recurred. A checkup bronchoscopy in April 1942, eight months after removal of the growth, showed no recurrence and a lipiodol study done over a year after the procedure showed the bronchus to be unobstructed. Ordinary roentgenograms of the lung have remained practically clear, but persistent rales in the right lower lobe testify to the presence of the bronchiectasis shown by bronchography. The patient's improvement was so striking that the surgical staff decided to defer the lobectomy which had been planned to follow bronchoscopic extirpation of the adenoma.

Case 4. The last case is that of a 39 year old housewife admitted in June 1942. Thirteen years previously she had been told she had a "spot" on her right lung. However, she remained free of symptoms until 1933 when she developed a chronic cough. This persisted with some intermissions and was associated with frequent small hemoptyses which were apt to occur at the time of her menstrual periods. For two years there had been increasing dyspnea and a feeling of substernal pressure. Examination showed a well-developed, well-nourished woman. There was marked restriction of motion of the right thorax, with an inspiratory thrill and harsh breath sounds, suggesting almost complete obstruction of the right bronchus.

X-rays showed what appeared to be an upper mediastinal mass, but on bronchoscopy a typical adenoma was found in the right main bronchus just below the bifurcation. It now appears that the mediastinal mass is merely the extrabronchial portion of this neoplasm.

The proximity of the lesion to the carina precluded lobectomy or pneumonectomy in this case and, therefore, local extirpation was performed by Dr. Leven, part of the tumor being removed in June 1942 and a further portion in November 1942. Bronchoscopy January 14, 1943, showed the bronchus to be open. No further growth of the tumor could be noted, although only two months had elapsed and this patient will be closely followed.

Since the first partial removal of this neoplasm seven months ago, the patient has had no cough, wheeze or dyspnea. At long intervals she raises 1 or 2 cc. of blood-streaked sputum. She has gained a small amount of weight and feels entirely well.

INCIDENCE

Bronchial adenoma is not a common tumor, but its incidence is probably greater than has been supposed, amounting to between 6 and 10 per cent of all primary bronchial neoplasms. However, since the majority of bronchogenic carcinomata advance beyond the operable stage before a diagnosis is made, adenomata make up a considerably greater percentage of the curable tumors. Churchill recently stated that 25 per cent of resectable bronchial growths belonged to this group.

The age and sex incidence of adenoma are in sharp contrast to those of carcinoma of the bronchus, as shown in Table I. These facts, together with the clinical features to be discussed, are strongly in favor of the view that the two are essentially different tumors.

PATHOGENESIS

There has been a good deal of dispute about the origin of bronchial adenoma. Some of the earlier workers believed that stasis of bronchial secretions might cause inflammatory polypi,

TABLE I
Bronchial Neoplasms

	Adenoma	Carcinoma
Age	80% under 40	90% over 40
Sex	70% female	85% males
Appearance	Smooth, pink, oval or lobulated; often pedunculated. Bronchus not fixed. Troublesome bleeding on biopsy.	Irregular, yellowish or grey; often ulcerated; bronchus infiltrated and fixed. Bleed readily but not profusely.
Clinical	Attacks of suppuration intermittent with long healthy intervals.	Suppuration or atelectasis usually progressive. Steady downhill course.
Bronchiectasis	Frequent, due to chronicity of course.	Infrequent; course usually too rapidly progressive.
Type of Hemoptysis	Often profuse, with sudden onset and abrupt cessation.	Usually only streaking, which is often continuous.

and that epithelial metaplasia then occurred and produced the final pathologic picture. This concept has been generally abandoned, and it is now agreed that the adenoma is a true tumor, inflammatory changes in the lung being secondary to it rather than responsible for it. We have no good evidence as to the cell type giving rise to these neoplasms, but the most commonly accepted view is that they originate from the duct epithelium of the bronchial glands. The fact that these ducts traverse the bronchial wall beyond the cartilaginous rings is given as one reason for the frequent extrabronchial extension of these growths.

PATHOLOGY

Bronchial adenomata occur in the larger bronchi. It has been said that they do not arise in branches of less than 10 mm. diameter, but such a sharp limit can probably not be applied to all cases.

Grossly, the adenoma is a smooth, round or oval, pinkish tumor. The intrabronchial portion most frequently is polypoid and may be pedunculated. In some instances, however, it is relatively flat and attached by a broad base. There is often extension through the bronchial wall with the formation of an extrabronchial mass which may be larger than the intrabronchial portion. A recent article reviewed 19 cases, in 90 per cent of which extrabronchial growth was present.

Microscopically, the adenoma is usually covered by epithelium which frequently undergoes metaplasia to the squamous cell type. Beneath the epithelium is a layer of loose connective tissue. This is often very vascular and is the origin of the profuse bleeding so commonly encountered in the condition. The neoplastic cells are rather small, cuboidal or polygonal in shape and uniform in size. They usually grow in sheets or cords and look rather undifferentiated. However, their nuclei are very uniform and mitotic figures are uncommon.

There is still a good deal of argument as to whether these lesions are benign or of low-grade malignancy. They are locally invasive and frequently recur after local removal. One recent paper reported two cases in which distant metastasis was said to have occurred, but the report is not very convincing. At present, the consensus is that the bronchial adenoma is not malignant in the clinical sense. No case is on record in which a patient has died of metastasis, even though some of these tumors have been known to exist for 25 years and more. They grow very slowly, and the symptoms and signs to which they give rise are largely produced by the complications of a long-standing and slowly progressive bronchial obstruction.

CLINICAL FEATURES

The clinical history in bronchial adenoma is of great importance. Usually there have been recurrent episodes of pulmonary infection characterized by cough, purulent sputum, fever, often pain (when pneumonia with pleural involvement has occurred). Hemoptysis is a prominent symptom, being encountered in about two-thirds of the cases. The bleeding is often profuse and repeated. It tends to start and stop abruptly. In women, hemorrhage from the adenoma often accompanies a menstrual period. The patient ordinarily has a cough and this may or may not be productive, depending on the stage of the disease and extent of bronchiectasis or pneumonitis present. Wheezing, due to partial bronchial stenosis, is often a complaint and if the obstruction is marked and involves a large bronchus, dyspnea may be severe.

The physical signs vary, depending on the degree of bronchial occlusion and the amount of pulmonary suppuration. Table II summarizes these changes. An early lesion may give no physical signs or there may be a localized coarse rhonchus over the lobe whose bronchus is involved. If pneumonitis is present, dullness, rales, and tubular breath sounds may be found. (The latter are usually reduced in intensity because of obstruction of the airway). In the late stages the signs are those of total atelectasis. A few cases may at some stage exhibit obstructive emphysema. Most of them develop bronchiectasis, which is of a severe grade in the more advanced cases.

ROENTGENOLOGIC FEATURES

Until fairly recently, the x-ray gave us chiefly circumstantial evidence about these tumors. That is to say, a patient exhibiting recurrent pneumonia in the same lobe with intermittent atelecta-

TABLE II
Mechanical Effects of Bronchial Tumors

Stage	Effect on Bronchus	Manifestation
Early	No obstruction	
	Irritation of mucosa	Cough
	Erosion of mucosa	Hemoptysis
Moderately	Partial obstruction	Dyspnea. Wheeze, often localized. Impaired bronchial drainage: Pneumonitis. Fever, purulent sputum. Later—bronchiectasis.
	Obstruction partial in inspiration, but total in expiration.	Obstructive emphysema.
Far advanced	Total obstruction	Total atelectasis, usually with suppuration.

sis and some bronchiectasis was suspected of having a bronchial adenoma. Lipiodol studies were then our best roentgenologic means of diagnosing the disease. An occluded bronchus at the end of which a smooth rounded filling defect appeared in the lipiodol shadow was often very suggestive evidence of adenoma.

In the past three years or slightly more, the use of body section roentgenography has been very helpful in identifying and following these cases, since films made with this technic often may outline clearly both the intra- and extrabronchial portions of the growth.

BRONCHOSCOPY

Final diagnosis is ordinarily accomplished by bronchoscopic visualization of the adenoma. Its gross features, the lack of infiltration and fixation of the bronchial wall so common in carcinoma, are extremely important in reaching a correct conclusion as to the nature of the tumor. Biopsy is frequently helpful and incidentally is often accompanied by free bleeding. Because of the difficulty of identifying these neoplasms microscopically from the small amount of tissue obtained in a biopsy, we have often had conflicting reports from the pathologist. It may be difficult or impossible for him to exclude carcinoma. It is our feeling, therefore, that a diagnosis of bronchial adenoma must be based on the entire clinical picture, including the x-ray and gross bronchoscopic findings, and that, if all these features are in accord, a report of microscopic malignancy from a biopsy should not be accepted as proof of cancer.

CLINICAL COURSE AND TREATMENT

The natural history of these tumors is that of a slowly progressive bronchial obstruction and often extends over many years. One case is on record in which symptoms due to a bronchial adenoma apparently were present for 53 years. As has been stated, all, or certainly nearly all, these lesions are benign as far as metastasis is concerned. However, their effects upon the lung may be extremely damaging or even fatal. Severe grades of bronchiectasis, suppurative pneumonitis, lung abscess, and empyema are common sequelae. It is obviously important, since the tumor itself is benign, to recognize and treat it, if possible, before fatal or permanently incapacitating damage has been produced.

Attempts at treatment have been in three general directions:

1. *Local bronchoscopic removal.* This has been done in all our cases and there seems to be reason to believe that the method has advantages under certain circumstances. Early cases, in which damage to the lung is not extensive and the patient can be carefully watched for recurrences, are suitable. Patients who refuse pulmonary resection or in whom the position of the growth makes this impossible (e. g. case 4) also will fall in this group. All patients who are to have lobectomy or pneumonectomy should be subjected to local removal first, if it is feasible, to permit good preoperative drainage of the diseased lobe and thus reduce the operative risk.

Most authors now feel that the majority of cases, because of the high incidence of local recurrence and extrabronchial extension, will require pulmonary resection. A recent article stated

that this was the method of choice in 90 per cent of cases. In my opinion, this has still to be proved. There has as yet been no report of a careful follow-up study of cases such as ours without resection over a period of years, with repeated local removal when indicated.

2. *Radiation.* This method has been given a limited trial. Results in general have not been satisfactory as these tumors are apparently not especially radio-sensitive.

3. *Pulmonary Resection.* Lobectomy or pneumonectomy will undoubtedly be necessary in a large number of cases, particularly where local removal is not feasible or is unable to relieve the symptoms of secondary bronchiectasis. Most authors now feel that, in carrying out resection, the tumor should be regarded as benign and the procedure therefore limited to lobectomy, if possible, in order to reduce the operative risk. A recent report records 19 bronchial adenomata, of which 7 had been treated by resection: 3 pneumonectomies with 1 death, 4 lobectomies with no deaths. All the living patients secured satisfactory results.

CONCLUSIONS

1. Early diagnosis is important, for if these tumors are removed early, the pulmonary suppuration seen later will not develop. Unexplained hemoptysis and recurrent pneumonia or atelectasis in the same part of a lung demand investigation.

2. Clinical evidence supports the concept that the so-called "bronchial adenoma" is an entity distinct of carcinoma from the bronchus.

3. Treatment cannot be guided by general rules. Each case is an individual problem.

4. Pulmonary resections (lobectomy or pneumonectomy) will be indicated in many instances. However, the patients who refuse radical surgery, or are not suitable for it, may often be kept in good health over considerable periods by more conservative measures.

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Discussion

DR. L. RAYMOND SCHERER: I enjoyed Dr. Lowry's paper very much. I particularly appreciated his clear development of the clinical aspects of this syndrome. We are too prone—at least I am—to group chronic obstructive bronchial disorders under one heading, i. e., that of malignancy.

DR. KENNETH A. PHELPS: I want to congratulate Dr. Lowry on this paper. It is a very nice discussion of a subject which still has many aspects which have not been settled. The Minneapolis Academy of Medicine should also be congratulated on having a new member who can give such a splendid report.

The subject of bronchial adenoma is interesting to the bronchoscopists, because we feel we have contributed something to both treatment and diagnosis. The subject has been so completely covered that I can add nothing except a few technical points.

Sometimes, if the adenoma is really a large mass, it can be cored out by using the bronchoscope itself. The end is dull and the hemorrhage is comparatively little. Also, the electrocoagulator can be used to help control bleeding. If necessary, the bronchus can be packed through the bronchoscope. It should first be determined whether or not all of the adenoma is endobronchial, or if it extends beyond the bronchial wall. The lamino-gram is of great aid in this respect. If the adenoma is within the bronchus, it seems logical to try to remove it by means

of the bronchoscope or some instrument through the bronchoscope.

Usually the symptoms of bronchiectasis disappear when the tumor is removed, so quite often the patient is symptom-free. Clinically they are well.

Although the tumor is benign from the standpoint of metastasis, it does recur, and we might say it is locally malignant.

We usually send the pathologist a small biopsy, obtained from the bronchus, and ask him to tell us what it is. This is not giving the pathologist a square deal. It must be that often these tumors have a varying pathological picture. It is sometimes quite easy for him to make a diagnosis, but at other times he seems to have considerable trouble.

DR. MALCOLM HANSON: These are very interesting tumors and I think these roentgenograms are somewhat self-explanatory. One secondary x-ray finding seen sometimes in this type of tumor is an obstructive emphysema.

DR. JAMES S. McCARTNEY: I had already read Dr. Lowry's paper and enjoyed it very much, but gained a great deal from seeing the pictures tonight. As Dr. Phelps just told you, the bronchoscopists frequently give us a small bite of tissue. Usually about all the information there is regarding the tissue is, "Here is a bit of bronchus. What is it?" There is usually nothing about the sex of the individual, nor any hint as to the duration of the process, in fact, not much of anything is given.

Ever since we have been getting these biopsies, we, in our department, have been passing them around, so that everyone has a chance to say what they are. I think my batting average is not very good, but I don't believe anyone else in the department is much better. We are pretty much divided in our opinion as to whether they are benign or malignant. I recall one case where there was a rather sharp division of opinion. The majority thought it was benign, but one or two thought it was malignant. Within a short time the patient had a pneumothorax, and well-defined but atypical glands were present in it.

You can ask, and I cannot answer why these are called bronchial adenoma, because the ordinary conception of an adenoma is that it is a proliferation of glands which has a tendency to fairly closely reduplicate the structure from which it arises, whether in the thyroid, parathyroid, adrenal, or prostate, etc. This does not in any way reduplicate the appearance of the normal glands in the bronchial tree. They are solid cords of epithelial cells, but nothing on which one can base one's opinion that it is bronchial epithelium.

As we commonly see, the malignant tumor is one which does not attempt to duplicate the structure from which it arises. We recognize the bronchial adenoma then for what they are. We have a tumor that is composed pretty much of solid cords of cells. These cells differ from malignant cells in the fact that there is rather marked uniformity in the size and depth of staining. There are no mitotic figures, but cells which are irregular and atypical in arrangement, yet tend to be fairly uniform in size and depth of staining. Yet, in the case I cited, these cells appeared to be ones which were not growing actively. However, in the material obtained from the pleural space, well-defined glands were present, and those cells showed considerable more evidence of active growth than was true in the primary lesion.

Personally, I am rather on the fence as to how to really make a diagnosis from the bronchial biopsy. I saw a bronchial biopsy a few weeks ago which I called a carcinoma. If I had seen it a while back, I think I would have called it an adenoma. I believe we are now inclined to call these biopsies carcinomas rather than adenomas.

DR. THOMAS J. KINSELLA: I have enjoyed this presentation by Dr. Lowry and wish to congratulate him on this excellent thesis. He has been perfectly fair in evaluating the various phases of the subject. In making a diagnosis of benign bronchial adenoma it is necessary that all phases of the picture be taken into consideration, for the diagnosis may be a tricky one.

In the first place, I do not believe that we are always fair to the pathologist when we give him a piece of tissue the size of a pinhead, considerably crushed and probably altered by secondary infection, and then expect an accurate diagnosis. We have seen much confusion in this field, with benign tumors called malignant and vice versa.

Local removal alone becomes the more hazardous in direct proportion to the uncertainties of diagnosis, for delay in treatment of a malignant lesion may mean the loss of all chance of cure.

The bronchoscopist often has a better chance than the clinician or pathologist to recognize this condition. The distant view may be more characteristic than that at close range. The typical adenoma is a smooth, rounded, pinkish mass often with small blood vessels crossing its surface, attached to the bronchial wall by a small or broad base. Secondary infection or ulceration may change its appearance. Bleeding occurs readily following any trauma. This local picture, considered with the history and age of the patient may establish the diagnosis without microscopic section.

Another suggested surgical procedure, in addition to those already mentioned, is bronchostomy with local excision of the tumor and reconstruction of the bronchial wall. This may be possible in some instances, yet narrowing of the bronchus from this procedure may well cause as much damage to the lung as the original tumor itself.

From the pathological standpoint, I should like to ask Dr. McCartney for his reaction to the ideas of Womack and Graham of St. Louis, that these tumors are mixed tumors, and also the suggestion that they represent fetal lung buds which have undergone a late new growth.

Dr. JAMES S. McCARTNEY: I am inclined to agree with the latter point of view. I haven't seen any in which I thought there was a possibility of its being a mixed tumor. It doesn't look like tumor stroma, but it looks like ordinary connective tissue or trabeculated supporting tissue.

Dr. THOMAS LOWRY: I have nothing to add, except that I want to thank the discussors for their remarks. I, also, wish to emphasize again the fact that I think the diagnosis has to be based on the entire picture, history, gross appearance of the tumor, and its clinical course as well. It is not fair to ask the pathologist to decide upon a diagnosis without benefit of these other factors.

CASE REPORT AND REVIEW OF CHOLECYST-ELECTROCOAGULECTOMY (Thorek)

STANLEY R. MAXEINER, M.D., F.A.C.S.

I beg your indulgence to report this case, not because it is unusual, but because it was treated by a type of surgery not commonly used nor understood.

The patient was a white female, 50 years of age, who entered the hospital in February, 1942. Seven days previous to admission, she developed pains which were more marked in the right upper quadrant and at times became severe. The patient tried simple remedies without relief. The onset occurred following a heavy meal which included fried meat and pastry. She had had no previous attacks, no jaundice, and no dark colored urine. Her past history had been essentially negative and her family history was irrelevant.

Physical examination revealed a well nourished individual. Her blood pressure was normal. There was considerable abdominal distention, and palpation revealed marked tenderness in the right upper quadrant with muscle spasm, and gave the impression of a well defined, firm, tender mass extending three fingers' breadth beneath the right costal margin. The balance of our examination was essentially negative. White blood count was 18,000 and bleeding and clotting time were normal. Icteric index was 6.4.

The day following admission to the hospital, the patient had a chill with an elevation of temperature to 101°. On each of the following days she had at least one chill with an elevation of temperature to 102.5°. All during the first week, the patient had a continuous temperature with elevated pulse. Because of her vomiting, feedings were given intravenously. A flat film made of the abdomen showed two or three calcified shadows, which had the appearance of large biliary calculi. The patient remained in the hospital for eleven days preoperatively, during the last five of which she became temperature-free.

At that time she was operated upon, and the gallbladder was found to be very tense and completely buried in adhesions. Stones were palpable in the gallbladder as well as in the cystic

duct. On opening the gallbladder, it was found to contain a purulent fluid, cultures of which showed gram-positive cocci, gram-positive rods and some gram-negative rods. A resection of the gallbladder with removal of the stones was carried out after the manner of Max Thorek. Seven grams of sulfanilamide were placed in the peritoneal cavity, and the abdomen was drained by two split tubes. The abdominal wall was closed with stainless steel wire, and the patient made a very satisfactory and unusually uneventful recovery.

The postoperative diagnosis was acute empyema of the gallbladder with cholelithiasis.

DISCUSSION AND DESCRIPTION OF THOREK'S OPERATION

Pribram¹ noted no operative death in a series of 200 consecutive cases of biliary disease which comprised complicated and infected cases. He attributed these results to an isolated destruction of the mucous membrane of the gallbladder with thermal cautery after dividing the cystic duct. The technic of Pribram is termed carbonization by Thorek who substitutes electrocoagulation. This is accomplished by the use of a large electrode held in contact with the tissues for several seconds, until they have become white and coagulated but not charred or carbonized. The chief object of the coagulation is to obtain a dry operative field, which permits closure without drainage. The coagulation prevents the oozing of bile and blood from the denuded surface of the liver and, likewise, prevents absorption of septic material directly into the lymphatics.

TECHNIC⁵

Through an appropriate abdominal incision, the gallbladder is exposed and the biliary passages and adjacent viscera examined. He does not attempt to eviscerate the liver. The field of operation is isolated with moist, warm sponges. The cystic duct and cystic artery are isolated and cut between ligatures. The gallbladder is then aspirated of its liquid content. It is opened widely and the stones removed. Next, the redundant convex portion of the gallbladder is removed, and the remaining portion of the gallbladder is coagulated electrically without, in any manner, disturbing the gallbladder bed.

After all of the mucosa has been destroyed, a running catgut suture approximates the two lateral cut edges of the gallbladder. The falciform ligament is detached from the abdominal wall anteriorly and folded laterally across the gallbladder remnant. The abdominal incision is closed by Thorek without drainage.

We have now operated upon approximately twelve very bad gallbladders, some of which were grossly infected, as in the case reported. Up to this time, we have not been able to make ourselves close the abdomen without drainage, and, as a result, one or two split tube drains have been introduced. Recently, at the meeting of the International College of Surgeons in Denver, I had an opportunity to confer personally with Doctor Thorek, and he presented a strong argument in favor of the complete absence of drainage. In a personal communication from Doctor Thorek³ under date of February 10, 1943, he states, "Up to the present time we have done 1940 cases. The mortality is one-fifth of one per cent, and this mortality was in my own cases, a rather brilliant series for so large a number of unselected cases with empyemas, gangrenous gallbladders and other complicating conditions. Please remember that the global mortality in unselected cases is still about 9.6 per cent."

In an article entitled "Electrosurgical Obliteration of the Gallbladder Without Drainage," Bailey and Love,² of the Royal Northern Hospital, report 129 consecutive cases without mortality.

CONCLUSIONS

The purpose of this discussion is not to "sell" the Thorek operation but to call to your attention and perhaps add to your armamentarium a surgical procedure which has been used about twelve times in our very worst gallbladder risks without mortality, and has been used 1940 times by a number of other surgeons with a mortality of one-fifth of one per cent in unselected cases.

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LUXATION AND AVULSION OF THE EYE BALL

KENNETH A. PHELPS, M.D.

The eye ball lies in the anterior part of the orbit, nearer the roof than the floor and nearer the outer wall than the inner. It is supported by orbital fat which is surrounded by the thin orbital fascia, through which the fat may at times easily herniate. The ocular muscles are attached to the globe at one end and to the posterior portion of the orbit at the other. This arrangement is admirable to make the globe freely movable, but it does not offer much resistance to external pressure.

The eye ball is dependent upon the bony orbital walls of the eye lids for protection against external violence. A line from the superior to the inferior orbital margin would pass through the cornea, and a line between the lateral margins would leave one-third of the globe anterior to it. The lateral wall offers the least protection. The globe tends to rotate since the axis of the orbit is divergent and the globe in a direct ahead axis, so that its posterior pole is not much behind the anterior margin of the lateral orbital wall.

When strong pressure is applied, pushing the globe forward, there is not much to hold it in the orbit.

Luxation is dislocation of the eyeball so the eyelids close behind it. The optic nerve and the ocular muscles are stretched but still attached. Such eyes can frequently be replaced within the orbit without any resulting impairment of vision.

CAUSES

(1) *Deliberate Trauma*: (a) Some people can dislocate their eye ball by a little pressure with their finger. (b) The surgeon dislocates the globe with the speculum as a part of the operation to remove an eye. (c) In the old days, robbers were quite apt to gouge out the eyes of their victims and, in some countries, one eye was gouged out of all slaves, as a mark of slavery. (d) Lunatics may gouge out their own eyes, sometimes quoting Scriptures, "if thine eye offend thee pluck it out." The procedure of gouging out an eye is described as being done with the thumb entering the temporal part of the orbit and the fingers on the nose as a support or fulcrum.

(2) *Accidental Trauma*: Birth injury—usually from forceps. There are numerous cases on record of an eye ball being dislocated at birth and being replaced, with good vision resulting. Other forms of trauma:

Case G. P.: January 12, 1933, a boy was sliding down hill "belly flop" and the runner of the sled ahead of him in some way penetrated his left orbit on the nasal side. A passerby

picked him up and stated that he put the boy's eye back into its socket. He was brought to Abbott hospital at once. A wound was present at the left inner canthus involving both eye lids and the caruncle. There seemed to be some retrobulbar hemorrhage, as the edges of the lid wounds could hardly be sewed together. The child stated that he had no perception of light, though the optic disc and retina seemed to be healthy. This eye remained blind (a primary optic atrophy developed), never moved well, and now has a cataractous dislocated lens, retinal detachment and other signs of degeneration. He is anxious to have the eye removed for cosmetic reasons, and is to have this done next week.

(3) *Pressure from behind*: Exophthalmic goitre, pulsating exophthalmia, tumor of the orbit, hemorrhage of the orbit (especially gunshot wounds), air from blowing the nose, when a fracture of the naso-orbital wall is present.

(4) *Shallow orbit and prominent eye ball*. *Case L. B.*: First examined at 11 months of age, eyes very prominent and question of intracranial pressure. The fundi essentially negative. At the age of four, still prominent eyes and shallow orbits. He woke up at 5 o'clock one morning with one eye dislocated and the lids closed behind it. He was taken to Abbott hospital and, under anesthesia, the eye was replaced. No visual loss resulted. Three months later the other eye luxated, but went back spontaneously. An operation was attempted by a neurologic surgeon to enlarge the orbits, but the child did not survive.

Avulsion of the eye ball is a dislocation, plus a tearing of some or all of the muscles and nerves, so they are not attached to the eye ball. *Cause*: Always trauma and usually severe. In most such cases the eye can not be saved. Some cases of lost eyes are recorded where the eye was found in the apex of the orbit, the nose, ethmoids, or antrum.

Case F. J.: A man working on a concrete job fell backwards, striking an iron rod which penetrated the left lateral orbital wall after fracturing and dislocating the malar bone and pushing the eye out onto the cheek. He was brought to Abbott hospital within an hour. There was considerable bleeding from the wound as well as from the nose. This was controlled and sulfadiazine used locally and by mouth. No evidence of meningitis or local infection developed, and an attempt was made to replace the globe into the orbit, after reducing the fractured orbital walls. Not successful, so enucleation was required.

CONCLUSION

The eye can not stand much pressure from behind, as it is not very solidly anchored in the orbit.

Luxation or avulsion may occur from many causes, the former not usually causing the loss of the eye and the latter practically always.

ENGLISH BUY X-RAY UNITS FOR RUSSIAN ARMY

Thirteen mobile trailer units, each compactly fitted with portable x-ray equipment that can be set up during battle or air raids in 20 minutes, have been purchased in this country by English donors for the Russian army.

Designed for use on the fighting fronts and in civilian emergency areas, each trailer carries complete facilities for fluoroscopy and radiography. Spanish refugees in England donated two of the units and various English organizations the others. Two units will be shipped first to England for acceptance ceremonies featuring Mrs. Ivan Maisky, wife of the Russian ambassador to England.

News-Letter

of the American Student Health Association

MEDICAL COVERAGE FOR ARMY TRAINEES

MAX L. DURFEE, M.D.,

Student Health Director, Iowa State Teachers' College,
Cedar Falls, Iowa

(In schools not associated with a medical department various plans have been worked out to provide complete medical coverage. The following report, quoted from a letter from Dr. Durfee, outlines a working plan in a school training both Army and Navy groups.)

I. Upon arrival of contingent of Soldier-Students

A. Sick call shortly after arrival.

B. Physical inspection of entire new group, usually day after arrival.

1. Advised concerning daily sick call at 0700 in a brief talk on personal hygiene.

II. Sick Call Daily at 0700, Sunday at 1000.

A. Soldiers desiring medical consultation requested to enter names on "Sick Book" after they arise at 0500. These men brought to Student Health Service from command headquarters by one of non-commissioned officers on medical staff. Each is disposed of in one of the following ways.

- (1) Any soldier with a temperature above 98.6, with occasional exception, is admitted to College hospital for observation, further examination, diagnosis and care as needed. We have never regretted following this rule. Other cases requiring hospitalization are also sent directly from sick call.
- (2) Minor treatments carried out by enlisted staff, under supervision of Health Director.
- (3) Arrangements made for appointment with local specialists, mainly EENT, and for necessary dental work.
- (4) Recommendations made by Health Director for limited duty when indicated. Most Health Service workers will recognize in this a similarity to civilian student's requests for excuse from physical education. The Army calls it "Gold Bricking."
- (5) Occasional student sent to room for rest, or, as the Army says, is put in Quarters.

B. Soldiers required to report illnesses at sick call whenever possible, but obviously, since illness does not strike by the clock, provision must be made for medical consultation at other times. Except in emergency, all soldiers must enter their names on the Sick Book before coming to the Health Service for attention. Their schedule is such that they do not interfere with the Student Health Service program when they are really in need of medical care at odd times. The services of the Director are available 24 hours daily. Medical care for the soldiers is simplified by the fact that the dormitories in which they live, the Health

Service office and the hospitals are in directly adjacent buildings, so close they almost touch each other.

III. Hospitalization

A. Complete hospital care, within the limits of physical plant and personnel, especially for acute medical conditions.

1. Acute surgical emergencies.

a. We have not even had an acute appendix up to the time this is written (4½ months). If one occurs, it would be transferred to local City hospital and operated with the help of Navy surgeons, resident on this campus.

b. We have been able so far to take care of all fractures and minor surgery that we have encountered.

2. Elective surgery.

a. When some defect interferes with a soldier's efficiency, and surgery is indicated, he is transferred to one of the Army hospitals in this area, usually Schick General Hospital in Clinton, Iowa.

3. Medical conditions requiring long hospitalization, when able to be moved, also transferred to Army hospital.

4. Laboratory.

a. There has never been a satisfactory laboratory for our Student Health Service. We had a good microscope. The Navy had none. As a result, because they are well staffed, they do our laboratory work in return for the use of our microscope, the use of our sterilizer facilities and our x-ray darkroom. The Army and Navy really cooperate on this campus.

B. It has been necessary to increase our permanent bed capacity from 11 which was adequate for the college students, to 28. This was done by remodeling one of the three buildings in our Health Service group (hospital, health service, isolation hospital) that had been infrequently used in the past for isolation. Our permanent nursing staff was increased from three to six.

IV. Miscellaneous

A. Reports

1. All paper work is done by two soldiers, a Corporal and a First Class Private, sent here on detached service to constitute the Medical Staff. All reports must be checked and signed by the Health Director. They include the following.

a. Weekly—Strength of Command and communicable disease report.

b. Monthly—Sanitary report; venereal disease report; Form 52, a copy in duplicate of

which is made out for each hospital admission, each soldier put in quarters and every medical transfer to another hospital. This has the soldier's identification and diagnosis and is signed by the Health Director.

2. Form 52A. This is similar to the dispensary record kept on each student coming to the average Health Service for medical attention. On this form are recorded all the pertinent findings of each visit of the soldier to the dispensary, usually at sick call.
- B. Physical Examinations and Inspections
1. Physical inspections are made on each group of soldiers shortly after their arrival at the station. This inspection is somewhat more than casual but much less than a complete physical examination. Its purpose seems to be to detect cases of venereal disease, disorders having skin manifestations, and give the physician a chance to estimate the personal cleanliness of the group. Each group of departing soldiers is also subjected to an inspection.
 - a. Monthly inspection of entire command, except commissioned officers.
 - b. 1617 inspected during the first 3 months of program.
 2. Physical examinations, done at request of Commanding Officer for the following reasons. (1) Soldiers being transferred to another branch of service because of being mal-adapted to the demands of this program. (2) Non-commissioned officers scheduled for or desiring advancement in rank. (3) Soldiers being released from Army. Agricultural discharge is an example.
- C. Immunization procedures.
1. Most of the soldiers coming to this station have been in the Army too short a time to have completed their typhoid and tetanus series. Others have been in long enough for their immunizations to be outdated so require repetition or "booster shots." 1517 injections given during first three months of program.
- D. Supervision of Sanitation of Environment.
1. All campus food handlers examined. The size of this force may be realized when it is understood that 6,000 meals are served daily in the College Food Service. Tuberculin testing, x-ray of positive reactors, annual retesting of negative and re-raying of positive reactors, blood tests and vaccinations are done on these people.
 2. Supervision of swimming pool and shower room sanitation.
 3. Establishing of quarantine and inspection of contacts of communicable disease.

V. Finance.

- A. This is handled entirely through the business office of the college and is determined by the President of the college and the Army contracting party.

PERSONAL ITEMS

Dr. Jerome E. Andes, formerly director of Health Service at the University of Arizona, who for the past year has been medical director of the Sunflower Ordnance Works, has recently accepted an appointment at the University of West Virginia at Morgantown. Dr. Andes will direct the Health Service and in addition will do some teaching.

ASHA DIGEST OF MEDICAL NEWS

The *BuMed News Letter* of August 20, 1943, summarizes our present knowledge regarding the isolation periods necessary for the ordinary communicable diseases as follows:

"In combating the spread of communicable diseases, the isolation of the case throughout the period of marked infectivity is of considerable importance. At best, however, this can be only partially accomplished, for the period of infectivity so often begins hours or days before symptoms sufficiently manifest themselves to make possible a diagnosis. Mild subclinical infections go undiagnosed, yet serve to spread infection to others. Obviously, with such initial gaps in isolation procedure, we can hope to gain but little by being hyper-meticulous in carrying out the latter part of the isolation process. The effort should be two-fold: (a) to prevent, as far as practicable, the spread of infection to others; (b) to keep the time lost by the case in isolation at a minimum.

With this double objective in mind, we should avoid on the one hand, such lax regulations as would permit German measles cases to carry on their regular duties and contacts in the obvious presence of rash and swollen post-cervical lymph nodes, and on the other hand, such strict regulations as would keep scarlet fever patients routinely under isolation for six weeks or more. A well balanced communicable disease control program will endeavor to isolate suspected cases promptly and freely; will release them just as promptly when observation shows the suspicion unfounded; and will extend the isolation only through the definitely and dangerously infective period.

Recommended isolation periods for the more common communicable diseases are as follows:

Measles. Communicable from the onset of the catarrhal symptoms (usually at least three days before the appearance of the rash) until the catarrhal symptoms have ceased (usually shortly after the return of the temperature to normal and well before the rash has completely disappeared). In a case without complications or abnormal discharges, release from isolation is usually safe any time after the fifth day following the appearance of the rash, provided the catarrhal symptoms have ceased.

(Continued on page 336)

The JOURNAL LANCET

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MINNESOTA, NORTH DAKOTA SOUTH DAKOTA AND MONTANA

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Minneapolis Academy of Medicine
Montana State Medical Assn.

North Dakota State Medical Assn.
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PEDIATRICS COMING BACK

On a trip to a medical meeting in Wisconsin about three years ago, a prominent St. Paul pediatrician made the startling statement "Pediatrics is a vanishing specialty." Naturally it became necessary for him to substantiate the basis for his conviction, and this he proceeded to do by relating that the Children's Bureau, United States Department of Labor, published pamphlets on child management in health and disease. These rather complete booklets, edited by eminent authorities on infant care, are distributed free of charge to all who may apply. No one can find any fault with this because its laudable purpose is to supply enlightenment to every home in an effort to improve the race. Then he referred to infant feeding, which formerly consumed so much of the pediatrician's time, being served more and more by

baby food manufacturers in supplying tables and formulas the directions and appropriate modifications of which the general practitioner or intelligent mother can understand and follow. Finally he cited the reduction in children's diseases due, not only to the above mentioned publicity, but, in a large measure, to vaccines and sera whose administration require no special skill.

He seemed to have proven his contention but if he were alive today it would be a pleasure to call his attention to certain changes that have taken place since then to increase pediatric practice. Basically because there are more babies in our midst. We would not infer that the drafting of fathers has had anything to do with it; rather let us assume that the increased birthrate that our country has experienced is somehow more of a patriotic urge. "Birth control," to some an ominous portent a few

years ago, seems to have been discarded for planned parenthood, judging by our crowded maternity wards, and this should give heart to disconsolate pediatricians. Obstetricians are having their inning now but this bids well for a pediatric boom.

A.E.H.

PRESSURE AND THE PRESS

Some time ago we were apprised of the fact that October with its other bounties would bring out National Newspaper Week, devoted to freedom of the press. Perhaps by the time this reaches you it will be taken care of and over with but, even so, there is no harm in misinterpreting the banner enough to do a little mild grumbling about the undesirable liberties of the press as they affect the doctor.

We refer especially to the premature, irresponsible, and often incorrect news reports of medical discoveries and "cures". Every medical meeting of any size seems to be followed by a plague of them. Someone reports work in progress on the treatment of asthma, for example, and by the time the home town papers pick it up the unsuspecting medical essayist has caused a disruption in economics, transportation, and housing. He has to spend all his time explaining, move out of town, or enjoy a brief but insecure period of big business until the sound and the fury dies.

No matter how carefully a medical news article is worded it seems to be pounced on as a sure cure by the public. Then come the phone calls to the doctor to see if it's true what they say in the paper about arthritis, blood pressure, or cancer.

There was once an advertiser who had a voice boom out at intervals on the radio: "Many people are using such-and-such for hay-fever." That was true—many misguided sufferers were trying it at somebody's suggestion—and it was doing them no harm. But the public's amazing ability to interpret the news to suit their own fancy is something from which they should be more carefully guarded. But that is getting away from the freedom of the press and into a more questionable field. All that is intended here is to remark that the fourth estate, like the first profession, is often guilty of taking advantage of a well known public weakness.

There have also appeared in recent years many things to indicate that the medical profession is not always one hundred per cent perfect.

L.M.D.

WORLD IS WARNED ON TUBERCULOSIS

Dr. Esmond R. Long of the Henry Phipps Institute of the University of Pennsylvania and Dr. Robt. E. Plunkett of New York State Department of Health are quoted thus in a recent issue of Consumer Reports, published by Consumers Union: "A grave menace exists of another world-wide recrudescence of tuberculosis. Its prevention will require vigorous effort against the spread of infection and all measures possible to maintain a high level of resistance to disease."

Book Reviews

Nephritis, by LEOPOLD LICHTWITZ, M.D. Cloth. New York: Grune and Stratton, Inc., 1942, 328 pages with 120 tables and illustrations, price \$5.50.

This monograph represents a compilation of the author's lifetime observation of nephritis and allied renal diseases. It presents some unique viewpoints which will be useful to the students of nephritis both from the academic and practical aspects. Upon first reading, some of the author's concepts appear to be in direct disagreement with theories which the student may have acquired from other schools of nephritis research. However, the methods of treatment which are summarized give the physician a practical approach to dealing with all types of renal disease. The author includes sections on disorders of the kidney in pregnancy, the central nervous system and endocrine influences on renal disease, and has an excellent review of the allergic mechanism in the nephritic syndrome.

The Blood Bank and the Technique and Therapeutics of Transfusions, by ROBT. A. KILDUFFE, A.B., M.D., F.A.C.S., and MICHAEL DE BAKEY, B.S., M.D., F.A.C.S. 558 pp., 214 illustrations and 1 color plate. St. Louis: C. V. Mosby, 1942. \$7.50.

The book presents an amazingly complete and comprehensive review of the literature on all aspects of the blood transfusion problem. An outstanding feature is the excellent extensive bibliography at the end of each chapter. The illustrations and laboratory methods described are simple but adequate both for the doctor who gives an occasional transfusion and the technician in an active hospital blood bank.

This book makes an easily accessible reference for the general practitioner to review known facts on blood groups and typing, and also makes available in a condensed form the latest literature on tests for blood incompatibility, changes in stored blood, and nature of transfusion reactions.

On Your Own: How to Take Care of Yourself in Wild Country, by S. A. GRAHAM and E. C. O'ROKE. Minneapolis: University of Minnesota Press, 150 pages, 1943, price \$2 (trade), \$1.50 (text).

On Your Own was undoubtedly stimulated by the war. The need for advice on matters essential for self-preservation under geographical and climatic conditions unusual for the ordinary urban civilian, motivated Professors Graham and O'Roke to compile a manual useful for anyone stranded in tropical jungles or Arctic regions. In a small manual of 150 pages, these experienced and widely traveled woodsmen have compressed information suitable for any situation from blisters to bedbugs.

By eliminating all data already available concerning first aid, camping, venereal disease and other matters which every Boy Scout should have learned, the authors have given valuable help on such practical considerations as to what edible plants and animals may be obtained in particular localities, how to avoid submersion in quags and bogs, what to do when lost, and many other important details esoteric to undisturbed city folks but vital when these protected persons are projected into foreign and strange situations.

This small, compact volume would be a valuable addition to the impedimenta of anyone going to foreign lands. It should be a complement to whatever official bulletins are included in the kits of soldiers, sailors and marines destined for foreign service.

News Items

Dr. Ernst Gellhorn of the department of physiology, University of Illinois College of Medicine, author of "Studies on Conditioned Reactions and their Clinical Implications," leading this number, which constituted the third annual JOURNAL-LANCET Lecture given on May 19 at the University of Minnesota, has joined the staff of the latter institution. He has accepted a professorship in the department of physiology and removed to Minneapolis. He will head the special unit in neurophysiology for the study of infantile paralysis that the National Foundation is setting up at Minnesota. The conditions of the grant by the Foundation were reported at length in these columns in the August issue.

Mike Mansfield, representative to Congress from the western Montana district, states that many Montana dude ranches and lodges have opened their property to the government for the rehabilitation of returned service men who require psychiatric treatment. He urges the utilization of the greatest possible number of them and increased use of the hospital for the veterans' facility at Fort Harrison.

Lieutenant Colonel Edwin S. Murphy, physician of Missoula, Montana, now is director of the office of medical information in the surgeon general's office at Washington, D. C.

It is reported in the newspapers of the state that it was at the instance of the North Dakota State Medical Association, which found that insufficient medical service was available currently in McKenzie county, that Dr. Jesse W. Moreland, a former Ward county health officer and a physician at Carpio for many years, removed to Watford City, McKenzie county.

Through the efforts of the Red Cross chapter of Highmore, South Dakota, the community has secured the professional services of Dr. E. A. Wilkinson, formerly at Haiti, a physician of 38 years' experience.

Drs. Geo. H. Williamson, Grand Forks, Archie D. McCannell, Minot, and Willard A. Wright, Williston, have been reappointed to the state board of medical examiners by Governor John Moses.

An auxiliary unit to the Silver Bow County Medical Association has been organized at Butte, Montana. Mrs. R. C. Monahan is acting as temporary chairman and nominations for permanent officers are to be submitted at the next meeting by a committee composed of Mmes. C. B. Rodes, J. C. Shields, T. J. B. Shanley, Saml. E. Schwartz, R. F. Peterson, D. L. Gillespie, Jno. S. Floyd and Chas. R. Canty. The organization meeting was presided over by Mrs. P. E. Logan, Great Falls, president of the state auxiliary, with Mrs. L. F. Hall, Helena, past state president, Mrs. A. L. Gleason, Great Falls, state secretary, and Mrs. D. T. Berg, Helena, national recording secretary, in attendance.

Mrs. Margaret N. Wolfe, secretary of the central office of the Woman's Auxiliary to the American Medical Association, has succeeded Mrs. George H. Ewell of Madison, Wisconsin, in the work of the office of chairman of press and publicity.

The officers and councillors of the South Dakota State Medical Association held a business meeting at Huron, Saturday, September 11, all officers and all councillors except one being present. Routine business matters were disposed of and a decision reached to hold the 1944 annual meeting of the Association with a scientific session at Huron in May.

Dr. Owen H. Wangensteen, director of the department of surgery, University of Minnesota Medical School, announces that the eleventh E. Starr Judd lecture will be given by Major General Norman T. Kirk, Surgeon General, United States Army, War Department, at the University of Minnesota, Monday evening, December 6, at 8:15 o'clock in the Museum of Natural History auditorium. The subject is "Surgery in War."

Dr. E. Martin Larson, Great Falls, Montana, president of the state tuberculosis association, delivered an address "The General Practitioner's Role in the Work of Offsetting a Threatened War Time Rise in Tuberculosis" at the annual meeting of the association in Helena, September 11th. Dr. Thomas F. Walker, Great Falls, presented a report on that city's tuberculosis program. Miss Mary Dempsey, statistician for the National Tuberculosis Association, spoke on sanatorium problems. Drs. Herman F. Schrader of Browning and John DeCanio of Crow agency reported on health problems among the Blackfeet and Crow Indians and a group of Blackfeet Indians performed an Indian dance.

Mrs. P. C. Gaines, Bozeman, president of the Gallatin County Tuberculosis Association, reported on the tuberculosis case-finding program among Montana State college students. Lucien Benepe of the state board of health submitted a summary on 1942 tuberculosis mortality rates in the state and Lief Fredericks of the state bureau of vocational rehabilitation recounted the work of the bureau with tuberculous patients. A symposium on tuberculosis control among special groups was led by Drs. Jos. L. Mondloch, Butte, James M. Flinn, Helena, and Marion S. Lombard, Spokane, Washington.

Lt. George A. Gray has taken over the duties of base surgeon at the Mitchell, South Dakota, Army Air Base, filling the vacancy left by the transfer of Lt. Thomas E. Crowell. Lt. Gray formerly was stationed at Sioux City, Iowa, and brings Mrs. Gray and baby son to Mitchell.

Dr. Bernard S. Clark, who practiced at Manchester, Missouri, has taken residence at Spearfish, South Dakota.

Dr. C. B. Darner of Fargo, North Dakota, has joined the personnel of the Medical Corps station at Mojave, California.

Dr. L. J. Nessa, who has been at the Black Hills ordnance depot at Provo, South Dakota, has been transferred to the St. Louis, Missouri, ordnance depot of infirmary.



SHAFT OF LIGHT—Prostigmin 'Roche' is undoubtedly one of the most outstanding achievements of the past decade. In clinical research Prostigmin is proving a shaft of light, helping the profession to combat successfully a number of disorders, the treatment of which has hitherto been a groping in the dark. Surgeons everywhere use it as a routine measure in preventing abdominal distention and urinary retention—and to the myasthenia gravis patient Prostigmin has indeed come as a shaft of light in his dark world of suffering and disability . . . HOFFMANN - LA ROCHE, INC., ROCHE PARK, NUTLEY, NEW JERSEY — *Makers of Medicines of Rare Quality*

PROSTIGMIN 'ROCHE'

Major John R. Vasko, M.C., of Great Falls, Montana, has been at the Fresno, California, Station for the past five and a half months.

Captain Paul T. Cook, M.C., of Valley City, North Dakota, after eight months at the Army Air Corps gunnery school at McCarran Field, Las Vegas, Nevada, has been transferred to the field at Stockton, California.

Dr. Erhart E. Zemke, physician and surgeon who enlisted from Fairmont, Minnesota, has been promoted to a captaincy.

Dr. J. M. Spatz of Cut Bank, Montana, is serving with the field artillery command at Ft. Leonard Wood, Missouri.

Dr. William A. O'Brien, director of postgraduate medical education at the University of Minnesota, was honored by the award of a fellowship by the American College of Hospital Administrators at the annual meeting of that organization at Buffalo, New York. He was cited for his "profound interest in problems of the Hospital Administrator, manifested by outstanding service as director of seven institutes for hospital administrators at the center for continuation study, University of Minnesota."

Necrology

Dr. Philip A. Delavan, 44, St. Paul, died September 6 at St. Joseph's Hospital after an illness of 11 days. He had practiced in St. Paul for 14 years. He was resident physician at Ancker hospital for eye, ear, nose and throat ailments, was on the staff at St. Joseph's and Children's Hospitals as well as on the staff of the University of Minnesota Student Health Service.

Dr. Wilfred F. Lowe, 40, former Grand Forks resident, lately residing at Jackson, California, died at the latter place September 11. He had practiced in Jackson for fifteen years after graduating from the University of North Dakota and completing his medical training at Rush Medical School, Chicago.

Dr. Andrew J. Gifford, 62, for 42 years a practicing physician of Alexandria, South Dakota, suffered a stroke September 14th and died suddenly at his home in Alexandria.

Dr. Ernest G. Sasse, 73, Richland County physician and surgeon for 39 years, died Wednesday, September 15th, at his home in Lidgerwood, North Dakota. He was born in Minnesota and had practiced in Bridger and Bear Creek, Montana, as well as in North Dakota.

Dr. John Butler, 67, former University of Minnesota medical school professor, and one time assistant city physician, died September 17th, at his home in Minneapolis after an illness of several weeks. Dr. Butler was the author of several medical books, had served with distinction to his profession in the last war, and was a member of county and state medical bodies, the American Urological Association and the American Dermatological Association.

ASHA NEWS-LETTER

(Continued from page 331)

Mumps. Communicable from 24 hours preceding the appearance of symptoms until the subsidence of all swelling in salivary glands or involved testicles. Release from isolation is usually safe 24 hours after all swellings of salivary glands or testicles have subsided. (It should be remembered, however, that with adult males the chance of orchitis persists for about one week after the subsidence of the parotitis.)

Rubella. Apparently communicable from 24 hours preceding the appearance of the rash until the subsidence of the rash. Release from isolation is usually safe 24 hours after the disappearance of the rash.

Scarlet fever, Streptococcic pharyngitis, Streptococcic tonsillitis. Most communicable in the first two weeks of the illness, communicable in the third week in approximately 25 per cent of cases, communicable in the fourth week in approximately 5 per cent of cases, communicable after the fourth week in approximately 1 per cent of cases. Release from isolation is usually safe 21 days after the onset of the disease, provided there are no complications or discharges. For another three weeks after release from isolation the patient should consider his nose and throat secretions still possibly dangerous to others. Desquamation has no relation to communicability.

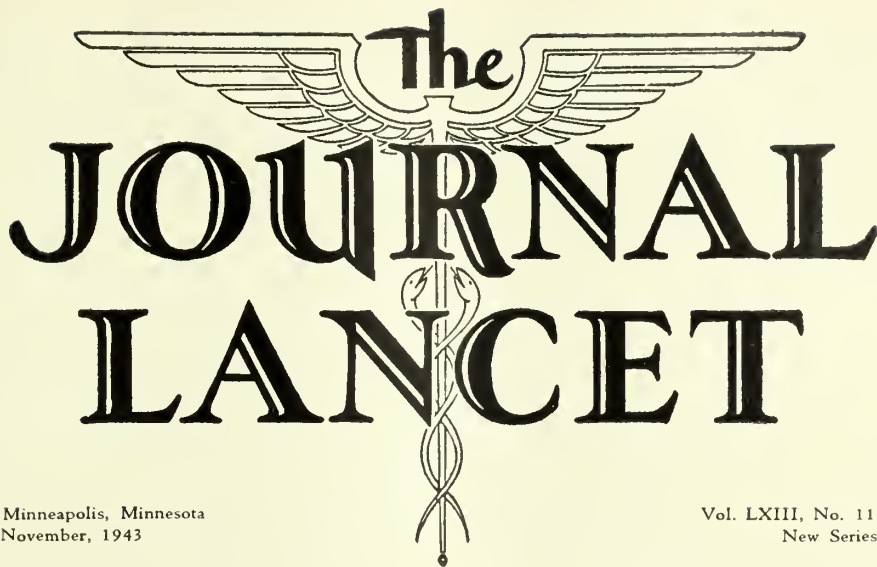
Chickenpox. Infectious from 24 hours preceding the appearance of the eruption until there are no longer any actual pustules. Release from isolation is usually safe when all pustules are gone (usually about seven days from onset), and the patient has taken a thorough bath and shampoo. The dry scabs apparently bear no relation to communicability.

Meningococcus meningitis. Probably communicable throughout the course of the disease and until the meningococci have disappeared from the secretions of the nose and throat. Release from isolation is usually safe when 14 days have elapsed since the onset and the fever has subsided.

Poliomyelitis. Apparently communicable the last one or two days of the incubation period, and for the first seven to ten days of the disease (virus may be found in the stools even much later in the disease). Isolation is necessary only during the first 14 days following onset.

Smallpox. This disease is apparently the most communicable of all diseases. It is communicable from the inception of the first signs or symptoms until the complete disappearance of all crusts and scabs. There is some evidence that the disease is communicable in the last one or two days of the incubation period. Isolation in screened quarters, free from vermin, is necessary until recovery is complete and all crusts and scabs have disappeared.

Diphtheria. Communicable from 24 hours before the onset of symptoms until the diphtheria bacilli have disappeared from the nose, throat or other site of infection. Isolation should be continued until symptoms and discharges have ceased and two successive nose and throat cultures, taken no less than 24 hours apart, are negative."



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New Series

Introduction to the Symposium on Vitamins

Ancel Keys, Ph.D.†
Minneapolis, Minnesota

THE subject of the vitamins has acquired both scientific importance and public interest which could scarcely have been imagined a dozen years ago although at that time the major vitamin deficiency diseases were by no means terra incognita, and inspired suggestions as to their manner of action had foreshadowed modern work on the behavior of some of them as enzymes. The progress of research has been so rapid that the significance of many findings has not yet been evaluated properly. As in some other fields, the most obviously difficult transition is that from chemistry to exact clinical application. In the case of the vitamins there has been a tendency by clinicians to obviate the problem by adopting the "conservative" policy of prescribing vitamins in case of doubt since, with the exception of vitamin D, they are almost completely non-toxic. Most internists realize that, as a result of popular "education" and commercial propaganda, vitamin administration may confer important psychological benefits quite apart from direct effects on intermediary metabolism.

The complexity of the problem of vitamin requirements of man is amply illustrated in the papers in this symposium. "Subclinical" deficiencies pose a most difficult problem. Until recent years it was considered that for each vitamin there is a general level of intake below which a frank deficiency disease would develop and above which there is no effect. With the realization of the inadequacy of this view the idea has developed that there might be a more or less direct quantitative relation between the amount of the intake of some of the vitamins and the general health and vigor. The truth of the matter is probably between those extremes but we are far from having precise answers as yet. Unfortunately there

undoubtedly are important individual variations, especially in the presence of other disease. Clinical experience with patients suffering from deficiency diseases may lead to erroneous conclusions about the public at large. The limited number of controlled studies on normal persons may not apply to those who are not so "normal". Modifying factors may exist in other elements of the diet, in the nutritional history and even in the climate or occupation.

In the past few years there have been many reports on the prevalence of vitamin deficiencies in the United States and Canada. In general these reports show that diets which do not conform to certain "recommendations" are very common and that one or more signs or symptoms which may occur in cases of true vitamin deficiency are so frequent as to be almost universal. The alarming conclusions that are frequently drawn from such studies depend on the acceptance of standards and criteria that are necessarily arbitrary. The recommendations of the National Research Council (1941) may be defended on the ground that the vitamin intakes thus provided would safely cover all reasonable contingencies with a generous margin. On the basis of present knowledge, however, it is not justifiable to conclude that health and vigor are jeopardized if these recommendations are not met.

Dietary surveys have provided much useful information.^{17,28,34,35,40} The utility of such surveys is strictly limited by the present fragmentary state of knowledge as to real human requirements. Another type of survey provides data on the frequency of signs and symptoms which may be related to the vitamin adequacy of the diet.^{3,4,23,36} We can agree with Mackie (1942) that: "Investigators working in different areas are not in agree-

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ment concerning the incidence or exact significance of particular symptoms and particular physical signs," (p. 276), and, "It must be emphasized, however, that no symptom or sign can be accepted as diagnostic unless supported by other evidence," (p. 277). By and large adequate "other evidence" is lacking in reports which purport to show that vitamin deficiency is exceedingly common in school children, W.P.A. personnel, factory workers and so on.

It is easy to criticize reports which rely on symptoms like "lack of appetite," "lassitude," "muscle pains," and "irritability," or on signs such as "poor muscle tone," "unexplained dermatitis," "fatigue of accommodation," and so on. Acceptance of such criteria means that every neurasthenic and every biologically inferior person would be counted as a case of vitamin deficiency. Even more definite observations are less specific than commonly supposed. For example, the correlation between night blindness and vitamin A is not close except under some highly artificial experimental conditions.^{12,27,32,38,39}

The case of corneal vascularity and of other ocular manifestations emphasized for the diagnosis of ariboflavinosis^{15,28,29} is instructive. Vascularity of the cornea develops in rats deprived of riboflavin^{2,8} and in some cases ocular lesions in man have responded to treatment with this vitamin.^{25,26} On this basis some investigators diagnose ariboflavinosis from corneal vascularity alone.³⁶ The application of this criterion to 1171 aircraft workers results in the conclusion that "every subject, regardless of age or economic status must be considered deficient in riboflavin" (Borsook, Alpert and Keighley, 1943, p. 133). It is interesting that "no correlation was found between ocular complaints, the incidence of cheilosis and corneal vascularity" (*ibid.*). Study of the diet of the same aircraft workers showed that 29.2 per cent of them had a regular daily intake of 2.7 mg. or more of riboflavin.³⁵ Only one of 198 Canadian aviators was free from vascularity of the cornea (Tisdall, 1943). However, in controlled experiments corneal vascularity does not develop with a daily intake of 0.5 to 1 mg. of riboflavin continued for many months.^{14,24,37} On the other hand, application of intensive riboflavin supplementation to aviators with corneal vascularity resulted in improvement in most of them in two months.³¹

The argument of the prevalence of corneal vascularity undoubtedly has been an important factor in estimating a high incidence of ariboflavinosis in the United States. The present indications are that, except for this argument, a riboflavin intake of about 1.5 mg. per day could be accepted as fulfilling all requirements. If riboflavin is needed to prevent corneal vascularity then possibly much more than the N.R.C. recommendation of 2.7 mg. would be required.

It is tempting to draw important practical conclusions from surveys of the amount of certain vitamins in the blood or urine but the proper interpretation of these surveys is uncertain. For example, it is frequently assumed that a level in the blood plasma of less than 0.5 mg., or even 0.75 mg., per cent of ascorbic acid is indicative of dangerous deficiency of vitamin C. A daily intake of 75 mg. or more of ascorbic acid would be

needed to maintain the plasma concentration above these levels. But plasma C of 0.5 mg. per cent is common in persons who show no other signs or symptoms of deficiency. Rinehart, et al.,²² found 26.6 per cent of 120 "normal" healthy medical students with plasma values less than 0.5 mg. per cent. Dagulf⁷ found only 7 cases of clinical deficiency of ascorbic acid in 20,000 persons but a study of 326 representative persons showed that in the spring only 6 per cent of these had plasma ascorbic acid concentrations as high as 0.5 mg. per cent and even at the time of the peak vitamin C intake (summer) 11.5 per cent were below this level. Lower levels prevailed in 255 tubercular patients and extra ascorbic acid given to these persons for up to 6 months had no effect on any aspect of health. In another group of 125 patients with plasma ascorbic acid lower than 0.5 mg. per cent there were no signs or symptoms referable to the vitamin C nutrition.¹ In a group of 60 children studied at intervals from May through the following March more than 50 per cent had plasma levels below 0.5 mg. per cent for the entire period yet weight, growth, gums, teeth, and so on were normal and there was no difference in the general health of children who characteristically had a low plasma ascorbic acid level and those who regularly had high levels.¹¹ In studies of industrial workers about half the men showed plasma ascorbic acid values below 0.5 mg. per cent (78 men²³, 1160 men³), yet no other signs or symptoms of ascorbic acid deficiency were seen. The belief that plasma ascorbic acid values reflect only relatively recent dietary history¹⁰ does not improve the argument that the frequency of values below 0.5 indicates a deplorable state of vitamin C nutrition. Skepticism, based on reasonable arguments, about setting ascorbic acid requirements as high as 60 or 75 or more mg. daily has been expressed by Rietschel,^{19,20} Fox and Dangerfield,⁹ and others.

The state of fomented alarm about vitamin deficiencies in this country has been sharply criticized by Clendening⁴ who cites many facts that are difficult to reconcile with statements popularized in nutrition campaigns and commercial advertising. It would seem fair to conclude that even if "subclinical vitamin deficiency" is frequent—and this is not proved—it is extraordinarily benign and scarcely warrants heroic efforts to correct in the midst of the crisis of war. From the scientific viewpoint one could wish for much more controlled research and far less propaganda on the subject.

Intakes of vitamin A, thiamine, riboflavin and ascorbic acid at levels much below the average American dietary produce no real deterioration for months and very special diets are required to produce true deficiency disease, even in the mildest form, in normal adults within half a year.^{5,6,13,14,21,33} It may be that vitamin requirements of man are very different for 20 years than they are for a year. The ultimate effects of subsistence of man at moderately low levels of vitamin intake for very long periods are not known.

Vitamin requirements have become more than a difficult scientific and medical question; already they have great sociological implications and tend to become a symbol of demands for economic equalization. This develop-

ment is most marked in the United States but it is recognized in England and elsewhere. The responsibility of the scientist and the physician in all this is arguable. For both it is probably desirable to extend their sociological consciousness beyond the ordinary horizons of their daily activity. But for both the primary responsibility remains the most honest performance in their chosen sphere of personal work. If that work touches on the vitamins then symposia like the present should serve a useful purpose. Even though there is a tendency at present to regulate nutrition by government it may be expected that the individual physician will still have some latitude in which to exercise sound judgment based on scientific knowledge.

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Newer Members of the Vitamin B Complex

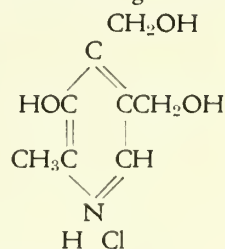
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THE three best known and most widely used members of the B complex have been discussed in other papers in this symposium. The deficiency diseases resulting from a lack of thiamine, riboflavin or nicotinic acid were known before the individual vitamins were isolated and synthesized. The existence of the remaining members of the B complex is based largely upon work with animals and the use of these factors in practical nutrition is not too clearly understood. This does not mean that these newer factors are not essential in the metabolism within the body, but the corresponding deficiency diseases are not so apparent. This situation may be due to several factors: first, the recognition of the additional B vitamins is so recent that extensive clinical studies have not been made; second, these factors are so widely distributed in a variety of foods that a serious deficiency is less likely to occur; and third, some of them at least are produced in the intestinal tract by bacteria.

Two additional compounds, namely, pyridoxine and pantothenic acid, were added to the B complex between 1938 and 1940. Pyridoxine (vitamin B₆) was recognized through its ability to prevent a dermatitis in rats, which was observed during attempts to produce experimental pellagra in rats. It was first obtained in crystalline form in 1938 and its synthesis was described by Harris and

Folkers¹ shortly thereafter. Pyridoxine hydrochloride is a white crystalline powder, slightly bitter in taste and odorless, possessing the following formula:



Pyridoxine deficiency in the rat has always been associated with a specific dermatitis called acrodynia by György,² although it has been demonstrated³ that a lack of this vitamin may cause retarded growth without the dermatitis, if ample fat is supplied in the diet. It appears⁴ that linoleic acid, pyridoxine and pantothenic acid are together concerned in the prevention of dermatitis. Chick and coworkers⁵ reported convulsions in pyridoxine deficient rats and pigs resembling epileptic fits in the human. Convulsions in dogs were observed by Fouts et al.,⁶ and Wintrobe⁷ has recently described convulsions in pigs on pyridoxine low diets.

A microcytic hypochromic anemia also results from a

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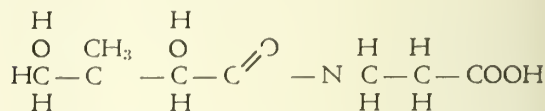
chronic pyridoxine deficiency in dogs⁸ and pigs.⁷ The hemoglobin and the red cells decrease progressively, the hemoglobin relatively faster than the red cells. Addition of pyridoxine causes a large reticulocyte response with rapid increase in hemoglobin and red cells until the normal level is attained. Rats,⁹ pigs¹⁰ and to some extent dogs¹¹ excrete in the urine a green pigment when on diets low in pyridoxine. Lepkovsky, et al.¹² have now identified this compound as xanthurenic acid and have shown the compound to originate from dietary tryptophane. These and other results indicate that pyridoxine may be closely related to protein metabolism.

No clear cut symptoms resulting from pyridoxine deficiency have been described in man. Spies, Bean and Ashe¹³ have reported an additional improvement in pellagrins when given pyridoxine after treatment with nicotinic acid, riboflavin and thiamine. Smith and Martin¹⁴ observed a rapid and satisfactory healing of the typical lesions of cheilitis with vitamin B₆ therapy. Although clinical treatment of such conditions as Parkinson's disease, muscular dystrophy and paralysis agitans has been studied, the results are not definite enough to permit postulation of the action of the vitamin or to associate any one of these syndromes with specific lack of pyridoxine in the diet. Pyridoxine administration has been used with some success in reduction in the oiliness of the skin in cases of acne.¹⁶

The human requirement is unknown, but animal experiments indicate that it may be about the same as that for thiamine, namely, 1 to 2 mg. per day. In fact, the vitamin B₆ requirement of chicks is higher than that for thiamine, 300 γ per 100 grams ration. There appears to be no difficulty in meeting this requirement because of the wide distribution in foods. Swaminathan¹⁶ found diets consumed in India to supply 3.5 to 5.0 mg. per day. Chemical methods have been used for the estimation of vitamin B₆ but the rat growth method is still the most reliable. The yeast method¹⁷ has been found to give results comparable to those obtained with rats. When bacterial methods are used, tissues have been found to contain a substance called pseudopyridoxine,¹⁸ which is a thousand times more active than pyridoxine hydrochloride. Recent work in the author's laboratory has shown that this substance shows no greater activity for the rat. Among the best sources of vitamin B₆ are rice, bran, liver, yeast, cereals, legumes, and milk. Whole wheat contains about 0.46 mg. per 100 grams, most meats 0.4 to 0.7 mg. per 100 grams on the fresh basis, and fresh vegetables about 0.1 mg. per 100 gm.

Pantothenic acid in the form of calcium pantothenate became available in 1940. The term, filtrate factor, was used for several years to designate that member of the B complex which prevented dermatitis in chicks. Although the so-called filtrate fractions from liver extract were effective in the prevention of black tongue in dogs, pellagra in humans and dermatitis in chicks, it was recognized as soon as nicotinic acid was accepted as the anti-pellagra factor that the activity of these fractions for the chick was not due to the nicotinic acid present but to a separate and distinct vitamin. Woolley, Waisman and Elvehjem¹⁹ and Jukes²⁰ independently demonstrated that

pantothenic acid, which Williams²¹ had shown to be a growth factor for yeast as early as 1933, was similar to the chick antidermatitis factor. The complete synthesis of calcium pantothenate which has the empirical formula (C₉H₁₆NO₅)₂Ca was achieved by Stiller et al.²² The free acid has the following structure:



Rats placed on diets low in pantothenic acid grow very poorly and develop in a few weeks necrosis of the adrenal cortex, a condition first described by Daft and Sebrell.²³ When black or piebald rats are used, significant changes in hair pigmentation (graying) can be observed. Unna et al.²⁴ have published photographs of these fur changes in nutritional achromotrichia. Ralli and Graef²⁵ have shown that adrenalectomy will cause an increase in the deposition of melanin in the hair bulbs and follicles of rats showing graying due to filtrate factor deficiency.

Acute pantothenic acid deficiencies in dogs²⁶ are characterized by sudden collapse associated with decreased blood dextrose, increased non-protein nitrogen and lowered blood chlorides. Severe intussusception in the intestinal tract and fatty livers have also been observed. Scudi and Hamlin²⁷ found that a lowering of blood lipids accompanied the production of fatty livers. Hughes²⁸ and Wintrobe et al.²⁹ have described the following symptoms: slow growth, rough coat, loss of hair, ulcers in the intestinal tract, and a "goose stepping gait" as a result of pantothenic acid deficiency in pigs. Phillips and Engel³⁰ found specific neuropathologic changes in the spinal cord of chicks suffering from pantothenic acid deficiency, and Wintrobe²⁹ has described sensory neuron degeneration.

In spite of these interesting symptoms in experimental animals, little is known about the importance of this vitamin in human nutrition. Spies and his coworkers³⁰ concluded from studies based largely on blood pantothenic acid values that it is essential in human nutrition. Gordon³¹ found the average daily excretion for 40 subjects to be 3.5 mg. The daily human requirement may fall within 5 to 10 mg. per day.

The pantothenic acid content of foods may be measured by growth experiments with chicks, but the microbiological methods³² are now in more general use. Liver is one of the richest sources, containing about 5 mg. per 100 grams fresh liver. Meats, cereals, and milk are also reliable sources. The administration of pantothenic acid has produced some improvement in cases of peripheral neuritis, Korsakoff's syndrome and delirium tremens.³³ Brandaleone, et al.³⁴ have recently reported that in a group of 19 elderly individuals with gray hair, a significant hair color change was noted in only 2 individuals during intensive therapy with calcium pantothenate, para-aminobenzoic acid, and brewer's yeast.

Although there may be some question about the inclusion of choline in the B complex, the fact that it is now added to most of the purified diets used in vitamin

studies suggests that it is logical to discuss its nutritional significance along with this group of compounds. Choline has been recognized for many years as a component part of the phospholipid lecithin, but its possible need in the diet was not apparent until Best demonstrated its role in the prevention of fatty livers in depancreatized dogs.³⁵ The function of choline is related to the mobilization of fatty acids in the body, since in its absence liver fat accumulates rapidly. Fatty livers in rats, induced by feeding high cholesterol diets, do not respond to choline treatment. The observations of du Vigneaud and his collaborators³⁶ that the methyl groups of choline as well as those of methionine and betaine are transferable in the animal organism have led to the conclusion that one of the functions of choline is to supply labile methyl groups. McHenry³⁵ states that there is evidence now that choline may function in at least three ways: to stimulate the formation of phospholipids, to make possible the production of acetyl choline, or to supply labile methyl groups.

Jukes³⁷ has shown that choline is one of the factors required in addition to adequate manganese to prevent slipped tendons or perosis in young turkeys. Depression of the growth rate when choline is omitted from the diet has been observed in the case of the rat by Richardson et al.,³⁸ in the chick by Hegsted et al.³⁹ and in the dog by Schaefer et al.⁴⁰

The high requirement of the young rat for choline has been stressed by Griffith,⁴¹ who previously reported fatty degeneration of the liver, hemorrhagic renal lesions, ocular hemorrhages and regression of the thymus within ten days after the rats had been placed on a low choline but otherwise adequate diet. Cirrhosis of the liver in rats fed diets low in choline and protein has been reported by György and Goldblatt,⁴² Blumberg and McCollum,⁴³ Webster⁴⁴ and Lowry et al.⁴⁵ The results of these studies have been summarized in *Nutrition Reviews*, vol. 1, p. 88, Jan. 1943, as follows:

1. Rats fed a diet low in protein but high in fat develop hepatic change characterized by (a) enlargement of the liver with a roughened, hob-nail like surface, (b) central or midzonal areas of necrosis and hemorrhage in the liver lobule, and (c) periportal increase in fibrous tissue. At times there is lymphocytic infiltration in the periportal areas and prominence of bile ducts. In some of these experiments the changes were similar to those seen in the livers of patients with portal cirrhosis.

2. The experimentally produced hepatic damage can be prevented either by increasing the protein content of the diets or by adding yeast.

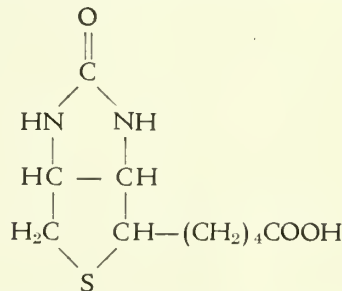
3. Cystine aggravates the development of the cirrhotic process.

4. Choline and methionine (a choline precursor) provide at least partial protection against the development of cirrhosis.

Fouts⁴⁶ has described fatty cirrhotic livers in dogs receiving the B vitamins in synthetic form without choline. Partial clinical improvement followed the administration of large amounts of choline, but combined administration of choline and liver extract produced more rapid improvement although fibrosis of the liver still persisted. Some success has been reported with choline in the treat-

ment of portal cirrhosis in man (Brown and Muether⁴⁷ and Fleming and Snell⁴⁸), but the workers suggest that improvement is possible only when hepatic damage is not too far advanced. With the present necessary modifications in the protein and fat sources in the human diet it would be well to pay some attention to the choline intake. Meats, cereals, vegetables and eggs are good sources of choline. The choline content of a number of animal and plant products has recently been tabulated by Engel.⁴⁹

Although biotin has been recognized as necessary for the growth of microorganisms for some time, its significance in the nutrition of animals has been elucidated only within the past year or so. Biotin was first isolated in 1936 by Kögl and Tonnis,⁵⁰ but its complex nature and its minute concentration in natural products delayed identification of its structure. Du Vigneaud and co-workers⁵¹ have recently shown that biotin has the following molecular structure.



Biotin is a stable compound, resisting autoclaving with strong mineral acids, and in the form found in natural products is but slowly inactivated with strong alkali. It is readily destroyed by oxidizing agents.

It has been known for several years that a characteristic syndrome can be produced in rats fed diets containing high amounts of raw egg white. Lease, Parsons and Kelly⁵² found that the rabbit and the monkey also exhibited a typical dermatitis when fed rations containing egg whites. As early as 1933 Parsons⁵³ concluded that the injury involved an interrelation between a positive toxicity and a relative absence of a protective factor, and a little later György named this factor vitamin H. Birch and György⁵⁴ obtained highly potent concentrates of the factor, and in 1940 du Vigneaud, Melville, György and Rose⁵⁵ suggested the identity of biotin and vitamin H.

György, Rose, Eakin, Snell and Williams⁵⁶ have now established the presence of "avidin" (an albumin) as the biotin inactivating factor in egg white. Thus, it becomes apparent that egg white injury is due to the unavailability of biotin by virtue of being tied up with avidin, in which complex biotin cannot be absorbed from the intestine and is excreted in the feces. Nielsen and Elvehjem,⁵⁷ using a more complete ration than had been used in the early work, were able to demonstrate a biotin deficiency in the rat fed 10 per cent levels of egg white. Typical symptoms of "spectacled eye" progressing to general alopecia and in the later stages to the onset of a spasticity and to final death of the animal were recorded. Even the severe symptoms of spasticity were cured when excess biotin (in excess of that which unites with the avidin) was

added to the diet. On the synthetic diet without the egg white these workers were unable to demonstrate any signs of biotin deficiency, and it seems probable that under most conditions the rat can synthesize, through the medium of bacteria in the intestine, sufficient biotin for its requirement. Biotin deficiency has been reported in the chick without resorting to egg white diets, which seems to indicate that very limited synthesis of biotin in the intestinal tract must prevail. A typical dermatitis involving the feet was found by Hegsted et al.⁵⁸ to be characteristic of the deficiency in the chick, and Patrick et al.,⁵⁹ also have noted similar dermatitis with turkeys on biotin deficient rations.

Rather definite information is available regarding the importance of biotin in human nutrition. Sydenstricker and coworkers⁶⁰ produced a deficiency in man by feeding egg white at a level which supplied 30 per cent of the calories. Symptoms of dermatitis developed as early as the third and fourth weeks and other symptoms similar to those seen in thiamine deficiency were observed. All symptoms were cured by the parenteral administration of 150 to 300 γ of biotin per day. Ooppel⁶¹ has shown that the biotin content of the urine is influenced by the amount in the diet. Most of the normal subjects excreted 20 to 50 γ per twenty-four hours, and he was unable to find a single patient who did not excrete biotin. Sydenstricker's patients receiving egg white showed levels as low as 3.5 γ per day. Ooppel also reported that diets of average composition contained 30 to 40 γ per day, or 10 to 16 γ per 100 gram of dry food. The latter value is interesting because the biotin requirement of chicks is 7 to 10 γ per 100 gram of ration.⁵⁸ When the biotin content of the feces was also determined it was found that the total biotin output was three to six times as great as the intake from the diet. Thus there is apparently intestinal synthesis of biotin in the human as well as in the rat. The intake of biotin in the diet may not be important except in special cases. It should be kept in mind, however, that a lack of some of the other B vitamins may cause deficiencies due to reduced synthesis of biotin as well as a deficiency due to a direct lack of the vitamin in the body tissues.

The significance of inositol in animal nutrition was first recognized through the use of the mouse. Eastcott showed as early as 1928 that inositol would stimulate the growth of yeast. In 1940 Norris and Hauschildt⁶² found that mice failed to grow on a synthetic diet containing the known members of the B complex. In addition to lack of growth, the animals showed loss of hair and scaly dandruff. Liver and yeast supplements produced normal animals. Woolley⁶³ described a similar condition and identified the factor in the yeast and liver as inositol. Further studies⁶⁴ indicated that some of the animals without inositol showed spontaneous cures. Cultures from the intestinal tract of the mice showing the spontaneous recovery yielded organisms which would synthesize much more inositol than cultures taken from the tract of mice that remained hairless. This synthesis was not observed when pantothenic acid was absent from the diet. Since no one has been able to demonstrate the need for inositol in the diet of growing rats, there is apparently sufficient

synthesis by the bacteria to meet the requirement. Whether this is true in humans remains to be determined.

p-Aminobenzoic acid was first described as a bacterial growth factor by Rubbo and Gillespie,⁶⁵ and Ansbacher⁶⁶ concluded it was a vitamin in 1941. Sieve⁶⁷ has used it as an achromotrichia factor. The fact that this compound is widely distributed in nature suggests that it may be an important vitamin, but we have been unable in our laboratory to demonstrate any definite effect of this compound in the rat except its counteracting effect on sulfaguanidine. In the chick it can partially compensate for the lack of liver extract factors when fed at high levels. Thus it may have an indirect effect by altering the synthesis of other factors in the tract. Martin⁶⁸ has reported similar results in the rat and suggests that it may have such an effect in humans.

In order to study still other possible members of the B complex, it has been necessary to use rats receiving sulfaguanidine or succinyl sulfathiazole, or chicks and monkeys on synthetic diets containing the nine B vitamins mentioned so far.

If 0.5 per cent sulfaguanidine or succinyl sulfathiazole is added to a synthetic diet containing thiamine, riboflavin, nicotinic acid, pyridoxine, pantothenic acid and choline and fed to rats, the rate of growth is greatly reduced and the prothrombin time of the blood is increased. The addition of liver extract to this ration gives optimum growth and normal clotting time of the blood.⁶⁹ The liver extract can be replaced by a folic acid concentrate and biotin.⁷⁰ Thus, the rat requires biotin and one or more factors in the folic acid concentrate, but under normal conditions these factors are produced by the intestinal bacteria. Gant et al.⁷¹ have shown a reduction in the coliform organisms in the tract of rats fed upon succinyl sulfathiazole. Spicer, Daft, Sebrell and Ashburn⁷² have reported a consistent development of a leucopenia and an agranulocytosis in rats receiving sulfaguanidine or succinyl sulfathiazole, in synthetic rations. The total number of leucocytes dropped from a normal of 10,000 to less than 1,000 in severe cases. These results have been verified in the author's laboratory and folic acid concentrates have been shown to be effective in preventing the leucopenia.

Chicks fed a modified synthetic diet plus the synthetic B vitamins including biotin and inositol, not only fail to grow but show very poor feathering and a rather extensive anemia.⁷³ All three deficiencies can be counteracted by adding 2 per cent liver extract or 5 per cent yeast to the diet and all the activity can be concentrated in crude folic acid preparations from these foods. Similarly, monkeys fail on synthetic diets but live and develop normally if liver extract, grass juice powder or a crude folic acid preparation is used.⁷⁴ The monkeys on the synthetic diet also show a leucopenia similar to that described by Day and coworkers⁷⁵ in monkeys fed a modified Goldberger diet. They found that yeast and liver were effective, and they named the active factor vitamin M.

It is evident, therefore, that the remaining members of the B complex can be concentrated in a crude folic acid concentrate. Most of these preparations have been made according to the procedure described by Hutchings, Bo-

honos and Peterson.⁷⁶ These workers used the *Lactobacillus casei* for the assay of the activity. Mitchell, Snell and Williams⁷⁷ used spinach as the source of their factor and the *Streptococcus Lactic R* as the test organism. They named the factor folic acid and found a rather pure concentrate to stimulate the growth of *L. casei* as well as *S. lactis*.

For some time the two factors were considered to be the same, but very recently Keresztesy, Rickes and Stokes⁷⁸ isolated a pure substance which is effective for *S. lactis* but is inactive for *L. casei* and they suggest that it is not folic acid. Piffner et al.⁷⁹ have obtained from liver a compound in pure form which is active in preventing anemia⁸⁰ in chicks on purified diets. These workers have retained the term Bc for this compound and they suggest that it may be identical with both the *L. casei* and *S. lactis* factors. In light of the above report this is not possible. The question which remains, therefore, is: are the two bacterial growth factors related to the factors needed by the rat, chicken and monkey. Briggs et al.⁸¹ have clearly demonstrated that the chick requires two factors which are separate and distinct from the *S. lactis* factor. These two factors have been temporarily called B₁₀ and B₁₁. It is more likely that the factor needed by rats fed the sulfonamides and by monkeys fed synthetic diets is related to the *L. casei* factor, especially since the factor corrects an anemia in chicks. The final isolation of these factors will do much to give us a complete picture of the remaining B vitamins.

We can only speculate as to the importance of these newer factors in human nutrition, but some of the possibilities are most intriguing since some of the conditions observed in the experimental animals certainly occur in humans. Thus, with further information some of the deficiency diseases which are uncontrollable today may be handled as readily as scurvy, rickets and pellagra are now controlled.

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Vitamin D

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THE D vitamins are chemically classified as sterols, and belong to the fat-soluble group of vitamins, a highly artificial, though useful, classification. These vitamins can be produced from sterols commonly occurring in plant and animal life, by ultraviolet irradiation or by activation with low velocity electrons. Although several related sterols have vitamin D activity, only two are of clinical importance. The plant sterol ergosterol, when treated with ultraviolet irradiation gives rise to several products, one of which, calciferol, or vitamin D₂, has marked vitamin D activity. Commercial viosterol is an oily solution of activated ergosterol, having calciferol as its chief component. Ergosterol occurs in yeasts and irradiation of the yeast cells produces calciferol. Activated 7-dehydro cholesterol, or D₃, is the form of vitamin D produced in the human body by action of ultraviolet rays on the skin. It is also the form found in the liver oils of cod and many other species of fish. Some fish liver oils, however, contain both vitamins D₂ and D₃. In general, vitamin D₃ predominates in naturally occurring vitamin D.^{1,6}

Whereas fish liver oils and the body oils of a few fish, like salmon, are relatively rich in vitamin D, most foods normally contain little or none of this vitamin. Bovine and human milk contain from 3 to 40 U.S.P. units to the quart.¹¹ Egg yolks contain variable amounts, depending on the food of the hen. The chief source of vitamin D for primitive peoples living inland is through the activation of body cholesterol by the ultraviolet rays from the sun. Modern civilization has reduced the effectiveness of this source. Irradiation of foodstuffs containing 7-dehydro cholesterol or ergosterol results in the formation of vitamin D in the food. Vitamin D from other sources is easily added to such foods as milk. Milk and bread are the only foods for human use now recognized by authoritative bodies as carriers for vitamin D, because unregulated irradiation of or addition of vitamin D to foodstuffs would result in overdosage of this vitamin among the general population. (Irradiated yeast is much used as a cheap and effective source of D for animals' feed other than for chickens. The milk of cows fed irradiated yeast contains increased amounts of vitamin D, as does the milk of human mothers who are ingesting vitamin D.)

Vitamin D in foods or in oily solution is stable as long as the oil does not become rancid. Rancidity in the carrying oil is accompanied by destruction of the vitamin. Exposure to heat and light is to be avoided because it increases the development of rancidity.

Vitamin D is absorbed from the intestine along with the fats in which it is carried. Adequate amounts of bile salts must be present in the intestine to provide for its absorption. Any condition which prevents absorption of fat will decrease the absorption of the fat soluble vita-

mins, including vitamin D. The absorbed vitamin, and that manufactured in the skin by the action of ultraviolet rays, are transported to the liver, which appears to be the chief storage place for the vitamin, though some may be stored also in other tissues. The stored vitamin D is released slowly for use, so that its effect may be apparent for a considerable period after the vitamin is withdrawn from the diet.

The functions of vitamin D in the animal body all relate to the metabolism of calcium and phosphorus.^{2,7,8,9} The chief function is to increase the amounts of these substances absorbed and retained in the body. Usually some increase in urinary excretion of calcium and some decrease in urinary phosphorus also are observed, especially during recovery from avitaminosis D. Experiments on dogs depleted of vitamin D show that administration of large amounts of this vitamin decreases urinary phosphorus by increasing the reabsorption from the kidney tubules.¹² In addition to the above functions it has been postulated also that vitamin D plays a specific role at the site of deposition of mineral in bone. Also, because of its effect in increasing the amount of calcium and phosphorus available for mineralization of bone, vitamin D is effective in regulating the rate of skeletal growth, an effect particularly noticeable in infancy, when skeletal growth normally is rapid.¹³ The effects of overdosage differ markedly from the effect observed after administration of prophylactic or therapeutic amounts of the vitamin, and will be discussed under hypervitaminosis.

CALCIUM AND PHOSPHORUS METABOLISM

The functions of vitamin D are associated intimately with calcium and phosphorus metabolism. About 98 per cent of the calcium and 90 per cent of the phosphorus of the body are found in bone. Both calcium and phosphate are simultaneously deposited in, or withdrawn from bone. In this country, the phosphorus intake is usually ample unless the diet is deficient in many respects; the intake of calcium is often grossly inadequate and so becomes the limiting factor.

The greatest need for calcium and phosphorus is during the period of skeletal growth. However, even in adults, bone is not an inert tissue. Studies using radioactive phosphorus as "tracer" show that phosphorus (and therefore calcium) once deposited in bone, does not remain there for the life of the individual but only for a space of a few weeks or months.^{7,8,9} The trabeculae of bone can be rapidly built up and destroyed, thus forming a reservoir of readily available calcium and phosphorus.¹⁴ The rate of exchange of radioactive phosphorus in enamel of teeth is so slow as to be negligible.⁹

Measurement of the amount of calcium and phosphorus absorbed from the gastrointestinal tract is complicated by the fact that both of these substances are also secreted or excreted into the intestine. It has been estimated that from 0.3 to 0.8 grams of calcium are secreted

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into the gastrointestinal tract daily, in the various digestive juices.⁷ Study of phosphorus excretion made by use of the radioactive isotope showed that about one-eighth of the phosphorus absorbed into the circulation of human subjects was excreted through the intestine.⁹ Thus the term "net absorption," meaning the difference between ingested and fecally excreted calcium and phosphorus, has come into use.

The calcium phosphates are not very soluble except in acid solutions. The chief absorption of these substances then, must occur high up in the tract, before the contents become alkaline. It follows that any factors tending to increase the acidity of the tract will facilitate absorption and, conversely, any decrease in acidity will lessen absorption. The solubility of calcium phosphate in the intestinal fluids is decreased also when a marked preponderance of phosphate over calcium ion occurs. The reverse would also be true, but is found less commonly. Calcium forms insoluble soaps with fatty acids, which are hydrolyzed from food fats by the action of intestinal juices. The formation of calcium soaps occurs whenever the absorption of fats is unduly slow. The decrease in fat utilization does not need to be of such magnitude as to cause steatorrhea in order to reduce effectively the calcium absorption. In illness, with consequent disturbance of gastrointestinal function, the rate of calcium and phosphorus absorption may be sharply decreased, especially in infants and younger children. The absorption of fat and of vitamin D is often also decreased in these circumstances.

The efficiency of absorption for calcium and phosphorus varies widely among various species. The rat is extremely efficient, absorbing over 90 per cent of the intake. The human is relatively inefficient, usually absorbing well under 50 per cent of intake even with the aid of vitamin D, and often absorbing none without the aid of the vitamin. For this reason the results of experiments on rats and other species can be applied to humans only with reservations.

The quantity of calcium and phosphorus excreted in the urine varies with the intake, the age of the subject, the acid-base regulation of the body, the efficiency of the kidney tubules, the endocrine balance of the individual, and the amount of vitamin D available. In the non-rachitic child, the ingestion of moderate amounts of vitamin D does not appear to increase the urinary excretion of calcium, though the absorption and retention of this element may be sharply increased.¹⁵ In the avitaminotic person, urinary excretion of calcium is reduced below the normal and is increased with the administration of vitamin D.¹⁶ Excessive amounts of the vitamin increase the urinary calcium above the normal limits. The urinary excretion of phosphorus, on the other hand, is increased during avitaminosis D, and administration of the vitamin decreases the amount so excreted, thereby increasing the amount of phosphorus retained in the body.^{12,16}

Some calcium and phosphorus are always excreted from the body. If the intake is very little, loss of mineral from the body is inevitable even though vitamin D is ingested. However, without vitamin D, ingestion of

ample amounts of calcium and phosphorus may still result in loss of both minerals from the body.

THE VITAMIN D REQUIREMENT OF NORMAL PERSONS

The vitamin D requirements of persons of various ages have been stated by the National Research Council, on the basis of present evidence, as 400 to 800 units daily for infants, children and pregnant and lactating women. No requirement is stated for adults.¹⁷ Supplementary discussion of these requirements is perhaps desirable.

Infants. The calcium and phosphorus intake of a full term breast-fed infant is just adequate to provide for good growth and development. Though the intake is minimum, the proportions of minerals, carbohydrate, and protein provide for optimum absorption. In addition, the breast-fed infant may receive as much as 50 to 100 U.S.P. units of vitamin D in the milk, if the mother ingests vitamin D, or is exposed to considerable sunshine. These factors probably account for the decreased incidence of rickets in the breast-fed infant, even when no additional vitamin D is given. Nevertheless, the baby fed human milk almost always retains more calcium and phosphorus when vitamin D is also given. The daily vitamin D requirement is certainly no more and may be less than that of the infant fed cow's milk.

The premature infant has a much smaller gastric capacity and a much greater rate of growth than the full term infant. Such an infant cannot get enough calcium and phosphorus from human milk to provide for bone deposition, even if vitamin D is also given.^{10,18} Thus these infants need both vitamin D and additional mineral. The latter is easily provided by adding dried skimmed milk to the human milk. When sufficient mineral is provided, the vitamin D requirement, though not known with certainty, is probably not above the maximum given for infancy, or 800 units daily.

Infants fed cow's milk have an ample intake of mineral, but the proportions of the other constituents of milk tend toward the production of alkalinity in the upper intestine, and the absorption of calcium and phosphorus is poor unless vitamin D is also given. Very small amounts of vitamin D are sufficient to improve the absorption greatly. Infants given no vitamin D retain an average of only 10 per cent of the calcium intake; when 90 to 100 units (the average daily intake from 135 unit vitamin D milk) are taken daily, the retention is increased to between 25 and 30 per cent of the intake. When whole milk modifications are fed, the amount of calcium and phosphorus retained is sufficient to prevent the development of rickets.^{3,5} When 300 to 400 units of vitamin D are taken daily as codliver oil or vitamin D milk, the retention of calcium is increased to between 35 and 40 per cent of the intake. The additional retention appears to provide sufficient mineral for somewhat accelerated growth of bone, as these infants grow at a significantly greater rate than do those given 100 units of D daily. The rate of growth of the latter is, in turn, greater than the average growth of infants recorded before vitamin D was given prophylactically.^{13a}

Infants fed the same cow's milk formulas but given 2,000 or more units of vitamin D retained nearly 40 per

cent of the calcium intake, but by five months of age showed an alarming lack of appetite. Skeletal growth slowed and even ceased entirely for several weeks; when resumed, growth in length proceeded at less than average rate.^{13b} It was concluded that vitamin D in amounts of 2,000 U.S.P. units or more daily produced a chronic mild hypervitaminosis, affecting appetite and, secondarily, growth, because of decreased intake.

From time to time, the relative efficacy for infants of vitamins D₂ and D₃ has been questioned. The question is still unsettled, but from the evidence at hand, it appears probable that the difference in effective unitage for the baby is not large and may be zero. Some evidence has been obtained indicating that concentrated oily forms of either type of vitamin D are not so effective for infants as the more dilute sources, and that if concentrated sources are used, the dosage should be approximately doubled.¹⁹ However, the range of dosage given by the National Research Council, 400 to 800 units daily, covers the requirements for both forms of administration.

Recently, the use of the so-called "shock treatment" or administration of one massive dose of D₂ or D₃, has been advocated in this country.²⁰ This treatment was first used in Germany as an automatic prevention of rickets in infants. It is reported that no toxic effects have been observed, even though dosages as high as 600,000 to a million units have been given orally or parenterally. However, death occurred suddenly in two infants given large amounts of vitamin D orally, after a total of about 3 million units had been given. In each case extensive metastatic calcification was found at autopsy.^{21,22} In general, because of the possibility of permanent damage which may not be evident within a few days or months, this type of prophylaxis seems to have few advocates in this country.

Any discussion of vitamin D prophylaxis, particularly during the period of infancy, is incomplete without comment on the psychology of vitamin D administration. Mothers who object strongly to the taste or odor of fish liver oils are apt to impart this dislike, consciously or subconsciously, to their offspring. Also, in general, the greater the effort needed to administer the dosage, the greater the likelihood of total failure in administration. For this reason primarily, the use of concentrates, administered in drop doses, and the use of vitamin D milks have become popular with mothers. The physician, on the other hand, is more apt to be concerned about the fallibility of mothers, and prescribe two or three times the dosage desired, in the hope that at least the desired dosage will be administered. The logic back of such a prescription is open to serious question as is evidenced by the outpatient study of Drake, Tisdall, and Brown in 1934.²³ Codliver oil was prescribed for three groups of infants in amounts of 1, 2, and 3 teaspoonfuls daily, respectively. No infant getting 1 teaspoonful of codliver oil developed clinical rickets; one of the group getting 2 teaspoonfuls and two of the group getting 3 teaspoonfuls of codliver oil daily developed rickets of moderate to marked severity. Thus the greater the dosage, the more rickets was observed; or to state the matter more correctly, the less the effort required of the mother, the

greater the certainty that directions would be followed. The increase in rickets observed meant merely that to give codliver oil several times daily involved too much effort for a certain proportion of the mothers, who discarded the whole idea instead of carrying through any part of it. From these and similar observations, it seems wiser to adjust the dosage so that it may be given no more than once daily, or automatically in the milk feeding.

Children. After the period of infancy, dietary habits are so varied that the intake level of calcium is often as much at fault as the intake of vitamin D. It appears probable that the amount of calcium and phosphorus needed yearly depends on the normal rate of growth for that year. Skeletal growth slows definitely from about one to three years of age, remains fairly constant during midchildhood and becomes more rapid preceding adolescence. The retention of calcium and of phosphorus in children one to fourteen years of age has been studied in our laboratory.²⁴ At each age, and regardless of mineral intake, some children have been unable to retain amounts of calcium and phosphorus adequate for bone growth unless vitamin D was also ingested. Usually, however, retention increased with intake, and the ingestion of vitamin D increased the retention at each level of intake. Results of studies from other laboratories permit somewhat similar conclusions. An adequate intake of minerals (a pint of milk daily at the age of slowest growth, more as growth increases, up to at least a quart daily during the prepuberal growth spurt), and daily intake of vitamin D equal to that of infancy, 400 units, appear to permit good growth and mineralization of bone.

Some evidence has been brought forward to show that greater amounts of vitamin D are needed for prevention of dental caries than for skeletal growth and mineralization and one study indicates that, as measured by caries prevention rate, vitamin D₃ is more effective than vitamin D₂.²⁵ The present confusion as to the relative importance of various factors that influence dental caries makes it appear best to hold conclusions in abeyance until these experiments can be repeated with all factors possibly influencing the results carefully controlled.²⁶

Adolescence. The period of adolescence and the two years immediately preceding puberty are again periods of rapid skeletal growth. They are also periods of readjustment of many metabolic functions and it appears that, particularly in girls, depression of retention of calcium and phosphorus may be marked. Johnston²⁷ has observed that at about the time of puberty, girls exhibit a marked lowering of calcium and phosphorus retention from a given intake, even when the amount of vitamin D provided is far in excess of the requirement as stated by the National Research Council. Osteoporosis is common in adolescence³ and dental caries is so common as to be almost universal. Much more study of the calcium and vitamin D requirements of this age group is needed.

Adults. All studies of calcium and phosphorus retention in pregnant and lactating women show that vitamin D is needed at these periods, together with an increased intake of calcium and phosphorus to meet the increased

demands on the maternal organism. It appears that lactation is more of a strain than pregnancy and an intake of milk up to 1½ quarts daily, together with 400 to 800 units of vitamin D, is needed to prevent depletion of the mother's calcium and phosphorus stores.³

Attempts to determine the vitamin D need of "non-encumbered" adults have as yet been unsuccessful. It seems established, however, that vitamin D does not decrease the minimum requirement for calcium and phosphorus, and that the average adult is more likely to need additional mineral, rather than vitamin D. Observations on college women²⁸ show that adequacy of the remainder of the diet is at least as important in determining the requirement of calcium and phosphorus as is added vitamin D. However, it appears reasonable to suggest that a moderate ingestion of vitamin D may be wise for night workers, miners, the aged and infirm, and others exposed to little or no direct sunshine. The need for adults is certainly no greater than 400 units daily and possibly is much less. The minimum requirement of calcium is met by a pint of milk or its equivalent in cheese, ice cream or other milk containing foods.

Severe osteoporosis at menopause is an all too common finding today. Most women at this time have ingested diets deficient in many factors besides vitamin D and calcium throughout their entire reproductive cycle and arrive at menopause nutritionally exhausted. Unpublished studies in this laboratory show that lowered gastric acidity and decreased absorption of fat are common; both of these decrease the absorption of calcium and aggravate the effects of a poor intake. Such women have usually lost all teeth long before menopause and depletion of bone mineral is marked. Recovery is slow because of the general lowering of nutritional status. It has been observed that diets rich in calcium and phosphorus, and low in fat, together with vitamins A and D may need to be supplemented with bile salt therapy to insure absorption of the fat soluble vitamins. In any event, recovery appears to be slower at this age than in younger persons. It will be interesting to watch whether menopausal osteoporosis will disappear, with better nutrition of adults, as has the chlorosis so common at puberty a generation or two ago.

VITAMIN D THERAPY

Rickets. The primary use of vitamin D was in the cure of infantile rickets. Without ingested vitamin D, rickets was exceedingly common in infants fed cow's milk, the peak incidence occurring toward the end of the winter season. While less common in breast-fed infants, rickets was by no means uncommon. Since vitamin D prophylaxis has become common, infantile rickets of clinical importance has become an uncommon disease in many parts of the country. Rickets of a degree discernible only by roentgenogram is still fairly common. Histological evidence of rickets was found in 46.5 per cent of 230 children from two to fourteen years of age, examined in consecutive autopsies.²⁹ Only 5 per cent of these cases could have been recognized by roentgenogram. Late rickets of clinical degree due only to avitaminosis D is rare in this country. Late rickets due to avitaminosis D and deficiency of calcium and phosphorus was common

in Europe after the last war and probably is again found there. Osteomalacia due chiefly to mineral deficiency, has always been common in some sections of China. In India avitaminosis D is common among girls following the custom of *purdah*, or confinement indoors from puberty to marriage.

Avitaminosis D is characterized by normal or slightly lowered serum calcium, lowered serum inorganic phosphorus, increased phosphatase, poor or no absorption of calcium and phosphorus from the intestine, a very low urinary excretion of calcium and often an increased urinary phosphorus excretion. When sufficient vitamin D is given, absorption of both calcium and phosphorus from the intestine is rapid and may amount to well over 50 per cent of the intake during the recovery period. The urinary calcium is somewhat increased, indicating possibly that absorption is more rapid than deposition. Urinary phosphorus is decreased and the serum phosphorus increases rapidly to normal levels. The plasma phosphatase decreases, at first rapidly, then more slowly. Deposition of mineral in bone can be discerned by roentgenogram within a week to ten days.

In avitaminosis, it appears that in general the greater the dosage, the more rapid the recovery. A dosage about ten times the prophylactic amount, or about 4000 units daily, permits rapid recovery from rickets in the infant. Single massive doses of from 600,000 to 1,000,000 units have been given for therapy of infantile rickets and may be desirable when circumstances render ingestion of a daily dosage improbable. Ordinarily such drastic therapy seems unnecessary and healing appears to be no more rapid with these dosages than with more moderate dosage. As soon as healing is complete, the dosage of vitamin D should be decreased to the customary prophylactic dose in order to prevent hypervitaminosis. In adult women with osteomalacia, daily ingestion of less than 500 units of vitamin D resulted in a marked increase in the amounts of calcium and phosphorus retained. Higher dosages of vitamin D caused further increases in mineral retention.¹⁶

In late rickets of the "refractory" type, blood, urine and bone findings are similar to those of infantile rickets, but healing does not occur until the dosage of vitamin D is increased to from 10,000 to 50,000 or more units daily. The underlying cause of this type of rickets is not clear. It has been shown that vitamin D is present in ample amount in the blood serum of children with this type of rickets when no evidence of healing can be observed in bone. If the intake of vitamin D is sufficiently raised, healing occurs. With such children one steers a difficult course between the Scylla of insufficient dosage and the Charybdis of overdosage with resulting toxic effects. We have observed that a dosage just sufficient to maintain normal blood values becomes a toxic dosage after osteotomy and immobilization of considerable part of the skeleton. These children need careful watching at all times. Parents should be warned that loss of appetite, nausea and vomiting on the part of the child are signs of acute toxicity with vitamin D and all vitamin D therapy should be discontinued until a week or ten days after all symptoms disappear.

In the late rickets associated with chronic acidosis or with kidney lesions, the primary cause of rickets is loss of calcium because of its use to neutralize excessive body acidity. The primary need of children with this type of rickets is for base rather than for vitamin D and the dosage of the latter usually need be no greater than for infantile rickets.

In osteomalacia, the treatment follows the lines advocated for rickets. Here again, supplementary factors, the utilization of fat and the gastric acidity, should be checked. High dosage of vitamin D starts rapid healing but the vitamin intake must be reduced as soon as healing occurs, to prevent symptoms of overdosage.

Very high dosages of vitamin D have been recommended for diseases other than those of bone, especially in arthritis, allergic disorders and psoriasis. The efficacy of vitamin D as a therapeutic agent for these conditions has not been borne out by the clinical evidence,³⁰ and the danger of hypervitaminosis is very real.

HYPERVITAMINOSIS D

Vitamin D in excessive amounts causes effects similar in many respects to those of hyperparathyroidism. The serum calcium is elevated above normal levels and calcium is rapidly lost from the body by excretion in the urine. Deposition of calcium phosphate occurs in many soft tissues, particularly the arteries. Collapse and death may occur suddenly in acute vitamin D toxicity.

The first symptoms of acute toxicity are often anorexia and lassitude; nausea, headache, diarrhea and urinary frequency may occur if the dosage is not decreased promptly. The exact dosage at which these symptoms occur varies with different persons. Some adults may show symptoms of toxicity with a daily dosage of 150,000 U.S.P. units; other adults seemingly can ingest double this dosage for a period of several weeks without apparent damage.

It seems often to be assumed that if symptoms of acute toxicity are absent, hypervitaminosis does not occur and no damage can result from long continued dosage with high levels of vitamin D. It appears more reasonable to assume that for a considerable range below the dosage causing symptoms of acute toxicity some damage may occur. Vitamin D is stored in the body and the effects of long continued excessive dosage may be expected to be cumulative. In fact it appears logical to assume five states of the body with reference to vitamin D; avitaminosis or severe hypovitaminosis, subclinical hypovitaminosis, normal zone, subclinical hypervitaminosis, and clinical hypervitaminosis. Four of these five zones have been observed in the study of the effect of vitamin D dosage on the skeletal growth of infants. In avitaminosis, rickets occurs, with its pathological changes in the skeleton. With 100 units of vitamin D daily, rickets is prevented but the growth and development of the infant are only fair. When the daily vitamin D intake is increased to 300-400 units daily, the physical develop-

ment of the infant is excellent. If the vitamin D intake is increased to 2000 units or more daily anorexia occurs and skeletal growth slows. Further marked increase in vitamin D intake would result in symptoms of acute toxicity.

It appears that until much more knowledge is gained concerning subclinical hypervitaminosis, the use of excessive levels of this vitamin, either in therapy or in prophylaxis, should be attended with caution.

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Ascorbic Acid Intake and the Appearance of Vitamin C Deficiency

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IN normal times the quantitative aspects of ascorbic acid metabolism, though of much academic interest, are of less practical importance since this vitamin occurs in many accessible and popular foodstuffs. In times of emergency and restricted diets such as the present, however, there are all too many occasions when a generous supply may be difficult or even impossible to ensure. Hence the quantitative aspect assumes some importance. In what follows we have attempted to discuss this subject in the light of recent investigations.

As the issues are somewhat confused it is helpful to keep the following four points constantly in mind:

(a) In everyday life vitamin deficiencies seldom occur singly; hence some of the symptoms noted, for example in scurvy, may be due to associated deficiencies, e. g., iron, protein, or perhaps another vitamin, such as the much debated "vitamin P".

(b) One may expect to encounter manifestations, following a short but acute deprivation of the vitamin, different from those arising after a prolonged but more moderate deficiency.

(c) Individuals evidently show a wide variation in their susceptibility to hypovitaminosis C.

(d) Inability to absorb the vitamin efficiently or even at all may undoubtedly occur, while an abnormal metabolism cannot altogether be excluded. Thus both in England and Austria it has recently been claimed that scurvy was encountered even in dogs, who are normally able to synthesize ascorbic acid.¹

EFFECT OF A DIET SOLELY DEFICIENT IN ASCORBIC ACID

Just as Williams and his associates have advanced the study of thiamin deficiencies by carrying out experiments on human subjects in whose diet this was the sole known constituent lacking, so Crandon, et al.,² have done the same for vitamin C. This work was so carefully performed, was so prolonged and so elaborately studied from many angles that, in our opinion, it represents as important an advance as that made in 1906 by Holst and Frölich when they found they could produce scurvy in guinea pigs, for it demonstrates clearly the sequence of events as the gradual onset of scurvy is achieved.

Crandon submitted himself to a diet totally devoid of ascorbic acid for a period of six months. Among other observations it was noted that (a) the first abnormal sign—hyperkeratotic papules—took 132 days to appear, (b) 91 days before this, the plasma ascorbic acid had fallen to zero, (c) adequate wound healing occurred after such zero values had existed for 44 days, (d) there was no subjective weakness until the beginning of the third month, (e) no gross changes of the gums took place, (f) there was no anemia, (g) capillary fragility

was not increased, (h) the blood complement titre remained normal throughout, and (i) no evidence of lowered resistance to infection was obtained.

Had other equally heroic volunteers been forthcoming to endure this ordeal, there would doubtless have been instructive variations in the results obtained, but restricted as the results are, they help to explain much that was formerly obscure. They have at any rate thrown a flood of light on certain aspects of the problem as we see it under South African conditions. Moreover, Crandon's unexpected findings gain direct support from the work of several other investigators. For instance, Rietschel and Schick³ have recorded almost identical results from equally drastic though far less elaborately controlled experiments carried out on themselves over 160 days. We reported⁴ the case of a Native prisoner whose natural aversion to vegetables and fruit was made use of during a period of ten months under very strict supervision. To our amazement he remained free from all clinical signs of scurvy and lived apparently in good health, gums included, on a diet containing exceedingly little ascorbic acid, derived from a well-cooked but small ration of meat. For days he excreted no measurable reducible substance in the urine (see also 5,6,7). The whole trend of our observations on the 950 Native mine labourers in our orange juice experiment supports Crandon's work. The precarious nature of their vitamin supplies may be judged by the fact that twelve cases of obvious scurvy occurred during the seven months, yet several of these cases showed no increased capillary fragility, no clinically unhealthy gums and no anemia. Repeated blood tests indicated how very low their "reserves" must have been, yet the overwhelming majority remained remarkably healthy, worked hard and were fully able to repair such wounds as arose from accidents.

It is also well to remember the extraordinary observation recorded by Hess,⁸ which can be fully substantiated from experience here, that complete and apparently lasting recovery from scurvy may be achieved by the giving of trivial amounts of the vitamin (also noted in experimental animals by Wolbach.⁹)

Combining all these observations, as well as others that space forbids us to mention, we have been driven to the conclusion that a healthy adult is capable of living, at least for a considerable period, on an extremely small daily intake of this particular vitamin without suffering any demonstrable impairment of health, vigour or loss of resistance to infection. The minimal requirement is not clear, but it must be not more than 15 mgm. and quite possibly less. It seems, too, that we are now in a position to distinguish between the inevitable results of prolonged ascorbic acid deprivation, such as interference with wound healing and eventual death, and those commonly

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associated disturbances such as increased capillary fragility, gum lesions and anemia, which may depend either on individual susceptibilities or on some as yet unidentified vitamin presumably closely associated with ascorbic acid in natural foodstuffs.

If we want to understand the functions and behaviour of vitamin C it seems to us that such considerations have their importance, but we fully admit that the nutritionist must never rest satisfied with supplying minimal requirements, which as our own evidence shows are but a precarious protection, even against scurvy.

What we need to know is whether a larger daily intake confers a superior degree of health, apart from its insurance value against contracting scurvy. In fact, as Bourne¹⁰ remarks, we need to know the effects upon health of a low intake continued for say 30 or 40 years. Since it is most unlikely that this aspect will be settled by experiments like those of Crandon carried out for very long periods, we must fall back on less direct evidence to be gained (a) from observations on persons or groups living on limited amounts of the vitamin, (b) the effects produced when more generous supplies are provided for such groups, (c) what happens when patients suffering from various complaints are treated solely with ascorbic acid.

A. Effects of sub-optimal supplies. An outstanding question is whether the capacity for sustained manual labour is diminished on sub-optimal vitamin C intakes. We have discussed the theoretical aspects in a later section.

Since our 950 Native mine labourers were all living on a diet so low in vitamin C that no less than twelve actually developed scurvy, it may be assumed that they must have all been in a state of gross hypovitaminosis C; indeed, it would be more usual to regard them as "suffering" from latent scurvy. Perhaps they were, but those in close contact with them could only marvel at the high level of general health and the high spirits they maintained. We wish that it had been possible to apply the many tests that Crandon used, but so far as the evidence goes—and we are not aware that any similar large scale study is available—it would seem that it is possible to live actively and healthily right up to the very edge of this particular nutritional precipice. We need not add that we are wholeheartedly against the existence of such precipices, but according to our experience there is as yet no infallible *clinical* sign to warn us before the brink is reached, which only makes the situation more dangerous. It may be added that there is a good deal of negative evidence in this country among Europeans and non-Europeans, as well as elsewhere, that large numbers of people do in fact live for long periods on extremely low daily intakes of ascorbic acid without showing signs of disturbed health that can as yet be attributed to this cause.

B. Improved health on larger intake. Obviously the foregoing does not get us very far and we pass on to consider the few studies in which a larger intake has been correlated with some aspects of health. For obvious reasons it is not easy to carry out experiments on human beings in which the amount of ascorbic acid available is the sole variant. Cowan, et al.,¹¹ and Glazebrook and

Thomson¹² attempted to do this. They report that prolonged dosing with large amounts of vitamin C had no important effect either on the number or severity of infections of the upper respiratory tract when administered to fair-sized groups of young adults. In the latter study the daily intake of the control group was estimated and found to be from 10 to 15 mgm. On the other hand these workers noted that, although the incidence of tonsillitis was not increased, the duration was almost a week longer in the untreated group. Moreover, there were no less than 17 cases of pneumonia and 16 cases of acute rheumatism among the controls, though none occurred among those treated with the vitamin. When considering this remarkable finding it is important to read Glazebrook's later commentary¹³ in which he emphasizes what he calls "the other side of the picture," i. e., that many of the control group achieved a high degree of immunity without ever falling ill.

A somewhat startling report emanates from Germany¹³ where a confection containing 50 mgm. ascorbic acid was given to one and a half million boys and girls aged ten to fourteen years, for a period of two months. The resistance of the children to infection was said to be increased and their physical development accelerated. It is somewhat difficult to reconcile this finding with those obtained in England, where, although numerous studies have demonstrated a decreased intake or lower state of the vitamin C reserves, there seems to have been little evidence of any deterioration of health.^{14,15,5}

C. Curative properties. As far as we are aware very few studies have been carried out in which a low level of health suspected to be due solely to a defective intake of vitamin C was treated only with ascorbic acid. Some of the twenty-seven cases reported on by Rinehart and Greenberg¹⁶ fall into this category, though others were also suffering from rheumatoid arthritis. In 17 of the 22 cases that were followed, definite clinical improvement was noted, apparently due solely to the administration of ascorbic acid (amounts not stated).

It is most desirable that close attention should be paid to this aspect of the subject in order that the significance of terms such as "hypovitaminosis C", "sub-clinical scurvy", etc., can be ascertained.

How does ascorbic acid function in the body? Presumably we should be in a better position to estimate our daily requirements more accurately and detect defects arising from sub-optimal supplies of this vitamin if we were more clear as to its functions in the body. Although ten years have passed since its chemical nature was established it will probably be agreed that the advances made in this field have been somewhat disappointing, at any rate they compare unfavourably with the progress made since the function of thiamin in relation to carbohydrate metabolism was recognized.

(a) *Carbohydrate metabolism.* When the ease with which ascorbic acid can be reversibly oxidized and reduced was discovered it was naturally thought that it might play a most important role in cell chemistry. It provided a simple explanation for the fact observed in the field that scurvy frequently appeared when hard work was undertaken.

The evidence already quoted does not lend much support for this latter hypothesis, though the inability to perform aerobic work which gradually appeared in Crandon's case is certainly highly suggestive, as are the results reported by Yakovlev.⁴⁴ We were able to trace the histories of over one thousand Native mine labourers who contracted scurvy and we came to the conclusion that it had developed neither more often nor more rapidly in those engaged in strenuous work than among those whose metabolic resources were less severely taxed. While we do not doubt that this phenomenon sometimes occurs we strongly suspect that it is due to an associated deficiency of thiamin and this is supported by the symptoms formerly observed here—the so-called "Rand Scurvy."

According to Keys and Henschel⁴⁶ muscular ability, endurance, resistance to fatigue or recovery from exertion remained unaffected, both in brief extreme exercise and prolonged severe exercise, when a diet containing 70 mgm. ascorbic acid was supplemented by 100 or 200 mgm.

Studying this question experimentally Stotz, et al.,¹⁷ while not doubting that ascorbic acid plays an important role in the metabolism of animals, remark that "at the present time there is considerable evidence against, and very little for, the function of ascorbic acid as a major respiratory agent in animal tissues, at least in the sense of being comparable to cytochrome or 'yellow enzyme'." In the same year Barron, et al.,¹⁸ concluded that "Ascorbic acid, a sluggish oxidation-reduction system, protected in the body from oxidation by the ordinary oxidation catalysts, seems to act as a promotor or catalyst of synthetic reactions (reductions, polymerisations), thus taking part in the building up of cellular and intercellular structures."

(b) *Possible relation to melanin.* Another clue lies in the disturbed metabolism of the aromatic amino-acids (phenyl alanine and tyrosine) which is said to occur in the absence of ascorbic acid (e. g., see Levine, et al.,¹⁹) and in the effect this may have on the production of melanin.²⁰

(c) *Production of intercellular substances.* As a result of his prolonged studies Wolbach⁹ writes, "Scurvy represents the inability of the supporting tissues to produce and maintain intercellular substances. The effect is therefore on cells of mesenchymal origin in contrast to the ectodermal and endodermal effects of vitamin A . . . the intercellular substances concerned in vitamin C deficiency are the collagen of all fibrous tissue structures, the matrices of bone, dentin and cartilage and all non-epithelial cement substances, including that of the vascular endothelium." This function of ascorbic acid is obviously of the very greatest importance because of its bearing on the healing of wounds. The history of the discoveries in this field has recently been discussed by Hartzell, et al.,²¹ and Bourne.¹⁰ The reality of the part played by the vitamin in the case of human wounds was dramatically proved by Crandon on his own body. In a later paper Lund and Crandon²² discuss the significance of various degrees of deficiency in relation to everyday hospital problems.

In spite of the frequent and severe deficiencies of this vitamin observed among our Native population, South African hospital experience would seem fully to support the conclusion reached by these workers and summarized by the American Medical Association²³ that "under usual conditions of diet and absorption the average person possesses a high enough ascorbic acid content in his tissues for normal wound healing." That very small amounts bring about prompt repair for animals had previously been noted by Wolbach.

Nevertheless the tissues are so vital that a supplementary supply should be administered either before or after operation wherever the least doubt arises. Lund and Crandon emphasize that a history of prolonged deprivation, diarrhea, gastric or duodenal ulcers, fevers, etc., are good examples of where such precautionary measures ought to be taken.

(d) *Capillary fragility.* It seems no longer possible to attribute to ascorbic acid the sole responsibility for maintaining "normal" capillary resistance, not only because acute scurvy may occur without such increase in fragility,^{2,4,15} but also because this substance does not necessarily relieve the condition when it occurs, while a substance (or substances) obtainable from foodstuffs can apparently do so.²⁴ (See also review 45.) In view of the experience gained from the study of other vitamins such observations should make us very guarded in attributing all the conditions that can be observed in clinical scurvy to a deficiency of a single substance.

(e) *Resistance to infection.* Long ago Hess concluded that "infection is the most important condition that may suddenly and precipitously induce scurvy." Many others besides ourselves must have been impressed with the sudden transformation that can take place, and the simile of a precipice again suggests itself. On the other hand there seems as yet to be no conclusive evidence that the reverse holds good; that a diet deficient in this constituent renders the consumer more liable to infection.^{2,11,12,14,22,25,26,27}

It has of course been repeatedly demonstrated that disturbances of the vitamin C situation are likely to take place in a variety of illnesses especially when of a febrile type. The difficulty is to assess their significance. An increased requirement is usually assumed though the effects noticed might be due either to some interference with appetite, absorption, abnormal excretion or a destruction merely incidental to the disordered metabolism. Abt, et al.,²⁶ do not accept the view that a rise in temperature *per se* increases requirements. Whatever the explanation for the "disappearance" of vitamin C that evidently occurs, it must be admitted that the beneficial effects following treatment with ascorbic acid in such conditions is, to say the least, disappointing. Abt's negative findings with 145 young children suffering from scarlet fever, diphtheria and rheumatic infections are particularly significant. (See also 27.) Similarly disappointing results have been recorded even in tuberculosis where, since the healing process is characterized largely by the formation of connective tissue, it might have been thought that treatment with ascorbic acid had its most logical basis.^{28,29,30}

Nor has better success attended laboratory investigation of the mechanisms concerned with resistance to infection. Thus although much has been written proving or disproving the existence of a relationship between vitamin C and complement, it is significant that in Crandon's case normal values were obtained even after clinical scurvy had been apparent for three weeks. The tests made by Agnew, et al.,³¹ were also negative, nor could they obtain any evidence that the amount of ascorbic acid present affects the anti-bactericidal activity of human blood. Feller, et al.,²⁵ also report various negative immunological findings.

(f) *Anemia.* Anemia is frequently, but by no means invariably, present in severe scurvy. However, Crandon showed no anemia, though no less than 6,000 cc. of blood was withdrawn during his experiment. (See also 6, 8.) According to Israëls³² "the effect of ascorbic acid deficiency seems to be more a depression of erythropoiesis than a failure of maturation at any particular stage." (See also 33.)

(g) *Protection against toxic substances.* Judging by the work of Beyer,³⁴ Bundesen, et al.,³⁵ Hagen³⁶ and Holmes,³⁷ ascorbic acid is able to prevent or cure the toxic effects produced by substances such as hepatoxin hydrazine, nearsphenamine, benzene or trinitrotoluene. Somewhat similar claims have been made both in America and England in relation to lead poisoning, but they are not supported by the study of Evans, et al.³⁸ The danger of any false sense of security, or of slackness in maintaining well-established precautions, arising because of such claims has been rightly emphasized.³⁹

(h) *Anti-toxic properties.* The fact that ascorbic acid is non-toxic even when taken in large amounts, provides us with a means of utilizing its remarkable ability to undergo reversible oxidation and reduction. Dr. L. Golberg of this Institute has suggested that some of the unexpected effects now being claimed for vitamin C, when operating in high concentrations, may well be attributed to these properties in contradistinction to its physiological functions as a vitamin. For instance, this might explain the foregoing anti-toxic properties, the benefits claimed in cases of hay-fever⁴⁰ and particularly its value in the treatment of methaemoglobinemia.⁴¹

D. *Effects of high temperature.* Claims have been made that the requirement for ascorbic acid is increased in hot environments, especially in hard physical work. These have been discussed by Henschel, et al.,⁴⁷ who have shown that, in the critical period of a few days when heat exhaustion and collapse are most imminent, administration of ascorbic acid (500 mg. daily) has no effect. The argument for increased vitamin C need in the heat seems to have originated from reports that ascorbic acid is lost in the sweat. It now is clear that sweat contains little or no ascorbic acid so the theoretical justification for using this vitamin in prophylaxis or therapy for heat exhaustion^{48,49} disappears.

NEED FOR EFFICIENT USE OF AVAILABLE RESOURCES OF VITAMIN C

Whether we require larger or smaller amounts for optimal health there is no more important aspect of our subject than the need for a greater appreciation of the ways whereby the *available supplies of ascorbic acid can be most efficiently utilized.* Even before the war there was much room for improvement, but in these days of famine or restricted supplies of food and medical supplies it becomes of far greater urgency.

Many humble but most valuable natural sources of vitamin C, such as pine-needles, alfalfa, rose hips, etc., are now attracting attention. The high concentration to be found in black currants and in guavas has also been turned to good account. But what is still so often overlooked is the alarming amount of vitamin C destruction which may take place before actual consumption. Quite apart from the reduction in intake that may arise from growing inferior crops or from harvesting them at an unsuitable stage, we would stress particularly the great losses that continually arise (a) from delay between picking and cooking, (b) from wasteful or unduly prolonged cooking (for example, boiling extracts much vitamin from peeled potatoes, cabbage, etc., so that whenever possible potatoes should be cooked in their jackets, or the cooking water also used), (c) from bringing vegetables slowly to the boiling point, which greatly increases enzymatic destruction, (d) from delay between the completion of

cooking and the serving, which may, after 15 minutes, reduce the remaining amount by as much as 25 per cent for cabbage and 40 per cent for potatoes. Harris⁴² discusses many of these points and rightly emphasizes the unique importance of the potato as the cheapest, most widely available and best-liked anti-scorbutic foodstuff that is likely to be eaten in significant quantities. Raw vegetables and fruit, though very valuable where they are readily available and popular, are broadly speaking of less widespread importance, because they are eaten in less significant amounts and are less adequately digested and absorbed.

There is abundant evidence to show that a great deal of preventable waste arises from lack of persistent attention to these apparently trivial details. In fact, many responsible persons would be astonished if they discovered that they were ignoring available sources of this vitamin and if they realized the discrepancies between the amounts supplied by a given diet on paper and those which are actually consumed by the persons under their charge. How low the net daily intake may fall, even where some attention may be assumed to have been given to dietary matters, has been shown by several recent investigations.^{5,12,43}

Finally, medical men are undoubtedly responsible for much thoughtless waste when they prescribe pure ascorbic acid where natural sources could just as well be employed. The value of using natural foodstuffs to cure disease should be more appreciated, for in this way large stocks of the synthetic product could be built up for emergency use overseas.

CONCLUSION

At present it is much easier to detect and measure the degree of saturation of an individual in respect to vitamin C than to assess its clinical significance. A healthy person is evidently capable of maintaining himself for a considerable period on a remarkably small daily intake, while so far it has not been found possible to establish with any degree of certainty that health or resistance to infection is thereby impaired. Nor is there convincing evidence that this vitamin exerts any beneficial effect upon the course of various common diseases.

In our present abnormal circumstances there are likely to be situations where this conclusion may be of practical value, or at least bring some assurance. Obviously, however, such a restricted intake offers no margin of safety and must be regarded as a precarious basis that should never be accepted with complacency. Since vitamin C is widely distributed and usually obtainable in cheap and popular foodstuffs there is seldom any valid excuse for such minimal intakes. Moreover, a generous supply is all the more desirable when it is remembered that not a few individuals exhibit certain abnormalities when dealing with this substance. Above all, it must be remembered that extreme prolonged depletion may interfere with the efficient healing of wounds.

There are some grounds for believing that ascorbic acid can be utilized by the body in ways which are quite apart from its specific activity as a vitamin.

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Medical Aspects of Vitamin K

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THE criterion for vitamin K deficiency is lowered prothrombin which can be raised by suitable administration of vitamin K. Hemorrhages need not be present but a bleeding tendency exists when the prothrombin is lower than about 30 per cent of the normal value.

Clinical methods for the determination of blood prothrombin are mostly variations of Quick's method. Two modifications of this method, which ensure a good differentiation between the prothrombin values and which have been studied with regard to nearly every detail, are described by Larsen and Plum (1941).

The richest sources of vitamin K among food stuffs are green leaves of any kind, tomatoes, hog liver and some cheeses. Meat and milk are poor sources and potatoes, beets, carrots, etc., are very poor in vitamin K. The intestinal bacteria produce vitamin K. The putrefaction organisms produce more than the lactic acid bacteria.‡

It is not known exactly how much vitamin K an adult

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‡Vitamin K isolated from green leaves (designated K₁) is 2-methyl-3-phytyl-1,4-naphthoquinone, whereas vitamin K isolated from putrefied material (designated K₂) has a longer side chain instead of the phytol group. Vitamins K₁ and K₂ are both fat soluble and their biological activity is quantitatively much the same, K₁ being slightly more potent per weight unit than K₂. Green leaves may contain as much as 30 to 40 micrograms of K₁ per gm. dry matter. Dried *b. coli* has an activity corresponding to 100 micrograms of K₁ or more, probably in the form of K₂. The artificial vitamin K substitutes which are commonly used for therapeutic purposes are derivatives of 2-methyl-1,4-naphthoquinone (Menadione U.S.P. XII) or this compound itself. Certain of the esters (diphosphate, disuccinate, disulphate) of the hydroquinone which corresponds to menadione and a few other derivatives such as 2-methyl-4-amino-1-naphthol hydrochloride and menadione-bisulfite are water-soluble or form water-soluble alkali salts and are therefore useful for intravenous injection. Menadione itself has a strong burning taste and irritates the mucosa of the stomach if given in excessive quantity. The reviewer and his associates have had experience with all the aforementioned substances but have mostly used the water-soluble tetra-sodium salt of 2-methyl-1,4-naphthoquinone-diphosphoric acid or the corresponding disuccinate ("Synkavite", Roche).

person requires per day but *alimentary vitamin K deficiency in adults is rare*. If the supply of vitamin K from the food is low, the normal putrefaction in the large intestine will furnish enough of the vitamin to prevent a substantial fall in prothrombin. Cases of mild alimentary vitamin K deficiency were reported by Kark and Lozner (1939). (See also Scarborough 1940). Aggeler et al. (1942) have observed the disease in a more severe degree in a patient with anorexia nervosa and diarrhea. Drastic dietary vitamin K deficiency may be expected when the food is low in vitamin K or when no food is given and, at the same time, the intestinal flora is depressed, such as may be the case in sulfa-drug treatment.

All conditions which reduce the absorbability of fatty substances, including vitamin K, may lead to vitamin K deficiency.

The most important condition of this kind is the *absence of bile from the intestine in obstructive jaundice*; and the cholemic bleeding tendency was, in fact, the first instance of vitamin K deficiency to be recognized in humans (Warner, Brinkhous and Smith 1938, Butt, Snell and Osterberg 1938, Dam and Glavind 1938). This complication, which previously constituted a serious danger in the surgical treatment of patients with obstructive jaundice, is now brought under control by the administration of a few milligrams of one of the water-soluble vitamin K substitutes, orally or parenterally, one day before the operation and daily or every other day for as long a time after as is required for the establishment of the flow of normal bile into the intestine (usually a couple of weeks).

Sprue and certain other *intestinal diseases*, such as ulcerative colitis, which result in profuse diarrhea and abnormal changes of the intestinal mucosa may also lead to lowered absorption of vitamin K and to a bleeding tendency (Hult 1939, Clark Dixon, Butt and Snell 1939, cf. also the monograph of Fanconi 1941).

From experiments with animals it may be expected that insufficient secretion of pancreatic juice (Sproul and Sanders 1941) may, at least to some extent, lead to vitamin K deficiency due to faulty absorption, even if perhaps not to such severe manifestations as under the conditions mentioned above.

An important manifestation of vitamin K deficiency is the *hypoprothrombinemia of the newborn* (Waddell et al. 1939,

Nygaard 1939, Dam, Tage-Hansen and Plum 1939, Quick and Grossman 1939). The prothrombin of the baby is usually more or less subnormal at birth and decreases further during the first few days of extrauterine life. After the third day the prothrombin usually increases so that in most cases the baby is out of danger of bleeding at the end of the first week. At the age of two to three months the prothrombin is the same as for normal adults. The percentage of babies with actual bleeding in the first week is about 1 per cent. One single large dose of vitamin K given immediately after birth (5 milligrams of "Synkavite," for instance) will not only raise the prothrombin to about normal in one day but will also prevent the fall in prothrombin during the first week. The same result can be obtained by treatment of the mothers with vitamin K prior to delivery. The same or a somewhat higher dose (say 20 mg.) can be used with mothers, but should be given every day during the last two weeks before parturition is expected, the essential point being that one dose is given between twenty-four and two hours before delivery.

It is of interest that the prothrombin of the pregnant woman is normally increased by 50 to 100 per cent at the time of delivery and some time before (E. Tage-Hansen 1940 and O. Thordarson 1940). This, together with the observations mentioned below, makes it seem likely that there is a certain resistance to the transfer of vitamin K through the placenta, so that an excess of the vitamin must be given to the mother in order to supply the fetus with the optimal amount.

The daily requirement of vitamin K is astonishingly low in babies, namely only a few micrograms of one of the artificial vitamin K substitutes. (Sells, Walker and Owen 1941, Hj. Larsen 1942). The prothrombin will, therefore, increase when the supply of vitamin K from the developing intestinal flora begins, and perhaps even the low content of vitamin K in the milk will contribute to the rise in prothrombin after the third day. The initial fall during the first few days must be explained by the absence of vitamin K due to the sterility of the intestine immediately after birth and to the negligible intake of milk. Other causes, such as low ability to absorb fat, low production of bile acids or inability of the liver to form prothrombin, have been ruled out as important factors (Plum and Uldall 1942, Vennet and Plum 1942, Glavind, Larsen and Plum 1942). Differences in the functioning of the liver may account for the fact that the normal value of the prothrombin is slightly lower in the first few weeks than two to three months later, but do not account for the low prothrombin in the first week.

Hemorrhages in the newborn with low prothrombin may occur in the intestinal tract (melaena), the skin, the cranium, the umbilicus and the retina. The question whether suitable vitamin K treatment actually can reduce the incidence of hemorrhage in the newborn has been answered in the affirmative by many investigators.

Series of several thousand newborn have been examined by Beck et al. (1941), Hellman and Shettles (1941) and Plum and co-workers (1942). A considerable decrease in the number of cases with bleeding was found in the treated series, and even a substantial drop in the number of early deaths and still births (the latter when the mothers were treated). Hemorrhages which are due to the rupture of larger vessels can, of course, not be prevented by vitamin K treatment. In contrast to the above-mentioned series, Sanford et al. (1942) reported that vitamin K treatment, even if it raised the prothrombin failed to prevent hemorrhages. Sanford's view was criticized by Quick (1942), Kugelmaas (1942) and Waddell (1942), and is, in fact, difficult to understand, since sufficiently lowered prothrombin always will dispose to bleeding.

There is a seasonal variation in the frequency and severity of the hypoprothrombinemia of the newborn (Waddell and Lawson, 1940, and others) and it is likely that the diet of the pregnant woman may influence the prothrombin of the baby even if her own prothrombin is not altered by changes in the diet within normal limits. (MacPherson 1942).

Experiments carried out with rabbits (Moore et al. 1942) have shown that vitamin K deficiency may lead to retroplacental hemorrhage and abortion.

Vitamin K deficiency has been observed in connection with *icterus gravis* (Dam, Tage-Hansen and Plum 1939).

Vitamin K can act only when the liver has maintained its ability to form prothrombin, and is ineffective against the hypoprothrombinemia which is found in certain liver diseases. Several authors have, therefore, suggested prothrombin determination and ingestion of vitamin K as a *test for liver function*. (Lord and Andrus 1941).

Warner (1941) has found a decrease in prothrombin in pernicious anemia which could be eliminated by liver extract but not by vitamin K.

Hemorrhagic diseases which are due to factors other than low prothrombin are not affected by vitamin K. This holds for hemophilia, thrombocytopenia, fibrinopenia and scurvy. Bleeding from gastric ulcers has no general relation to vitamin K deficiency (Lebel and Dam 1940). The author is also of the opinion that the same holds for hemoptysis in patients with pulmonary tuberculosis, even though some reports to the contrary have appeared (Sheely 1941, Levy 1942). Gyntelberg and Dam (1940) found no change in prothrombin in a series of patients with hemoptysis, and the same was found by Plum and Poulsen (1942) in a much larger series. The last mentioned authors also tried treatment with vitamin K but with negative result.

A new and somewhat surprising use of vitamin K in the form of menadione has been suggested by Fosdick et al. (1942). They reported that menadione given by mouth prevents the formation of lactic acid in saliva and thereby might counteract dental caries. The inhibitory effect on lactic acid formation is not specific for vitamin K, since other quinones may act similarly (Armstrong and Knutson 1943). The practical value of this observation has not yet been established.

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Vitamins and Physical Performance

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WAR by its demands for increased physical output and its restrictions on availability and choice of foods has made mandatory a critical analysis of the factors that influence the work capacity of man. The general problem of the relation of diet to physical performance has recently been reviewed.^{25,18} Frank vitamin deficiencies may produce profound disturbances in general bodily functions and as a result decrease the ability to do work. It is then by inference often assumed that "suboptimal" vitamin intakes should produce some decrease in physical performance. If from 25 to 50 per cent of the population are on diets containing "suboptimal" amounts of vitamins,^{6,39,41} the implications are alarming. However, before wholesale vitamin supplementation is justified it must be proved that more than minimal vitamin intakes are a real value in increasing the general level of health and physical vigor.

In the present discussion emphasis will be placed upon vitamin A, the B complex vitamins (particularly thiamine, riboflavin and niacin) and ascorbic acid. The purely clinical manifestations of vitamin deficiencies will be included only as they bear upon the specific problem of physical ability.

VITAMIN A

Observations on the effect of low vitamin A intakes on physical ability have been chiefly incidental to other studies. Rats on diets supplemented with vitamin A were more active than the controls¹⁵ but dogs remained active and in good health on low vitamin A diets for nearly a year after vitamin A disappeared from the blood.³⁰ Drigalski⁸ reported psychic disturbances, easy fatigability and muscular cramps in a young man on a vitamin A deficient diet for two months. Controls and objective measurements were lacking.

The effects of low vitamin A intakes on the ability of five men to do moderate and exhausting exercise have been studied by Wald, Brouha and Johnson.⁴² For six months the diet contained about 100 I.U. of vitamin A per day but was adequate otherwise. This period was followed by six weeks on a normal diet supplemented with vitamin A. Measurements were made on heart rate during and after work, blood pressure, ventilation, oxygen consumption, respiratory quotient and blood lactate after both moderate and exhausting exercise. Work and recovery indexes were calculated. None of the physiological variables were significantly changed by the deficient diet. One subject reported abnormal fatigue and lassitude while on the deficient diet even though objective tests showed no decline in ability. All the subjects *thought* they felt better and could do the work more easily on the normal diet. Subjective impressions are apparently of little value in establishing the true physical state of subjects.

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Harper, Mackay, Raper and Cann¹⁷ observed an increase in vital capacity, breath-holding time and the time a column of mercury could be maintained at 40 mm. by a steady exerted expiration in a group of 69 young men when vitamins A, D, and C were added to a diet of unknown vitamin content. The resting heart rate was, however, lower when the supplements were not given. It is doubtful that the tests used were true measures of physical fitness.

VITAMINS OF THE B COMPLEX

Vitamins of the B complex have been claimed to have profound influences on physical performance, even in the absence of clear symptoms or signs of clinical deficiency. In the case of thiamine, riboflavin and niacin such claims are bolstered by the undoubted importance of these vitamins in energy systems fundamental to carbohydrate metabolism and, presumably, to muscular contraction. Physical deterioration may be striking in beri-beri and pellagra, of course, but the important questions are: (1) Can physical performance be improved by the addition of these vitamins to a diet which would otherwise be considered adequate? (2) Is physical performance depressed in the absence of other objective signs of deficiency? (3) How rapidly does physical deterioration occur in an individual on a diet which eventually may produce definite signs of deficiency in these vitamins?

SUPPLEMENTATION OF AN ADEQUATE INTAKE WITH B COMPLEX VITAMINS

The supplementation of a normal diet with B complex vitamins has no influence on work capacity in properly controlled experiments. Csik and Bencsik⁷ thought they observed an increased strength and ability to work in two subjects that were given a B complex preparation. They had no controls and the increased ability appears to be purely a training effect. Large daily supplements of the B vitamins to soldiers subsisting on the regular U. S. Army Garrison rations have in this laboratory proved negative.²⁶ The experiments were carefully standardized and controlled. Ability to perform brief exhausting work and sustained hard work, psychomotor functions, and biochemical blood and urine details of metabolism failed to indicate any advantage derived from the large B complex supplementation. Failure of extra vitamins of the B complex to increase physical performance has been confirmed.⁴⁰ The rate of recovery from muscular fatigue is also not influenced by supplementing an "adequate" diet with intravenous injections of the B vitamins.¹²

SUPPLEMENTATION OF A RESTRICTED INTAKE WITH B COMPLEX VITAMINS

A decrease in physical performance has recently been reported to occur rapidly when normal men are placed on diets presumably very deficient in all the B vitamins. Within four weeks sedentary men reported some vague

subjective symptoms of easy fatigue, loss of ambition and loss of efficiency in doing their normal routine work.¹⁰ A moderate deterioration in ability to do brief exhausting exercise (Harvard Physical Fitness Test) was also noted. Other objective measurements were generally negative. All symptoms were cleared up by the administration of brewers' yeast. When subjects were forced to do hard work (4,000 to 5,000 calories per day) on a similar deficient diet a marked progressive physical deterioration occurred during the first week.²⁰ At the end of one week brewers' yeast was added to the diet. "Physical fitness" increased. No analyses of the diets were made, caloric intake and output were not regulated nor were control subjects used. The results can be further seriously criticized because the subjects suddenly started on a program of severe muscular work without any training. Psychological factors were not controlled; it is inconceivable that the subjects (some of whom were doctors) did not realize when the 18 gms. of yeast were added to their diet.

Barborka, et al.,¹ reported a decrease in work output shortly after their subjects were put on a vitamin B deficient diet even though there was no other objective evidence of deficiency. The usual subjective symptoms of easy fatigue, lack of pep and muscle pains which often accompany a monotonous diet were noted. The work output for the one subject reported in detail was progressively decreasing for months before the introduction of the deficient diet. It should be noted that the type of work measured is easily influenced by motivation. The problem of the effect of low B vitamin intakes on physical performance during hard work has been subjected to carefully controlled experiments in this laboratory.²⁷ Details of the results will be published elsewhere. Diets containing from one-fourth to one-third the amount of B vitamins recommended by the National Research Council proved to be ample for men doing 4,500 to 5,000 calories of work per day for periods of at least two weeks. When properly controlled, the objective measurements of physiological, psychomotor, psychological and biochemical variables in rest, in different types of work and in recovery refute the claims that physical performance rapidly decreases when men work hard while on a diet restricted in the B vitamins.

THIAMINE

The addition of 5 to 15 mgs. of thiamine daily to a diet containing sufficient thiamine to prevent deficiency symptoms has been reported to increase work capacity in uncontrolled experiments.^{9,14,32} Such tests are greatly affected by psychological factors and are not true measures of muscular endurance. Bøje³ found extra thiamine of no value in increasing the performance of trained athletes. In controlled experiments thiamine did not increase breath-holding and arm-holding ability.²³ Objective measurements have demonstrated that large thiamine supplementation of a normal diet does not increase physical performance.²⁶

Subjects on a very low thiamine diet have been reported to develop, in the course of a few weeks to months, clinical deficiency symptoms which include muscle soreness, weakness, fatigability, and decreased ability to do

physical work.^{11,22,33,44} The acceptable evidence indicates that clinical thiamine deficiencies are slow in developing even when the thiamine intake is extremely low. Of particular concern is the fundamental problem of whether physical performance is enhanced by a thiamine intake greater than that required to prevent frank symptoms of deficiency.

The results from experimentally induced thiamine deficiency in female patients in an insane asylum have led Williams, et al.,^{44,45,46,47} to believe that there is a difference between minimal and optimal thiamine requirements. Emphasis was placed on clinical and indirect biochemical observations rather than on physical performance. They concluded that 0.40 mgs. per 1,000 calories was the absolute minimum daily requirement to prevent thiamine deficiency symptoms and that from 0.60 to 1.0 mg. per 1,000 calories is necessary for the maintenance of maximum physical efficiency. They infer that the optimal intake is greater than the minimal requirements. In this laboratory²⁸ normal male subjects have been kept on restricted thiamine intakes with a carefully controlled regime of diet, work, and observations. The results indicate that for at least ten weeks no benefit of any kind was derived from thiamine intakes greater than 0.23 mg. per 1,000 calories. Muscular, neuromuscular, cardiovascular, psychomotor and metabolic functions were not limited by the thiamine intake. Clinical signs, subjective impressions, mood and behavior were not influenced. Wang and Yudkins'⁴³ subjects on a very low thiamine intake developed no symptoms except lack of appetite, general fatigue and lassitude. The symptoms persisted as long as the special diet was eaten even after the addition of 1.8 mgs. of thiamine per day and probably were psychological reactions to the monotonous diet.

RIBOFLAVIN

Clinical ariboflavinosis is not notably associated with muscular weakness or reduced work capacity and restriction of the riboflavin intake of man for many months has failed to demonstrate any physical deterioration.^{29,48} Levels of riboflavin intake as low as 0.3 mg. per 1,000 calories maintained for five months permit maximum exertion and efficiency in neuromuscular, cardiovascular and psychomotor performance (op. cit.) It should be noted that in the United States an intake of less than 1 mg. of riboflavin on a 3,000-calorie diet is achieved only by considerable effort and special precautions. Accordingly it would appear that under ordinary circumstances in this country limitation of physical performance by a deficiency of riboflavin must be extremely rare.

NIACIN

Weakness and inability to work effectively are prominent in pellagra and, in view of the reported high incidence of this condition, we might surmise that many thousands of people are limited in physical performance by deficiency of niacin in the diet. However, there is little that can be said as to quantitative relations. The requirement for niacin to prevent frank pellagra is unknown and criteria for estimating the state of niacin nutrition are unsatisfactory.^{34,37,49} Accordingly, it cannot be stated what level of intake of the vitamin is needed

to guarantee maximum capacity for work performance nor whether neuromuscular deterioration proceeds appreciably at levels of restriction where cutaneous and other signs do not appear. Controlled studies on physical fitness and work output are lacking. It does appear that physical performance is not improved by the addition of large niacin supplements to ordinary diets which are considered adequate for the prevention of frank deficiency states.^{26,40}

ASCORBIC ACID

Ascorbic acid has not been neglected as a factor influencing physical performance. Claims have been made that the vitamin C requirement is increased during hard work and that vitamin C supplementation enhances work capacity even in the absence of deficiency symptoms^{2,4,16,31,38}. The evidence upon which the claims are made is by no means unquestionable. Data collected from South African mine workers who were on a low vitamin C intake demonstrated that work capacity and performance in athletic events were not influenced by ascorbic acid supplementation.^{5,13,21,36} It was shown that the work output of the miners was the same whether the men were receiving 15 to 25 mgs. or more than 50 mgs. of ascorbic acid per day. The addition of 200 mgs. of ascorbic acid daily to diets containing 70 mgs. had no effect on the ability of U. S. Army soldiers to do hard work.²⁶

VITAMIN E

The present state of knowledge of the role of vitamin E in muscle metabolism and muscular disorders has been reviewed by Keys²⁵ and Pappenheimer.³⁵ Animal experiments demonstrate that lack of vitamin E is associated with profound muscular changes.^{19,24} No controlled observations have been made on the physical ability of men on low vitamin E diets and it is probably safe to assume that the average diet contains sufficient vitamin E to fill most human needs.

CONCLUSIONS

All acceptable evidence agrees that the supplementation of an "adequate" diet with any or all of the vitamins known to be required by humans does not increase physical performance, work output or recovery from fatiguing work.

Hard physical work can be performed without physical deterioration for months on diets that contain about one-half the recommended daily intake of B complex vitamins. Hard physical work apparently does not greatly increase B complex vitamin requirements beyond those due to the increased caloric output.

In the normal young man 0.30 mg. of thiamine per 1,000 calories is sufficient for at least some months to prevent deficiency symptoms and to allow maximum physical performance. Larger thiamine intakes have no effect on work capacity.

The riboflavin requirement for maximum physical efficiency is probably not appreciably more than 1 mg. daily.

Available information does not allow a precise estimation of the niacin requirements for maximum physical performance. However, 15 to 20 mgs. per day will probably prove sufficient.

Daily intakes of 25 mgs. of ascorbic acid over long periods of time have not been accompanied by signs of scurvy or by physical deterioration.

Claims about the possible reduction in work output by the current vitamin levels in the American diet are not justified from the present state of knowledge.

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Climate and Vitamin Requirements

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TROPICAL or semi-tropical conditions have long been associated with diseases caused by deficiency of the various vitamins, particularly those vitamins of the B complex. It is of interest, then, to inquire what effect climate may have on vitamin requirements of man. Van Veen¹ has pointed out that this problem is complicated by the fact that poor social and economic conditions co-exist with tropical conditions in the Far East; this is also true in other tropical areas. The high incidence of parasitic infection in such regions is another complicating circumstance. Thus, factors other than climate per se are operative in the tropical and sub-tropical areas where nutritional deficiency diseases are endemic. To obtain reliable information on the question of the influence of climate on the vitamin requirements of man, it would be necessary to set up rigidly controlled experiments to test the effects of light, humidity and temperature. These questions are of particular importance when so many members of the Armed Forces are taking up residence under rigorous conditions in many parts of the globe where the climate is of an extreme nature.

The influence of light on the requirements for vitamin D in children requires no comment here. The possible effect of light on the requirement of riboflavin necessary to prevent damage to the cornea is currently being studied in several laboratories, but the results of these investigations are not available as yet. There have been no suggestions that very low temperatures have any effect on vitamin requirements other than those due to increased consumption of calories. Accordingly, the present discussion will be confined to the effects of high temperatures.

In the desert and tropics sweat production may be extremely high. Bock and Dill² have shown that a seven-hour walk in hot desert conditions may lead to a loss of 9 liters of sweat. In this laboratory³ losses of 5 to 8 liters have been regularly observed under such conditions. Early studies on the concentration of both thiamine and ascorbic acid in sweat suggested that important losses of these vitamins might occur in this way. Hardt and Still⁴ reported 1.5 micrograms of thiamine in a pooled sample from four subjects at rest. In work, these authors reported 90 micrograms of thiamine per liter of sweat and as much as 4,540 micrograms per liter of sweat collected from men who had ingested 50 mg. of thiamine orally. The ascorbic acid content of sweat has been reported to be as high as 0.64 mg. per 100 ml. (Cornbleet, Klein and Pace⁶), or even 1 mg. per 100 cc. (Bernstein⁵). It now appears that these high values for the concentrations of thiamine and ascorbic acid were the results of technical errors. Carefully controlled work in this laboratory⁷ has shown that the average concentration of ascorbic acid in sweat is not more than 0.06 mg. per 100 ml., a figure which would indicate a loss in the most extreme condi-

tions of less than one-tenth of the N.R.C. recommended daily allowance. Tennent and Silber⁸ have reported finding no ascorbic acid in sweat and only minimal amounts of dehydro-ascorbic acid. Thiamine concentrations of the order of 0.15 micrograms per 100 ml. were found.⁷ This might lead to a maximal loss of 50 micrograms per day, less than one-thirtieth of the estimated daily requirement. Unpublished results from other laboratories confirm these negligible losses of thiamine and ascorbic acid in sweat.

Riboflavin occurs in sweat in such small amounts that it was necessary to concentrate pooled samples by low temperature vacuum evaporation to obtain a reliable analysis. The concentration of riboflavin was estimated at 0.5 micrograms per 100 ml.⁷ which represents a possible loss under extreme conditions of less than 2.5 per cent of the daily estimated requirement.

Preliminary estimates of the nicotinic acid content of sweat indicate that some nicotinic acid may be lost under conditions of maximal sweating. The concentration of nicotinic acid in sweat has been estimated to be as high as 0.1 mgm. per 100 ml. by both the chemical and microbiological methods. These are preliminary estimates; further work is necessary before it is established that the nicotinic acid requirement in hot climates is increased significantly by losses through sweating.

Recently claims have been made for increased requirements of both thiamine and ascorbic acid in hot environments due to causes other than losses through sweating. Mills^{9,10} has recently reported that growing rats require twice as much thiamine at 90° F. as at 60° F. His results are striking and leave no doubt as to the effect of temperature on the thiamine requirement of the rat. However, it is doubtful whether these results can be applied to man as Mills has recently suggested.¹¹ The rectal temperature of adult rats in an environment of 90° F. is 2.5° F. higher than in a 68° F. temperature;¹² young rats are even more poikilothermic. This is in sharp contrast to the drop of 0.5° F. rectal temperature which usually occurs in men entering the tropics.¹³

Data relating to the effect of temperature on the thiamine requirement of man is at best fragmentary. Preliminary studies¹⁴ in this laboratory indicate that supplementation of a normal diet with 5 mgs. of thiamine, 10 mgs. of riboflavin and 100 mgs. of nicotinamide does not influence the ability of men to perform work during the critical¹⁵ period of adaptation to high temperature. Holt¹⁵ has concluded from studies of the urinary excretion of thiamine of subjects on controlled diets that the thiamine requirement of man during periods of increased temperature is less than it is during cool spells. This conclusion is in agreement with the report of Williams, et al.¹⁶ that 4 patients on 0.15 mg. thiamine a day tolerated the diet for 88 days in the winter, while another group on the same diet was able to continue 147 days during the sum-

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mer. However, the lack of objective criteria in the summer experiment¹⁷ and the high dependence in both experiments on vague clinical symptoms of subjects who had been previously classed as psychotics do not lend as much support to the validity of this observation as might be desirable. The answer to this question will come only when long-term experiments (four to six months) similar to that of Keys, et al.¹⁸ or Williams, et al.¹⁹ are carried out under the desired climatic conditions.

Claims for supplementation with ascorbic acid in hot weather have been based on trials of this vitamin for the prevention of heat exhaustion at a large industrial concern.^{20,21} The problem of the prevention and treatment of heat exhaustion in desert and tropical areas is one that is important to the armed forces as well as to industry. The question has been carefully studied in this laboratory.²² Cardiovascular functions, the performance of standard physical tasks, psychomotor functions, ascorbic acid in sweat, blood plasma and urine and the incidence of heat exhaustion were studied intensively in 44 normal young men living in the laboratory's air-conditioned suite under rigidly controlled conditions of diet, physical work and environment. Air temperatures during the day were 120° F. and at night 85 to 90° F. The residence in the hot suite varied from four hours to six days. The effects of ascorbic acid intake of 20 to 40 and 520 to 540 mg. a day were carefully compared. Pulse rates in rest and work, rectal temperatures, vasomotor stability tests, rates of sweating, general observations and subjective reports all failed to demonstrate any significant advantage for the men receiving supplements of ascorbic acid. Heat exhaustion, characterized by nausea, vomiting, tachycardia, hypotension, vertigo, dehydration and collapse occurred with equal frequency in the vitamin C restricted and supplemented groups. This investigation seems to have ruled out any specific curative or prophylactic effect of ascorbic acid on the treatment or prevention of heat exhaustion. Sodium chloride still seems to be the most effective agent for the prevention and cure of both heat cramps²³ and heat exhaustion.²⁴

It should be remembered that the long-term effects of hot climates on the ascorbic acid requirement have not been ruled out. However, the ascorbic acid requirement of man in temperate climates is still very much in dispute.²⁵ Adequate criteria for the determination of the normal vitamin C requirement will have to be developed before differences in requirements due to climatic condi-

tions can be properly evaluated. The same statements apply to the other vitamins.

CONCLUSIONS

Vitamin losses in the sweat are negligible and do not contribute in any significant degree to the development of deficiency diseases in hot climates. A possible exception to this may be nicotinic acid.

Ascorbic acid does not improve the ability of men to perform work in the heat and does not appear to have any effect on the prevention or cure of heat exhaustion.

There is at present no acceptable evidence that vitamin requirements of man are increased by tropical or desert conditions. However, it has not been proved that requirements are not ultimately affected under these conditions. The answer to these questions awaits long-term objective experiments on man under these particular climatic conditions.

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Laboratory Methods of Evaluating Vitamin Nutritional Status

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AT present there is good evidence that human beings require thiamin, riboflavin, niacin, vitamins A, D, C and K. Many methods have been proposed by which it was hoped to determine whether an individual is deficient in these vitamins. These tests have involved physiological, neurological, psychological and biochemical measurements. This review will be limited to an evaluation of the chemical methods suggested for these measurements. There are a number of good surveys of the methods used in the study of vitamins D^{60,115} and K,^{15,24} consequently these vitamins will not be considered further.

VITAMIN A

Methods of Analysis. Considerable research is still being done on the methods for the determination of vitamin A. The present methods of analysis have been reviewed by Hickman.⁵⁶ There are a number of modifications of the Carr-Price reaction which have been used extensively in the work to be reported.^{71,76} These methods depend upon the extraction of vitamin A by means of an organic solvent (or mixture of solvents), evaporation of solvent, solution of residue in dry chloroform and formation of a blue color upon the addition of a chloroform solution of antimony trichloride. This procedure determines both carotene and vitamin A. The carotene can be measured separately by comparing the yellow color of the first extract with a standardized solution of potassium dichromate.

Blood Levels. Many reports have purported to show a correlation between the level of vitamin A in the plasma and the individual's reserves of this vitamin. Most of these reports have been studies of subjects from various economic levels.^{70,84,85,88} The assumption has been made that the people with the higher income have the larger intake of vitamin A. This is probably true for large groups, but in individual cases and in small series it may give a false impression of the vitamin status. Even if the assumption were valid the results of the plasma vitamin A analyses show considerable overlapping. In spite of these limitations, the above workers suggest plasma levels of 40 to 49 I. U. per 100 cc. serum as borderline for children.

There is some experimental evidence that the vitamin A in the plasma decreases when the intake is reduced,¹³⁰ but no indication of the lower level compatible with health was secured. Surveys of adults from different economic levels have been made similar to those among children.^{1,148,150} In one of these studies¹ the lower limit for normal plasma concentration of vitamin A was set at 80 I.U. per 100 cc., yet 77 per cent of the male subjects from a "low socio-economic stratum" had

more than this. Such a finding is inconsistent with the hypothesis that people with small incomes are malnourished, or else the plasma level does not accurately reflect vitamin A nutrition.

Other investigators have assumed that their modifications of the visual tests for vitamin A sufficiency are valid indications of nutritional status and on this basis have attempted to set up normal blood levels.^{86,104} There is still too much controversy as to the influence of vitamin A on dark adaptation to permit the use of this technique in establishing normal plasma levels.

In general, it seems as though a low vitamin A intake is associated with a low level in the blood. As yet there has been no agreement on the lower levels of normalcy. Even if one were to accept the lowest level given by the above workers (30 to 60 suggested by Wolff), one can still find such great variations that the validity of the basic assumption is questioned. For instance, de Haas and Meulemans⁴⁹ found 3 of 16 children showing signs of vitamin A deficiency (blindness, xerosis or Bitot's spots) who had some vitamin A in their serum, in one case as much as 38 I.U. per 100 cc. On the other hand, if one accepts the higher limits, there are many persons who, on this basis, would have to be considered deficient, but who show no other signs of deficiency than the low plasma level. This matter cannot be definitely settled until a controlled dietary study at various levels of vitamin A has been made. These tests will have to consider the possible destruction of this vitamin in the diet and the gastrointestinal tract.^{19,56}

Most emphasis has been placed on the amount of vitamin A in the plasma because the carotene level "seems to be a measure of the difference between the rate of absorption from the intestines and the rate of absorption by the tissue and not an index of nutritional reserves or intake."¹³

The liver is the main storage depot for vitamin A^{34,94,107}; the amount in the rest of the body is only a small fraction of that normally occurring in the liver. A number of attempts have been made to correlate the vitamin A in the liver of experimental animals with that present in the plasma. So far most of these experiments have shown that when the level of vitamin in the liver is high, the blood level is also high but in none of these is the correlation very good in the lower ranges where it is most important for the differentiation of "subclinical avitaminosis."^{61, 68, 82, 83, 148} A similar conclusion was reached by Meyer, et al.,⁹¹ who studied the vitamin A in human liver biopsy samples and compared the values with the plasma levels.

The ingestion of a meal has no perceptible influence on the amount of vitamin A in the blood.⁷⁶ The inges-

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tion of fairly large amounts of alcohol increases the plasma level, largely because of the appearance of an esterified form of the vitamin.²⁷ This test has been suggested as a means of measuring the vitamin A stores²⁶ but so far nothing has been done to evaluate it.

Josephs⁶⁹ claims on the basis of experiments with rats that the first manifestation of a vitamin A deficiency is a decrease in the total blood lipids. However, his own results with human beings⁷⁰ indicate that there is no very great difference in the total blood lipids of individuals of different vitamin A status.

Ralli, et al.,¹¹⁰ found that when normal subjects are given a dose of 100,000 I.U. vitamin A in the form of a codliver oil concentrate, the increase in the plasma level was much greater than that in patients with cirrhosis of the liver. They had previously shown that the stores of vitamin A in the livers of patients with cirrhosis were less than those in normal individuals.¹⁰⁹ The fasting blood levels in all of their normal subjects were much higher than those reported by other workers. Furthermore, two of their patients with cirrhosis showed fasting levels between 70 and 75 I.U. per 100 cc., which according to other workers is normal.

Excretion tests cannot be performed on human beings because normally there is no excretion in the urine of vitamin A or carotene.^{79,117,135}

Conclusion. At present there is no reliable laboratory test for vitamin A sufficiency. Further work under more controlled conditions will have to be done in order to establish whether the plasma vitamin A level adequately reflects one's nutritional status.

VITAMIN B₁

Methods of Analysis. At present there are a number of methods for the determination of small amounts of thiamine. These methods have been reviewed by de Jong.⁶⁷

Bisulfite Binding Substances. In an effort to find some biochemical difference between people securing an adequate thiamine intake and those on a deficient intake, early investigation was directed toward a study of the amount of keto-compounds in the blood under different dietary conditions. Peters and his group at Oxford^{65-a, 103} showed that a deficiency of vitamin B₁ in rats produced an increase in pyruvic acid. Since then many attempts have been made to determine whether the amount of aldehydes and ketones (bisulfite binding substances) in the blood reflects the thiamine nutritional status. The increase in these compounds in the blood of animals maintained on varying levels of vitamin B₁ has been questioned. Thompson and Johnson¹³⁴ maintained that there was a marked increase in the bisulfite binding substances (B.B.S.) in the blood of polyneuritic pigeons and that most of this increase was due to the presence of pyruvic acid. De Jong⁶⁶ followed the B.B.S. in the blood of pigeons from the start of an experimental deficiency and found that some birds developed opisthotonus before there was any increase in the B.B.S.

Some of the earlier clinical results indicated an increase in the B.B.S. in the blood of Orientals with beriberi and a decrease following yeast supplementation.¹⁰⁵

The studies on pyruvic acid in the blood during this condition showed a considerable overlapping of the various groups.^{9,17,106} In all of the cases so far studied, there has been no careful study of the diet other than that secured by case histories. Most of the deficient persons studied had various diseases which might have decreased their thiamine intake, but the independent influence of these diseases on the B.B.S. in the blood was not considered.

Recent work indicates that there is no close relation between the blood B.B.S. and the urinary excretion of thiamine. This was shown in the experiment of Robinson, et al.,¹¹³ in which a subject was maintained on a low thiamine diet for one month. During this time there was a progressive decrease in the blood B.B.S. Even after prolonged exercise, while the subject was on this diet, there was no increase of total keto-compounds in the blood. It had previously been reported⁸⁷ that after mild exercise the blood pyruvic acid increased to a greater extent in subjects with a poor intake of thiamine than in their controls. Diseases not associated with a thiamine deficiency may also increase the level of B.B.S. in the blood and cerebrospinal fluid.^{146,149}

Shils, et al.,¹²⁵ have shown further that when persons are kept on a very low intake of thiamine for 37 days, the excretion of B.B.S. in the urine shows no change even though the excretion of thiamine in the urine ceases.

So far no one has studied the rate at which pyruvic acid injected into human beings is removed from the blood stream in relation to thiamine deficiency. Sherman and Elvehjem¹²⁴ found that normal chicks showed practically no increase in the blood pyruvic acid under these conditions whereas polyneuritic chicks showed a high peak which was maintained for some time. Bueding, et al.,¹⁸ claim that following the ingestion of glucose the pyruvic acid increases to much higher levels in the blood of subjects with a deficiency of thiamine than in the blood of their normal subjects. They give no indication of the thiamine intakes of their subjects.

Urinary Excretion. As soon as the tests for thiamine became sufficiently sensitive, studies on the excretion of this compound were initiated. Harris, et al.,⁵¹ used the bradycardia assay technic with rats and found in normal persons an excretion of 0.39 mg. per day. Seven cases of beriberi excreted less than 0.01 mg. per day. They concluded that symptoms of polyneuritis were associated with an excretion of less than 0.023 mg. per day. Other European and Asiatic reports^{62,136,144} list the minimal thiamine excretion by normals near the same level. American reports⁸⁹ have tended to place the minimal level much higher. Most of the suggested minimal levels for this country have been 0.09 mg. for males and 0.06 mg. for females per twenty-four hours.

Before examining various modifications of the excretion assay, it is necessary to consider the standards of normalcy so far proposed. Most of the reports in the literature can be criticized because the vitamin intake has been unknown and the deficiency cases have been subjects who had some other complicating disease. In our

laboratory we have had normal men on a known amount of thiamine.⁷³ These men excreted over a period of six months less than the amounts of thiamine suggested by American investigators as being indicative of a deficiency. During this time there was no change in their physical or psychological performance. At present we have another group of normal men on a still lower thiamine intake. Over an extended period their thiamine excretion has been close to zero without any physiological change.⁷⁵ Holt⁵⁹ has also questioned the validity of the urinary thiamine levels so far proposed for adequacy. According to him the excretion of any thiamine (or for that matter any other vitamin) in the urine indicates that the body has a surplus available for excretion. This and similar evidence make it necessary to re-evaluate the criteria proposed both for the estimation of the nutritional status on the basis of urinary excretion as well as for the minimal requirement for these vitamins in so far as the estimates have been based on urinary excretion.

A number of saturation tests have been proposed in an effort to overcome the disadvantages of the basal twenty-four-hour excretion. The test doses have varied from 1 to 100 mg. when given orally and from 1 to 50 mg. when given by injection. These tests have been described and discussed by de Jong.⁶⁷ Nothing very definite can be said about the standards for normalcy until some agreement can be reached on the technic to be used for this test.

There are certain factors that may influence an excretion test. de Jong⁶⁷ found that even when the thiamine intake of normal men was constant the excretion varied by as much as 375 per cent from day to day, especially at the lower levels of excretion. If a twenty-four-hour basal urine collection were made on the day of the low excretion and the urine following the saturation test dose were collected on the day of the high excretion, a falsely high value would be obtained. The unexplained variation in the urinary thiamine is much more important at the lower levels of excretion where it may give a fairly high percentage excretion of the saturation test dose one time and a negative value the next.⁹² Another factor of importance is the presence of concomitant deficiencies which may produce a high excretion of the test dose even though there are symptoms of thiamine avitaminosis.⁹⁶ Intestinal absorption and renal excretion are other factors which may influence the excretion of the test dose.

Blood Levels. Many reports have appeared on the amount of thiamine in whole blood and the possible use of this criterion in evaluating the nutritional status.^{45,145} Most of the early work indicated that normal values varied from 0.004 to 0.018 mg. per 100 cc. whole blood. Cases with signs of clinical thiamine deficiency had smaller amounts than this. More recent reports^{120,151} have shown a great variation in the day-to-day level of thiamine in the blood. Further doubt is cast on the reliability of this method by the finding that some Batavians with severe beriberi had normal blood levels.¹⁰¹ The distribution of thiamine in the blood has shown that the white cells contain an average of 0.07 mg. per 100 cc., the red cells 0.086 mg. and the plasma almost none.⁴⁸

The amount of B₁ in the white cells has been proposed as an index of thiamine saturation but as yet there has been nothing more than the suggestion.⁴⁸

Conclusion. Of the methods so far proposed for the evaluation of the state of thiamine nutrition, the best one appears to be the twenty-four-hour urinary excretion while the subject remains on his usual diet. If a large amount of vitamin B₁ (0.1 mg. or more) is excreted in such a sample, that person is in no danger of being deficient. At the lower levels (0.05 mg. or less) it may be necessary to repeat the determination and if there is still some thiamine in the urine, it seems safe to consider that individual as receiving a low but sufficient amount of the vitamin.

RIBOFLAVIN

Methods of Analysis. There are a number of chemical tests for riboflavin which depend on the measurement of the characteristic yellowish fluorescence of this compound when ultraviolet light is passed through a solution of it. In our laboratory we have found that the method of Connor and Scaub²⁸ is the best one for urinary analyses. It may be advantageous to run blanks on these samples after irradiating them to destroy the flavin because there are some non-vitamin substances present in urine which fluoresce under the conditions of the test. The microbiological assay of Snell and Strong¹²⁷ has been found admirable for other analyses providing certain precautions are observed.^{2,10}

Blood Levels. A few reports have appeared on the concentration of riboflavin in the blood as determined by the microbiological procedure.^{5,133} The work at Hillman Hospital showed that there was no apparent difference in the amount of riboflavin in the blood of normal people and in that of persons showing clinical signs of ariboflavinosis. Shortly thereafter Eckardt, et al.³⁵ showed that there was something in blood which interfered with the microbiological determination. So far no report has appeared in which this difficulty has been overcome. The interfering substance has been concentrated by continuous ether extraction but a large part of the material still remains in the blood.⁴⁰ At present it is hard to determine whether the riboflavin level in blood offers any index of nutritional status because the concentration of the stimulatory substance varies from sample to sample.³⁵

Urinary Excretion. The amount of riboflavin excreted in the urine appears to be related to the dietary intake. A measurement of the urinary excretion as an index of nutrition is subject to the same limitations as discussed under thiamine. A number of isolated studies on normal individuals have led some investigators to put the "normal level of excretion" at over 0.5 mg. per day.^{41,133} Axelrod, et al.,⁴ state that the normal excretion is above 0.2 mg. per day while levels below 0.05 are indicative of ariboflavinosis.

Najjar and Holt⁹⁷ have claimed that their modification of the saturation test distinguishes between normal subjects and those with mild clinical symptoms of flavin deficiency. This, however, has not been the experience

of Axelrod, et al.,⁴ who found no relation between the excretion of a test dose and the previous daily excretion of riboflavin. The results of the group at the Mayo Clinic¹⁴⁷ tend to confirm the fact that the test dose method offers no better guide to the nutritional status than can be secured from the ordinary twenty-four-hour urine excretion. Our own experience⁷² has been very similar to this and more recently we have occasionally found an apparently complete retention of the test dose by normal individuals.⁷⁴

Conclusions. The twenty-four-hour urinary excretion offers the best available index of riboflavin nutrition. The interpretation of these results is similar to that discussed under thiamine.

NICOTINIC ACID

Methods of Analysis. There are a number of methods available for the determination of nicotinic acid and its derivatives. The chemical methods have been reviewed by Bandier.⁷ Most of these methods involve the splitting of the pyridine ring by means of cyanogen bromide followed by coupling of the liberated compound with an aromatic amine to produce a yellowish color. There are pigments present in most biological materials which interfere with the final colorimetric estimation. This has resulted in a number of modifications which attempt to overcome the difficulty.¹⁴³ A microbiological procedure has been developed by Snell and Wright¹²⁸ which overcomes many of the disadvantages of the chemical methods but suffers from the fact that it requires a number of days before the results are available. For most purposes where time is not an important factor, this is probably the best procedure to use.

Blood Levels. As soon as it became evident that nicotinic acid was a cure for pellagra, attempts were made to determine whether there was any relation between the nutritional status of an individual and the level of nicotinic acid in the blood. A number of early reports^{8,141} stated that the level of nicotinic acid in the blood of pellagrins was lower than that in normal blood. More recent work has definitely shown that there is no decrease in the level of nicotinic acid in the blood of persons suffering from an acute deficiency of this vitamin. Most of the nicotinic acid in the blood is present in the corpuscles where it occurs as coenzymes I and II; very little is present in the plasma and all of that is in the free state.³⁷

Porphyrin Excretion. Ellinger and coworkers reported an increased excretion of porphyrin in pellagrins.^{11,36,129} They used a method which according to Watson^{90,139} measured either urorosin or indirubin. More exact tests for porphyrins indicate that pellagrins and normal subjects excrete the same amount.

Urinary Excretion. Studies on the excretion of nicotinic acid in the urine have been complicated by the fact that most of it is excreted as trigonelline and only a small part as nicotinuric acid.⁹⁰ Vilter and coworkers reported¹³⁹ that no nicotinic acid or any of its derivatives are excreted by pellagrins. The method used by these workers has been criticized as being unreliable and only semi-quantitative.¹⁴² Rosenblum and Jolliffe¹¹⁶ claim that cases of alcoholic pellagra excrete less nicotinic acid than

normal persons but their procedure also measures a certain amount of trigonelline.⁴² The end products of nicotinic acid metabolism appear to be the same in dog and in man.¹¹⁸ No change occurs in the excretion of nicotinic acid in dogs even up to the development of black tongue, but there is a marked decrease in the excretion of trigonelline during this time.¹¹⁸ A similar decrease in trigonelline excretion has been observed in humans maintained on a restricted nicotinic acid intake.^{42,46} A fairly simple method is available for the determination of trigonelline⁴⁴ but the interpretation of the analytical results is difficult because the diet may add considerably to the excretion. When the dietary intake of trigonelline is kept as low as possible, the excretion of trigonelline plus nicotinic acid derivatives ranged from 4.3 to 15.0 mg. per day (average 8.7) in persons showing signs of vitamin deficiency and from 12.3 to 22.1 (average 16.1) in normal persons.⁴⁶

Two saturation tests have been proposed for evaluating the nicotinic acid status of a subject.^{46,102} Both of these tests involve a basal twenty-four-hour urine excretion followed by another twenty-four-hour urine collection after a test dose of 300 or 500 mg. of nicotinic acid has been given. The authors claim that the per cent of the test dose excreted is related to the previous nicotinic acid intake. Most of the increased excretion was due to the presence of trigonellin.

In man the largest part of the excreted nicotinic acid is accounted for in the form of some compound (or compounds) other than the three that have so far been studied (trigonelline, nicotinic and nicotinuric acids). When Sarett, et al.,¹¹⁹ gave 500 mg. of nicotinamide per day to six normal students, they were able to account for only 36 per cent of the ingested vitamin on the basis of urinary excretion on the last day. In dogs a somewhat similar experiment¹¹⁸ showed an excretion of 90 to 100 per cent of the ingested vitamin on the last day of the saturation test.

Najjar and coworkers^{95,98,99} have reported that when a person on a normal diet changes to one restricted in nicotinic acid, the excretion of a fluorescent compound (F_2) decreases. As the excretion of this compound decreases and as the nicotinic acid deficiency progresses, another fluorescent compound (F_1) appears in the urine. Under normal conditions the urine contains mostly the F_2 compound whereas in pellagra nothing but F_1 is excreted. A number of recent reports have attempted to identify F_2 with thiochrome²⁹ and with N-methyl nicotinamide chloride.⁶³ These claims have been refuted¹⁰⁰ by Najjar and his group who maintain that it is one of the dihydro-N-methyl nicotinamides. At present there have been no other reports than those from Johns Hopkins on the use of this technic.

Conclusion. At present there is no wholly acceptable method for the evaluation of the nicotinic acid status of a subject.

VITAMIN C

Methods of Analysis. The oldest and the most commonly used method for the determination of vitamin C in biological materials depends upon its reduction of the

dye 2, 6-dichlorophenolindophenol. Under ideal conditions the dye is decolorized instantaneously by ascorbic acid. There are some other compounds present in urine and blood such as thiosulfates, ergothioneine and disulfides which decolorize the dye more or less slowly. The various modifications of this technic which have been proposed with the hopes of making the method more specific have been reviewed by Bessey.¹² A more precise technic has been described recently⁵⁷ in which the influence of the non-vitamin reducing substances has been reduced to a minimum. This method is probably the best one to use for urine samples whereas the Mindlin-Butler procedure has proved satisfactory for plasma analyses.⁹³ These procedures involve the use of a photoelectric colorimeter in making the final determination. A number of methods have been described^{39,52} whereby the amount of vitamin C is determined by titration. Most of these methods include a larger amount of the interfering substances than do the procedures which depend upon the photoelectric colorimeter. A procedure which depends upon the formation of a hydrazone with dehydroascorbic acid has been described¹¹⁴ but as yet no other laboratory has commented on it.

Blood Levels. The determination of the fasting plasma level of vitamin C has long been used as a method of determining whether a subject is receiving a sufficient amount of the vitamin. Many American and European workers^{126,148} have set up the following criteria to aid in their interpretation of the chemical results: above 1.2 mg. per cent "saturated", 0.6 to 1.2 mg. per cent "satisfactory", 0.3 to 0.6 "prescorbutic", below 0.3 mg. per cent "scurvy level". It was originally thought that the fasting plasma value was a reflection of the immediate preceding dietary intake^{16,38} and that if there had been no marked change in the ascorbic acid intake the plasma level indicated roughly the amount of vitamin C in the body. Some workers have put so much faith in this method that they have proposed tables showing the extra amounts of vitamin C that would be required to raise the plasma level from one value to another.¹³⁷ The above work implies that all subjects receiving the same intake of vitamin C will show the same plasma level. Recent work indicates, at least as far as women are concerned, that this is not so and that there may be a considerable variation in the day-to-day plasma levels when the dietary intake is maintained constant for a period of three weeks or more.¹³¹ A similar finding has been reported for children living in a "well managed orphanage" over a period of ten months.⁵⁸ Here in a group of 60 children getting the same food the plasma vitamin C level ranged from below 0.25 to 1.2 mg. per cent.

These examples make one wonder, first, whether the plasma level reflects the previous dietary intake as accurately as some workers have claimed and, second, whether the low levels classified as "prescorbutic" are actually indicative of latent scurvy. Dagulf³² showed that in Sweden the levels of plasma ascorbic acid in the spring averaged 0.22 mg. per cent for 326 healthy individuals. These levels are maintained through most of the year except during the summer months and, in spite

of this condition, the general health and well-being of the Swedes have steadily improved. In the last few years a number of workers^{20,23,31,43,71-a,111} have questioned the reliability of the plasma level as an index of vitamin C nutrition.

Butler and Cushman^{21,22} showed that the white cells contain a very high concentration of vitamin C. In a study on a human subject³⁰ the white cells still had their normal concentration of ascorbic acid long after the plasma was free from it. These workers have suggested that the white cells would offer a better index of vitamin C nutrition than the plasma level but as yet there have been no other reports on such a study. Heinemann⁵⁵ has proposed the determination of the vitamin C in whole blood to replace the plasma levels. The determination of ascorbic acid in both white cells and whole blood presents more analytical difficulties than the plasma procedure since special precautions have to be taken in order to overcome the oxidative action of the oxygen liberated from oxyhemoglobin during the laking of cells.⁸¹

A high concentration of vitamin C in the plasma is a good indication that the individual is receiving sufficient vitamin. The interpretation of low levels has become more difficult than was originally anticipated. Until more definite evidence has been produced it is unwarranted to speak of plasma levels below 0.5 mg. per cent as "subclinical scurvy" or "prescorbutic".

Many attempts have been made to surmount the shortcomings of the plasma vitamin C determination by the use of "saturation tests"^{108,132} in which the increase in the plasma level after a test dose of vitamin C is measured, but each worker has used his own procedure and criteria so no valid comparison or evaluation of this technic can be made.

Urinary Excretion. The ease with which vitamin C is destroyed has prompted a considerable amount of work on methods of preserving this compound in the urine during collection periods. Vitamin C can be preserved in brown bottles at room temperature for twenty-four hours when 8-hydroxy-quinoline is used as a preservative as recommended by Sendroy and Miller.¹²¹ Another equally satisfactory method is to use solid metaphosphoric acid as a preservative in such an amount that the final concentration in the urine sample is about 3 per cent.

In the early work on the urinary excretion of vitamin C, the daily excretion was used as a measure of the adequacy of the diet. The minimal level of excretion which indicated an adequate intake was set at 13.8 mg. per day.⁵⁰ It was soon shown that the excretion of reducing substances was influenced by things in the diet other than vitamin C.⁵³ These substances are apparently thiosulfates, disulfides and other substances which can be removed by precipitation with barium acetate.¹³⁸ Various reports have indicated that some patients with clinical scurvy still continued to excrete considerable amounts of reducing substance as determined by the indophenol titration technic.¹²³ How much of this is actually non-vitamin-C reducing substances has never been investigated. These considerations have led most investigators to rely

on various modifications of the "saturation" test as an index of vitamin C nutrition.

Practically each worker has used his own modification of the "saturation" test with the result that the dose has ranged from 25 to 1,000 mg. The method of administering the test dose has included oral, intravenous and subcutaneous routes. When a test dose is given in addition to the usual intake, the greatest part of the extra excretion (if there is any) occurs during the following six hours.⁶⁴ If the test dose is taken with a meal, the amount excreted is larger than if the dose is given in the fasting state.⁵⁴ Most workers are agreed that the excretion of at least 50 per cent of a test dose of vitamin C during the following twenty-four hours indicates that the individual is "saturated" with the vitamin.¹²⁶ Again it is difficult to interpret the values below 50 per cent since most workers consider anyone who is not "saturated" as deficient to a certain extent. Zilva¹⁵² has ably questioned the validity of such reasoning and suggests a revision of the present theories that a person must be flooded with vitamins in order to maintain a salubrious condition. The establishment of the lowest percentage excretion of the test dose compatible with normal health will have to await further investigation.

Conclusion. If the amount of vitamin C in the plasma or in the urine is high enough, there is no doubt that the subject is receiving a sufficient amount of ascorbic acid. When the plasma level falls below 0.5 mg. per cent and the urinary excretion drops under 14 mg. per day, the interpretation thereof is uncertain at the present time.

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The Clinical Diagnosis of Deficiencies of Thiamine, Riboflavin and Niacin

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THE task of attempting to throw light on this much confused subject is one which we have undertaken with some hesitation. Our own experience does not stem from regions where manifest B deficiencies are endemic. Our work has been in an area—perhaps more typical of the country as a whole—in which frank deficiencies of the B complex are rare and where the chief problem is the recognition of the latent or "subclinical" deficiency. The frequency of these subclinical deficiencies, the criteria for establishing the diagnosis and applying vitamin therapy are burning questions at the present time. Let us begin by considering the recognized clinical manifestations of these three deficiency states.

THIAMINE DEFICIENCY

The recognized manifestations of frank thiamine deficiency are: polyneuritis, myocardial failure, edema, anorexia, and psychic changes. We have seen all of them

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in sporadic cases that have come under our observation. The neuritis affects the legs with the greatest frequency, next the arms; the cranial nerves are involved exceptionally in the adult, a third nerve palsy being the most frequent manifestation. Observers from the Orient report that in infants the recurrent laryngeal nerve is often singled out, aphonia being an early and prominent symptom. No better description of the signs of early thiamine neuritis in the lower extremities has been given than that of Jolliffe,¹ who emphasizes the fact that the process is always a symmetrical one, that the sensory and reflex changes precede the motor ones and that there is a regular pattern of extension—the plantar area, sock area and calf area being successively involved. According to Jolliffe evidences of neural involvement occur in the following sequence: muscle hyperesthesia, loss of vibratory sense, loss of reflexes, loss of position sense, motor weakness. Abnormality of gait, may, however, develop before there is definite motor atrophy because of the hyperesthesia. Our own experience, based on a number of cases

that have developed under close observation, is not entirely in accord with this. We can affirm the symmetrical character of the neuritis and the fact that involvement of the legs usually, though not invariably, precedes that of the arms. The progressive involvement of the plantar, sock and calf region has not been characteristic of our cases, which have usually shown tenderness of calves and thighs simultaneously as the first signs of sensory involvement. In our experience motor weakness and hyperesthesia have developed early and almost simultaneously, followed shortly by loss of reflexes; other sensory functions—vibratory, position and temperature sense—have not been noticeably affected at the onset. The first objective sign is an ataxic gait due to weakness. It may be difficult to evaluate motor weakness in the presence of muscle hyperesthesia, but we have seen weakness develop with little or no hyperesthesia to account for it.

The *cardiac manifestations* of thiamine deficiency may precede or follow the neuritis. Whether the heart is affected early appears to depend on the physical activity of the subject; individuals leading sedentary lives usually develop neuritis before there is any evidence of cardiac failure, the reverse being true of those who are more active. It is now clear that there is nothing characteristic about cardiac failure resulting from thiamine deficiency. Earlier reports indicating the right heart to be particularly affected have not been confirmed by recent observations. A rapid pulse, symmetrical enlargement of the heart and all the signs of congestive failure may be present. The electrocardiogram shows changes, but none that differentiate this condition from other forms of myocarditis.

Edema in thiamine deficiency may result from cardiac insufficiency or may occur quite independently of it. Such edema has often been attributed to low serum proteins due to a concomitant deficiency of protein in the diet, but it is now clearly established that thiamine deficiency *per se* can produce edema which is not explained by cardiac failure or by a reduction in serum proteins. The mechanism of its production is obscure but the response to therapy is rapid, rarely requiring more than twenty-four to forty-eight hours.

Anorexia is usually listed as an early symptom; in our experience, too, it has usually been the first manifestation to appear.

Vomiting is likely to occur only when food is forced in the face of a poor appetite. Failure to gain weight or loss of weight does not in our experience occur in the absence of gastrointestinal symptoms.

Psychic Changes. Claims have been made that delirium and coma may result from acute thiamine deficiency.² Even more difficult to evaluate are reports of various neurasthenic manifestations that may occur in chronic thiamine deficiency. In addition to aches and pains, fatigability and insomnia, emotional tension and irritability have been particularly noted³ as well as lack of concentration. We have observed evidences of irritability associated with the development of thiamine deficiency but only exceptionally. As a rule the psyche has not been affected in our experience.

On what criteria can the diagnosis of thiamine deficiency be based? None of the symptoms mentioned above are pathognomonic of this condition. When any one of the major objective symptoms, such as polyneuritis, edema, or cardiac insufficiency is present without other explanation it is proper to think of thiamine deficiency, and when several of these symptoms coexist the probability of their being due to lack of thiamine is correspondingly increased. Nevertheless, it is always hazardous to make such a diagnosis unless, (a) some factor known to predispose to thiamine deficiency is present or, (b) definite laboratory evidence of thiamine deficiency can be obtained.

In the absence of any of the major objective symptoms, when the only evidences of deficiency are vague and highly non-specific, such as poor appetite, lassitude, vague pains, poor sleep, emotional irritability, etc., the diagnosis of thiamine deficiency becomes even more tenuous. Yet it is on precisely such grounds that thiamine is being prescribed or is being self-administered to our population on an appalling scale. The propaganda comes from places high and low, from those commercially minded and those with altogether altruistic motives. We are confronted by dietary surveys made by reputable individuals which report that millions of Americans ingest subnormal amounts of thiamine. Reputable medical men support this view. Advertising of vitamins and of reinforced foods is permitted, which gives the impression that the government itself shares the view that American diets are generally thiamine deficient and that the ingestion of vitamin pills or reinforced foods will abolish fatigue, crankiness, loss of sleep, the war jitters and what not and will substitute vim and vigor. The conservative medical man can hardly be blamed if he fails to resist the current and permits himself to prescribe B vitamins, and thiamine in particular, for symptoms which are common to the great majority of diseases he has to treat.

In the interest of correct thinking the present writers would like to point out, (1) that the existence of thiamine deficiency on a wide scale in this country has never been demonstrated by medical surveys employing accurate laboratory criteria; (2) the surveys made have been dietary surveys based on values for thiamine "requirements" that have never been accurately determined and that have for this very reason been set at a high level.

What then justifies the physician in making a diagnosis of thiamine deficiency and in prescribing thiamine? It is our opinion that although any of the vague as well as the definite symptoms should make one think of such deficiency, a diagnosis should not be made unless there is evidence from the history of some factor predisposing to B avitaminosis or some laboratory evidence for the same. The factors known to predispose to B avitaminosis are as follows:

1. An unbalanced diet—predominantly of refined carbohydrates—which adds to the B requirements and also diminishes the supply of these factors. Patients nourished by intravenous glucose alone may be included in this group.

2. Disturbances of digestion or absorption which interfere with the assimilation of these factors.

3. Circulatory disturbances, such as post-hemorrhagic shock, which may interfere with the adequate distribution of B factors.

4. Conditions which increase the demand for B factors—fever, hyperthyroidism, exercise, pregnancy, lactation, an overactive heart.

Only when such evidence is at hand, pointing to a reasonable possibility of B vitamin deficiency, are we justified in advocating vitamins beyond those contained in a normal balanced diet.

Is there any harm in giving B vitamins? Aside from the drain on the pocketbook, the contents of which might better be used for nourishing foods, there seems to be little danger in giving B complex as a whole. Toxicity studies with individual members of the complex indicate that enormous doses must be given before symptoms are encountered. On the other hand, if an unbalanced intake of B factors is taken the possibility of producing harm is not so remote, and it may be worthwhile to review the evidence on this point. The administration of thiamine to patients with polyneuritis^{4,5,6} has been followed by symptoms of pellagra. There is laboratory evidence⁷ that both thiamine and riboflavin will, in excessive amounts, cause an increased demand for niacin. Analogous effects have been observed from the administration of niacin alone; pellagrins so treated have developed riboflavin deficiency⁸ or beriberi.⁹ It is clear that correction of a single deficiency may precipitate some other deficiency that was already present in a latent form. It does not follow that the normal individual is harmed by the administration of single vitamins, but there are reasons for conservatism even here. Vitamins taken in excess are disposed of in large part by unknown mechanisms, some of which may involve the use of other vitamins, creating an abnormal demand for the latter. For example, Handler and Dann¹⁰ showed that an excess of nicotinamide will interfere with rat growth and cause fatty liver, an effect preventable by adding choline or methionine to the diet. Apparently the unneeded nicotinamide is methylated, causing a drain on the body's methylating agents—methionine and choline. In the case of thiamine there is evidence that, taken in excess, it may deplete the available supply of niacin, perhaps because a niacin-containing enzyme is concerned in its phosphorylation, as Lipton and Elvehjem¹¹ have shown. The practical conclusion to be drawn from these facts seems clear enough: therapy with pure B vitamins should always be combined with some B complex preparation.

Before taking up the laboratory diagnosis of the three major B deficiencies, which can conveniently be discussed together, let us review the situation for the clinical diagnosis of riboflavin and niacin deficiency.

RIBOFLAVIN DEFICIENCY

The cardinal symptoms of this deficiency are: an atrophic glossitis, in which the tongue is said to be cyanotic in color rather than angry red, as in pellagra; cheilitis, involving the lips as a whole; angular stomatitis ("perlèche"), in which exudative lesions occur at the cor-

ners of the lips, often with cracking; seborrheic lesions about the nose and eyes and occasionally elsewhere; "rosacea keratitis," a vascularizing lesion of the cornea beginning at the margin and extending centripetally. We have had an opportunity to see this picture in a number of experimental subjects studied by Sebrell and Butler, and have encountered it in characteristic form in at least two or three cases in Baltimore. The picture, when well developed, is clear enough, and the evidence of its relation to riboflavin deficiency is impressive. On the other hand, a number of observations have recently come to light which make the diagnosis difficult. The glossitis may be indistinguishable from that of pellagra. An angular stomatitis indistinguishable from that described may respond to pyridoxin therapy, and furthermore lesions of the angles of the mouth are often traumatic, having no relation to avitaminosis.¹² The most specific feature of the syndrome, the corneal lesion, can no longer be regarded as specific¹³ for it has been produced in a number of experimental deficiencies and has been observed in thallium poisoning and in association with various infectious diseases, notably measles.¹⁴ During the past two years thirty-two patients with the clinical diagnosis of simple rosacea keratitis have been referred to us for study from the Wilmer Ophthalmological Institute. In two of these we have found definite evidence of riboflavin deficiency by means of the urinary excretion test described below. In both these patients the condition responded dramatically to riboflavin therapy. The remaining patients showed normal riboflavin excretion figures and failed to respond to therapy.

It is our present impression that riboflavin deficiency is a decided rarity, apart from areas where it is reported to be endemic. The criteria for trying specific therapy would appear to be any of the specific lesions described, bearing in mind that such lesions are not necessarily specific.

NIACIN DEFICIENCY (PELLAGRA)

The cardinal symptoms of pellagra are described in most textbooks of medicine and will not be taken up in detail here. The characteristic symmetrical lesions of the skin, erythematous at first and subsequently pigmented and scaly, and their symmetrical distribution on exposed parts of the body are highly characteristic. A fiery red glossitis, diarrhea and mental changes highly variable in character constitute the rest of the picture.

We shall confine ourselves to calling attention to some recent additions to the picture—notably to the syndrome of acute encephalopathy described by Jolliffe et al.,¹⁴ and by Cleckley et al.¹⁵ This syndrome is characterized by an acute stuporous condition, sometimes with extrapyramidal symptoms, and is said to respond dramatically to specific therapy. It is regarded as an extremely acute form of niacin deficiency in contrast to the more chronic states giving rise to the cutaneous, oral and enteric lesions.

Our experience with frank pellagra in Baltimore is very limited. We should, however, like to mention an interesting recent observation—a patient who developed pellagra on the wards of the Harriet Lane Home while receiving a supposedly adequate B complex preparation.

EXCRETION OF THIAMINE IN URINE AT DIFFERENT LEVELS OF INTAKE

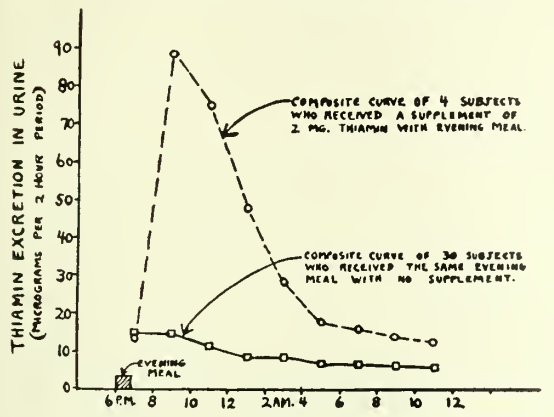


Fig. 1

EXCRETION OF RIBOFLAVIN IN URINE AT DIFFERENT LEVELS OF INTAKE

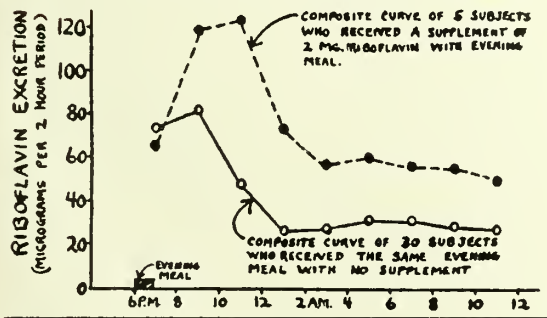


Fig. 2

EXCRETION OF F₂ IN URINE AFTER INGESTION OF NICOTINAMIDE

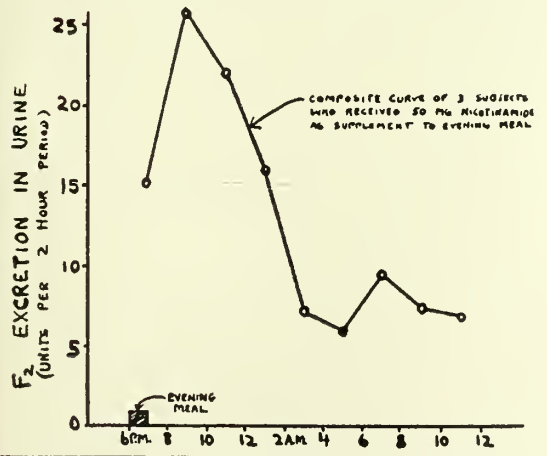


Fig. 3

The patient, a 12 year old girl, was suffering from what was apparently a very low grade ulcerative colitis. Yet despite almost negligible gastrointestinal symptoms, unmistakable pellagra developed. Assay of the B complex preparation used showed that it was very high in thiamine and relatively low in niacin; it seems possible that the excess of thiamine administered may have contributed to the pellagra.

The belief that subclinical niacin deficiency states are of frequent occurrence has been expressed by a number of observers, but it must be admitted that conclusive evidence for this has yet to be presented. The failure of any satisfactory laboratory test has until recently made it very difficult to assess the situation. This state of affairs no longer holds since the discovery in urine by Najjar and Wood¹⁶ of a fluorescent substance which we believe accurately reflects the state of the body stores with respect to niacin.¹⁷

THE LABORATORY DIAGNOSIS OF EARLY B DEFICIENCIES

It is not possible in this brief space to discuss adequately the various methods employed by different workers. This topic is, moreover, the subject of another contribution to this symposium. We should, however, like to call attention to simple procedures, developed in our laboratory, which permit one to determine by the analysis of a single specimen of urine, collected under appropriate conditions, whether or not the body stores of thiamine, riboflavin or niacin are deficient and whether the patient in question is in need of specific vitamin therapy. The body reserves of thiamine and riboflavin are reflected in the urinary excretion of these substances, the vitamins failing to appear in appreciable quantity when the body is deficient. In the case of niacin we do not measure the excretion of the vitamin itself but that of its fluorescent derivative F₂; the latter disappears from the urine in deficient states.

The measurements are made by fluorescence technics. Thiamine is readily converted into the fluorescent substance thiochrome which gives a brilliant violet fluorescence in ultraviolet light. Riboflavin itself is easily extracted from urine and gives a yellow-green fluorescence. F₂, the fluorescent derivative of niacin, gives a pale blue fluorescence. By means of a fluorophotometer highly accurate quantitative measurements of these factors in the urine can be made, but expensive electrical equipment is not necessary. The significant information—the presence or absence of appreciable quantities of one or the other of these factors in the urine—can be obtained, after appropriate treatment of the specimen,¹⁸ by examining the fluorescence in a dark box in which an ultraviolet lamp has been installed.‡ If, for example, appreciable amounts of thiochrome fluorescence can be detected, one can conclude that the patient does not need thiamine therapy; and if riboflavin or F₂ is demonstrable in the urine, the conclusion can be drawn that the patient is not suffering from riboflavin or nicotinic acid deficiency.

These statements must be qualified in one respect; the

‡A simple and inexpensive apparatus of this type is manufactured by W. A. Taylor and Company, 7300 York Road, Baltimore.

urine specimen to be analyzed must be collected *under appropriate conditions*. A casual specimen, or a twenty-four hour specimen is of relatively little value, since the vitamins (or vitamin derivative in the case of niacin) may appear in the urine even in markedly deficient subjects as a result of a single vitamin-containing meal. In order to avoid this difficulty it is necessary to allow sufficient time to elapse after the last meal to permit the excretion of the excess of unstored vitamin ingested with the meal. A twelve-hour overnight fast is sufficient for this purpose, for we have shown that the excess of unutilizable vitamin ingested with a meal is usually excreted in the urine within eight hours.

The course of vitamin excretion after a vitamin-containing meal is illustrated by the accompanying graphs (Figs. 1, 2, and 3) which show the excretion of these factors in two-hour periods following an evening meal supplying one or another of these vitamins at different levels of intake. It will be noted that following the ingestion of vitamins there is a marked increase in the excretion of vitamin (or vitamin derivative, in the case of niacin). In the course of some eight hours the rate of excretion falls to almost a constant level, a level which is determined by the stores of this vitamin in the body. If the excretion is measured during an arbitrary period, as, for example, the thirteenth hour after a meal, this value serves as an accurate guide to the body stores of vitamin.

In practice, this "fasting hour excretion test," as we have called it, is conveniently carried out as follows:

7 P. M.—The subject is allowed to eat his evening meal as usual.

7 A. M.—On arising he voids and discards the specimen. He then drinks a glass of water.

8 A. M.—He voids again. This specimen is used for analysis. Breakfast is permitted only after the second voiding is obtained. If, by any chance, the subject is unable to void the second specimen one hour after the first, breakfast is withheld until it has been voided. The time interval is then noted (one and one-half or two hours as the case may be) and the excretion is calculated on a one-hour basis from this.

The urine specimen is analyzed for thiamine, riboflavin, and for F_2 (this last to measure niacin body stores).

Interpretation of the test. The quantity of thiamine, riboflavin, or F_2 found in the test specimen indicates the extent of the body reserves of thiamine, riboflavin, and niacin respectively. As long as any appreciable amount of vitamin (or vitamin derivative, in the case of F_2) is found in the test specimen, this indicates that the body has a surplus available for excretion, and that deficiency of that particular vitamin is not to be feared. But if no appreciable quantity of the vitamin is demonstrable in the fasting hour test, it indicates that no surplus is then available for excretion; such an individual is potentially deficient and should be given additional vitamin in his diet.

The validity of this interpretation is based on extensive data which we have obtained in the case of thiamine;

§By highly sensitive instruments and unusually delicate methods, it can be shown that even under deficiency conditions, minute amounts of vitamin are excreted. Such quantities are not detectable in the test as ordinarily used.

limited data in the case of riboflavin and niacin indicate that the interpretation given above is valid for these two vitamins also.

Advantages of this test procedure. The advantage of this procedure over the twenty-four hour excretion measurement has already been pointed out. This test avoids the interfering effect of vitamins given in the immediate diet.

The test also has distinct advantages over the so-called "load tests" in which excretion is measured after a test dose of vitamin, the deficient individual retaining more of the test dose than the nondeficient one. Such load tests, when given orally, are greatly affected by conditions which impair intestinal absorption. When given parenterally, the renal threshold for vitamin excretion may be exceeded under conditions of impaired renal function. Load tests are, furthermore, annoying because of the injection, the necessary omission of breakfast and the need of collecting urine for several hours after the test dose, inconveniences which are avoided in our procedure.

Disadvantage of the Fasting Hour Excretion Test. The test has one disadvantage. It does not permit one to evaluate degrees of deficiency more severe than those which give negligible values in the fasting hour. In other words, it permits one to say only whether or not adequate stores of vitamin are present. The more severe degrees of deficiency must still be defined by other tests, such as the various load tests.

It should be pointed out that our procedure, like all other tests which measure chemical deficiency, is subject to the limitation that it fails to reveal the cause of anatomical lesions that may remain after a chemical deficiency has been corrected. It must therefore be applied before a corrective diet or vitamin therapy is instituted.

The frequency of B deficiencies. What has been our experience in using these tests? In other words, how frequent is so-called "subclinical" B vitamin deficiency? We would like to be able to answer that question, but we are not in a position to do so at the present time. No extensive surveys are yet available. Our experience with these tests in Baltimore can be measured only in months and we shall have to have more time. But we can say this. Evidence of subnormal thiamine stores has been found in nine out of ten cases of diarrhea in children. That is our most impressive positive finding. We have also encountered among many suspects one or two instances of thiamine deficiency as well as riboflavin and niacin deficiency in badly neglected underfed children living mostly on refined carbohydrates. Our impression is that the frequency of thiamine deficiency is greatly overestimated at the present time.

It seemed possible to the writers that the human requirements for thiamine had been overestimated by those who have attempted to study this problem. It is difficult to control thiamine intake accurately when natural foods are given, for their content is at best highly variable. An accurate determination of thiamine requirements can be made only if the level of intake can be accurately controlled, as may be done in the synthetic diets given to experimental animals. We have attempted to determine the thiamine requirement of man by the use of just such

a diet. A group of human volunteers was placed on an experimental diet consisting of vitamin-free casein, "crisco," a malt-dextrin sugar mixture, a mineral mixture and a mixture of pure vitamins. This last was the only source of vitamins provided; all the ingredients were kept constant with the exception of thiamine, which was varied. It was our plan to reduce the thiamine intake to the bare minimum needed to prevent symptoms and chemical changes of thiamine deficiency. The results of this experiment, which has now continued for more than a year, are very illuminating. It was found that the daily intake of thiamine could be reduced to one-tenth of the recommended daily allowance of the National Research Council (in other words to 0.15 mg. per day for a sedentary adult male) and kept at this level for months without any evidence of deficiency developing. We then reduced the thiamine intake to zero, fully anticipating that within a few weeks all subjects would exhibit thiamine deficiency. Four of the nine developed symptoms in the course of the first month and the remaining five have continued to thrive for a period now approximately seven weeks. Since stores of thiamine are believed to be very limited, this observation puzzled us and we sought for the reason why these individuals could remain healthy without ingesting thiamine. Briefly, it was found that their intestinal bacteria were manufacturing thiamine and that there was an abundance of free thiamine in the stools. When the intestinal bacteria were suppressed by the administration of sulfasuxidine, the thiamine disappeared from the stools. The synthesis of thiamine by microorganisms in the gastrointestinal tract has been observed in the rat and in the rumen of certain ruminant animals, but has not hitherto been observed in man. The phenomenon requires much further study. We do not know as yet what organisms are responsible for the synthesis or what dietary conditions enable them to flourish; studies of these aspects are now in progress. But it is at least clear that a new protective mechanism against avita-

minosis in man has been demonstrated. We may note, in passing, that this protective mechanism is interfered with by sulfa drugs, a fact which has obvious clinical implications.

CONCLUSIONS

1. The incidence of B deficiencies in the United States appears to be greatly overestimated.
2. The biosynthesis of B vitamins in the human intestine, demonstrated by the authors for thiamine, is a protective factor against deficiency that has not hitherto been considered adequately.
3. Indiscriminate vitamin medication is not without possibilities of harm and should be condemned.
4. Laboratory tests are now available which make it possible to determine with accuracy who needs B vitamins and who does not.

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The Growth of Scientific Knowledge on the Vitamin Needs of Man

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THE coining of the term "vitamin", the chemical and biological identification of some of the vitamins, the synthesis of some of the vitamins, and the scientific proof of the causal relation between specific vitamins and some specific diseases are all achievements of the last fifty years. But deficiency diseases are ancient. And some of our forebears of hundreds if not thousands of years ago must have surmised, however vaguely, that scurvy at least was related to a dietary deficiency, for the successful therapy of this malady with fresh fruits, fresh vegetables, and fresh extracts of green leaves (pine needles) goes back several hundred years, and appears to

have been independently discovered in Europe and in America (by some of our Indian tribes).

The known story of the occurrence and the therapy of scurvy, rickets, pellagra, beri-beri or polyneuritis, diseases now known to be due in whole or in part to deficiency of specific vitamins in the diet, is quickly told, at least so far as this story bears on today's problems of diet and disease. Vitamin deficiency diseases undoubtedly antedate recorded human history, for they can be brought on by food scarcity alone, quite apart from the processes of storing, salting, drying, cooking, and refining foods. Although man, even way back, appears to have been, by necessity or by preference, fairly omnivorous, occasional

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or chronic food scarcity sufficient to produce disease undoubtedly occurred, for these diseases are even older than *homo sapiens*. We may assume that our earliest human forebears met these food deficiency diseases in the same way as does the wild animal today, that is, by eating more and by eating a greater variety of natural foods, when these were available and restored health, without any clear conception of cause and effect. This simple "trial and error" method is also older than man. Our 20th century contribution to this method of learning the causes and cures of vitamin deficiency diseases is mainly this: *more people now see more clearly that only by well controlled trials on mice and men will we ever eliminate the errors*. This is the essential of our science in modern biology and medicine. This could and would have made even our own day bright, and our path fairly clear as to causes, cures, and preventions of the vitamin deficiency diseases, had not the inertia of habit, the fog of lay ignorance, the wishful thinking of some workers in biology and medicine, the chronic clouds of quackery, and the ever clever vortices in the dust of commercial venality still befuddled the minds of investigators, physicians, and patients.

Inadequate intake of vitamin A brings on no readily recognized or specific symptoms, unless the lack is extreme and chronic. And even then the lesions in the cornea and conjunctiva may be confused with local infections, the impairment of growth in the young may be due to many other factors, and not all forms of night blindness stem from deficiency of vitamin A. There can be little doubt but that at times sufficient lack of vitamin A in man's diet has occurred way back, sufficient lack to bring on some of the above symptoms. But no vitamin A deficiency disease as definite as scurvy, rickets, or beri-beri, appears in human records prior to the present century. To be sure, something interpreted as night-blindness is referred to in Papyrus Ebers (1500 B.C.), and even liver therapy of the condition may be hinted at in that document. But that medical document is largely a collection of incantations and other forms of superstition and ignorance. And let us not forget that the liver was a potent tool of the soothsayers of those days. Towards the close of the last century two investigators (Luin, 1881; Pekelharing, 1905) showed by controlled experiments on animals that when all the then known constituents of cow's milk were purified, recombined and fed to animals, growth was retarded and the final issue was early death. But growth is impaired by prolonged and serious deficiencies in any one of the essential factors of the diet (protein, calories, inorganic salts, and vitamins A, C, thiamine, riboflavin, and niacin). Vitamin D deficiency to the point of definite development of rickets may not be accompanied by definite retardation of body growth. Therefore, measurement of growth of the young is not a criterion of vitamin A adequacy or inadequacy of the diet, unless all the other known factors are present in abundance. An experiment along this line was reported by the English biochemist, Dr. F. Gowland Hopkins in 1906. That experiment blazed the trail for the discovery of vitamins A and D.

Rickets is an old disease, probably antedating man.

The symptoms of rickets were clearly described by the English physician Gilson four hundred years ago, but the relation of rickets to vitamin D, to the ultraviolet rays from the sun, to the calcium and the phosphorus in the diet, and to the absorption of these substances from the intestine, as well as the relation of the parathyroid hormone to the deposition and release of calcium in the bones, was not understood till the present century. In the nineteenth century rickets was probably the most common vitamin deficiency disease in the temperate regions of the world, including the United States. For our clothing interferes with the production of vitamin D in the human body, by the ultraviolet sun rays.

This vitamin deficiency disease is an illustration of the complex factors involved in the genesis and the therapy of at least some of the dietary deficiency diseases. Rickets is still a problem in our land, for recent studies at Johns Hopkins hospital indicate that sub-clinical rickets in children is much more prevalent than we would expect from the incidence of this malady recognizable by clinical tests on the living child now at our disposal. It is now very clear that in the preventive and curative therapy of rickets we must reckon with many factors other than the abundance of vitamin D in the diet of the growing child.

Beri-beri, according to R. R. Williams and T. Spies, was recognized as a specific disease by the Chinese nearly 3000 B. C. The first important step to prove that beri-beri is a dietary deficiency disease was taken in 1885 by the Japanese. By the substitution of barley, fish, etc., for a considerable part of the polished rice in the ration of the Japanese sailors, the incidence of beri-beri among these sailors was greatly reduced. This demonstration appears to have made scant impression on contemporary medical men, either in the Orient or in Europe and America. They were still under the teaching that proteins, calories, and inorganic salts were the only dietary essentials, despite the known etiology and therapy of scurvy. The next great step was taken by the Dutch physician Eijkman, working in Java, who in 1897 produced in chickens the nervous disturbances of human beri-beri by feeding initially healthy chickens the prevailing human diet in the Orient: polished rice. Feeding chickens unpolished rice did not produce the disease. Therefore, the missing factor or factors must have been in the part of rice removed by the polishing process. But Dr. Eijkman did not at once draw this seemingly obvious conclusion. But this was soon proved to be the fact and opened the door to a veritable wonderland: the vitamin B complex, a land still not fully mapped.

Pellagra is to a certain extent the occidental counterpart of the oriental beri-beri. Some of the pathologic physiology of these two diseases overlaps. Naturally, both these maladies may at times be complicated by other diseases, such as infections, which confused the earlier observers. Pellagra prevails in countries or sections where Indian corn (maize) makes up a considerable part of the daily diet (Russia, Egypt, Italy, United States). Since the disease appeared to be more prevalent in years when climatic conditions increased the spoilage of corn by moulds, there was a possibility that pellagra was a form of chronic food poisoning, and was not due to a food de-

iciency. This possibility was largely discounted but not disproved by the classic work of Goldberger in 1915, who produced pellagra in healthy persons on diets now known to be low in the water soluble vitamins, especially niacin. The next big step was the production and the cure of pellagra (black tongue) as this disease appears in dogs, by the type of diets inducing and curing pellagra in man. But even after the studies by Goldberger became known and were accepted, the possibility that food poisons, as well as infections, played a role in the genesis of this disease was still entertained by not a few competent men. While the dietary deficiency inducing pellagra is primarily in niacin and in others in the B group, protein deficiency and chronic infections frequently complicate the picture.

Scurvy. The successful therapy of scurvy by extracts of fresh pine needles, as well as by eating fresh vegetables and fruits, dates back at least 400 years. But the experimental production of true scurvy in the guinea pig by Holst and Froelich did not come till the early part of this century (1912). The isolation, identification, and synthesis of the C vitamin (ascorbic acid) are all achievements of the past two decades. Frank or advanced scurvy is now almost non-existent in our country, but impairments of health (such as capillary fragility, decreased resistance of the liver to specific poisons, etc.), by chronic low intake of the C vitamins, may not be so rare, according to recent studies on man and animals. The C vitamin is less resistant than some other vitamins to storage, drying, and cooking of foods, but Vilhjalmur Stefansson showed that there is enough C vitamin in fresh meat (when eaten raw) to prevent and cure scurvy. In addition to storage of this vitamin in animal tissues, it is widely distributed in fresh foods of plant origin. And on a reasonably abundant and omnivorous diet, there is certainly sufficient storage of C in the tissues of man and other animals to carry them in fair health for months on winter foods, or on no food at all (hibernation). So it is not true that we *must* have orange juice every day in order to maintain the abundant life.

WHAT ARE THE OPTIMUM VITAMIN NEEDS OF MAN?

Here even the most competent and conscientious physician is in a dilemma. Clinically recognizable vitamin deficiency diseases are now rare in our country, except for pellagra in the South. Laboratory and clinical tests detecting incipient vitamin deficiencies are as yet largely in the experimental stage.

The blood plasma concentration of vitamin C and the daily urinary excretion of vitamin C, in the absence of definite and specific physiological and clinical symptoms of vitamin C deficiency, apparently have not yet helped us to fix either the minimum or the optimum quantity of vitamin C in the diet. (*Nutrition Reviews*, 1:142, 1943.) But some clinical writers claim that bleeding gums, spring fatigue, gastrointestinal and respiratory infections, capillary hemorrhages, dental caries, pyuria, (and, on the basis of therapy, *hemophilia!*) are caused by or aggravated by subminimal intake of vitamin C.

According to Drs. Holt and Najjar, fasting (12 hours after the meal) urine may show no thiamine, without the

subject or patient revealing any other recognizable thiamine deficiency symptoms. But time, rate of physical work, and the numerous other factors in health prevent us from drawing too dogmatic conclusions from these experiments. However, the authors seem justified in pointing out that the National Research Council's recommendation of 1.5 mg. of thiamine as the daily requirement of the average adult is too high by 100 per cent.

According to Dr. H. R. Sanstead (U. S. Public Health service), the common capillary invasion of the cornea beyond the limbus is not a specific sign of riboflavin deficiency, and is not influenced by riboflavin therapy. Cheilosis, vascularizing keratitis, and magenta colored tongue with flattened papillae are clearly not specific for riboflavin deficiency and may not respond to riboflavin therapy even when this is accompanied by the eating of a greater quantity of better foods (*Nutrition Reviews* 1:327, 335, 1943). And prolonged subsistence on diets below the daily intake of this vitamin recommended by the National Research Council does not usually bring on distinct symptoms of deficiency, even when by the tissue saturation tests the tissue reserves of this vitamin are gradually decreased. The concentration of niacin and riboflavin in the tissues seems to depend on the level of the protein in the diet, irrespective of the levels of intake of these vitamins (Sarett and Perlzweig, *J. of Nutrition* 25:173, 1943).

It is most unfortunate that the prolonged and, apparently, well-controlled tests on low (about 0.5 mg. per day) thiamine ingestion by Williams, Mason, Smith and Wilder (*Arch. Int. Med.* 69:721, 1942), were made on psychiatric patients committed to a state hospital, since the most definite symptoms of deficient intake of this vitamin in man are related, directly or indirectly, to disturbances in the nervous system. We cannot get reliable data on the thiamine needs of a person with an average normal brain from studies on the population of a hospital for the insane. At any rate, Drs. Holt and Najjar of Johns Hopkins Hospital discovered no deficiency symptoms in 12 male subjects after months on a diet containing 0.375 to 0.625 mg. thiamine per day, that is about the same or lower thiamine intake as in the Mayo Clinic experiment on psychiatric patients.

Fatigue, or increased susceptibility to fatigue from physical work, is probably a sequel to all chronic dietary deficiencies (calories, proteins, vitamins, inorganic salts). Such increased fatigability is indicated on prolonged subminimal intake of thiamine (Ivy, et al., *Proc. Central Soc. Cl. Res.* 15:20, 1942). But the quantitative determination of fatigability is full of pitfalls, especially in uncontrollable psychological factors, and calls for so much time both on the part of the patient and the physician that this method is virtually out of the question, even in the strongest clinics and hospitals. And merely the record of the patient's opinion or the report on this point on the patient's history sheets gives no reliable data for the doctor and contributes little or nothing to medical advance, especially in an era, like the present, when the daily press and the hourly radio promise supreme pep and power from vitamin pills. To be sure, it is reported that, if hard physical work is performed daily on a diet

otherwise adequate but almost devoid of the vitamin B complex, increased fatigability may be demonstrated within a week (Johnson et al., *Jour. of Nutr.* 24:586, 1942). This would seem to prove a very rapid depletion of the tissue stores of these vitamins under these conditions. However, giving daily the vitamin B complex in excess of the amount recommended by the National Research Council (1.5 mg.) and provided by our Army ration does not give added power to perform physical work without incurring fatigue (Keys and Henschel, *J. Nutrition* 23:259, 1942). In later experiments (in press, *J. Nutrition*) the same authors, using healthy young men, over a period of three months, found no increase in fatigability, or any other evidence of thiamine deficiency, when the daily intake of this vitamin was cut to about one-half that recommended by the National Research Council, that is, to 0.25 mg. per 1000 calories, instead of 0.6 mg. per 1000 calories.

We have travelled far since the classic experiment of Gowland Hopkins in 1906, but not far enough to put all our dietary health insurance on the 1943 synthetic vitamin pills. According to Waisman, Rasmussen, Elvehjem and Clark, the rhesus monkey cannot live on a purified diet of sucrose, casein, salts, corn oil, vitamin C, and all eight of the now known vitamins in the B group, but when liver in the amount of 3 per cent is added to this synthetic diet nutritional adequacy appears to be attained (*J. Nutrition* 26:205, 1943). This brings us almost back to 1906. The natural foods are still on top.

The public has been rendered "vitamin conscious" by the press, the radio, and by the less critical laboratory and clinical workers in nutrition. The detail man is eloquent and persuasive. So, lest we overlook a bet, we join the vitamin band wagon. Even our Councils of Pharmacy and Chemistry and of Foods and Nutrition have given provisional approval of the old "shotgun" therapy in the form of commercial vitamin mixtures (*J. A. M. A.* 119:948, 1942). Another straw pointing to the strength and direction of this monsoon is the following assertion in *Nutrition Reviews* (1:36, 1942): "Everyone now recognizes the indispensability of vitamin C and vitamin D additions to the diet of the normal infant. Every infant whether breast or bottle fed should be given early and regularly a generous supply of codliver oil or some other source of vitamin D.—When formula fed, orange juice or some other source of vitamin C should be supplied." I readily admit that adding codliver oil and orange juice to the infant's diet is an insurance against rickets and scurvy, but to imply or assert that without this insurance rickets and scurvy are inevitable goes contrary to present knowledge, contrary to present and past human experience. The writer (now 69) was breast fed, but never had codliver oil in infancy or childhood. He had not seen or tasted citrus fruit or tomatoes till he was 16 years old. He is 5 feet 11, has 28 of his "permanent" teeth still workable and no x-ray evidence or other sequelae of childhood rickets and scurvy. Dr. A. H. Siebrell stated recently, "It is significant that almost all practicing physicians are prescribing vitamin preparations for more and more of their patients." Significant of what? Commercial advertisers and detail men of the vitamin pill industry prescribe even more vitamin pills on

laymen's self diagnosis. Neither fact proves an increasing need of vitamin pills for the abundant health of the people. There was a time when the practicing physician prescribed more and more phlebotomy, more and more leeches. The only significance of that fact was ignorance and wishful thinking on the part of that generation of physicians. Dr. Norman Jolliffe lists "constipation, irritability, and fatigue" as nutritional deficiency diseases. On that medical dictum it should not be difficult for the vitamin pill salesman to foist his wares on almost everybody on some occasion, except for the equally rosy promises from chewing gum, cigarettes, and Carter's Little Liver Pills.

We are told by a colleague in chemistry: "It is recognized already that one vitamin can and does cure mental derangements." This is stated without qualifications, while as a matter of fact mental derangements are due to a great diversity of factors, including heredity, mechanical and chemical trauma and cerebral ischemia. The value of the vitamin B complex in mental derangements seems to be largely limited to those accompanying advanced pellagra and chronic alcoholism. The 1942 faith and hope in universal health miracles from synthetic vitamin pills seem premature, if not immature. When I see our institutions for the feeble-minded and the insane evacuated and closed by giving any or all of our 1943 variety of vitamin pills to these unfortunate fellow citizens I, too, will sing "Hosanna to the Highest." This scientist goes on to say: "Good diets, which mean an abundant supply of vitamins, promote intellectual keenness. . . . There can be no doubt that much dullness on the part of school children . . . can be traced in part to lack of the proper kind of food and especially lack of enough vitamins." These are broad and important generalizations. But I know of no evidence that an ample ingestion of vitamin pills will materially improve the scholastic record of millions of children and young adults in our schools. These assertions are just too good to be true. Human biology is not that simple.

Another colleague in chemistry tells us that the Germans "have enjoyed a more generous supply of thiamine and other vitamins which grains provide than have the people of Scandinavia, the Low Countries, France, Spain, Italy or the British Isles. Perhaps pacifism is a product of malnutrition." Yes, the god Mars is traditionally pictured as a well-nourished specimen, and if good nutrition leads to war, and malnutrition to the striving for peace, what kind of diet has enabled men to discover the scientific method, to develop a sense of justice, a spirit of fair play, a love, respect and preference for truth and individual honesty? Are modern science and modern education sequelae of malnutrition?

Recently a subcommittee on medical nutrition of the National Research Council presented a report on malnutrition, under the heading, "Recognition of Early Nutritional Failure," and with two tables of signs and symptoms. I fully agree with this committee when it says: ". . . there is imperative need for (a) determination of the actual incidence of early deficiencies among the general population and for (b) the establishment of satisfactory diagnostic criteria for the recognition of such conditions." But after tabulating no less than twenty-

nine alleged signs and symptoms of early or incipient dietary deficiencies that even laymen might observe and diagnose, the committee seems to wipe out its entire tabulation and report by this statement: "Implicit in the definition of the problem and in the foregoing statements is the fact that no symptoms or physical signs can be accepted as diagnostic of early nutritional failure. Certain symptoms and physical signs, however, when verified by a competent physician and when other possible causes have been ruled out, should be considered as significant indications." If this latter statement is true, and I subscribe to it, their tabulation is misleading, if not false *in toto*, in so far as present known facts of incipient dietary deficiencies are concerned.

The committee lists lack of appetite as a sign of incipient malnutrition. This is contrary to my experience, both in man and in animals. I saw thousands of undernourished people on the continent of Europe in the winter of 1919, but, unless moribund, these people were eager for good foods. They ate the most unappetizing foods. At the end of over forty days of complete starvation a person, otherwise normal, has an appetite for food keener than at the start of the fast. I have had dogs, for various research purposes, fast much longer than forty days. At the end or towards the end of these long fasts, these dogs grabbed food eagerly. To be sure, the rat on a diet deficient in vitamin B complex will after a while eat less and less of this ration. But it will, unless moribund, eat a better ration. So appetite is not lacking. But it is clear that appetite for food being impaired by any cause will ultimately lead to malnutrition.

The alarming claim (100,000,000 Americans do not have a good diet) for national malnutrition in our land appears to be based primarily upon a series of surveys conducted by the Bureau of Home Economics of our Federal Department of Agriculture. These surveys embraced some 4,000 urban and village families of various levels of income and some 2,000 rural families of varying levels of income, selected from representative regions of our country. The surveys consist in reports from these families as to how much money they spent for food and what kinds of food were bought and, in the case of rural families, how much and what kind of food they consumed from the crops on their own farms. The field investigators had to take, or did take, the people's word for all these alleged facts. It is impossible to determine the degree of accuracy as to memory of whatever members of these families gave the facts or alleged facts to the enumerators. The precarious character of such data should have been apparent to any scientist who is free to work and think.

On the basis of the kind and quantity of the food bought or grown on the farms, the Bureau of Home Economics estimated the diets of these families as "excellent", "good", "fair" or "poor". No physical or medical examination was made of the members of these families. Not even such a simple physical fact as the determination of the body weights of the people involved seems to have been undertaken. The necessity of such checks should also have been evident. The value of these statistics must largely be left up in the air as regards evidence for good or bad nutrition in our country because

of the neglect of such an obvious factor as medical evidence of the health status of the people concerned. Criteria and standards for the estimation of the quality of diets are still largely arbitrary and matters of definition.

How does Dr. Parran's interpretation of these statistical studies by the U. S. Bureau of Home Economics check with data from other sources? Hospital statistics (admission, mortality rate) do not reveal significant national malnutrition in the United States, except for pellagra in the South. Of course, the mortality statistics reveal only terminal malnutrition, and admission statistics tell us only of malnutrition recognizable by present tests. Chronic malnutrition shortens the life span, but last year the average length of life of our citizens reached an all-time high of 63.42 years. There is some statistical evidence that our children are growing faster and taller than in the past, that college freshmen are taller than they were a decade or more ago. Children and youths do not grow faster or taller on inadequate diets. We admit freely that these statistics do not cover our entire population. They are, however, indices. Malnutrition on a national scale does not lead to obesity, quite the reverse. This is certainly true of the experimental animals and that was my observation in the war-devastated countries in Europe at the conclusion of World War I. Recent studies by the Life Extension Examiners show that 10 per cent or more overweight is nearly three times more prevalent (28 per cent) in the United States than 10 per cent or more underweight (12.8 per cent). It is a curious coincidence that the percentage of obesity in our people should come so close to Dr. Parran's estimate of the people having a good diet (25 per cent). The obese may enjoy a good diet, but they do not use it wisely. Apart from pellagra, perhaps obesity is the most serious aspect of malnutrition in our country.

If 100,000,000 Americans, in times of peace and food plethora, had poor diets, that condition should have been revealed on medical examination of our millions of young men for our Army and Navy. All these data are not yet assembled and analyzed, but according to Dr. Rowntree, the first 800,000 men, age 21 to 35, examined in the 1941 U. S. Army draft had an average height of 67.5 inches, or exactly the same average height as our drafted men in World War I. But the 1941 men were on the average eight pounds heavier than the Army men of 1917-1918. We do not know whether these eight pounds represent muscle, bone or fat. These data on the 1941 draftees do not point towards an overwhelming malnutrition in our country. This should give us some assurance and some happiness. But we should not be content, we should not rest on the oar until we have discovered more adequate tests of incipient malnutrition, until we have cleared our land of myopic food practices, until we see the dawn of understanding dispelling our fog of ignorance as to the nature of health and the nature and role of foods, until we have reached first base, at least, in driving pellagra from the American home.

The growth of our understanding of the vitamin needs of man is a record of much blundering ignorance, some wishful thinking and a slow progress through controlled observation and experiments on man and other beasts. Blundering ignorance as to food composition and man's dietary needs brought on us the classic vitamin deficiency diseases (rickets, scurvy, beri-beri, pellagra). The striking results of good food therapy in these diseases have engendered in our generation the utopian hope that a greater abundance of vitamins will rid man of nearly all real and imaginary ills. But more and better controlled observations and experiments will restore sense and scientific sanity, will remind us again that life is just not that simple.

News-Letter of the American Student Health Association

STUDENT HEALTH CENTERS

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Public health work clearly has made good in those diseases which are subject to attack by environmental, law enforcement, or other methods applicable to masses of people. Other diseases appear to require personal, active, popular participation in control methods. This has introduced the clinical approach to public health.

Decentralized public health organization has introduced the term "Health Center." This means established building centers for local areas where local health officers and their workers may carry out modern public health work either as official or voluntary agencies or both. The centers have been faced with the establishment of clinics of various types, in their attack upon disease which does not respond to methods of sanitation.

Over a period of three decades such centers have developed in great variety at our American colleges and universities. Under all sorts of names, and with great variation in programs, most institutions of higher education have some such centers under their control to meet the general problem of student health and related instruction. These centers usually assume a considerable degree of responsibility for public health practices for the college population. This has resulted in the establishment of clinics of the types required in official public health practice and, because of the peculiar college and student situation, the college often is forced to establish clinical facilities or supervision traditionally associated with the private practice of medicine.

It would appear that by public health centers which probably will be established widely in the future, the colleges have an opportunity to work out many problems of the relation of public and private interests.

PERSONAL NEWS

The Council voted against calling a general meeting in New York City to coincide with meetings of the American Public Health Association October 12-14. Because of an urgent request to organizations from the Office of Defense Transportation to limit civilian travel and because of the difficulty of health service staffs to leave their work at this busy time in the fall it seemed advisable to forego a general meeting in October. In accordance with tentative plans made last March, an annual meeting is contemplated for late in the winter. The dates of the meeting will have to conform, as much as possible, with end of term breaks in the school year.

Members will be doing a service if they will write, expressing their opinions on the need for the general meeting in the face of congested travel conditions, the dates when most staffs can send representatives, and their preference for discussion topics.

Dr. Charles E. Shepard is now stationed in Washington, D. C., with the title of Director, Personnel Training

Program with the Coordinator of Inter-American Affairs in the Office for Emergency Management.

After four years as physician and director of Student Health at Texas State Teachers College for Women at Denton, Dr. E. A. Taylor has resigned to join the staff of the Terrell Laboratories and Clinic in Fort Worth, she is succeeded by the former incumbent of the North Texas State Teachers College post.

Chronic Granuloma Following Typhoid Booster Dose. Tilden and Arnold, in the July (1943) issue of *Archives of Pathology*, describe a granulomatous reaction which occurred in 6 of 4,500 persons who received intradermal injection of triple typhoid vaccine. The vaccine was prepared by the U. S. Army, using the Boxill strain. The reaction, so far as is known, is of cosmetic importance only.

Immune Rabbit Serum in Rocky Mountain Spotted Fever. Topping, in *Public Health Reports* of May 14, 1943, reported treating 52 patients with Rocky Mountain Spotted Fever Immune Rabbit Serum. Only 2 of the 52 patients died, a fatality rate of 3.8 per cent, as compared with an expected rate of approximately 18.8 per cent. The 2 patients who died were men, aged 66 and 72 years.

Another Penicillin-like Antibacterial Substance. Bush and Goth, in the June (1943) issue of the *Journal of Pharmacy and Experimental Therapy*, report another powerful bacterial substance somewhat comparable to penicillin. This substance, called "Flavicin", is produced by a mold belonging to the *Aspergillus flavus* group. Flavicin appears to be more active against the *Brucella abortus*, the *Staphylococcus albus*, the *Bacillus anthracis* and the *Corynebacterium diphtheriae* than is penicillin. Toxicity studies on Flavicin have not yet been reported.

The Results of Sulfonamides in Pneumonia. In a statistical study of a large group of insurees with the Equitable Life Assurance Society, Ungerleider, Steinhaus and Gubner found (*American Journal of Public Health*, September 1943) that since the advent of the sulfonamides:

(1) The case fatality rate from pneumonia had fallen from an average of 20.8 per cent to 3.9 per cent.

(2) The total duration of illness in pneumonia had decreased from the modal period of 38 days in 1935 to 27 days in 1941.

(3) The incidence of pneumonia had increased from an average of 2.6 per 1,000 annually to 3.0 per 1,000.

They calculate that sulfonamide therapy now saves the lives of 25,000 industrial workers annually, as well as reducing lost time due to illness in industry by 1,000,000 working days.

Activated Sludge Renders Polio Virus Non-infective. Carlson, Ridenour and McKhann, in the September (1943) issue of the *American Journal of Public Health*, report that activated sludge in amounts as low as 1,100

parts per million, with 6 hours aeration, will remove or inactivate a mouse-adapted strain of poliomyelitis virus to a sufficient extent to reduce, greatly, infectivity for mice injected intracerebrally. "Heavier concentrations of sludge with longer aeration periods largely eliminate infectivity."

Active Immunization with Tetanus Toxoid. Fraser, MacLean, Plummer and Wishart, in the September (1943) issue of the *American Journal of Public Health*, report as follows on their studies of immunization with tetanus toxoid:

(1) The response in antitoxin in persons given three doses of toxoid is better than in persons given only two doses.

(2) A combined antigen, made up of typhoid, paratyphoid A and B vaccine, suspended in tetanus toxoid (T.A.B.T.) given in three 1 ml. doses, three weeks apart, stimulated the production of at least 0.02 unit of antitoxin in 99 per cent of 79 persons, and at least 0.1 unit in 87 per cent.

(3) Results suggest that tetanus toxoid with the typhoid element added is more effective than without.

(4) The antitoxin response to a "recall dose" is less in persons with low levels of antitoxin than in persons with relatively higher levels.

They recommend "that the first recall dose of T.A.B.T. (4th dose) be given not less than three and not more than six months after the primary series of injections."

Effect of Intramuscular Injection of Atabrine. In the August 14 (1943) issue of the *British Medical Journal*, Frank Hawking, D.M., reported that histological examination of the tissues of rats and rabbits, after subcutaneous and intramuscular injection of atabrine musonate, always showed a certain amount of necrosis at the site of injection. The damage produced by the atabrine is similar in character to that caused by the injection of quinine, but less than one-third as extensive. The author concludes that, though these findings do not contraindicate the parenteral use of atabrine in patients who cannot take it by mouth, they should be borne in mind when choosing between the intramuscular and the intravenous routes.

Atypical Pneumonia due to Streptococcus Viridans. In the June (1943) issue of the *American Journal of Medical Sciences*, Solomon and Kalkstein describe 5 cases of atypical pneumonia in which the etiologic agent appeared to be the *Streptococcus viridans*, since this organism was recovered from the blood or pleural fluid as well as the sputum. These cases exhibited (a) a prolonged severe course with high mortality; (b) severe pleuritic reaction with serous effusion; (c) failure to respond to sulfonamide therapy.

Immunity Produced by Clostridium Welchii Toxoid. Sarah E. Stewart, Bacteriologist, U.S.P.H.S., in the January (1942) issue of *War Medicine*, reported that she had succeeded in immunizing guinea pigs with *Clostridium Welchii* toxoid so that they are resistant to many lethal doses of toxin or to viable culture injected either intraperitoneally or intramuscularly.

More recently, she compared protection against viable

culture vs. protection against toxin and found that guinea pigs immunized with this toxoid alone were more resistant to massive doses of viable culture than to equivalent "minimal lethal doses" of toxin.

Now, in the *Public Health Reports* of August 20, 1943, the same worker reports a study of the mechanism by which this somewhat unexpected phenomenon is brought about. The answer is that the antitoxin "renders the toxicogenic bacteria nontoxic and susceptible to the action of phagocytic cells."

British Experience with Bacillary Dysentery. A recent report of the July (1943) meeting of the Army Pathology Advisory Committee (British) brought out the following points with regard to bacillary dysentery:

(1) Most Shiga and Flexner infections yield promptly to adequate dosage with sulfaguanidine or succinyl-sulfathiazole and stools become regularly negative for these organisms at an early stage.

(2) Sonne infections do not respond as well to these sulfa drugs, and tend to persist in the stools for long periods even if the clinical symptoms have cleared.

(3) When dysentery cases are not bacteriologically clear in 14 days on sulfa medications by mouth, a two-ounce retention enema of 10 per cent sulfaguanidine in normal saline, if given at daily intervals, will usually render the patient non-infective in a maximum of 28 days.

(4) Sonne infections are infrequent in the Middle East, frequent in England.

British Treatment of Malaria in Returned Service Men. Clark, in Vol. II, No. 1 (1943) issue of the *Journal of the National Malaria Society*, states that the standard treatment, in the British Army, of malaria occurring in individuals returning from service in malarious areas is as follows:

Days 1 and 2—Quinine bisulphate or quinine hydrochloride, grains 10 in solution, in one fluid ounce of water, by mouth, three times in 24 hours.

Days 3, 4, 5, 6, 7—Nepacrine hydrochloride (equivalent of our atabrine), 0.1 gram tablet, three times a day, swallowed whole with a draught of water, after food.

Days 8 and 9—No antimalarial drug treatment.

Days 10, 11, 12, 13, 14—Pamaquin (equivalent of our plasmoquine), 0.01 gram tablet, three times a day, after food.

Roentgenological Chest Surveys of Recruits. Richards, in the *American Journal of Roentgenology* of January, 1942, stated that as the result of x-ray examination of 328,325 recruits for the Canadian Army (using 14x17 inch film), 1.6 per cent were rejected. Of the 5,273 rejected, 3,076 were rejected for tuberculosis, 1,088 for non-tuberculous pulmonary disease, the remainder for cardiac or other conditions. He estimates that investing \$600,000 in this survey saved the Canadian government over \$20,000,000 (the cost of each such case to the government, if it had not been discovered before induction, being estimated at \$4,000).

Sulfathiazole in Vincent's Infections. Hirsch and Spingarn, in the September (1943) issue of the *Military Surgeon*, report success in treating Vincent's (fuso-spirochetel infection of the gums and throat with sulfathiazole. The dose used was 4 grams daily for 2 to 6 days.

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MINNEAPOLIS, MINNESOTA, NOVEMBER, 1943

VITAMINS

Nothing since the dawn of time, since the creation of Adam and Eve, or, shall we be content to say, since the very first page of medical history, has caused such widespread interest as the development of the appreciation of vitamins.

With every new discovery, vitamins are found to have more and more general application. Men of science describe, in terms that the laity does not always understand, how this or that avitaminosis has been corrected, thereby overcoming some obscure disease that previously baffled conscientious endeavor on the part of the medical profession. The story of these accomplishments is hailed by an eager world. Newspapers and magazines play it up and the appeal to the laity is natural. The word itself bespeaks life. Vitamins are useful in sickness and in health. And where is the man, pray tell, who even in

health does not wish to be stronger and have health more abundant? Promise of "vim, vigor and vitality" was the chief attraction in the days of medicine shows, and now every mother's son who makes or sells foodstuffs of any kind must give assurances that his product has been enriched to supply these very requirements. The government is faithfully providing vitamins for our fighting forces and radio programs urge a maintenance dose from this day until death. The resultant popularity has called forth mirth-provoking comments that do no good. The so-called vitamin craze should not be ridiculed. In ethical hands it isn't a racket; it is something very wonderful. Therefore it behooves the medical profession to so master the subject of vitamins that the natural procedure is for the patient to advise with his doctor rather than attempt vitamin self-medication.

A. E. H.

HOW TO PREVENT COLDS

In 1908 my father built a sleeping porch on our house. We would all sleep out there in the winter, if it got cold enough, he said, and we wouldn't have any more colds. So we all slept out on the sleeping porch. All I can remember about it now is that we had fun out there but I was tired all the time and was glad to get to school where I could sleep.

Then we started taking cold baths. My father rigged up a rubber shower contraption so that everybody could get up and have an ice-water shower first thing in the morning. That was so that we wouldn't have any more colds. Cold showers went on for quite a while and were very jolly. Everybody slapped and snorted and shrieked in his turn and then waited to hear the next victim. We caught father using some warm water one morning, so the whole system broke down. I don't remember having any colds in those days but that was forty years ago.

When I got older and left home, I didn't do anything about colds except carry a handkerchief. Those were busy, exciting days in which I don't remember about colds. Otherwise occupied.

Now, in the year 1943, my wife says we should do something so the children won't have colds. She turns to me because I am a doctor and she doesn't know any better. Well, let's see, there have been quite a few fads about colds. Sunlamps, codliver oil, vaccines, and now we sleep with the windows closed. I think maybe the best thing would be to build a sleeping porch where the kids can take up the family pillow fights where they left off in 1910. I don't remember any colds then—or much of anything else.

L. M. D.

EMERGENCY MATERNITY AND INFANT CARE IN NORTH DAKOTA*

The House of Delegates of the North Dakota State Medical Association, at its annual meeting in Bismarck last May, rejected the plan proposed by the United States Children's Bureau for the emergency maternity and infant care of service men's wives and infants. Our association has been subjected to considerable adverse comment since that time. The latest reports indicate that North Dakota and Louisiana are the only states in which a plan is not in operation. Attempts were made, since last May, to adopt a plan whereby the hospitals in the state would provide free hospitalization for the individuals covered by the act. However, the hospital plan carried a proviso that the physician attending the wife or infant would be required to sign a statement that he was not charging a fee for his services. Obviously this proviso was objectionable to the hospital administrators, as well as to the medical profession, so the hospital plan was rejected. A joint committee consisting of representatives of the state hospital and medical associations was recommended to study the problem. This committee met in Fargo on September 12, 1943, and adopted a plan to be submitted to the respective associations for consideration. A special meeting of the Council of the North Dakota State Medical Association was then called. The Council met in Fargo on October 3, and adopted the

plan recommended by the joint committee. The plan is as follows:

Emergency Maternity and Infant Care Program (E.M.I.C.)

1. 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 for medical maternity care and not to exceed \$10 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 certification, 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.

A detailed plan, based on the above plan, is being submitted by the North Dakota State Health Department to the Children's Bureau. It will be interesting to note the attitude of the Children's Bureau toward this proposal. The Council felt that the wives of service men should not only have the right to choose their own physician, but also to make whatever financial arrangements are necessary. If a stated allotment for this service is not permissible under the terms of the act, attempts should be made at once to amend the act.

L. W. L.

*For detailed presentation of plan as administered by state health departments, see October issue; paper by Edith M. Sappington, M.D.

Book Reviews

Your Own Story, Human Reproduction simply explained, by MARION L. FAEGRE, Minneapolis; Minnesota State Department of Health, 64 pages, pamphlet, mailed free to citizens of the state on request.

"An attempt to provide answers to some of the questions young children ask," something over two-thirds of the booklet being devoted to replying to the child directly, in language that he can understand, and the remainder being addressed to parents. This is another in the series by Dr. Faegre, as a member of the faculty of the University of Minnesota. A foreword has been written by Dr. Haven Emerson. The text has been prepared for and published by The Minnesota Department of Health, Division of Child Welfare, and copies may be secured from that office.

Neurosurgery and Thoracic Surgery: Volume VI of Military Surgical Manuals: prepared and edited by the Subcommittee on Neurosurgery and Thoracic Surgery of the Committee on Surgery of the Division of Medical Sciences of the National Research Council; Philadelphia, W. B. Saunders Co., 310 pages, 1943, price \$2.50.

The high mortality rates of central nervous system and thoracic injuries in modern warfare and the special nature of these injuries emphasize the need for this clear, concise text on the subjects. It is written by authorities in these fields and under the auspices of the respective sub-committees of the Committee on Surgery.

Much of the information on neurosurgery is based on experiences in the war of 1914-1918 with additional reports from the present war. The section on thoracic surgery includes information dealing only with the special problems encountered, practical diagnosis and applied therapy, and makes no attempt to completely cover the subject. References and 103 photographs and anatomical drawings supplement the written text.

Gastro-enterology (in three volumes) by HENRY L. BOCKUS, M.D., Professor of Gastro-enterology, University of Pennsylvania Graduate School of Medicine. Separate index volume. Three volumes total about 2,700 pages, fully illustrated. Philadelphia, W. B. Saunders Co., 1943, price \$35.00.

Volume I: *Gastro-Enterology*. With the publication of the first volume of a projected three-volume work, Dr. Bockus has begun to fill the need, long apparent, for a compendium of information concerning gastro-enterology. Single volumes, under single authorities, and other edited collections of several authors, have appeared in recent years; outlines for students and monographs on particular diseases have been presented. Many of these have been important and useful; but there was a lack of a definite, authoritative and interpretative treatise covering the total field of gastro-enterology. This gap in medical literature has now been adequately filled by *Gastro-Enterology*.

The first volume, dealing with the esophagus and stomach, is now at hand. Written by one with broad experience in the field, the content is encyclopedic, but at the same time pointed with personal opinions and sound conclusions. A fair presentation of all worthwhile ideas on controversial subjects, such as the etiology of peptic ulcer, is given, emphasized by the forthright judgment of a practitioner and experimenter. For integration and coherence, the writing reminds one of Osler; the advantage of single authorship of a medical text is amply proved.

The references are to the most recent work in gastro-enterology, buttressed by sufficient, but not burdensome, historical background source material.

In the discussion of diagnosis, stress is properly placed upon a carefully taken and intelligently interpreted history. In outlining treatment, particularly for peptic ulcer, individualization is accented as against rigid standardization.

From the promise offered by this first section, Volume II on the small and large intestine and peritoneum, and Volume III on the liver, biliary tract and pancreas and secondary gastro-intestinal disorders, will be eagerly anticipated.

Practical Survey of Chemistry and Metabolism of the Skin, by MORRIS MARKOWITZ, M.D.; Philadelphia, the Blakiston Company, 1942, blue fabricoid, gold-stamped, 196 pages, plus appendix of 4 pages and index of 11 pages. Price \$3.50.

The author has written a very concise outline of the essential facts, as the title indicates. The subject matter is divided into four parts: Part I, Chemistry of the Skin, discusses metabolism of the skin as well. Part II, Hematology, covers the hematopoietic changes related to cutaneous diseases. Part III, Blood Chemistry, a practical section, and Part IV, Vitamins in Dermatoses, which includes a table. Each part is well organized and outlined and is followed by a complete bibliography on the subject matter. Considering the brevity of the book, it contains a world of information. It clearly shows the modification of the chemical composition of the skin following pathologic processes. It is recommended to all physicians whether engaged in research or clinical practice and especially to those interested in skin diseases.

News Items

REPORT OF JOINT PROJECT BY SOUTH DAKOTA STATE BOARD OF HEALTH AND UNITED STATES PUBLIC HEALTH SERVICE

A Series of Lectures to Physicians and Health Workers on Tropical Diseases

Exotic diseases having become a problem in northern latitudes due to the return of service men from tropical lands and of tourists from the southern states and Mexico. South Dakota, the first northern state to undertake such a program, arranged a series of talks at official meetings of district medical societies. These talks, given by Marcos Fernan-Nunez, M.D., professor of pathology and tropical medicine at Marquette University for sixteen years, have been thus reported to Dr. Eben J. Carey, dean of Marquette University medical school:

"Illustration was by lantern slides and motion pictures and covered the general field of tropical medicine with special reference to the diagnosis and management of chronic cases which are the usual types seen in the north. (Several cases of tropical diseases have appeared in South Dakota.) The itinerary follows.

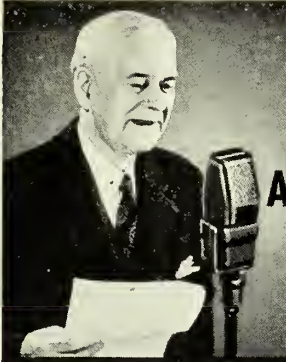
September 20—Aberdeen, South Dakota. A dinner was given by the Aberdeen District Medical Society. The meeting was held at St. Luke's Hospital and was exceedingly well attended by the physicians, sisters and nurses of the hospital, health workers and scientific people generally. Total, about 130.

September 21—Huron. Appearance on the afternoon program of the meeting of the South Dakota Public Health Association, a very live organization, and formal presentation which constituted the evening program. Attendance at both meetings, about 250.

September 22—Sioux Falls. Evening meeting held at the city hall was attended by the district medical society, army medical officers from the air forces technical school, sisters and nurses from the Sioux Valley Hospital and McKennan Hospital, Dr. J. C. Ohlmacher, Dean of the South Dakota University Medical School, health workers and scientists generally. Attendance, about 300.

September 23—Pierre. A dinner was given by the district medical society. The talk was at the high school auditorium and attended by the physicians, sisters and nurses of St. Mary's Hospital, science teachers, health workers, and physicians wives, total around 150. Following the meeting, a reception was held at the home of Dr. Triolo. While in Pierre Governor Sharpe was visited. He invited Dr. Fernan-Nunez to his press conference and the lecturer attended.

September 24—Rapid City. The meeting was held in the high school auditorium and attended by the district medical society members, medical officers of the army bombing school, sisters and nurses of St. John's Hospital, health workers, scientific people, high school students, and others. Total, about 130.



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VITAMINETS *Roche* THE VITAMIN-MINERAL SUPPLEMENT

September 24—Rapid City. An inspection of the very up-to-date health center, a cooperative enterprise between the State Board of Health and the city Health Department. Here a blood slide of a malaria patient was shown and mention was made of other cases which had occurred in that city.

From Aberdeen to Rapid City the trip was made in an automobile with Dr. Gilbert Cottam, superintendent of the State Board of Health, and Dr. A. Triolo, deputy superintendent. Dr. Cottam, formerly dean of surgeons of South Dakota, retired at the age of 70, but was immediately drafted by the Governor to head the state medical service, a very fortunate choice for the post. South Dakota is one of our greatest states. Its beautiful clean, modern small cities, the proverbial hospitality and friendliness of its people, the spirit and atmosphere of the great West, all combine to make it a fine place to live and work.

There is a definite need for young well-trained physicians. They would be welcomed and every possible aid given them. It was Dr. Cottam's expressed opinion that the campaign accomplished its purpose."

Dr. George Brecher, American physician of Olmutz, Czechoslovakia, is leaving America to take residence in Port-au-Prince, capital of the Republic of Haiti. For the past year he has been a fellow in pathology at Mayo Clinic, Rochester, during part of which time he was first assistant in the section on pathologic anatomy. Two years of training were spent at the University of London, England, School of Hygiene and Tropical Medicine. Dr. Brecher will engage in public health service in Haiti, under the joint auspices of the Haitian and United States governments.

The discovery of a new anti-malaria drug, totaquine, was disclosed in a report read at the opening meeting of the United States Association of Military Surgeons at Philadelphia in October.

The University of Minnesota study of breast cancer has received additional impetus from the entry of the Dight Institute of Human Genetics into participation. The program will be under the direction of Dr. Jno. J. Bittner, now a professor of cancer biology at Minnesota, collaborating with Dr. Robt. G. Green, professor of bacteriology, Dr. Chas. Evans, Dr. C. P. Oliver, Dr. Maurice Visscher for the department of physiology and Dr. Wm. O'Brien, professor of preventive medicine.

Yankton, South Dakota, District Medical Society held its annual fall meeting September 30 at the state hospital. Dr. J. C. Ohlmacher, president of the South Dakota State Medical Association, was the guest of honor, speaking during the course of the evening. Physicians representing localities throughout the southeastern part of the state heard two scientific lectures. Senior students from the University of South Dakota school of medicine in Vermillion were invited guests. A separate meeting of the Women's Auxiliary of the district society was held at which Mrs. Ohlmacher was reelected president. Mrs. L. J. Brookman was named secretary-treasurer. Mrs. Geo. S. Adams, first vice president and chairman of or-

ganization for the Auxiliary, was hostess at a dinner for the out-of-town visitors. Present were Dr. Frank W. Haas, assistant superintendent at the state hospital, Mrs. Edward Joyce, state Auxiliary historian, Mrs. Jno. C. Hagin, state Auxiliary president, Mrs. E. R. Schwartz of Wakonda, Mrs. Arthur P. Reding of Marion, Mrs. Jno. D. Thomas of Charlestown, New Hampshire, and Mrs. Eli M. Morehouse of Yankton. The attending physicians, auxiliary members and students made a group of about 100.

Dr. D. W. Gross of Woonsocket, South Dakota, has removed to Brookings.

Dr. A. R. Foss of Missoula, Montana, was elected president of the Montana board of medical examiners at a reorganization meeting in Helena, October 5. Vice president is Dr. Cedric Nelson, Billings, Dr. Otto G. Klein, Helena, was reelected secretary, other members are Dr. Earl Porter of Lewistown and Dr. J. H. Garberson of Miles City.

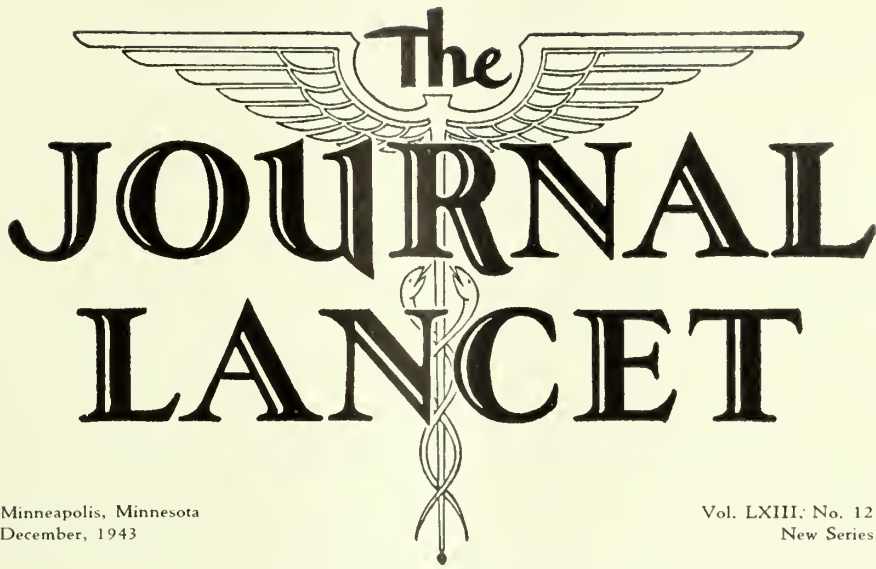
Dr. Owen H. Wangenstein, Director of the Department of Surgery, University of Minnesota Medical School, announces the eleventh E. Starr Judd lecture which will be given by Major General Norman T. Kirk, Surgeon General, United States Army, War Department, at the University of Minnesota, Monday evening, December 6, 8:15, in the Museum of Natural History Auditorium. The subject is "Surgery in War."

Minnesota State Medical Auxiliary met in all-day session in Minneapolis October 22 to discuss sharing responsibility for the execution of the war service program.

For outstanding work in the fight against tuberculosis Dr. C. L. Sherman, Luverne, Minnesota, received the Christmas seal plaque of the Minnesota Public Health Association at ceremonies conducted in his home city October 12. For three decades Dr. Sherman has been a leader in anti-tuberculosis work in southwestern Minnesota.

Dr. F. J. Hill of the North Dakota State Department of Health, has announced that the district health office, which has been maintained at Valley City for the past six years, is being discontinued as a result of the action of the Board of County Commissioners. They are said to have repudiated a promise made the state authorities to sign a contract which contemplated the appropriation of funds to carry on a county program. The city of Valley City had voted cooperation and funds but gave the state health department a release from its arrangements following the county commissioners' action of refusal to enter the program. This change results in Dr. E. L. Sederlin, former Fargo city health officer and lately district health officer at Valley City, being transferred to Bismarck.

Dr. M. D. Wagar of Michigan, North Dakota, has removed to White Plains, New York. Dr. Paul Reed of Rolla, North Dakota, is now engaged in practice at Virginia, Minnesota. Dr. A. C. Burt, Fargo, North Dakota, is a recent addition to the medical practitioners of Minneapolis.



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New Series

The Psychiatric Problem in War and Peace

J. C. McKinley, M.D., Ph.D.†

Minneapolis, Minnesota

PUBLISHED studies of combat casualties from various theaters of the war indicate that 30 to 50 per cent or more fall into the neuropsychiatric field. Mere displacement of predisposed individuals from neutral, protected environments to the more exacting demands of military existence, even without any immediate prospect of combat, takes its psychiatric toll as indicated in the following article by Heersema. "Combat fatigue," "convoy fatigue," "traumatic neuroses," "war neuroses," "shell shock" all come in for comment or discussion in this issue of the JOURNAL-LANCET; recognition, screening for selection of soldiers, appropriately organized and suitably placed teams for psychotherapy provide a mitigation of the problem, as several of the authors point out.

Following the war we can expect an inevitable increment in the hospital facilities for these patients. Before the war psychiatric cases had already occupied more than half of all the hospital beds in the country. What the magnitude of the problem will become in the non-institu-

tionalized population can only be guessed at but its full exposition will doubtless be staggering.

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 obviously desirable trends pending a more direct acquency and degree of environmental impact on the individual.

More psychiatrists, increased facilities, improved medical appreciation of the problem in the individual patient are obviously desirable trends pending a more direct approach to preventive measures. What these measures should be involves controversial issues in ethics, religion, the law and the like. Some day the medical profession, sociologists, the clergy and indeed all thinking people are likely to find themselves participating in discussions on these points by the very weight of the threat that the neuroses, the psychoses and the borderline states in psychiatry hold for us. The sooner we begin our fundamental thinking, fact finding and debate, the sooner will we be in a position for the instigation of effective measures of control,

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Guillain-Barré's Disease (Encephalo-Myelo-Radiculitis)

A Review of 33 Cases

A. B. Baker, M.D.†

Minneapolis, Minnesota

ALTHOUGH many publications have appeared describing this symptom-complex, our knowledge concerning this condition still remains far from complete. Any observations that might enhance our understanding of this disease seem of definite value. It is for this reason that a comprehensive review of those cases which we have considered as belonging to this symptom-complex has been undertaken. We have attempted to procure follow-up studies of the older cases in order to determine objectively the degree and severity of any resulting residuals. Finally, detailed pathological studies were carried out on 2 fatal cases and revealed some very unusual findings which seemed to us to suggest the possible pathogenesis of this disease.

The symptom-complex commonly referred to as Guillain-Barré's syndrome has been recognized since 1892 when Osler¹ first described it under the term of "acute febrile polyneuritis." Since that time, cases apparently belonging to this same group have been described under a wide variety of terms, "radiculoneuritis" (Guillain, Barré and Strohl,² Guillain³), "acute ascending paralysis" (Casamajor⁴), "acute infective polyneuritis" (Bradford, Bashford and Wilson⁵), "infective neuronitis" (Kennedy⁶), "polyneuritis with facial diplegia" (François, Zuccoli and Montus⁷ and Taylor and McDonald⁸), "myeloradiculitis" (Strauss and Rabiner⁹), "neuronitis" (Gilpin, Moersch and Kernohan¹⁰), "myeloradiculoneuritis" (Shaskan, Teitelbaum and Stevenson¹¹) and "encephalo-myelo-radiculitis" (Polan and Baker¹²). Since this disease seems capable of involving almost any part of the nervous system, the resulting clinical symptoms and signs naturally are most variable, hence making the differentiation of this illness from variants of already well-known neurological disorders often very difficult. Therefore, it is impossible at present to determine definitely whether the numerous cases reported in the literature actually belong to the same symptom-complex or whether they are the result of totally unrelated disease processes. Most of the cases reported, however, do have so many features in common, which definitely differ from the characteristics observed in other neurological disorders, that one is unable to avoid the conviction that they represent a specific disease entity, probably of virus origin. Such an impression is strengthened when one considers the histopathological alterations observed in our fatal cases which, in many aspects, resembled those lesions observed in both proven and suspected virus infections. These will be discussed in a later paragraph.

In a previous publication we reported 8 cases of Guillain-Barré's disease under the title of "encephalo-myeloradiculitis."¹² This descriptive term was selected because

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it seemed most adequately to describe the distribution of the clinical symptoms in our cases and appeared to be a much more inclusive term than the more limited names used to date by other investigators. However, even such a title has certain definite defects. Primarily, it is too complicated for general use. Even more important is the fact that this disease may confine itself to selected regions of the nervous system, and the resulting clinical picture would, therefore, not necessarily correspond to such an inclusive title as "encephalo-myelo-radiculitis." In order to avoid the confusion of conflicting terminology, it would seem best, at least until some specific etiological agent is isolated, to refer to this condition as Guillain-Barré's disease, since these investigators did emphasize the characterizing features of this illness. Guillain, Barré and Strohl,² and Guillain³ first reported on this illness in 1916 and again in 1936, recording a total of 12 cases. Their patients all developed a flaccid paralysis of the limbs with some involvement of both deep and superficial sensation. In all their cases, the spinal fluid contained an elevated protein without pleocytosis; and it was the cell-protein dissociation that these authors considered specific for this illness. No attempt will be made to review the literature completely, since such reviews already have been published. (Gilpin, Moersch, Kernohan,¹⁰ Polan and Baker¹²). Most of the more recent publications have consisted of descriptions of isolated cases. (Saurer,¹³ Glen,¹⁴ Anderson,¹⁵ Santi,¹⁶ Casamajor and Alpers¹⁷).

CHARACTERIZING FEATURES OF GUILLAIN-BARRÉ'S DISEASE

In order to describe adequately the criteria used in the diagnosis of this disease, it becomes necessary to discuss briefly those features which characterize this illness. It is only after one has a clear picture of the entire morbid process, including its differentiating characteristics and its clinical course, that one is able to identify this illness from among the many similar diseases encountered in the neurological field.

1. *A rather sudden onset occasionally preceded by a history of some antecedent infection, chiefly of the respiratory passages.* In the majority of cases, mild premonitory symptoms suggestive of some antecedent infection of the upper respiratory tracts appear a few days or even a number of weeks prior to the acute illness. These preliminary symptoms may vary from such mild complaints as malaise, fleeting pains, muscle tenderness, backache, mild lethargy, to such acute disturbances as nausea, vomiting, severe persistent headaches, chills, severe muscular aching, anorexia, and soreness in the neck. In the occasional case, there may be a prolonged period of headaches, often very severe, and some soreness in the neck. The acute illness, when it occurs, is usually fairly sudden

in onset, and may follow directly after the vague premonitory complaints or may appear only after a latent period of well being, lasting many days or even weeks. In one of our cases, an entire month elapsed between the preliminary symptoms and the acute illness, and during the interval, the patient had no complaints. In some individuals, the neurological symptoms and signs appear acutely with no preliminary warning and with no history of any preceding infection of any type.

2. *Absence of those findings suggestive of a septic or toxic reaction in spite of the severe clinical symptomatology.* The patients as a rule show almost no hyperpyrexia, unless there is some complicating infection in the urinary or respiratory tracts. It is very impressive to observe so little effect upon the body temperature in individuals with such acute severe generalized nervous system involvement. The pulse also is unchanged and continues to be full and regular. The blood picture generally is unaltered, but at times the leukocytes may be slightly elevated, counts as high as 15,000 cells per cubic millimeter having been recorded. Usually, the leukocytes range between 7,000 to 9,000 and show a normal differential count. Even the sedimentation rate remains within normal limits, although on occasions, these rates have been somewhat elevated. Whenever the laboratory findings indicate definite variations from normal, one must check carefully for some complicating infection, since in our experience, this disease in itself will not excite any of those changes associated with the more common bacterial or toxic reactions.

3. *A cell-protein dissociation in the spinal fluid with a normal cell count and a high protein.* This finding has been advocated as being one of the most characteristic features of this illness. Guillain, Barré and Strohl² first pointed out this observation and have since gone so far as to insist that the presence of 1 to 2 grams of protein in the spinal fluid is necessary before one is justified in making a diagnosis. Guillain has also refused to recognize as belonging to this syndrome any condition with a spinal fluid pleocytosis. It was primarily because of their emphasis upon this spinal fluid finding, that this condition has come to be known as Guillain-Barré's syndrome. Many investigators, however, have felt that too much emphasis has been placed upon this cell-protein dissociation and that it alone is neither pathognomonic nor absolutely necessary for a diagnosis of this disease. The absence of such protein elevation in otherwise fairly typical cases has been reported by Taylor and McDonald,⁸ Margulis,¹⁸ and Polan and Baker.¹² It has been generally accepted that the degree of protein in the spinal fluid varies with the stage of the illness, and the presence of an elevated protein will naturally depend a great deal on how frequently the spinal fluid is examined. Since there is often little clinical indication for repeated spinal punctures, this cell-protein dissociation may occasionally be overlooked in cases where it would have been observed had repeated spinal examinations been made. We have observed in many of our cases a normal fluid at the onset of the illness only to have the protein become elevated later in the course of the disease. Similar observations

have been reported by Stone and Aldrich¹⁹ and Madigan and Marietta.²⁰

Investigators have also taken issue with Guillain's firm stand against a pleocytosis. The presence of a mild or moderate cell increase, chiefly mononuclears, is not untenable with a diagnosis of this disease. Gilpin, Moersch and Kernohan¹⁰ in their cases reported a cell variation from 1 to 80. Similar cellular elevations have been reported by Taylor and McDonald,⁸ and Polan and Baker.¹² In our present series of cases, the spinal fluid cell count ranged from 0 to 154 cells—chiefly mononuclears.

4. *Radicular involvement.* This is one of the most constant features of this disease regardless of the region of the nervous system predominantly implicated at the height of the illness. The radicular pain is early in onset and, although involving primarily the extremities, may appear in any region of the body. The pain may be widespread and comprise an outstanding part of the entire clinical picture, or it may become well localized to small regions of the body and eventually be overshadowed by the subsequent symptoms referable to involvement of the peripheral nerves, cord, or cerebrum.

5. *Facial nerve palsy.* So frequent has been the involvement of the facial nerve, that some of the original descriptions of this syndrome were reported as a "facial diplegia associated with a polyneuritis" (Patrick²¹). The frequent palsy of the facial musculature has been well recognized, but the emphasis placed upon this finding has varied greatly in different publications. Taylor and McDonald,⁸ for example, excluded from their series all individuals who failed to show a facial diplegia, regardless of other findings. These authors felt that although the facial nerve was not the only one involved, it was in general the most constant and conspicuous clinical feature. On the other hand, Gilpin, Moersch and Kernohan¹⁰ observed facial weakness in but 35 per cent of their 20 reported cases. Generally, one can say, that the presence of a facial weakness is very helpful and extremely suggestive of this syndrome but is by no means necessary for a diagnosis.

6. *Absence of mental symptoms even in the presence of a very severe illness.* Very few investigators have reported mental symptoms in this disease. Occasionally, however, in the more severely involved cases, mild delirium with disorientation, restlessness, and excitement may occur. Somnolence and mild lethargy are by no means uncommon and are usually observed early in such patients.

7. *Favorable prognosis usually with fairly good functional recovery.* Guillain³ has emphasized this feature as one of the essential characteristics of this illness. He felt that the disease is always benign, and that should the condition terminate unfavorably, the diagnosis has been incorrect. Most investigators, however, have not accepted this dogmatic point of view. It is becoming more and more apparent that the outcome is not always favorable and that cases can terminate fatally or recover with resultant residuals. Taylor and McDonald⁸ reported one death and 5 cases with residuals out of a total of 16 patients presenting a typical facial diplegia. Bradford, Bashford and Wilson⁷ reported 8 deaths in 30 cases, while Gilpin,

Moersch and Kernohan¹⁰ recorded a 20 per cent mortality rate. In our 33 cases we have had but 3 deaths; however, many of our patients in spite of a satisfactory recovery after a stormy illness, have developed residuals which have persisted for many years. In order to check carefully the frequency and degree of such residuals, a follow-up study of many of our earlier cases was undertaken and will be discussed more fully in a later paragraph. Generally one can say that recovery is the rule in this illness regardless of the severity of the clinical picture, but that in many of the more severe cases, residuals or even fatalities will eventuate.

From a review of the above features of this illness, it is readily apparent that there is no single characteristic that can be designated as diagnostic. In view of the absence of any specific etiological agent, one is forced to accept a more practical attitude in regard to this illness and to consider in the diagnosis all the features presented. It is only after a careful consideration of all the symptoms and signs that one can arrive at a final satisfactory diagnosis. This frequently will necessitate a fairly prolonged period of observation, before one feels justified in classifying the illness and venturing a prognosis.

CLINICAL FORMS

Many descriptions of the clinical features have appeared in the literature. One finds, however, that generally the symptomatology has been too greatly oversimplified. The neurological complaints and findings may be most variable and will naturally depend upon the part or parts of the nervous system implicated. Usually, the involvement tends to be accentuated within certain regions, thus producing a predominating symptomatology, modified, however, by the less striking and often scattered complaints from the remaining nervous system impairment. For convenience, therefore, one might classify the clinical pictures seen in this condition into five forms, depending upon the region most severely involved; namely, the abortive or mononeuritic, the polyneuritic, the myelitic, the bulbar and the cerebral types of illness. Although all the above forms of this disease seem to differ greatly clinically, they do present certain related features. Probably the most outstanding are the radicular pain, the acute muscle tenderness and the marked clinical improvement in spite of an apparently severe damage to the nervous system. The radicular pain may involve any part of the body, most commonly occurring in the proximal parts of the limbs. These spontaneous pains may be mild or very violent and are often provoked by pressure on the muscles or by movement of the limbs; they persist for weeks and require heavy medication for relief of the extreme discomfort. Severe muscle tenderness almost always accompanies the radicular pain but may occur independently and persist for a longer period of time. Certain other observations already discussed under the "characterizing features of this illness," also appear fairly consistently in all forms, and are helpful diagnostically. The course of the disease is usually afebrile with little or no alteration in the leukocyte count; and the spinal fluid, some time during the course of the illness, probably will show an elevated protein with a relatively normal cell count,

Aside from these general features, the clinical symptomatology differs radically from case to case as will be demonstrated by the illustrative material to be reported.

TYPE I. Abortive or mononeuritic form. There can be no doubt that slight attacks of this illness do occur and pass unrecognized, thus making the frequency probably much greater than is generally recognized. In our experience, it is this form that has been most greatly underemphasized, probably because the rigid criteria set up by Guillain have been too closely adhered to. During that period when we were seeing most of our cases, many patients were studied who presented complaints which were identical with those observed in the early stages of Guillain-Barré's syndrome. These individuals gave a history of a sudden onset of severe radicular pain often preceded by some antecedent infection of the upper respiratory passages. The radicular pain was at first fleeting in character, involving the limbs or the trunk, and was often associated with some muscular aching and severe headache. This pain would not uncommonly disappear within a few days, only to return after a latent period of several weeks; occasionally it did not disappear but become localized to a single limb where it was soon followed by muscular weakness or paralysis, distal hyperesthesias and very painful aching muscles. In spite of the predominantly mononeuritic symptomatology, careful neurological examination almost always revealed other scattered findings indicative of the more diffuse nature of the actual involvement (Case 31). In some patients, this form of the illness made its appearance as a classical Bell's palsy, only to reveal on examination associated findings of such a mild nature that they would not be expected to produce functional disturbances and hence, would almost invariably be overlooked by the patient. Case 6 was typical of such a symptomatology. The patient, a 16 year old female, after a period of headache and neck pains, developed a complete right-sided facial palsy. She had no other complaints but, when examined carefully one month later, still revealed extensive findings consisting of paresis of both lower limbs with hyperactive reflexes, and positive toe signs on the right. In many instances, such a patient would have been diagnosed as a typical Bell's palsy and would have received no further studies. Similar cases have been mentioned by Bradford, Bashford and Wilson⁷ in their report.

Usually in the abortive form, the illness begins to recede after about two weeks with complete recovery eventuating in about a month. In an occasional severe case, the weakness may persist for many months and be accompanied by a mild but definite muscular atrophy (Case 31). The following two cases illustrate this form of the disease.

CASE 31: T. S. (H.N.726426) first noticed periodic pain in the popliteal region in December 1941. This pain was moderately severe, persisted for several weeks and then gradually disappeared. A few months later his pain recurred but was now localized to the anterior lateral surface of the left knee and soon spread up the anterior surface of the left thigh and down the leg to involve both the leg and the foot. At this time he complained of no systemic symptoms. His pain became so severe that he was forced to discontinue his work. Shortly after the recurrence of his pain, there also appeared a progressive loss of strength in the left leg and in both upper limbs, being particu-

larly marked in the hands. After a few months of partial inactivity, the pain subsided, but paresthesias and particularly the paresis persisted, especially in the left lower limb, upon which the patient was unable to bear weight. This weakness gradually improved enough so that the patient was able to walk; however, because of the slowness of his recovery, he finally sought medical aid almost one year after the onset of the illness.

At this time neurological examination revealed the cranial nerves to be normal. There was a slight weakness of the left hand as well as of the entire left lower extremity. The biceps reflex was reduced and the knee jerk was absent on the left. There was some atrophy of the abductor and of the quadriceps muscles on the left, and patchy areas of hypesthesia over the medial surfaces of the left lower leg and the lateral surface of the left thigh. The ankle reflexes were normal.

Laboratory studies revealed a leukocyte count of 10,650 with 59 per cent neutrophils. The spinal fluid contained no cells; 76 mgm. per cent of protein; and 50 mgm. per cent of sugar. Even at this late date, there still appeared a mild elevation of the spinal fluid protein.

The patient was placed on a high vitamin diet and discharged.

CASE 33: P. H. (H.N. 627350), a 62 year old farmer, while plowing, suddenly developed a severe momentary sharp pain in the upper medial aspect of the right thigh followed within a few hours by some soreness and stiffness in the same extremity. That evening he developed tenseness in the adductor muscles. The pain became progressively worse, was not relieved by medicinal treatment and prevented him from sleeping. Because of the persistence of this pain, he was hospitalized after a few days for further treatment.

Examination revealed the patient's pupils to be slightly irregular. The middle and lower abdominal reflexes were absent as was also the right knee jerk. There was considerable limitation in the movement of the right leg due to pain, and the muscles in this limb were very sensitive to pressure. There was an area of hyperesthesia over the medial aspect of the right thigh. Laboratory studies revealed a blood count of 7,500 with 65 per cent polymorphonuclears and 35 per cent mononuclear. A spinal puncture showed no cells and 75 mgm. per cent of protein.

The patient remained in the hospital for three weeks, during which time he gradually improved. Ten days after admission he developed hiccoughs which continued for one week with only short intervals of relief. During this same period he became mildly confused and disoriented. Following recovery from the hiccoughs, the confusion also cleared up, but the patient continued to be somewhat irritable and suspicious.

The pain in his thigh gradually decreased, so that at the time of his discharge, he appeared to be completely recovered. The entire course of his illness was afebrile.

TYPE II. Polyneuritic form. This is the most frequently described form of this illness although many cases listed as a polyneuritis actually show extensive signs of cord involvement. These patients usually, after a few premonitory signs suggestive of the abortive form of the illness, or after a latent interval following an upper respiratory infection, develop either a gradual or often a sudden onset of motor weakness involving the limbs, primarily the lower extremities. This motor weakness is flaccid in type and at its onset almost always involves the entire extremity. Individual muscles are almost never picked out, and there appears to be a definite tendency to implicate the larger muscle groups of the proximal regions of the limbs, namely, the thighs, the pelvis and the shoulder girdle. Weakness in the upper extremities usually occurs later than the involvement of the lower limbs and is often less severe. Not uncommonly the muscles of the trunk and of the anterior abdominal wall are also implicated, resulting in difficulty in rising or sitting up in

bed. Only exceptionally does the distal musculature become weakened early in the disease and even in these cases the palsy soon spreads to the entire extremity with the most severe disabilities occurring in the shoulder and hip regions.

Paresthesias, hyperesthesias and anesthetics with severe muscular pain may precede or accompany the motor weakness. In some cases, the sensory involvement may be much more extensive and severe than the motor impairment and may comprise the predominant part of the clinical picture. Occasionally, when the sensory involvement is severe, it not uncommonly follows a glove-stocking distribution. In such cases the paresthesias may persist throughout the entire course of the illness and may create a serious treatment problem. Headaches of a most intense type occur and may continue throughout the early part of the disease.

This type of illness, although superficially resembling many of the better known forms of peripheral neuritis, does possess certain definite differentiating features which will be discussed in a later section on differential diagnosis.

CASE 11: K. B. (H.N. 723461), a 23 year old housewife, first became ill in July, 1942. At that time she suddenly developed headaches, vomiting, diplopia and some dizziness. These symptoms were periodic and occurred every other day for about two weeks and then disappeared. Two weeks later and five days before her admission to the hospital, she first noticed low back pain followed by numbness in her hands and feet and some difficulty in walking. At first she was able to get around but became very tired on the slightest exertion. A few days later she noted that when she raised either of her arms to the level of her shoulders there was a tingling sensation in the arms and hands. The involvement of her extremities continued to progress until she was unable to walk and was finally forced to enter the hospital. At the time of her admission she was able to get around only with assistance.

Neurological examination showed a slight ocular imbalance with a fine lateral nystagmus in gazing either to the right or the left. There was a left lower facial paralysis and a paresis of all limbs with a generalized areflexia. The abdominals were absent; and the Babinski reflexes were negative. She had a fine tremor of the hands and on coordination showed a slight past-pointing to the left. There was a hypesthesia and a hypalgesia in both hands and in both legs below the knees. Vibration sense was decreased at the wrists and ankles.

Laboratory studies were negative except for the spinal fluid which contained one cell and a protein content of 217 mgm. per cent.

The patient was treated by complete bed rest and a high vitamin intake. She showed a very definite but gradual improvement both subjectively and objectively. Ten days after admission, sensation began to return to her extremities, followed within a few days by improvement also in her motor function. By the time she left the hospital, one month after her admission, sensation was normal as was also most of her muscle strength. The abdominal reflexes were still absent, and the only muscular impairment was a slight weakness of grip in her left hand. During her hospital stay, her blood studies showed 8,600 leukocytes with 75-25 differential. Sedimentation rate was 17.5.

CASE 30: F. H. (H.N. 725737). On August 3, 1942, three months prior to our observation of him, this 46 year old white male began to have pains on the outer side of his right foot. These pains increased and gradually spread to involve the entire right leg from the hip down. Next, the right shoulder became involved so that pain resulted on voluntary movement. These aching pains persisted in the right arm for ten days and then disappeared. Subsequently the left leg from the knee down became involved. The increasing pain made it necessary for the

patient to quit his job as a machinist on August 17, 1942. On September 2, 1942, he had some teeth pulled, but the pain in his legs increased. About one week later, he first noticed gait difficulty due to weakness in his right knee. This weakness progressed fairly rapidly, so that in two weeks he was unable to bear weight on his right leg. At this same time he also noticed a developing weakness of the right shoulder. Raising the limb became very difficult although strength in his hands remained good. He entered a local hospital where he remained for 18 days. His pain decreased but his weakness progressed to involve the hand as well as the rest of the right upper limb.

During the weeks following his hospital discharge, he continued to experience slight spontaneous pain in his legs, extreme muscle tenderness, and some paresthesias. His pain again began to increase in severity; but now, he also noticed "shooting pains" which started near the inner malleoli of both ankles and radiated to the soles, penetrating throughout his feet and spreading especially to the inner toes.

Examination on admission on November 15, 1942, revealed a slight tremor of the tongue. There was a generalized weakness of all limbs with some atrophy of the intrinsic muscles of the hands, of both arms, and of the calf muscles of the right leg. There was also a marked paresis of the trunk muscles, the patient being unable to arch his back or sit up in bed unassisted. All the reflexes in the extremities, both deep and superficial, were absent. There was a glove and stocking hypesthesia in the extremities and scattered areas of hypesthesia over the right side of the face. Deep sensation was decreased on the left with position sense bilaterally impaired.

Spinal puncture revealed the fluid to be under normal pressure and containing no cells but 153 mgm. per cent of protein. Laboratory tests for the various chemicals capable of producing similar nervous system damage all proved negative.

Under treatment consisting of bed rest, uniform heat on the extremities, sedatives, high vitamin intake, and exercise for strengthening the limbs, the patient showed gradual progressive improvement. The hypesthetic areas progressively grew smaller and some (specifically those above the right eye) disappeared. The "shooting pains" disappeared completely from the feet and partially from the right arm. The ankle jerk on the right returned and strength gradually improved in all muscle groups.

On discharge from the hospital after a two and one-half months stay and six months after the onset of his illness, the patient had shown a very marked recovery. He could now walk unassisted although there still was a definite weakness of the right lower limb. In spite of an atrophy of most of the muscles of the upper limbs, strength was good except in the right hand. The trunk muscles still were somewhat paretic, although the patient could now arch his back and raise himself in bed. Spontaneous pain had disappeared. All the deep reflexes in the upper limbs were normal; in the lower extremities, only the right ankle jerk was present.

TYPE III. Myelitic form. In our experience, this form of the illness appears to be the most frequent, comprising almost one-half of our cases. The progress of the illness is very dramatic and a severely involved individual may make a fairly rapid and almost spectacular recovery in a very short time. More often than in any other form, the onset may be sudden and the course rapid with no premonitory symptoms. These patients complain of a slight numbness and tingling in the lower limbs followed within a few hours by a marked paresis that may develop into a complete paralysis within a very short time. The motor involvement is usually of a flaccid type, although in some cases it may be partially spastic indicating involvement of the upper motor neuron. The deep reflexes are usually reduced or absent, but may be hyperactive, associated with sustained or unsustained clonus. Early in the disease there is definite muscle tenderness which, as it disappears, reveals a loss of muscle and tendon pain. If the

illness is very severe, there may develop a similar involvement of the upper extremities. Sensory disturbances primarily of the superficial type comprise a prominent part of the clinical picture and are of a definite segmental nature, ascending with the progression of the disease and producing a definite sensory level as is so often seen in a transverse myelitis. Bowel and bladder dysfunction occur relatively early, resulting in urinary retention and bowel incontinence or constipation. Aside from the typical cord involvement, these patients also develop severe radicular pain and scattered cranial nerve palsies. The spinal fluid protein becomes elevated early, thus facilitating the diagnosis. The spinal fluid cell count at first may also be elevated, but soon returns to within normal limits.

The course is very impressive. After a continued progression for from two to four weeks, the illness suddenly begins to recede and the rapid recovery can be followed clinically by checking the level of the sensory disturbance, which diminishes daily and is associated with a concomitant improvement in the muscular palsies. The paresthesias disappear as soon as improvement begins. Recovery is usually complete although some residuals do remain in the form of a persistent paresis of scattered muscle groups.

CASE 26: H. I. (H.N. 725158), a 40 year old farmer, first complained of severe occipital headaches and pain behind the eyes. One week later while at work he experienced an attack of general malaise, chills, and fever, and, at the same time, developed a numbness and tingling in his feet which he stated, "felt like walking on a deep carpet or on cotton." This disturbance progressed, his legs became weak, and, finally, he was able to walk only with support. Within a few days, he also developed urinary retention, bowel incontinence and, later, severe constipation. At about this time, he began to complain of vague pains in his muscles, calf tenderness and hyperesthesias. Ten days after the onset of his illness, he had a spell of nausea and vomiting. A spinal tap was done locally and showed no cells. He was then sent to the hospital for further study.

On admission, September 28, 1942, the neurological examination revealed negative cranial nerves. The upper extremity reflexes were hyperactive and equal. The great toe signs were positive on the right; equivocal on the left. The right ankle jerk was increased; the left, decreased. There was an unsustained ankle clonus on the right. Finger to nose tests showed a moderate ataxia on the right. Heel to knee tests were normal. The next day, it was noted that the abdominal reflexes were absent; there was a slight paresis of the upper and a moderate paresis of the lower extremities; and there was hypesthesia below the knees.

By September 29, incoordination was noted in finger to nose, finger to finger, and heel to knee tests. The last of these was especially poor on the left. The hypesthesia now extended up to the mid-thigh and was progressively more intense distally. By October 1, three weeks after the onset of the illness, both upper extremities were spastic and there was an unsustained wrist clonus bilaterally. The Hoffman reflexes were now positive bilaterally. There was a paresis of all movements of the arms. Both legs showed flaccid paralysis with many fibrillary twitchings. The Babinski tests were negative but the Gonda reflex was positive on the right. Hypalgesia was present below the eighth dorsal cord segment. The intercostals showed some weakness and respiration was only fair. There was a marked constriction of the visual fields.

On October 2, pain and temperature sensations were absent below the second dorsal level; and light touch, below the seventh dorsal segment. Respirations were now shallow and rapid, and the patient appeared critically ill. On October 5, definite improvement was noted. Sensation was now normal above the eleventh dorsal segment, and motor power had partly returned

to the upper limbs. The knee jerks were active and the toe signs were still positive. Fecal and urinary retention continued. On the 9th of October, sensation was normal above the first lumbar segment. Complete anesthesia was limited only to the lateral aspects of the left leg, the right big toe and the plantar surfaces of both feet. By October 12, there were no areas of complete anesthesia and hypesthesia was limited to the legs. There was almost no weakness in the upper extremities. By October 24, there was only mild impairment of pain and touch on the medial aspects of the legs. Great toe signs were still present. The retention catheter was removed October 28, but the ability to void spontaneously did not return for a few more days. The visual fields had returned to normal by this time. At the time of discharge on December 15, three months after the acute illness, the patient was up and about with almost complete recovery of muscle power.

During his hospital stay, the urinalyses at various times showed traces of albumin, red blood cells and white cells. His white blood count was 11,800 with 86 per cent neutrophils. The blood urea nitrogen was normal. Spinal puncture shortly after admission showed a cell count of 154 with 80 per cent mononuclears; these cells rapidly dropped to one within a few days. The spinal fluid protein remained elevated around 118 mgm. per cent, but dropped shortly before discharge to 53 mgm. per cent. Bacteriological studies on both blood and spinal fluid were negative. Body temperature throughout varied between normal and 101.8°. The pulse varied from normal to 128.

The treatment consisted of strict bed rest, large doses of vitamins, especially B₁ and C, and sedation. Sulfadiazine was given to prevent urinary infection resulting from the Foley catheter. Mild laxatives and enemas were used to combat the fecal retention. Pilocarpine was used to aid in voiding after the catheter was removed. The patient was kept on a soft diet until November 18. Physiotherapy was introduced when the patient was well enough.

CASE 13: Mrs. I. P. (H.N. 726506) was well until the morning of November 1, 1942, when she awoke to find that she had bladder and bowel incontinence. She found it very difficult to walk to the bathroom because of the weakness of her lower limbs. She also noticed numbness and tingling in both lower extremities and anesthesia in the area of the buttocks. During the next four days her weakness and sensory involvement progressed and she was finally hospitalized for three weeks in a local hospital from where she was transferred to our care on November 28, 1942.

At the time of her admission she showed a complete paralysis of the lower limbs with hyperactive knee jerks, but absent ankle jerks and abdominal reflexes. There was a hypesthesia below the tenth dorsal cord level, and muscle pain was markedly increased.

A spinal puncture revealed no increase in pressure, 1 cell, 132 mgm. per cent of protein and a negative colloidal gold curve. Her white blood count was 7,300 with 63 per cent polymorphonuclears. The serology was negative.

Under symptomatic treatment, she showed a very slow but definite improvement. After two weeks, her severe muscle tenderness disappeared and she became much more comfortable. Her sensory involvement gradually receded and within a few weeks had entirely cleared up, leaving only a small anesthetic area about the buttocks. Strength also gradually returned to her limbs so that after one month she was able to move her legs freely even though they were definitely parietic. Sphincter control was also regained at this time and the catheter was removed. The neurological examination at the time of discharge after a three months hospital stay, revealed a slight right lateral nystagmus, absence of the abdominals, and slightly increased muscle pain in the left leg. Her knee jerks were still hyperactive and her ankle jerks absent. She had not gained sufficient motor strength to support herself in walking. Periodically during her hospitalization, she had recurrences of most severe radicular pain localized to various regions of the limbs or trunks and lasting from hours to days.

TYPE IV. *Bulbar form.* This type of the illness is almost invariably accompanied by involvement of other

parts of the nervous system, even though the bulbar symptoms do comprise the most impressive part of the clinical syndrome. In most cases, the bulbar symptoms occur only after the illness has been in progress for some time, although in the occasional case the cranial nerve damage appears suddenly and early, and overshadows all other findings. Almost any of the cranial nerves may be implicated resulting in ophthalmoplegias, diplopia, anisocoria, facial anesthesia or hypesthesias, vertigo, dysarthria, dysphagia, and dysphonias. Unilateral or bilateral facial palsies are extremely frequent and often very severe. In an occasional case the medullary damage may be so severe that even respiratory and cardiac irregularities occur. One of our patients (Case 17) developed a complete external ophthalmoplegia with subsequent involvement of almost every cranial nerve. Aside from the facial palsies, the most common bulbar symptoms consist of disturbances in articulation and deglutition. Speech becomes nasal in type and fluids are regurgitated through the nose.

In most cases, there occurs an associated involvement of the limbs with pareses, sensory disturbances and reflex irregularities. Curiously enough, cerebral findings are not more common in this form of the illness, the patients remaining mentally clear in the face of a most extensive bulbar damage.

In spite of the apparently severe involvement in such a vital region, the prognosis is usually good, although the occasional case does terminate fatally from a respiratory paralysis. Residuals when they occur are chiefly limited to the facial muscles, although persisting diplopia, ocular imbalance and even limb pareses have been observed. Again, in this form of the illness, certain associated features readily allow for an accurate diagnosis and hence a more favorable prognosis. These consist of an early bilateral facial weakness, the afebrile course, the associated limb involvement with radicular complaints and, finally, the cell-protein dissociation in the spinal fluid. This latter finding, however, is not always observed, since the spinal fluid protein does not become elevated until late in the illness and may not be detected unless repeated spinal punctures are performed.

CASE 17: Mrs. R. S., a 30 year old housewife, became ill one week after she returned from a trip to California. Shortly after her return home, she developed a mild diarrhea but no other symptoms. On March 12, 1941, while getting on a streetcar, she suddenly felt a numbness in both lower limbs. There were no other complaints until the following morning, when she discovered that she had difficulty in opening her right eye, and blurring of vision on looking to the right. Her legs continued to be numb and weak, resulting in an unsteady gait.

She was seen three days after the onset of her illness, at which time her cranial nerves were negative with the exception of a slight ptosis of the right lid. Deep reflexes were hyperactive with a bilateral positive Hoffman, but negative Babinski's. The abdominal reflexes were reduced on the right and absent on the left. There was marked weakness of the right arm and shoulder girdle. Her coordination was intact, as was also her deep sensation. Superficial sensation revealed hypesthesia in the right upper extremity along the dorsal cord level. There was also a hypesthesia over the left thigh and leg. During the next few days the patient's condition progressed very rapidly. Within four days she developed signs of a bulbar involvement, for which she was hospitalized.

On March 17 examination revealed a partial involvement of all the extraocular muscles, a ptosis of both lids, paresthesia and hypesthesia over the face, bilateral facial and palatal paralysis, and bilateral weakness of the tongue. Deep reflexes were reduced, although obtainable. She had a diffuse patchy involvement of superficial sensation involving primarily the limbs. During the next few days her condition continued to progress. She developed complete paralysis of all the extraocular muscles with bilateral involvement of the fifth, seventh, ninth, tenth and twelfth cranial nerves. The vagus involvement at times became very alarming because of the resulting bradycardia. She also experienced severe pain in all her limbs and very severe muscle tenderness. Mentally she remained clear, and showed elevation neither of temperature nor of leukocyte count.

Spinal puncture done on the day of her hospital admission revealed a normal cell count with normal protein. The spinal fluid studies were not repeated. After a period of 10 days the patient's illness began to subside and she was discharged from the hospital one month after admission, at which time she still had a severe diplopia, a nasal type of speech and a bilateral facial weakness. She was now able to swallow and her pulse had returned to normal. There was still slight weakness in the extremities, although all sensory disturbances had disappeared.

The patient was followed for over two years. Throughout this period improvement has continued, and when she was examined two years after the acute illness, her cranial nerves were negative with the exception of a persistent mild bilateral facial weakness. Strength had returned to all limbs, and her reflexes were now normal.

TYPE V. Cerebral form. This is an extremely rare and not usually recognized type of Guillain-Barré's disease. It usually begins with severe headaches, malaise, vertigo and nausea. The patients feel weak and remain in bed for a few days. The symptoms may then subside only to be followed by mild facial weakness or scattered radicular pains. After a few days, the headaches again return and are often accompanied by a mild lethargy which tends to increase in severity. As the illness progresses, signs of cord or bulbar involvement may develop. Some patients become confused, noisy, restless and agitated. It is in this form of the illness that papilledema usually appears. The prognosis must be guarded, although many patients make a fairly complete recovery.

CASE 24: E. H. (H.N. 713471), a 39 year old housewife, became ill in the latter part of September, 1941, at which time she complained of a sub-occipital headache, generalized malaise, anorexia, chills and a mild elevation of temperature. Within a few days she became mildly lethargic and tended to sleep excessively. Her headaches were very intense and persistent, but there was no nausea or vomiting. Within a week these symptoms began to subside, but she now developed urinary retention. She was catheterized by the local doctor, who finally sent her to the hospital for further investigation.

General examination revealed a very obese female. Neurological findings showed a mild papillitis of both discs. There was an anisocoria, the right pupil being larger than the left. The deep reflexes were normal, except for the right knee jerk which was slightly more active than the left. There was generalized muscular weakness of all four extremities. The patient was unable to void.

Laboratory studies showed a white count of 8,350 with 84-16 differential. Spinal fluid showed 22 cells with a protein content of 58 mgm. per cent.

The patient remained under observation for one month. During that time she regained her bladder control and the papillitis disappeared. At the time of her discharge from the hospital, she still had a marked weakness of both lower limbs and her deep reflexes were now slightly hyperactive. She was seen two months later and during that period had improved to such an extent that she was now neurologically negative, having made a complete recovery.

CASE 14: Mrs. P. L. (H.N. 702680), aged 27 years, became ill November 1940. The first symptom noticed by this patient was a peculiar feeling over the skin of her face, which lasted for a few days and then cleared up. At this time she felt very tired. A few weeks later she suddenly developed chills and fever followed by vertigo, nausea and vomiting. The vomiting was unrelated to meals and was most severe in the morning. She was taken to the hospital, where she remained for ten days. During her stay in the hospital the vomiting disappeared. Shortly after returning home, she developed numbness of the entire left side. This was soon followed by a widespread motor involvement which first appeared in the left foot and leg and, then shortly afterward, spread to the entire right side, including both the lower and upper extremities. Two weeks before her examination by us and a week after the onset of her numbness and weakness, she developed some diplopia, dysarthria and occasional difficulty in swallowing. Because of the rapid progression of her illness she was brought to the hospital.

On her admission December 14, 1940, the examination revealed an anisocoria with the right pupil larger than the left. There was a nystagmus present on lateral gaze and a marked dysarthria. The deep reflexes were reduced; the abdominal reflexes were absent. There was a generalized flaccid paralysis involving all extremities, the weakness being most marked in the proximal part of the limbs. There was a left-sided hypesthesia and hypalgesia, including the face. Vibratory sensibility was lost and position sense reduced in both lower extremities. There was marked ataxia in both upper and lower limbs.

Laboratory examination revealed a white count of 10,600 with 67 per cent polymorphonuclears and 33 per cent mononuclears. Spinal fluid contained 7 cells, with 177 mgm. per cent of protein and 83 mgm. per cent of sugar.

The patient's course was very rapidly downhill. After a few days, she became markedly confused, noisy, restless and agitated and had to be transferred to the Psychiatric Unit for further care. She developed a complete left-sided facial palsy and her bulbar symptoms became very marked. She gradually became more lethargic, less cooperative and at times very noisy. She was treated with a high vitamin intake, blood transfusions, and intravenous fluids. Her temperature, which had remained between 98 and 99° during the first two weeks in the hospital, gradually began to rise and she expired after a hospital stay of 19 days. No autopsy was obtained.

A summary of all our cases is given in Table I. The disease affected both sexes about equally and occurred in all age groups; the ages in our series varying from 1½ to 62 years. Although cases were seen throughout the year, the majority tended to occur at two definite periods, namely, during the winter and summer months. Sixteen (49 per cent) of the cases occurred in winter during the months of November, December and January; while 7 (21 per cent) appeared during the summer. It is curious and perhaps significant that this condition occurs most frequently after the peak of poliomyelitis, and it has been this predominance during the winter months that has often been the primary factor in arousing suspicion that this disease was some form of infantile paralysis. This seasonal tendency also allows for some speculation regarding the pathogenesis of this illness. Infections spread by insect vectors tend to disappear abruptly with the onset of cold weather (equine encephalitis); while those spread by contact exposure increase during the winter months. However, Guillain-Barré's disease, in spite of its frequency during the winter, shows no indication of being spread by direct contact. In none of our cases, in spite of careful questioning, was there any suggestion of a similar illness in other members of the same family or community. Moreover, although we have not made a

custom of instituting isolation technic in these patients, we have not as yet had any indication of contact infection within our personnel, many of whom have had a most intimate exposure to these individuals.

In spite of the general impression that this disease appears chiefly as a polyneuritis (Patrick,²¹ Taylor and McDonald,⁸ Bradford, Bashford and Wilson,⁵ etc.), the most common clinical picture observed by us, was referable to involvement of the spinal cord (Group III in Table I). Forty-five per cent of our patients presented such findings as compared to 24 per cent with mononeuritic symptoms and but 21 per cent with predominantly polyneuritic findings. The cerebral type was extremely uncommon, appearing in but three cases. This latter form has received very little emphasis in the literature but warrants more attention.

Facial palsies appeared in only 27 per cent of our cases, but was observed in all five clinical forms of the disease, thus emphasizing the unusual specificity of this illness for the seventh cranial nerve, regardless of the location of the predominant tissue injury. In some of the very mild abortive forms, the associated facial palsy was the one feature that helped strengthen the diagnostic impression. Involvement of other cranial nerves was not uncommon, appearing in 39 per cent of the cases; in 4, the bulbar symptoms comprised the predominant part of the clinical picture and implicated chiefly the third, fifth, sixth, ninth, tenth and twelfth cranial nerves. Choked discs were observed in 6 cases. The presence of increased intracranial pressure does seem to indicate a more grave form of the illness, since 2 of our 3 deaths occurred in patients with such papilledema.

The spinal fluid findings were most variable, but a high protein with a low cell count did constitute one of the most constant features. None of our cases showed the extreme spinal protein increase of 1 to 2 gms. as reported by Guillain. The greatest increase observed by us was 345 mgm. per cent. On the other hand, 6 of our cases showed a normal spinal fluid protein at the time of examination. Only 4 of the patients showed a spinal fluid pleocytosis, the remaining cell counts being well within normal limits.

In spite of the often severe clinical symptomatology, our patients showed little or no hyperpyrexia unless there was some complicating urinary or respiratory tract infection. In most cases the temperature varied between 98 and 99.6°. The blood picture was usually normal but occasionally showed a moderate leukocytosis reaching as high as 15,000 cells.

Recently we have observed another unusual laboratory finding in many of our patients. In the course of a general medical workup on one of our milder cases (Case 18) a slightly elevated heterophil antibody titre[‡] (agglutination of sheep red cells) was discovered. In view

‡Heterophil antibody is the antibody produced by a non-species specific antigen which has the ability to agglutinate sheep red cells. These antibodies were discovered by Forssman who injected rabbits with emulsions of guinea-pig organs, thereby producing these hemolysins against sheep corpuscles. Similar sheep cell-agglutinating antibodies can be produced with tissues of many other animals. The Forssman agglutinin is normally present in human sera in titres of 1:24, but when evident in higher concentration indicates some abnormality.

of this observation, similar studies were made on the sera of 4 subsequent cases and all were found to have elevated titres, often as high as 1:224. The significance of this finding is as yet unknown, but the presence of this Forssman antibody in the sera of these patients may offer another test which, if positive, may aid in the differentiation of this disease from other neurological syndromes. The testing for these antibodies is a very simple laboratory procedure.²³ It consists of mixing a fresh suspension of sheep corpuscles with varying dilutions of the patient's serum, and, after a time (12 hours), recording the highest dilution of serum that produces a macroscopic agglutination of the sheep cells. Because of the ease with which this test can be performed, it would seem of definite interest to have the sera tested in every patient suffering from Guillain-Barré's disease in order to determine whether this elevation in the heterophil antibody titre continues to be a constant finding.

COURSE AND PROGNOSIS

Guillain^{2,3} in his publications insisted that the outcome of this disease was always favorable and that all cases recovered fairly promptly and completely after an illness of a few weeks or months. He felt that the real syndrome was always benign. It is apparent from a review of the literature as well as from a study of our own cases, that this point of view is too extreme. It is true that in spite of a fairly severe clinical involvement these patients usually show a gradual and continuous improvement over a period of many months or years with fairly complete recovery. However, the more cases one studies and the longer one follows the recovered patients, the more cautious one becomes regarding the ultimate prognosis.

In the abortive or mononeuritic form, the entire course of the illness may be very mild and last but a few weeks with complete recovery. But even in such cases, if careful followup studies are performed years afterwards, residual weakness and reflex abnormalities may be elicited.

In most cases, usually after an acute onset and after progressing rapidly for a few days or weeks, this illness becomes stationary or starts to subside with improvement often being very slow and continuing for many years. The sensory recovery is much more rapid than the motor, and not uncommonly some motor weakness and reflex alterations can be observed for many years after the acute illness. We have obtained followup studies on many of our patients, and have been impressed by the frequency and often the severity of the neurological sequelae present after two to three years. In none of the more involved cases had complete recovery eventuated, and many of the patients still had incapacitating residuals such as sphincter disturbances, unilateral or bilateral limb weakness. The one optimistic feature in all these cases was that improvement apparently was still in progress in spite of the long interval since the primary infection, and it is possible that in time complete functional return might occur.

Recurrence of symptomatology occurred in only one of our cases (Case 17), who, during the course of two years,

had repeated relapses requiring complete bed rest. In most cases, it appears that improvement once begun continues uninterrupted, providing moderate care and rest are obtained.

Contrary to the belief of Guillain, fatalities do occur. If the illness continues to progress after a period of six to eight weeks after its onset, the prognosis must always be guarded, since it is frequently this type of case that continues to a lethal outcome.

DIFFERENTIAL DIAGNOSIS

Because of the wide variability of the clinical symptoms in this disease, it is often confused with variants of other well known neurologic disorders, from which it must be differentiated before an accurate diagnosis can be made. For this reason, it might be well to discuss briefly a few of the differential points between the Guillain-Barré syndrome and other neurological disorders.

1. *Peripheral neuritis of an infectious or toxic type.* Usually in this illness the course is febrile and an elevated leukocyte count may be present. The nervous system involvement tends to remain localized to the limbs and only uncommonly extends to the brain or spinal cord; hence, cranial nerve palsies, segmental cord lesions, and weakness of the trunk and back muscles almost never occur in the average case. The spread of the involvement within the extremities is fairly constant, progressing symmetrically from the distal to the proximal regions and producing first, sensory and later, motor impairment. Scattered radicular pain usually does not occur, the paresthesias observed being evenly and consistently distributed to the distal portions of the extremities. In Guillain-Barré's disease, on the other hand, the entire limb often becomes weak at one time, with the predominant functional disturbances within the proximal muscle groups, such as those of the pelvic and shoulder girdle. The involvements spread consistently to the trunk with resulting weakness of the back and abdominal musculature. An elevated protein with a cell-protein dissociation is exceedingly uncommon in the toxic or infectious peripheral neuritis.

2. *Postdiphtheritic peripheral neuritis.* This form of neuritis often shows an elevated spinal fluid protein and a low cell count similar to Guillain-Barré's disease. The history of the preceding diphtheritic infection, however, facilitates the diagnosis. The spread of this form of neuritis is very similar to the toxic-infectious types and is usually not associated with accompanying signs of spinal cord or brain injury.

3. *Poliomyelitis.* This disease may produce a very difficult differential problem and, no doubt, many cases diagnosed as atypical poliomyelitis actually are instances of Guillain-Barré's disease. Certain features, when carefully evaluated, aid greatly in the differentiation. In poliomyelitis, the course is usually more febrile, and the patients more constantly show manifestations of meningeal irritation with some nuchal rigidity and an increased cell count in the spinal fluid, the spinal protein remaining within normal limits. The involvement is predominantly and usually exclusively of a lower motor neurone type

and tends to select scattered muscles or muscle groups rather than an entire extremity as is so common in Guillain-Barré's disease. Spastic weakness and sensory disturbances are almost never seen. The prognosis in poliomyelitis is usually not so favorable, since residual weakness and severe muscle atrophies are much more frequent and pronounced.

4. *Landry's paralysis.* This condition is probably not a clinical entity but a symptom-complex, consisting of a sudden flaccid paralysis of the lower limbs which ascends rapidly to the abdominal and intercostal musculature and eventually to the upper limbs. In fatal cases, a bulbar involvement ensues with medullary damage. This symptom-complex in contrast to Guillain-Barré's disease is extremely uniform in its attack, almost always starting in the lower limbs and ascending symmetrically. Spasticity is never seen and sensory involvement does not occur. The course and prognosis are much more grave and, when medullary paralysis occurs, the outcome is usually fatal. In spite of the occasional cranial nerve implications in Landry's paralysis, the facial nerves which are so commonly involved in Guillain-Barré's disease are almost never damaged. Finally, the spinal fluid usually shows no changes.

5. *Myelitic syndromes secondary to infections.* The course of the disease in an infectious myelitis is usually much slower than in Guillain-Barré's disease, and the patients appear much more toxic. After reaching its peak, the infectious process tends to remain unchanged for long periods, resulting in extensive trophic changes associated with motor and sensory residuals. These patients often remain bedridden for long periods and produce some of the most difficult nursing problems encountered in the neurological field. Radicular and cerebral involvements are almost never seen, and the sensory impairment when it occurs, is usually of segmental rather than of radicular distribution. The spinal fluid may show an elevated protein but usually contains an associated cell increase.

6. *Epidemic encephalitis.* Since the first recognition of Guillain-Barré's disease occurred shortly after the large epidemic of lethargic encephalitis, many investigators have suggested a possible relationship between these two conditions (Bassoe,²⁴ Beriel and Devic,²⁵ Sands,²⁶ Strauss and Rabiner²⁷). These investigators feel that Guillain-Barré's disease may be a variation of epidemic encephalitis and caused by the same virus. To emphasize such a relationship, Margulis¹⁸ reported a case of polyneuritis developing in connection with an unquestionable case of epidemic encephalitis, while Strauss and Rabiner reported 6 cases of "myeloradiculitis" in which 1 case later developed a parkinsonian syndrome. Generally, these two diseases do not resemble one another clinically. In epidemic encephalitis, the disease process tends to remain localized to the cerebrum and almost never spreads to the rest of the central and peripheral nervous system. The cranial nerve involvements characteristically appear as ocular findings rather than facial palsies, as is so frequent in Guillain-Barré's disease. Finally in epidemic encephalitis there is usually a pleocytosis but no elevation in the spinal fluid protein.

TABLE I
Clinical Features of Guillain-Barre's Disease

Case No.	Name and Hospital No.	Sex	Age	Date of Onset	*Type of Illness	Facial Palsy	Other bulbar Symptoms	Choked disc	Spinal Protein	Fluid Cells	Temperature	Period Followed	Leukocyte Count	Outcome	Heterophil Titre
1	D. J. 728919	F	18 mo.	Jan. 1943	III	-	-	-	88	1	97-99	1 mo.	4,700	Paresis all limbs	
2	L. M.	F	6	Aug. 1940	III	-	-	-	142	1	99-100	11 mo.	8,200	Complete recovery	
3	R. B. 718941	F	12	March 1942	III	-	-	-	41	2	98.6	3 mo.	11,000	Complete recovery	
4	G. K. 728610	M	14	Dec. 1942	II	-	-	-	43	4	98-99.6	2 mo.	10,300	Paraplegia	1-224
5	S. H.	M	15	Dec. 1942	II IV	+	+	-	197	2	98				1-112
6	E. C.	F	16	Oct. 1940	I	+	-	-				24 mo.		Residual paresis right arm and leg	
7	L. R. 684598	F	19	Dec. 1938	I	-	-	-	46	0	97.8-99	24 mo.	6,400	Complete recovery	
8	B. J. 679553	M	20	March 1939	III	-	-	-	58	57	101.6	3 mo.	7,200	Residual paresis of lower limbs.	
9	E. W. 723962	F	24	Sept. 1942	IV	+	+	-	345	5	99-101	2 mo.	7,200	Residual paraplegia	
10	L. B. 706995	M	25	April 1941	II	-	+	-			98.6	20 mo.	7,600	Complete recovery	
11	K. B. 723461	F	26	July 1942	II	+	+	-	217	1	98.6-99.6	1 mo.	8,600	Generalized hyporeflexia	
12	H. S. 686385	F	26	Dec. 1939	III	-	+	+	109	0	98.6-102	36 mo.	10,650-9,000	Paresis lower limbs	
13	I. P. 726506	F	27	Nov. 1942	III	-	-	-	132	0	98.6	3 mo.	7,300	Paresis legs, Sphincter disturbance	1-56
14	P. L. 702680	F	27	Nov. 1940	V	+	+	-	177	7	98-101	1.5 mo.	10,600	Death	
15	R. H. 684560	M	28	July 1939	III	-	+	-	23.8	2	97-98.6	4 mo.	5,800	Complete recovery	
16	A. R. 695338	F	29	April 1940	III	+	+	+	243	0	99	8 da.	12,000	Death	
17	R. S.	F	30	March 1941	III IV	+	+	-		0	99	23 mo.		Persistent facial weakness	
18	L. W.	F	30	Jan. 1943	I	-	-	-	34	0	98.6	1 mo.		Persistent radicular pain	1-56
19	A. B. 693303	M	34	Dec. 1939	III IV	+	+	+	3+ Nonne	1	99-100	6 mo.	13,400	Death	
20	V. A. 694689	M	35	Dec. 1939	II	+	-	-	134	4	97-99	36 mo.	6,300	Paresis lower limbs	
21	T. H. H.	M	36	Dec. 1941	I	-	-	-			98.6	3 mo.		Complete recovery	
22	M. N. 667969	F	37	March 1938	V	-	-	+	18.4	1	98-99.8	48 mo.	15,000	Complete recovery	
23	A. B. 708849	M	38	May 1941	II	-	+	+	253	11	98.6-99	21 mo.	9,700	Paresis lower limbs	
24	E. H. 713471	F	39	Oct. 1941	III V	-	+	+	58	22	98-99.2	3 mo.	8,350	Complete recovery	
25	M. H. 684609	F	40	July 1939	III	-	-	-	38	16	99-100	18 mo.	8,800	Paresis lower limbs	
26	H. I. 725158	M	40	Sept. 1942	III	-	-	-	65.9-118	1-154	98-100	3 mo.	11,800	Complete recovery	
27	E. A. 718854	F	41	Dec. 1941	III	-	-	-	190	0	97.8-98.8	13 mo.	7,500	Quadriplegia	
28	M. A. 717275	M	44	Dec. 1941	I	-	-	-	38.12	1	98.2-99.6	12 mo.	5,500	Complete recovery	
29	N. G.	M	45	Dec. 1941	I	-	-	-	-	-	98.6	3½ mo.	-	Complete recovery	
30	F. H. 725737	M	46	Aug. 1942	II	-	-	-	153	0	98.6	6 mo.		Paresis right leg and both hands	1-56
31	T. S. 726426	M	57	Dec. 1942	I	-	-	-	76	0	97-98.6	12 mo.	10,650	Paresis left leg	1-56
32	J. C. 72617	M	57	Dec. 1941	III	-	-	-	151	5	98.6	12 mo.	5,700	Paresis right leg, Hypesthesia left hand	
33	P. H. 627353	M	62	May 1940	I	-	+	-	75	0	98.6	4 mo.	7,500	Complete recovery	

*I. Abortive or Mononeuritic; II. Polyneuritic; III. Myelitic; IV. Bulbar; V. Cerebral.

7. *Multiple sclerosis.* This condition is often difficult to differentiate from the myelitic form of Guillain-Barré's disease, especially when the latter tends to show involvement of the pyramidal system. Generally, however, multiple sclerosis produces much more spastic weakness and less sensory disturbance. Radicular pain and severe muscle tenderness almost never occur. Although cranial nerve findings are present, they usually involve the second rather than the seventh cranial nerve, producing optic atrophy rather than a facial palsy. A speech disturbance may be present in both illnesses but in multiple sclerosis it is scanning in type and can occur independent of a severe bulbar involvement, while in Guillain-Barré's disease, the dysarthria appears only after the disease has spread to the bulb and is the direct result of the extensive bulbar palsy.

TREATMENT

The treatment at present is entirely symptomatic. The following are a few of the measures that, in our experience, have proven beneficial.

1. Strict bed rest during the acute stage of the illness. This is a most important therapeutic measure. In those patients who have refused to accept complete bed rest and have continued to be up and around during the early stages of the illness, the involvement has invariably continued to progress and has often become most severe. Immediate hospitalization not uncommonly results in a much more rapid arrest of the disease process with subsequent improvement in both the sensory and motor impairment.

2. Medication and particularly heat to combat the severe discomforts of the radicular pain and muscle tenderness. The treatment of these painful limbs often constitutes one of the most trying therapeutic problems in this disease, especially since these pains may persist throughout the course of the illness. One hesitates to resort to the opiates, but we have found that codeine in small doses often offers by far the most satisfactory results. The barbiturates, especially sodium phenobarbital intramuscularly, have been found helpful but not entirely satisfactory when used alone. In children, chloral hydrate by rectum frequently offers satisfactory sedation. Hot wet packs completely surrounding the painful extremities and applied every alternate hour, produce great comfort to the patient and are most useful in relieving some of the more intractable pain.

3. Large doses of vitamins B₁ and C, especially in those cases which appear to have a radiculitis or a polyneuritis. It has been our practice to give our patients 150 mgm. each of thiamine chloride and cevitamic acid daily during the first week of the illness; thereafter, the dosage is reduced to 9 mgm. of vitamin B₁, and 75 mgm. of vitamin C. It has been our impression that the best results are obtained when these two vitamins are used together, and we have therefore had them combined in a single tablet to facilitate their use.

4. Tidal bladder irrigation and the sulfonamide group of drugs to combat urinary involvement and infection in those cases with sphincter disturbances,

5. Multiple small transfusions in the acutely ill patient.

6. Maintenance of an adequate nourishment in the acutely ill patient. Not infrequently when the illness is severe, an inadequate intake results, either because of an unwillingness of the patient to eat or because of a bulbar palsy with dysphagia. This may become quite alarming since these patients frequently will go into a negative nitrogen balance and remove the necessary proteins from the various body organs, particularly the liver, which organ may already be involved by the disease process.²⁷ In order to prevent such an occurrence, one should not delay in instituting tube-feeding preferably by means of a slow continuous drip method. The formula used should contain an excess of protein, at least 4 gm. per kilo body weight for the adult, in order to maintain a positive nitrogen balance. One can easily supplement such a feeding by an adequate quantity of the necessary vitamins. Through the use of such a continuous drip feeding, one avoids overloading the stomach, and vomiting is frequently prevented. On our service for our feeding formula, we have adopted the Vorco diet,²⁸ supplemented by Dietene§ and brewers yeast to furnish an adequate vitamin intake. A sample of this feeding formula is given in Table II.

TABLE II
Daily Feeding for an Adult
(Vorco Diet containing 2420 calories)

Milk	1000 cc.
Eggs	6
Egg whites	2
Skimmed milk powder	1 cup
Dextrose	1.5 cups
Salt	5 gms.
Supplemented by Dietene and Brewers Yeast containing 1106 calories.	
Milk	100 cc.
Dietene	60 gms.
Brewer's yeast	60 gms.

7. Physiotherapy for the muscular involvement as recovery begins. Throughout the course of the illness mild muscle massage and even passive motion should be instituted. This can be increased as recovery continues and the limb tenderness decreases. Some form of physical therapy may be necessary for long periods after the patient has left the hospital.

PATHOLOGY

It has been definitely established that extensive alterations do occur throughout the nervous system, the pathological lesions varying with the extent and locations of the disease process. Most investigators have described the most severe changes within the peripheral nerves and the spinal cord. Bradford, Bashford and Wilson,⁵ Casamajor⁴ and Mirus²⁹ all observed alterations primarily within the motor cells of the spinal cord. Many of these cells had undergone a patchy degeneration consisting of pyknosis or swelling, partial to complete chromatolysis, cytoplasmic vacuolization, and a nuclear eccentricity. The neuronal damage was usually distributed irregularly along the various cord segments, the injured cells frequently being surrounded by many structurally intact elements.

§Dietene is prepared by the Dietene Co., Minneapolis. It can be mixed with milk and readily passes through a nasal tube. One hundred (100) grams is equivalent to 338 calories and contains: protein—18 gms.; fat—4.4 gms.; carbohydrate—69 gms.; calcium—.60 gms.; phosphorus—.55 gms.; Fe—.15 gms.; vit. A—10,000 units; vit. B₁—2.5 mgm.; vit. C—75 mgm.; vit. D—1,000 units; riboflavin—3.3 mgm.; nicotinic acid—2.2 mgm.

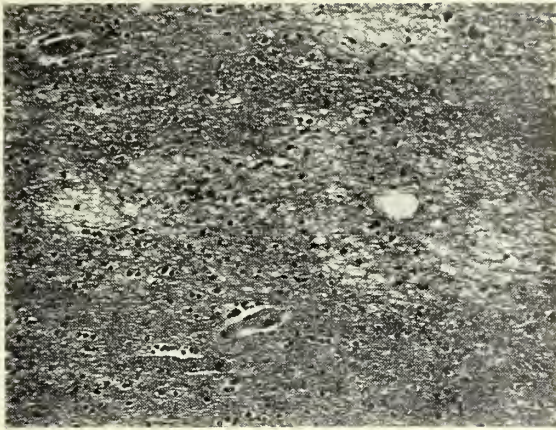


Fig. 1. (Case 19). Multiple areas of perivascular demyelination within the subcortical white matter. The myelin destruction is only partial with early vacuolization. Weill's stain.

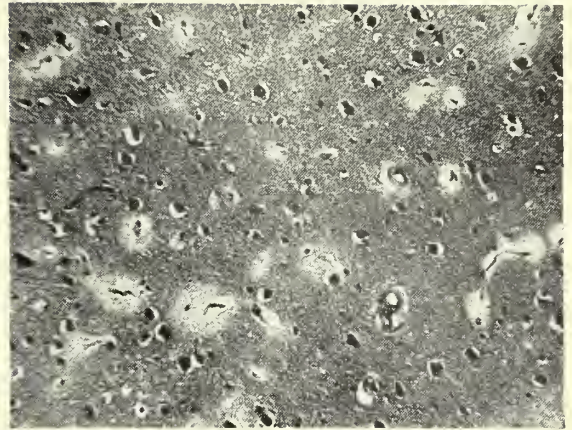


Fig. 2. (Case 19). Numerous small areas of demyelination scattered around the cortical vessels. Weill's stain.

Casamajor also observed an increase in the cellular glia within the central gray matter while Shaskan, Teitelbaum and Stevenson¹¹ described definite degeneration within the myelin sheaths of the posterior columns and of the dorsal-spino-cerebellar tracts.

Changes within the dorsal root ganglia have been consistently reported. (Casamajor,⁴ Bashford,⁵ Gilpin, Moersch and Kernohan¹⁰). These ganglion cells apparently undergo severe changes with swelling and loss of tinctorial properties. Some become pyknotic with beginning neuronophagy. Gilpin, Moersch and Kernohan reported a diffuse lymphocytic infiltration within the dorsal ganglia.

Changes within the peripheral nerves have been reported by Shaskan, Teitelbaum and Stevenson,¹¹ Gilpin et al.,¹⁸ Casamajor,⁴ Mirus,²⁸ and Bashford, Bradford and Wilson.⁵ The larger nerves showed a partial irregular destruction with myelin degeneration, and even fragmentation of the axons and a Schwannian proliferation.

In a previous publication,¹² Case 19 was briefly reported.

This was a 34 year old male who first noticed a weakness in his lower limbs 6 months before his admission to the hospital. This weakness gradually increased in severity during the next five months, at which time there first appeared a bilateral facial palsy. Within the next few weeks, the course of the illness was very rapid with the appearance of respiratory difficulty, diplopia and weakness of the arms.

On admission to the hospital, the patient had marked respiratory difficulty and was placed in a respirator. Neurological examination revealed an extensive involvement of the cranial nerves with nystagmus, bilateral facial palsy, masseter weakness on the left, dysphagia, and some dysarthria. All deep and superficial reflexes were absent, there was a paresis of all limbs and an impaired superficial sensation to the fourth dorsal segment. Spinal puncture revealed one cell and a 3+ Nonne. The patient's course continued rapidly downhill and he died six days after admission from an apparent respiratory paralysis.

Pathologic observations. External examination of the brain revealed an extreme vascular congestion. Microscopic studies with the various special technics (hematoxylin-phloxin, Nissl's stain [thionin], Weill's stain and the Bodian technic) showed widespread lesions scattered throughout the nervous system. The most striking alterations consisted of scattered areas of perivascular demyelination involving primarily the gray and white

matter of the cerebral hemisphere and, to a lesser degree, the basal nuclei (Fig. 1 and 2). The rest of the nervous system contained none of these changes. These perivascular alterations varied from a moderate distention of the perivascular spaces to an extensive tissue destruction. Within the damaged tissue, the changes seemed to be limited primarily to the myelin sheaths, the axons usually showing only a mild swelling and irregularity. Besides this perivascular demyelination, many of the smaller cerebral vessels showed a marked endothelial proliferation with a partial to a complete lumen occlusion.

Nerve cell damage, although fairly extensive, was limited almost entirely to the brain stem. The cortical neurons were uninvolved. A few cells within the basal ganglia showed a mild swelling with a partial chromatolysis. The most severe neuronal alterations were observed within isolated cranial nerve nuclei, namely, the facial and the dorsal nuclei of the vagus (Fig. 3, 4). Here, many of the cells were swollen and chromalytic with pale nuclei. A few of these swollen cells were irregular in outline, vacuolated and had lost most of their tinctorial properties, appearing as ghost cells (Fig. 4).

The spinal cord contained surprisingly few changes. A few scattered motor cells within the various cord segments showed mild alterations of a definite reversible nature. The cord white substance was uninvolved. The rootlets, especially in the lumbar regions, revealed a partial destruction of their myelin sheaths with some swelling, fragmentation and even myelin disappearance. The axons were only partially altered, a few being entirely absent. The damaged portions of the rootlets were replaced by a moderate Schwannian proliferation.

The peripheral nerves, especially the lower limbs, revealed an extensive patchy myelin injury which selected isolated areas throughout the nerves. The neurokeratin network within these damaged regions was condensed into geometric figures. The axons were swollen, irregular and in certain areas fragmented. No cellular reaction was visible in any of the nerves.

CASE 9: A. R. (H.N. 695338), a 29 year old housewife, first became ill two weeks prior to her admission to the hospital in April, 1940. Shortly after washing her car, she noticed some soreness in the calves of her legs which continued to increase in severity and soon spread to involve the muscles of the hips. The following evening, she developed severe shooting pains through her back and was forced to go to bed, where she remained until the time of her admission. While in bed, she developed muscular pain and some numbness in both arms and hands, especially the left arm, which became weak and difficult to use. She also began to complain of severe pain in her neck and lower back, associated with a moderate frontal headache.

Shortly before admission, the patient noticed some difficulty in speech, although at this time she had no difficulty in swallowing. Turning in bed would make her dizzy and nauseated. Just before she was brought to the hospital, she developed a

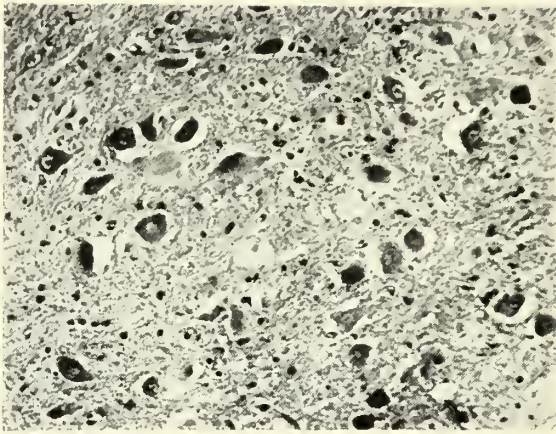


Fig. 3. (Case 19). Facial nucleus. Note the irregular involvement of the nerve cells. Many are swollen, chromolytic and have lost their tinctorial properties. Nissl stain.

bilateral facial palsy, which was mild at first, but gradually increased in severity. Examination on her admission revealed the patient to be fairly comfortable. She had slight pain on antero-flexion of the neck, and her optic discs were hyperemic. There was a slight horizontal nystagmus on lateral gaze. An anisocoria was present, the right pupil being larger than the left. There was a bilateral fifth nerve involvement with hypesthesia over the face and a bilateral absence of the corneal and conjunctival reflexes. All the muscles of the face were parietic. The uvula moved only slightly on phonation and the pharyngeal reflexes were decreased. There was a marked paralysis, involving all extremities as well as the abdominal and back muscles. This paralysis was of a flaccid type and was associated with a total areflexia. The patient was unable to arch her back or use her intercostals in breathing, although her diaphragm was intact. Superficial sensation was severely impaired in both lower extremities to the region of the iliac crest, and was much less involved from the crest to the region of the clavicles.

While in the hospital, the patient's condition seemed to progress. She developed a partial diaphragmatic paralysis with periods of cyanosis and respiratory embarrassment, which required the use of the respirator. Her weakness was so profound that she was almost helpless. In spite of the extensive cranial nerve involvement, she continued to be able to swallow. Her bilateral facial palsy became more marked, as did also her dysphonia, until she was able to speak only in a whisper. She developed a complete bladder retention, requiring catheterization. Her numbness spread to involve all her limbs. In spite of being kept in the respirator, the patient developed increasing breathing difficulty and expired eight days after admission.

Laboratory studies revealed a leukocyte count of 12,000 with a 78-22 differential. Spinal puncture showed no cells and 243 mgm. per cent of protein. Throughout her stay in the hospital, she remained afebrile except terminally when her temperature rose to 101° F.

A complete autopsy was performed. Grossly, the nervous system was normal in appearance. Sections were taken from various regions and stained with the various special technics used to denote tissue changes.

Throughout the cerebral hemispheres there was a marked distention of the perivascular spaces involving the vessels both of the gray and white matter. The brain tissue adjacent to these distended spaces varied greatly in appearance, usually staining very deeply and appearing to be compressed by the distended vascular space. Around a few vessels, the tissue immediately adjacent to the distended spaces showed a very mild demyelination with a swelling and a tinctorial loss of many of the myelin sheaths. The axons in these regions appeared intact. Within the subcortical white matter, especially within the parietal regions, there was some diffuse demyelination. These areas

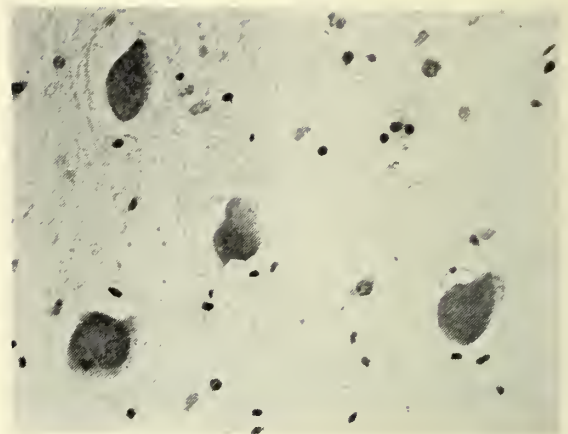


Fig. 4. (Case 19). Dorsal nucleus of the vagus nerve. These cells show a complete chromatolysis and a loss of their processes. Nissl stain.

did not seem to be perivascular in arrangement but could very well have resulted from confluent perivascular foci.

The small cerebral vessels showed numerous structural changes. Many contained a definite endothelial increase with a resulting lumen occlusion; others showed a homogeneity of their walls with a partial loss of tinctorial properties. Many vessels appeared to have undergone a swelling of their wall elements, producing a definite lumen reduction or even occlusion. Around a few scattered vessels, there were seen a few mononuclears distributed within the perivascular space. These vascular changes were much less conspicuous within the brainstem and were not observed within the cerebellum or spinal cord.

The nerve cell alterations were very striking and were again limited almost entirely to the brainstem. Only an occasional shrunken cell could be found within the cerebral cortex. Very severe neuronal alterations were present within the nuclei of the fifth, seventh, tenth, and twelfth cranial nerves. Here the cells were frequently swollen, rounded, and contained either a partial or complete chromatolysis. Many had lost most of their tinctorial properties and stained very lightly or not at all to form ghost cells (Fig. 5). A few of the cells were fragmented or even pyknotic with shrunken cell processes. The cell nuclei were generally less severely involved, many appearing entirely normal in spite of the extensive cytoplasmic changes. In the sixth cranial nerve nucleus, the cells showed only a mild swelling and a partial diffuse tigrolysis.

The spinal cord contained no histological changes. The peripheral nerves revealed an extensive demyelination with fragmentation and often complete disappearance of many of the myelin sheaths (Fig. 6). In spite of the extensive myelin alterations, the axis cylinders were usually spared and demonstrated only slight swelling and irregularity, but no fragmentation (Fig. 7). In the more severely damaged regions, Schwann cells had proliferated to replace much of the injured nerve tissue.

DISCUSSION

The concept of Guillain-Barré's disease has been too greatly restricted, primarily because the criteria suggested by Guillain have been too closely adhered to. This disease probably is much more frequent than is generally recognized. Since this illness may involve any or all parts of the central or peripheral nervous system, the neurological complaints and findings may be most variable and no single symptom-complex can be offered as characteristic. We have elected to describe five different forms of this illness, depending upon the region of the nervous system most severely implicated. Such a classification has the advantage of broadening our concept of this illness

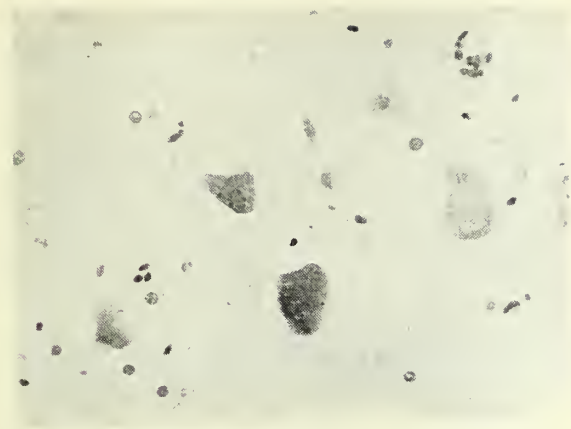


Fig. 5. (Case 9). Dorsal nucleus of the vagus nerve. The cell changes are most variable and consist of swelling, chromatolysis, loss of cell processes and even fragmentation. Some neurons are much more severely injured than others. Nissl stain.

and facilitating its differentiation from other similar neurological disorders. There are certain features, however, which are suggestive of this disease, even though not in themselves diagnostic. Probably the most outstanding are the radicular pain and the striking clinical recovery in spite of an apparently severe damage to the nervous system. Certain other features are helpful diagnostically. The temperature and leukocyte count are not greatly altered and the spinal fluid often shows a cell-protein dissociation. The latter observation will depend upon how frequently the spinal fluid is examined during the course of the illness. In our series it was present in 68 per cent of the patients.

The clinical manifestations of this disease indicate that severe functional impairment of the nervous elements occurs in almost every patient regardless of the duration of the illness. From a follow-up study of the persistent residuals and from a review of the autopsy studies in our fatalities, it appears very likely that in many of the more severe cases, definite permanent and irreversible structural alterations result, which in the chronic illness may be very extensive and may localize within any part of the nervous system, even the hemispheres. The histopathologic alterations seem to vary directly with the severity and duration of the illness. In the more acute cases, there may occur only vascular changes with distention of the perivascular spaces, while in the more prolonged cases, there often results perivascular myelin destruction and extensive nerve cell alterations. The most conspicuous neuronal changes seem to take place within certain selected cranial nerve nuclei. It is impossible to observe such severe nuclear alterations, especially within the tenth cranial nerve nucleus without concluding that in certain cases, a fatal termination may eventuate from damage to the medullary centers.

Finally, the observations in our cases, tend to offer some suggestions as to the pathogenesis of this disease. The striking perivascular distribution of the cerebral lesions certainly indicates a hematogenous spread of the noxious agent. Such lesions resemble very closely those observed in many of the proven and suspected types of

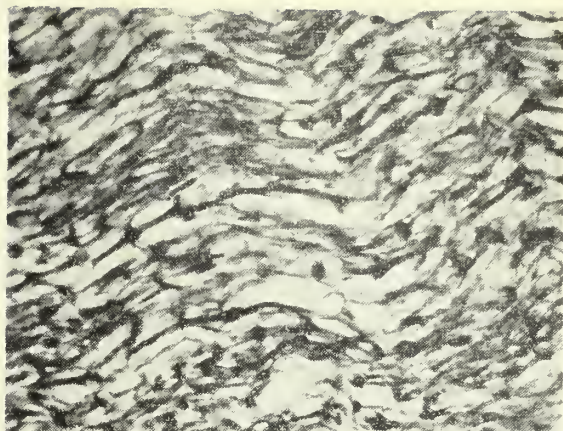


Fig. 6. (Case 9). A section through the sciatic nerve showing a partial myelin injury. Note the extensive vacuolization and the tendency to form geometric figures. Weil's stain.

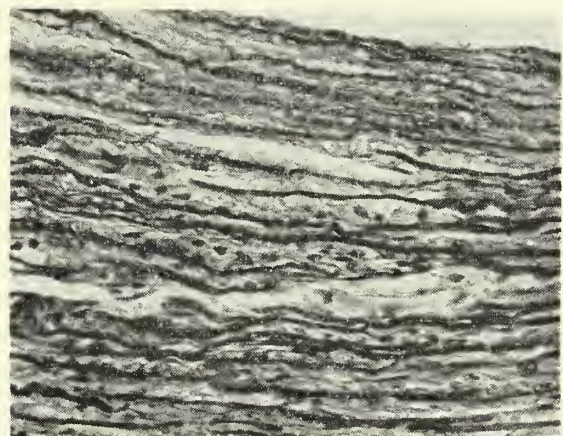


Fig. 7. (Case 9). Same section as Fig. 6, but stained to demonstrate the axons. Note that these structures are relatively intact. Bodian stain.

virus involvements such as equine encephalitis, postvaccination encephalomyelitis, measles encephalitis, etc. Certainly both the perivascular demyelination and the vascular alterations have a striking resemblance to those alterations seen in the western form of equine encephalitis (Baker and Noran,³⁰ Noran and Baker³¹). In addition to these vascular alterations, one is confronted by a disease that also produces neuronal changes that have a definite selectivity for certain cranial nerve nuclei. This cellular specificity seems, to us, also to suggest a virus infection.

SUMMARY AND CONCLUSIONS

1. Thirty-three cases of Guillain-Barré's disease are reported. In 2 of the fatal cases, complete autopsy studies were obtained.

2. Since this disease may involve any part of the peripheral or central nervous system, we have divided the resulting clinical syndromes into five forms, depending upon the region of the nervous system most severely implicated. These consist of (1) the abortive or mononeuritic, (2) the polyneuritic, (3) the myelitic, (4) the

bulbar, and (5) the cerebral types of Guillain-Barré's disease. The myelitic form is the most frequent, occurring in 45 per cent of our patients as compared to 24 per cent with mononeuritic symptoms and but 21 per cent with polyneuritic findings.

3. Certain features, when associated with any of the above clinical forms of this disease, aid greatly in the diagnoses. These consist of: marked radicular pain and muscle tenderness; a normal or only slightly elevated temperature and leukocyte count; a cell-protein dissociation in the spinal fluid; a facial palsy; and a favorable prognosis in spite of an apparently severe illness.

4. In spite of the apparent optimistic outlook in this disease, careful follow-up studies in older cases indicate that neurological residuals do occur very frequently, especially in the more severely involved individuals.

5. This disease seems to occur predominantly during the winter months, although scattered cases may be seen throughout the year.

6. The visible histopathologic changes consist of perivascular foci of demyelination scattered throughout the cerebral hemispheres, neuronal alterations within the cranial nerve nuclei, and patchy areas of myelin destruction within the peripheral nerves.

7. The perivascular distribution of the cerebral lesions suggest a hematogenous spread of the noxious agent.

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War and Peace Neuroses*

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THE subject assigned to me in this series was entitled, "Shock to the nervous system." As this covers a wide field, and as some aspects of it have already been or will be considered by my colleagues, I shall confine myself to the consideration of abnormal mental states, the result of war experiences. By experiences, I mean not only the actual physical traumas inflicted directly or indirectly by weapons used in warfare, but the far more subtle effects upon the mind of the stresses and strains produced by the existence of a state of war, whether knowledge of it is acquired by actual participation in the conflict or not. In other words, the

effects of mental experiences upon physical conduct during times of war.

This language, of course, implies a conceptual dualism, that of mind and body, which should be explained. But though it is easy enough to define the term body, it is not so easy to define mind, and I am not going to attempt it, for far abler minds than mine have failed to produce a satisfactory definition. Instead, I shall imitate the school-boy, who, on being asked to describe an elephant, replied that this he was unable to do, but he could jolly well recognize an elephant when he saw one. Similarly, though neither you nor I nor anyone else has ever seen the mind, we know well enough what we mean by it.

*Read February 8, 1943, at staff meeting of St. Vincent's Hospital, Billings, Montana, as part of a series on War Casualties.

This limitation of my subject excludes from my consideration all conditions with recognizable tissue pathology, whether this be the actual destruction of nervous tissue, as in the more serious and plainly evident wounds, or the microscopic hemorrhages of less violent traumata.

In the course of my discussion, I will have to wander away from actual warfare, for there is nothing in the symptoms produced which is peculiar to warfare. They all have their counterparts in civilian life. It is only the tempo and the intensity of them that are changed in war, an intensity that multiplies many times the mental shocks of ordinary time, and a tempo that squeezes into a rapid crescendo emotional experiences which would be spread out over long periods of time during peace, or, more accurately, those intervals of relative quiet which we call peace.

First, let us consider what are the effects of war traumata, in other words, what symptoms or physical manifestations occur as the result of the mental impressions produced by actual warfare. An individual is present, for instance, in a place subjected to bombing by enemy airplanes. Of course, he may be the victim of a direct hit and pass at once out of the picture, or he may be physically injured by fragments of bombs or detritus, or suffer from the effects of those atmospheric condensations which we call blast. If so, we will turn him over to the tender mercies of the surgeons, and let them work their sweet wills upon him; possibly, if we are of a religious frame of mind, dismissing him with a prayer, possibly, remembering the remark of a congressional chaplain, that he first prayed for the senators, but, after looking them over, he prayed for the country. But all of those in the bombed area will have been placed in deadly fear, and I know of no better description of the physical effects of fear than that of Darwin¹: "The eyes and mouth are widely opened, and the eyebrows raised. The frightened man at first stands like a statue, motionless and breathless, or crouches down as if instinctively to escape observation. The heart beats quickly and violently, so that it palpitates or knocks against the ribs. . . . The skin becomes pale as during incipient faintness. . . . The hairs also on the skin stand erect, and the superficial muscles shiver. . . . There is a death-like pallor; the breathing is labored; . . . the uncovered and protruding eyeballs are fixed on the object of terror; or they may roll restlessly from side to side. . . . All the muscles of the body may become rigid, or may be thrown into convulsive movements. . . . In other cases, there is a sudden and uncontrollable tendency to headlong flight; and so strong is this that the boldest soldiers may be seized with a sudden panic." Cannon, more recently describes them in terms of modern physiology and endocrinology.² Fear is purposive, has for its object the placing of the body in the best condition to meet and avoid the danger, impelling it either to fight or to flee, and by these means, the inner tensions are overcome and permanent damage to the mind avoided. But during a bombing, the victim is helpless. He cannot fight the enemy nor can he run away. The utmost he can do is to throw himself upon the ground, or, if time permits, seek refuge in some place which may or may not afford protection.

His terror can find no outward expression, but bombards all the organs of the body with a series of violent and concentrated stimuli. He may remain outwardly quiet, but this only denies him the physical release of tension by the muscular action of his vocal organs. Shakespeare, good psychologist as he was, knew this when he said: "Give sorrow words. The grief that does not speak whispers the o'er-fraught heart and bids it break." In describing the bombing of St. Thomas' Hospital in London a participating doctor says³: "In peace time, our psychologists had warned us to be prepared to have the hospital stormed by screaming people, and to have outbreaks of hysteria in the wards themselves. In point of fact, not one whimper or lamentation was heard from start to finish. . . . For a moment or two after the explosion, there was absolute silence. Then a man's voice said, 'Christ', and a woman's, rather plaintively, 'I don't think I am going to like this at all.'" Unconsciously and instinctively, these people reverted to the defense mechanism of some of the lower animals, who sham dead in hopes of deceiving their enemy, in this case, of course, an utterly futile maneuver.

Now is it any wonder that such experiences may permanently affect the individual who has suffered them? Indeed, fright alone may cause death, which, translated into physiological terms, means that the heart may stop beating, either by overstimulation of the vagus and consequent inhibition, or by overstimulation and exhaustion of the sympathetic system.

But after the immediate danger has passed, the effects may remain. The highly organized nervous system of man has acquired, to a degree above all other animals, the function of memory, or the ability somehow or other to store up past experiences and to recall them. In this way, he practically lives at times in the past, and not only does he see and hear all which he saw and heard at the time of the occurrence, but he experiences the inner feelings or the emotions which he then felt, and these inner feelings can later produce the same effects upon his bodily organs. You can prove this readily enough to yourselves. Think of the loss of some dearly loved relative or friend, and you will immediately feel the emotion of sadness, and may even weep. Think of some angry altercation with an enemy, and your pulse will quicken, and you may even clench your fists. With the temporary distractions of daily life, our attention is switched to other objects and we forget, but, these distractions ceasing, the forgotten experiences crowd back into our consciousness and plague us. In the stillness of the night, they rise up to torture us, and we strive to thrust them back into the unconscious and to seek a little temporary oblivion in "sleep which knits up the ragged sleeve of care," vainly in most cases, as shown by the wide use of barbiturates.

Man has also acquired the faculty of imagination. From his past experiences he conjures up visions of the future. This is of great value to him in enabling him to anticipate dangers and to take steps to meet them. If we and our allies had had more of it, we might have prevented this war. But it can be carried to excess, and then becomes a positive disadvantage. Thus, we have the man

or woman continually fretting and worrying over things which *might* happen, crossing all the bridges before coming to them, and living in a continued state of fear. During times of war, this type of person develops war hysteria. Though he may be far from actual danger, he visualizes himself at the mercy of the enemy and fusses over perfectly unnecessary precautions. He makes up the ranks of those who pass sedition laws; and he sees a communist or other menace in all those who do not think as he does. Fortunately, this is not as bad in this war as it was in the last, when it actually assumed epidemic proportions.

All these fears not only affect us when we are actually conscious of them, but they exert their pernicious influence in the realm of the unconscious, producing such psychosomatic combinations as neurocirculatory asthenia, hyperthyroidism, and peptic ulcer. There is evidence that these have increased in the countries which have been long in the war, and we, here, may expect similar results, for we are not the least excitable of the human race. Though there have always been in America plenty of people forced to live on the very margins of existence, at the same time there are probably more people who have enjoyed actual luxuries in it than in any other country. The vigor of their protests at such minor inconveniences as restrictions upon coffee, rubber and gasoline shows, too, that they have come to expect all their accustomed pleasures as an inalienable right, and we may anticipate that the deprivation of them and consequent frustrations will produce their symptoms.

This matter of previous experience, pleasant or otherwise, is of profound importance in the war neuroses. The mother's darling, whether the mother be the actual physical maternal progenitor or a country fortunately blessed with an abundance of material wealth, will suffer badly. There have been taken away from civil pursuits and thrust into the armed forces, millions of men. Most of them have gone in against their will, and nearly all of them have relatives emotionally affected by their departure. In the services, they will find their liberty curtailed in all directions. Every detail in their lives will be determined for them. Though they may have been accustomed to depend upon the automobile for physical transportation even for the shortest distances, and though they may have been used to sitting in the bleachers and applauding the physical prowess of others, they will now have to depend largely upon their own organs of locomotion, not only for the transportation of their persons but also of their belongings; and they will be active participants themselves in the most gruelling and cruelest sport of all — war. For these purposes, they will be subjected to severe and arduous training, often under the unsympathetic direction of so-called and well-called, hard-boiled superiors. Any attempt to avoid these things will be visited with punishment. And, in addition, and as the goal to which all their training is directed, they will be compelled to face physical mutilation and death itself.

Of course, among them are many men who have all their lives been enduring hardships. For these, it will not be much of a change, often, indeed, it will be a change for the better, for, while the army may be a hard task-

master, it is also a solicitous one, taking much pains to see that each man is well fed and well clothed, and receives both preventive and curative medical attention when needed. Gone, fortunately, are the days when greedy contractors could make fortunes by supplying an army with embalmed beef and paper shoes, or with defective guns which were as likely to kill or wound the shooter as the shootee. But even the hardy are likely to chafe under the restrictions placed upon their personal conduct. Men value most the liberty to go and come as they please. If this were not so, there would be no justification for anybody fighting this war. It is very doubtful whether the negro in this country is a bit better off since slavery was abolished. Oftentimes his "freedom" is little more than the freedom to starve or near-starve. But I think it perfectly safe to predict what the result would be, if the question of freedom or slavery, with the implications of both, were submitted to the negroes themselves for a vote.

Much more will those men who have been used to comfortable living be likely to resent army life and discipline. It will be very different from the mild discipline of contemporary American homes, and the feeble attempts of spinster schoolteachers to lead them into the ways of learning. Most of them, I think, will make a satisfactory adjustment, but there will be a minority who will not. They will convert their mental conflicts into physical symptoms, be the despair of the medical officer, a nuisance to their company commander, and, after the war is over, tearful applicants for compensation for disabilities supposedly incurred during service.

Among these during the last war were the so-called cases of "shell-shock". A man suffers from the explosion of a shell either with or without physical injuries. Following this, he becomes anxious, sleepless, with trembling, mental irritability, oftentimes developing paralysis, or such sensory disorders as blindness or deafness. Fundamentally, what has happened is that the man has gone through a terrifying experience, which may or may not be concussion, which he reproduces in memory, and which keeps him in a chronic state of fear. There is fear of the permanent results of his recent experience, and fear that he may again be placed where a repetition of the experience may occur; and, as the continuance of his physical symptoms will prevent his being sent back to military duties, he has nothing to gain by recovery. Now do not misunderstand. These are not conscious, deliberate reactions. It is the automatic—instinctive, if you like—part of the man which is reacting. He truly knows not what he is doing, any more than people generally recognize their motivation in most of their every-day conduct. The higher cerebral functions, by which one supervises and criticises one's conduct in relation to some acquired system of ideals and conventionalized behavior, no longer act, and he is at the mercy of his emotions. He really has had a "nervous breakdown," and this has produced a somatic disorganization. This somatic disorganization may produce actual pathological changes in his tissues and organs, giving rise to such diseases as hyperthyroidism and peptic ulcers.

Whether or not an individual will so react in times of stress will depend upon his past experiences. Our conduct at any one time is always determined by our past. Give a man, trained to standards of honesty, one hundred dollars for delivery to someone else, and it is pretty certain he will so deliver it, but give it to a man brought up among thieves, and it is equally certain that he will keep it himself. A child is brought into the world with certain tendencies to particular types of reactions, call them urges, instincts, or what you will. These are all directed to his own preservation and happiness. But the world he is brought into is a pretty tough place, composed of many other individuals all seeking the same object. Conflicts are bound to occur, and hard knocks will be the lot of all. For many years, the child will depend upon his parents for protection. But if that protection goes too far and he is shielded too much, he will never develop the ability to resist "the slings and arrows of outrageous fortune." He will come to expect a consideration he is not likely to receive in later life. A child brought up in such a way is liable to develop tantrums, or sulk when he cannot get his own way, the counterpart of the neuroses of later life. His training has to teach him how to live with his herd, to make compromises with others, and to give and take. He learns that certain forms of conduct receive the approval and other forms the disapproval of his herd. He is taught certain ideal patterns of behavior which he is expected to follow. Civilized society could learn, from those we are pleased to call savages, something worth while in this matter. All these have ceremonies which mark the boy's passage from childhood to adolescence, when he is initiated into adult society. Some of these are severe, inflicting upon him prolonged hardship and actual physical pain. Failure to acquit himself honorably in these will place upon him a stigma from which he will never recover. Small wonder that traumatic neuroses are unknown among savages.

When a man goes into the services, he receives something of this training. Rudyard Kipling pointed out the changed outlook upon life of a man brought up in the underprivileged classes, upon his induction into the army. Here he finds himself a member of a group with a common purpose, to the achievement of which all his conduct must be directed. In everything he does, he must subordinate himself and even sacrifice himself for this. He acquires, too, a set of traditions up to which he must live. He learns of the glorious deeds of his regiment, and becomes conscious that, as part of the regiment, he shares these glories, and that upon him, too, devolves the onus of continuing that tradition and adding his part to further glories. He must not let the regiment down. Now you see why, when the burden laid upon him becomes greater than he can bear, and he breaks, he takes refuge in physical sickness. That lets him out, and he avoids the obloquy of the coward. Before you condemn him, remember Whitfield's remark on witnessing a criminal going to the gallows: "There, but for the grace of God, go I." For every man has his breaking point, or, if you prefer Wechsler's way of putting it, "every nor-

mal person is a little neurotic, and every neurotic, much normal."

And all these war neuroses have their counterpart in civilian life and during times of peace. Indeed, the study of them has added much to our understanding of these peace conditions which are always confronting us. We see them in men, as the result of accidents or business failures or worries, in women, as the result of marital difficulties or the failure of their love lives. From all these, they have sought refuge in physical sickness. It is their way of meeting their troubles. When you see a man or woman with a rapid heart, a flushed skin, and a tremor, even a raised basal metabolic rate, do not at once incriminate the thyroid; before you remove it, search diligently for a mental origin, even though they may deny these. Before you operate on a woman's genitalia, even though there are some abnormalities, make sure the symptoms she complains of are really due to the abnormality, and are not a defense reaction to some continuing psychic trauma. Be careful not to emphasize a harmless premature systole or an unimportant murmur. Many people have been made cardiac invalids for life by overemphasis of these. Even electrocardiographic changes simulating coronary thrombosis, such as alterations in the level of the S-T segment or negative T waves, can be caused by fear. And please do not give digitalis unless the indications are definite and positive. Digitalis will never bring back a wandering lover or husband, nor rescue a business rapidly going to the dogs. Nor will teeth extraction, either. And for the nurses, be careful how you suggest to your women friends possible physical causes for their symptoms. Your prestige as a nurse will add weight to your remarks, and may render very difficult an appreciation of the true basis of the ill health.

It is so important to avoid fixing in the minds of these people the idea of a physical origin of their symptoms. This is what they want, for it provides the escape from the disagreeable situation, and especially do they want the authoritarian confirmation of the doctor. I am afraid that after the war is over we will see many of these war neuroses. We did after the last one, and ill-judged sympathies for ex-soldiers, or mistaken diagnoses have cost the country millions of dollars, and made many men parasitic upon the community for life. Sympathy for others in their troubles is good, but can easily become mere sentimentality. Approbation and disapprobation, rewards and punishments, are a potent factor in keeping all of us toeing the line. A stiff upper lip and the avoidance of self-pity do much to help in meeting adversities. After all, many people have carried on and distinguished themselves with serious physical handicaps; our own president sets a brilliant example of how a physical handicap can be overcome. Certainly, a man who develops some of these physical disabilities when simply confronted with the possibility of military service is of little value to a community, and one may well doubt the wisdom of compelling another man to risk or lose his life in defending him.

Many of the current hasty marriages, too, are going to cause trouble, and develop their own crop of neuroses, when the emotional let-down comes and life resumes its

humdrum character. The man out of work and in civilian costume will seem to the woman who has married him a very different individual from the hero in his uniform.

In all probability after the war, we will have what one might call a collective neurosis. After their battle experiences, the men who come back will never be quite the same. Their background will be different, particularly for those who previously had known nothing but the humdrum life of a small community. After risking their lives, they will feel themselves entitled to special consideration and privileges. But many of them will find their places taken by some of their contemporaries, who, for various reasons, good or bad, were able to stay safely at home, and they will have to begin all over again. Naturally, they will have little love for these stay-at-homes—often, indeed, plain slackers—who will try to hang on to what advantages they have gained. Incidentally, medical practice may be profoundly affected. Men who have become used to receiving medical attention whenever they have needed it, or thought they needed it, will demand a continuance of such privileges. So we may expect a widening of the field of activities of the Veterans' Bureau, and, possibly, an extension of the services to the families of ex-service men, or even to the general public. Indeed, if all men are to be potential military material, it is only common sense to provide them, especially in their younger years, with all the facilities

to make them *good* material, and so avoid the appalling number of rejections of the present war. Consequently, state medical service in some form or other, in spite of the opposition of many of the profession, is likely to receive an increased measure of support.

Soon, too, the soldiers will cease to be regarded as heroes, for the country will have had enough of heroics, and will want to get back to "normalcy" again—silly term that, as if anyone can say what is "normal" in this ever-changing world!

When the danger is over, our pacifist and isolationist friends will probably again find full voice, and may persuade a disillusioned and war-weary people to attempt another flight from reality, and to disclaim any share in the responsibility of maintaining the peace for which they have fought. This happened before, and is not unlikely to happen again, particularly if it offers any immediate advantage to one or other of the political parties. And so the merry old game will go on as before; and in a few years we will have a bigger and a better war, for a vicious circle exists, in that the neuroses of peace produce war, and war, in its turn, produces another crop of neuroses.

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Convoy Fatigue and Traumatic War Neuroses in Seamen

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THE men of the Merchant Marine were among the first victims of the war since the submarine warfare had already gotten under way before we were combatants. In those early days and during the first months of the war the seamen who were ill or injured were taken care of in Marine Hospitals and in clinics operated by the U. S. Public Health Service for the care of the American Merchant Marine. Many neuropsychiatric casualties occurred, and as their number increased, it was necessary to make other provisions for their care. It was also found that a hospital was not the best place for them.

In order to meet this emergency the War Shipping Administration appropriated funds to the Recruitment and Manning Organization in July, 1942, to set up a medical division staffed by commissioned officers of the U. S. Public Health Service. The United Seamen's

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Service, a private organization closely connected with the War Shipping Administration and working in behalf of seamen, has contributed generously to the work. Soon after the program got under way it became apparent that it should be broadened, to include particularly the prevention of the traumatic neuroses or at least to endeavor to diminish their severity.

DEFINITION

We call the milder reactions "convoy fatigue" to differentiate them from traumatic war neuroses. The former term does not have the connotation of mental disease for the patient and the public. The latter implies that the patient's symptoms are directly connected with his war experiences. Traumatic war neurosis may be defined as an unconscious or partly conscious explosion of anxiety and fear at a primitive psychological level, resulting in the disorganization of the psychosomatic mechanisms.

Certain neuro-psychiatrists limit the diagnosis of traumatic war neurosis to cases with a history of previous

good adjustment; onset following combat, showing objective symptoms of anxiety and probability of recovery. They consider cases of nervous reaction not fulfilling these criteria to be recurrences of old psychoneurotic disorders. Our experience leads us to diagnose traumatic war neurosis also in cases in which the patient has a neurotic history, but his reaction is a response to a real and immediate situation. It appears to be discreet and encapsulated, is at first unrelated to the past and may remain so for a short time. In some cases the traumatic neurosis may clear up. We also feel that the diagnosis is justified when the symptoms occur after a prolonged period of exposure to the probability of enemy action without actual combat. We consider as criteria the presence of physical signs and symptoms associated with unconscious or partly unconscious anxiety and fear following the stress and strain of active duty and the tendency to recovery.

Numerous references^{1,2,3,4,5,6} in the literature have emphasized the importance of the physical condition of the men and of heredity as well as of previous neurotic difficulties as predisposing to traumatic war neurosis. It has been our experience that hereditary and constitutional elements appear to play a comparatively small part in these reactions. Many men of poor background go through combat with amazingly little disturbance. Even those with a history of neurosis frequently experience enemy action without increase in their symptomatology. While men of good background are more likely to withstand stress and strain, some will break unexpectedly and all will show some signs of breaking if the stress is great enough. Each man has his breaking point, as was shown at Guadalcanal.⁷ Predictions from a man's background are, therefore, impossible, and no one can foretell what he may be called upon to endure. Undoubtedly, good physical condition makes a man feel able to cope with situations and that helps his mental state. In addition factors on board ship are important. A great deal of mental tension can be built up on a ship if there is dissatisfaction over conditions and anxiety over lack of proper safety measures. Accounts seem to indicate that there are fewer breakdowns on a happy ship.

The fact that the seamen were exposed at the beginning of the war to enemy action with no means of defense was important. The sense of complete helplessness and frustration under attack and the pent-up hostility could be nerve-racking. This has improved since the ships have been armed and sail in well-protected convoys.

While all of these external factors are important, the neurotic reaction frequently is heightened, if not at times caused by, a sense of shame and of fear and the obvious physical reaction to it. In these cases every effort,—in some consciously, in others unconsciously,—is made to repress it. When the effort of repression is successful, the neurotic symptoms, of course, increase.

SYMPTOMS

Symptoms are varied and may involve any parts of the body-mind mechanism. At times the picture is that of a chaotic state similar to that described by Pavlov and Cannon in animals when in acute mental states. The

total organism may be affected. For convenience the symptoms may be classified as follows, though any combination or all may be present:

1. *Emotional.* Anxiety, panic, confusion, amnesia, stupor, over-excitement may occur, and occasionally, psychotic or epileptic attacks. Irritability, restlessness, insomnia, as indications of a state of tension, are common during long voyages through danger zones even if there has been no actual contact with the enemy.

2. *Motor.* Tremor and, occasionally, cataleptic state may occur.

3. *Vegetative.* Nausea, vomiting, anorexia, severe constipation, diarrhea, tachycardia may occur. Any of these symptoms may be found in the tension states and considered as part of convoy fatigue as well as of the more serious traumatic war neuroses.

4. *Deferred reactions.* There may be no apparent effects immediately after the trauma but symptoms may suddenly appear after the return home, after an illness, exposure to a prolonged tropical temperature, or some form of emotional strain, such as difficulties at home. One man, aged 50, an oiler in the engine room of a tanker, was torpedoed twice, got malaria on the west coast of Africa where his lifeboat landed, and on the return voyage was subjected to twelve days of unusually torrid tropical weather. The ship was torpedoed and he suffered a minor injury. Up to that point he apparently had had no nervous symptoms but this seemed to be the last straw and he suffered a severe traumatic neurosis.

5. *Physical injuries with psychological concomitants.* Injuries from blasts, punctured ear drums, subdural hematomas, and skull fractures may be found, as well as all of the usual types of wounds. Immersion foot is found after long exposure to the weather. Any of the psychosomatic symptoms mentioned above may accompany these physical injuries. Slow healing and subsequent discouragement may retard recovery from the neurosis, particularly in men unaccustomed to illness.

DEVELOPMENT

1. *Early stage.* The early stage lasts from the onset of symptoms until there is evidence of a change of phase. Either there is an improvement after external strain has been removed and treatment started or the symptoms increase in severity. In these cases reaction ceases to be associated solely with the traumatic events. Most cases come in the first category. They recover spontaneously without going on to the next stage.

2. *Subacute stage.* Failure to clear up after the early phase is marked by a tendency to connect the traumatic event with later experiences and to over-react to events in the present and to ideas about the future. There may be periods of improvement with relapses to the original symptoms in between. Failure to improve is likely to occur if events following the original trauma are discouraging and harassing rather than helpful, and if there is lack of appreciation of the patient's condition.

3. *Subchronic stage.* In these cases the patient begins to seek a secondary gain from the neurosis. The need to defend himself against further trauma gains the ascendancy over the desire to go back to sea and over ideals of

loyalty, bravery, and sacrifice. The present reactions become related to the neurotic patterns of his early development. The patient tries to find a comfortable niche in which to settle and to look for aid to increase his dependence.

4. *Chronic stage.* The situation described in (3) takes on a more permanent character and there is considerable evidence of regression into invalidism.

TREATMENT

Psychological first aid should be administered at the onset. This has not been possible in the case of seamen, but experience in the British and Spanish Loyalist armies as well as our experience with casualties seen later indicates the advisability of immediate therapy. To this end we are educating those who are most likely to be on hand at the onset to understand the emotional condition of the man, the need for prolonged sleep, and, after that, for companionship, the proper use of sedatives and the types of restraint, should any be necessary. Those in charge of United Seamen's Service for seamen in the main ports of the world, officers in charge of the ship's medicine chest and the men themselves, are being given this information.

Survivors landed in foreign ports are taken care of by the Government and other agencies such as the United Seamen's Service and the Red Cross. Arrangements are made to bring home the casualties as speedily and under as favorable conditions as possible. They are met on arrival by doctors of the Public Health Service and War Shipping Administration officials. From here they are taken to Marine Hospitals, sent to Rest Centers, or returned home.

The United States Merchant Marine Rest Centers have been established for the treatment of both convoy fatigue and the traumatic war neuroses except in cases having physical disabilities requiring hospital care. These centers, which are attractive, home-like, and very informal, accommodate from 30 to 50 men. They are situated in the country near the large sea ports. There is a psychiatrist in charge. Nurses are selected for their capacity to participate wholeheartedly in the program. The length of stay is limited to three weeks since the centers are not planned to care for chronic cases.

The Work-Recreation Program. There is a hobby shop, which is a less pretentious modification of the highly organized occupational therapy department of a mental hospital. Its equipment is simple and only short term projects are undertaken. The managers also call for volunteers among the men to assist in maintenance repair jobs, modest construction projects, and various tasks about the grounds.

This work program is an important instrument in restoring the patient's self-confidence, giving him a sense of personal achievement, re-establishing his assurance in his usefulness, and gradually reconditioning him for the active life he will resume.

Recreation is of two types. In the first, the patient participates actively in games, social dancing, community singing, amateur theatricals, etc. These activities are shared by the doctors, nurses, other employees, and vol-

unteers. The second type of recreation is passive. A local committee invites artists in various fields to donate their services and the patients constitute the audience.

Such activities are not only diverting but are a means through which the personnel and community express their special interest in the patient's welfare and make him feel an honored member of the community. Care is taken to relate the activities of each man to his condition.

Psychotherapy is conducted through group discussions and personal interviews. It has two chief aims—to contribute to the man's understanding of himself and his symptoms and to send him back to sea better equipped to take care of himself physically and mentally. The more a man knows how to understand and handle his fears, how to use every available means to help himself in dangerous situations, the less likely he is to break down.

Each man is given a physical examination and is interviewed on admission. The length of the interview depends on his condition and willingness to talk. No pressure is put on the patient. Emphasis is put on the necessity to restore good sleeping habits and good physical condition. The work-recreation program is discussed in relation to the man's interests and condition. When necessary, special diet, vitamins and physiotherapy are prescribed. The number of personal interviews depends on the needs of the individual patient. No attempt is made to do other than superficial therapy. It is our experience that the best results are obtained by a thorough airing of the traumatic experiences and by the release of the attendant emotions. Only such earlier personal experiences are obtained as are spontaneously brought out by the man and they are not pursued further. In selected cases, sodium amytal is given intravenously as a hypnotic to aid in the recall of the traumatic events.

An understanding of the psychosomatic mechanism, expressed in simple terms, is emphasized in both interviews and group talks. Considerable relief is experienced by the patients through an understanding of the relation between their symptoms, which are such a mystery to them, and the emotional reactions to their experiences. The naturalness of fear reactions is repeatedly stressed and the physiological reactions to fear are discussed.

Group therapy may be carried out in small or large groups depending on the subject and the technics of the individual doctor. It is very informal and wherever possible is illustrated by charts and films. Anatomy, physiology and psychology are discussed from the standpoint of the man's own psychosomatic symptoms. Relations between officers and men and problems of authority are discussed and many "gripes" are gotten rid of. The men themselves suggest subjects. An understanding of convalescence and fatigue is important, as many are over-eager to get back to sea. A sense of group solidarity is fostered and there is great comfort in the knowledge that others have the same feelings and difficulties so that shame tends to disappear.

First aid may be taught by local Red Cross teachers. This is particularly important, both actually and as a psychological aid, as there are no doctors aboard merchant ships and a man never knows what he will be up

against in a lifeboat. Damage control, ways of leaving the ship and swimming through oil are taught with Navy films. Handling of lifeboats is practiced with regulation boats, and swimming and life-saving are taught. This is greatly appreciated by the men and adds to their morale and security.

Approximately 80 per cent of our men are ready to go back to sea in three weeks. Of the remainder a large percentage ship on the Great Lakes or work in the fishing industry and shipyards and return later to sea.

PREVENTION

We are now accepting in the Rest Centers men who do not suffer from war neuroses but who are tired or in poor physical condition after a trip at sea. Often a few days or a week will put them in good condition and we are hopeful that this will prevent breakdowns or at least diminish their severity. The educational program also helps. Men who have been at the Rest Centers are encouraged to return to rest up for a few days after subsequent voyages.

Every effort is made to prevent the man from getting into the chronic or subchronic state by helping him bring his fears to the surface and by reconciling them with his pride and ideals. Another branch of the maritime industry which is without danger may be made acceptable. It is important that the Rest Center should not assume the appearance of a "Snug Harbor."

The educational program is being extended to union halls, and United Seamen's Service hotels and recreation centers. It includes discussions of physical care, psychological reactions related to the men's situations, first aid and taking care of oneself in dangerous situations.

AFTER CARE

A medical social worker to whom the man is assigned on admission takes care of any necessary arrangements until the man signs up. Contact is kept with the doctor

through two addressed postcards given the man when he leaves the Rest Center and which he mails from any ports in which he lands, giving a statement of his condition.

CONCLUSION

Traumatic war neuroses of all degrees are seen in many merchant seamen who have been subject to more strain than they are physically and emotionally able to bear. They occur in men who are neurotic and in those who seem to have been relatively stable and do not always seem to be in proportion to the strain involved. The symptoms may include all of those which the psychosomatic mechanism is capable of producing.

Treatment should be instituted as early as possible and include (1) sleep, induced if necessary, (2) removal of all strain in the environment, (3) adequate diet, (4) psychotherapy directed toward the full expression of the traumatic events coupled with the expression of the emotions associated with them and toward an understanding of the causes of the breakdown, and (5) treatment of physical difficulties.

Prevention consists in (1) getting the man in the best possible condition before going to sea, (2) providing as much training as possible to cope with any emergency that may arise and (3) giving him an understanding and acceptance of his emotional reactions under strain.

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Employment of Mental Hygiene Principles in Improved Selection of Armed Forces*

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THE problem of an adequate screening program for the State Selective Service to prevent individuals who are socially and mentally ill from joining the armed forces has been of vital interest to military and civilian physicians, social and welfare workers and civic minded citizens for at least the past two years, that is, even before our actual participation in war. Many persons have felt the need of a more adequate program, but have felt themselves thwarted and frustrated by the military and professional red tape through

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which it is necessary to wade in order to institute certain procedures. In spite of such restricting forces, valuable methods of selective service screening and aids to discriminative selection that have been put into operation in the past year are a credit to various state organizations of social welfare and selective service as well as to certain individual champions of the program. It should be of general interest to become acquainted with some of the history of what has been done in this state regarding this problem in the past year, as well as to emphasize the objectives.

Much interest in this problem stems from the practical aspect of how to avoid the end result of military neuro-

psychiatric casualties. Through contact with clinical conferences at one of our state hospitals, I personally became acutely aware of the military neuropsychiatric casualties that were being dumped upon the state hospitals as an additional load for the hospitals and their overworked staff. We realized that in many of these cases the individuals had been working as productive units in their own community before they had been subjected to military induction. I saw one particular case in which a farm hand, aged twenty-one years, had been making a favorable adjustment on the farm prior to induction although there had been evidence of a previous maladjustment at the age of seventeen years when he had felt that he had been hypnotized and had had a quarrel with his father, had struck him and had caused considerable comment among the neighbors. The father was a religious fanatic and one brother has been hospitalized for mental disease continuously since 1939. Actually, the whole family is considered below par mentally. In December, 1941, the young man enlisted and went through the usual induction into the army. The local board was undoubtedly aware of the fact that the family was considered somewhat unstable, that one brother, four years older, was an inmate of a state hospital, and even that the patient had had a "nervous breakdown," but no mention was made of these facts and there was no machinery for presenting them to the induction board. The patient went on into the army, only to have a rather severe period of excitement and subsequent catatonic behavior about six weeks or two months after his induction. The result was his eventual discharge from the army because of dementia praecox and his return to his home county, from where he was sent to a state hospital. This appears to be a needless waste of a farm worker, resulting in another social dependent for the state and a considerable amount of futile expenditure of energy on the part of the army doctor, as well as an unnecessary expense to the government in terms of dollars and cents.

In the early part of 1942, when these casualties began to appear rather prominently in our state hospitals, this entire screening and selection situation was the subject of discussion by the executive committee of the Minnesota State Mental Hygiene Society. At no time did we direct any unfavorable criticism at the induction board or the Selective Service medical department for their failure to have anticipated these military psychiatric casualties; but instead, our interest concerned what means might be used, or what means were available by which we could logically anticipate such casualties and scientifically employ the information available in the various state departments and bureaus. In May, 1942, we had the opportunity of discussing this problem with Dr. George Stevenson, the medical director of the National Committee on Mental Hygiene, who very graciously gave us much valuable information as to the functioning of the screening program and the psychiatric social work being performed in this field in New York and Connecticut. Furthermore, he indicated that the problem was of such importance that a special co-ordinator was about to be appointed to the staff of the National Committee on Mental Hygiene for the purpose of co-ordinat-

ing the programs employed in the various states and furthering this project to become national in scope.

During the summer of 1942 we investigated the available facilities that were not being utilized in the state, but which would give information, at least, of such individuals as had been inmates of state institutions. This critical information was often omitted by the registrant, even purposely, with the hope that he might achieve through enlistment what could not be obtained otherwise, namely, recognition of being of sound mind and body. We recognized that it was not just a simple procedure of writing a letter to the State Selective Service headquarters asking why the Central Index of Registration was not being used. This index registers all inmates of state institutions, criminal offenders and juvenile delinquents who come to the attention of state agencies. Obviously this matter of transferring information from a civilian source to a military organization required a series of sanctions and authorizations for which machinery had not yet been set up. In addition to this, there was a certain amount of resistance to any radical departure in method because of the fact that Minnesota had been showing a highly favorable record with a relatively small return of psychiatric casualties. Then too, the officials at the Selective Service Headquarters had been harassed, from the very day the organization was established, by busy-bodies, cranks and aggressive individuals with pet ideas about how to run Selective Service. We had no intention of being relegated to the "crank" heap. A brief glance at statistics derived from the last war indicated that 47 per cent of veterans hospitalized at the time of a special survey in 1927¹ were of a neuropsychiatric character. Even if Minnesota's immediate record was better than that of other states, the percentage would still be much higher than it should be unless we were able to use some anticipatory measures to prevent these psychopathic individuals from becoming inducted.

Certainly it was deemed worth while to acquaint the Selective Service Headquarters with the fact that a very understanding group of social workers were willing to donate their services as needed, and that the Central Index was a valuable source wherewith a minimum of work might logically produce valuable information. A formulation of a plan was drawn up whereby Selective Service might utilize these facilities, but it was not until October 12, 1942, through the initiating force of Miss Mildred Thomson of the Division of Public Institutions, that a committee was actually brought together. This committee included representatives of the Division of Public Institutions, of the medical department of the State Selective Service, of the State Division of Social Welfare and of the State Mental Hygiene Society. This meeting resulted in recommendations from the Division of Social Welfare relative to the need of co-operation with the local draft boards in preventing induction of persons mentally unfit, with concomitant directives from the medical department of the State Selective Service Headquarters to the same end.

It was the plan that some one person in the local welfare board should have the responsibility of checking the lists of registrants and of listing any information known

to be of value to the draft board. Lt. Col. Hullsiek, then the medical director of Selective Service, agreed to instruct the draft board at the time of posting a list of the men to be inducted, to send a duplicate to the local welfare board and another to the Division of Public Institutions for checking against the Central Index. There were to be no interviews and no exhausting search of records, as it was assumed that we could utilize facilities that were available without having to set up any separate or cumbersome machinery which would admittedly have provided further information on each registrant but which the Selective Service Headquarters was not yet convinced was necessary. This procedure could be used throughout the state, but it was recognized that it would be most effective in the rural communities where local crack-pots and ne'er-do-wells would be known to the welfare worker because of greater opportunities for incidental knowledge of a personal nature in the rural community. That is to say, it was recognized that a cursory examination of the list as it was sent out by the local draft board could not be of as much value in personality estimation of registrants in the urban centers where a much larger, and therefore more impersonal, organization was set up as it would be in the rural communities. When one considers the large number of plans, mostly of a highly unworkable character which had been submitted by telephone and letters to the State Selective Service as to how to improve its organization, one has a fuller appreciation of Lt. Col. Hullsiek's prompt response in his offer to issue a directive to the local draft boards instructing them to set machinery in motion to utilize these new sources of information.

At the same time that this so-called state plan was being organized, a much more comprehensive and intrinsically urban plan was being formulated by a group of social workers, psychologists, and psychiatrists under the able guidance of Mr. Allan Stone of St. Paul, with the object of putting such a plan into effect in Ramsey County. I am much indebted to Mr. Stone^{2,3} for the presentation of the following factual material regarding the working plan in Ramsey County. It was my early impression upon being acquainted with this plan—the so-called urban plan—which was later confirmed in personal interviews with Mr. Stone, that the authors of the plan were seeing the problem in its fuller implications, that is, not only of the immediate need to improve the army, but also of the need to avoid an increasing load of social dependents during the war and in the rehabilitation period. Sometime in the latter part of October, 1942, this urban plan was presented to the Selective Service Headquarters but it was temporarily tabled by that board as a state plan was in the process of being adopted.

It might seem that there were two plans which were serving as competition to each other. However, the adoption of a so-called state plan did not involve the exclusion of a more refined and necessarily detailed urban county plan. Rather, an initial program of taking advantage of the facilities of the Central Index and county welfare board information should really serve as an opening wedge of an adequate state-wide program and, fortunately, it appears that this is just about what has hap-

pened. Since January 1, this urban plan as formulated by Mr. Stone and his colleagues has been in effect in Ramsey County and has obtained the complete approval of the medical department of the State Selective Service as expressed by Major R. B. Radl,⁴ its medical director.‡

It may be of value to go briefly into the workings of the plan devised by Mr. Stone and his co-workers, which I shall designate as the Ramsey County plan, which has subsequently served as a model for the selective service screening programs of other urban counties. This program is officially a part of the St. Paul council of social agencies. According to the Ramsey County plan, an executive committee is set up, composed of psychiatrists, welfare administrators, and paid workers who are responsible in general for the operation of the program, while the case work committee is responsible for the review of case histories and the preparation of case summaries for the induction station. The Minnesota State Selective Service Headquarters officially ordered the twelve local boards in St. Paul and Ramsey county to furnish the screening committee with identifying information on each registrant in class 1A. This information was prepared on standard cards with sufficient information to identify the registrant properly. These identification cards were prepared by the local board four to eight weeks prior to the induction of the registrant. Then these cards were submitted to the Central Registration Bureau of the County Welfare Board, which is the social service exchange for all aid and welfare agencies in the St. Paul area. The worker clears the registrant's card at the Central Registration Bureau from a master file, noting Bureau registration of the Selective Service registrant and his family. The registrations are in turn referred to the various family agencies, guidance clinics and health and welfare organizations and are completed by the case workers in these selected agencies.

The major headings of information include: (1) psychologic report, (2) history of neuropsychiatric disability, (3) health history, (4) police and court records, (5) personality traits, (6) school history, (7) employment history and (8) heredity. The case work committee then reviews the reports from the various agencies and a brief case summary is prepared, outlining the available and verified information. This summary is so organized as to permit a medical examiner at the induction station to scan it in a very brief period, a matter of a few seconds, and to provide him with the necessary data to clarify his estimation of the individual's personality. When these summaries are prepared, they are placed in a plain envelope, marked "confidential, for the use of the neuropsychiatric department at the induction station," and are sent to the local board, from where they are transmitted to the induction station at the time the registrant is inducted. It is, of course, important that the information contained in the summary be kept confidential and this has been thoroughly respected by all persons and officials including the local draft boards, who have retained the privilege of examining the summary before passing it on

‡Since this paper was written, active screening programs have been instituted in Hennepin (Minneapolis) and St. Louis (Duluth) counties and arrangements have been made for organizations of programs in other counties in Minnesota.

to the army induction station. Three copies of the summary are made, the first copy going to the local draft board. It is sealed by them and given to the adjutant in charge for transmission to the Induction Center medical officer. A second copy goes to the State Selective Service headquarters for the medical officers and the third copy is retained for the office of the county screening program headquarters, as the Ramsey County headquarters, for example. From January 1, when this plan went into operation in Ramsey County, until March 26, a total of 3,343 cards was traced and the Ramsey County Central registration bureau identified 2,178 or 69.2 per cent of these cards. One hundred and eighty-five summaries had been prepared which represented 5.5 per cent of the total 1A registrants or 8.5 per cent of the identified 1A registrants. These figures are rather astounding, particularly the identification of two out of three of the cards which had been cleared. Working through Captain Burgess at the State Induction Center, Mr. Stone found that a sample of twenty-three summaries broke down into the following categories: in thirteen instances the men were rejected on a neuropsychiatric basis; in eight instances they were accepted; in one instance, there was a possibility of epilepsy and the man later was rejected; and in one instance the man was rejected on a physical basis before the social history was utilized. Summing up the figures which this sample brings out, and eliminating the one man rejected on a physical basis, it can be seen that fourteen of twenty-two positive summaries were effective in supplying factual material which aided in the rejection of the registrant, but even for those who were accepted, every summary provided information which allowed the examining neuropsychiatrist to make a more effective and time-saving evaluation of the particular examinee.

If one wishes to convert these into dollars and cents, it will be found that the estimated cost of a neuropsychiatric casualty⁵ to the Government is \$30,000. The cost in military expenditure of simply arranging the discharge of a man who had been inducted into the service might be expected to run into thousands of dollars, at least \$2500, even if the government were absolved of all future responsibility. One might then say that in this sample alone, of these fourteen cases, this screening plan has materially aided in saving the government about \$35,000. Applying these figures comparably to the total 185 summaries prepared in the first three months in Ramsey county alone, it is fair to say that this program should be saving the government a good many hundred thousand dollars a year. However, certainly one of the immediate major accomplishments of this program has been the recognition by the army medical officers of the value of the information and factual material which has been provided. Under date of March 16, 1943, Major (now Lt. Col.) R. B. Radl notified all Ramsey county draft boards saying that any volunteer's name should be sent to the Ramsey county headquarters office to get the social information to the Induction Center more quickly than usual. This is a particularly valuable directive inasmuch as a volunteer frequently has ulterior motives for enlisting, such as the social absolution of some physical infirmity by his being openly accepted by the army. In

this regard, epileptics are frequent offenders and any source which will provide information that the volunteer wishes to hide is of inestimable value.

Much of the work of all urban county programs has been done as after-hour and volunteer work, but it seems we have reached a point where we are perfectly justified in saying that this should be a part of the regular social service duties, for certainly there is no more vital program in the social services than the screening program with its objectives today. We do not have actual figures of the result of the state plan, that is, the results of the work of the rural county welfare boards. However, we know that any material that has been presented by them has been informative material, that it is of a positive character (as only positive information is passed on to the Induction Center) and that it has been extremely valuable in specific cases. Recently, state and national selective service regulations have included directives for the local boards of the induction centers to use any social service data in arriving at the eligibility and desirability of the registrant. It is probable, however, that each of the local boards would benefit by some instruction and acquaintance with the set-up for utilizing social service data. Many of the men on local boards throughout the state are not instructed in the humanities and do not perceive the ill effects of trying to fit the village ne'er-do-well into the army in order that the army should try to make a man of him. It becomes the particular patriotic duty of the medical officer of the local board to prevent occurrence of such travesties, as he knows better than anyone in the community that the psychopathic adolescent who breaks down under the rigors of army life is very likely to be a social dependent for the rest of his life.

I have gone into certain features of the past year's work in some detail to demonstrate the soundness as well as the importance of this screening project. A program of this type is essentially synonymous with the highest type of mental hygiene program inasmuch as the promotion of mental health and the prevention of mental breakdown are not only implied in this program but inherent in its very workings. The Mental Hygiene Society as a co-ordinating advisory body which includes professional social workers, psychologists, psychiatrists, clergy and intelligent lay people who are interested in permanent social organization, should most naturally embrace a program of this type. But what is the individual job of physicians? First of all, to become acquainted with the program and to recognize its social importance, but more than that, to take active steps, in their own district and with the distinct security that they are a part of a state-wide program which, thanks to the working statistics of the Ramsey county group, is feasible. At the present time, legislation^{6,7,8} is pending, or has been passed, to provide hospitalization for practically every form of disease with which a soldier may be afflicted, whether it existed prior to his induction or not. Our experience with hospitalization of veterans from World War I has shown the tremendous expense involved with neuropsychiatric casualties, the majority of which could have been predicted and prevented by a more careful weeding out at the time of induction. Our experience also tells us that

the benefits to veterans of World War II will most likely be as broad as those to veterans of World War I. We do not take issue with the character of benefits, but it is well to point out the importance of preventing the unnecessary tax load and payment of future benefits to predictable psychiatric casualties through the expedience of supporting a program of screening which keeps these registrants at work at home.

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Neuropsychiatric Emergencies*

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THE purpose of this presentation is to call attention to some of the more important conditions in the field of neuropsychiatry which are frequently encountered by every practicing physician and surgeon. These conditions are considered as "emergencies," because they constitute a threat to the life of the individual or may result in permanent invalidism unless promptly diagnosed and treated immediately.

INCREASED INTRACRANIAL PRESSURE

Increasing intracranial pressure is only a symptom or indication of serious underlying pathology, but in itself it constitutes a serious threat to the life of the individual. It is a condition which must be relieved by correct differential diagnosis and treatment of the underlying cause, before the increase in pressure causes serious permanent destruction of centers in the brain and even death. It is doubly important that it be recognized early, because the underlying cause is frequently as much of an emergency as the increase in intracranial pressure itself.

The normal pressure of the spinal fluid is 8 to 12 mm. of mercury or 110 to 200 mm. of water. Generally, pressure over 25 to 30 mm. of mercury is considered critical and the more rapidly it develops, the more likely we are to find early choking of the optic disks with resulting blindness, or medullary compression with imminent respiratory paralysis.

The syndrome of increasing intracranial pressure is characteristic and constant. Headache, accompanied by nausea and vomiting, with somnolence, restlessness, and vertigo are the important subjective signs, and the objective signs are choked disk, projectile vomiting, mental and personality changes, slow pulse, positive x-ray findings, increased intraspinal pressure, and, occasionally, extraocular palsies, especially of the sixth nerve, and convulsions. When these symptoms occur together there is never any question as to the diagnosis. One should suspect increasing intracranial pressure, however, when any combination of the above occurs.

Some of the more important and commoner causes of

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increased intracranial pressure may be classed as follows:

1. Trauma: (a) Concussion, contusion, and laceration of the brain; (b) Injury of the middle meningeal artery; (c) Subdural hematoma.
2. Spontaneous subarachnoid hemorrhage.
3. Acute infections: (a) Purulent meningitis; (b) Encephalitis; (c) Brain abscess.
4. Brain tumors: (a) Pituitary tumors; (b) Meningiomas; (c) Cerebellopontine-angle tumors.

1. *Cranial Trauma:* (a) In concussion, contusion, or laceration of the brain, the important thing is to first combat shock, and then relieve the pressure, and prevent infection. If shock is present, the less done, the better. Merely clean up the wounds, stop the bleeding, and combat the shock with heat, transfusions, and morphine. This is probably the only condition in which morphine is indicated in all head injuries. In any trauma to the head, with laceration of the scalp, it is wise to determine whether or not a fracture is present. This can be done by probing the wound with the finger, using strictly aseptic technique, and by x-ray. When all evidence of shock is past, then other necessary procedures can be carried out.

Special attention is required in the case of escape of spinal fluid through a fracture. When fluid escapes through the ear, the cranial cavity is decompressed, the pressure is relieved, and spinal puncture is not necessary. As a matter of fact, a lumbar puncture is contraindicated, as this tends to reverse the flow of the fluid with the chance of drawing organisms into the subarachnoid space through the ear. The ear is cleaned mechanically and flooded (not syringed) with antiseptic solution and a wick (not a plug) is inserted. The patient is then turned over and the ear allowed to drain.

In basal fractures, the spinal fluid may escape through the nose. Here, it is best to let the patient alone and give adequate doses of one of the sulfa compounds in order to prevent or combat an infection. If the exact location of the fracture is known, and the patient is not in shock, one may repair the dura by a transfrontal craniotomy. If increasing intracranial pressure persists in spite of the escape of spinal fluid through the nose, the

pressure may be relieved by dehydration or decompression. Spinal drainage should be resorted to only after all other methods fail.

The basic treatment of any head injury is rest and adequate sedation. The head of the bed may be elevated, the lungs should be watched closely for signs of developing pneumonia. Mechanical restraints are contraindicated as this would tend to cause straining and restlessness which in turn would only raise the intracranial pressure. Sodium luminal in 5-grain doses is generally sufficient to keep the patient quiet. The restlessness and irritability frequently respond to paraldehyde, chloral hydrate, bromides, or sodium amytal.

(b) *Injury of the middle meningeal artery* in trauma of the head is relatively uncommon and easily overlooked, but when recognized early, is amenable to treatment with subsequent recovery. The history is quite characteristic. There is usually a history of trauma generally followed by unconsciousness, then a lucid interval followed by a lapse into drowsiness and coma. During this third stage there are usually signs of increasing intracranial pressure and focal signs of compression, such as hemiparesis starting in the face and spreading to the upper and lower extremity on the same side as the clot or the opposite side. The hemiparesis may be preceded by Jacksonian fits. Occasionally the pupil on the same side as the lesion may enlarge. With the hemiparesis, a positive Babinski sign, increased tendon reflexes and an ankle clonus may be elicited. The treatment consists of a craniotomy and removal of the clot. Without treatment, death will result, usually from medullary paralysis due to increasing intracranial pressure.

(c) *Chronic subdural hematoma* is a comparatively common and frequently overlooked condition. It is due to ruptured pial veins with collection of venous blood (either clotted or liquid) between the dura and the arachnoid membranes. Trauma, either severe or trivial, is the most common cause, although it is not unusual for the patient to have no recollection of any cranial trauma. Unconsciousness may or may not have been present following the initial injury. The symptoms may come on at any time from a few days to several months and even years after the trauma. Headache, at first recurrent and later continuous, is one of the most prominent complaints. The headache may be lateralized to the side of the lesion. Mental clouding or some alteration of the intellect is another common finding. The signs of increased intracranial pressure without definite localizing signs should lead one to suspect this condition. There may be a slight facial palsy, or an inequality of the reflexes, but generally the neurological signs are inconspicuous. In fact, the very diversity of symptoms is quite characteristic of the condition. Somnolence is often present and frequently all out of proportion to the degree of increase in pressure. Encephalography or ventriculography or trephining on the suspected side are aids in making a diagnosis. The hematoma, when located, is washed out through two or more burr holes, or a small flap is turned down and the entire hematoma removed. It is often necessary to explore both sides. In the majority of cases, the results from operation are gratifying.

2. *Subarachnoid Hemorrhage*: Subarachnoid hemorrhage is due to rupture of a congenital aneurysm or an otherwise diseased vessel of the circle of Willis or one of its branches. This condition occurs frequently in young individuals. When it occurs later in life it is generally associated with hypertension. Trauma, in itself, will never cause spontaneous subarachnoid hemorrhage, as there must be pre-existing vascular disease present.¹ Trauma, however, may be an aggravating factor in this condition, but it must be severe. Straining and lifting a heavy object may initiate the hemorrhage. The clinical course is constant and characterized by sudden severe persistent headache, drowsiness, signs of increasing intracranial pressure and later signs of meningeal irritation. Loss of consciousness is not uncommon. The diagnosis can be established by the presence of blood in the spinal fluid in the absence of trauma, infectious meningitis, and other intracerebral disease processes. Later the fluid may appear xanthochromic. There is generally an increase in the globulin and protein in the spinal fluid (See table). The treatment is aimed at keeping the patient quiet for a period of several months. Immediate steps to relieve the increased intracranial pressure are taken by administering hypertonic salt solution intravenously or, if necessary, lumbar puncture. This last procedure is not without danger as it may initiate fresh bleeding from the diseased vessel.

3. *Acute Infections*: (a) All of the various types of meningitis have several features in common, notably signs of meningeal irritation (neck rigidity, opisthotonos, Kernig sign, and Brudzinski sign). The various forms are also similar from a clinical standpoint, but the causative organism in each type is different. Staphylococci, streptococci, pneumococci, B. influenzae, and meningococci are the common causative agents. The organisms are probably carried to the subarachnoid space via the blood stream. In all types, other than the meningococcic form, the meningitis is usually secondary to upper respiratory infections such as pneumonia, lung abscess, empyema, bronchiectasis, and, less commonly, to infections in other parts of the body, such as otitis, paranasal sinus infections, endocarditis, puerperal infection, etc. In many instances the initial signs and symptoms may point to pulmonary or abdominal involvement and distract the attention completely from the central nervous system. In every acutely ill individual, tests should be made for signs of meningeal irritation, and one should look for signs of increasing intracranial pressure. If the syndrome of meningeal irritation (i. e., rigid neck, Kernig sign, and Brudzinski sign) is present, early lumbar puncture is indicated. The findings in the spinal fluid are of particular help in the diagnosis and management of the infection (See table). Of definite value in the treatment of these cases is sulfanilamide or one of its related compounds. In the case of meningococcic meningitis, the meningococcic antitoxin, used either alone or in conjunction with one of the sulfa compounds, is the treatment of choice.

(b) *Encephalitis* is an acute disease which often takes on epidemic proportions. The clinical picture is essentially one of cerebral involvement, although occasionally

signs of meningeal involvement are present, especially the Kernig sign. One of the striking features, aside from the toxic signs and peculiar drowsiness or lethargy frequently seen, is the presence of ocular palsies, i. e., divergent or convergent squint. The spinal fluid findings are often inconclusive, but when altered may help in making the diagnosis. The treatment is often disappointing, although Rosenow has recently developed an antiserum which was used with some success in the recent epidemic in this part of the country. The antistreptococcic encephalitic serum (Rosenow) is not effective in all types of encephalitis, but when indicated, often produces dramatic results. The indication for its use is a positive skin test with the u-globulin factor of serum of horses immunized with the streptococci isolated from patients and horses ill with the disease.

(c) *Brain abscess, new growths (tumors), and hemorrhage* are the mass lesions of the brain, and from a neurologic standpoint alone, they are difficult to differentiate. The greatest aid in the diagnosis is the history. A history of infection points to an abscess. Abscesses of the brain develop by direct extension (contiguity) and are usually large and single, or are blood-borne (hematogenous) and in this case more apt to be multiple. About 75 per cent of all brain abscesses occur as the result of direct extension and about 75 per cent of this group come from infection of the mastoid, 20 per cent from the paranasal sinuses, and the remainder from osteomyelitis, trauma, infections of the scalp, etc. In the blood-borne group of abscesses, 75 per cent are of pulmonary origin (lung abscess, empyema, etc.), and the remainder from any other infection in the body. It is important to keep the above in mind when taking and evaluating a history.

If the abscess is from the mastoid, the common locations are the adjacent temporal lobe or the cerebellum, and if from the paranasal sinuses, the frontal lobe is more often involved. The symptoms are the same as for any other mass lesion, with signs of increased intracranial pressure and focal signs depending on the location of the lesion. An abscess, however, has in addition a history of infection, and the patient has a muddled intellect and slow responses. In all patients with mastoiditis, especially in children, who suddenly become drowsy and more listless, a brain abscess should be suspected. It is important to obtain visual fields, if possible, for if the temporal lobe is involved there will be cuts in the fields of vision. These are sometimes difficult to obtain in children because of the age, inability to concentrate, and drowsiness. The fields can be roughly tested, however, by the "feeding test." This is accomplished by bringing a spoonful of food from the periphery into the field of vision. If there is no defect in the field of vision, the child will turn his head toward the food. If a defect is present, the child will be unable to see the food and will show no response. The treatment is entirely surgical and is accomplished either by puncture of the abscess with a needle through a small trephine opening and insertion of a drainage tube, by a large opening through the cortex to the abscess and inserting a drain, or by a bone flap and drain. One of these methods combined with judi-

cious use of the sulfa compounds often enables one to remove the abscess in toto after about ten days. Surgery is not indicated until the abscess is walled off and encapsulated. This is a difficult time to determine, but surgery should never be attempted before the cells in the spinal fluid are predominantly lymphocytes. Operation should then still be postponed as long as the patient's condition permits. If operation is instituted before this, it would only interfere with the protective mechanism of the brain in trying to wall off the infection.

4. *Brain Tumors*: The subject of brain tumors is too large to discuss fully here. It is wise, however, to remember that tumors occur in the brain as frequently as they do in other parts of the body. The majority of brain tumors are gliomas and the prognosis is unfavorable. Some tumors, however, when recognized early are amenable to satisfactory treatment. A few of these tumors will be discussed briefly.

(a) *Pituitary tumors* constitute about 17 per cent of all primary tumors of the brain. These tumors are usually recognized late and only after irreparable changes have taken place. Headache is a frequent early symptom, but signs of increased intracranial pressure generally do not occur until late in the course of the tumor's growth. Endocrine disturbances, such as impotence in the male, amenorrhea and sterility in the female, acromegaly and pituitary adiposity, occasionally disturbances in sugar and water metabolism, and changes in vision (bitemporal hemianopsia early, and complete optic atrophy and blindness late), usually betray the presence of pituitary tumors. In the majority of cases, x-ray studies reveal a characteristic deformity of the sella tursica with erosion and destruction of the posterior clinoid processes. Routine eye studies, which include visual acuity, fields of vision, and ophthalmoscopy should be made in all suspected cases. Early treatment consists of x-ray radiation of the pituitary and frequent eye studies. If, in spite of this treatment, there is increasing impairment of vision, surgery is indicated.

(b) *Meningiomas*, which constitute about 15 per cent of all brain tumors, arise from the coverings of the brain and cause symptoms by compression. The main symptoms and signs are those of increased intracranial pressure or focal signs of compression, usually both. Meningiomas may be removed in toto with usually complete or almost complete return of function and alleviation of symptoms.

(c) *Cerebellopontine-angle tumors* constitute about 7 or 8 per cent of all primary brain tumors. If seen early, practically complete relief may be obtained from operation, while if they are seen late, little or nothing can be done for the patient. This tumor formerly held a hopeless prognosis, but with the recent advances in neurosurgery and with the use of electrocoagulation to stop the hemorrhage, the outlook for recovery is much brighter. The true tumor is a growth of the neurolemmal sheath of the eighth cranial nerve. However, meningiomas and von Recklinghausen's disease in this location may cause the same symptoms. Generally, the first symptom is unilateral tinnitus with subsequent nerve deafness in the affected ear. Occasionally pains in the

face and partial peripheral paresis of the homolateral side of the face are encountered early. Nystagmus and corneal anesthesia, vertigo, and cerebellar signs on the same side as the lesion (hypotonia, ataxia, and dysinergia) occur later. Choked disk generally occurs later in the course of the disease.

I recall seeing a case in a 35 year old female whose only symptoms were a slight lagging of the right upper lid, ataxia to the right with occasional vertigo, and diminution of hearing in the right ear. The Barany tests, whose results are pathognomonic in this condition, revealed the presence of a dead labyrinth on the right. The x-ray examination showed evidence of beginning enlargement of the internal auditory meatus and destruction of the adjacent petrous portion of the temporal bone. Surgery relieved the symptoms completely, with the exception of some diminution of hearing on the involved side.

SPINAL CORD INVOLVEMENT

Some of the more important and more frequently encountered "emergencies" involving the spinal cord are protruded intervertebral disk, spinal cord tumors, and spinal epidural abscess. Because these conditions lead to compression and irreparable damage to the spinal cord, early recognition and treatment are imperative. Early surgery in all of these conditions yields, in the majority of instances, excellent results. These conditions all have the following in common: early backache and root pains. Root pains are severe lightning-like pains with a segmental distribution, often aggravated by coughing and sneezing, bending, or straining, and are due to irritation of the posterior root fibers as they enter the spinal cord. Every case with a definite history of root pains and backache should have a lumbar puncture and manometric studies to determine the possibility of a subarachnoid block. If a block, either complete or partial, as evidenced by the Queckenstedt test and possibly xanthochromic fluid and low pressure, is present, oil or air x-ray studies may be made, in order to ascertain the level of the lesion. Iodized oil should never be introduced into the spinal subarachnoid space unless it is completely removed following the x-ray studies. The oil can be removed either at the time of surgery, providing surgery is done immediately, or through the spinal puncture needle, using the fluoroscope to locate the oil. Complete and frequent neurological examinations will often reveal an inequality of reflexes, and occasionally sensory changes may be present which will aid in determining the level of the lesion.

Spinal epidural infections are always secondary to an infection elsewhere in the body, such as upper respiratory infections, bacteremia, furuncles, and occasionally the condition may be precipitated by, or follow trauma. In making a diagnosis, one will find the history of a previous infection, backache, root pains, signs of meningeal irritation, and later evidences of cord compression.

PERIPHERAL NERVE TRAUMA

Peripheral nerve injuries are frequently the result of lacerating wounds of the extremities, particularly in the upper, and are often associated with section of tendons. Often, such injuries to the nerve are overlooked at the

time of repair of the tendons, and will not become evident until weeks and sometimes months later when the splints are removed and paralysis and muscular atrophy are noticed. It is then next to impossible to effect a union of the nerves—in the first place the nerve ends are difficult to find, and in the second place it is difficult to promote growth at this late date. The time for nerve repair is immediately following the injury. Testing motor power and sensation will reveal the nerves involved. Often motor loss is rightly confused with severed tendons, but loss of sensation can occur only with an injured nerve, and is an absolute indication for immediate repair.

DEFICIENCY DISEASES

An "emergency" can be said to exist if the true nature of a deficiency disease is not recognized before irreparable damage to the nervous system takes place. An example of such a condition is pernicious anemia, which is accompanied in the great majority of cases by symptoms of cord involvement. Pernicious anemia causes an involvement of the lateral (pyramidal or motor tract) and the posterior columns (Goll and Burdock), causing motor weakness, a positive Babinski sign, and loss of position and vibration sense in the lower extremities (deep sensation). There is no alteration of pain and temperature sense. If allowed to progress, a state of disabling paraplegic ataxia will result. The presence of motor weakness, spasticity, and ataxia of the lower extremities, no matter how slight, calls for complete blood studies (including a Wassermann test), and if these are negative, a gastric analysis and sternal puncture should be done. It is not uncommon to find that spinal cord changes often antedate the onset of other symptoms of pernicious anemia, and early massive doses of liver extract, in combination with thiamine chloride will produce, in most instances, gratifying results. If the cord changes are already irreversible, such therapy is still indicated in order to prevent further involvement of the cord and progressive invalidism.

MYASTHENIA GRAVIS

Myasthenia gravis, a syndrome combining rapid but reversible fatigue, weakness, and occasionally wasting of muscles,² especially those supplied by the cranial nerves, has a resemblance to bulbar or bulbopontine palsies on the one hand, and muscular dystrophies on the other. The affliction is often unrecognized, always serious, and frequently fatal. The diagnosis in a well-marked case is easily recognized by the myasthenic facies, ocular palsies, and nasal voice, with a history of fatigue. If thymic hyperplasia is present (seen in about 50 per cent of the cases), the diagnosis is confirmed. In earlier cases, however, in which the patient complains of fatigue, especially at day's end, and on repetition of movement, occasional diplopia, ptosis and inability to open or completely close the eyes, fatigue and difficulty in swallowing toward the end of a meal, this condition should be suspected. An infallible diagnostic test, according to Bennett and Cash,³ is the administration of one-twentieth to one-fifth the usual adult physiological dose of curare (intocostrin). The treatment, while not curative, but merely palliative,

DIFFERENTIAL DIAGNOSIS OF SPINAL FLUID FINDINGS

Disease	Appearance	Pressure	Cells	Globulin	Protein	Sugar	Chloride
Normal	Clear—Colorless	8–12 mm. Hg. 110–200 mm. H ₂ O	0–10 lymphocytes	Neg.	15–40 mg. per 100 cc.	50–90 mg. per 100 cc.	700–760 mg. per 100 cc.
Injury of middle meningeal artery	Bloody	Marked increase	Varying number of R.B.C.	Trace	Normal to slight increase	Normal to slight increase	Normal
Subdural hematoma	Xanthochromic or bloody	Moderate increase	Often few R.B.C.	Trace	Normal to moderate increase	Normal to slight increase	Normal
Spontaneous subarachnoid hemorrhage	Bloody, supernatant fluid yellow, later xanthochromic	Moderate to marked increase	Crenated cells	Trace to moderate	Slight increase	Normal to slight increase	Normal
Staph. and Strep. meningitis	Turbid and cloudy. Frequently clots	Moderate to marked increase	200–10,000 Pmn's—Organisms	Moderate to marked increase	Moderate to marked increase	Decrease 20 mg. per 100 cc. or less	Decrease
Pneumococcic meningitis	Purulent. Fibrin—fluid escapes poorly	Marked increase	200+	Moderate increase	Moderate to marked increase	Decrease	Decrease
Meningococcic meningitis	Turbid. Occasionally clear	Marked increase	200+ chiefly Pmn. Intracellular Diplococci	Moderate increase	Moderate to marked increase	Decrease	Decrease
Encephalitis	Normal or xanthochromic. Occ. fibrin web	Normal to slight increase	Normal to slight increase. Lymphocytes	Trace	Normal to slight increase	Normal to slight increase	Normal
Brain abscess	Opalescent	Moderate increase	Slight to moderate increase. Pmn's, early; Lymph., late	Normal to trace	Moderate increase	Normal	Normal
Brain tumor	Clear, may be xanthochromic	Slight to moderate increase	Normal to slight increase	Trace to moderate increase	Moderate increase	Normal	Normal

is often life-saving. Perhaps the most successful remedy is prostigmin, 2 cc. of 1:200 or 1:400 solution given by hypodermic, or 15 mg. t.i.d.a.c. This dosage may produce diarrhea as the drug accentuates intestinal peristalsis. This may be counteracted by giving atropin, gr. 1/200, with each dose of prostigmin. Other drugs which also have a beneficial effect are ephedrine sulfate ($\frac{3}{8}$ to $\frac{3}{4}$ gr. t.i.d.), KCl., 2 gm. five times daily or oftener, and glycine, 5 to 10 gm. six times daily. In cases of extreme respiratory embarrassment, with severe dyspnea, the Drinker respirator and oxygen inhalations are indicated in order to prevent death. If the thymus gland is enlarged, surgical removal will sometimes bring lasting relief of symptoms. An interesting case came to my attention a few months ago. This was the case of a nurse, 31 years of age, who found she was becoming excessively fatigued toward the end of the day. She was so tired, in fact, that she could barely open her mouth to eat, and then swallowing became difficult. Rather than give up her job, she tried taking ephedrine sulfate, to see if it would pep her up. To her great relief she was relieved of all her symptoms and was able to continue her work. Later she found that increasing doses of the drug were required to relieve her. She became alarmed and thought she was becoming addicted to the drug. When seen, the typical history, plus the findings on examination and the history of relief with ephedrine confirmed the diagnosis. She was switched to prostigmin, 15 mg. t.i.d.a.c. with complete relief. Following this she had an apparent remission and now only requires occasional small doses of the drug.

STATUS EPILEPTICUS

Status epilepticus, a state of frequently recurring generalized convulsive seizures between which the patient is apt not to fully recover consciousness, needs energetic anticonvulsive medications, or various complications, such as postepileptic psychosis, postepileptic paralysis, and even death may occur. In many instances, this state may be prevented. In epileptics, sudden withdrawal of anticonvulsant drugs or a change of medication, especially when phenobarbital is being used, dietary indiscretions, alcohol, and fatigue are all factors which might produce this condition. There is no specific treatment for status epilepticus, and the drug that will work in one case will have no effect on another. Several methods may have to be tried before the seizures are stopped. Sodium luminal, given intravenously in 3 to 5 gr. doses for adults, will usually stop the seizures. We have given as much as 12 gr. intravenously with no serious effects. Paraldehyde in 1 to 4 dram doses, per rectum, can also be used. Ether given by the open drop method to full anesthesia, avertin given in two-thirds to three-fourths the usual anesthetic dose, and magnesium sulfate, 10 cc. of a 25 per cent solution given intravenously, are other methods that can be employed in the treatment of this condition. Good nursing care during the attack is essential. One must be on the alert to prevent hyperthermia by encouraging heat loss and inhibiting heat production. Fluids may be given within reasonable limits. Precautions must also be taken to prevent the patient from injuring himself by falling out of bed or biting his tongue during a convulsion.

TETANUS

The best treatment of tetanus is in its prevention. In the majority of instances, this can be accomplished by the administration of the antiserum in all contaminated injuries. In the event that this treatment is not successful or in case serum had not been given, more energetic treatment must be used. The diagnosis is based on the history and evidence of a wound or injury, by stiffness in the use of the neck and jaw muscles and cramps or spasms in the region of the wound. As the infection progresses, the patient will have slowness in swallowing, opening the mouth and extruding the tongue, increase in tonus of the facial muscles and occasional twitches in the muscles. Toxic symptoms will also appear, in the form of restlessness, generalized aches and pains especially in the back and head, and sweating. Dysphagia and trismus or risus sardonius appear later. This latter is characterized by elevation of the eyebrows, narrowing of the palpebral fissures, exposing of the teeth and depression of the angles of the mouth. When the diagnosis of tetanus has been made, an initial intravenous injection of at least 50,000 units of antitetanic serum is made.⁴ This is for the purpose of neutralizing all the toxin in the body which is still free and unaltered. This dose is enough to counteract the toxin in one who has a chance to recover. Massive doses are not necessary, for if one full lethal dose of tetanus toxin is fixed and altered by the central nervous system, 1,000,000 neutralizing doses of antitoxin will not save the patient. After this initial dose, daily injections of 5,000 units are given to insure the neutralization of any additional toxin that may be absorbed. In addition to the above treatment, 10,000 units of antitoxin are infiltrated into the wound and about one hour later the wound is incised to allow for full drainage. Fifteen thousand to twenty thousand units of the serum can also be given intrathecally in very severe cases. The convulsions must be controlled. Generally, this can best be accomplished by giving paraldehyde per rectum every three hours in doses varying from 10 to 40 cc. This can also be given with normal saline intravenously by the continuous drip method. Drugs which depress the respiratory centers are definitely contraindicated. In very severe cases, one may have to resort to artificial respiration, tracheotomy, or oxygen inhalations. It is important to maintain adequate fluid and nourishment during the course of the illness.

EMOTIONAL DEPRESSION

A depression, whether of the neurotic (which occurs in the various psychoneuroses and even with somatic disease) or the psychotic type (such as occurs in the manic depressive psychoses and involuntal melancholia), is always an emergency, in that there is a constant threat of suicide present. One has only to note in the daily newspapers the number of suicides by hanging, jumping from high places, asphyxiation, poison, etc., in order to realize the lack of appreciation of the dangers of depressions. Every depressed patient is a potential suicide, and means to protect the individual from himself should be taken. It is a fallacy to presume that those individuals who show no outward evidence of a depression but who threaten suicide will not attempt it. I am reminded of an instance, the case of an elderly woman who had nu-

merous somatic complaints of a functional nature, loss of interest, and fatigue, who felt she had outlived her usefulness and was only a burden to her family. No one took her threats of ending her life seriously until one night when she jumped out of a second story window and was instantly killed.

The psychotic depressions, with retardation both of psychic and motor activity, frank feelings of depression with morning aggravation and evening amelioration, self-accusation and preoccupation, are not difficult to recognize, and adequate precaution should be taken with them as well as with those who are only mildly depressed or discouraged.

With the advent of the various forms of shock therapy, especially electroshock, the number of hospital days of treatment has been materially reduced, and in the great majority, recovery takes place.

The following case histories are typical. The first is a woman of 53 who had been in the hospital for three and one-half years, suffering from a severe involuntal melancholia. She was depressed and agitated, had numerous self-accusatory ideas and wanted to die. She constantly begged the nurses to let her jump out of the window or to take her down to the river where she could drown herself. She attempted suicide by hanging prior to her admission to the hospital and once following admission. She went on several hunger strikes in an effort to starve herself to death. It was at this time that we began to use metrazol (which I understand has now been replaced by electroshock) at the North Dakota State Hospital, and she was one of the first patients to receive this drug. She made a rapid and complete recovery, was discharged from the hospital and remains well and active today. The other case is a 56 year old female who was admitted to the hospital with a marked agitated depression. She had attempted suicide by drowning prior to admission. This patient felt she had sinned against the Holy Ghost, could not be forgiven, and was doomed to hell's fires. While in the hospital she attempted suicide by hanging, but fortunately was discovered before she died. She was given metrazol and made a complete recovery and has resumed her church work with her husband who is a minister.

SUMMARY

Several neuropsychiatric conditions have been discussed, from the standpoint of "emergencies." Prompt recognition of certain definite syndromes and signs, such as the syndrome of increasing intracranial pressure and of meningeal irritation, inequality of tendon reflexes, cord compression, root pains, pathological reflexes, and changes in the mental and emotional state should lead one to further special investigations which will result in early diagnosis and prompt treatment, and will in the majority of instances prevent death or possible chronic invalidism.

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Differentiation of Functional and Organic Neuropsychiatric Conditions*

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THE similarity of the signs and symptoms of many organic and functional conditions is well known. In confusing cases the diagnosis has heretofore usually been organic disease; this has been owing to the lack of understanding on the part of the clinician, who fears that diagnosing a patient as ill but not physically so will carry with it a marked stigma to both patient and family. This is demonstrated by the fact that organized medicine recommends in its classification of diseases that in case of doubt a diagnosis of arteriosclerotic dementia should be preferred to one of senile psychosis.

In our undergraduate training much time was spent on the organic aspects of such conditions as pneumonia, peptic ulcer, brain tumor and fractures, but very little time on the functional conditions. However, this attitude is now changing, bringing with it new concepts of and approaches to many human ailments.

The following case, to be considered in detail later on, is an example of the similarity of functional and organic symptoms. This patient first became ill with nausea and pain in his epigastrium. Shortly after this, he felt dizzy and it was necessary for him to lie down. Peculiar sensations radiated through his arms and legs, and soon all four extremities began to twitch. On examination the patient was found to be conscious: along with the previous symptoms there were noted a marked fluttering of the eyelids, generalized convulsive twitchings, and tachycardia. Other physical findings were negative. The patient was given a further neurological examination, routine and special laboratory tests, and x-ray and spinal fluid examinations.

Finding all of these tests negative, the neurologist would probably make a diagnosis of encephalitis. However, further training would equip him with the means of arriving at a more correct diagnosis and treatment.

The dislike for dealing with something that we cannot see, feel, or put under a microscope is understandable. Yet there is something that differentiates each of us from a machine which always responds in the same manner to the same stimulus. This something is important to our remaining well, and is the factor to which the organic clinician fails to attach proper significance. He may feel that there should be no such diagnosis as hysteria, and that to make such a diagnosis merely means that the physician is too lazy to seek out some structural pathology. Some clinicians will admit the condition is functional, but only upon being able to give no adequate structural explanation for the patient's condition. At this point they are likely to dismiss the patient by telling him to forget his ailment.

To say merely that a patient's condition is organic or functional means little to anyone. It is like saying that

the sounds we heard at a concert were musical. Yet, if we are told what music we have heard, and if we can be made to understand the music in its many phases, then we come to appreciate its total value and then only know how to criticize it.

Organic teachings have attempted exactly this. One of the most important aspects of structural pathology is its cause and pathogenesis, involving an understanding of how the morbid process has developed so that we will have a better knowledge of how to treat it. Similarly, the cause and dynamic development of pathological functional conditions are now being taught and studied.

The newer concept of diagnosing and treating these conditions lies not only in excluding every organic condition but in arriving at a positive functional diagnosis, such as hysteria, schizophrenia, manic depressive psychosis, etc., by a study of the patient as a whole.

CASE REPORT

Applying these new concepts to the case referred to above, we arrive at an entirely different understanding of the patient and his sickness, which may lead us to a satisfactory diagnosis, at least to a much more logical basis from which to work. This is done, first, by a study of the patient's personality as it appears at the time; secondly, by the study of his past experiences and his adjustment to his previous problems. Perhaps these facts alone will show a definite pathological background, influencing his present behavior.

A study of our patient according to these methods reveals many significant findings. Shortly after his admission to the hospital it was noted that although he seemed quite out of contact with reality and unable to control his movements, he readily understood the doctor, who told him that he would have to stop jerking his arm if he did not want to cause himself additional pain during an intravenous injection, and promptly curtailed the convulsive movements of the arm.

A search into this man's history revealed the early development of a neurotic personality, as well as the precipitating factors in the present situation.

The fourth of seven children, he was born on a small farm in southern Minnesota. As a child he was shy, sensitive, and rather easily hurt. Although he played well with his brothers and sisters, he tended to stay away from strangers. He developed many fears and fantasies, mostly concerned with impending personal disaster.

His mother was described as nervous, tense, and a hard worker. His father was strict, demanding, but not brutal. Both were extremely religious.

His parents had considerable difficulty in persuading him to go to school and much of his first year there was spent in crying. He did well in school, but worried considerably about his marks, even though he passed readily.

*Read before the Ramsey County Medical Society, February 22, 1943.

He concentrated hard on sports and did fairly well; he said his efforts were in order to get the recognition of his schoolmates, to whom he felt inferior in every respect. Although troubled by many problems, he found no one to whom he could turn and so kept his feelings to himself. This habit has continued up to the present time and is the cause of much of his distress.

He decided to study for the clergy. Here, too, his fears and feeling of insecurity and inferiority followed him in all his efforts. He worked hard. Each year seemed to find him more exhausted and burdened with increasing problems. His feeling of tension and exhaustion, however, he kept to himself.

During his third seminary year the first symptoms of his impending neurosis became evident. Because of his tenseness, apprehension, indecisiveness, and poor sleep he consulted a doctor, who examined him and prescribed a sedative. His concern was somewhat eased by a vacation.

He finished his schooling and, after being ordained, he remained fairly well adjusted for two years. During this time he was associated with two other assistants whose friendship he greatly enjoyed, and, although the work was hard, he was happy.

Then he received an assignment as only assistant to another pastor. The patient had been warned that this pastor was a stern, pessimistic, nonjovial individual with whom several assistants had had trouble, yet he decided to accept the position. Incidentally, it is noted that the pastor had had to be hospitalized for a "nervous breakdown" a few years previous.

For two and a half years the patient struggled under an almost intolerable situation. There was no satisfaction in his association with his pastor, who was so strict that our patient took on many additional duties as an excuse to get away from his elder.

He began showing signs of his neurosis two months before his hospitalization—irritability, poor appetite, poor sleep, and anxiety. These increased in intensity up to the point at which hysterical manifestations incapacitated him for work.

This history, revealing these previous periods of maladjustment, provides a logical basis for further study and treatment. Further personality studies might include psychosomatic examinations, hypnosis, narcosis, various association tests, and psychoanalysis.

PSYCHIATRY IN DIAGNOSIS

An understanding of the patient's personality is important in many other fields besides neurology. This is evidenced by the recent development in the field of psychosomatic medicine. Certain types of dermatitis, thyroid dysfunctions, allergies, colitis, and peptic ulcer have been studied from this point of view.

At a recent medical meeting in a discussion of peptic ulcer the internist said that he felt that surgical treatment was inadequate, the surgeon that medical treatment was insufficient. Although Pavlov's classical experiments proved that the gastric acidity of dogs varies directly with emotional stimulation, yet there was no consideration on the part of either clinician of any of the patient's emotional factors.

The past dislike of psychiatry on the part of most doctors is well known and understandable. They disliked it because it was too abstract, too full of vague terms, but mostly because its only result was to classify the patient under some diagnostic heading. This situation has gradually changed, and psychiatry is no longer a descriptive science that accepts an organic explanation for its findings. Rather is it now a study of the causative and developmental factors embracing the treatment of patients who are functionally ill.

News-Letter

of the American Student Health Association

DIGEST OF MEDICAL NEWS

LT. COMDR. D. F. SMILEY, MC, USNR

A New Conception of Fungus Infection of the Skin. For many years the main emphasis in combating the fungus infection of the feet and groin has been placed on the prevention of new exposure to exogenous infection by means of foot baths, spraying of floors, etc. Sulzberger, Baer and Hecht (*Arch. Dermat & Syph.*, April, 1942) now express the belief that since conjugal and familial transmission of ordinary fungus infections of the feet and groin is either non-existent or a great rarity, alterations in host susceptibility and loss of local immunity are more important factors than is exogenous infection. According to this concept, frequent washing of the feet and careful drying of the skin between the toes is more important preventively than soaking the feet in medicated foot baths.

Early Mobilization of Head Injury Cases. Many physicians have felt that head injury cases should be kept in bed for a minimum of two or three weeks. As the result of a wide experience in the Head Injury Centers in Great Britain, Cairns reports that these patients recover and return to duty much more quickly if they are allowed to be up and about as soon as they recover consciousness and feel able. Shearburn and Mulford in the October (1943) issue of the *Bulletin* of the Army Medical Department concur in the opinion that early mobilization of head injury cases is advisable.

Dermatitis Due to Resin-finished Shorts and Fabrics. Harry Keil (*Jour. of Allergy*, Sept., 1943) presents evidence that neither abietic acid nor glycerin abietate is the cause of the contact dermatitis due to certain resin-finished fabrics. The etiologic agent is apparently a special ester gum existing in a water-miscible, emulsified form produced by the introduction of a wetting agent such as

lauryl sodium sulfate or triethanolamine oleate. This emulsion is thoroughly worked into the fabric but is removed (since it is water-miscible) by perspiration and by washing. Since perspiration is present in larger amounts in summer than in winter, the dermatitis is more often seen in summer than in winter. According to the author, shorts containing these irritative resinous emulsions are still commonly found on the market.

Effect of Sulfonamide Therapy on the Common Cold. Kanvar and Mount in the September (1943) issue of the *Journal of the Kansas Medical Society* report their study of 127 patients with upper respiratory infections of unknown etiology as follows:

1. "There were 75 cases that were treated symptomatically and 52 comparable cases that were in addition treated with sulfonamide."
2. "In this study there was no evidence that the chemotherapy influenced the course of the disease or prevented complications."
3. "Complications secondary to chemotherapy administration tend to be more frequent and more severe than those following the usual respiratory infection. Use of chemotherapy in a trivial case may sensitize the individual so that its subsequent use is contraindicated in a more serious illness where it is urgently needed."
4. "Careful clinical observation should enable the physician to select those upper respiratory infections which require sulfonamide administration."

False Positive Serologic Reactions in Symptomless Malarial Carriers. T. R. Dawber in the October (1943) issue of *Internal Medicine* presents two cases "in which a diagnosis of syphilis was erroneously made on serologic reactions found to be positive because of latent malarial infection. In each case development of clinical malaria occurred before antisyphilitic treatment was begun." This is definitely at variance with the statement of Mohr, Moore and Eagle that such false positive serologic tests were to be expected in malaria "only during, or shortly after the acute febrile illness."

Alkalis with the Sulfonamides. The Committee on Chemotherapeutic and Other Agents of the Division of Medical Sciences, National Research Council, at a meeting, Sept. 3, 1943, passed the following recommendation: "The incidence of oliguria, hematuria, and anuria following sulfadiazine therapy may prove to be great under conditions where the output of urine cannot be maintained above 600 or 800 cc. per day, as in tropical climates where a shortage of water exists. It is recommended that under conditions where such complications are being encountered the medical officers shall administer an initial dose of 4 grams of sodium bicarbonate together with an initial dose of sulfadiazine, and shall follow this with 2 grams of sodium bicarbonate every four hours regardless of the dosage of sulfadiazine being employed. In the management of complications, resulting from the toxic action of sulfadiazine on the kidneys, the administration of even larger doses of alkali, such as 3 or 4 grams every four hours may be helpful."

Acute Poisoning from Cadmium-plated Food Container. On October 2, 1943, ten men in a U. S. Naval motor torpedo boat squadron were made acutely ill with

nausea, vomiting and diarrhea as the result of drinking lemonade which had been stored for several hours in cadmium-plated food containers. Frant and Kleeman (*J.A.M.A.* 117:86-89, 1941) state: "The association of immediate food poisoning of groups with the ingestion of an acid liquid prepared in a metal container should cause suspicion, and an immediate investigation for the presence of cadmium-plated utensils should be made."

The Treatment of Meningococcus Carriers with Sulfadiazine. Cheever, Breese and Upham in the October (1943) issue of *Internal Medicine* make the following report on the use of sulfadiazine prophylactically in an outbreak of meningococcal infections occurring in a large naval construction training center:

1. At the beginning of the experiment, 57.7 per cent of the men showed nasopharyngeal cultures positive for meningococci (46.7 per cent positive for Type I organisms, 5.5 per cent positive for Type II organisms, 3.9 per cent positive for Type II Alpha organisms, 1.6 per cent positive for untypable meningococci).

2. Men from a barrack known to have a high carrier rate were divided into two approximately equal groups. One group (the treated) was given 3 grams of sulfadiazine in divided doses on the first day, 3 grams on the second and 2 grams on the third—a total of 8 grams in 72 hours. The second group (the untreated) received no special medication but lived, worked and messed with the treated cases. Both groups were cultured at the beginning, at 72 hours, and at 144 hours.

3. The results in the two groups in terms of percentage of total cultures positive were as follows:

	Population	0 hrs.	72 hrs.	144 hrs.
Treated	203	79.31	00.00	00.49
Untreated	186	58.06	80.64	76.35

The authors conclude: "Sulfadiazine is effective in clearing the nasopharynx of meningococci since all of 161 meningococcus carriers receiving 8 grams of the drug over a period of 72 hours yielded negative cultures on the fourth day."

Caffeine Withdrawal Headache. Dreisbach and Pfeiffer, after finding that 25 of 128 migraine patients reported that lack of their usual coffee resulted in headache, attempted to produce this phenomenon. They administered caffeine usually for a week and then abruptly withdrew it. In 55 per cent of 38 trials on 22 subjects sudden withdrawal of the caffeine produced as severe headache as the patients had ever experienced. In 29 per cent of the trials there was definite headache but not of severity to demand treatment. In 16 per cent of the trials no headache of any importance occurred. Blood studies appeared to show a lowered serum calcium, an elevated serum phosphorus, and possibly an increased blood volume accompanying the headache. (*Jour. of Lab. & Clin. Med.*, July, 1943).

Morphological Structure of Rickettsiae. Upon examination with the help of the electron microscope the rickettsiae of epidemic typhus, of endemic typhus, of Rocky Mountain spotted fever, and of Q fever were found to be strikingly similar to each other in appearance. Distinguishing one species from another by appearance alone is so far impossible. Each species does, however, present

great variation in its morphology. In all four species bacillary forms and much smaller coccoidal forms were demonstrated. This variation in morphology among rickettsiae of the same species is quite in contrast to the relative uniformity of viruses which have so far been studied by means of the electron microscope. (Plotz, Smadel, Anderson, Chambers, in *Jour. of Experimental Med.*, April 1, 1943).

Intradermal Vaccine Therapy in Brucellosis. Urschel reports that 87.5 per cent of 28 undulant fever patients who received intradermal injection of brucella vaccine (mixed, heat-killed) obtained fair, good, or excellent results. The injections averaged 20 per patient and were given at five- to seven-day intervals into the forearm or

medial surface of the thigh. (*Indiana State Med. Assn. Journal*, August, 1943).

Futility of Intravenous Use of Arsenicals in Vincent's Infection. E. C. O. Jewesbury in the September 18 (1943) issue of the *British Medical Journal* reported the development of typical Vincent's infection of the gums and buccal mucous membranes of two patients who were under treatment for syphilis. One patient had received 5 grams of intravenous arsenical (N.A.B.), the other had received one course of 5.55 grams two months previously and had had 4.65 grams on his second series when the Vincent's infection started. Such evidence would certainly make it appear futile to give intravenous arsenicals for the treatment of Vincent's infections of the mouth and gums.

LIST OF PHYSICIANS LICENSED BY THE MINNESOTA STATE BOARD OF MEDICAL EXAMINERS ON NOVEMBER 5, 1943

OCTOBER EXAMINATION

Name	School	Address
Bacon, John Fremont	U. of Pa., M.D. 1942	328 E. Henn. Ave., Minneapolis, Minn.
Blake, Allan John	Marquette U., M.D. 1943	42 - 15th Ave. N., Hopkins, Minn.
Cameron, John Minge	Harvard U., M.D. 1942	Mayo Clinic, Rochester, Minn.
Collins, Royden Fred	U. of Wis., M.D. 1942	1663 Sherburne Ave., St. Paul, Minn.
Cronkite, Alfred Eugene	Stanford U., M.D. 1938	Mayo Clinic, Rochester, Minn.
Geist, Susanne	U. of Minn., M.B. 1942, M.D. 1943	825 St. Clair Ave., St. Paul, Minn.
Hagedorn, Albert Berner	Stanford U., M.D. 1943	Mayo Clinic, Rochester, Minn.
Haines, Richard DeWayne	U. of Rochester, M.D. 1942	Mayo Clinic, Rochester, Minn.
Hall, William Everett	Marquette U., M.D. 1943	Miller Hospital, St. Paul, Minn.
Huseby, Robert Arthur	U. of Minn., M.B. 1943	University Hospital, Minneapolis, Minn.
Hutchins, Selwyn Percival Rice	U. of Texas, M.D. 1941	Mayo Clinic, Rochester, Minn.
Jams, Alexander Murdoch	U. of Pa., M.D. 1942	Mayo Clinic, Rochester, Minn.
Klontz, Charles E., Jr.	U. of Ill., M.D. 1942	Mayo Clinic, Rochester, Minn.
Lenz, Gilbert Gordon	U. of Minn., M.B. 1943	Ancker Hospital, St. Paul, Minn.
Levin, Louis	U. of Cincinnati, M.D. 1941	Mayo Clinic, Rochester, Minn.
McClellan, James Thomas	U. of Okla., M.D. 1942	Mayo Clinic, Rochester, Minn.
Millen, Francis Joseph	Marquette U., M.D. 1942	Mayo Clinic, Rochester, Minn.
Oliver, James	Northwestern, M.B. 1943	Ancker Hospital, St. Paul, Minn.
Peterson, Floyd Russel	U. of Minn., M.B. 1943	St. Luke's Hospital, Duluth, Minn.
Rousuck, Asher Ashley	Wayne U., M.D. 1940	Mayo Clinic, Rochester, Minn.
Sborov, Abe Michael	U. of Minn., M.B. 1943	Ancker Hospital, St. Paul, Minn.
State, David	U. of Western Ontario, M.D. 1939	University Hospital, Minneapolis, Minn.
Stevenson, Margaret Lydia	U. of Minn., M.B. 1942	815 Superior St. S. E., Minneapolis, Minn.
Stueland, A. J. Richard	Temple U., M.D. 1943	Ancker Hospital, St. Paul, Minn.
Thomas, Henry Randall	U. of Pa., M.D. 1939	Mayo Clinic, Rochester, Minn.
Tompkins, Souther Fulton	Washington U., Mo., M.D. 1942	Mayo Clinic, Rochester, Minn.
Williamson, Robert James Douglas	U. of Toronto, M.D. 1940	Mayo Clinic, Rochester, Minn.
Wilson, Hal Truax	U. of Michigan, M.D. 1942	Mayo Clinic, Rochester, Minn.
Wilson, Thomas Reid	La. State U., M.D. 1941	Mayo Clinic, Rochester, Minn.
Wood, Wilbur Donald	U. of Minn., M.B. 1940, M.D. 1941	Mayo Clinic, Rochester, Minn.

BY RECIPROCITY

Douglass, Bruce Eccles	U. of Wis., M.D. 1942	Mayo Clinic, Rochester, Minn.
Fair, Ellis Edwin	U. of Okla., M.D. 1941	Mayo Clinic, Rochester, Minn.
Graham, Russell Bion	U. of Colo., M.D. 1942	Mayo Clinic, Rochester, Minn.
Guenther, Theodore August	U. of Mich., M.D. 1940	Mayo Clinic, Rochester, Minn.
Henry, Earl Wilson	Johns Hopkins, M.D. 1940	Nopeming Sanatorium, Nopeming, Minn.
Kirkland, William George	Hahnemann Med. Coll., Pa., M.D. 1938	Mayo Clinic, Rochester, Minn.
Pease, Gertrude Lorna	Creighton U., M.D. 1941	Mayo Clinic, Rochester, Minn.
Reif, Harold Alfred	Wayne, U., M.D. 1937	1009 Nicollet Ave., Minneapolis, Minn.
Rickard, Elsmere Rife	Northwestern, M.B. 1923, M.D. 1924	Minn., Dept. of Health, U. Campus, Mpls.
Robson, John Theodore	U. of Ore., M.D. 1942	Mayo Clinic, Rochester, Minn.
Spar, Arthur Aaron	U. of Neb., M.D. 1942	Mayo Clinic, Rochester, Minn.

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Deterling, Ralph Alden, Jr.	Stanford U., M.D. 1942	Mayo Clinic, Rochester, Minn.
Gentry, Robert Wilton	Harvard U., M.D. 1942	Mayo Clinic, Rochester, Minn.
Heskett, Robert Glynn	Harvard U., M.D. 1941	University Hospital, Ann Arbor, Mich.
Jarboe, James Parran	Georgetown U., M.D. 1942	Mayo Clinic, Rochester, Minn.
Mickelsen, Emma Florence	U. of Minn., M.B. 1937, M.D. 1938	4390 Coolidge Ave., Minneapolis, Minn.

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MINNEAPOLIS, MINNESOTA, DECEMBER, 1943

NEUROPSYCHIATRIC ADVANCES AT THE WAR FRONT

Any classification of nervous diseases may well start by dividing them into organic and functional. In the former there is a demonstrable lesion as the causative factor, a definite tissue change to which the disorder may be ascribed while in the latter the etiology is more ambiguous and often quite speculative due to the fact that in a functional disease there is derangement of an organ's normal action without any structural change.

With our present state of knowledge, the term functional disease is entirely proper but many feel that it is rather unsatisfactory as a scientific expression of diagnostic entity. Perversion of function constitutes disease but the realist likes to look beyond this for some morbid change in the tissues to account for it as the underlying cause. He shows a disposition to avoid the term by substituting such expressions as neurosis, anxiety states, and neuropsychiatric conditions.

Fatigue is a common symptom in functional disorders and in addition to the purely subjective symptom it may manifest itself by clumsiness and tremor of the hands, diminished power of concentration at exacting tasks. There is often headache, backache, anorexia and insomnia. Some individuals become tense, depressed, resentful and irritable, portraying general anxiety. Mild forms of anxiety neuroses are seen by the general practitioner every day. Many of them get along on a mild sedative that produces a relaxed indifference until adjustment of internal to external relations shall have been accomplished by time and the further guidance of a wise family doctor.

Sinistrosis will probably be a more popular name hereafter for that dreadful "shell shock" that so many of our soldiers suffer from when frustrated in combat on our battle lines. In the past only physical injuries were treated at the front and those suffering from any form of neuropsychiatry were forced to wait for evacuation into

some remote establishment in the rear. Since the Tunisian campaign when marvelous benefits became apparent from forward area psychiatry in these cases, however, there has been a demand from the medical corps for more experts to treat them like other emergencies as soon as they are found. The results so far reported have been hailed as among the most outstanding advances in medical treatment to come out of the war. A. E. H.

INTRATHORACIC INTEREST

Medical literature has recently given emphasis to four intrathoracic conditions which seem to have assumed new importance because of recent illumination. The diseases referred to are bronchial adenoma, pulmonary embolism, traumatic carditis, and coccidioidomycosis. They are related only in their locale.

Bronchial adenoma usually occurs in younger adults, 80 per cent under forty, and most of the symptoms are those which arise secondary to mechanical factors. Early diagnosis is difficult but important because satisfactory treatment depends on operative removal, either by thoracic surgery or by the bronchoscope. In its early stage it is most frequently misdiagnosed as pulmonary tuberculosis.

There is nothing particularly new about pulmonary embolism except the new emphasis on single or repeated emboli or infarcts arising from asymptomatic phlebotrombosis of the deep vessels of the leg. Attacks of faintness, prostration, unexplained fever, or more severe symptoms attended by shock and resembling coronary occlusion should not be dismissed without directing attention to the deep vessels of the calf where symptomless thrombi frequently occur. Twenty per cent of pulmonary emboli on the medical service at the Massachusetts General Hospital were found to have their origin in the deep venous plexus of the calf.

Traumatic carditis is another vague intrathoracic condition. Symptoms resembling coronary sclerosis or myocarditis may appear any time up to three months after the actual injury. In fact the injury is often forgotten when substernal pain, dyspnea, and circulatory disturbances bring the patient to the doctor. Investigators of this subject find that serial electrocardiograms in addition to other adjuncts of heart diagnosis are often necessary to obtain a true conception of the frequency of this type of injury.

Coccidioides immitis is a fungus indigenous to the southwest desert areas. It frequently gives rise to a pulmonary infection resembling tuberculosis in its pathology and insidious manner of onset. Occasionally, however, it produces an acute influenza-like illness or an arthritic form known locally as San Joachim fever or a disseminated granulomatous involvement which may be fatal. It may be diagnosed by an intradermal test analogous to the Mantoux. Its wider interest at this time is occasioned by the large number of army troops undergoing training in the desert areas.

The apparent increase in incidence of the above mentioned intrathoracic conditions is due for the most part to improved diagnostic procedures and advancing clinical acuity.

L. M. D.

THOMAS ANDREW STOREY, Ph.D., M.D. 1875 - 1943

Death has removed from our midst Dr. Thomas A. Storey, Emeritus Professor of Hygiene and Physical Education at Stanford University, California. The end of his distinguished career occurred October 27, 1943, at Atlanta, Georgia, where he was directing an important war educational program for the American Social Hygiene Association.

His passing has deprived this country of an able scholar and stimulating teacher in the field of college hygiene, physical education, and organized student health work. Dr. Storey's most potent contribution to the field of hygiene was his philosophical approach to the subject health based upon sound biological foundations. It was his concept of hygiene that guided his activities during all the years of his professional life; and the contributions he made to the field of knowledge in the form of his teaching and his writing reflected always his belief in the necessity of integrating the specific branches of hygiene into an organic whole.

He entered Stanford University in the pioneer period of its founding, was a classmate of President Ray Lyman Wilbur. His interests were in physiology and kindred biological subject and led to a Ph.D. degree in 1902. In 1905 he received his M.D. degree from Harvard Medical School, and after his internship, he was called as Professor and Director of Physical Education and Hygiene at the College of the City of New York. In 1926 he returned to his Alma Mater where he organized and became director of the Department of Hygiene, Physical Education and Athletics. During this interim he developed the Student Health Service. This is his monument. Author of textbooks, a syllabus, and many scientific contributions, he was honored by being Consultant of the American Social Hygiene Association, Secretary-general of the Fourth International Congress of School Hygiene, Ex-secretary to the President's Committee of Fifty on College Hygiene, and was President of the American Student Health Association 1925-27 and a member of the Council at the time of his untimely death.

As chairman of a committee he organized the Pacific Coast Association, a component regional society of the parent association, besides being a member of many national honor societies in medicine, physical education, and public health. The Gullick prize medal was awarded him for distinguished services in the field of physical education and allied subjects.

Dr. Storey is survived by his widow and three grown daughters to whom the Association extends its heartfelt sympathy.

At the services held in the beautiful Stanford Memorial Church on November 12, faculty, friends, former students, and many members of the American Student Health Association attended to pay tribute to the sterling character and kindly spirit of Dr. Storey, and to honor and cherish the memory of one who helped to make the world a better place to live.

ROBERT T. LEGGE, M.D.

American Student Health Association,
Berkeley, California.

Book Reviews

Allergy, by ERICH URBACH, M.D., with the collaboration of PHILIP M. GOTTLIEB, M.D. New York: Grune and Stratton, Inc., 1943; 1100 pages, 400 illustrations, 80 tables and charts. Price \$12.

Conceived by a writer and teacher of international prominence, with a quarter of a century experience, Doctor Urbach's book presents a concrete guide for the diagnosis and management of all allergic diseases. It includes a basic critical analysis of the accumulated scientific research upon which the principles of allergy are based. Emphasis is laid on the clinical and technical advances of today. The new concepts of diseases of hypersensitiveness are stressed as pathergy, heteroallergy, endogenous allergy, and there is a comparison of the advantages of deallergization and hyposensitization. The author's method of deallergization by the method of oral skeptophylaxis is presented in detail.

There are three divisions of the text. Part I deals with the fundamentals of hypersensitiveness and the principles of diagnosis and treatment. Part II discusses the entire range of offenders responsible for allergic diseases—inhalant and food allergens, contactants, physical agents, bacterial allergens, etc. Part III extensively deals with the symptomatology and therapy of allergic diseases.

The 400 illustrations and 80 tables and charts are invaluable aids in differential diagnosis, and present at the same time a most welcome visual survey of the clinical manifestations and testing methods in every type of allergic condition. Nine full-page graphic pollination calendars are another feature of the book. There is a most comprehensive review of the literature. The book is well bound, has good type and paper; and the pictures carry a real meaning to the reader. General practitioner and any specialist applying allergy to his practice will find it complete, practical and accurate.

Nervous Indigestion and Pain, by WALTER C. ALVAREZ, M.D., New York: Paul B. Hoeber, Inc., 488 pp., 1943, \$5.00.

As a successor to Alvarez's previous book *Nervous Indigestion*, the present work is more detailed in the discussion of the meaning of symptoms. The importance of such a discussion stems directly from the circumstance that about half of the patients who relate complaints to the stomach or bowel have no organic lesion of the gastrointestinal tract, and most of them have no bodily disease at all. From a wealth of personal experience, a broad physiologic background and a sympathetic understanding of the miscalled "nervous" patient, Dr. Alvarez is able to analyze and explain symptoms such as bloating, belching, nausea, vomiting, heartburn, diarrhea and constipation. Each condition is illustrated by a sprightly anecdote and explained upon the basis of personally conducted experiments. Adding to the entertainment and no little to the instructive value of the book are the delightful quotations heading each chapter; these alone comprise an education in classical medicine. The bibliography and suggestions for supplementary reading constitute a postgraduate course in gastroenterology. The facile, informal, flowing style is characteristic of the author.

The Compleat Pediatrician, by W. C. DAVISON, M.D., Durman, N. C.: Duke University Press, 256 pp., 1943, \$3.75.

Between the covers of this book there is an enormous amount of material which helps the physician in one of the simplest ways to diagnose and treat the diseases of infants and children. Many of the illnesses of the child have symptoms and signs which are not well understood by those who attempt to apply the clinical findings of adults. The monograph straightens out the situation and any physician actually using the book will become enthusiastic to the point of being unable to resist employing it many times.

News Items

Lt. Wm. Walter Wood, Jr., M.C., U.S.N.R., Jamestown, North Dakota, a graduate of the University of Minnesota, class of 1937, and later a fellow at Mayo Clinic, Rochester, is now with a unit in Australia. On October 1, Dr. Wood was raised to a full lieutenancy.

Dr. Fredk. T. Foard, medical director of the Rocky Mountain states for the United States public health service, with headquarters at Denver, Colorado, conferred in Great Falls, Montana, November 4 with Dr. Thomas F. Walker, city-county health official of the district. Dr. Foard, previous to assuming the post of medical director, was assistant surgeon general at Washington, D. C.

Dr. F. R. Schemm, Great Falls, Montana, presented a paper, "Loss of Edema without Loss of Weight" at the November 4 meeting in Chicago of the American Federation for Clinical Research. This meeting, a regional session, was followed the next day by a national meeting of the Central Society for Clinical Investigation.

Dr. Joseph Tschetter, for the past two years resident surgeon in ophthalmology at the University of Denver medical school, has opened offices in Huron, South Dakota, for practice in eye, ear, nose and throat.

Dr. James Smith Bates, former physician of Clear Lake, South Dakota, for thirty years and recently practicing at Watertown and Sioux Falls, has resumed his practice at Clear Lake.

Dr. Clayton H. Halverson, Minot, North Dakota, after serving since September 1942 in the army medical corps, recently at Camp Polk, Louisiana, is re-entering private practice at Minot.

Dr. J. E. Low, formerly of Ronan, Montana, and Dr. H. H. Parsons of San Bernardino, California, at one time practicing at Sidney, Montana, from which place he left to serve in the first World War, have established practices in Sidney. Dr. Parsons will occupy the offices that were left by Dr. Robert D. Harper when the latter joined the naval reserve.

Dr. Gilbert Cottam, superintendent of South Dakota state board of health, has added to his staff a public health engineer specializing in food sanitation and an associate bacteriologist attached to the laboratory division.

The recovery of Bernard Millar, farmer of Eagan, South Dakota, from disease caused by staphylococcus septicemia germs, through the administration of penicillin, discloses a total of three issues of the drug to date in this area; to McKennan hospital, Sioux Falls in this instance, and to Mayo Clinic and the University of Minnesota.

Dr. Joseph P. Merrett, Marion, North Dakota, who for several months has maintained his office in the La Moure hospital, will locate in Valley City, leaving La Moure without a resident physician.

Dr. Albert D. Brewer, city-county health officer at Bozeman, Montana, since the inception of the health unit there in 1929, has resigned to accept a position as staff physician at the state sanitarium, Galen, where he is now situated.

Anna R. Skein, for thirteen years superintendent of the Grafton Deaconess Hospital in North Dakota, and distinguished for her leadership in establishing training schools for nurses in Minnesota, has tendered her resignation to members of the medical staff of the hospital.

Dr. Joel C. Swanson, Fargo, North Dakota, suing in the district court at Wahpeton, was awarded \$10,188 as his one-sixth of 50 per cent of the accounts receivable of a clinic with which he had been associated. On severing his connections a year ago, Dr. Swanson petitioned for a declaratory judgment and, after a month during which the judge in the case had it under advisement, was notified of the decision in his favor.

Dr. Francis Ogg is the new chief medical officer of the veterans' administration facility at Hot Springs, South Dakota, replacing Dr. F. C. Smith, whose retirement was forced by disabilities resulting from sun stroke this summer. Dr. Ogg, Kansas born, has been in the service 15 years, most of the time at Bath, New York, where he was chief of surgery.

Dr. David J. Almas, Chinook, Montana, delivered a lecture at the nurses' institute at Sacred Heart Hospital, Havre, September 6.

Dr. Frank L. Unmack, Deer Lodge, Montana, has been appointed by Dr. Ritchey, president of the Montana State Medical Association as a member of the medical military preparedness and defense activity committee.

Dr. C. M. Kelsey of Minot, North Dakota, where he has been associated with Dr. Alfred R. Sorenson for three years since his internship at Trinity hospital, has removed with his wife and two-year-old son to St. Paul where he will practice medicine.

The North Dakota Society of Obstetrics and Gynecology held its fall meeting in Devils Lake October 16. The meeting was well attended. The program consisted of these papers: "Low Dosage Roentgen Therapy in Amenorrhea," Dr. Chas. Heilman and Dr. G. Wilson Hunter, Fargo; "Appendicitis in Pregnancy," Dr. F. A. DeCesare and Dr. J. F. Hanna, Fargo; "Abdominal Pregnancy" (report of a case), Dr. John Graham, Devils Lake; motion picture, "Caudal Analgesia"; "Manual and X-ray Recognition of the Adequate Obstetric Pelvis," Dr. Everett C. Hartley, St. Paul, Minnesota.

SIXTH ANNUAL FORUM ON ALLERGY

The Forum on Allergy is an international postgraduate society founded in 1938. By its annual oration gold medal award it recognizes outstanding contributions to clinical allergy. Its program is most intense, but informality and emphasis on the practical mark the conduct of the meeting. This year the forum will hold its sessions in the Statler Hotel, St. Louis, Missouri, on Saturday and Sunday, January 22 and 23. All reputable physicians are welcome. They are offered an opportunity to bring

themselves up to date by attending the review of the progress of a rapidly advancing branch of medicine, to receive intensive postgraduate instruction and to come to know many distinguished authorities in the field. There are fifteen study groups, any three of which are open to the registrant. They are so divided that those dealing with ophthalmology and otolaryngology, pediatrics, internal medicine, dermatology and allergy run consecutively. In addition the study groups are arranged on the basis of previous registration. In this way, as soon as the registrations are completed, the registrant is expected to write the group leader and tell him just what questions he wants brought up in the discussion. Attention is also called to the fact that during these last two days almost every type of instructional method is employed: special lectures by outstanding authorities, study groups, pictures, demonstrations, symposia and panel discussions.

Necrology

Dr. Lewis Morgan Daniel, 49, Minneapolis, died November 23 in Pompano, Florida. For the last few months associated with the editorial department of this publication (with a posthumous contribution appearing in this issue over the familiar "L.M.D.") Dr. Daniel was cherished by all. A life-long resident of Minneapolis, he was a graduate of West high school and University of Minnesota academic and medical colleges, having received his degree in medicine in 1924. He practiced in Minneapolis and had been gone on a holiday for rest only a short time when word was received of his death.

Dr. John Barlow James, 56, who had practiced medicine at Page, North Dakota, for the last 31 years, died November 8 at his home in Page. He was born at Steele. A son, Dr. Basil James, is an army physician at a South Carolina camp.

Dr. McCormick Smetters, 66, Butte, Montana, died October 19 at Springfield, Illinois, following an illness of several months. He came to Montana in 1901, practiced first at Hunters' Hot Springs for six months, then continuously since at Butte. A past president of the Silver Bow Medical society he was active in state medical association work for many years. He was renowned as a horseman for over twenty-five years throughout the west.

Dr. Frank J. Williams, 56, Butte, Montana, former city physician, died October 22 at Butte. He was a graduate of the Butte schools, Valparaiso college, Indiana, and the Chicago College of Medicine and Surgery, now connected with Loyola university, class of 1908. Dr. Williams was a member of the army medical corps in World War No. 1.

Dr. Fred G. Gilbert, 75, retired physician and resident of Rapid City, South Dakota, died November 14 in a Rapid City hospital.

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DR. MC KHANN JOINS PARKE, DAVIS & CO.

Dr. Charles F. McKhann, who has for several years been on the faculty of the University of Michigan, has resigned from that institution to accept a position as Assistant to the President of Parke, Davis and Company. Dr. McKhann will devote his time entirely to the scientific activities of the company. He assumed his new duties October 15.

At the University, Dr. McKhann has held the positions of Professor of Pediatrics and Communicable Diseases, in the Medical School, and Professor of Maternal and Child Health, in the School of Public Health. He has also acted as consultant to the Secretary of War in the Control of Epidemic Diseases.

The summer of 1941, previous to coming to the University of Michigan, he acted as consultant to the Board of Health, Territory of Hawaii. From 1936 to 1940 he held the position of Associate Professor of Pediatrics and Communicable Diseases at Harvard Medical School and Harvard School of Public Health. Before that he spent a year as Visiting Professor of Pediatrics and Communicable Diseases at Peiping Union Medical College, Peiping, China.

Since 1930 he has conducted and directed research on communicable diseases, immunology, renal diseases, nutritional diseases, and on certain phases of toxicology. He developed and introduced immune globulin and has contributed to the development of several other products.

Dr. McKhann is a member of the Michigan State Medical Society, American Medical Association, American Society for Clinical Investigation (vice president, 1943), American College of Physicians, American Academy of Pediatricians, Society for Pediatric Research (president, 1936) and American Public Health Association.

MORE PENICILLIN FOR ARMY

Work has begun on a five-story and basement reinforced concrete and brick factory and laboratory building, 182' 6" by 82' 6", for the Lederle Laboratories, Inc., at Pearl River, N. Y., according to plans prepared by the Chemical Construction Company. The Chemical Construction Company and the Lederle Laboratories are wholly owned subsidiaries of the American Cyanamid Company, one of the largest chemical and allied industry manufacturing concerns in America.

The job has high priorities from the War Production Board and extreme speed is required in order to meet the Army's needs for penicillin, the remarkable new drug which the armed forces need in large quantities.

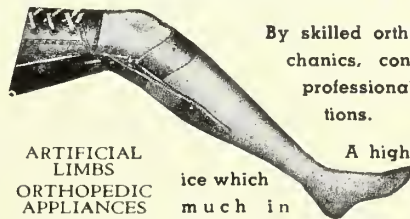
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The inclusion of aluminum hydroxide gel in *New and Non-official Remedies* and its admission to *U. S. P. XII* prompted the Squibb Laboratories to offer the preparation under the official name and, of course, in conformity with official specifications and standards.

As offered by E. R. Squibb & Sons, Aluminum Hydroxide Gel is pharmaceutically an elegant preparation of a fluid consistency. The suspension is practically snow white, pleasant to take, lacking any suggestion of astringent taste. Diluted with two or three parts of water the Gel may be administered by gastric drip, or taken in 1 or 2 teaspoonful doses in water or milk. Aluminum Hydroxide Gel Squibb is available in 12-ounce bottles.

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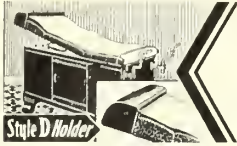
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"Tuamine Sulfate" is unique among vasoconstrictor drugs since it produces nontraumatic shrinkage of the nasal mucosa without undesirable systemic effects. The isotonic solutions are within the acid range of pH and are well tolerated even by abnormally sensitive membranes without altering the flow of nasal secretions.



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SOUTH DAKOTA WOMEN'S AUXILIARY

Plans for the 1944 activities of the Women's Auxiliary to the South Dakota State Medical Association were formulated at an advisory board meeting held October 27 at the home of Mrs. D. S. Baughman, at Madison. Present were Mmes. John C. Hagin, Miller, state president, C. E. Sherwood, program chairman, and J. R. Westaby, chairman benevolent fund committee, both of Madison, E. T. Stout, Pierre, corresponding secretary and treasurer, G. E. Burman, Carthage, chairman public relations and publicity, R. A. Buchanan, Huron. Mrs. Baughman is the state president-elect.



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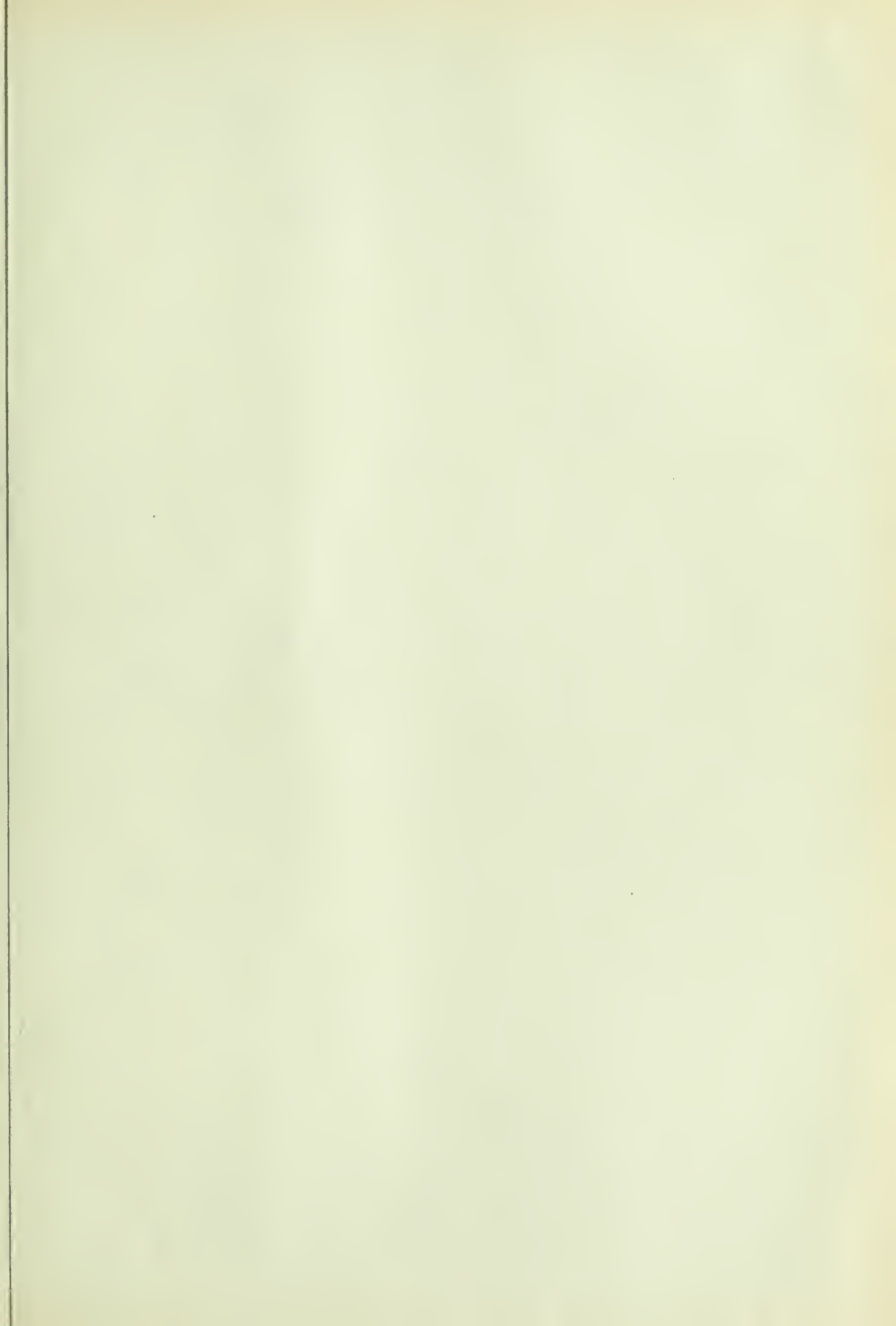
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