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Original Articles

ACUTE MENINGITIS AND TUBERCULOUS MENINGITIS

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Since the beginning of last winter we have had daily opportunities of studying acute meningitis in an intense way. In less than a year we have followed more than a hundred clinical histories of meningitis eighty of these being tuberculous meningitis. Most of the cases have followed grippe or have appeared a short time after it, grippe having been the cause only occasionally. Other illnesses have also awakened meningeal conditions, thanks to special pathogenous agents. We will condense here the ideas published in recent papers,[1] and will add some new facts of later date.

We divide meningitis, from a clinical standpoint into three groups:—1. Acute and superacute meningitis.

2. Tuberculous meningitis.

3. Meningeal reactions.

The acute and superacute meningitis are produced in general by specific infections, the principal agents being meningococcus and pneumococcus. Streptococcus, staphylococcus, etc., can also be the cause of the forms of meningitis.

Meningitis of Meningoccocic Origin, or Cerebrospinal Meningitis.—For the last few years we have had a small number of cases of this form of meningitis. Now and then epidemic invasions have ap-

[1] Meningitis cerebro espinal y meningitis tuberculosa, Rev. Med. del Uruguay, Dec. 1919.
Consideraciones generales sobre meningitis aguda. Arch. latino Americanos de Pediatria, Jan. 1920.

peared. This form can appear at any age of life but prefers early infancy and has been observed even in babies two months old. It is generally benign and responds to serotherapy. The serum employed has been prepared by our "Instituto de Higiene" (Public Health Institute). Mortality, 2 per cent.

The routine examination of the cerebrospinal liquid constantly offers unexpected results. We beg to remind the readers that the cytology in meningitis is a sign that should be analyzed and discussed in each special case, since similar results may be due to altogether different types of meningitis.

Notwithstanding the sharp contrast between cerebrospinal and tuberculous meningitis, it is in some cases possible that clinical and cytologic resemblances may lead to error, more so during the present epidemic, since both forms can be seen side by side. The cerebrospinal liquid in cerebrospinal meningitis may be transparent with lymphocytes, from the outset; but in general it only becomes so when there is a tendency towards improvement. This modification may take place rapidly, independent of treatment as in two cases which we have observed. Here the liquid was purulent with polynuclear leucocytes. The next day without any treatment it was transparent and contained lymphocytes.

These facts explain some clinical varieties that at certain moments in the course of cases may lead to difficulties in the analysis of the symptoms and in the therapeutics to be applied. To this group belong: (*a*) Cases of cerebrospinal meningitis with transparent liquid; (*b*) atypical cases of benign meningitis, with transparent liquids and with polynuclear formula; (*c*) atypical cases of meningitis of lymphacytic form ending in recovery (pseudotuberculous meningitis, primary, or at least apparently not secondary). All these forms can be produced by meningococcus, and may have begun with characteristic symptoms, but when under clinical observation, may be atypical or abortive and may be more or less rapidly modified, in such a way as to make their interpretation very difficult.

The bacteriological examination, when possible, solves all doubts. We know that by repeated tests the tubercle bacillus is nearly always to be discovered in tuberculous meningitis; as for cerebrospinal meningitis we have seen that in many cases only cultures will show the meningococcus.

Meningitis with Pneumococcus.—This is characterized by sudden onset, the marked meningeal symptoms, and by its frequently fatal ending. Some benign forms have been observed and even some that end in recovery. It is generally primary; in some cases it fol-

lows a pneumonic attack, immediately or after several days of convalescence. One of our patients had had pneumonia a month previously. The meningitis appeared suddenly and death occurred within forty-eight hours. Another patient had left the hospital a week before, convalescent from pneumonia. He was feeling in good health, was taken suddenly ill, and twelve hours later was dead. The postmortem examination showed suppuration of the meninges, which contained only pneumococcus.

In two cases we saw the pneumococcus associated with the meningococcus.

In some suppurating primary meningitis cases the streptococcus is the only microbe present. Such was the case in a child of six years that died notwithstanding the treatment.

There are atypical or undifferentiated forms of meningitis benign or severe, with transparent or purulent liquid, which it is impossible to designate. It may be that they belong to the groups mentioned, but that they come under observation disfigured or lacking a complete investigation, and thus their true nature cannot be ascertained. Among the more interesting cases of this sort are the serious and lethal forms with transparent cerebrospinal fluid with small modification of the cells, lymphocytes or polynuclears, without microbes, and at postmortem showing a suppurating meningitis. We have seen this type in two girls one four and the other thirteen years of age.

Tuberculous Meningitis

This meningitis can be superacute, acute or subacute. One of our patients died in forty-eight hours; four lived for a week, but these were exceptional cases. In general the evolution is subacute, insidious, cold and progressive, with alterations, ending in death in three or four weeks. It may appear in children at all ages; the youngest of our patients was four months old, the oldest fifteen years. Special symptoms correspond to special ages, for instance in the breast-fed infants there is rapid evolution with convulsions or coma; they sleep through their illness. The grown-up child and adolescent has more irritative or spasmodic contractures and the convulsive symptoms, delirium, etc.; in second infancy we find the classic form of this illness with all its well known features.

Tuberculous meningitis may be primary or secondary. The primary form appears in a patient who up to that time has been in apparently perfect health, though we must accept as proved the fact that the biological reactions would have been positive had

they been investigated. Several of our patients had been perfectly well and one can imagine the surprise experienced by the observer face to face with a strong child without antecedants and without any previous illness. Tuberculous meningitis can appear at any age. Sometimes the children are delicate and fragile, although not really ill or considered to be suffering from tuberculosis. There are also cases of children who, although they do not show symptoms of tuberculosis, have lived in infected surroundings.

The secondary form can follow a tuberculous process, lung, peritoneum, joint, etc., in its classical features or as a final spread of granules. We can also consider as secondary the meningitis that follows other infectious conditions, such a grippe, measles, whooping cough, typhoid fever, among the most prominent.

Many of the primary forms are really consequent upon grippe or are grippe complications. In some cases the grippe has been more marked, fever had set in and then the disease has turned out to be tuberculous meningitis. The influence of measles and whooping cough on tuberculosis in breast fed babies is too well known. These illnesses are benign in healthy children who have been carefully reared, but if the tubercle bacillus is latent it is very common to see the microbe in evidence in the form of a bronchopneumonia or generalization in the meninges.

Typhoid fever is not considered as the occasional cause of such manifestation but its influence is frequently dangerous. Every year we have opportunities of seeing children in whom typhoid fever ends in tuberculosis or who have tuberculosis some time after recovering from the typhoid. Tuberculosis may be pleural, lung, abdominal or meningeal. We have seen recently six cases (in succession at the Hospital) of typhoid fever ending in tuberculous meningitis, some immediately thereafter, others a short time later. It is interesting to note this fact in conjunction with the studies of the typho bacillus of Landouzy; in our experience the first part of this illness is generally (nearly always) typhoid fever, which is now better diagnosed.

We will include as atypical forms of tuberculous meningitis, two cases that began with spinal symptoms of paraplegia; in one this was the first or initial symptom, in the other, it occurred two months before the meningeal symptoms. The cytology of the cerebrospinal fluid was characteristic in general. The liquid was transparent or slightly opalescent, it contained cells to the number of 100 to 500 a cubic millimeter; sometimes less, rarely more. Lymphocytes were predominant (from 80 to 100). In some ex-

ceptional cases polynuclears may have been present (3 to 4 per cent. of our observations). The leucocyte formula is not pathognomonic. It may be completed by investigation of the tubercle bacillus and it is well known how difficult it is and the length of time required to carry this investigation through. We found the bacillus in 80 per cent. of our cases; in the other cases the diagnosis rests solely on the clinical symptoms, cytology, post-mortem, and inoculation of guinea pigs.

In all our histories we have had conclusive evidence of the accuracy of the diagnosis.

This diagnosis may be difficult when the clinical signs are not well definied or when the laboratory findings are not complete. There is a group of illness that clinically and cytologically can be mistaken for tuberculous meningitis, and for which the conventional name of pseudo-tuberculous has been selected. This pseudo-tuberculous meningitis may be primary or secondary.

Primary Pseudo-tuberculous Meningitis.—Some of the patients offered the symptoms of a specific illness, making the confusion with tuberculous meningitis nearly unavoidable. This form apparently primary, may really be only an illness whose origin or beginning has not been observed (mumps meningitis, for example) or the observer may encounter it at a described period of its evolution when the resemblance to tuberculous meningitis is very marked (cerebrospinal meningitis).

Secondary Pseudo-tuberculous Meningitis.—The new methods of diagnosis and the new facts ascertained have enlarged this chapter in a slow but progressive way. We know how to diagnose the following forms: (*a*) *Mumps meningitis.* We have had several cases of this very interesting form. When the antecedents are vague, it may simulate tuberculous meningitis and also when the initial symptoms have been attenuated, but the favorable outcome of the case is decisive evidence of the diagnosis. (*b*) *Heine-Medin meningitis.* Meningeal symptoms are characteristic in this illness, lymphocytosis is the usual cytologic formula. In our country the epidemics are not intense and the symptoms that predominate during the course of the cases are chiefly paralysis, pains, etc., as usual, but in other countries where big epidemics have been observed pure meningeal forms may be seen leading to error in the diagnosis. (*c*) *Otitic meningitis.* Meningeal symptoms from acute otitis may differ in nature and in importance. A common form consists in slight meningitis with moderate lymphocytosis that disappears as soon as the otitis improves; the principal difficulty in the diagnosis

is that the otitis may not be evident and then the meningeal symptoms with their cytologic formula will lead to error. (*d*) *Syphilitic meningitis.* In hereditary syphilis there are forms of slight meningitis with lymphocytosis, but they will rarely imitate the tuberculous meningitis or have its lethal issue. When death ends the illness the tubercle bacillus has been the cause of the symptoms. We have seen this happen in three of our patients, children in late infancy with hereditary syphilis, with positive Wassermann that died of tuberculous meningitis duly diagnosed and proved. (*e*) *Cerebrospinal meningitis.* During the present epidemic this form and tuberculous meningitis coexisted, giving us daily opportunity of seeing the very interesting clinical problem offered by this association. Benign forms or those that responded to the serum treatment or recovered spontaneously, may offer a clinical appearance resembling to a marked degree tuberculous meningitis in some of its varieties, the more so since the cytologic formula is also very similar. There is good reason for insisting upon the convenience of making a bacteriological examination and cultures. As clinical facts the favorable outcome and the effects of treatment are also factors to be considered.

The differential diagnosis between tuberculous meningitis and pseudo-tuberculous meningitis is a very interesting one. In the first place in so far as it may indicate a specific and perhaps favorable treatment in some cases; secondly in so far as it may be the basis of an altogether different prognosis.

The pseudo-tuberculous forms are curable in general, the tuberculous incurable; one cannot reckon with the rare cases of cure in tuberculous meningitis. Our mortality was 100 per cent. One of our patients considered cured died from a second attack of tuberculous meningitis eighteen months later, duly diagnosed in both cases.

Meningeal Reactions

This group is considered only from a clinical viewpoint. We consider as meningeal reactions, secondary forms of meningeal symptoms that appear in the course of many different illnesses. These symptoms may be: rigidity of the neck and Kernig's sign or they may be represented by cytologic changes, lymphocytosis, polynucleosis or both forms of symptoms, that is to say, rigidities and cytologic change, with or without special alterations of the general condition of the patients. We have just seen such manifestations in two cases of grippe. A girl with congestion of the lungs complained of severe headache and vomiting, rigidity of the

neck. Kernig's sign was present. The cerebrospinal fluid came out under high tension, but was transparent and there were no modifications in its chemical or cytologic reactions. A few days later all the symptoms had disappeared. In another case, very similar to the first there were 40 cells (mostly lymphocytes); the patient recovered inside of a week.

Sometimes a similar association of symptoms appears during the course of an acute otitis; it is a milder form of the manifestation mentioned in another section of this paper under the heading of pseudo-tuberculous meningitis. Also during the progress of measles we can observe rigidities and contractions without the corresponding cytologic findings. This will calm any anxiety as to meningeal complications. In bronchopneumonia we see meningeal reactions that may be referred to occult otitic inflammations that will disappear during the course of the illness. It is frequent to find rigidity of the neck and Kernig's sign at the outset of pneumonia. The lumbar puncture obtains a hypertense liquid, but without cytologic changes.

But it is during the static period of typhoid that this reaction has a special clinical interest. The patient reaches the hospital during the static period of the illness and sometimes has Kernig's sign and rigidity of the neck to such a degree as to make the differential diagnosis difficult. But the cerebrospinal fluid, although under increased tension, showed no cytologic alterations, and the patient recovered in a few days. It is a purely toxic symptom that may also appear in other illnesses, but we need not prolong the discussion.

These general ideas, based on the study of recent cases, show the great interest of this study and also the great progress made with the aid of the examination of the cerebrospinal fluid. We must not forget that the meaning of the examination of the cerebrospinal fluid should be discussed and weighed in each case, since similar results may be due to different processes. To have its full force, the examination of the cerebrospinal fluid must be supplemented by the bacteriological examination.

Once the form of the illness is found, the practical problem is solved, and the prognosis and treatment are simplified. Much has yet to be done, but we hope that science will deliver to us the weapons to triumph over this illness in all its forms, especially in the case of the terrible tuberculous meningitis.

May, 1920.

SYPHILIS AND DEGENERATION

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Because of its protean nature syphilis is capable of affecting every tissue and organ of the body. While in its early stages the morbid changes it produces are more or less transitory and amenable to treatment, yet it is at this stage of its greatest virulence that if transmitted parentally it causes either death of the product of conception before it emerges into the world or else an infant, which, if it survives is more than likely to show the influence of the disease throughout life. In the tertiary stage of the disease its well-known predilection to affect the organ of thought—the brain—is a cause of degeneracy in those who acquire it.

The incidence of syphilis in the United States, including the inherited as well as the acquired form, has been variously estimated at from ten to twenty per cent.. The former is the percentage which I believe to be approximately correct in the white race. In the negro I believe the percentage to be much higher, approximately thirty per cent. Thus it can be seen how widespread is this scourge and further, from the knowledge we now have of its pathology, that it is sufficient to cause nearly all the degeneracy now existing both in and out of the penal and other institutions in the country. For I am firmly convinced that syphilis and its companion evil, alcohol, are the principal causative factors of the vast army of degenerates who are a burden and a menace to every civilized state.

The close connection that exists between syphilis and crime is not hard to find. In fact, the statistics are much in excess of the data I shall here present. Material gathered by Bourdeau relating to the inmates of the prison at Auburn, New York, is interesting as offering evidence which it is hardly possible to controvert as to the influence of luetic disease as a factor in criminal degeneracy. Bourdeau found that 16.65 per cent. of the males and 33.85 per cent. of the females gave a positive Wassermann. He also found that in those with positive Wassermann reactions over eighty per cent. showed stigmata of degeneracy. Atwood analyzed two hundred and four cases of low-grade idiots, inmates of the New York City

Children's Hospital and School on Randall's' Island. A Wassermann test of the blood was taken in each instance. Eighty-eight females and one hundred and sixteen males were examined. One hundred and forty, or more than two thirds, were under twenty years of age. The blood reacted positively in thirty or 14.7 per cent. Of these twenty were females or 22.7 per cent of the females examined, and ten were males or 8 per cent. of the males examined. The stigmata—the classic signs whereby the disease manifests itself physically—were present in only four of the thirty positive. This showing is perhaps on its face rather inconclusive, but I am convinced if Atwood had carried his investigations further by performing a lumbar puncture as well, the number of positive Wassermanns would have greatly exceeded the percentage he records. It is well known to syphilologists that hereditary syphilis may be present and yet not manifest itself serologically, but in other, even subtler ways, of which the contamination of the spinal fluid is one, the child may bear the impress of the disease.

Hereditary syphilis is one of the most important problems to be considered in the study of degeneracy. It accounts for every conceivable nervous and mental abnormality from simple nervousness to complete idiocy. The early recognition of this taint is also of vast importance, for by so doing timely and active treatment may in some instances improve or arrest these neuropathies. Syphilis is rarely acquired in childhood except by accident—*syphilis insontium.* If present in the acquired form its recognition is not as a rule difficult. The diagnosis of hereditary syphilis, however, especially in the absence of stigmata as frequently occurs, is attended with much more difficulty. While the Wassermann test of the blood or of the spinal fluid in the absence of gross physical signs will often establish the diagnosis, yet the organism may be profoundly vitiated by the inherited disease without even these pathognomonic signs being present, as I will later explain.

Since syphilis is a disease that can be transmitted to the offspring, even—in my opinion and of others as well—to the third generation, let us consider the mechanism of this transmission. I can do no better than give the conclusions of Haberman with whom I am in full accord. These are:

1. The *spirocheta pallidum* may be transmitted to the embryo directly from the mother who is a syphilitic. In this event the embryo may (*a*) cease to develop and be expelled—abortion; or the embryo may (*b*) continue to develop to a certain stage and then cease, although viable when expelled--premature birth. An infant

so born is naturally immature and with but a feeble hold on life. It may gasp out its life in a few moments or it may live for a few hours or even a few days. (*c*) The embryo may continue to develop and be born at term but born dead—still birth. Or (*d*) the infant may be born at term and show signs of the disease at birth and, if properly treated, live. Or (*e*) the infant may show no signs at birth: it may appear normal and healthy in every way and then show evidences of the disease within the next few months. Or (*f*) the infant may show no signs at birth or during childhood but when adult life is reached it may suddenly show evidences of the disease —*syphilis hereditaria tarda,* or, as the French term it, "tertiarism d'emblée. Oppenheim states that such outbreaks may not occur until the thirtieth or even the fortieth year, although Fournier places the age incidence much lower, from the third to the twenty-eighth year.

2. Syphilis of the parents may so affect the germ cells, not perhaps by the spirochetæ themselves but by the toxins generated by them, as to cause a molecular disturbance or possibly a chemical change, thus from the very beginning debilitating the germ plasm and thus retarding its development or causing it to develop abnormally. Because of this inherent toxic influence the fetus may not grow beyond a certain stage and in consequence abort or be born prematurely; or it may persist and be born with some deformity, or dystrophy, or aplasia. Such an infant will of necessity be marasmic, puny, and with but slight aptitude for life. All this is due to damage to the germ and its specific cause is the parental disease, and yet there is no infection *per se* as we understand the word. The Wassermann reaction of such a child will be returned negative. In these cases there is the cell damage which is hereditary in contradistinction to the cell infection which is congenital. In this degenerative process the nervous system must perforce bear its share and it is from such stuff that neuropaths are made.

3. There is a third possibility which must also be borne in mind. Parents such as I have mentioned may have a child which is born and grows to maturity without ever showing any evidence of syphilitic disease. It is healthy from birth onward. Yet it may have one or more siblings who are infected. A healthy child may be followed by one diseased and such may be followed by another that is clean. There is no rule. Kassowitz, however, has pointed out that in a general way the result of conception is more severe the nearer the conception is to the beginning of the disease and the severity diminishes the further in time the conception is away from

the initial infection. This is best illustrated as abortion, premature birth, still birth, a living child that does not long survive, then a congenitally syphilitic child and then a healthy child. This is known as "Kassowitz's Law" and from observation I am convinced that it is true.

Recent observations in regard to the transmission of syphilis from parent to offspring are interesting in that they differ somewhat from opinions hitherto held. It would appear that the disease in children of syphilitic forebears is less severe the more intense the disease was in the parents. In other words in the passage from the parents to the offspring the disease becomes attenuated. It has also been noted that the augury for the future of the child is more grave when the disease is inherited from the mother than when it is transmitted paternally. Fournier found that in maternal syphilis eighty-four per cent. of the offspring were affected whereas in paternal syphilis the percentage of transmission was reduced to thirty-seven per cent.

From the preceding we may consider syphilitic degeneracy to be represented by two types. In one the children of syphilitic parents are patently affected with the disease and show the same by various stigmata and by the presence of a positive Wassermann reaction in the blood and also in some instances in the spinal fluid as well. In the other, the disease is not manifest by any physical signs or by the presence of a positive Wassermann in the blood and it may also be absent in the spinal fluid, but is displayed by psychopathic divergencies of the germinal toxemia. There is still another type which might also be included. In this no abnormalities either physical or mental are present for many years but at a comparatively early age, *i.e.*, about the third decade of life abnormalities of the psyche suddenly develop. It is possible that dementia præcox may be included in this class.

I am firmly of the opinion, although I know it is denied by some, that syphilis is largely responsible for idiocy and imbecility. I have already cited the findings of Atwood and I am convinced that future research will finally force this conclusion to be accepted. But it is not these cases which offer the greatest difficulty in tracing the cause to a parental luetic infection. A child may be born of syphilitic parents who is apparently healthy but in reality is an asymptomatic syphilitic. These cases as a rule escape attention because of the fact that syphilis is not suspected. The child may show a normal development up to, say, the tenth or twelfth year. Then without any apparent cause its mentality begins to deteriorate. The first

sign may be merely that of mental fatigue. But this fatigue is not alleviated. Sooner or later—usually within three years—a true paresis develops. Sometimes the premonitory symptom is an epileptic seizure, but more frequently the course is insidious, a slow but progressive mental deterioration. E. Livingston Hunt has ably described this form of juvenile paresis. Not all of these children by a very considerable majority however develop paresis but almost invariably they do show an "irritable weakness" or excitability, a fatiguability of the higher centers. Neurasthenia, hysteria or the two combined are common expressions of this form of degeneracy due to syphilis. Freud, as cited by Loewenfeld, has pointed out that in more than half of the severe hysterias, obsessions, etc., observed by him, the father of the patient was syphilitic. While none of these patients showed any of the gross manifestations of inherited lues, yet their psychopathic inheritance was looked upon by him as due to their "luetic inheritance." In other cases the child may be normal mentally or even of an advanced mental type but shows evidences of mental instability such as lack of concentration, diversity of moods and sleep disturbances. In these cases the mental deterioration involves the ethical sense and many a juvenile criminal is such because of syphilis in his progenitors.

The stigmata of hereditary lues frequently almost entirely disappear in late childhood or early adolescence. Some, however, never disappear, and when present are absolutely pathognomonic of hereditary syphilis. These are the saddle nose, the notched teeth, deafness, corneal opacities and the radiating scars at the labial angles. Individuals so marked are almost invariably undersized and of generally poor physique. Not infrequently they are undeveloped sexually. In this connection I would say, that it is my opinion, based upon the assumption now gradually taking form amongst psychiatrists, that sexual perversions are in a large measure due to changes in the secretions of the internal glands, that these changes can in many instances be traced to syphilis in the forebears of this particularly disgusting class of degenerates.

The stigmata of syphilis are not to be confused, however, with the so-called stigmata of degeneracy; but it cannot be denied that the stigmata of degeneracy are all too frequently found in congenital syphilities. The stigmata of degeneracy are the signs whereby we know that there has been damage done to the germ which may be from syphilis or from some other cause. As stated by Haberman, "where such germ plasm has been vitiated, the individual resulting from it may show the invalidation of the stuff he is made of

in both mental and physical abnormalities; these abnormalities are the tags of his inherited taint or defectivity—hence *stigmata degenerationis.*"

The stigmata of degeneration are both psychic and somatic. They are present in idiots and imbeciles and those psychopaths who may be either criminals or of the type that is usually designated as cranks, or peculiar, or eccentric. I do not wish the reader to infer that I believe that these signs necessarily imply congenital syphilis in every instance. They do not. But I do believe that syphilis is by far the most important causative factor, either immediate or remote. It must also be said that their presence is by no means an index of the degree of psychic variance. This is exemplified by the fact that only a few may be present in an individual with marked psychopathic tendencies and they may also be encountered in a perfectly normal individual. But it may be said that as a rule their presence is of import as strongly suggestive of inherited psychic defect. These degenerative stigmata are represented by cranial abnormalities of the teeth, the hard palate and of the external ear, the fingers—webbed, polydactylism, abnormalities of the hair—alopecia, hirsuties, abnormal pigmentation of the iris, genital abnormalities—excessive size of the penis or extreme smallness of that organ, cryptorchidism. Lefthandedness is also included by some, although I do not.

Morel defines degeneracy as a morbid deviation from an original and normal type. These deviations are transmissible and the bearer of them inevitably passes them on to his descendants. This is the law and it cannot be denied. We know that the descendants of syphilitics present certain malformations that are so distinctively characteristic of their inherited dyscrasia that they have been designoted as the stigmata of the disease. But these degenerative signs are not only physical; they are mental as well and it is these last more than the physical signs which class the individual so afflicted as degenerate.

The question might be asked, What is degeneracy? Dana defines it as "a condition in which there is marked deviation from the average normal." The physical signs thereof are defined by Church and Peterson as "anatomical or functional deviations from the normal, which in themselves are usually of little importance as regards the existence of an organism, but are characteristic of a marked or latent neuropathic disposition."

These are purely neurological definitions and do not take into consideration moral obliquities. They convey no intimation of a

descent in the intellectual or moral scale. Nor can it with truth be said that every deviation is of a degenerative character, for we know that they are not. Stigmata then are nothing more or less than deviations from the normal type, and it must be admitted that this so-called normal type is a product of deduction rather than experience. It is a composite photograph of the physical, intellectual and moral characteristics of the average individual. In other words of a standardized type which Goethe defined as an "abstract and general image."

Walton has suggested that there be incorporated in the terminology of psychiatry a word that will more definitely describe the facts rather than one which merely infers a tendency. He therefore proposes the words "deviate" and "deviation." Such a nomenclature would seem to me to be appropriate when we consider that the question not infrequently arises whether the possessor of stigmata in every instance represents a lowering in the intellectual or physical scale. Indeed, he may represent an appreciable improvement at least in so far as his traceable ancestry is concerned. Degeneracy indicates a downward trend but in the ultimate analysis this does not always hold good. We frequently encounter acuteness in some special sense so remarkable that it suggests a reversion to an earlier sylvan ancestry, rather than the familial decadence in the sense in which it is understood by Nordau and others. The abnormal responsiveness to stimuli sometimes observed in the so-called superior degenerate, reminds us very strongly of the similar power observed in animals, a power which tends toward the survival of the fittest in eluding danger. Such could not, by any stretch of the imagination in my opinion, be called a sign of decadence. Because of this fact, the expression superior degenerate is a misnomer. For, if the individual so designated is inferior to the normal, he certainly cannot be superior at the same time, and if he is superior he can hardly be termed degenerate. If these postulates which some so lightly assume are true then we are all degenerates; the condition of the absolute norm is essentially an ideal one. To what extent deviation from this norm constitutes clinical degeneracy is a mooted question and what is more, is likely to remain so for a long time to come.

Much stress, and in my opinion with abundant reason, has been laid on syphilis as a causative factor in producing physical and moral degeneracy. The *spirocheta pallidum* is a most subtle organism and penetrates to the most remote recesses of the body and profoundly enervates the cells composing all the tissues. It also has a special

prediliction for the nervous system. Idiots, imbeciles, epileptics and that type of individuals of unstable mental equilibrium with erratic or criminal tendencies which we term degenerates, can be produced by syphilis.

Syphilis is accused of frequently causing insanity. It does if we limit it to certain types. When syphilis attacks the brain it does so by setting up an inflammation of its supporting membranes. Rarely is the brain substance itself affected except by continuity; although gummata of the brain occur they are not frequent. This it does in the guise of a meningitis which may be of the base or of the convexity. In the former paralyses occur rather than mental deterioration, but in the latter an acute delirium may appear which frequently passes, however, with comparatively slight damage. Although, as pointed out recently by Collins, there is left a "syphilitic scar of the spirit" which always remains and the patient is never so well mentally thereafter in spite of an apparent clinical cure. When the vessels supplying the brain are affected the condition known as paresis supervenes. Paresis is of slow evolution—it is possibly the most slowly evoluting disease known. Its insidious advance may be taking place while the patient is seemingly enjoying the best of health. It is a true degenerative psychosis causing its victim to be guilty of many more or less antisocial acts, especially those pertaining to judgment and morals, long before the coarser and pathognomonic symptoms are apparent. General paralysis of the insane (G. P. I.) is caused only by syphilis. This is an established fact. Yet while it is common among civilized men it is almost unknown amongst savages even where syphilis is rampant. The factors which in the highly complicated lives of the most advanced peoples tend to the development of neurasthenia and kindred neuroses in conjunction with syphilis aid also in causing paresis. Syphilis, however, is by far the most important factor; for, where syphilis is unknown paresis is unknown. Paresis occurring in young subjects is also due to syphilis—in its hereditary form.

Because of the fact that it is absent where the stress of modern civilization does not obtain and that it is more frequent in individuals of more than average intelligence, it would seem that mental effort has a more or less direct bearing on this form of syphilitic brain disease. Syphilis, therefore, appears as a contributory rather than a necessary cause. There is undoubtedly an inherent weakness of the protoneurons of some individuals which marks them as the especial prey of the *spirochæta pallidum*. The theory of a special strain of spirochetes which cause nervous syphilis does not

appeal to me. It is a possibility I utterly deny. *Syphilis á virus nerveux* of the French or the *lues nervosa* of the Germans does not exist; what exists is a *locus minoris resistentiæ*. In a pathologic sense the parable of the sower applies here. The seed cast on fertile soil will flourish; that cast on barren soil will die and be swept away.

Many observers, myself included, believe the endogenous psychoses to be the ultimate results of hereditary syphilis—the Parthian shot as it were of the dyscrasia. Space forbids the discussion of this phase of syphilitic degeneracy. The subject has not received the attention its importance demands. Further research will undoubtedly crystallize many facts at present only dimly suspected.

There are those who maintain that a direct relation exists between syphilis and crime in so far as the hereditary form of the disease is concerned. This is undoubtedly true. Where syphilis is prevalent, degeneracy is prevalent, where degeneracy is prevalent, crime is prevalent. Lombroso has noted the frequent presence of heredo-syphilitic stigmata in young criminals guilty of sexual crimes, usually those of a perverted nature. Criminals of this type are morally insane and their perverted acts are the result of their syphilitic taint.

As long ago as 1874, Huebner in his classic monograph, "The Luetic Diseases of the Arteries of the Brain," showed that when the spirochetæ attacked the cerebral arteries an inflammation resulted, in other words an endarteritis develops which narrows and finally obliterates the lumen of the vessels. The alteration in the cerebral circulation which naturally ensues causes either impairment of the neuron or its total destruction, which readily explains the perversion of the functions of the will. The lack of nervous conductibility with its consequent failure to react to stimuli explains the apathy and callousness of many criminals; again, the nervous activity may, for the nonce, be superstimulated and the sudden flash thus generated gives rise to many crimes of impulse. When we study the profound alterations which syphilis is capable of causing in the blood and lymphatic supply of the cerebral neurons, in preventing their development and perverting their nutrition it cannot be denied that it must of necessity exert a powerful influence on the psychic functions of the afflicted individual.

Criminality can be divided into two types—an atavistic and an evolutive type. The first connotes violence, whereas the second tends to fraud. Heredo-syphilitics in the main belong to the atavistic type. Arrested cerebral development is a concomitant of

hereditary syphilis; since the fundamental impact of the disease falls largely upon the cerebral circulatory apparatus, cerebral growth cannot be properly proportioned. This failure of the cerebral blood supply prevents each determinant from obtaining its rightful share and hence its immaturity and unevenness which accounts for the heredo-syphilitic's lack of control and consequent tendency to crimes of impulsion and emotion.

Any one coming much in contact with criminals, as has been my experience, will be struck with the frequency with which is encountered the acquired form of the disease grafted on to the hereditary taint. These cases offer striking examples of the "binary syphilis" of Tarnowsky. This double infection—this vicious circle—has a most debilitating influence. Lack of space prevents me from discussing further this phase of syphilis and degeneracy and I would refer those interested to Tarnowsky's brilliant monograph.

Syphilis exerts a profoundly deteriorating influence on the bodily organism—particularly the tissues of the cerebrospinal axis, and unfortunately, both for the individual and society at large, who are thus made to suffer vicariously for the sins of their ancestors, this deteriorating influence is transmissible "even unto the third and fourth generation," if not in the actual sense at least in its baneful effects upon the minds and bodies of generations yet unborn. That there is a connection between syphilis and degeneration—intimate and far-reaching—is a pathologic axiom that cannot be denied.

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THREE TYPES OF SPINAL CORD INJURIES IN WARFARE*

By Henry Viets, M.D.

BOSTON

Cases of spinal cord injury in warfare are subject to classification into three groups: the neurological, the urological and the combined group. Into the first class I would put all the cases not complicated by urinary tract infection. Sepsis of the bladder or kidneys is of such paramount importance when present that it is always well to consider a case with it as primarily urological and thus form a separate group. As many cases have both the neurological and the urological aspect in the foreground another or combined group is justifiable.

The purely neurological cases without urinary tract infection are relatively rare in military hospitals. They are usually of two kinds, those with wounds of the lower segments of the spinal cord or of the cauda equina or those with wounds of upper segments that have developed an early automatic bladder and have thus escaped sepsis of the urinary organs. A single example of the neurological type will serve to illustrate this group.

A. J. V. was wounded July 4, 1918. A shell burst behind him and a shrapnel ball entered his back to the right of the mid-line at the level of the fifth lumbar vertebra. It passed through the abdominal cavity and made an exit in the right lower quadrant. He immediately lost consciousness and remembers nothing of the next two or three days. On the same day as his injury an extensive laparotomy was done and the wound of entrance excised. On the second day he developed pneumonia which later resulted in an empyema. The laparotomy wound healed well and he also recovered from a rib resection for his empyema.

He was first seen by me sixty days after his injury. The back wounds were healed and movements of the spinal column were unrestricted. The abdominal operative wound and that in the right lower quadrant were also healed and his only complaint was a foot drop and weakness of his right leg. There was paresis of extension

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and rotation of the hip, flexion of the knee and abduction of the leg. The biceps and semitendinosus were paralyzed. There was paresis of the anterior tibial group but paralysis of the peroneal group, all extensors of the ankle and the extensors and flexors of the toes.

The muscles paralyzed are supplied by the fifth lumbar and first and second sacral segmental nerves. There was absolute anesthesia of the skin areas supplied by the same segmental nerves. The knee jerks were active and equal but the right ankle jerk was absent. There was no plantar response on the right. The abdominal and cremasteric reflexes were active and equal. No vasomotor disturbances were noted. Micturition was normal but there was loss of rectal sensation with constipation. No cystitis present. The x ray showed a partial destruction of the superior and inferior articular processes of the fifth lumbar vertebra on the right side with extensive destruction of the lamina of the same bone between them; many minute foreign bodies at the point of the lesion.

Four months after injury there was practically no change except the return of rectal sensation. The spine was straight with slight limitation of flexion. He stood with the weight mostly on the left leg with the pelvis slightly tipped, the right side lower than the left and he walked with the right leg abducted. Six months after injury there was some ankylosis of the sacro lumbar articulation on the right but the patient had improved markedly and was walking without crutches.

Eleventh month (September, 1919). Personal communication. "Improved wonderfully since December, in fact more than I had expected to. My belly wound pains at times, especially when I am about to pass water and my back has a continuous dabbling pain, not very intense but enough to let me know that it is there, while I cannot sit on my right side. My foot drags on the outer side and has not gained any more sensation; also am unable to move my toes. Very difficult to flex my body either left, right, backwards or forwards; aside from these minor facts, I am in good condition."

When I saw him the question of operation with suture of the nerves in the cauda equina was considered. It was assumed in this case that the ball had cut the nerves of the fifth lumbar and first and second sacral segments on the right side as they lay in the cauda equina at the level of the fifth lumbar vertebra. A few apparently successful cases of this operation have been reported and there seems to be no good reason to suppose that suture at this level, if the nerves can be isolated, would not do as well as the more peripheral operation on the sciatic. The idea of surgical interference was

abandoned, because of the apparent gradually returning functions of the nerves involved. Later records, however, show that the fifth lumbar and the first and second sacral nerves never recovered, so that the policy of non-interference was perhaps unwise.

The urological group includes the cases with marked urinary tract infection without severe injury to the spinal cord. In spite of the infection this type of case often does well if the urological factor is recognized early and sufficient attention is paid to it.

E. J. K. was wounded July 23, 1918. A shell burst behind him while he was standing and a fragment hit him in the back between the scapulæ. He fell down at once but was not unconscious. His feet and legs were immediately paralyzed, but there was no pain in the arms or legs. He performed involuntary micturition and defecation about one hour after being injured. The same day a small piece of shell was removed from his back in the mid dorsal region without removal of any bone. A catheter was passed for the first time on the third day. There was a complete paralysis of the lower extremities but the x ray of the dorsal vertebral column was negative. From the third day to the eighth a catheter was passed every few hours but he developed a severe cystitis and on the eighth day after his injury a suprapubic cystotomy was done. The drainage was only partially successful and on the thirteenth day a permanent catheter was substituted and the operative wound allowed to close.

I first saw him twenty-six days after his injury. There was a marked cystitis, with absolute paraplegia of the legs but good drainage through the permanent catheter. When it was removed, however, the next day, the bladder was found to be working automatically. There was no incontinence and the urine came with a definite spurt, 150 to 250 c.c. at a time. There was no sensation in passing water and absolutely no control over it.

A general neurological examination of the head and upper extremities was negative. Both legs were paralyzed, the left slightly more than the right. Sensory examination showed marked patches of hypesthesia of both legs below the knees, more especially on the left. None of these patches were very definite in character. Both knee jerks were very exaggerated and about equal. There was a double ankle clonus and double Babinski.

The temperature continued a septic course for ten weeks. The cystitis was very marked and was followed by a double pyelitis. The bladder, however, continued to work automatically once in two or three hours, except during the most severe hours of sepsis when there was incontinence. On the seventy-fifth day (October 4, 1918),

after a severe chill in the late afternoon the temperature fell to 98 and never went above 99 again. His general condition began to improve at once and within a week the urine began to clear up. The sensation entirely returned in the legs and movement was markedly improved. The right leg was practically normal. The left leg still showed paresis of the muscles moving the knee, ankle and toes. Reflexes were still exaggerated with a double clonus and Babinski.

Seventeen weeks after his injury I made the following notes: The patient has had a normal temperature since the end of the tenth week, has improved rapidly and is now up and about the ward on crutches. The right leg is practically normal. The left leg shows slight weakness, especially in the peroneal group, with a tendency to contracture of the tendo Achilles. Both knee jerks are very active. There is a double clonus and Babinski. No sensory or vasomotor changes are noted. The patient has gained partial control over his urine and can now hold it for half an hour or more. There is a slight amount of pus in the urine.

Fifteen months after injury he writes: "I am feeling fine. Can walk about with a cane but have difficulty in stooping over and picking up anything and cannot carry a weight over twenty-five pounds. My left foot is partly twisted inward." There was no cystitis or pyelitis at this date but occasional incontinence of urine.

This case brings out three interesting points. First, in regard to catheterization. All the usual methods were used, intermittent catheterization, suprapubic drainage and lastly permanent catheterization. Urinary tract infection followed, but in spite of it an automatic bladder developed. Pyelitis, however, was a poor substitute for an automatic bladder and this type of case would have been an ideal one to try the noncatheterization treatment. When the permanent catheter was removed to clean it, an automatic bladder was inadvertently discovered. One must then look for automatism from the very start; perhaps many of our catheters are left in too long.

In the second place we had a paraplegia with signs at first of a severe and extensive cord involvement. The patient was, in fact, treated at the front as a fracture of the vertebral column with consequent hopeless paralysis. Nothing could have been further from the truth; there was no fracture and the spinal cord was so slightly damaged that nearly complete recovery was possible. Presumably there was a small hematomyelia, the result of concussion. He presented a dismal picture during the first weeks of his illness and the

surgeon who saw him first apparently prepared for a long siege by suprapubic drainage.

The third point is that this patient ran a ten weeks' course of severe sepsis, cystitis, double pyelitis, and very grave general symptoms with apparent inability to overcome the infection. His temperature ran almost daily to 104 or 105 in the afternoon. Suddenly, within twenty-four hours, his temperature fell and never again went above 99. From the day of the crisis he began to recover rapidly.

The third type of case is the combined neurological and urological. Most cases of spinal cord injury have some urinary tract infection but I have classed in this third group only those with severe trauma to the spinal cord plus a severe infection of the bladder and kidneys. An illustration of this type is as follows:

W. H. S. was hit in the left side of his back just below the angle of the scapula by a shrapnel ball, September 30, 1918. No history, in detail, was ever obtained, as the patient remained partially unconscious until death, fifty-nine days later.

On the third day after his injury an examination revealed a complete parapiegia with sensory loss to the umbilicus, loss of deep reflexes with a Babinski sign and retention of urine. X ray showed a shrapnel ball in the spinal canal partly in the body of the tenth dorsal vertebra. Five weeks after injury he presented the following picture: very septic, cystitis and pyelitis, complete paraplegia without pain, dyspnea, cyanosis and a persistent unproductive cough; large, deep coccygeal bed sore with exposure of lower end of sacrum. Later the sputum showed evidence of a lung abscess. His general condition precluded operation. Death occurred on the fifty-ninth day.

Autopsy showed a large right lung abscess and multiple abscesses of the kidneys. The ninth, tenth, eleventh and twelfth thoracic vertebrae with the tenth and eleventh ribs left were removed, disclosing the spinal cord from which the dura was partly dissected. The course of the bullet was found to be as follows: wound of entrance, about six inches from the mid line, left, causing fracture of the tenth rib at this point. The bullet then traveled for two or three inches in the pleural cavity, without apparent injury to the lung. It then entered the vertebral column and lodged anterior to the spinal cord, partly severing it. An abscess cavity was found around the bullet and also one in the spinal cord about this level. The bullet was found *in situ*.

This man lived two months largely because of his superb health at the time of injury. He had all the serious factors of the worst

type of trauma; a septic, partially severed cord, a double pyelitis and very extensive bed sores. I think his treatment before he reached the base hospital was bad. The bullet should have been removed early. The noncatheterization treatment might have saved his urinary tract infection. His bed sores were certainly greatly increased by transportation. The lesson to be learned from the history and autopsy are as follows: Severe spinal cord cases should be considered as nontransportable for four to six weeks after injury. To follow this, I realize, at times may be impossible. Laminectomy is indicated when a foreign body is near the surface and has obviously carried in infection to the spinal cord. The bullet in this case would have been easily removable. Noncatheterization is probably preferable to the catheter plus infection.

Conclusions

The examples given above of the three groups of spinal cord injury in warfare seem to me to cover the most important aspects of this type of wound. No case, of course, fits exactly into any category; all have some elements of each part. I should like to lay stress on two points. First, one is constantly making a bad prognosis in cases that turn out well and vice versa. Part of our failures have been due to the partial neglect of the urological aspect in these cases. Most of our failures, however, are due to our relative ignorance of the functions of the spinal cord. We are increasing our knowledge slowly along these lines, largely due, I think, to the splendid type of physiological research done in England by the combined efforts of clinicians and physiologists.

The second point of interest to be gained from this study is really a correlate of the first. The patient's life in most cases is held in a balance between urinary infection and freedom from sepsis. Severe infection often means death; slight involvement of bladder and kidneys may lead to recovery if the spinal cord damage is not beyond repair. I used to say to myself as I walked through my wards: "Urology first, neurology second." This point of view, I am sure, was a correct one. Our hope for the future, perhaps, lies in noncatheterization; we should give it a thorough trial. We should remember with Celsus that it is better in doubtful cases to try a doubtful remedy, than none at all.

Society Proceedings

JOINT MEETING OF THE NEUROLOGICAL SOCIETY AND THE SECTION OF NEUROLOGY OF THE ACADEMY OF MEDICINE

HELD AT THE ACADEMY OF MEDICINE NOVEMBER 9, 1920

The President, DR. WALTER TIMME, in the Chair

PRESENTATION OF CASES

PSYCHOSIS FOLLOWING SURGICAL OPERATION

DR. A. L. SORESI (by invitation) presented two patients in both of whom unexpected signs of violent collapse with mental and psychic confusion had followed upon surgical operation. One man, sixty-eight years old, had been operated on for carcinoma of the stomach. The first symptom of the psychosis was extreme cheerfulness in an otherwise stolid, morose individual. He then became irrational and violent. He collapsed very rapidly and the prompt administration of strychnine seemed to be the only means of reviving him. The other patient presented, a very fat man, had had an appendicitis operation followed by a psychosis. He had been a heavy drinker for many years. Strychnine was used effectively in this and other instances of acute exhaustion following surgical operation. The patients presented had completely recovered from their psychoses and were perfectly rational.

DRS. E. B. CRAIG and H. A. RILEY examined the patients at the meeting and reported a generalized tremor of the lips and tongue, fibrosis of the peripheral arteries, and diminished blood pressure in the first patient. The second patient showed sluggish pupils and reflexes were elicited with difficulty.

DR. JOSHUA H. LEINER asked whether the routine examination of the blood pressure had been made before operation to determine whether a possible toxic factor might have been present, that showed adrenal involvement.

DR. SORESI replied that the leucocyte count made after the operations, in addition to the routine examination, showed no infection [with the natural exception of the appendicitis case]. All the patients in whom this psychosis occurred had normal pulse and temperature yet they ap-

peared to be dying. No organic condition could be found to account for the psychosis. The strychnine was administered as an emergency stimulant in view of the extreme collapse, and the absence of toxic signs. Its use had been effective in all the cases.

POLIOMYELITIS

Dr. Isadore Abrahamson wished to call the Society's attention to the existence of an epidemic which bids fair to throw considerable light on a series of infectious diseases which stand related to one another. He discussed the difficulties of differential diagnosis that early investigators experienced; the similarities in pathological anatomy; the results of animal experiments here and abroad; the discovery of the organism by Loewe and Strauss and the failure of Flexner and Amoss and others to corroborate their findings. He then discussed in brief the variations of the clinical syndromes during the epidemic. The epidemic died out and for a time only chronic or remitting cases were seen. Then came warnings of poliomyelitis; it appeared in Boston in epidemic form, then cases appeared in New York City. The Board of Health reports ninety-three cases, the maximum number in October.

But while a clear cut poliomyelitis syndrome can be seen, there were cases more numerous than is easily credible of a disease which establishes conclusively in a clinical way, the missing link between lethargic encephalitis and poliomyelitis though the early and very marked palsies would rather place them in the latter category.

There were a number of very mild cases consisting of a catarrhal inflammation of the nose and throat, with fever, general *malaise*, and an involvement of the facial muscles with or without diplopia.

Among the severer cases that came under his observation were in brief the following:

1st case.—Boy of sixteen. Pharyngitis, nausea, vomiting; then diplopia, the same evening left facial palsy, followed by involvement of the left tongue. The temperature was rising all the time. The next day, there was decided oculomotor involvement, paralysis of the left face and tongue and motor fifth nerve; left palatal palsy; marked midbrain tremor of the upper extremities; abdominal reflexes gone; right knee jerk absent, left diminished, both Achilles jerks absent, no Babinski, no Kernig, no retraction of the head. Lumbar puncture 66 cells, lymphocytes. The diagnosis was bulbar and midbrain poliomyelitis. The patient died that night.

2nd case.—Boy of nine. Early diplopia, rigidity of the neck. There was dropped foot on the right side, left Babinski, Kernig's sign present. The patient was lethargic for forty-eight hours. The spinal fluid within forty-eight hours of the onset showed 149 cells, 90 lymphocytes, excessive albumin and globulin. Fehling reduction. There was recovery except for dropped foot on the right.

3rd case.—Two year old child whose mother had lethargic encephalitis with considerable residues. The child showed a poliomyelitis syndrome.

4th case.—Four members of the same family had acute sore throat just before a fifth, a boy of fifteen, showed diplopia, ptosis on the left, tremor of the extended right hand, paralysis and later atrophy of the left upper extremity, weakness of the right side of the face, retraction of the head. There were no evidences of Kernig's nor Babinski's signs, no nerve tenderness nor hyperesthesia. The patient is on the road to recovery except for the paralyzed left upper extremity.

5th case.—Woman of thirty-nine, was aphasic for four days. Lost the power first of the right upper extremity, then in the right lower extremity. There is myoclonic twitching of the right upper abdomen. The left pupil is larger than the right, rigid, ovoid, weakness upper left. Seventh nerve weakness, left externus and internus, right externus. A flaccid weakness of the left upper extremity. Bilateral Babinski; marked midbrain tremor of left upper extremity. The blood pressure, heart vessels, and urine were negative. The Wassermann test gave negative results. Lumbar puncture tap showed old blood [7–10 days old], 14 cells all lymphocytes.

Dr. Abrahamson said that he had been in communication with Dr. Zingher of the Health Department who has studied the spinal fluids in the reported cases of poliomyelitis of this epidemic, and the vast majority show a great excess of lymphocytes, excess of globulin and Fehling reduction.

Of special interest in his cases and in those of other physicians of whom he inquired, was that almost all have, at the outset, a catarrhal inflammation of the nose or throat, and fewer gastrointesinal signs. The same peculiarity is noted of lethargic encephalitis and influenzal encephalitis.

Dr. M. Neustaedter, in discussing Dr. Abrahamson's paper, said that the cell count, globulin and albumen content of the spinal fluid alone without the clinical findings are no index of any particular disease. In any inflammatory condition of the meninges irrespective of the etiological factor we find alterations in the spinal fluid in its cytology as well as its chemistry. So far as his experience goes and the literature on poliomyelitis is concerned, there seems to be a universal opinion that early in poliomyelitis there is a marked lymphocytosis and later in the course polymorphonuclears predominate. Reports of other investigators show that with the Lange test about forty-five per cent. of cases of poliomyelitis give the luetic curve. In his work on complement fixation of spinal fluids with poliomyelitis antigen he had some very gratifying results in poliomyelitis and recently also in lethargic encephalitis. It seems worth while that this specific complement fixation test should be tried more extensively and in it we might have a specific reaction pointing more definitely to the etiology of the two diseases. He has conducted

neutralization tests with poliomyelitis virus and serum of recovered lethargic encephalitis patients since March last. This work has not yet been reported. The results show that there is a very close point of contact between poliomyelitis and lethargic encephalitis.

Dr. E. Altman said that the epidemic has reached the lower East Side as well as the Washington Heights region where Dr. Abrahamson had studied it. He stated that he had a child about two years of age on his service at the Beth Israel Hospital that showed a hemiplegia. The leg and arm recovered rapidly, but the face remained paralyzed when the child was discharged after a three weeks' stay in the hospital.

Dr. David J. Kaliski (by invitation) said that he was not convinced of the value of the complement fixation test for poliomyelitis using the antigen perfected by Dr. Neustaedter. Most of the sera sent by Dr. Neustaedter were negative, while a few of the controls (not cases of poliomyelitis, most of them old specific cases or other neurological conditions) gave fixation with the antigen. Thus the question of the specificity of the antigen was brought up for consideration. Using the organisms of encephalitis lethargica isolated by Loewe and Strauss as antigen in a complement fixation test for this disease, he had not been able to decide definitely the value of the reaction principally because of a falling off in the cases of the disease when he was ready to study this phase of the problem. However, the work was proceeding and would be reported later on.

Dr. Kaliski stated that there were no definite diagnostic criteria in the cerebrospinal fluid which would serve to distinguish absolutely poliomyelitis, encephalitis lethargica, and the polioencephalitis types. Where there was likely to be a larger number of cells in the fluid in the former condition, with an increased globulin reaction, and even a faint opalescence of the fluid due to a very large number of cells in the fluid, this was not diagnostic, but merely suggestive of the former diagnosis. Hemorrhage and even xanthochromia had been seen in a few cases of encephalitis lethargica. The curves obtained with the colloidal gold test were not characteristic for poliomyelitis. Most of the fluid showed slight and surely not characteristic and constant changes from the normal. A rare case had been reported as showing a curve similar to that characteristic of paralytic dementia or syphilis, but he had not been able to confirm this as yet in any of his cases. In encephalitis likewise no characteristic or constant deviations from the normal were found. In a few cases of superior poliomyeloencephalitis no changes whatsoever with the colloidal gold test were found while the lymphocytes were usually only moderately increased, rarely about 50–100 cells to the millimeter.

Conditions like poliomyelitis, encephalitis, poliomyeloencephalitis and tuberculous meningitis frequently gave similar findings in the fluid as regards the cells, the globulin, and the presence of sugar reducing substances, and the deviations were usually in degree only. Of course, in

the latter condition (tuberculous meningitis) the finding of tubercle bacilli cleared up the diagnosis. From the viewpoint of the pathologist, the diagnosis of any of these conditions with certainty was impossible, with the exception of tuberculous meningitis.

Dr. J. H. Leiner spoke of four cases lately at the Lebanon Hospital on the service of Dr. Wm. Leszynsky, in three of whom there was facial palsy and meningeal irritation that later proved to be of poliomyelitic origin. One child was somnolent, had no Babinski or Kernig sign, knee jerks were absent; the patient died within forty-eight hours. One child with facial involvement gave a history of vomiting and gastrointestinal disturbance three or four days before coming to the clinic. The illness then assumed a poliomyelitic character.

Dr. Abrahamson, in closing the discussion, expressed the hope that by calling attention to the current epidemic, the symptoms and signs of which seemed to fall between the known varieties of poliomyelitis and encephalitis, new data might be collected from observers and the relationship between influenza, lethargic encephalitis and poliomyelitis be established.

PUPIL DILATATION AND THE SENSORY PATHWAYS

Dr. Joseph Byrne considers the mechanism of pupil dilatation as set down in the text books unsatisfactory from the physiological standpoint and misleading to the clinician. Experimenting with cats, Dr. Byrne found that after section of any considerable portion of the afferent pathways pupil inequality ensued. Thus after section of one sciatic nerve or of the lumbosacral nerve roots, the contralateral was smaller than the homolateral pupil, whereas after section of the brachial plexus, or of any of the cervical nerve roots, as well as after hemitransection of the spinal cord in the upper or lower cervical region, or in the lower thoracic or upper lumbar region, the homolateral was the smaller of the two pupils. Following any one of the lesions enumerated, after the lapse of a more or less well defined period of incubation, *e.g.*, from eight to twelve days after section of one sciatic nerve, intravenous injections of adrenalin caused the relatively constricted pupil to become, for a time, larger than its fellow. This phenomenon is known as paradoxical pupil dilatation and Dr. Byrne's experiments are the first in which paradoxical effects have been observed after lesions of the afferent pathways all previous observations having been made after lesions of the efferent pathways, *e.g.*, of the cervical sympathetic. In addition to anatomical section Dr. Byrne made injections of alcoholic solutions into the sciatic nerve and into the nerve trunks of the brachial plexus. The results corresponded closely with those obtained after anatomical section. From the effects of complete cord transection at various levels above and below the upper thoracic region [inferior cilio-spinal center of Budge] upon the pupillary phenomena noted after section of the

afferent paths, it was concluded that in the normal waking state afferent impulses from all parts of the periphery are constantly impinging on the cells of the lateral grey column in the upper thoracic region on *both sides*. These impulses determine the efferent flow along the cervical sympathetic nerve which keeps the pupil dilated. There is, however, another factor in pupil dilatation which depends upon inhibition of the sphincter muscle. But this forms the subject of a separate study. Dr. Byrne's experiments give no support to the existence of a hypothetical cerebrospinal dilator pathway running, as set down in the text books, from the region of the pons to the lower cilio-spinal center. In no instance has Dr. Byrne been able to obtain effects upon the pupil after hemitransection of the cord in the cervical region which could not as readily be obtained after posterior nerve root section. However, in hemitransections of the cord made about the level of the second cervical root very marked homolateral pupil constriction was encountered. This, in Dr. Byrne's opinion, was in part the result of injury of the root pathways of the fifth cranial nerve and not the effect of lesion of any special cerebrospinal dilator pathway. In conclusion Dr. Byrne remarked that his experiments opened the way for a more exact interpretation of pupil inequality as encountered clinically, *e.g.*, in tabes, etc., whereas they seriously bring into question the value of the socalled Klumpke-Dejerine sign which is usually interpreted to mean injury of the efferent cervical sympathetic pathways.

Dr. Sherwin asked for information as to the structures upon which adrenalin was supposed to act in eliciting paradoxical pupil dilatation.

Dr. K. Sellards Kennard (by invitation) called attention to the fact that pupil inequality was a somewhat common occurrence among cats and asked if any steps had been taken by Dr. Byrne to eliminate possible error from this source.

Dr. Walter Max Kraus asked whether histological studies had been made upon the cells of the lateral grey column and upon the dorsal nuclear column. It would seem as if the pathways involved in the pupillary phenomena were identical with the pain paths. The main afferent sympathetic paths are those of pain and probably crossed in the spinal cord after entering with the sympathetic.

Dr. Thomas Hayes Curtin (by invitation) asked how the adrenalin was administered, and what was its effect on the musculature. He spoke of various methods of producing dilatation. It might be produced by the effect of the administration, rather than by the drug itself.

In closing, Dr. Byrne said that the site of action of adrenalin in eliciting paradoxical phenomena was presumably the myoneural junctions in the iris. Many series of experiments by various observers pointed to this conclusion. As in the case of the blood vessels adrenalin had a two-fold action on the pupil, viz., a primary dilating action followed by a secondary constricting action.

Replying to Dr. Kennard's question, Dr. Byrne said that in all cases

careful preliminary tests had been made and after such tests many animals had to be rejected. Replying to Dr. Kraus, Dr. Byrne said that his histological studies had been made and marked changes had been observed, *e.g.*, after sciatic section, in the cells of the dorsal nuclear as well as in the lateral grey columns. The changes were evident on both sides but were more marked upon the contralateral side in the case of the lateral grey columns [Budge's inferior cilio-spinal center]. Dr. Byrne agreed with Dr. Kraus that the paths involved in the pupillary phenomena were closely related to if not identical with the pain paths. Compare the pathic pupillary reflex. Indeed the experimental studies were undertaken in the first instance with the hope of substantiating physiologically and anatomically, Dr. Byrne's hypothesis as to the Mechanism of Pain.

A STUDY ON MOTOR APHASIA OF THE CORTICAL OR MIXED TYPE

Dr. Samuel Brock gave the following history of an American railroad mechanic, forty years of age. He had used alcohol to excess formerly with frequent intoxication. Cigarettes were also used to excess, but no drugs. The family history was unimportant, there was no history of head injury at any time, venereal infection was denied.

While in France in service with the Canadian Army some two and a half years ago, the patient suddenly pitched forward unconscious. On recovering, his speech was affected and his right arm and right face paralyzed. Practically complete recovery in the face and arm has occurred, but the speech defect has improved very little. Since the onset of this trouble he has had seizures of a Jacksonian type, beginning in the right face, then involving the right arm and leg. Neuropsychiatric examination reveals a motor aphasia; the gesticulations, mimicry and slight irascibility seen in this type of speech difficulty are quite manifest. Stereotyped phrases such as "Just the same,"—"Sometimes pretty good, sometimes I could do nothing." "If I come here, I'll have to give it up." "If you can." "Boston." "I cannot move," are used. He is able to count up to seven, and to enunciate the first two letters of the alphabet.

When asked to write down his age he wrote 1881 the year of his birth. His replies are not the exact answer to the question asked, but closely related to it; "when" seems to be mistaked for "where." He is able to write down very few words from dictation, and cannot write simple sentences, or numbers of more than four figures. He appreciates his inability, and notices his mistakes. He is able to write his name. Copying printed or written words is done quite well. Reading printed or written words is accomplished slowly but correctly. He recognizes all objects, and gives no evidence of being apractic.

There is no gross impairment of motor power. No Babinski or

allied reflexes are elicited. They are all exaggerated and equal on both sides, except that the right Achilles is slightly more active than the left, and at times the right knee jerk predominates. In the sensory sphere: an area of hypo to anesthesia to light touch is noted, together with analgesia on the anterior and posterior portion of the right chest and adjacent neck, going down to the level of the abdomen. There is no ataxia or adiadochokinesis, no Gordon-Holmes phenomenon. A tremor of both hands is present. All other examinations, with exception of examination of spinal fluid which was not performed, are negative.

He had suffered from dyspnea on exertion, cardiac palpitation and precordial pain. This evidence of cardiovascular disturbance and the sudden onset postulates a vascular accident in a branch of the left middle cerebral artery supplying the posterior part of the left inferior frontal convolution and adjacent motor area. The residuum was considered to be either a cyst or an old area of softening. An operation was proposed with the understanding that while but a small chance of improving his condition existed still there was a possibility.

OPERATION AND FINDINGS OF ABOVE DESCRIBED CASE

Dr. K. Winfield Ney described the operation and findings. Operation was indicated because of evidence of cortical irritation with typical Jacksonian seizures. The patient was not encouraged as to results. Dr. Ney operated as follows:

Under local anesthesia, a large flap was turned down in the left parietal region. About seven centimeters above the external auditory meatus a large cyst was found. Vessels were ligated around the cyst. During the ligation there was an escape of a large amount of fluid from the cyst, after which it collapsed, leaving a cavity about 2 cm. wide and 1 cm. deep. The thin upper wall of the cyst was resected, leaving a cavity which had the characteristic yellow appearance of degenerative brain tissue. The lesion had been located accurately.

About a year ago seventy or more craniotomies done under local anesthesia were reported before the Society by Dr. Ney, and since that time he has added about twenty-five more. He stated that he was becoming more and more confident of the value of this procedure. The majority of neurologists are somewhat skeptical in regard to intracranial operations because of the high mortality. In these series of operations under local anesthesia there have been no operative deaths. The local anesthesia has never had to be supplemented by a general anesthetic, nor has it been necessary to discontinue any operation because of pain, shock, or any of those disturbing factors which are experienced under general anesthesia. Blood pressure is seldom changed throughout the operation. There is no pain in going through the bone and cutting of the dura is not noticed, provided it is not pulled or too greatly traumatized. The vascular instability associated with many

brain operations, such as edema, etc., has not been a complication following our invasions under local anesthesia. The infiltration of the tissues gives us an almost bloodless scalp incision which is also helpful in the elimination of shock.

The prospects of intracranial surgery under this form of anesthesia, Dr. Ney feels, are most encouraging.

Dr. Neustaedter asked concerning the results of the operation. Had the Jacksonian attacks been affected?

Dr. Timme asked whether any nystagmus had been present.

Dr. Byrne said that Dr. Taylor has been using local anesthesia at Fordham, and that he, personally, could not speak too highly of its advantages. The neurologist, incidentally, is given an opportunity of testing cortex sensibility.

Dr. Brock, in closing the discussion, said that the patient was no better. The Jacksonian seizures were just as frequent as before, the aphasia was the same.

There was no nystagmus before or after operation.

The findings of this case bear out older studies on aphasia. A cortical lesion at the entering and leaving pathways, causes a mixed aphasia, which is of distinct value from a localizing viewpoint.

Current Literature

II. SENSORI-MOTOR NEUROLOGY

2. CRANIAL NERVES AND MEDULLA.

Hess. Arcus Senilis, Virilis, and Juvenilis. [Neurol. Centralbl., Dec. 1, 1918, No. 23, Vol. 37.]

By arcus senilis is understood a senile, bluish-white clouded ring at the periphery of the cornea which makes its appearance symmetrically in both eyes, and is conditioned by a conversion of this portion into fat. According to the period at which the senium sets in—in the sixtieth or sixty-fifth year, or, under favorable conditions of life in the seventieth, or under severe ones, in the fifty-fifth year—this sign may be observed, without, however, having any other significance than as an indication of the senium. As far as the author knows, there are no comparative studies of this phenomenon nor statistics of its frequency. In regard to the histology, Attias and others have proved that this is not an accummulation of hyaline substance, nor a lime salt, as was assumed by earlier writers, but composed of an enormous number of fat globules, consisting of neutral fat and fatty acid. The theory of an adherence or clouding of the corneal lamella has been abandoned, at least by opthalmologists, though there are writers, for example, B. Virchow, who defend a modified form of this view, namely, that the degeneration of the cellular elements of the corneal parenchyma may be understood as a chronic keratitis, in which the regressive processes are so slow that they must be assumed to be due to simple disturbances of nutrition. The color of the concentric corneal opacity is blue-white or yellowish, according to the number of the fat globules deposited. From the fact that variations are observed in the manner in which the arcus forms, it has been assumed by Attias and others that these variations are due to differences in age, there being an arcus juvenilis with its own peculiarities. The author, however, thinks it probable that the differences in development are determined by histological and chemical peculiarities rather than by age. His observations, however, were undertaken to determine other problems, *i.e.*, the frequency of the arcus cornæ in adults and its clinical significance. A fact of interest mentioned by Burdett is referred to, namely, that in negroes living in Tennessee this phenomenon makes its appearance much earlier than in mulattoes and whites. In view of the little attention which has been given this subject in the literature, the author was pleased to undertake the examination, in regard to this

feature, of those who came to the Reserve Hospital at Hamburg, including a round three thousand individuals from every stratum of society and every occupation. Extensive tables are given showing the relative frequency of the presence of the arcus in various nervous diseases. The author sums up the results of his researches as follows: Great caution must be used in drawing conclusions from the observations and experiments described in his article and the results thereof must be verified from other sources before they can be accepted. It may be regarded as proved that in earlier years of life a concentric opacity at the periphery of the cornea makes its appearance so that an arcus juvenilis and also an arcus virilus may be assumed. It is probable that there is close connection between the early appearance of the arcus and the neuroses which also finds expression in the war neuroses, rendering the view that the war neuroses are wholly of psychogenic derivation very probable. A special practical significance attaches to this sign, as it permits the assumption of extreme exhaustion. In cases where the word of the patient is doubted, this sign would always be of value as indicating severe mental shock, and this value should not be disregarded by nerve specialists in dealing with war neuroses.

Agosta, A. Ramsay Hunt's Syndrome. [Atti Soc. Lomb. Sc. Med. Biol., 1920, IX, p. 15.]

This is a clinical observation of a typical case of the syndrome originally described by J. R. Hunt and appears to be the first indisputable case observed in Italy. The author takes this opportunity to confirm the fact that the seventh cranial nerve contains afferent and efferent fibers. (DaFano.)

Maxwell, S. S. Labyrinth and Equilibrium. [Jour. of General Physiology, Vol. II, No. 2, p. 123.]

In the dogfish it is possible to remove the semicircular canals with their ampullæ without injury to the vestibular structures. The technique is relatively simple but requires considerable skill and practice. The technique of the removal of the otoliths without injury, or with relatively little injury, to the canals and ampullæ is also described. The latter is a more difficult operation.

As indications of the functions remaining after the extirpation of the various parts of the labyrinth the equilibrium reactions of the animals were used as well as the compensatory movements of the eyes and fins described first by Loeb and later by Lee. The utmost care was taken to avoid confusion of the reactions from the labyrinth with those from some other receptor. In this regard particular attention was given to the exclusion of retinal and tactile stimuli.

The results may be summarized as follows:

1. Removal of the semicircular canals with their ampullæ.

A dogfish from which all six ampullæ have been removed but which retained its utricular otolith uninjured shows definitely the following reactions. (1) Compensatory movements of the eyes and fins occur on rotation of the animal around the longitudinal axis of the body; *e.g.*, on rotation to the right, the right eye goes up and the left eye goes down. This position of the eyes is retained as long as the abnormal body position is continued. (2) Compensatory movements of the eyes and fins occur on rotation around the transverse axis of the body. (3) No compensatory movement is made in response to rotation around the dorsoventral axis, that is, to rotation in a horizontal plane. (4) The animal swims in a manner differing little from the normal. (5) The righting reaction takes place promptly and vigorously; if the animal is placed belly up in water it turns over at once.

2. Removal of the otoliths. After removal of all the otoliths from both ears the following results are seen in successful cases. (1) Compensatory movements of the eyes are made in the regular way to rotations about all three body axes, longitudinal, transverse and dorsoventral. If the animal is rotated around a longitudinal or transverse axis and held in the abnormal position the compensatory position of the eyes is retained. The movements appear to differ from those in the normal animal only in being slower and less vigorous. (2) The animal swims in normal orientation and maintains its equilibrium in the water. (3) If turned belly up in the water it rights itself.

The animals which possess ampullæ only (without otoliths) and the animals which possess otoliths alone (without ampullæ) are somewhat slower and weaker in their reactions, and swim less steadily than normal animals. The only marked difference in the results of the two operations is that the response to rotations in the horizontal plane is lost in those with otoliths only and is retained in those with ampullæ only.

The experiments therefore show that the ampullæ alone (without the otoliths) suffice for all the dynamic and all the static functions of the ear; and that the otoliths alone (without the ampullæ), suffice for all the static and all the dynamic functions of equilibrium of the ear with the exception of the response to rotation of the animal in a horizontal plane. [Author's abstract.]

Ivy, A. C. Study of Relation of Cerebral Cortex to Vestibular Nystagmus. [Jl. Comp., Neurol., Oct., 1919.]

This was studied in frogs, turtles, pigeons, rabbits, kittens, cats, pups and dogs. Various cerebral ablations were performed and their effects upon vestibular nystagmus was observed, rotation being the stimulus used. Decerebration in the frog, turtle, and pigeon does not disturb vestibular nystagmus nor complete decerebration with extensive destruction of the thalamus in the rabbit abolish the quick component of nystagmus, provided the body temperature is kept normal. F. T. Rogers' obser-

vations on reduction of body temperature following thalamus lesions and the effect upon reflexes have been confirmed for the rabbit. In the cat and dog ablation of the motor cortex in the region of the eye area causes a temporary, with some permanence, five to fifteen fold increase in the duration of the after-nystagmus when the animal is rotated opposite to the side of the lesion. There is an increase in the nystagmus reaction when the deviation is opposite to the side of the lesion, with some diminution, but not abolition, when the deviation is to the side of the lesion. A general conclusion is warranted that the quick component of vestibular nystagmus is not due to the integrity of a cerebral reflex arc, but is dependent upon some center below the thalamus, over which the cerebrum exercises its well recognized inhibitory influence. [Author's abstract.]

v. Eiselsberg, A. Freih, and O. Marburg. The Question of Operability of Intermedullary Tumors of the Medulla Oblongata. [Archiv. f. Psych., 1919, Vol. 59, p. 453.]

From the clinical symptoms of the case here reported the diagnosis of tumor medullae spinalis corresponding to the eighth cervical and first dorsal segment, principally on the right, probably intraspinal was made. At operation a tumor as large as a date stone was found shining through the posterior columns; this was successfully removed. The patient died eight weeks later, not as a result of the operation, but from pneumonia and a stomachic disturbance with which the patient was troubled before the operation. Histological examination of the extirpated tumor revealed a spindle-celled sarcoma, probably a primary growth. This case shows conclusively that intramedullary tumors can be operated on and that the medulla oblongata recovers from the injury without great difficulty. In the present case segments of the anterior cornua were affected as well as parts of the lateral columns near the tumor. Through the operation only the right posterior column was injured, evidenced by the fact that after operation a disturbance of the deep sensibility of the toes made its appearance, a relatively insignificant one. One of the most important symptoms for the diagnosis of the intramedullary site of the tumor is the disturbance of sensibility. In the majority of cases there is serious disturbance of sensibility from the level of the tumor downwards.

Phelps, Eduard. Clinical Features and Diagnosis of Tumors of the Medulla Oblongata. [Archiv. f. Psych., 1919, Vol. 59, p. 1014.]

There is necessity for further elaboration of diagnostic characteristics of tumors of the medulla oblongata, especially of those clinical signs which permit early diagnosis, as an operation, to be effective, must be undertaken at the earliest possible moment. The author describes eight cases, one of intramedullary, four of intradural and three of vertebral

tumor. It was found that the distinctive symptoms indicating the segmental localization of the focus were most clearly manifested in the intramedullary tumor, and the localization of the extramedullary tumor was easier to recognize from the symptoms than that of the vertebral. The intramedullary tumor affected the radiation region of the posterior root in several segments, especially on the right side. The early symptoms of sensory stimulation and the later sensory and motor impairment of metameral nature are therefore explicable from the anatomical relations. The assumption that the roots which pass by extramedullary tumors are simply pressed aside without being essentially injured was not confirmed. The early symptoms of sensory stimulation and defect and, at times, of motor impairment are of no diagnostic value in determining the localization of the tumors; they develop as result of intramedullary as well as of extramedullary and vertebral tumors, being due to secondary changes in the immediate environment. The regularity of the disturbances of sensibility suggest them to be functional. If, apart from these symptoms, disturbances in the direction of the head develop they may be regarded as directly due to the focus. In one case there was heightening of the knee reflexes, although the extramedullary tumor was at the level of L2–3. In another instance the reflexes were heightened where there was a caudal lesion. The knee reflexes, then, may be heightened when the tumor lies directly in the reflex field, even in the caudal region. A peculiar segmental symptom in one case was the hypersensitiveness to mechanical and electrical stimulation in the nerve trunks of the arms, resembling somewhat the hypersensitiveness in tetany. The author is of the opinion that where there is a rise in temperature the symptoms of tumors are more distinct and he suggests the artificial production of high temperature as a diagnostic measure in doubtful cases.

Schmieden, V. Injuries of Medulla Oblongata in War. [Archiv. f. Psych., 1919, Vol. 59, p. 509.]

Recoveries from projectile wounds in the medulla fall far short of expectations. Too often, severe acute trophic decubitus, urosepsis, or shock intervenes; the neurological interpretation of the symptoms in their initial stages is too difficult; the medulla has too little capacity of healing when its substance, even in a very slight degree, is primarily injured. In wartime good results from surgery are far fewer than in peace, yet operations had to be performed as the only hope. Nearly every gunshot wound is complicated from the start with symptoms belonging to the medulla oblongata. From the wounds themselves there are powerful distance effects which may be lethal or produce permanent injuries. Usually the man wounded in the vertebral column falls on the firing line and epidural or subdural hematoma may be the cause of the traumatic paralysis. Here removal of the cause may be followed

by good results. The diagnosis of the localization of wounds of the vertebral column is made from the medulla oblongata symptoms, the level of the wound being usually indicated by the place where the projectile penetrated. Wounds of the cervical region are the most fatal. Those who survive the first effects of a transverse lesion above the fourth cervical segment succumb because the degenerative medulla softening spreads to the respiratory centers or paralyzes the phrenic nerve. It is impossible to judge of the severity of the injury to the medulla immediately after the wound. The presence of an asymmetrical paralysis, *i.e.*, of the Brown-Sequard type, indicates immediate operation, as these symptoms are evidence of anatomical conditions which can be improved by surgery. The writer sees a means for recognizing hopeless cases in the presence of medulla particles in the spinal fluid. If the puncture is made according to Quincke's method in the lumbar region and particles are found in the fluid an operation for the cure of the paralysis would be useless. Wholly normal fluid permits hope of favorable results. Primary meningitis caused by the projectile itself plays an unimportant rôle, but careful prophylactic measures should be taken against exudative meningitis. Lighter forms of this may be cured by means of repeated punctures. Operations are always performed under local anesthesia.

Bab, W. Loss of Vision from Methyl Alcohol Poisoning. [Berl. kl. Wochenschrft., Oct. 20, 1919.]

Seeing that cases of methyl alcohol poisoning are increasing, Bab recommends that, in case it does not seem feasible to prohibit its manufacture, it might be made unpleasant to taste by adding small quantities of some harmless substance. This would lessen the danger of its use as a drink. He gives four cases showing the pronounced degenerative processes from the action of the methyl alcohol.

Zethelius. Lumbar Puncture in Wood Alcohol Blindness. [Hygiea, Jan. 31, 1920.]

Zethelius relates the negative results of diaphoresis and potassium iodide in the prevention of blindness during acute methyl alcohol poisoning and says that in three cases treated by himself with lumbar puncture he obtained one good and one fair result. One patient, a syphilitic and alcoholic, drank 50 to 60 c.c. of wood alcohol without apparent ill effect, and for several days continued to drink it. On the fourth day abdominal pain set in, with failure of vision. The Wassermann of the blood and spinal fluid was negative, but the puncture showed that the fluid was under pressure with a positive Nonne. He improved under the puncture and this was repeated several times. In the end his vision was left but little impaired—slight retraction of temporal visual field of the right eye.

Ribon, V. Optic and Auditory Perception Centers. [Rev. de Med. y Cirugía, Bogotá, Oct., 1919.]

The topography and the physiology of the brain areas which allow perception of the impressions transmitted by the nerves of vision and of sound are discussed by Ribon, who describes the close connection between these nerves in this respect and the way in which music often seems to give an impression of actual color. The range of the wood wind instruments represents one color, other instruments, other scenes and colors. In Haydn's "Creation," the flutes and horns in the introduction conjure up the fresh coloring of the morning.

Kerbrat. Ocular Complications and Influenza. [Jour. de méd. et de chir. prat., Oct. 25, 1919.]

In the influenza epidemic of 1918–19 irido-choroiditis was frequently found, but not always associated with a suppurative process of the adjacent tissues, such as sinusitis or adenitis, but appeared to be due to general septicemia. It usually developed as the attack of influenza was subsiding, when the system offered less resistance to pyogenic organisms. Also, Kerbrat's patients had been in a state of mental and physical depression even before the attack. Involvement of the uveal tract was much more serious than simple serous iritis, which sometimes occurred, and was accompanied by little pain or exudation. Severe pain, hypertension, mydriasis, and discoloration of the iris was shown in the uveal inflammation. Opacity of the cornea and hypopyon frequently supervened. The other eye might become involved, but, as a rule, sympathetic ophthalmia was rare. When the process was confined to a single eye, panophthalmia might occur, or, apart from a general inflammation of the eyeball, gradual atrophy of the eye and blindness might result.

Weakley, A. L. Homonymous Hemianopia in Malaria. [Brit. Jour. Ophthal., July, 1919.]

The patient was a lieutenant, aged 28, admitted to hospital with malignant malaria and examined by the author on account of bad sight. The pupils were slightly larger than normal and reacted sluggishly to light. The vision of the right eye was $^6/_{24}$ and the left $^6/_{36}$. The fundi were healthy and the discs of good color. The fields showed right homonymous hemianopia, absolute and complete, for colors and white. The condition began suddenly, three weeks previously, with severe head pain followed by a period of unconsciousness. He now has loss of memory and confusion of thought. There is probably a lesion near the angular and supra-marginal gyri and the posterior part of the internal capsule on the left side; possibly a blockage of a vessel or vessels by malarial parasites.

Meyerhof, M. Influenzal Paralysis of the Abducens Nerve. [Med. Klinik., Sep. 28, 1919.]

In the epidemic of influenza, 1889–90, diplopia due to paralysis of the muscles of the eyes was occasionally observed. By 1904 sixty cases had been published. The nerves affected, in the order of frequency, were the abducens and the oculo-motor. In the recent epidemic the author observed as many as six cases of abducens paralysis; in two, necropsies were made. A careful macroscopic examination was made of brain, the eyes and their muscles, and the nasal cavities. In the first case numerous punctiform hemorrhages were found in the cerebral hemispheres, but the brain centers of the ocular muscles were intact while the orbit and nasal cavities showed no macroscopic sign of disease. In the second case the cerebellum, as well as the cerebrum, showed punctiform hemorrhages. After giving details of all cases, the author concludes that the paralysis of certain muscles of the eyes during or soon after an attack of influenza is due, as in the case of diphtheria, to the action of the toxins of the specific infection on the nerves of these muscles.

Pfingst, A. O. Unilateral Progressive Myopia.[1]

Mrs. A., age 30 years, housekeeper, with a good personal and family history, was first seen by me in December, 1903, when she was 15 years old. She was attending high school at the time and complained of burning in her eyes after reading for a short time, blurring of type and an occasional headache. Shadow test at this time showed 1.0 D. hyperopia in the horizontal meridian, and 0.5 D. h. in the vertical. The interior of both eyes was normal. In the subjective test, made with the patient fully under the influence of a cycloplegic, she accepted with the right eye—0.75 D. cylinder, axis 105 degrees—0.25 D. S., which gave her 20/15 vision. With the left—0.5 D. cylinder, axis 75 degrees—0.5 D. S., vision 20 15. She was given glasses correcting her astigmatism, to be used constantly, with complete relief of the asthenopia. Three years later she consulted me on account of phlyctenular disease. After recovery from this I found upon casual examination that with her old lenses, which were still comfortable, her vision in both eyes was 20/15. She was then 18 years old, was living at home assisting her mother in household duties, and doing but little reading. I did not see her again until April, 1915. She then gave the interesting history of a gradual impairment of vision in the right eye until it had become practically useless. Coincident with the impaired vision the eye had gradually turned outward until there had developed a decided divergent squint. At this time the shadow test revealed between $5\frac{1}{2}$ and 6 D. myopia in this eye. A good-sized

[1] Reported before the Louisville Eye and Ear Society, December 11, 1919.

crescent had formed on the temporal side of the optic disc and the macular region was mottled with numerous areas of atrophy and small pigmentary deposits. There was considerable deviation of the visual line outward, and slight exophthalmus. There was no asymmetry of the cranium. With the left eye covered the best vision obtainable in the right eye was 20/200, this with a —6 D. Lens. The corneal curve was unchanged, measuring less than 1 D. astigmatism with the ophthalmometer. The lens was evidently in its normal position, and the anterior chamber was of equal depth in every meridian. Tension was apparently normal and alike in both eyes. The left eye showed no change in refraction or otherwise from that originally recorded. My last examination of this case was made in September, 1919. The shadow showed an increase of 2.0 D. myopia and with a —8.50 D. she had 20/200 vision. In addition to the degenerative changes in the retina noted in 1915 there were several larger atrophic areas near the macula. Quite a large staphyloma had developed. The left eye was still unchanged. This is a case of acquired anisometropia, the condition of the right eye being one of progressive or malignant myopia due, no doubt, to elongation of the axis of the eye. The possibility of the myopia being due to changes in the conformation of the cornea (keratoconus) or the lens (result of subluxation) could positively be excluded. The cornea had its normal curve, while the equality of depth of the anterior chamber and failure to see the lens edge through a wide pupil would exclude the possibility of a subluxation of the lens. The anisometropia in this case developed after the eighteenth year; perhaps after the twentieth; later than is usual for progressive myopia to develop. These cases usually begin between the twelfth and fifteenth years of life. The development of progressive myopia in one eye while the other remained unchanged in its refraction during a period of sixteen years, is an unusual occurrence. A similar case has never come under my observation nor have I been able to find such recorded in the literature at my disposal. [Author's abstract.]

Léri and Thiers. Reflex Adduction of Eyeball. [Rev. Neur., Nov., 1919.]

Any peripheral stimulus, such as touching the mucosa of the ear with cold water, or tickling the mucosa of the nose, induces at once a pronounced deviation inward of the eyeball on that side. Léri and Thiers had two patients with this and other symptoms showing injury of the labyrinth, but it was negative in twenty-two other neurologic patients. As an aid in detecting an upset in the muscle balance from excessive functioning of the third pair and weakness in its physiologic antagonists, the abducens or sympathetic it is useful.

Perret, C. A. Retrogasserian Section of Trigeminal Nerve. [Schw. Arch. f. Neur. u. Psych., 1919, Vol. 5, No. 1.]

In a severe case of trigeminal neuralgia which Perret operated by severing the nerve back of the gasserian ganglion most satisfactory results were obtained. This operation entails ascending degeneration of the fibers of its sensory root and stops the neuralgia, while no danger of the neuroparalytic keratitis liable after gasserectomy is present as the sympathetic fibers passing to the ophthalmic nerve are left intact. The article is illustrated.

Adson, A. W. Cutting the Sensory Root of the Gasserian Ganglion for the Relief of Trifacial Neuralgia. [Surg. Gyn. and Obst., 1919.]

Although Adson is a staunch upholder of the Frazier operation, instead of performing an avulsion of the fifth root he divides it cleanly with a simple guillotine of his own devising, laying great stress on the importance of not disturbing the ganglion more than is absolutely necessary. In actual practice he only displays the hindmost end and the root. After division the proximal end of the stump is pushed back into the posterior fossa and the dural opening, through which it enters the cavum Meckelii, is plugged with a muscle pad. His own observations lead him to believe that the facial paralysis which sometimes follows the operation comes from intrapontine hemorrhage due to the rough avulsion of the root. Adson, like Frazier, uses a special brain retractor carrying a small electric light, which allows of a well-lit operation field. As he mentions 38 cases operated upon in the past two years, the Mayo Clinic seems to abound in this material.

Chavez, M. Sixto. Trigeminal Neuralgia. [Chrón. Méd., Sep., 1919.]

The many cases of trigeminal neuralgia of undiscoverable origin are mentioned by Chavez, who tells that he cured supra-orbital neuralgia of three months' standing by electricity, but the interval since has not been very long. A. Courcelle's success by subcutaneous injection of air (1905), can scarcely be applied in treatment of the trigeminal form on account of resulting disfigurement. The first to inject alcohol in treatment of facial neuralgia (1902) was Pitres of Bordeaux, but its effect does not last more than nine months. Chavez gives a case in which the trigeminal neuralgia was not modified in the least by the neurolytic injections of alcohol nor by partial resections of the nerve.

Perret, C. A. Nerve Anastomosis for Facial Paralysis. [Schw. Arch. f. Neur. u. Psych., 1919, Vol. 5, No. 1.]

The good results in a case of total facial paralysis by end-to-end anastomosis of the hypoglossal and facial nerves are shown by Perret

in an illustrated article. Seven years later no asymmetry could be detected and hardly a trace of lagophthalmos remained. One half of the tongue early showed a tendency to atrophy, but later it grew less apparent, and the speech was unimpaired. There is a slight fibrillary tremor in certain regions in the cheek, but this can be controlled when she is not tired.

de Castro, A. Facial Diplegia. [Rev. Neur., Nov., 1919.]

This author has many cases yearly at his clinic in Rio. It is rapidly progressive, and may take days or months to subside. Sometimes it disappears completely on one side while persisting on the other. The facial paralysis usually is bilateral and persists longest when polyneuritis is present. Three cases are illustrated. Contracture is rare and seldom affects both sides.

3. SPINAL CORD.

Flesch, Julius. The Achilles Reflex. [Neurol. Centralbl., April 1, 1918, No. 7, Vol. 37.]

Disturbances of the reflexes are the most important indications of anatomical lesions in the central nervous system. If the reflex arc is interrupted there is absence of reflex, and the author thinks the Achilles is a more constant sign in this connection than the patellar. In luetic diseases and toxic diseases of the central system both reflexes usually disappear simultaneously and both then have the same diagnostic dignity, yet, from the point of view of localization in the segment, they have independent and distinct values. The reflex arc of the Achilles tendon goes through L. 4 to S. 2, while that of the patellar reflexes go through L. 2 to L. 4. Summing up the results of a series of observations covering a period of fifteen years the author describes several types of reaction of the Achilles reflex which he thinks are of diagnostic value: Peripheral paresis, the amplitude of the reflex is concentrically reduced. Nuclear paresis and hypotony, fatigability and displacement toward the tensor side (excentrically narrowed in amplitude). Functional hypertony, quantitative hyperexcitability and concentrically increased amplitude. Spasms, hypertony, clonus—quantitative hyperexcitability and displacement excentrically toward the flexor side (side of relaxation). Thus in all hypotonic conditions the reflex is displaced toward the tensor side and reduced or concentrically reduced in amplitude (central, spinal diseases). This phenomenon is due to the fact that the hypotony gives rise to difficulties in co-vibration in the position of tension. In hypertonic conditions, on the contrary, the reflex width is displaced toward the flexor side for the same reason, and is increased absolutely in amplitude. In neurotics the Achilles reflex is greatly increased in amplitude in both directions. If, in addition to the neurosis there is a unilateral, organic central or peripheral

atonic affection, a comparison of the results of the two sides will give the clue to the condition. On the organically unaffected side there will be a reflex zone of greatly increased amplitude, and on the other side a great reduction of the amplitude of the reflex zone together with apparently rather lively reflexes. The author was able to establish by measurements that the patellar reflex of one side in individuals suffering from ischias neuritis was exaggerated in the typical manner, while, on the contrary, on the unaffected side the Achilles reflex was found to be stronger and the patellar relatively weak. In myoclonia and functional tremor the Achilles reflex in the position of tension varied greatly at different times; seeming at one moment to be wholly absent and soon afterwards greatly exaggerated. This is due to the intermittent conditions of the innervation of the muscle in question. If the exciting shock is synchronous with the stage of contraction (clonic spasm) the reflex is absent, but the very next shock, when the muscle is relaxed may elicit the reflex. This phenomenon is to be distinguished from true fatigue. Where there are muscle spasms, organic conditions of hypertony, *i.e.*, pyramidal disease, the stimulus never fails to elicit a response; the more frequently and the more rapidly the stimuli succeed each other the stronger and more abundant are the reactions.

Veraguth, O. Concerning the Dorsal Reflexes in Man. [Neurol. Centralbl., April 1, 1918, No. 7, Vol. 37.]

The author had to examine a schizophrenic who had shot himself with a revolver. The Roentgen photograph showed the bullet lodged in the right hemisphere, but no symptoms of injury to the brain were discoverable except a very great difference in the reaction of the right and of the left side when the skin of the back was stroked. On the side of the lesion a touch at any point of the back was sufficient to cause the body to bend in a concave form on the right. This peculiarity attracted the attention of the author to the dorsal reflexes and the results of his observations on material of various sorts is presented, as he thinks they may be of theoretical and semiological interest. He first gives the experiences of other writers, Bechterew, v. Monokow, Galant, etc. According to his own experiments the reflex region of the back comprises the entire surface from the beginning of the cervical region to the coccyx. This area he divides into a scapular, a costal, and a lumbar, transverse zone and then subdivides these, in turn, by lengthwise parellel lines into a paravertebral and an outer zone (corresponding to about the anterior axillary line) and a middle zone between the two. There is thus a special zone over the spinous processes. The periosteum reflex depends principally on the spinous processes of the last lumbar vertebræ, the parts of the sacrum which are only covered by the skin, and the thala of the ilium, constituting a "perisacral zone." The sensory receptors, the stimulation of which produces the dorsal

reflexes, are not situated only in the skin, but also, in certain zones and for certain stimuli, in the deep tissues under the skin, and, in the perisacral region, in the periostium. The muscular response to stimuli by the dorsal reflexes varies greatly according to the age of the subject and the condition of the central nervous system. The author divides the different reflex phenomena into groups beginning with that in which the most extensive reflex abnormalities are manifested, *i.e.*, Little's disease, infantile hemiplegia, and encephalitis. In the next groups he places cases of tabes in which, at the onset, the well-known symptom of hyperesthesia to cold is manifested. In this disturbance it is principally the axillary region in the costal zone which responds most extensively to the stimulus of cold. The third group is formed by newborn infants in which very strong dorsal reaction is shown. When the skin of the spinal column is stroked on the right and left side successively, in the three zones of the lumbar region, distinct serpent-like movements of the trunk are produced. In the newborn, too, there is distinct evidence of a medio-dorsal zone, for, if the infant is stroked exactly on the middle line of the back, the stimulus radiates to both sides in the erector trunci and produces a lordotic movement of the lumbar part. The fourth group, in which the phenomena are quite variable, is composed of adults with unilateral lesions of the brain. The reflex anomalies in these cases, especially when the frontal half of the brain is affected, are usually more strongly manifested on the injured side than on the other. All these reactions contrast with those of the normal adult organism. In some "ticklish" individuals there is a reaction similar to that observed in newborn infants with the difference that, in the former, there is not the same motion of the head as in the latter. The majority of adults, however, show a great reduction of the dorsal reflexes and there seems to be only one condition under which the reflexes awaken and that is when the subject is surprised by a stimulus and then the response is manifested by a contraction of the erector trunci. After this careful study of the phenomena, some theoretical remarks are made on the results. First, the nature of these reflex processes is interesting from the point of view of the muscular activity; they give the impression of being an effort to reduce the surface menaced by the stimulus. They are thus analogous to the retraction reflexes which v. Monakow, Pierre Marie and Lhermitte have described. Where, however, a rhythmic dorsal movement and a reaction of the extremities is elicited in response to the stimulus, the process can no longer be regarded as a retraction process, for in the medulla the complicated machinery of atomatism which has been recently described by Boehme is set up. Regarded from the point of view of adaptation to purpose the dorsal reflexes present an especially interesting problem. In the newborn infant the reflex reactions of the back seem at first to be movements of defense, but a closer study has induced the author to

favor another view, as follows: the normal position of the newborn infant is on the back. Now, if the skin of the back is so extremely sensitive to stimuli, it may be assumed that the irritations of the bedding which act as constantly varying stimuli, give rise to the constant kicking movements of the child. This, in turn, in the form of constant exercise is a stimulus bringing about the development of the central medullary paths, and causing the final evolution of the proprioceptive sensibilities for producing the movement of the extremities.. Attention is called to the fact that the head of the infant is moved to the side by stimulus applied to the back. Magnus and Klejn have described the close connection existing, in animals, between the complex mechanism of locomotion and the movement of the head. It is very probable that every forceful bending of the infant's neck in response to dorsal stimulus is the necessary excitant for the development of the movements of the legs. The author, therefore, would call the dorsal reflex a "learning reflex." As soon as the child is able to walk erect the continued excitability of the dorsal reflexes would be purposeless and they might then assume the character of defense reflexes. If they are thus regarded it is interesting to note that in adults the cutaneous sensibility is no longer sufficient to produce the reflexes, but stimulus to deep sensibility by exogenous influences and the element of surprise are usually necessary to elicit them. The interpretation of these conditions seems to be that the defense mechanism is set in play only under urgent necessity and when the cerebrum has not time to bring about the needed protection by a movement better adapted for the purpose, as for example, by a simple bending of the spinal column. It is a very significant fact, indicative of the manner in which the evolution of the mechanism of locomotion takes place, that extremely complicated series of movements with rhythmic course can be produced by stimulating the regions of deep sensibility in a narrowly circumscribed dorsal area, as soon as the inhibitory influences in the frontal part of the central nervous system are cut off. The author adds some facts from his observation of the training of horses for riding which seems to throw light on the phylogenetic development of the dorsal reflexes.

Richter, August. The Faradic Great Toe Reflex. [Neurol. Centralbl., April 1, 1918, No. 7, Vol. 37.]

In testing for sensibility to pain for faradic stimulus the author accidentally made the following discovery: If, in a healthy person, the skin of the back of the foot at the interdigital fold between the great and the second toe is stimulated by a weak or medium faradic current, the electrodes being of knob or button shape and the large plate being placed on the sternum or sacral region, there is usually a plantar flexion of the toe, and, more rarely, no movement. In pathological processes, on the other hand, where spastic reflexes as consequence of lesions of the pyra-

midal tracts were present, there was usually slow dorsal flexion of the great toe resembling the Babinski or Oppenheim sign. If this phenomena were confirmed by experiment with more extensive material, the author thinks it might be a diagnostic aid comparable in value to Oppenheim's sign.

Koelichen, J., and Szerszynski, B. Lesion of the Cervical Spinal Cord with Peculiar Sensory Dissociation. [Neurologisches Centralblatt, February 15, 1918, No. 4, Vol. 37.]

Lesions of the spinal cord caused by wounds from sharp instruments usually lead to paralysis of the Brown-Sequard type, because they usually injure one half of the cross-section of the spinal cord. Recently the author had opportunity to observe a case of a puncture of the neck which injured the spinal cord, interesting from the fact that the resulting clinical picture differed widely from the Brown-Sequard type. In the author's case the thermal sensibility and sensibility to pain were preserved, while that to touch and deep sensibility were destroyed, the contrary effect being generally observed. This unusual form of dissociation of sensibility is doubtless due to the localization of the lesion. It is to be assumed that both the posterior columns, through which the conductors for touch and deep sensibility pass, have been injured, while the anterior portions of the lateral columns, through which are conducted the sensation of pain and thermal sensations have remained intact. A slight spastic paralysis indicated injury of the lateral pyramidal tracts. Besides these there were other later disturbances of sensibility which can not be accounted for by these localizations and boundaries of the traumatic lesion, namely, a symmetrical disturbance of sensibility to touch in both hands with destruction of deep sensibility in finger and hand joint, also weakening thereof in elbow joint, with ataxia of the hand. These symptoms were probably caused by circumscribed symmetrical foci remaining as final results of the injury in the posterior columns, so localized as to correspond to the conductors of the areas affected. Another feature of interest is that there were hyperalgesias distributed in trunk and members to correspond to the disturbances of sensibility to touch. The causes of hyperalgesia in diseases of the spinal column are still obscure. Various theories have been advanced, some of which, as Schiff's, maintain that when certain nerve conductors are disturbed the excitability of others is heightened, or (Kocher) that the hyperalgesia is due to the fact that when a stimulus cannot reach a brain center because of injury of the posterior columns, it forces a way through the gray substance where it suffers summation and intensification; or (Fabritius) that hyperalgesia accompanying spinal column lesions only occurs when the lateral pyramidal tracts and, concomitantly, the nerve fibers in the lateral columns leading from these tracts backward and inward, suffer severe lesion. The lesions of these nerve fibers are supposed to give rise to the hyperalgesia as result of stimulation of the

section of the spinal column which lies below the level of the lesion. The author's observations, however, convinced him that in his case a certain causal relation or at least a parallelism existed between the cessation or weakening of the sensibility to touch and the hyperalgesia. He inclined to the belief that the cause of the hyperalgesia was not a lesion of any particular sensory conductor, but rather was caused by a change in the conscious sensibility to stimulation. For where there is destruction or diminution of sensibility to touch with preserved sensibility to pain, the pain reaches consciousness in an altered form, *i.e.*, without the sensation of touch which otherwise always coexists with it. It is possible that the cause of the hyperalgesia lies, therefore, in this subjective disturbance. Confirmation of this hypothesis is found in an allied phenomenon, that of retarded sensibility to pain in spinal column lesions; when pricked the patient first feels the touch, only later the feeling of pain arrives in consciousness and then in a greatly intensified form.

Barré, J. A. New Leg Test for Pyramidal Tract Impairment. [Presse Méd., Dec. 24, 1919.]

With the patient under examination lying prone on a bed or table, Barré lifts the legs to a right angle with the thighs, and requests the patient to keep his legs motionless in this attitude. The normal subject maintains the legs in the vertical position for a prolonged period without distinct effort. In paralysis or paresis of the pyramidal tract, on the other hand, the leg on the affected side sags in extension more or less quickly. It may immediately drop, or if there is merely paresis, remain vertical for a short time, then descend in an even or jerky manner. The patient may make several incomplete attempts to bring the leg back to the vertical before it finally drops to the bed or table. Where there is slight paresis, the leg may remain for some time at an angle of 120° or 140° with the thigh. In such cases a further test is to order the patient to flex both legs on the thighs as completely and for as long a time as possible. On the affected side flexion will be found less complete and steady than on the normal side, and if the affected leg is brought back to the vertical it will usually be seen to fall in extension in spite of contractions of the posterior thigh muscles. As another supplementary test the patient must resist extension of the legs after he has brought them as near as possible to the thighs. On the sound side, the examiner will note prompt resistance as he attempts to force the limb down in extension, while on the affected side it will appear only after the angle has been to some extent opened. As a direct indication of paralysis of voluntary motility the procedure is useful, and experience has shown it to be more reliable than the tests hitherto in use. It may facilitate differentiation between true and hysterical paralysis, and may distinguish certain spinal lesions from disease of the cauda equina or peripheral nerves. Among the organic, spastic paraplegias or hemiplegias it differentiates cases with actual paralysis from others in which

the term paralysis is hardly appropriate. When the sign is negative in paraplegia, complete return of voluntary motility is shown to have occurred.

Williams, T. A. Case Showing Unusual Sensory Dissociation, due to Organic Disease. [Presented to the Philadelphia Neurological Soc., March Session, 1920.]

A college student, aged 20, had returned at Christmas, 1918, feeling exhausted. In May, 1919, the sight of the left eye became dimmed. In June, fainting attacks supervened, with rigidity and spasms, following numbness and dull sensations in the feet, and followed by an unsteady gait. A few months later another attack occurred, since which she had been unable to walk. When seen in February, 1920, she presented a typical picture of disseminated sclerosis, namely exaggeration of the deep reflexes, plantar reflexes extensor, abdominal reflexes absent, severe dysergia shown by violent intentional tremor, nystagmus on looking laterally along with slow conjugate deviation, pallor of the left optic disc, especially temporarily; poorly maintained contraction of the pupils to light, especially the left, and slow slightly slurring speech. She was mentally very clear and there were no emotional disturbances.

The lower limbs were insensible to deep pain and to vibration, and a pin prick was scarcely felt as such below the upper third of the thigh. Localization, however, could be made and the temperature sense was retained, not only to heat and cold, but to warmth and coolness. The spinal fluid gave a negative reaction to the colloidal gold and to the Wasserman tests, but there was a slight increase of protein and seven lymphocytes in each cubic millimeter of fluid.

Dissociation between the temperature sense and that of pain is very unusual except over minute areas in syringomyelia. Head has figured some cases of this kind in a well known study. This case is worthy of record, especially as the condition persisted three weeks later. In case of objection, I may add that the most careful precautions were taken against suggestion. [Author's abstract.]

Goldflam, S. Benign Form of Brown-Séquard Syndrome. [Rev. Neur., Sept., 1919.]

In all Goldflam's five cases of the Brown-Séquard syndrome, the men were strong, aged between 29 and 50, and no indications of syphilis, tuberculosis, alcoholism or blood disease. All were Jews. Remissions are usual, and the spinal hemiparesis was never accompanied with symptoms from cranial nerves. Goldflam has had many cases but the five described are all that have been under observation for some four to seventeen years. Diagnosis is based on insidious onset, slow evolution, preponderance of the paresthesias in one leg, mildness of pains, the often stationary course, and the long remissions. The prognosis is favorable.

Somerville, W. G. Subacute Combined Spinal Cord Degeneration. [South. Med. Jl., Feb., 1920.]

Somerville's patient was a woman, aged 55, whose trouble began insidiously fifteen months previously, with numbness and tingling in the feet and legs, and gradually extended up above the umbilicus. Numbness and tingling of the hands and wrists had recently developed weakness of the lower extremities with rather marked ataxia; some difficulty in voiding urine, but no retention nor incontinence. The lower extremities felt as if they were tightly bandaged. There had been intestinal attacks with some rise of temperature at intervals of every few weeks. Her color was pale and sallow; heart and lungs were negative. Hemoglobin was 63 per cent.; red blood corpuscles numbered 2,300,000, with slight variation in size, but no nucleated cells. Every stool examined showed the *Cercomonas intestinalis*. The great importance of examining the intestinal discharges is urged as the symptoms may be produced by an intestinal parasite.

Demole, V. Congenital Malformation of Spinal Cord. [Schw. Arch. f. Neur. u. Psych., 1919, Vol. 5, No. 1.]

In a woman of 30 not in any way nervous Demole found at postmortem forward subluxation of the skull on the spine, and the spinal cord crushed out of shape. This he attributed to flexion of the neck at the third fetal month, for reasons which he describes. He remarks on the way in which the fetal spinal cord adapts itself to such injuries. The atlas had grown to the axis beneath.

Cyriax, E. C. Minor Displacements of Vertebræ. [Jour. de Chirurgie, Dec., 1919.]

It is hardly realized how many unsuspected cases of incomplete dislocation of the cervical vertebræ exist. Moreover, they can exist without symptoms. Cyriax has treated hundreds, finding the pathology and the necessity for reduction and the technic practically the same in all. Pain, stiffness, and inability to move the head may all disappear as compensation becomes established. Palpation in the dorsal position is most instructive. One transverse process in front, the other at the back, signifies rotation on the axis; one in front, with the other in normal position, signifies rotation with unilateral forward displacement. The other displacements likely to be encountered are given with radiograms of each, and four typical case histories. Little or no pain need be given in reducing. In one of his cases there were no functional symptoms except change in the voice, rebellious to all treatment.

Söderbergh, G. Muscular and Reflex Segmentation of Abdominal Wall. [Acta Med. Scand., Jan. 23, 1920.]

The author analyzes eleven clinical cases of spinal paresis or meningitis. He urges the importance of remembering that the motor and

reflex symptoms are more objective than the sensory symptoms, and that the extramedullary tumors are almost all located in the dorsal region of the cord. The extent of the area of rigidity is instructive. He speaks of his late researches on the innervation of the abdominal reflexes according to the segment of the spinal cord and involved roots.

Vaglio, R. Spina Bifida Statistics. [La Pediatria, Jan., 1920.]

An examination by Vaglio of 10,000 infants showed 23 cases of spina bifida, or 1 in 434; 13 were females, 10 males. Most were brought to the hospital a few days after birth, less frequently in the first few months, and only 2 cases were not seen until they were 1 and 2 years old respectively. There was one case of double spina bifida. The tumor in 12 was in the lumbo-sacral region, in 3 in the sacral, in 3 in the lumbar, in 2 in the dorso-lumbar, and in 2 others in the lower dorsal and cervical regions respectively. The size varied from that of a large walnut to a large orange. In only one was the tumor considerably larger, being about the size of a fetal head. The skin was almost intact in 8 cases, intensely reddened and vascular in 5, and ulcerated in 7; in 3 there was an escape of cerebro-spinal fluid. In only one was there a tuft of hair over the tumor. Family history showed syphilis in only 3 cases, in another 6 cases its presence was shown either by the hereditary history and clinical evidence or the Wassermann reaction. In only one was the existence of other cases of spina bifida in the ascendants or collaterals noted. In one case the mother was tuberculous. Regarding concomitant affections, 7 had hydrocephalus, 6 clubfoot, 4 paralysis of the lower limbs associated in 2 with clubfoot, 1 had Little's disease, 1 cleft palate, 1 had a multiple malformation of the anus and genitals, and 1 had multiple small angeiomata of the scalp.

Kimpton, A. R. Tænia Solium in Spinal Cord. [Surg. Gyn. Obst., Feb., 1920.]

There is no record of a pork tapeworm being removed successfully from the spinal cord during life, and Kimpton thinks his is the first case. Mercur found a similar tumor of the spinal cord, but at necropsy. In Kingston's case a diagnosis of spinal cord tumor at the fourth or fifth dorsal segment had been made and operation was advised. A laminectomy was done on the fourth, fifth and sixth dorsal vertebræ and the cord exposed. In the tension of the cord a clear difference was noted. The tension appeared to be greater, and the cord was paler in this region. A translucent tumor was found when the cord membranes were incised. The tumor was easily shelled from the cord. It appeared as a gelatinous mass. The pathologic diagnosis was cysticercus racemosus.

Pende, N. Rhizomyelia. [Policlinico, Dec., 1919, Med. Sect. 12.]

In a woman of 48 who had had several attacks of acute articular rheumatism in eighteen years Pende found nothing to indicate any spe-

cial endocrine disturbance. The associated osteomalacia clears up the etiology of the rhizomelic spondylosis, suggesting a common origin in a trophoneurosis of bones and joints. It is localized in this case in the inferior cervical and the lumbosacral metameres and the adjoining joints and corresponding joints in the limbs. There is a good analysis and comparison of the modern views on spondylosis.

Van Haelst. Resection of Motor Nerves in Spastic Hemiplegia. [Le Scalpel, March 6, 1920.]

A girl, aged 9, with spastic hemiplagia of the right lower limb, showed extreme adduction and pronounced talipes equino-varus. A study of the case showed the condition due chiefly to spastic contraction of the adductors, gastrocnemius, soleus, and tibiales (anticus and posticus). An operation was done, at which the obturator nerve was exposed and 2–3 cm. of each of its branches resected. Through an incision over the lower part of the popliteal space two thirds of those branches of the internal popliteal nerve supplying the inner head of the gastrocnemius and half those branches supplying the outer head were resected. A nerve trunk was then differentiated which supplied the tibialis posticus and part of the flexor proprius hallucis. Isolating the fibers supplying the latter muscle, the remaining two thirds of the nerve trunk were resected. All tendency to talipes disappeared. The child began to walk eight days after operation, and was soon able both to walk and run in a manner almost normal.

Sargent, P. Surgical Aspects of Spinal Tumors. [Brit. Med. Jour., Jan. 10, 1920.]

Twenty-seven cases of neoplasm of the cord operated upon during the last ten years are given by P. Sargent. Fifteen were of encapsulated intrathecal extramedullary tumors and of these all but one were of a benign type. In this group, eleven are described as showing satisfactory results, one case with a long previous history remained *in statu quo*, and three patients died. Twelve with tumors in other positions, all of a malignant type, gave less satisfactory results. Three patients died shortly after operation: seven showed improvement and two lived for over six years; three were unimproved. The operative procedure was practically that employed by Horsley save for the anesthesia, which in most cases was ether given intratracheally. Postoperative dangers are unexplained death, leakage of spinal fluid with general symptoms and danger of infection, acute dilatation of the stomach, and paralytic ileus. There was relief of pain in practically every case, improvement of motor control and sensation in more recent cases, improvement of sphincter control in the most satisfactory cases, and in a few, practical cure with return to a condition such that ordinary duties could be resumed.

Reitlich and Roeper. A Gunshot Wound of the Lower Cervical Cord. Unilateral Mydriasis, Produced at Will. [Neurologisches Centralblatt, February 1, 1918, No. 3, Vol. 37.]

After a lesion of the lower cervical cord produced by a severe gunshot wound the author's patient for months was able to dilate the pupil of the left eye to the maximum extent by moving the left arm in which there was spastic paralysis. There was also slight paralysis of the sympathetic nerves on the left. The case is one of the few in which severe injuries of the spinal cord have been favorably influenced by operation. How was the pupillary phenomenon produced? The first explanation is that the dilatation was due to a sensory or psychic reflex. It is known that in psychic mydriasis there is pupillary rigidity, but only when the effect is at the highest point and then lasting only a few seconds. Besides the psychic sensory influences on the pupil are always bilateral, which was not the case here. The mydriasis with paralysis of the sympathetic nerves next suggested Langendorf's paradoxical pupillary reaction. He brought about dilatation of the pupils that lasted as long as six months by extirpation of the ganglion cervicale supremum on one side in cats and rabbits, but these reactions were only observed where the connection of the ganglion supremum with the terminal ramifications of the sympathetic nerves were broken. In the case under consideration in this article there was no injury of the superior cervical ganglion and, according to the direction of the path of the gunshot which ran obliquely backward and upward from the posterior border of the left sternocleido up to the level of the fourth cervical arch, an injury of the funiculus marginalis is also highly improbable. Langendorf's reaction was supposed to have been due to a reduction of tonicity in the nerves controlling the reflex, while, in the author's case, it appears that the phenomenon could only have been produced through a stimulation of the sympathetic nerve from the fact that hyperidrosis was artificially caused on the side where there was paralysis of the sympathetic nerves as well as widening of the palpebral fissure, through stimulation by motion. In the opinion of the author this stimulation could only have proceeded from the spinal column. The stimulus runs along the sensory nerves of the arm to the posterior horn. Here, through the forced and painful movements, an irritation is set up in a definitely circumscribed area of hypersensibility which is communicated to the sympathetic nerve fibers, thence through the rami communicantes to the funiculus marginalis and further centrally to the brain. Whether the stimulus reaches the thalamus opticus and from this point causes an arrest in the region of the nucleus of the oculo motorius of the same side producing a reduction of the tonicity is a theoretical problem which need not be entered upon; had such been the case the effect would probably have been revealed bilaterally. In view of the fact that hitherto the ciliospinal center has been localized only hypothetically this case is interesting, giving rise to the question whether such a center at a cer-

tain place may not be inferred from the clinical symptoms described. According to experimental researches with animals, the pupillary dilators leave the spinal cord through the rami communicantes of the seventh and eighth cervical and the first to the third thoracic nerves. According to the view of Bach it is the two superior thoracic nerves and perhaps the lower cervical which, in man, control the dilators of the pupil. In the author's case the motor and sensory disturbances point to pathological changes situated between the third cervical and the second thoracic segment. At the level of the third and fourth cervical segments there was a hyperalgesic zone. From the sixth cervical to the second thoracic segment there were changes which found external expression in hyperesthesia and motor disturbances, and, when passive movements were produced, in intense pain in the palmar surface. If the attempt is made to determine the place where the paralyzed sympathetic nerves are irritated we must expect to find a hypo-functioning together with a hyper-sensibility. The passive movements in the hand or elbow joints do not give rise solely to the symptoms of a stimulation of the sympathetic nerves, but also cause hyperalgesia in the hand, which, according to the schema of the segments, points to the seventh cervical and first thoracic segment, that is to say to the place hypothetically attributed to the ciliospinal center.

Gierlich. Gunshot Wound of Right Cervical Sympatheticus with Injury of the Pons of Same Side and Cervical Medulla. [Neurol. Centralbl., October 1, 1918, No. 19, Vol. 37.]

Accounts of injuries of the brain trunk by a wound in the neck without injury of the vertebral column and base of the skull have, so far as the author knows, never been published. Wounds of the cervical sympatheticus as Gross recently remarked, are also very rare. The patient was wounded through the neck by a shot from an infantry gun. The bullet penetrated at the right submaxillary angle, to the inner border of the sterno-cleido-mastoid muscle and passed out 3 cm. to the side of the second thoracic spinous process. The resulting phenomena fall into three symptom groups: First, Horner's complex of eye disturbances and absence of perspiration on the right side of the breast and face; secondly, a spastic paralysis on the left side, as well as a bilateral destruction of sensibility; and, finally, a flaccid atrophic paralysis of the muscles of the left hand. The absence of perspiration on the right side of the face, the presence of Horner's complex of the eye muscles, are signs of a destruction of function of the cervical sympatheticus. Gross mentions nine cases of wounds in this region from former wars and Karplus has described such cases. The symptoms in the author's case, as far as the disturbances of the sweat secretions and the eyes are concerned, resemble, generally, the descriptions of these writers. In the author's case, immediately after the injury, there was a feeling of heat on the side of the gun shot, but no flushing, and

the skin was pale and hard. Karplus and Jendrassek each observed hyperidrosis on the same side of the face as the wound, and explained it on the ground that the wound was situated far down on the sympatheticus or that the nerve was only partially severed. Of special interest were the unilateral disturbances of mobility and sensibility after a gunshot wound through the neck—symptoms which, so far as the author knows, have never been described. The motor disturbances seemed to be of monoplegic form, *i.e.*, a spastic paralysis of the upper extremities following Wernicke's predilection type, the contraction of the flexor muscle in the elbow and the pronators of the forearm being especially characteristic. The shoulder, the hypoglossus, and buccal and cheek regions were affected, but as usually in hemiplegic paralysis, the facialis of the eye and forehead were free. There was, therefore, a monoplegia facio-brachialis. The deep reflexes of the upper extremities were exaggerated. The skin reflexes of the left side were, on the contrary, diminished, and the abdomen reflexes were absent—all indicating the localization of the focus in the central motor neuron of the right side and above the crossing of the facialis. The localization is rendered still more precise from the disturbances of sensibility. It may be assumed, following Edinger, that deep and superficial sensibility take separate paths in the medulla oblongata. The fibers for deep sensibility run upwards in the posterior column, while the fibers for superficial sensibility run toward the brain in the tractus spinothalamicus of the other side, arrive at the outer side of the olivary body and run along the first mentioned fibers laterally. Then the whole mediai lemniscus traverses the brain stem as a compact bundle to the thalamus. At this height a relatively small focus affects the entire sensibility of the body of the opposite side. In the author's case the fiber areas of superficial sensibility is entirely destroyed. The median bundle of fibers which conduct deep sensibility seems to be partially preserved as only the distal parts of the body show complete destruction. The focus must be sought at the level of the united medial lemniscus, and, indeed, before it enters the thalamus and after the reception of the sensory trigeminal fibers. The focus was, therefore, situated either in the upper pons or in the cerebral peduncle. As the oculomotorius fibers which all traverse this peduncle were not affected, the focus could not be situated here, but rather in the proximal plane of the pons on the right side embracing the lateral part of pyramidal fibers connected with the pons and the medial lemniscus. The atrophied flaccid paralysis of the left hand, as there was no injury to the nerve plexus and nerves themselves, must have been due to an injury to the cell layer of the anterior cornu of the left side, probably C. 8 or D. 1. According to the Roentgen picture, the cervical vertical column as well as the base of the brain were uninjured. The disturbances must, therefore, have been due to an indirect injury of the medulla oblongata in the form of a concussion. The medulla oblongata is hung loosely in its jointed canal so that a blow

spends its force over an extensive area. In the author's case, the injury to the medulla was on the opposite side to the gunshot path, in the pons on the same side. At the present state of our knowledge it is impossible to say how the injury in the pons was produced, whether by a bruising against the bony substance or because the pons is a point minoris resistentiæ. The focus was probably not in the form of a bleeding but of multiple small necrotic foci as the symptoms manifested no tendency to recede.

4. MIDBRAIN CEREBELLUM.

Netter, Bloch, and Dekeuwer. Sugar Content of Cerebrospinal Fluid in Lethargic Encephalitis. [C. R. Soc. Biol., March 20, 1920.]

These authors, in 15 cases examined, found that the quantity of sugar present almost always distinctly higher than normal. One case showed no increase, but there were signs of medullary localization, and in another the fluid was withdrawn when the patient was moribund; in the remaining thirteen the increase of sugar was on the average 0.78 gram per liter. Such findings signify a special affinity of the virus for the mesencephalon and are produced by irritation of the glycogenic center. There is no hyperglycemia in these cases, much less glycosuria. The finding has no absolute diagnostic value, for equally elevated readings may be obtained in other diseases (notably pneumonia with meningeal symptoms) and even in tuberculous meningitis. It is useful in diagnosis of doubtful cases, and decided the diagnosis in four of the authors' cases.

Voss, G. Polioencephalitis Hemorrhagica Superior in a Woman of Thirty-nine. [Neurol. Centralbl., August 16, 1918, No. 16, Vol. 37.]

The author's case is remarkable because of its origin and course. It is clear that the disease picture belongs to encephalitis hemorrhagica superior. The encephalitis made its appearance in a woman of good social standing who previously and always enjoyed good health, but who, without the knowledge of her husband, had for many years used alcohol to an extreme degree. The disease picture of polioencephalitis hemorrhagica was first given by Wernicke and afterwards by numerous others. Vogt regarded the characteristic of the disease to be "a combination of ophthalmic disturbance with the typical phenomena of delirium tremens." P. Schroeder denies the independence of this disease and recognizes it as only a peculiar form of severe alcoholic delirium. Its clinical stamp is due to a certain predilection of the intoxication process for a particular localization, namely for the aqueductus sylvii. Schroeder saw now and then in the initial stages of the Korsakow psychosis, besides the rather frequent disturbances of the eyes, "slight or moderately severe spastic phenomena." He rightly finds their anatomical foundation in

the degeneration of the funiculus pyramidalis, or in a diffuse degeneration of the white substance, as described in pernicious anemia, alcoholism, and other chronic diseases. The author's case does not conform with Vogt's view of the regular presence of psychic disturbances resembling those of delirium but belongs rather to the Korsokow psychosis. In the somatic sphere the concurrence of the entire absence of the tendon reflexes with the spastic phenomena (Babinski's, Gordon's reflexes) is remarkable. The changes in, or above, the medulla oblongata which produced the spastic reflexes were, nevertheless, not of a nature to cause a heightening of the tonus: there was, on the contrary, a complete atony. The disappearance of the tendon reflexes may be referred to disease of the posterior columns. The paralysis of the legs developed in a typically neurotic manner. It began at the periphery and ascended steadily and slowly to the pelvic girdle. The ataxia which was found at the first examination of the patient probably did not depend on the neuritis but rather on changes in the mesocephalon or cerebellum. Schroeder calls attention to the symptom of polyuria conditioned by bulbar disturbances in this disease. In the author's case there was oliguria and the author does not go into the question as to whether it was centrally conditioned or not. Variation in pulse frequency and occasional acceleration of respiration pointed to an involvement of other vitally important centers in the medulla oblongata. The only pathologico-anatomical cause which suggests itself for these disturbances is a bleeding or softening, and this view is further strengthened by the extreme variations in the behavior of the eye muscles. While the activity of some of the muscles was restored, others remained permanently paralyzed. The author emphasizes the fact that the reaction of the pupils to light was above normal during the whole time, while accommodation was nearly absent for nearly two weeks, returning shortly before the death of the patient, however, so that she was able to read. The whole course of the disease was in conformity with other observations and descriptions. Death occurred in about five weeks, from paralysis of the heart.

Denéchau, D. Lethargic Encephalitis. [Bull. Med., Jan. 24, 1920.]

In Denéchau's own four cases one died, and the mortality was 37 per cent. in the twenty-nine cases reported at the Société médicale des hôpitaux. Only nine survived of the eighteen cases followed to date, and four were left with contractures or uncertain gait, ptosis or persisting somnolency. At the end of the third or fourth month only five seemed to have recovered completely. One of his own cases still has paralysis of the two internal rectus muscles, tremor, cerebellar disturbances in gait, etc. The others, seen last at the fifth month, still displayed numerous sequelæ. Dieting and good nursing are chiefly essential. Good results from hexamethylenamin by vein and mouth, with

repeated lumbar puncture aiming to draw the drug into the subarachnoid spaces have been reported by Netter and Lhermitte.

Riggs, C. E. Epidemic Lethargic Encephalitis. [Minnesota Medicine, Feb., 1920.]

In 1917, Von Economo, of Vienna, reported thirteen cases in which the patient manifested somnolence not unlike that observed in sleeping sickness. Frequently after a variable period—from two weeks to even months—death occurred. To this disease he gave the name lethargic encephalitis. He believed the symptoms to be due to a living virus similar to but not identical with poliomyelitis. According to Bassoe, there is a triad of symptoms: somnolence, irregular temperature and cranial nerve involvement common to a dozen different brain affections which may so closely simulate epidemic encephalitis as to make the differential diagnosis a matter of great difficulty.

The occurrence of this disease has usually been associated with a pan-epidemic of influenza. The encephalitis is commonly sequential to the influenzal attack, although it may occur at the same time; no other infectious agent is so inimical to the nervous system as influenza. The neurological manifestations were similar to those present in the first great epidemic of twenty years ago. While no positive proof of the nature of the virus has been found, the researches of Loewe and Strauss are very promising. It is an infectious encephalitis, a distinct disease and one which has until recently escaped recognition. The habitat of the infectious agent is the nasopharynx. Thence it passes by the lymph channels to the vessels of the base of the brain.

The symptomatology is clearly exemplified in this case: Mrs. A—— had an attack of influenza last July from which she never completely recovered. She was depressed, nervous and slept badly; for several weeks she heard bells ringing in her head; her hands were numb and she suffered from headache. There was also double vision and a slight temperature. The neurological examination was negative. Her face was mask-like and she was lethargic; there was rigidity of the neck muscles and of the extremities; there was no tremor or choreiform movements; sensation normal. The spinal fluid findings were negative. There was cyanosis and profuse perspiration; death was due to failure of the cardio-respiratory system.

Encephalitis is not a rare disease, as is too commonly supposed; it occasionally complicates typhoid fever and is often a fatal ending in head injuries. The acute hemorrhagic encephalitis of childhood, Strümpel told us many years ago, was due to an infection. Lethargy is present in eighty per cent. of the cases. This and cranial nerve involvement are the most usual symptoms. Ophthalmoplegia was observed in 75 per cent. of the English cases. Epileptiform attacks are rare. The temperature may be normal or there may be a moderate rise either at the beginning or during the illness. Encephalitis occurs at all ages and

affects both sexes equally—infants, children and adults alike being attacked. According to Buzzard, the cortex may be the point of infection and much difficulty may arise in its differentiation from brain tumor, brain abscess, cerebral hemorrhage and thrombosis. The involvement of the brain stem is indicated by diplopia, nystagmus and ophthalmoplegia. A distinctive clinical picture, viz., mask-like face, rigid limbs, tremor, posture and gait of paralysis agitans, points unmistakably to the basal ganglia as the seat of attack. Dr. Timme reports two cases of bilateral facial involvement. I have observed one patient similarly affected. This is evidently a post-influenzal condition. I have seen one case of deranged hypophyseal function. The patient became misshapen, coarse of feature, the flesh hung in rolls over the abdomen, the feet and hands were enlarged. The skin over these parts exfoliated and her hair came out by the handful. Deviation from the normal in the blood and spinal fluid was slight; the blood culture was sterile, the leucocyte count 9,260; it may reach 15,000 (Neal). The spinal fluid may be normal or there may occur a moderate increase in cells with globulin or albumin excess. The Goldsol reaction resembles that of poliomyelitis; the reduction in Fehling's is normal. There is a marked contrast between the blood and spinal fluid in this disease and poliomyelitis. Examination of blood and spinal fluid, while affording no positive proof in support of a diagnosis, aids greatly in the exclusion of obscure cerebral disorders. According to Wilson, the macroscopic changes on the cranial surface are slight; there is meningeal congestion, localized meningitis and areas of subpial effusion. The gray and white matter is the seat of minute hemorrhages scattered irregularly and variable of distribution.

Other observers report hemorrhages as few in number, while others regard them as equal. The small vessel walls are infiltrated with lymphocytes and plasma cells. The lesions in the nerve cells are less extensive than in poliomyelitis; there is less neurophagia. The prognosis depends on the site of the lesion. Though complete recovery is the rule, the patient may be left with impaired mentality with permanent cranial and spinal palsies. The infective agent in poliomyelitis is believed to be entirely distinct from that of encephalitis. The relation between it and influenza awaits positive proof. Because of the unknown character of the infection, therapy is necessarily unsatisfactory. Good nursing and careful feeding are the most important measures. Lumbar puncture should always be used as an aid in diagnosis; if there is increased pressure of the spinal fluid daily withdrawal is indicated. [Author's abstract.]

Woods, Hiram. Ocular Changes in Encephalitis Lethargica. [Arch. of Opthalmology, November, 1919.]

The clinical histories of the cases—seven during the past year—are very complete; two give histories of antecedent influenza, and in Woods's

opinion the frequency with which lethargic encephalitis has followed an attack of influenza is due (1) to the high incidence of influenza at the time, (2) to the reduction in resistance of the individual due to a previous influenzal attack. In only one of his cases was optic neuritis present, and this was of very mild degree; in three cases serious impairment of accommodation was present, together with dilatation of the pupils; extrinsic ocular paralysis was the rule, the third, fourth and sixth nerves being affected in various cases, as well as the seventh in three cases. Paralysis of intrinsic and extrinsic ocular muscles tends to spontaneous recovery. Nystagmoid movements occurred in five of the seven cases; these movements as a rule bore no relation to the axis of voluntary movement of the eyes—that is, with lateral movements of the eyes there would be a rotatory or vertical nystagmus. Woods thinks that the ocular symptoms are obviously of antral origin. Only one of the seven cases died, and an autopsy was not allowed.

Calhoun, Henrietta. Histopathology of Brain and Spinal Cord in a Case Presenting a Postinfluenzal Lethargic Encephalitis Syndrome. [Am. Arch. of Neurology and Psychiatry, January, 1920, Vol. III, pp. 1–16.]

Case F. T. from the service of Dr. C. P. Howard, presenting the typical syndrome of (1) sleeplessness followed by drowsiness and nocturnal delirium which deepened into coma; (2) cranial nerve involvement; (3) and spinal cord symptoms of rigidity of the neck, lost knee jerks and incontinence of urine and feces, came to necropsy after an illness of three weeks. The most marked pathology is the infiltration of the basal ganglia with lymphocytes, plasma cells and homogeneous bodies. These colloid droplets are rounded, variable in size and probably represent degeneration products, they have been described in trypanosomiasis. The nerve cell changes are uniform in the brain and cord, showing a chromatolysis and an axonal reaction. There are no instances of neurophagia and no hemorrhages into the gray matter. The spinal cord shows a diffuse infiltrative myelitis characterized by thickening of the neuroglia septa, exudate into the spaces of the ground substance of the cord, congestion, swollen myelin sheaths, areolar placques, and infiltrations of lymphocytes, plasma cells and red blood corpuscles most marked in the vessels arising from the vasocorona. The ventricular system shows a granular ependymitis of the fourth ventricle, and closure of the central canal of the cord, except at the tip of the conus medullaris where it is dilated. Epidemic encephalitis is a disease of unknown etiology, new to this country, and which is, pathologically, an acute infiltrative encephalomyelitis, the most marked changes occurring about the blood vessels of the basal ganglia, and in the white substances of the spinal cord. [Author's abstract.]

Netter, A. Recrudescence of Epidemic Lethargic Encephalitis. [Bull. de l'Académie de Méd., Jan. 6, 1920.]

A. Netter saw twelve cases of this disease in Paris between November 26, 1919, and January 6, 1920, and had knowledge of twenty other recent ones. The twelve personal cases were sparsely distributed in different quarters of the city, and no connection between them could be traced. Of the three cardinal signs of the disease, two, viz., fever and somnolence, were uniformly present. Diplopia, followed by temporary paralysis of accommodation, was, however, lacking in one third. Hypoglossal involvement was observed in three instances, and facial involvement in two. Three patients showed tremor, one general convulsions, and copious salivation in two. All these symptoms are among the customary manifestations of the disease; the oculomotor disturbances seemed, however, to be less marked than in cases the author had previously seen. In most patients the condition lasted three weeks. Two had completely recovered at the time of writing; two had died.

Skversky, A. Lethargic Encephalitis in the A. E. F. [Abstract, from the American Journal of the Medical Sciences, December, 1919.]

The writer forms the basis of this contribution upon the clinical study of ten cases which came under his observation at General Headquarters, B. H. 90, France, during the months of January, February and March of 1919. Without going into an unnecessary description of the disease picture which had been so universally described, he states that, generally speaking, case reports had been justifiable when they conformed in the main with the simple descriptive term "lethargic encephalitis." In the United States the timely association of this new disease picture with the epidemic of influenza resulted in numerous hasty and ill-considered case reports many of which were concommittant or residual physical or mental states often observed in association with influenza or, for that matter, other acute febrile disorders. The writer states that in the studies by Menninger on the psychoses associated with influenza in Boston, a review of nearly one hundred cases wherein it was expected that the central nervous system would be at least vulnerable if not actually involved, no symptoms referable to our present conception of lethargic encephalitis were noted. At the time of this review, nearly a year after this study, it is perhaps well to call attention to the conflicting opinions on this phase of the problem as seen in New York City. The Health Commissioner has recently informed the public through the press that influenza and the epidemic of encephalitis are one and the same disease. On the other hand, the recent bacteriological studies of Drs. Strauss and Loewe wherein a filterable virus isolated from the nasal washings of individuals suffering from epidemic encephalitis say quite the reverse. These investigators, though able

to reproduce the disease in monkeys to the twelfth generation, were unable to do so with the nasal washings or spinal fluids from cases of influenza. In any event whatever the bacteriological status of this disease may prove to be, its immediate association with influenza appears to be refuted on good ground. Therefore, the indiscriminate reporting of cases purporting to be lethargic encephalitis during a widespread epidemic such as influenza tends to add to the perplexity already existing in the attempt to establish a distinct clinical entity.

The A. E. F., which was not spared the scourge of influenza, saw so little of lethargic encephalitis that the disease was of comparatively very recent observation and aroused a sporadic interest only. However, during the first three months of 1919 a series of cases passed through Base Hospital 90 all of which presented symptoms of both encephalitis and lethargy. It was a great question in the mind of the writer whether they should be considered of epidemic nature and belonging to this new disease entity which was prevalent and gained such universal attention. The cases reported in the study presented such a wide range in symptomatology and resembled such well known neurological disease pictures commonly met with that it led the writer to doubt the existence of this "new disease" as a definite and new clinical entity.

He first cites a case beginning with external opthalmoplegia associated with marked asthenia and presenting a myasthenic electrical reaction. After a few months of study it was still a question as to whether this was not a case of myasthenia gravis even though there was a mild febrile period which was accounted for by chest signs of a suspiciously tuberculous nature.

There follow two cases presenting typical Parkinsonian disease pictures, one precipitated by mild trauma and the other by a "hard cold" a few months previously. In both the onset was abrupt, with somnolence. Neither presented signs of pryamidal tract involvement. The first case became progressively worse while the second showed some improvement after a few months. Attention is called to the fact that physical and emotional trauma have frequently been cited as precipitating factors in paralysis agitans.

The fourth case was one of marked generalized chorea which came on a month after a febrile disorder, the latter having been considered on the medical service as a para-typhoid B. The early onset of the disease was noted as mainly that of "lethargy and mental torpor." The spinal fluid showed 680 cells, no organisms and negative Wassermann. This case did not respond to the usual treatment of the infective or Sydenham types of chorea, but, on the contrary, became progressively worse.

An interesting case presenting a cerebellar picture then follows: The onset was sudden as in a vascular lesion and without any febrile

period. He was lethargic. The differential diagnosis was fully considered even that of hysteria though this condition seemed reasonably unlikely.

There is also a typical case of multiple sclerosis showing nystagmus, intention tremor, measured speech, absent abdominals, increased deep reflexes and retentive sphincters, the whole picture of sudden onset with lethargy, 71 cells in the spinal fluid and negative Wassermann. He made a partial recovery.

The last three cases, one showing complete internal and partial external ophthalmoplegia, following mumps. The other two showed ophthalmoplegia and facioplegia, one following a broncho-pneumonia and the other a mild fever of unknown origin. All were lethargic and recovery was slow and incomplete.

In summing up the clinical features, one finds that all the cases were unmistakably lethargic. The wide range of anatomical distribution showed that no distinct part of the central nervous system was spared. Cases of the polyneuritic form were observed but the writer preferred at this time not to include them in the present study. The laboratory studies though limited showed that in the majority of cases there was a mild leucocytosis with eosinophilia in the blood and a mild lymphocytic pleocytosis in the spinal fluid. In all the cases the Wassermann was negative in both blood and spinal fluids. What bacteriological studies were made proved negative. In nine out of the ten cases described there was a definite febrile period either preceding or concommittant, including "bad colds," mumps, broncho-pneumonia and a possible para-typhoid B. There were no deaths, and recovery was slow and incomplete in the majority of instances.

In conclusion, the writer states that encephalitis may occur as a complication or sequel to any infection. With encephalitis, an elastic term, diffuse brain involvement is expected and with it the naturally outstanding feature of lethargy. This much is true, he admits, that while the majority of cases which he studied resembled other well known diseases of the central nervous system they were atypical in some form, either in onset, clinical course, or outcome, but, clinically, they were encephalitis with lethargy. The writer concludes that while bearing in mind the possibility of there being distinct infectious diseases of the nervous system which escape detection because of the general similarity in their clinical manifestations to well recognized entities, the study of these cases does not aid in establishing lehargic encephalitis as a new clinical entity. [Author's abstract.]

Bassoe, P. Epidemic Encephalitis. [Jour. A. M. A., Ap. 10, 1920.]

Since his last report of a number of cases of epidemic encephalitis, Bassoe has become convinced that the same unknown virus produces clinical forms in which lethargy and other common symptoms of the

characteristic "lethargic" form may be lacking. That it is the same disease is shown by the similarity in pathologic anatomy, the existence of transitional forms, and the occurrence of all these forms in the same community at the same time. Among the cases observed during the past winter, several presented severe symptoms of a general infection suggestive of typhoid fever, acute miliary tuberculosis or other acute infectious disease. The resemblance to severe, acute chorea was marked in other cases, verified by necropsy. Among new symptoms Bassoe, too, has observed the twitching of the abdominal muscles to which Thomas F. Reilly recently has called attention. Six detailed cases are given.

6. BRAIN.

Spielmeyer, W. The Central Changes in Typhus and their Significance for the Histopathology of the Brain Cortex. [Zeitschr. f. d. ges. Neur. u. Psych., June, 1919, No. 1 and 2, Vol. 47.]

The author examined twelve cases of typhus and in the present article restricts himself to his findings in the central nervous system. Foci were scattered throughout the whole brain but seemed to have greater predilection for the gray substance. Beside the typical nodule like foci of Fraenkel there were other structures which the author calls atypical, rosette-like foci, bush-like interlacings, principally of the rod cells and the so-called glia stars, and glia cell rings around the vessels. The bush-like glia proliferations were confined wholly to the molecular zone of the cerebellum. In his histological examinations the author found no evidence confirmatory of the generally prevalent view that the formation of the foci in typhus is due to a primary disease of the walls of the vessels. He is not able to ascribe any rôle to the degeneration of the vessels in the pathogenesis of the disease. Even in the most fully developed foci the vessels were not perceptibly altered. The foci in the central organ are composed principally of proliferations of neuroglia and in most instances exclusively of this substance, although in some places there were elements of which the glial nature cannot be determined and these may possibly be of mesenchymal derivation. In the early stages of the formation of the foci leucocytes were observed and later lymphocytic elements. There were further diffuse changes in the nervous system in the form of plasma-cell infiltration of the vessels of the central tissue, deposits of cells in the pia mater and signs of decay in the nervous parenchyma. The accumulation of cells in the meninges seemed to have no relation, either in localization or character, with the foci in the nervous tissue; the most striking elements in the meninges were the macrophagi. The author calls attention to the significance of his findings for the general pathology of the nervous system. Typhus is only of interest to brain pathology because general histopathological symptoms manifest themselves in a very pronounced manner. The histo-

pathological picture of typhus is of a nature to furnish valuable clues to the origin of plasma cells, macrophagi, and rod cells. It demonstrates the manner in which the plasma cells are developed from the lymphocytes and shows their genetic relation to the same. The origin of the macrophagi is also made clear, namely as derivatives of the marginal cells of the meningeal lymph spaces. Finally in typhus it is possible to prove the gial nature of rod cells better than in any other disease. It is very difficult and at the same time unnecessary to give a fixed definition of typhus. Pronounced inflammatory changes of diffuse character coexist with pure localized proliferations, the non inflammatory proliferating foci existing side by side with foci of inflammatory origin. The extraordinarily polymorphous character of this disease, and, above all, the apparent antithesis between non-exudative localized proliferations and entirely inflammatory localized changes shows anew that a single causal agent may bring about alterations of varying morphological dignity and that such changes, though differing greatly from each other in form, may all be transitional phases of the same process. The finding of pure glia proliferation in the form of foci leads to the important question whether there can be glia proliferation independently of a primary degeneration of the functionally active nervous tissue. The author is of the opinion that the glia is not merely an inert supporting tissue, which can bring about merely a compensatory proliferation when equilibrium or tension is disturbed. Under certain circumstances it reacts to independent stimulus and in many instances is excited to proliferation.

von Podmaniczky, T. Concerning the Rôle of the Glia in Diseases of the Cortex of the Cerebrum. [Arch. f. Psych., 1918, No. 1, Vol. 59.]

Bursting of a vessel with bleeding in the brain tissue leads to locally circumscribed degeneration of the nerve tissue together with degeneration of the glia. Obstruction of circulation as result of changes in the walls of the vessels conducting the blood supply to the brain leads to wider spead destruction of the tissue in the form of numerous foci. The glia remains intact and there is lively proliferation. The part principally affected is the cortex, and the result is arteriosclerosis. If the focus originates in a bleeding (apoplexy) it is confined to definite limits, while in the diffuse form it is difficult to determine the exact boundaries of the foci. The first form might be designated a focus of softening, while the second type might be called atrophic foci. In the first form the glia as well as the nerve elements are destroyed and because of the reparatory function of the fibrous glia, there is a lively proliferation to repair the destruction in the zone of the softening. Stout fibers are formed which collect in a wall about the point of softening, leading to the arteriosclerotic cicatrice on the foundation of a bleeding. The second manner in which pathological proliferation of the glia takes place is illustrated in cases where the supply of blood to the brain is interrupted.

A reactive proliferation is set up and the vessels are surrounded by a more or less thick glia envelope, the fibers being arranged in a spiral form. The rôle of the glia in disease of the cortex is the same whether the disturbances originate primarily in degeneration of vessels, of medullary sheaths, of nerve parenchyma, or of the glia itself. The glia always responds to every sort of stimulation with exactly the same form of proliferation. This phenomenon is therefore not conditioned by the form of the disease but by qualities inherent in the nature of this tissue.

Schrottenbach, Heinz. Pathology of Human Neuroglia in Idiopathic Hydrocephalus Internus. [Archiv f. Psych., 1918, No. 2–3, Vol. 59.]

In studying this case of hydrocephalus internus the author used the Cajal gold chloride impregnation method and found pathological changes in the glia cells of all parts of the brain. The astrocytes were more frequently affected than the round, apolar, or glia cells of simple form. The changes assumed the character of proliferations, hypertrophies and degenerations. The proliferation affected principally the apolar and astrocytes; the degeneration attacked the astrocytes much more frequently than the other cells and all parts were involved (nucleus, protoplasm, and processes). These three pathological forms were rarely found as independent phenomena, but were usually associated in the same cell. In ameboid glia cells in the neighborhood of the ventricle walls there was a peculiar sort of hypertrophy with distinct signs of degeneration, and further, in this same vicinity, the fiber structure of the neuroglia seemed to be loosened and the chemical and biological character of the cells is probably altered by an inflow of spinal fluid conditioned by a long-continued heightened pressure with consequent saturation. The author cannot agree with Cajal's view that the round apolar glia cells are to be regarded as mesodermic formations and therefore as essentially different from the elements with dendritic ramifications. There were transitional forms between apolar and spider cells indicating the development of the latter from the former—that the apolar cells are young glia cells. Accumulations of young cells around astrocytes suggests the probability that the spider cells form a nutritional center for the others. The collection of glia cells, young cells without dendrites as well as older ones with ramifications, around the blood vessels is probably due to the fact that nutrition is better in perivascular region.

Weygandt, W. Concerning the Problem of Hydrocephalus. [Archiv. f. Psych., 1919, Vol. 59, p. 519.]

The author calls attention to the peculiar skull formation at different periods of life of various celebrated men—Schopenhauer, Beethoven, Edison, Napoleon I, etc., as being of hydrocephalic character. There

are indications that slight hydrocephalic phenomena are not incompatible with preëminent intellectual capacity. There is, however, a general prejudice against regarding pathological processes as the foundation for higher psychic capacity, the idea being current that the one is a falling below the average, and the other an elevation above it, but the author calls attention to the fact that the two phenomena are not measured by the same values. The disease may be clearly congenital or apparently due to exogenous factors, but it is always possible, when tumors with hydrocephalus develop after inflammations, infections, etc., that they were determined by primary tendencies in the organism. The author describes briefly two cases of hydrocephalus. The first shows the connection between this disease and an affection which is not yet clearly understood, *i.e.*, chondrodystrophia, and suggests a possible connection between the biological foundation for the two diseases. Notwithstanding a marked deformity of the skull there was considerable mental development, showing that even with extreme hydrocephalic conditions in the brain, the cortex structure may be preserved. The second case was one of congenital hydrocephalus in a child ten months old. Ventricle puncture was being considered but the child died before the operation was performed. The section revealed a papillar tumor in the ventricle. If the puncture had been made death would have immediately resulted from bleeding; the case shows the caution that is necessary in making the puncture for hydrocephalus, and both cases show that hydrocephalus may be connected with other organic disease of congenital original that are of severe and incurable nature.

Gebb, and Weichbrodt. The Bérial Brain Puncture. [Neurol. Centralbl., Feb. 1, 1919, Vol. 38.]

In 1909 Bériel proposed a new place for making brain punctures, *i.e.*, in the orbital cavity. Independently of Bériel, F. Sioli indicated the possibility of making a successful puncture at this point, having made a curious observation in connection with a brain injury in an epileptic attack. At the post-mortem of Sioli's patient it was found that a wooden penholder had penetrated the nasal canthus, reaching the brain, and had been broken off, so that the piece of wood had remained in contact with the brain for one and one half years before the death of the patient without being discovered. It was thus shown how easy it is to reach the brain at this point. The brain puncture being of great interest at the present time in connection with luetic diseases of the central nervous system, the authors undertook the operation at this point in thirty cases. In ten cases they obtained particles of the brain substance in life. In comparison with the Neisser-Pollack method, the Bériel method is recommended by its greater simplicity and there is no special danger connected with the operation. That it is impossible to prevent bleeding is obvious. There may also be some exophthalmus conditioned by the orbital bleed-

ing, but this soon recedes. It will be difficult to convince relatives, however, that the patient has not been hit in the eye. Because of this circumstance and because of the bleeding in the vicinity in the eye the authors find the Bériel method less suited for general use than the Neisser-Pollack and think it should only be employed in exceptional cases.

Odefey, Martin. Fat-containing Substances and Pigments in Parts of the Brain. [Archiv f. Psych., 1918, Vol. 59, No. 1.]

The author states the general conclusions reached from the examination of one hundred and ninety-eight individuals. The yellow pigment makes its appearance after birth; it is found in early childhood with a certain regularity, but may be absent at an advanced age (40 to 50 years). The formation of pigment is in general independent of a fundamental disease affecting the individual. Intoxications and acute infectious diseases seem to have no effect whatever on the phenomenon, but it is possible that chronic diseases, especially syphilis and tuberculosis, may influence it to a certain extent. The most important factor in producing it is local decomposition and decay in the brain, and the most usual place for the deposit is the pallium and the corpus striatum; it is rarely found in the pons or substantia nigra. It is generally supposed that the yellow pigment really consists of a mixture of the pigment with fat substance, but a certain independence of the coloring matter from the liquid substance is indicated by the fact that pure liquid free of fat is deposited in the brain vessels and their vicinity. Fatty degeneration of both the brain vessels and the interstices and its results in producing dementia, etc., have been much discussed since publication of Virchow's paper on "Encephalitis congenita interstitialis." The author is of the opinion that local disturbances are not without influence on the fat deposits, but that the most important factor is a general disturbance of metabolism, as well as deleterious influences originating directly in the blood. Deposits of hemosiderin are nearly always found in advanced age, usually without any other local disturbances and under almost normal conditions. The most usual place for deposits of pigment containing iron is in the great ganglia. Perivascular deposits of this nature are very frequent in paralysis.

Kopetzky, Samuel J. Recently Observed Intracranial Infections Complicating Mastoiditis. [The Laryngoscope, December, 1919.]

Dr. Kopetzky reports four cases of sinus thrombosis, one case of cerebellar abscess, and one case of meningitis sympathica. Of the sinus thromboses, two were in children, the youngest thirteen months of age. Of these, one was tentatively diagnosed as pneumonia, the other, a temperature caused by absorption. The latter eventually presented symptoms referable to the meninges, and at operation undertaken when puru-

lent meningitis had already developed, a sigmoid sinus thrombosis was found as the inciting cause of the meningitis. The third case of sinus thrombosis gave no intracranial symptoms at all, until the terminal stage, when an inoperable thrombosis was found at operation. The fourth case presented all the classical symptoms of a cerebral abscess, which disappeared after the removal of the thrombus in the lateral sinus. The case of meningitis sympathica developed rapidly a few hours after radical mastoidectomy undertaken to relieve a cholesteatoma involving the middle ear and mastoid process. Symptoms of rapidly increasing intracranial pressure, with Cheyne-Stokes respiration and symptoms of violent mania, were entirely relieved by a prompt parietal decompression. The case of cerebellar abscess was at first diagnosed as encephalitis lethargica. The symptoms we are wont to see with cerebellar abscess were absent. The abscess was found at operation.

The cases are reported in detail. The value of lumbar puncture examination comprising the chemical, physical and cytological factors of the fluid is stressed as of great diagnostic value, and the findings from blood culture are discussed. The cases are all atypical and present five points of differential diagnosis. [Author's abstract.]

Damade, R., and Boisserie-Lacroix, J. Cerebellar Abscess of Otitic Origin with Complete Homolateral Hemiparesis. [Gaz. hebd. d. sci. méd. de Bordeaux. December 7, 1919.]

These authors quote Sabrazès, who has said that cerebellar abscesses may be clinically unrecognizable. Many observers have shown that there may be complete destruction of a large part of the cerebellum without any so-called cerebellar symptoms. In the fatal case reported by the present writers, which occurred in a man aged 56 who had suffered from right otitis for more than thirty years, there was complete hemiparesis on the same side as the ear affection, and this was the only sign which suggested a cerebellar abscess. Post-mortem the abscess was found in the most anterior part of the right cerebellar hemisphere. According to Acland and Ballance complete hemiparesis on the same side as the ear affection is pathognomonic of cerebellar abscess. It appears to be due to compression of the pyramidal tract below the decussation of the pyramids, hemiparesis on the opposite side to the cerebellar lesion being caused by compression of the pyramidal tract above the decussation. The occurrence of hemiparesis in cerebellar abscess is not frequent. Only 30 cases were collected by Acland and Ballance in 1894, in 25 of which the hemiparesis was on the opposite side to the otitis, and in 5 on the same side. In the recent literature the present writers have found only two cases of cerebellar abscess or tumor accompanied by hemiparesis on the side of the lesion, reported by Macewen and by Chauvet and Vetter.

Ponce de León. Brain Cyst. Lumbar Puncture. Death. [Arch. Lat. Am. d. Ped., Nov.–Dec., 1919, J. A. M. A.]

Ponce de León applied lumbar puncture to clear up a puzzling case of headache and vomiting in a boy of 11. The headaches had begun three months before, and the child preferred to lie down all the time. In the last six weeks the headache had grown worse, especially at night, and vomiting was frequent, and there was hypertonicity and also exaggeration of the reflexes. The region of the frontoparietal sutures was tender, and the legs were somewhat stiff but there was no paralysis. Lumbar puncture released 10 c.c. of normal fluid, but a few hours later the headache became intense and the child died, just twelve hours after the puncture. Morquio recently cited a very similar case in which he refrained from lumbar puncture, but the child died in this same sudden way.

Souques, A. Generalized Loss of Reflexes in Craniomeningeal Wounds. [La Médecine, February, 1920.]

The author has found that in five cases of wounds of the skull and meninges a generalized loss of reflexes was present. None of the symptoms which usually accompany the loss of reflexes were present—for example, lightning pains, anesthesia, Romberg's sign, hypotonus, or paralysis. Lumbar puncture showed the presence of an excess of albumin and definite hypertension. The loss of reflexes was explained by a change in the posterior roots due to meningeal infection or hypertension.

Carver and Dinsely. Biological Effects of High Explosives. [Brain, Part II, 1919.]

There are many patients suffering from the neuroses of war in which the emotional factor does not appear to be primary and cannot be considered as causative. The authors consider that in such cases a purely psychogenic explanation will not suffice. Observation reveals that "commotional" factors have been operative. They refer to three sub-groups. First, cases of "direct concussion" produced by the impact of missiles—either fragments of shell or earth—characterized clinically by loss of consciousness, aphasia, sphincter trouble, amnesia and profound mental exhaustion. Secondly, cases of "indirect concussion," brought about by variations in pressure accompanying the detonation, in which the clinical indications are less intense than in sub-group 1. Thirdly, those in which the etiological factor seems to be the fine, extremely rapid vibrations, less known as products of explosions. The authors describe this factor for the first time, the issue being demoralization. As part of their investigation they conducted a series of detonation experiments upon fish and rats. From this they determined three zones: (1) the zone of *brisance*, with which this paper is not concerned; (2) the zone of "decompression"; (3) a zone in which the effects are slight and transitory.

They conclude that the neuroses of war may be brought about either by the action of "purely emotional shock" or by "purely physical shock," but most commonly by a combination of these two factors (after the psycho-neurotic symptoms have been cleared up, the residual, actual neurosis, which has formed a foundation for the whole disorder, is often exposed). The object of the paper is to correct the present tendency to regard the neuroses of war as of exclusively emotional origin.

Jefferson. Neurological Signs in Gunshot Wounds of the Scalp. [Brain, June, 1919.]

When in France, Jefferson sought neurological signs and symptoms in a case-series of 54 scalp wounds, and was able to establish them in all but five cases. He comments that such signs have been greatly neglected. The eye has seen the scalp injury alone; the mind has travelled no further. He gives two types: those in which the changes are concussional and general and those with signs of local cerebral contusion. In most cases the symptoms are transient and not obvious, excepting when seizures of Jacksonian type arise. Patients seldom connect the numbed or weak hand or the contracted visual field with the head wound. In none of this series was there fracture of the skull, yet there were eleven definite local contusions of the motor cortex, four of the visual and two more in which a motor lesion was associated with a sensory disturbance of the hand. Three patients had Jacksonian seizures, three were trephined on the neurological evidence, extradural clot being disclosed in two. In four cases there were signs of contra-lateral injury by *contre coup*. It is important to remember all this in regard to pensions. While the scalp wound may have been in itself trivial, momentous cerebral injury may have been inflicted.

Harris, T. J. Brain Abscess Dependent upon Empyema of the Frontal Sinus. [Am. Laryng. Soc., June, 1919. N. Y. M. J.]

The author reported the case of a man, aged twenty-six, who was admitted to the eye ward of General Hospital No. 14 on September 10, 1919, suffering from a swelling of the right eye. A diagnosis of pansinusitis on the right side was made and confirmed by x-ray pictures, but the patient refused an intranasal operation for correction of the septum to secure better drainage. Under threat of court martial the patient finally consented to operation, and a radical Killian operation was performed. Convalesence was slow, and it was then noticed that palpation of the operated field showed a soft, apparently fluctuating mass. A diagnosis of brain abscess was made and confirmed by the neurologist.

After careful consideration, an expectant course of treatment was decided upon. For the next twenty-four hours no change could be noted in his condition except an increase in his apathy. Suddenly, at the end

of twenty-four hours, he became almost completely comatose. The pulse had dropped to a little over forty, and the optic neuritis was found to have increased since the last examination to three diopters. Immediate operation was decided upon. This was performed under one per cent. novocain. An incision was made directly through the integument over the swelling. Retraction of this revealed at once the dura with little or no granulation tissue intervening. Palpation at this time no longer gave any sensation of fluctuation. With the desire to reduce to a minimum the danger of meningitis, extreme care was exercised in the exploration of the frontal lobe. A probe introduced through the dura immediately entered a large cavity without meeting any resistance at all. Bearing in mind the proximity of the ventricles, the probe was not carried beyond two centimeters. No brain tissue was encountered and pus in quantity was not evacuated, a few drops only following the incision of the dura. No irrigation whatever was employed. A rubber drainage tube was introduced and held in position by a suture to the outer wound. The wound was left open. An immediate improvement in the condition of the patient took place. His pulse in the course of a few hours returned to normal, and within seventy-two hours he was mentally in the same state as he had been a short time previous to the onset of the active symptoms. There was at no time any escape of cerebrospinal fluid. A small brain hernia, however, took place which gave some trouble. Amputation of the protruding mass was practised with benefit. The patient was still in the hospital in February. Later reports were to the effect that while it was necessary to open up the wound for purpose of better drainage, and the patient had proved to be the victim of recurring erysipelas, there had been no return of the brain compression symptoms.

As distinguished from abscess of the temporo-sphenoidal lobe, abscess of the frontal lobe was virtually symptomless. Unless the disease had extended beyond the silent area, no paralysis took place, which increased the difficulty of making an early diagnosis. Headache was probably the most characteristic symptom. Several of the case reports contained reference to the apathetic condition of the patient. Projectile vomiting had long been recognized as a symptom of brain abscess. Repeated references were made in the literature to vomiting. In the case reported the patient had been subject to this for weeks before the abscess was recognized, and it is impossible to say positively whether the cause lay in the brain. The latent period could last for an indefinite time. Only when brain compression had taken place or the abscess had extended so far as to cause absorption was it capable of easy recognition. Clinically speaking, cases divided themselves into acute and chronic types. The acute cases were associated with pain and increased temperature. Usually an empyema of the frontal sinus had been recognized and a radical operation performed without relief to symptoms. Often at the time of the operation, a disease of the posterior wall of the sinuses

was discovered. In these cases immediate operation had followed; in others, the brain had been explored only after an interval of several days. The prognosis was grave, but by no means hopeless. In a number of cases reported there had been satisfactory recovery after operation. This depended upon the type of case, whether acute or chronic with a walled-off cavity. Meningitis was chiefly to be dreaded.

A valuable suggestion had been made by Elsberg, who stated that if before an abscess of the brain was opened, packing of gauze soaked in tincture of iodine was placed under the dura all around the wound the danger of meningitis was practically avoided. He further recommended that two drainage tubes be introduced, neither of which should be removed until ready to be taken out, and that they should be shortened from time to time.

Notes and News

NEW DIRECTOR OF NEUROLOGICAL INSTITUTE OF VIENNA

Professor Obersteiner has resigned the directorship of the Neurological Institute in Vienna. Professor Marburg has been appointed his successor. A new building has been erected, housing the department for research on normal and pathological histology of the nervous system, the departments of chemistry and experimental research, and a neurological library of 43,000 volumes. Free assistants are available for promoting the investigations.

The institute will be at the disposal of all those working in the neurological department and is again open to students from America.

SOME RECENT ADDITIONS TO PERIODICAL NEURO-PSYCHIATRIC LITERATURE

Since the termination of the World's War hostilities a number of new publications in Neurology and Psychiatry have appeared. Readers of this JOURNAL have already noted the new American Archives of Neurology and Psychiatry, now at the completion of two successful years. Under the subsidy of the American Medical Association it promises to occupy an important position in the more descriptive phases of neurology and psychiatry. Its name unfortunately conflicts with that of Mott's, Archives of Neurology and Psychiatry. This latter however is a yearly publication of the London County Asylums, and represents chiefly the work done at Claybury.

French periodical literature has not been enriched, rather it has suffered a loss in the discontinuance of the Nouvelle Iconographie de la Salpetriere—an omission from French literature greatly to be deplored.

The Spanish countries have contributed a number of new periodicals. The Revista de Psiquiatria appeared for the first time in 1918 from Lima, Peru. It is a quarterly and is most ably edited by two very well known neuropsychiaters of that country, Dr. Hermilio Valdizan and Dr. Honorio F. Delgado. In addition to original

articles it contains a very valuable abstract department in which the neuropsychiatric studies of South America are especially well reviewed, as well as the literature of other countries.

The Archivos de Medicina Mental now in its fourth volume comes to us from Havana. It was founded by Dr. José A. Malberti and is edited by Drs. Carlos M. Piñeiro, V. Pérez Lerena, and Francisco Garcia. It appears monthly and bimonthly and is chiefly concerned with shorter notices and psychiatric material of local interest.

The Archivos Brasileiros de Neuratria e Psychiatria, which was founded in 1919, is the official organ of the Brazil Society of Neurology, Psychiatry and Legal Medicine. Among its editorial board are the well known names of Drs. A. Austregesilo, Juliano Moreiro, Henrique Roxo and Ulysses Vianna. Waldemar de Almeida, Faustini Esposei, Heltor Carrilhe and Adante Boteihe are also on the editorial board. Rio de Janeiro is the home of this interesting quarterliy publication which contains Original Articles, the Bulletin of the Society, Abstracts and Book Reviews. Vol. 1, No. 3 contains an interesting bibliography of the Brazilian literature of Dementia Praecox.

The Archivos de Neurobiologica has had its first number appear with the current year. It is published in Madrid. It is directed by Drs. J. Ortega Gasset, G. R. Lafora and J. M. Sacristán, with a large corps of collaborators in histology, physiology, psychology, neurology and psychiatry. Articles on Tactile Space, Epileptic Attacks in Schizophrenia, Postinfluenzal Neuritis, Tumor of the Corpus Callosum, Histogenesis of the Neuroglia of the Olfactory Bulb, Polymorphous Cells of the Fascia Dentata, New Methods of Analysis of the C. S. F., Review of Nissl's and Alzheimer's contributions to neuropathology, with book reviews and abstracts make up the contents of the first number of this interesting new publication.

Dr. M. Levi Bianchini, of Nocera Superiore, Italy, has founded a new Italian Journal, Archivio Generale di Neurologia e Psichiatria, the first numbers of which have been received. The new journal promises to stand with the best of the Italian Journals of Neuropsychiatry. Dr. Bianchini has also inaugurated a series of Monographs, Bibliotheca Psichiatria Internazionale of which five have been received to date. Among the editorial board of the new Archivio are such well known names as G. Antonini, C. Coenecl, S. de Sanctis, E. La Pegna, E. Media, G. Mingazzini, G. Modena, D. Ventra and L. Zarrandal Bo—a group of the younger Neuropsychiatrists of Italy are among the active editors. The journal is printed in Naples.

Since the cessation of publication of the English Review of Neurology and Psychiatry, a successor, this time a quarterly, The Journal of Neurology and Psychopathology, has taken its place. It is published in London, and is directed by an editorial committee as follows: Drs. S. A. Kinnier Wilson, T. Graham Brown, R. M. Stewart, Bernard Hart, Henry Devine, Maurice Nicoll and C. F. Coombs. Wm. Wood and Co. of New York are the American Agents. The first number is attractive and we wish it success.

A successor to the old Zentralblatt für Psychoanalyze has arisen in the form of a new bimonthly journal of Psychoanalysis entitled "Psyche and Eros." It is an international journal and is being published in New York, edited by Dr. S. A. Tannenbaum of New York, the European Editors being Drs. C. Bandouin, F. Morel and Ed. Claparede of Geneva, H. Silbirer and W. Stekel of Vienna. The first issue appeared in July, 1920.

Another psychoanalytic venture is The International Journal of Psycho-analysis. Official Organ—with the Internationale Zeitschrift für arztliche Psychoanalyse—of the International Psychoanalytic Society. It is directed by Dr. S. Freud and edited by Dr. Dr. Ernest Jones. It is to be a quarterly and is published from London. The first number contains an appreciative sketch of the psychoanalytic work of Dr. J. J. Putnam, by Jones; one of the difficulties of Psychoanalysis by Freud; an exhaustive study on the Character and Married Life of Henry VIII by Flügel; a popular exposition of the Freudian Psychology by Dr. Bryan, and an extremely valuable review of recent psychoanalytic literature in English by Stanford Read. It reviews some 400 titles in a most thorough and interesting manner.

From Roumania there has come the newly founded, 1919, Bulletins et Memoires de la Société de Neurologie, Psychiatrie et Psychologie de Jassy. Under the Presidency of Prof. Parbon, formerly of Bucarest, now of Jassy, this small but active society has done some extremely valuable work in neuroendocrinology, most of which has appeared in this new "Bulletin," the beginning of the second volume of which, June, 1920, has just appeared.

The Bulletin de la Société de Médecine Mentale de Belgique which ceased publication in June, 1914 (No. 174), resumed publication in December, 1919, Nos. (175–177) and has appeared regularly since that date. Dr. H. Hoven of Lierneux is Secretary and Editor of the Bulletin whose reestablishment we welcome.

J.

Book Reviews

Hitschmann, Eduard. Gottfried Keller. Psychoanalyse des Dichters, seiner Gestalten und Motive. International Psycho-analytic Press, Leipzig, Vienna, London, New York. 1919.

Psychoanalytic study is producing a not inconsiderable group of writings upon the lives and works of the world's literary men. So far these appear mostly in the German language and of course largely concern the writers in that tongue. The fact of their publication should act as an incentive to this task on the part of writers more accessible to English readers, where no less than in these studies much could be learned of the psychology both of success and failure and a new value be set upon the men and the works which literature makes the property of all. For these psychoanalytic critics illustrate the genuine function of criticism in that they seek no display of superciliousness of criticism nor a misleading enthusiasm. Psychoanalysis only levels men to a truer human basis and admits of no such extremes. Its whole interest, as its function, is to discover and make known the facts of life, whether in the ordinary individual or in the gifted man who can make his psychic facts accessible to all. The purpose of this is that sources of psychic power may be better understood, failures avoided, better adjustments be made as the race proceeds. For this reason it is profitable to investigate a writer's reasons for success and likewise his examples of failure and the sources of these. At the same time it is also profitable to turn the light of interpretation upon his works so that the message which he intuitively delivers may more surely reach its goal. Mention may be made also of the service these books render in increasing our acquaintance with the world's talented workers and giving new impetus to literary study.

In this respect one could wish that Hitschmann had been a little less parsimonious in presenting Gottfried Keller's life and work. The very short chapters into which he has divided his study suggest that fuller portrayal of this artist and poet's life and his created works would have taken the reader into a field of rich artistic as well as psychoanalytic interest. Not only are the allusions somewhat fragmentary but the treatment is topical rather than fully developed. However, there is enough to offer suggestive stimulus to a further study of the subject and much illuminating material may be gathered even in this rather too short treatment. More important still it brings its instructive lessons for psychic understanding and increased psychic control of other lives. For so well have the causes been revealed both for the particular developments of the poet's life, in-

cluding the marked turning points in his creative career, and so understandingly have his weaknesses been pointed out that the book speaks almost with reproach for the world's careless disregard of psychological understanding for the guidance of individual lives particularly in childhood.

The study reveals a man of unmistakable talents, further stimulated to their exercise by the cherished ideal of a father of superior tastes who had died early in the boy's life. The boy grew to manhood in a marked dependence upon his mother, and this even in financial support continued on into his adult years. This dependence is evident in the ill success of his love life throughout his years and has formed indirectly much of the theme of his writings. The psychic inhibition which accompanied it, and which is marked by other infantile traits, was instrumental in determining and at times altering his career. In his work for example there is much evidence of an exaggerated peeping interest in the human body which earlier had turned for expression to the painting of the human form. In this earlier field the inhibitions seemed to have interfered and turned him aside to landscape painting, where the instinct takes a more concealed form in a diffused and symbolic exercise. Even this gives place largely to the painting of word pictures and the more indirect indulgence of the impulse in the experiences of his fictitious characters.

It is a study of most profitable interest thus to follow out the development of the traits which are determined early in the life of the writer. Some of them attain that expression which frees them from burdening his life and make for him the elements of his ability in art and literary work. With some he has only partially succeeded in mastery of them and they either impair his life's happiness or they cross his artistic pathway and turn it in a new direction. At other times again they give a peculiar personal emphasis to his work with a certain exaggeration of the strongly insistent infantile factors. It is especially in the novel "Grüner Heinrich" that this is most in evidence. This is not intentionally an autobiographic work, but is eloquent with the revelations of the poet's unconscious life and even with the external experiences which his unconscious determined for him.

Mott, Frederick W. Archives of Neurology and Psychiatry from the Pathological Laboratory of the London County Mental Hospitals, Maudsley Hospital, Denmark Hill. Vol. VII, 1918. Printed for the London County Council. P. S. King and Son, Ltd.

Each one of the papers which constitute this report might be the subject of separate comment. The excellence of their preparation, dealing as they do in minute detail with the investigations in the most recent lines of pathology in nervous and mental diseases, reveals the fact that the press of war work has been only an incentive to general interest in this branch as in all other branches of medicine. Dr. Mott's presidential address, which forms the opening chapter of

the collected report, deals with the relation of the sexual and ductless glands to mental disease. Special investigation had been made upon the ovaries in mental disease, in which the study seemed to confirm the fact that the female reproductive power is at least diminished or even absolutely cut off in actual mental disease. These investigations were necessarily interfered with before they were made as definite as could have been desired, but they as well as the other investigations made denote the trend of medical interest and point to the fields that lie open for further active interest.

Special attention has also been given to the study of hypothyroidism in cases of insanity both in male and female. The average weight of the thyroid gland in both sexes is generally smaller than in healthy subjects although variations occur. These variations are most marked in the female before and after the climacterium. The other ductless glands were subjected to the same test of weight as well as to histological examination. In a special study of the glands in dementia præcox it was found that there was a tendency to hypofunction of the thyroid gland in the male and to hyperfunction in the female. Striking changes manifested themselves in the sexual glands, both sexes showing diminution of the reproduction function.

Dr. Mott himself has also contributed a detailed study on the pathology of venereal disease. Interesting investigations have also been made as to the convolutional patterns in the brains of related individuals. Such a study, as Dr. Sano, the investigator has stated, "is of special value in the determination of the transitions from one brain pattern to another, both as a whole and in detail. A knowledge of the normal transitions from one convolutional pattern to another may be of use in the consideration of the convolutional pattern in pathological conditions".

A large section of the report is devoted to strictly war neurology through an important contribution by Dr. Mott upon the punctiform hemorrhages which occurred in the brain as a result of gas poisoning and a paper by the same author reporting the microscopic findings in two brains of the effect of commotio cerebri without visible external injury. The Chadwick lecture by the same physician presents the subject of mental hygiene to be applied to cases of shell shock. The entire contents of the book form leading contributions upon these various phases of the pathology and the therapeutic responsibility in regard to nervous and mental diseases.

Jansen, Murk. De Physiologische Skoliose en Haar Oorzaak. Leiden, E. J. Brill, Publisher.

The writer of this book seeks to confirm assertions that he has made before in regard to the existence of a physiological scoliosis, a normal one it might be called. He shows that the spinal column reveals a tendency to bend in three sidewise curves in its dorsal portion. The uppermost and lowest curves tend toward the left and the middle one toward the right. The tendency to curvature is greatest in the lowest curve, less in the middle one and least in the upper portion, the region of the breast. While these natural or

physiological curves may become clinically exaggerated, forming the starting point of abnormal scoliosis, they must on the other hand be distinguished from other forms which may be designated as accidental scolioses.

The various anatomical causes to which tendency to these curvatures has been attributed in literature, the position of the aorta and other asymmetries which have been put forward, Jansen believes have been taken upon incomplete anatomical evidence. Closer investigation proves that they are not sufficient for explanation. He brings forward physiological and anatomical evidence to prove that the cause lies in asymmetry of the diaphragm which in the function of respiration effects this typical bending of the spinal column in conformity with the expansion of the lungs. This explains why the curvature is more marked in the dorsal portion than in the lumbar portion. This explanation receives support also from the fact that rachitic children are more subject to other forms of scoliosis than an exaggeration of this physiological form. For in their case there is far less action of the diaphragm in relation to the spinal column.

Jansen illustrated by charts and photographs the various forms of scoliosis thus associated with the respiratory activity. These, with the text, form a valuable contribution to the already existing literature of this subject, which he fully discusses, and lays stress upon its special clinical application. For this purpose he has added a brief chapter upon the ontogenesis of this physiological scoliosis of practical value for its prophylactic significance, showing how the evil effects of this action of the diaphragm may be guarded against. He has also a chapter on the phylogenesis of the phenomenon showing its relation to the attainment of the human anatomical position.

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Original Articles

A CONTRIBUTION TO THE STUDY OF GLIOMA

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Introduction.

One who engages in the study of glioma must necessarily encounter three important problems, which have been studied and discussed by a great many writers.

The first is the question of how to differentiate gliomata from sarcomata, and in association with this the arguments concerning gliosarcoma, and also the socalled glioma sarcomatode. Golgi was the first to claim that the glioma is principally made of glia element, a simple fact known to all at the present time, but considered a great discovery at that time. Before that time, for a considerable period, Virchow differentiated gliomata from sarcomata as entirely independent tumors of the central nervous system, but he was unable to give definite histological criteria characterizing these tumors, because in those days the glia element was not known to be the derivative of the ectodermal system, and was not distinguished from the connective tissue element of the mesodermal origin. Among a number of authors, Stroebe is one who, after studying a great many cases of glioma, undertook to establish a definite differential diagnosis between glioma and sarcoma. Stroebe advanced the theory that the glioma is practically composed of astrocytes, and that "for the diagnosis of glioma not only the presence of the fibers among the cell elements is necessary, but also those fibers ought to be connected with cells in form of astrocytes." Since that time a great

many authors have proposed a number of criteria for this problem, but being based, as we know, on a defective knowledge of the neuroglia, it was always unsatisfactory. The rapidly growing glioma, at least in a part of the tumor, and a certain kind of glioma such as ameboid cell glioma, may not show any fibers at all, and the diagnosis cannot be made on the grounds of the formerly known characteristics of the neuroglia, but can be made only by the more profound recent knowledge of the latter element.

Since the classical study of Weigert (1895), our view of the structure and function of neuroglia has undergone a great change. Weigert demonstrated the neuroglia fibers by his own elective method, and considered them to be those executing the important and only function of the neuroglia, connecting and sustaining the tissue of the central nervous system. Shortly after that, Held (1909) approved Hardesty's idea of the syncytial nature of the glial protoplasm for the entire central nervous system, and still later (1903 and 1909) he pointed out that this syncytial protoplasm gives forth the characteristic fibers and cuticular membrane. Through the latter the ectodermal tissue of the central nervous system is separated from the genetically foreign substance of the pia mater and the blood vessels. He showed also that the fiber free cells of the glial origin, laden with waste product of the pathologic metabolism, could go through the limit membrane into the perivascular space, thus being set free from the syncytial union of the central nervous system. Bonome (1907) studied and showed how the early syncytial structure of the glial protoplasm metamorphoses into the complete syncytium of the mature central nervous system. According to this author, the metamorphosis taking place in this early period is not a simple developmental proceeding, but is a complicated process, in which chemically and morphologically different substances of various kinds are produced.

As for the pathological neuroglia, we owe our present knowledge to a great extent to Nissl, Alzheimer, and their pupils. Nissl described, while studying various diseases of the central nervous system, a number of different forms of progressive and regressive metamorphosed neuroglia cells. To those forms already known, he added a peculiar type of elongated rodshaped cell, which was called by the author *Stabchenzelle*, rod cell. Alzheimer's (1890–1904) staining methods, by which he demonstrated the protoplasmic portion and products of metabolism within the cell, were better than any other methods. He pointed out clearly and precisely the scavenger function of the neuroglia element, and described a certain type

of glia cells as *amoeboide Gliazelle* (1910). He also noticed that under certain conditions, the protoplasmic syncytium proliferate without new formation of neuroglia fibers, and that primary existing fibers disintegrate occasionally into a peculiar substance amidst the altered syncytial protoplasm (Alzheimer's *Fuellkoerperchen*). Merzbacher, in his study of the morphology and biology of granule cells (1909), expressed his idea that neuroglia cells may have reparative or reconstructive and nutritive function, as well as scavenger function. Many authors support this latter conception. Marui, in his study of central neuritis, demonstrated a certain granule, which he called "Neucleoproteid like granule," in ameboid and preameboid cells of different cases, and in granule cells of a case of cerebral hemorrhage, and associated this granule with the constructive function of the neuroglia cells.

By these recent studies, our knowledge of normal and pathological glia is evidently broadened. The differential diagnosis between glioma and sarcoma has become much easier than it used to be. The glioma and sarcoma are genetically entirely different neoplasms, and therefore ought to be strictly distinguished from each other. The designation of gliosarcoma is to be avoided if possible, though there are rare cases of such combination.

The second problem is that of the pathogenesis of this tumor. The important arguments of this problem are: the question of congenital predisposition; possibility of the displacement of the embryonal sprout of tissue; the persistence of the embryonal cells; whether the fully developed glia cells are able to differentiate further into the lower type of neuroglia cells, etc. These have been much studied and discussed by various authors. Some support Cohnheim-Ribbert's theory of neoplasm, while others try to deny it.

The third problem encountered is regarding the relationship between the pathological proliferation of the neuroglia and the neoplasm of the neuroglial origin. Some consider them to be entirely different processes, while others do not find any fundamental difference between these two. In literature we find a number of different pathological conditions of abnormal neuroglia proliferations, namely, marginal gliosis, perivascular gliosis, ependymitis granulosa, diffuse sclerosis, multiple sclerosis, tuberous sclerosis, gliomatosis, neuroglioma ganglionare, glioma gangliocellulare, diffuse glioma, glioma, glioma sarcomatodes, etc. Are these entirely independent, or are they closely related, and to be explained under the same pathological process? This is an extremely difficult question.

With a few exceptions, former authors studied the tumor itself

and its immediate neighborhood more than the general glial condition of the individual, while the study of the latter is extremely important for the understanding and solving of the questions above mentioned, especially the last two. The writer has studied this in four cases of cerebral glioma, and found a number of interesting facts which may throw some light on the problems presented.

Observation I

Central Glioma of the Third Ventricle

This case was presented by Dr. L. G. Lowrey as, *Report of a Brain Tumor in a Case Clinically Considered to be Paresis,* in the Journal of Nervous and Mental Disease, Vol. 47, No. 5, 1917. After histological study he made a diagnosis of "Glioma, or at most a gliosarcoma." He reported this case, "because of the rarity of brain tumors among the insane, and because of the erroneous diagnosis of paresis made in this instance." As this was the nature of his purpose, he did not go into detail of general glial conditon, although he noticed "the increase in the neuroglia in general, and a great many cells presenting themselves as long drawn out rods." The writer has studied this case from a different standpoint. The case history and general pathologic observation is abstracted from Dr. Lowrey's report.

The case is that of a male. D. S. H. Clinical No. 17643, Pathological No. 1764. This man was an illiterate French Canadian, with onset of mental trouble at age of forty-one. The family history was negative for nervous and mental diseases. Patient was married and had six children. There was no history of trauma or serious disease; no venereal disease. Onset of present trouble from 1911 to time of admission in October, 1913, at age of forty-three. He failed gradually, and did not work during this period. It was said he had a "shock" in 1912, following which he was unconscious for a few minutes. His speech was somewhat thick and indistinct for some months. He was never irritable, but became somewhat restless at night and memory gradually failed. For two weeks he was very weak and had to be cared for in bed. He complained of pains in head and all over body.

Physical Examination.—Well developed and nourished; mucous membrane pale; tongue tremulous; face, asymmetrical; lungs, negative; heart, normal except that sounds were distant; pulse, 82. There was moderate thickening of the peripheral vessels. Blood pressure was 135. Abdomen, negative. Wassermann on blood serum, posi-

itve, on spinal fluid, unsatisfactory. Fluid contained blood; hence, other laboratory tests were unreliable.

The patient complained of no pain or headache. The eye movements were normal. Arcus senilis. Pupils, irregular, unequal, react sluggishly to light and distance. Vision not determined. Cooperated poorly in sensibility tests, so that little was made out. No tenderness of large nerve trunks. Could not recognize objects, "due to dementia." Knee jerks absent. Arm reflexes, normal. Cremasteric and abdominal reflexes absent. Incontinent. Romberg, positive. Marked tremor of fingers and tongue. Somnolent.

Mental Examination.—Dull and stupid. Remained quietly in bed. Untidy. No spontaneous speech. Responses relevant and coherent. Some motor speech defect. Partially disoriented. No evidence of hallucinations. Memory much impaired. No tendency to fabricate. Could not be made to understand the association tests. Expressed no delusions. No insight. Thought he was sick, but mind all right. Indifferent.

Course of the Disease.—October 28, quiet, dull stupid; physical condition, poor. November 1, demented, speech defect, untidy. November 4th, brighter, more responsive, disoriented, memory impaired. November 12th, disoriented for place and partially for time; contented. November 14th, presented at staff meeting with a diagnosis of general paralysis, to which all agreed. December, difficulty in walking. Fell out of bed; staggering gait; headache and toothache. Eyesight dull. No delusions or hallucinations. January, 1913, convulsions. February, quiet, failing. No relevant responses. August, demented. Excited and angry at times. Marked expectoration. Spoon-fed. October 9th, gradually failed for two weeks. Had series of convulsions from which he did not rally. Died.

Autopsy.—One and one half hours post mortem. Contracture at hips and knees. Atrophy of calves. Tronchanteric and sacral decubitus. Pupils unequal. Axis of the eyes directed outward. Abdominal organs in good position. Adhesive pleuritis. Bronchopneumonia. Slight fibrosis of heart muscle. Fatty liver. Diffuse nephritis. Small colloid cyst in thyroid. Dura not thickened nor adherent. Pia not thickened. Considerable subpial edema. Basal vessel not sclerotic. Pituitary small and flat. Brain weight, 1560 g. Pons and cerebellum 180 g. Cerebellum slightly softer than normal. Sections negative.

Hemispheres.—Just in front of the anterior extremity of the corpus callosum there was, in the left hemisphere, a white, firm,

raised area of irregular shape. This was firmer than the surrounding tissue, whiter than the gyri, but had much of the same physical characteristics. Median sagittal section revealed a large irregular grayish mass, containing numerous soft, reddish, hemorrhagic areas. This had invaded the corpus callosum and both thalami. To a large extent it filled up the third ventricle, and more or less blocked the lateral ventricles, thus filling all apertures below the corpus callosum. The irregular mass observed on the median aspect of the left hemisphere was apparently not connected with the larger and deeper mass.

After the fixation, frontal sections were made. Tumor mass larger on the right than on left. In certain areas, as just above the thalamus, the entire right ventricle was filled by it. Where it invaded the ventricle walls, it was of looser texture. The corpus callosum was much corroded. On the right side, a whitish mass, rising behind the thalamus, extended for a short distance on the median surface of the hemisphere. The descending horn of the left lateral ventricle contained a large blood clot, in addition to bloody fluid. Gyrus dentatus poorly marked on left side. Above the posterior horn of the lateral ventricles the white matter was soft.

Microscopical Examination.—In addition to Dr. Lowrey's preparations which were stained with cresyl-violet, Weigert's iron hematoxylin and picro-fuchsin, phosphotungstic acid hematoxylin, Weigert's myelin sheaths method, and Marchi, sections were made from several parts of the tumor, both hemispheres, pons, cerebellum and spinal cord, and were stained by Weigert's neuroglia method, Cajal's neuroglia method, Alzheimer's methods for demonstration of protoplasmic neuroglia, Bielschowsky's method, and Herxheimer's for lipoid substance.

The tumor consisted of glia cells, closely packed together, with a varying proportion of glia fibers. The glia fibers were demonstrated very well in all parts of the tumor, although they were rather thin and poorly developed, when compared with the abundance of cell element. In the periphery of the tumor, where the tumor tissue showed gradual transition into the normal brain substance, the glia fibers were thicker than they were on the surface or in the center of the tumor. A great many astrocytes or spider cells were observed in this region. The nuclei of the glia cells were of various shapes, some oblong, others oval and polymorphous. The staining quality of these nuclei also varied, the smaller ones being stained deeper than the larger ones. The chromatin substance and intranuclear network were well retained. The protoplasmic portion of the cells

were for the most part very small, but when demonstrated showed typical polyangular shape and direct connection to the fibers. Occasionally there were large cells, appearing like ganglion cells, scattered in various parts of the tumor. These were, apparently, the same cells described by Stroebe and others as, "Ganglion cell-like element within the glioma." Occasionally the cells had two or more nuclei, usually located in the periphery of the enormously large cytoplasma, with vacuoles of various sizes. The protoplasm of these large glia cells contained elements of various kinds, some possibly being phagocytic, while others were of regressive, character. These cellular contents showed various staining qualities, by which they could be separated into Marchi, fuchsinophilic, lipoid granule, amyloid corpuscle, etc. In the study of pathological neuroglia these cells are known as granule cells, and their function as scavenger cells. Some of the tumor cells thus seem to function like the normal neuroglia.

In certain sections the nuclei of the glia cells aggregated into a sort of rosette formation. In none of the sections, however, was the writer able to find the cavities lined with epithelial or ependymal cells. Since Stroebe found a cavity lined with epithelial cells, and considered it to be a sprout of the embryonal neural tube, which gives rise to later development of the glioma, the like formation has been described by a number of authors. Some hold the same opinion as Stroebe, while others regard it to be a secondary formation from the tumor cells. The question arises, as to whether or not the glia cells are capable of transforming themselves to a lower embryonic stage of development. This question, and the relationship between the rosette and epithelial formations, will be discussed later.

Capillaries were markedly increased. Vessel walls were thickened, and showed occasional calcification and hyaline degeneration. Perivascular lymph space was widened, and in it some fat corpuscle cells were found. Throughout the tumor were hemorrhagic and necrotic areas.

The exact origin of this tumor cannot be definitely determined. The tumor cells did not show definite characteristics of ependymal cells, although most of the cells were more or less elongated in shape. The tumor filled most of the lateral ventricles posterior to the cut surface through the optic chiasm, involving the corpus callosum and invading the lateral walls of the third ventricle. From its location, it is most probable that the tumor originated from the ventricle wall, and belongs to the central glioma of cellular type.

Findings Outside of the Tumor.—In some parts, the tissue sur-

rounding the tumor showed rarefication, the architecture being loosened. The cells were less numerous and intermingled with granule and fat corpuscle cells. This suggests that the tissue was degenerating by the expansive growth of the tumor. Beyond this area, the brain tissue showed some increase of neuroglia cells and fibers, but remarkably less than were found in the tumor tissue. In other parts, the tumor tissue showed gradual transition into the normal brain section, without any recognizable demarcation. The neuroglia cells diminished gradually and diffusely to the average number of the normal appearing tissue, but the writer failed to find a definite border between the normal and pathological; as the neuroglia cells, in this case, were generally increased, and no normal tissue, in regard to the neuroglia element, was found throughout the brain. The question arises as to whether the general increase of neuroglia cells was due to general paralysis, as was clinically diagnosed. There was no perivascular infiltration, no serious disturbance of the cytoarchitectonic and myeloarchitectonic picture, and no great changes in the nerve cells. The general gliosis is not to be considered a secondary reactive process to the general paralysis, or to the primary parenchymatous degeneration. The changes of the neuroglia consisted not only in the increase of the cells, but also in the deformation of the normal spheric type of the nuclei. Very few glia cells retained their original form, while the greater part of the cells showed more or less altered forms, ovoid, oblongate, rod shaped, irregular, polymorphous, etc. Most of the nuclei stained deeper than normal, some of them showing regressive changes, while a few of them stained pale. The satellite cells (travant) were not increased, but showed definite form anomalies, some even being transformed into long drawn out rods, travant rod cells. This change of the neuroglia in general indicated, apparently, the proliferative process of the preëxisting neuroglia by some primary cause, not as a result of the parenchymatous involvement. Has this general gliosis resulted from the infective proliferative stimulation given forth from the tumor tissue, or has it resulted from the common causative factor which originated the tumor? To find an explanation to this question the sections from different parts of the brain were comparatively studied. Contrary to the writer's expectation, the gliosis was not of a diffuse character, but showed considerable topic difference.

The left cornu ammonis, right posterior central convolution, and convolutions of both frontal lobes, showed most marked gliosis. In the left cornu ammonis the cells were extremely increased, being

packed closely together forming gliomatous areas. These areas were more or less diffuse, gradually transforming into the normal brain tissue. The cells were almost as polymorphous as those in the tumor tissue (Fig. 1). Nerve cells and myelin sheaths were observed among these areas, but they were more or less degenerated. Histologically, no distinction was noted between the tumor

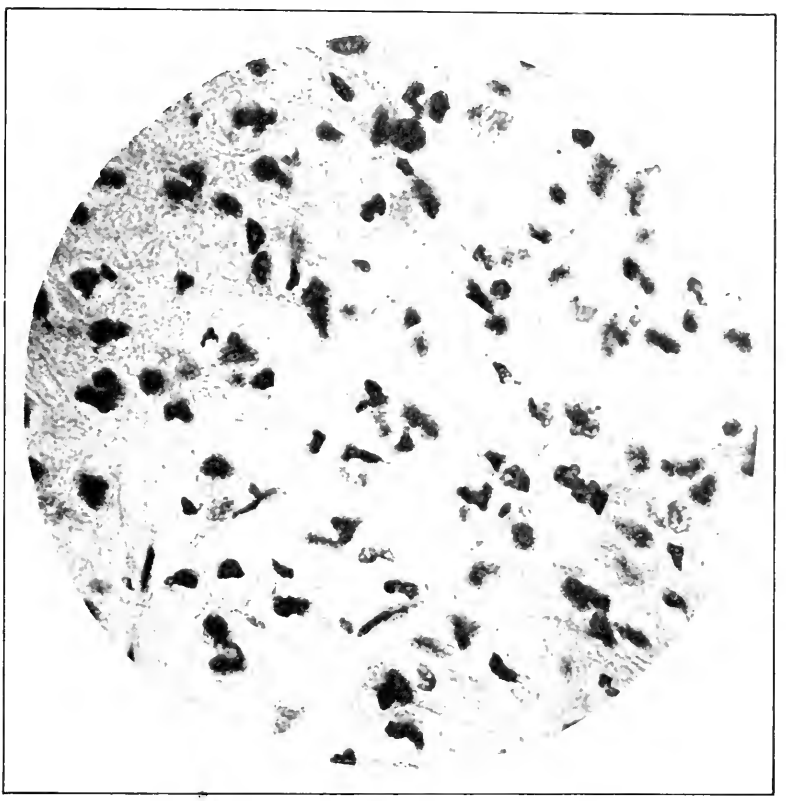

FIG. 1. A gliomatous area found outside of the tumor.

and these gliomatous areas. Macroscopically, the cornu ammonis did not show any increase in volume, making it very difficult to classify this kind of process. Whether it is to be classed in the extremely advanced stage of the gliosis, or diffuse gliomatosis, cannot be positively determined. According to the histological picture, which is almost identical with the tumor itself, it ought to be called diffuse glioma, or, at most, diffuse gliomatosis, while, when the gross anatomy of this part is taken into consideration, it is more justifiable to classify it as diffuse sclerosis.

As Dr. Lowrey noted, there were a great many cells presenting themselves as long drawn out rods. These were the Nissl rod cells of the gliogenic nature (Fig. 2). The opinions of authors in regard to the rod cells differ; some propose the ectodermal origin, others insist on the mesodermal. The first theory is affirmed by Cerletti and Straussler, and the second by Nissl and Alzheimer. Ris, Achu-

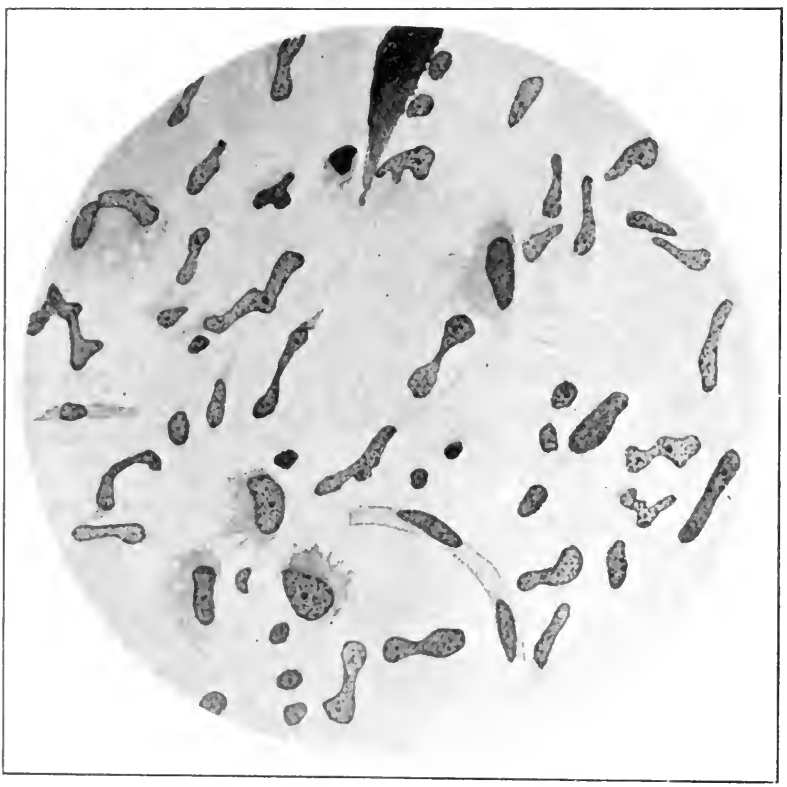

Fig. 2. Rod cells found diffusely outside of the tumor in the normal brain tissue.

carro, and Urlich, believe in both mesodermal and ectodermal origins.

The rod cells found in cases of multiple sclerosis, diffuse gliosis, diffuse glioma, and glioma, are believed by the writer to be definitely gliogeneous. The rod cells seem to indicate an abnormal proliferation of the neuroglia element, at least in the diseases above mentioned.

Observation II

Superficial Glioma of the Left Frontal Lobe

Case of a female, D. S. H. Clinical No. 17513. Pathological No. 2029. Patient's mother was said to have been nervous. Otherwise there is no history of mental or nervous diseases in the family. Patient was born in Ireland fifty-nine years ago, and at the age of twenty-nine came to Boston, where she worked as a waitress. She married and had three miscarriages. Her husband had syphilis some nineteen years ago, and the patient believed she had contracted it from him.

Onset of Illness.—Present trouble came on gradually for eighteen months. She became extremely irritable and showed marked impairment of memory. A year previous to admission she had an unconscious spell lasting two or three hours. Following this she was confused for several days, and from that time her speech became thick and incoherent; also her gait became unsteady. She was committed to Danvers State Hospital in August, 1913.

Mental Examination.—She was dull and stupid, and very untidy in her habits. She showed some speech defect which was more noticeable on repeating test phrases. She was confused and disoriented, and her school knowledge was poorly retained. Calculation ability was very poor. There was marked tremor of hands and writing was almost illegible. She had no hallucinations. Her memory was much impaired for both recent and remote events, and association of ideas was retarded. She seemed to have very little insight into her condition, and thought her coming to the hospital was due to some stomach trouble. She was apathetic, and showed slight motor restlessness.

Physical Status.—She was poorly nourished and developed. Slight asymmetry of face. Lungs, negative on auscultation and percussion. Cardiac dullness was not increased. No murmurs. Pulse, 84. Slight sclerosis of peripherel arteries. Abdomen, negative; genitourinary organs, negative; urine, negative; Wassermann test on blood serum, negative.

Nervous System.—Eyes, pupils equal, slightly irregular, react sluggishly to light. Hearing, apparently normal. Taste and smell not determined. Cutaneous sensibility localized poorly. Position sense fair. Stereognostic sense unimpaired. Vasomotor condition: No cyanosis or edema. Knee jerks exaggerated and equal. Marked clonus on right; less marked on left. No Babinski. Gait, ataxic. Marked swaying of Romberg's position. Marked tremor of extended fingers.

Course of Disease.—August 16, 1913, patient remained quietly in bed; untidy; euphoric. August 20. Marked memory and speech defect. September 17. Presented at Staff Meeting with the diagnosis of general paralysis, to which all agreed. October 3, confused; delusions developed. December 1, 1914, was unable to stand. Complained of drawing sensation and pain in left leg, also a twitching, as if her side and hip were drawn up. November 30, 1916. Patient gradually failed and was unable to walk. Was markedly demented and confused. July 13, 1917. Patient had continued to fail more rapidly during the last seven days and died, the cause of death being given as cerebral tumor. Like the previous one, this case was erroneously diagnosed as general paralysis, possibly because she had an indefinite history of syphilis, and because she had both mental and physical syndromes, similar to those of general paralysis. For some reason the spinal fluid was not examined, an unfortunate oversight, since the spinal examination on all suspected cases has been one of the routine tests of our laboratory.

Autopsy.—Six hours post mortem. Pupils were equal and regular. There was a deep sacral decubitus. Heart showed patent foramen ovale and fibrous myocarditis. Lungs were slightly adherent to the thoracic walls. There was chronic passive congestion of liver and chronic cholelithiasis. Kidneys showed chronic diffuse nephritis. Appendix contained a small calculus. There was fibrosis of uterus and cystitis.

Everywhere the dura was adherent to the calvarium. The brain weight with fluid was 1320 g. The dura was adherent to the brain on the left frontal region, and could be removed only by dissecting with scissors. The brain in the left frontal region showed a neoplastic area measuring 6 x 5 cm., and extending back from the frontal pole almost to the junction of the anterior central convolution. This area was very hard, somewhat elevated, nodular, and irregularly firm. Posterior to this mass the tissue was softened, almost gelatinous in consistency. The pia mater over this tumor mass measured three mm. in thickness, but elsewhere there was no thickening, nor adhesions, of the pia mater. The right frontal lobe showed nothing of note, the gyri being fairly well formed. The convolutions of both hemispheres were generally flattened. The rest of the left hemisphere, exclusive of the area in the frontal region mentioned above, showed nothing of note. Basally, the left olfactory bulb was small and densely adherent to the hemisphere. The right was negative. The circle of Willis showed slight thickening and irreguarity in the region of the anterior communicating artery. No granulations on the floor of the fourth ventricle.

The *spinal cord* showed nothing unusual. Middle ears were negative. After fixation, frontal sections were made according to Dalton's method.

Left Hemisphere.—Cut surface through frontal lobe in front of the corpus callosum showed the tumor occupying the anterior pole of the centrum semiovale. The neighboring medullary substance was softened. Cut surface through the anterior border of the corpus callosum. The tumor was situated in the larger part of the centrum semiovale and in the anterior part of the corpus striatum. In consistency the tumor mass was partly soft and partly firm, the softening suggesting secondary degeneration. Cut surface through the corpus callosum and corpora striata. The centrum semiovale and medullary substance of the third frontal convolution was softened. On macroscopical observation no more tumor substance was to be seen. Cut surface through the corpus callosum and lenticular nuclei, in front of the anterior commissure. The lower part of the centrum semiovale and a part of the corpus striatum still showed softening. In the surfaces through the posterior to anterior commissure there were no apparent gross changes.

Right Hemisphere.—The lateral ventricles were somewhat dilated, while the cavity of the left side showed flattening. In the white substance of the right occipital lobe there was a small cavity, suggesting pocket formation of the lateral ventricle, but without any connection with it. The area surrounding this small cavity was somewhat soft in consistency. Cut surfaces of the white matter as well as the gray matter were firm throughout both hemispheres, with the exception of the above mentioned softened areas. The surface of the ventricular walls was smooth on both sides.

Microscopical Examination.—Examination of the cerebral cortex and spinal cord failed to reveal any evidence of a paralytic process, there being no lymphocytic infiltration in the meninges nor in the perivascular lymph spaces, and no plasma cells. The cytoarchitectonic picture of the cortex was fairly well retained, there being no marked parenchymatous degeneration. In addition to these findings the negative spinal tests on fluid, which was taken post mortem, affirmed this case was not general paralysis, as was diagnosed clinically.

The tumor consisted of glia cells and fibers. The cells showed two different types, one being small with spheric nucleus and small protoplasmic bodies, more like normal glia cells, while the other was larger in size, appearing more like ganglion cells of the cortex, or of the anterior horn of the spinal cord. The smaller were more

numerous than the larger ones. The latter, however, were fairly abundant, and seen throughout the tumor. The protoplasmic body of these giant cells was extremely large, the whole cell being larger than the Betz cells of the motoric center, and when stained by Alzheimer's method showed a granular aspect, infringed by numerous vacuoles of various sizes. By application of light green fuchsin

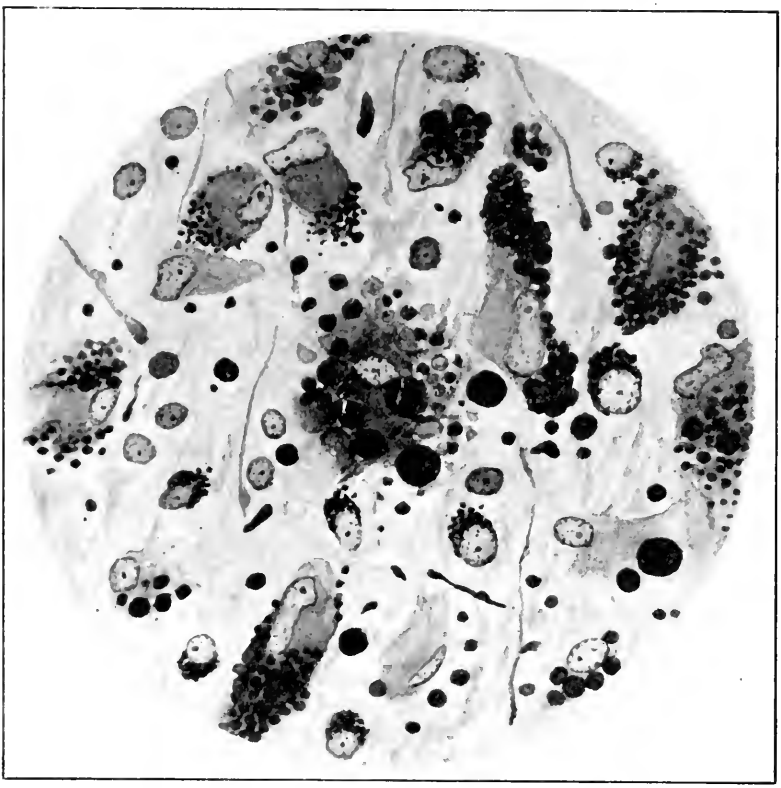

FIG. 3. Giant cells or granule cells found in the tumor tissue. Sudan III.

stain, on sections treated with osmic acid, various chemical stages of fat bodies, both on septi and in vacuoles, were revealed. In some cells the fat bodies were uniform, while in others the sizes varied. Debris of the nerve element and amyloid corpuscles were observed in the cells, particularly in those having various forms of fat bodies. The cells with more uniform fat corpuscles may be regarded as the result of the regressive metamorphosis, while the others may be the result of phagocytic function. The giant cells possessed, not rarely, two, three, or more nuclei with various forms, located mostly in the

periphery of the protoplasm. The nuclei of the giant cells stained paler than those of the smaller (Fig. 3).

The giant cells showed characteristics of the granule cells of Merzbacher, which appear in the pathological processes of the central nervous system functioning as scavenger cells. These cells were very precisely described by Lotmar, in the *Beiträge der Histologie des Glioms*. The same cells were apparently observed by Pels-Leuden, Redlich, Borst, and others, in multiple sclerosis. Stroebe called the glioma, consisting of these cells, "Glioma gangliocellulare." To the writer, the designation of gangliocellulare seems undesirable, as this ganglion cell like form is only one of the manifestations of the various forms of the neuroglia, and has nothing to do with the ganglion cells of the cortex. It is better to call it granule cell glioma, or giant cell glioma.

The neuroglia fibers were very well demonstrated, especially those given off from the small neuroglia cells. In the central part the thick fibers were the only constituents of the tumor forming a dense network. In the periphery the fibers were finer, and the network was looser than in the central part. In the periphery the neuroglia cells were increased, occasionally showing mitotic figures.

The blood vessels were sparse in the tumor, showing more or less regressive changes. The neuroglia figures seen formed a thick envelope around the vessels, strengthening the *membrana limitans*. The perivascular lymph space was slightly enlarged with a few fat corpuscle cells. A few necrotic areas and hemorrhagic spots were observed, especially in the central parts. Degenerated nerve fibers were seen in the periphery, but none in the center.

Findings in the Immediate Neighborhood of the Tumor.—Forward and upward the tumor showed very gradual transition, both by gross and by microscopical observation. Posterior to the tumor the brain substance showed a large softened area, in which the tissue was rarefied with very loose neuroglia fibers and occasional fat corpuscle and granule cells. The granule cells, the same as were found in the tumor tissue, were more abundant than the fat corpuscle cells. The neuroglia cells in this region were laden with various lipoid substances and debris of the nervous element. Beyond this softened area, in the white substance of the parietal region, the neuroglia cells were still noticeably increased with various form anomalies, such as giant and small cells with irregular forms of nuclei. These were the same in quality as those of the tumor tissue, but less in quantity. Toward the occipital lobe the cells gradually decreased in number, and merged into the normal appearing tissue without any demarcation.

Neuroglia Element in General.—As in the preceding case, this case showed a marked general gliosis, not only in the cerebrum, but also in the cerebellum, pons, peduncles, medulla oblongata, and spinal cord. In the spinal cord, however, the gliosis was less marked than in the rest of the central nervous system. In this case also, the general gliosis was not found in the same intensity throughout, but showed considerable local difference. The pons and the medul-

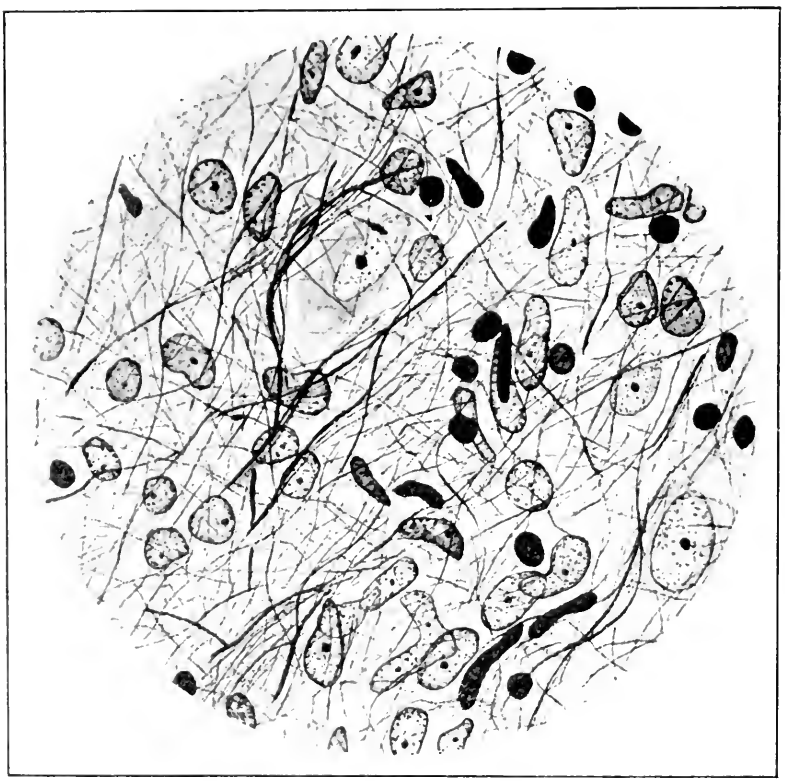

FIG. 4. Gliosis in the pons.

lary substance of the occipital pole of the right hemisphere (contralateral to the tumor) presented the most marked gliosis. In the pons the large, pale stained, irregularly formed nuclei were very numerous, while the small spheric nuclei were less in number (Fig. 4). The cells appeared more abundantly in the ganglions than in the nerve tracts. The neuroglia fibers in this region were unusually well demonstrated, marginal glia being remarkably thickened.

The small cavity, in the white substance of the right occipital

lobe mentioned above, was lined with cubic epithelial cells throughout the entire dimension. In certain areas the ependymal cells arranged themselves in a single cell layer, while in other parts they presented four, five, or more cell layers (Fig. 5). This cavity, studied by serial section method, proved not to be connected with the lateral ventricle in any way, but in general appearance it was exactly similar. Since Stroebe found small cavities lined with epi-

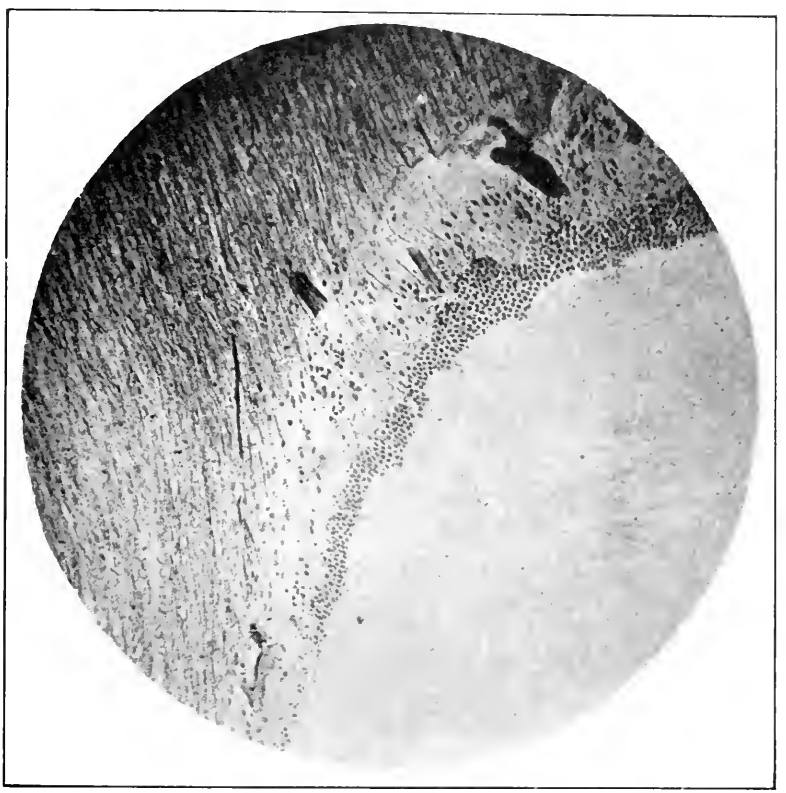

FIG. 5. A cavity lined with epithelial cells in the white substance of the right occipital lobe.

thelial cells in the tumor tissue, the same formations have been described by a few authors, but as to the nature of the formations opinions differ. The ventricle like cavity in this case, though it was not in the tumor tissue, as in other cases, cannot be considered as anything else than the displaced or invaded neural canal, *i.e.*, lateral ventricle.

In the immediate neighborhood of this epithelial formation, a

great many cells were found from which parallel running fibers were given off, resembling connective tissue (Fig. 5). The nuclei of these cells were more or less elongated, some showing evidence of direct dividing. These elongated cells with parallel running fibers, when studied carefully, proved to be neuroglia cells of ependymal character. As is known, the ependymal cells give off fibers in one direction only, in this differing from other forms of neuroglia cells.

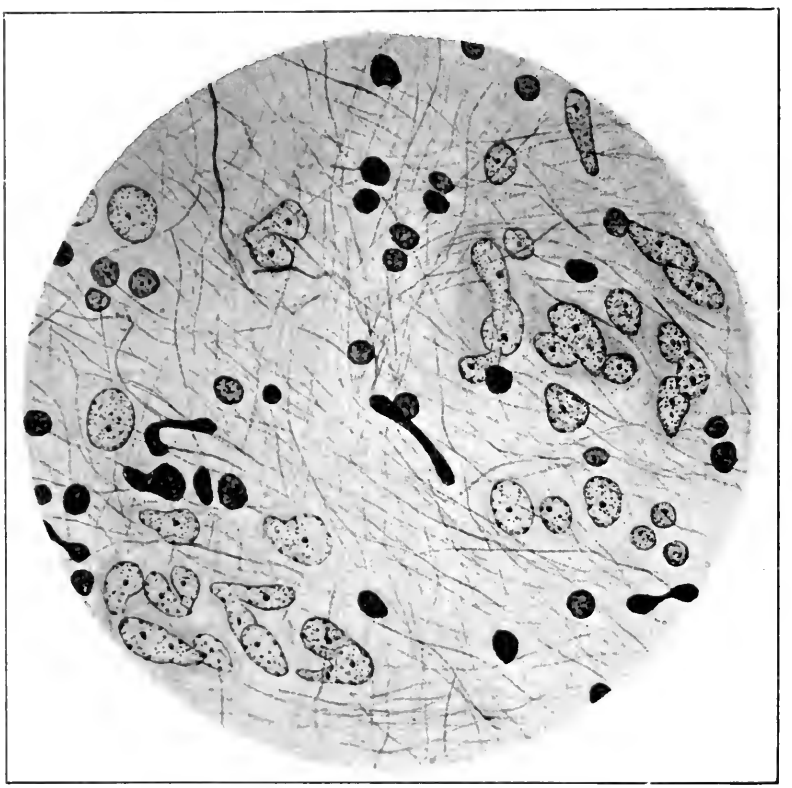

FIG. 6. Gliosis and giant cells with multiple nuclei.

Thus, this case indicated abnormal proliferation of the ependymal cells of the neural canal, evidently pointing to the embryonal factor in the sense of Cohnheim's theory. On the outside of this peculiar tissue of ependymal character was considerable gliosis. Not only increase of neuroglia cells was found but these cells showed an immense variety of forms (Fig. 6). Some were small and stained deeply, while others were large, very irregular in form, and with rather faint staining. Many of the giant cells, described previously,

were shown with less corpuscular and lipoid contents. Mitotic figures occasionally were seen. In short, the whole picture resembled that of the tumor tissue, probably with less cell element. The whole area showed very gradual transition into the apparently normal tissue of the occipital lobe. The neuroglia fibers were well demonstrated in this gliomatous area, as well as in the surrounding tissue. Both frontal lobes and cornu ammonis also showed well marked general gliosis. More rod cells were observed in the cortex than in the white matter. Particularly in the cornu ammonis considerable satellitosis and perivascular gliosis were observed. The marginal network of glia fibers was prominent throughout, but especially in the frontal lobe of the left side, corresponding to the tumor.

Observation III

Superficial Glioma of the Left Temporal Lobe

This case is that of a male, D. S. H. Clinical No. 21305, Pathological No. 2110. When admitted to this Hospital patient was forty-nine years of age. Mother died at age of seventy-two of goitre. One brother was a patient in this Hospital, his case being diagnosed as taboparalysis. Personal history showed no important diseases during infancy and childhood. Married at age of twenty-one, having one child. Until about five years ago he drank a great deal. No history of venereal diseases. About twenty years ago he got into a fight with a man in a billiard room, and was hit over the head with a billiard cue, but there were no serious after effects.

Onset of Disease.—About three or four weeks before admission he visited his brother, and at that time appeared exhilarated, grandiose, and talkative. About a week before admission he was taken sick in Providence, Rhode Island, and his brother was called to take care of him. He had been in a confused state of mind for three or four days, and was unable to take care of himself. He complained of headache, buzzing in his ears, and pains in his eyes. In moving about he would tumble and fall over things. He was removed to his brother's home where he remained ten days. He would not eat, was constipated, had frequent periods of confusion, and fainting spells; gait was unsteady. He was sent to this Hospital in December, 1918.

Mental Status.—He was aphasic, unable to comprehend questions, and could not recognize objects placed before him. Speech was incoherent and irrelevant. He was completely disoriented in all spheres. Memory was completely gone for both recent and re-

mote events. Association of ideas was very much impaired. No delusional formations could be obtained. He had no insight into his condition and was apathetic. There was no motor excitement.

Physical Examination.—Well nourished, well developed. Face asymmetrical; left nasal labial fold deeper than that of right. Hands cyanotic. Respiration, 18. No abnormalities were shown by auscultation and percussion. Heart sound somewhat irregular, but no definite murmur. Pulse, 80; rather high in tension and irregular. Blood pressure, 120–100. Considerable fetor. Stomach and abdomen negative. Genitourinary tract negative. Urine showed no sugar; no albumen. Wassermann on blood serum negative. Spinal fluid: Wassermann, negative. Gold, 3222221000. Globulin, faint ring. Albumen, 7 in 30.

Nervous System.—No nystagmus. Pupils, unequal and irregular, moderately dilated, reacted well to light test. Ophthalmoscopic examination was not done. Hearing, good. Taste and smell could not be tested. Reflexes. Deep reflexes practically abolished on both sides. Motility of facial muscles unimpaired. Tongue protruded somewhat to right. There was some loss of power in the right hand. Romberg, positive. There was a marked tremor of fingers. Slept well.

Course of Disease.—January 1, 1919. Confused, restless at times. January 20. Patient remained in bed for ten days on account of his confusion. At 9:30 P.M. he had a series of slight twitchings of the muscles and hands which lasted a few minutes. January 21. At 3:05 A.M. he sat up suddenly, and fell back dead.

Autopsy.—Seven hours post mortem. Small scar on right arm, also one on left leg. Acneform eruption over the back. Right nasolabial fold not as deep as left. Nose seemed somewhat deviated to left. There was profound hemorrhage from the nose. No adenopathy. The organs of the body were not taken out. Spinal cord was not removed.

The scalp was thick, but there were no adhesions or scars. Calvarium was dense, diploë was not visible. Grooves for middle meningeal arteries were deeper and wider on the left. Dura mater was neither thickened nor adherent. Pia mater was not clouded, but was remarkably congested. On removing the brain the left temporal tip was firmly adherent to the dura mater of the middle cerebral groove. Convolutions of both hemispheres were flattened. Basilar artery, carotids, and major cerebral arteries were not sclerotic. Cranial nerves, negative. A tumor, about the size of a hen's egg, was found over the lower surface of the left temporal lobe,

involving the uncus, anterior one third of the fusiform gyrus, and anterior two thirds of the second and third temporal convolutions. The first temporal convolution was considerably pressed down by the tumor mass. In consistency the tumor was fairly firm, but the brain tissue around it was somewhat soft. Within the tumor, and located above the uncus, was a nodular hemorrhagic area, about the size of a walnut, and of softer consistency than the surrounding tumor tissue. Brain weight, 1610 grams.

Vertical sections were made according to Dalton's method. The tumor occupied the greater part of the white matter of the left temporal lobe, extending from the cut surface through the corpus callosum and anterior commissure to the vertical section through the anterior pair of tubercula quadrigemini. The cut surface showed several hemorrhagic and softened areas. A certain part of the tumor showed a fairly well pronounced demarcation from the surrounding brain tissue, but the largest part of the tumor passed gradually into the normal brain substance.

Apart from the tumor, in the centrum semiovale and on the vertical section through the optic chiasm, a small hemorrhagic area was found. The centrum semiovale of the left hemisphere was found to be firmer in consistency than that of the right.

The right hemisphere was negative, except for the general flattening of the convolutions due to the increase of the intracranial pressure.

Microscopical Examination.—The tumor tissue consisted of a great many large and a smaller number of small spheric cells of neuroglia fibers. The large cells were the same as found in the preceding case. The small were more like normal neuroglia cells of the white matter. In the central part, the fibers were found thickly interwoven into a dense tissue. In the periphery they were finer and looser, and more in the form of prolongations of astrocytes.

Throughout the tumor the blood vessels were extremely increased, showing mostly regressive changes, while some indicated progressive processes. Most of the walls were thickened, calcified, or showed hyaline degeneration. In some places, however, the endothelial cells were shown proliferating and invading the surrounding tissue through the *membrana limitans*. Perivascular lymph spaces were dilated, and filled with cells laden with catabolic elements. Necrotic areas with coagulated albuminous substance, and many hemorrhagic areas were observed (Fig. 7).

The tumor tissue showed gradual transition into the normal substance, except in a certain area where there was more or less

definite demarcation, and where the tumor tissue compressed the surrounding substance. It is to be mentioned that this pronounced demarcation has nothing to do with the nodular area as found in a case of Stroebe's study, which he believed to be a regional metastasis. To the writer, the glioma seems to show expansive proliferation, in addition to infiltrative process.

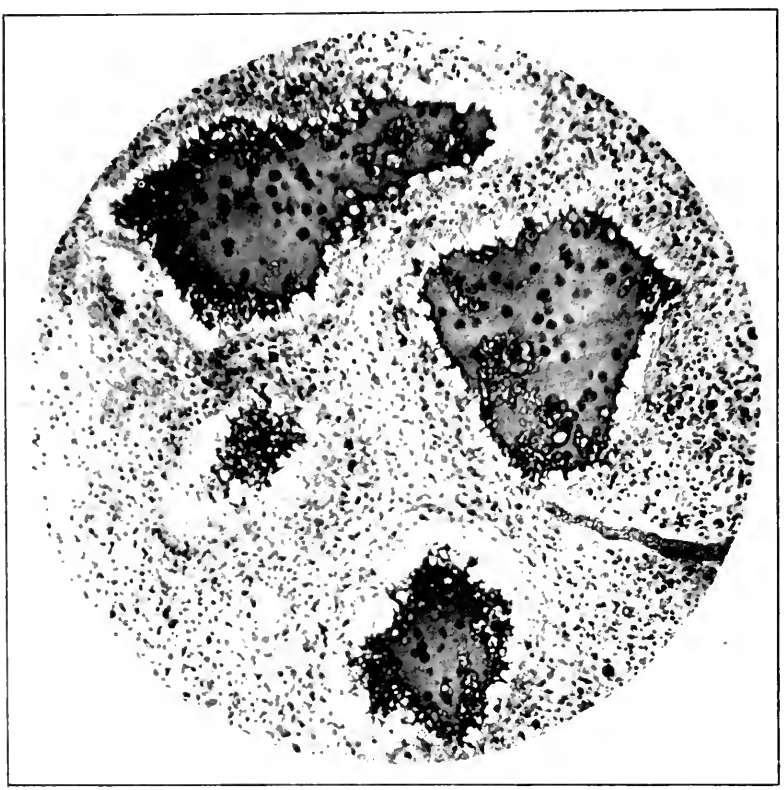

FIG. 7. Necrotic areas with coagulated albuminous substance.

The Neuroglia in General.—The neuroglia cells were generally increased in the cortex, as well as in the white matter. Differing from the two preceding cases, the forms of the nuclei were not so variable, being more or less spheric. In the cortex, however, many rod cells of typical form were encountered. These were more numerous in the cornu ammonis than in other parts. Like the preceding cases, this case presented an extreme local gliosis. In the part of the centrum semiovale, where a small hemorrhage was observed, the gliosis was most pronounced. The forms of nuclei were

manifold, varying as much as in the tumor tissue. Here the question may arise as to whether or not the gliosis of this part is secondary reactive process to the hemorrhage, trying to repair the place destroyed. The area of this extraordinarily pronounced gliosis extended over the whole dimension of the centrum semiovale of this plane, and it seemed to be too large an area for the reactive secondary gliosis. Moreover, a fine network of neuroglia fibers was found inside the hemorrhagic area, suggesting, by their manner of proliferation, a primary process. Also, the hemorrhagic area appeared to be a recent occurrence, for the red blood cells retained their form and pigment. Landau found considerable alteration in the walls of the vessels inside the tumor, but none in those outside. In this case the vessel walls in the tumor showed, as described above, remarkable changes, with some progressive ones. The centrum semiovale vessels were also more or less sclerotic, walls were thickened, partly calcified, while in the remaining normal tissue there was no apparent alteration in the vessels. Therefore, it is more reasonable to regard the hemorrhage as being a secondary process, in consequence of gliomatous changes of the tissue.

Special attention should be paid to the fact that there was no histological connection between the tumor and the gliomatous area of the centrum semiovale. These two were independent, insofar as the formation was concerned. The glia fibers were unusually well demonstrated throughout. The marginal neuroglia network was extremely thickened, especially over the left temporal lobe, and immediately above the tumor.

Observation IV

Central Glioma of Left Hemisphere

This case is that of a male, D. S. H. Clinical No. 20818, Pathological No. 2087. Mother of patient had locomotor ataxia; otherwise the family history is negative for nervous and mental diseases. Patient was born in Nova Scotia fifty years ago. He received a grammar school education, and always worked as a lobster packer. Married at the age of twenty-seven; two children; no miscarriages. He denied venereal diseases. Had good disposition and excellent habits.

Onset of Illness.—About a year previous, while loading a boat, the derrick broke and a heavy beam came down on his head, rendering him unconscious for several minutes. He returned to his work the same day, but remained only a few moments as he became

unconscious again. He was taken home but returned to work in a few days. He continued work until January of the following year, although he was gradually failing. On January 4th, 1918, he had a severe attack of vomiting, with pains in his forehead, which lasted for three days, after which he returned to work. He worked for three days and had another attack, duplicating the previous one. These spells continued until May 2nd, when he was taken to the Massachusetts General Hospital, and there operated upon for brain tumor. The usual decompression was made, but brain did not appear to be under pressure, and there was no evidence of tumor. On May 9th, 1918, he was discharged, "unrelieved," to this Hospital.

Mental Status.—Patient was quiet, tractable, indifferent, and had little to say. He was tidy in his habits, and was partially oriented. He showed slight speech defect, which was more pronounced on repeating test phrases. His school knowledge and calculation ability was good. Memory was much impaired for both recent and remote events. He had no hallucinations or delusions. He realized his condition. He said his memory had been bad ever since he received injury, and could not recall when operation occurred, but remembered being operated on at the Massachusetts General Hospital. He said his head felt better, and things were beginning to come back to him. Emotional tone was one of indifference. There was no motor disturbance.

Physical Status.—Fairly well developed and fairly well nourished. Had a scar on right side of head in the temporal region, the result of operation for decompression. There was some facial asymmetry. Slight sclerosis. Chest, poorly developed and narrow, with sharp costal angle. Lungs showed nothing remarkable on percussion and auscultation. Heart, negative. Pulse, 72. Blood pressure, 140–70. Abdomen, somewhat tense, otherwise nothing remarkable. Genitourinary organs, negative. Wassermann on blood serum, negative.

Nervous System.—No localized pains or headaches. Conjunctivæ somewhat congested. Pupils, equal, slightly irregular, reacted well to light and distance. Hearing, good. Cutaneous sensibility unimpaired. No edema; no cyanosis. Arm reflexes present and equal. Knee jerks exaggerated and equal. No clonus. Babinski, both sides positive. Gait; somewhat unsteady. Romberg, positive. Some tremor of extended fingers. Patient slept well.

Course of Disease.—May 9, 1918. Patient quiet and tractable, dull and indifferent. Memory defective. Had insight into his condition. May 13th, continued quiet and tractable. Slight speech de-

fect. May 20th, no change. May 22nd, patient presented at Staff Meeting and diagnosed as traumatic psychosis. June 23rd, patient died, cause of death being given as bronchopneumonia.

Autopsy.—Extending from right ear upward and backward to the lambdoid suture was a linear scar. Beneath the temporal muscle was a circular area, six cm. in diameter, where the calvarium was removed, and the brain substance was palpable, but there was no bulging. There was another pale white scar, 4 x 6 cm., about two cm., in front of the right ear. The nasal septum was moderately deflected to the right. There was no malformation of xyphoid process. Fine omental adhesions around spleen, gall bladder, and cecum. Slight adhesive pleuritis. Early bronchopneumonia. Chronic passive congestion of liver. Cloudy swelling of kidneys. Slight hypertrophy of prostate.

The dura was not adherent to the calvarium. There were a few minute depressions along the superior saggital sinus. The meningeal grooves were shallow. There was no evidence of fracture anywhere in the skull. Brain weight, 1500 g. Capillaries of pia mater were greatly injected everywhere. The convolutions were prominent but seemed to be flattened over the entire brain. On the inferior surface near the midline, the convolutions near the optic chiasm of the left temporal lobe were edematous, and fluctuated on palpation. The inferior surface of the left temporal and frontal lobes was broader and somewhat more flabby than on the right. The basilar vessels were not sclerotic. There were a few fresh fibrinous adhesions about the basilar vessels. The cord was not remarkable.

Sections of the Brain.—When the brain was sectioned, a soft, fairly well circumscribed brain tumor was found in the left hemisphere. This involved a large part of the internal capsule, a small part of the corpus striatum in the region of the caudate nucleus, and a large part of the central region of the frontal and temporal lobes. This tumor began about two cm. from the tip of the frontal lobe, and extended backward six cm. into the temporal lobe, barely reaching the main part of the internal capsule and the occipital lobe. It encroached upon the lateral ventricle, which was enlarged behind the tumor mass compensatorily. Also, there was some evidence of internal hydrocephalus in the right lateral ventricle. The mass forming the tumor was rather soft and structureless, and did not seem very necrotic. It was not especially rich in blood supply. In some parts it was fairly well circumscribed, while in other parts it invaded the brain substance. The choroid plexus seemed edematous and enlarged.

Microscopical Examination.—This tumor consisted of more cells than fibers. Toward the center the cells were very closely packed, and there were almost no fibers. The small cells were more numerous than the large. In the periphery the number of cells was noticeably diminished, with an increase of neuroglia fibers. Where the neuroglia cells were seen closely packed together, epithelial formations of various forms and sizes were encountered. These were found not only around the vessels but free in the tumor tissue, not, however, lining the vacuoles of large cavities. The forms were very irregular, and when seen under low power they appeared to be of glandular structure. By higher magnification these cells of epithelial formation were shown displaying the character of ependymal cells, being more or less cubic in form, and from one end of which fine fibers were given off toward the periphery (Fig. 8). The ependymal structure differed from the one observed in the white matter of the occipital lobe of the second case, in that the cell order was more irregular and was not related to the cavity, but found amidst the tumor tissue. However, this epithelial formation was the same as has been observed and described by many authors. In this case the tumor was located near the lateral ventricle, and the epithelial formation might be regarded as the remains of the embryonal tissue which may have given rise to the later development of the tumor. But on the other hand, the epithelial formation in this case, being an incomplete one, might be regarded as secondary formation of the neuroglia cells. The neuroglia cells in the tumor had a tendency to arrange themselves into an epithelial like structure. The irregular forms of the structure and its objectless arrangement would suggest that the formation was secondary, and made from younger proliferating neuroglia cells. Occasionally mitotic figures were observed.

Contrary to macroscopical observation, the vessels were found to be fairly abundant in the tumor, and showed fatty and hyaline degeneration, and a few calcified ones. The perivascular lymph spaces were enormously dilated, and contained granule and fat corpuscle cells. The neuroglia proliferation was especially marked around the vessels.

As has been described in the microscopical observation, the growth of the tumor was not absolutely infiltrative. In some parts, the tumor showed a pronounced line of demarcation against the normal tissue, the latter showing more or less marked rarefication. Therefore, the tumor suggests, in these parts, a definite expansive growth. Heretofore the infiltrative growth of the glioma has been

considered as a chief characteristic, and little attention has been given to its expansive growth. In most parts, however, it showed diffuse infiltrative or infective growth (Stroebe). The transition into the normal appearing tissue was diffuse and very gradual with-

FIG. 8. Epithelial structures within the tumor tissue.

out noticeable demarcation. In front and behind the tumor mass, almost all areas of the centrum semiovale were occupied by considerably increased neuroglia cells, and the definite border of the tumor could not be determined.

Neuroglia Cells in General.—As in the other cases, in this case also a considerable general gliosis was discovered. This condition was found not only in the left hemisphere but also in the right hemisphere, cerebellum, and spinal cord. The glia cells were noticeably increased, both in the cortex and medullary substance. The forms of the nuclei were more or less altered, normal spheric cells being rarely observed. Rod cells were abundant in the cortex, and less in number in the white substance. The frontal convolutions and cornu ammonis presented a more marked gliosis than in the other parts. The centrum semiovale of the right hemisphere and lenticular nuclei of the same side displayed the most marked gliosis. Among these areas of gliosis, the ganglion cells and myelin sheaths were more or less degenerated, the ganglion cells revealing considerable fat deposit, which was granular in appearance, and occupied most parts of the cell body. The nucleus of these ganglion cells was seen pressed to the side of the cell body. The ganglion cells of the cortex showed some degeneration, which, however, is to be expected in most brains. The neuroglia fibers were demonstrated everywhere, the marginal network being remarkably increased. In most parts of the cortex and medullary substance perivascular gliosis was encountered.

Summary

The recent study of the normal and abnormal neuroglia has shown that this element is more than a mere connective tissue of the central nervous system, and that it has a reconstructive and nutritive, as well as scavenger, function. There is even a hypothesis that the neuroglia cells may excrete a certain hormone, which is related to the development of the central nervous system. Thus, the glioma being of neuroglial origin, and the neuroglia being a specific and peculiar element of the central nervous system, the study of the general condition of the latter, in cases of glioma, is quite necessary.

One of the most important findings in this present study is the general gliosis associated with gliomata. In each case, herein observed, the writer found a well pronounced general gliosis, though each differed more or less in intensity. So far, in the search in literature, the writer has not ben able to find that general gliosis, in cases of glioma, has ever been thoroughly described. It has been described by a few, but has attracted little attention.

How is the Diffuse Gliosis to be Explained?—The glioma, when proliferating, does not progress in the direction of the least resistance, as most other tumors do, nor does it grow by way of the lymph

channel or blood stream, but in most cases there is very gradual transition into the surrounding brain substance. Storch noticed this condition, and pointed it out thus: "It gives an impression as though all the glia cells of the peripheral part and the surrounding tissue begins to proliferate by some stimulus cast forth from the tumor. This, I might say, proliferative stimulus reaches to the neuroglia cells at a considerable distance." Thus Storch called attention to the gliomatous transformation of neuroglia cells of the normal brain tissue, even at a "considerable distance" from the tumor substance.

Does this So-called Infective Stimulation cause the Diffuse Gliosis?—The writer does not think so, for the stimulation is only around the tumor, and cannot explain the diffuse gliosis of the glioma, which is general in character.

The writer also studied the general glial element in two cases of endothelioma, in one case of metastatic carcinoma, in one case of metastatic sarcoma, and in two cases of internal hydrocephalus. In all of these the writer failed to find any noticeable general gliosis. By this comparative study the increase of the intracranial pressure can be safely ruled out from the etiology of the general gliosis. The sarcoma and carcinoma are tumors which are supposed to produce some toxic agent, but neither can this be responsible for the above mentioned condition. In the case of metastatic sarcoma, which had been provisionally diagnosed as glioma, the writer studied the brain tissue first, in the anticipation of finding the same general condition of the neuroglia, which condition, however, he did not find. But, this negative finding was later justified, as a careful study of the tumor revealed it to be a sarcoma, and not glioma.

Although Ranke admits Storch's infective theory, he gives another possibility for the explanation of the gliosis or gliomatosis of the surrounding areas of the tumor. Ranke says that some of the tumor cells, set free from the syncitial union, may wander into the normal surrounding tissue, especially around the ganglion cells, and may give the appearance which was noted by Storch. This explanation of Ranke sounds more reasonable than the infective theory, but is still insufficient, especially for the explanation of diffuse gliosis. Although Storch's theory is not available for the explanation of this question, we can still accept the idea of proliferative stimulation, which, however, does not directly execute its influence upon the surrounding tissue, but performs its action indirectly through the blood stream, although nothing definite is known.

Possibly there is another explanation for the general gliosis, *i.e.*,

an assumption of a common causative factor for both general gliosis and tumor formation. The general gliosis in these cases of glioma showed a great resemblance to that of diffuse sclerosis. In the diffuse sclerosis, as in the cases discussed, the genesis and the character of the gliosis is not well known. Whether this is an exogenous or endogenous disease of the central nervous system has not been determined, nor is it known whether the hyperplasia of the neuroglia is secondary to the degeneration of the nervous parenchyma, or whether it is a primary overgrowth of the glial element, in consequence of which degeneration of the nervous element is caused. Strümpell called this pathologic process a chronic interstitial encephalitis, claiming it to be of an inflammatory character. Rebizzi, differing from Strümpell, declared it to be primary disease of the nervous element, causing the proliferation of the neuroglia.

In a study of a former case of diffuse sclerosis, the writer expressed the view that this diseased condition was probably brought about by a primary unknown biochemical stimulation, which worked upon the endogenous congenital factor, and therefore is to be classed as gliogenous neoplasma, such as diffuse glioma. The writer is of the opinion that in cases of glioma, diffuse gliosis is the same in character as diffuse sclerosis, being a primary process caused by the same etiological factor as that of the tumor. Yet, so far as the etiological or stimulative factor is concerned the writer has indefinite conception. It might possibly be caused by something related to a disturbance of the internal secretions. Some cases showed a positive Wassermann test on blood serum, as in those of diffuse sclerosis, while others presented neither clinical nor serological evidence of luetic infection.

In addition to diffuse gliosis, focal gliomatous areas were found in the first three cases. The glioma has been said to be a solitary tumor which is unable to form any metastasis, except regional nodular ones. How, then, can these gliomatous areas outside of the tumor be explained? Landau reported a case of diffuse glioma in which he observed two entirely separated areas of gliomatous alteration. Not rarely gliomata of the stem of the brain are found associated with gliomatous areas of the spinal cord, which show the clinical syndrome of syringomyelia. In regard to the difference of such gliomatous areas and the glioma, Landau concludes: "While the glioma, being originated from the displaced embryonic sprout, gives the impression of a circumscribed tumor which has started from a single predisposed area, and the regular form is only slightly impaired by its infiltrative proliferation, the diffuse gliomatosis

arises from innumerable points or, sometimes, even from macroscopically distinguishable spots which are of congenital abnormal predisposition and distributed over the large area of the cerebral tissue." In regard to the gliomatous areas and the tumor the writer cannot agree with Landau, for no fundamental difference could be seen between the two, except in external appearance. Both formations, probably, have resulted from a congenital basis and the same causative stimulation, the only difference being that the glioma appears more circumscribed and compact in cellular and fibrous element, while the diffuse glioma or gliomatous area is more irregular and diffuse. While the glioma shows a change of external configuration, the gliomatous area shows no changes of gross anatomy. Both processes are abnormal proliferation of neuroglia cells with congenital predisposition. The very rapid and luxuriant proliferation of the glioma gives the impression of the infiltrative or socalled infective progress, while the gliomatous areas present a picture of appositional growth.

Therefore, the gliomatous areas seen in these cases of glioma seem to the writer to be caused by the same etiological factor, acting on the congenitally displaced or agenetic tissue, and have only a quantitative difference between them and the tumor proper.

The epithelial formation in the glioma, and in diffuse glioma, has been described by many. The same structure was found by the writer in both the first and last cases discussed, and in the second case a displaced neural canal in the center of the gliomatous area was seen.

Stroebe was the first to describe this structure, and to regard it as a displaced neural canal which had taken place during embryonal life. This is an evident support of Cohnheim's hypothesis of superfluous or displaced embryonal cells, who states that: "Cells or tissue which in the course of the development of the body may be displaced or do not undergo the normal differentiation, may remain for long periods unaltered, but liable in later life, by some cause or other, to proliferate with all the potencies of the lowly organized cells, in the midst of the mature tissue."

Storch also observed ependyma-like element and cell groups scattered through the tumor. In one case he noted a splitlike cavity half lined with ependymal cells, and situated in the neighborhood of the ventricle. Storch admits the possibility of the displaced lateral ventricle being the cause of the glioma. "Theoretically," he said, "there is nothing to oppose the assumption that displaced embryonal neuroglial cells are responsible for the later development

of the glioma." But on the other hand Storch remarks, "Stroebe's findings of ependymal structure can be explained in another way, that is, the part of the lateral ventricle may be taken into the tumor tissue while the latter is proliferating, and on account of its irregular growth the cavity may be found at quite a distance from its origin." Storch also admits the possibility that the fully developed glia cells may be able to metamorphose themselves into the ependymal cells, just as the contrary is the fact, *i.e.*, the ependymal cells produce neuroglia cells physiologically.

Saxer does not believe in the congenital nature of the epithelial formation, but he says that the neuroglia cells being of ectodermal origin have a tendency to form an epithelial arrangement when proliferating. Bonome, agreeing with Saxer, does not regard it as always being a displaced neural canal, but differs from Saxer in that he considers it to be caused by embryonal undifferentiated cells. Ribbert, in studies of two cases of glioma, observed the same structure, and claimed it to be the displaced embryonal tissue. Fodomaniczky also described the same structure and expressed the same idea as Ribbert. Landau agrees with Ribbert in that he does not regard the epithelial formation as a congenital malformation. "When the glioma is growing," he says, "one may find at the part of the most active proliferation, a formation which is identical with the embryonic neuroglial element, and the youngest stage of these proliferated glia cells corresponds to the epithelial formation."

The opinions of the different writers can be grouped under two hypotheses,—1. Primary existence of the epithelial structure as such, *i.e.*, a displacement of the embryonal cells.

2. Secondary development of the epithelial arrangement from proliferating neuroglia cells.

Under the second theory we find two varied opinions. Bonome regards epithelial formation as formed secondarily from embryonal cells, while Saxer asserts that the mature glia cells, when rapidly proliferating, form the embryonic type which are known as ependymal cells.

In all research literature which the study of epithelial formation has produced it is evident that the writers observed two different structures, one an ependymal cavity with typical cuboid cells, and the other of a rosette or irregular band form arrangement. In the case of Observation I the writer found a rosette formation, and in Observation II, in the center of the gliomatous area, was found a real ependymal cavity, while in Observation IV a bandlike arrangement of cells was seen. This last was described by Wintersteiner in his monograph on "das Neuroepithelioma retinae."

The atypical epithelial structure, as the rosette or bandlike arrangement of the cells seems, to the writer, to be a secondary formation caused by the proliferating neuroglia cells. The typical ependymal cavity lined with cuboid cells, found in the center of the glioma or in the gliomatous area, may be regarded as having primarily existed as a malformation, which later gave rise to development of the tumor. It will be very difficult, in some cases, to decide whether or not the structure found is primary or secondary.

The writer cannot agree with the assumption that the typical ependymal cavity is an accidental finding having nothing to do with the tumor formation. Not only Stroebe's case, and the case discussed in Observation II, but the findings of many support Cohnheim's hypothesis for the glioma. In most cases of syringomyelia Hoffmann regards the formation to be of the same origin. Glioma, on the other hand, presents an imposing array of instances in which tumors are found in conjunction with other congenital malformations, such as encephalocele, spina bifida, and syringomyelia. Another formation is the neuroglioma ganglionare, which is to be considered as a congenital heterotopia, and is occasionally found associated with glioma. Congenital malformations of other organs of the body have been observed by many writers. In the study of Observation II a patent foramen ovale was found, and in the last, Observation IV, was seen a malformation of the xyphoid process. All these facts lend considerable possibility to Cohnheim's hypothesis, and to the writer it appears to be applicable, at least in certain cases.

In connection with epithelial formation the question arises as to whether or not the mature neuroglia is able to form ependymal cells of a lowly organized type. According to Lenhossek, the gliomatosis is developed from the cells, *i.e.*, developed from undifferentiated neuroglia cells which retain their embryonal character, while the neighboring neuroglia cells differentiate farther to their mature form. He does not put great stress on the idea of the displacement of the cells, in this respect differing from Cohnheim. Landau, believing as Lenhossek, states that the epithelial cells and the ependymal formation of the tumor can be explained by the assumption of agenetic cells. Saxer is of the opinion that the mature neuroglia cells, being ectodermal in origin, have a hidden power to form epithelial structure when proliferating rapidly. In accordance with which of these opinions or theories are the observations of this study?

As has already been described, diffuse gliosis of cases of glioma

was not only expressed by an increase in number of cells, but the individual element showed very marked change in form. The first case showed hardly any normal appearing neuroglia cells either in the cortex or white matter. There were abundant satellite cells of rod shape, called satellite rod cells. These of abnormal form cannot be considered to have existed as such from the beginning. The facts that the transition between the normal part of the cerebrum and the tumor tissue is very gradual and that the neuroglia cells in general present remarkable abnormalities point to the hypothesis that the mature neuroglia cells are able to transform into a lower embryonic type.

If, however, the normal neuroglia cells are able to develop glioma cells, the congenital theory of Cohnheim and Lenhossek seems to be disproved. Is then, the congenital theory for the development of the glioma to be discarded? No. A whole array of facts suggesting congenital factor, which cannot be denied, has been pointed out by the writer. That the two apparently different hypotheses of Cohnheim and Saxer can be associated, is the opinion of the writer. The reaction of the neuroglia for the stimulus seems to be different in each individual. For example, Merzbacher's case showed gliomatosis, reacting to sarcoma and to local softening, but, few known cases of sarcoma are accompanied by secondary gliomatous formations, and no other case has ever been reported, in which the simple area of softening is considered to be the origin of the glioma. The congenital predisposition is not only to be expected in the form anomalies, such as displacement or agenesis, but is also to be expected in the character of the neuroglia cells, which may react easily to the external stimulus. In the present study neither metastatic carcinoma nor sarcoma showed recognizable general gliosis or gliomatous formation, except the normal reactive gliosis around the tumor. Merzbacher's case must then be considered as one with congenital predisposition, in which normal mature neuroglia cells have an abnormally exaggerated reaction to the external stimulation. The abnormally labil character of the neuroglia cells is naturally to be expected in brains with congenital predisposition,—thus finding an association between the hypotheses of Cohnheim and Saxer.

As to the proliferative modus of the glioma opinions differ. Storch added to the theory of infiltrative growth, to which most writers agree, a new proliferative process known as *inficierendes Wachstum*. As has already been mentioned, the proliferating picture around the tumor gave the author the impression that the neu-

roglia element in the neighborhood had been infected by some proliferative stimulation, produced from the tumor and gradually absorbed by it. Like Storch, and most authors, the writer observed a remarkable proliferative process of the cells in the cortex neighboring the tumor, especially those accompanying ganglion cells. Storch's theory at first semed plausible to the writer, but when the diffuse gliosis was taken into consideration it was no longer sufficient explanation for this condition. Storch's idea that the normal cerebral tissue is readily transformed into tumor tissue is far fetched, and to the writer seems improbable.

The writer believes that the tumor is formed by a group of neuroglia cells of unstable character, or by displaced embryonal tissue, which reacts with the same abnormal proliferative process. By the assumption of a general stimulation, the coexistence of the general diffuse gliosis, proliferative process of the surrounding tissue, gliomatous areas, and the glioma itself can be explained.

Associated with the proliferative modus of the glioma there arises a question as to the difference between reactive gliosis and gliomatosis. Stroebe says that in gliosis the cells are more uniform and like normal neuroglia cells, while in glioma there may be found manifold varieties of the histological picture in the same process. Storch called attention to the secondary degeneration of the glioma, which is not found in the reactive or reparatory gliosis. Rossolimo thinks that the appearance of the cells with large thick prolongations, and the tendency for forming cysts, are characteristic of the gliomata. Weigert pointed out that the characteristic of the gliosis is in the luxuriant formation of the neuroglia fibers. Lenhossek and Storch are of the same opinion. According to Bonome, both irregular and polymorphous large cells and small, with scant protoplasmic portion, may be found in the areas of gliosis. Hertwig and Roessle think that the disproportion between the size of the nucleus and protoplasm is characteristic of tumor cells, and by this the tumor cells can be differentiated from reactive neuroglia cells. Ranke is of the same opinion, but says that the more important fact than this is the ependyma-like formation of the tumor, for by this the real tumor formation can be decidedly differentiated from the reactive gliosis. By him a part of the luxuriant proliferation of the tumor tissue was considered to be a reactive gliosis of normal neuroglia cells existing in the tumor tissue.

To the writer, it seems that many characteristics of the reactive gliosis and gliomatosis described by the authors cannot be applied in all cases. In fact, when studying cases of glioma and allied diseases,

transitional forms are, not rarely, encountered, making differentiation almost impossible. Henneberg, like the writer, could not see any absolute difference between the secondary gliosis and glioma. Merzbacher and Uyeda's case is also an example that there is no fundamental difference between the two.

Theoretically, the reactive gliosis and gliomatosis is distinctly separated, in spite of the fact that histological differentiation is sometimes almost impossible. Reactive gliosis is proliferation of the neuroglia, reacting secondarily to a certain condition; hence, it is an appropriate hyperplasia, showing some functional characteristics of neuroglia. These characteristics are filling spaces, encapsulating foreign bodies, strengthening the *membrana limitans,* deporting waste products, transporting nourishment, etc. In the reactive process the neuroglia cells may appear in various forms showing very active proliferation, sometimes as active as in the abnormal neoplastic proliferation, but always having a certain purpose; whereas, the hyperplasia of the tumor cells is entirely independent and egoistic in its way of proliferation.

Another fact that makes the differentiation between gliosis and gliomatosis difficult is, that the tumor cells execute, to a certain extent, the physiological function of the normal neuroglia. The scavenger function, luxuriant fiber formation, etc., seen in the tumor, have been attributed by many to the function of the abnormally proliferating tumor cells. Thus, in one way, the gliosis appears more like gliomatosis, while, on the other hand, gliomatosis has the appearance of gliosis.

Between the simple reactive gliosis and gliomatosis of decidedly neoplastic nature there are a number of diseases, which are known under the names of diffuse sclerosis, lobar sclerosis, tuberous sclerosis, multiple sclerosis, etc. Many claim predisposition of the individual for these diseases, while others propose that these diseases are exogenous, and result from an inflammatory process of the nervous element. Already the writer has expressed his idea as to the congenital nature of diffuse sclerosis and allied diseases. If these are, as presented, a primary development from some etiology acting on congenital basis, there is no fundamental difference between the glioma and these diseases mentioned above. The difference is in the various resultant forms, and not in the nature or genesis of the process.

Further discussion of these diseases individually is not the purpose of this study, and would lead beyond the limit of this article.

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EPIDEMIC ENCEPHALITIS. RESIDUAL SYMPTOMS, CHRONICITY AND RELAPSING TENDENCY

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Since the recent outbreak of epidemic encephalitis, much has been written concerning its clinical manifestations, pathology, and possible etiology, but few suggestions have been made as to treatment and little or nothing has been said as to the residual symptoms remaining after the immediate attack has spent its force. Numerous writers have mentioned the extreme languor and disinclination to mental and physical effort, which has been manifest in many cases following the acute symptoms, but aside from this one is able to gain little information as to the ultimate outcome of the more severe cases. With a view to bearing a small part in completing the literature dealing with epidemic encephalitis, I wish to report the apparent end results in a serious case which I have been permitted to keep under continuous observation, and in several others which I have kept track of less rigidly myself or through their attending physicians.

Case.—M. T., female, aged eighteen, stenographer. Family and previous history, negative. No history of previous influenza. On February 12, 1920, was obliged to remain at home on account of a pharyngitis which, according to the mother's statement, was rather atypical in character, resembling neither diphtheria nor tonsilitis. The pharynx was red with a coating of glairy mucus somewhat similar to that observed in mild cases of scarlatina. Within a few days there was an apparent complete recovery, permitting her return to work. On February 21, after a period of seeming good health, she complained of a severe pain between the shoulders and became very nervous, with an insistent desire to weep. The pain lasted approximately twenty-four hours. February 23, she became extremely drowsy and slept throughout the entire day. On the evening of the twenty-third, it was observed that her right upper extremity was weak,—sufficiently so, that she was unable to feed herself readily with the right hand. Between February 23 and February 29, at which latter date I was first permitted to make an ex-

amination, she was extremely restless, slept scarcely at all, complained of a severe pain which for want of better description may be designated as an intercostal root pain of mid-dorsal origin, suffered from nocturnal delirium, and manifested a tendency to sit up in bed with abdomen flexed upon the thighs and head under the covers. When asked why she assumed this grotesque posture, she stated that it relieved the pain in her chest. During the remissions of the delirium she complained of difficulty in breathing and of a distressing, jerking sensation in her chest, probably diaphragmatic in character, which occasioned a feeling of suffocation. Two days after the onset of the thoracic symptoms, unusual unilateral and bilateral, more or less rhythmic, abdominal contractions developed, which continued with considerable severity for a number of weeks. At the time of my first examination, February 29, 1920, I found the temperature varying from 99° F. to 101° F.; pulse 120; bilateral ptosis of the upper eyelids; dilated, irregular, unequal pupils which responded not at all to light or in accommodation; the ocular fundi could hardly be considered definitely abnormal, although there was possibly a slight obliteration of the disc margins. At this time she complained of attacks of unprovoked diplopia which could be reproduced by directing the eyes to the extreme right. There was also a pronounced nystagmus of both horizontal and rotatory character, when the eyes were directed to the extreme right or left. Aside from the mid-dorsal root pain on the left side there was no evidence of disturbance of the sensorium. The biceps, triceps, supinator, patellar and achilles reflexes were slightly more brisk than normal, but were equal throughout. The abdominal reflexes were present and rather more pronounced than normal. Pathological reflexes were not obtainable. At this time and on several subsequent occasions, the urine was entirely negative; blood Wassermann, negative; spinal fluid Wassermann negative, no excess of globulin, ten lymphocytes to the cu. mm., fluid removed under slightly increased pressure; blood pressure 120–80; cultures of blood and spinal fluid were not made. A diagnosis of epidemic encephalitis was unhesitatingly made at this time. After the period of extreme restlessness and delirium previously noted, and beginning about March 5, the patient exhibited the typical lethargic phenomena so well recognized in most cases. This lethargy continued for a period of at least four weeks, during which the afternoon temperature on several occasions reached 104° F., and the pulse continued from 120 to 130. During the first week in April the lethargy became less marked, the pupils resumed their responsive-

ness to light and in accommodation, the delirium subsided, the temperature sought a much lower level, the ptosis, double vision, and nystagmus became much less marked, and a condition of general improvement seemed to have been inaugurated, but toward the close of the first week in April an apparent relapse occurred. The patient became very weak after a severe vomiting attack, and there were many indications of impending dissolution, including profuse perspiration, total oblivion to environmental stimuli, and mucus accumulation in the throat. Two days later, on or about April 7, consciousness returned, and there was apparent marked improvement in all of the symptoms which had heretofore been exhibited, but a new group of phenomena was brought to our attention, namely, bilateral, rhythmic contractions of the facial muscles, particularly those about the mouth. There were also rhythmic contractions of the extensors of the index and middle fingers on both sides. This group of symptoms has continued with greater or less severity, up to the present time.

On June 1, after several weeks of symptomatic quiescence, during which time the appetite improved and convalescence seemed to be thoroughly established, a rather abrupt, flaccid paresis of the extensors of the right lower extremity became noticeable, the patellar reflexes being normal, the right achilles jerk lost without any disturbance of sensibility and with no demonstrable pathological reflexes on either side. This extensor weakness completely disappeared within three weeks of the time of onset. On August 15, the patient became very nervous and restless, began to lose weight, and required large doses of hypnotics to produce sleep. September 1 she became very drowsy and lethargic; spent most of her time sleeping, it being very difficult to arouse her sufficiently for the administration of nourishment. At this time a reexamination revealed temperature 99° F., pulse 110, bilateral ocular ptosis, nystagmus, dilated, irregular, unequal pupils which failed to respond to light and in accommodation. There was no disturbance of the deep or superficial reflexes, nor any symptoms directing attention to involvement outside of the cranial cavity. At the present time, September 14, the lethargic state is becoming less marked, but the ocular symptoms are still very pronounced, making it impossible for the patient to read or busy herself at any occupation necessitating the use of the eyes.

My chief purpose in presenting the above clinical history is to call attention to the chronicity and relapsing tendency manifested in a case in which the diagnosis of epidemic encephalitis is beyond

reasonable controversy. The duration of this illness extends from February 21, 1920, to the present day, September 14, 1920, and there is as yet, no satisfying evidence of true convalescence. An analysis of the clinical history reveals the onset of the original illness together with three distinct relapses. During the first week in April we have the period in which death seemed imminent, followed by the institution of the bilateral, myoclonic contractions of the muscles of expression and extensors of the radial fingers on either side. On June 1 after a slight increase in the midthoracic pain, we have the occurrence of the flaccid paresis involving the extensor muscles of the right leg. Again, beginning September 1, after an initial period of restlessness and insomnia which continued over a period of two weeks, an almost exact reproduction of the symptoms noted in the beginning of the illness, was observed, including lethargy and the oculomotor phenomena.

After reading most of the available literature pertaining to the subject of epidemic encephalitis, one is tempted to theorize with reference to the nervous mechanisms which give expression to the underlying etiologic irritant. This is especially true after reading the articles of Hunt on "Acute Infectious Myoclonus Multiplex and Epidemic Myoclonus Multiplex" (Journal A. M. A., Vol. 75, page 713, September 11, 1920), and that of Pardee on "An Acute Descending Radicular Type of Epidemic Encephalitis" (Am. Archives of N. and P., Vol. 4, page 24, July, 1920). These writers while recognizing an etiologic factor common to the various types of epidemic encephalitis, lay special emphasis upon two of the most interesting symptoms so common to this disease, viz., the myoclonic muscle contractions and the spinal root pains. Hunt calls attention to the fact that a peripheral or lower neuron type of myoclonus multiplex more commonly of sporadic origin, has been recognized for some time,—that it must be differentiated from paramyoclonus multiplex of cerebral origin,—and makes the comment that the exact mechanisms which are responsible for the production of the phenomena have not been agreed upon. He feels that "at the present time it would be hazardous to attempt a more definite localization of the disorder than as an irritative manifestation referable to the spinal level of motility." In the case of M. T. it is worthy of note that the myoclonic manifestations were first thoracic and diaphragmatic,—later abdominal, and were finally present in the face and hands. If I had observed the morbid movements referable to the higher levels first, I should have been inclined to think of them as being cortical or subcortical in origin, since they are not essen-

tially dissimilar to those observed in athetosis. When considered in relation with the preceding thoracic and abdominal contractions, however, they do not in any way differ from them except in the point of level. In the contribution of Pardee previously referred to, several of his case reports tend to indicate a progressive lowering of the level of the root pains during the progress of the disease. The author seems to feel that this descending type of root pains is sufficiently characteristic to warrant an increase in our already burdensome nomenclature. In the case of M. T. the root pains remained rather stationary in the midthoracic region on the left side, but the muscular contractions changed their location from thoracic to abdominal, and later to the face and extensors of the fingers, indicating at least a progressive nerve root involvement if not a purely descending progression.

Before bringing this paper to a close, I wish to mention briefly the fact that out of some thirty well defined cases of epidemic encephalitis, I have been able to obtain reports as to the outcome, in several. The first patient in whom I observed the root pains and muscle contractions, was taken ill October 23, 1919. At the present time he is at work, but still has some evidence of his lower thoracic root pains, occasionally has a return of the muscular contractions, is frequently inordinately drowsy, his mental processes are retarded and he suffers from apathy and disinclination to work. A young woman who suffered from a most typical attack, which had its onset about December 17, 1919, has apparently regained her health, with the exception of occasional attacks of diplopia. B. O. S., male, aged thirty-six, suffered a typical mild attack of epidemic encephalitis about January 15, 1920. At the present time, examination reveals no evidence of organic disease, but the patient is so easily exhausted by mental or physical effort that he is yet unable to do any of the work on his farm. Searching observation in this case, reveals a slight immobility of features similar to that of Parkinson's disease. I have noted a gradual improvement each time he has presented himself for examination. In J. F. T., male, aged forty, epidemic encephalitis developed January 18, 1930, the symptoms being chiefly of the delirious type with severe right lower thoracic root pains and bilateral abdominal contractions. Improvement was very slow and at the present time he occasionally suffers from the old root pains but has no muscular spasms. Aside from this he appears to have fully recovered. Mrs. G. C., aged forty-two, on January 29, 1920, had right lumboabdominal root pain of great severity, which after having persisted for a period of two weeks, became

associated with unilateral and bilateral contractions of the abdominal muscles. During the fifth week of her illness she suffered from three extremely severe generalized convulsions, followed by a deep coma which lasted for four days. On recovery from the coma, examination revealed dilated, unequal, irregular pupils, unresponsive to light or in accommodation, and horizontal nystagmus and diplopia. There was no disturbance of the sensorium, deep, or superficial reflexes. In this case the lethargic phenomena were not at all prominent during the early months of the disease. About a month subsequent to the convulsions, she complained of extreme exhaustion, and the left upper extremity became spastic and assumed a posture of flexor contracture. The deep reflexes of the left upper extremity were exaggerated, but those of the right upper and both lower extremities were normal. At this time the nystagmus and oculomotor symptoms disappeared, the patient was bright, read novels, and conversed fluently. From this time on, however, she gradually developed a state of apathy, lost interest in her surroundings, her whole body became progressively more rigid and cadaver like, similar to the state frequently observed toward the terminal stage of Parkinson's disease, the facies became immobile, the upper eyelids drooped, and any extreme emotion caused a grotesque contraction of the muscles about the nose and mouth which failed to relax until several minutes had elapsed, and simulated muscular perseveration or tonic spasm. When this generalized rigidity reached its maximum, the deep reflexes became bilaterally overactive, but were equal, and no pathological reflexes could be elicited. At the present time, some eight months from the date of onset, this state of living death still persists, without any apparent hope of improvement. The blood and spinal fluid Wassermann in this case were negative, and the spinal fluid has exhibited no abnormality.

Many of the cases I have been unable to follow up, but the fragmentary reports here submitted, may I hope, give some intimation of the after results which may be observed in epidemic encephalitis.

Conclusions

1. Not all cases of epidemic encephalitis die or recover. Some drift into a subacute or chronic state which lasts many months. In some cases a distinct relapsing tendency may be observed, in which newly localized symptoms may appear and in which an almost typical recurrence of the symptoms observed at the onset, may be reproduced.

2. The irritant causing the root pains and myoclonic muscle contractions of epidemic encephalitis, undoubtedly successively involves different segmental levels of the cord or its corresponding nerve roots, giving rise to descending and ascending forms of radiculitis.

3. The motor nuclei and roots of the cranial nerves are not immune to the irritant which causes symptoms of radiculitis in the various spinal levels of motility.

4. Even the most mild attacks of epidemic encephalitis frequently leave the afflicted person incapacitated for full participation in his work, for many months.

5. The symptoms of epidemic encephalitis are protean in character, and tend to prove that both the central and peripheral nervous structures are susceptible to some irritant generated by the invading microorganism.

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384TH REGULAR MEETING

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SCIENTIFIC SESSION

The President, DR. WALTER TIMME, in the Chair

ENCEPHALITIS LETHARGICA WITH SEVERE RECURRENT NARCOLEPSY

DR. WALTER M. KRAUS showed a boy who had lethargic or narcoleptic attacks during the day with insomnia at night. The patient had an influenza like attack in February, 1920, and after this was continuously somnolent for six weeks. He could be aroused to take nourishment and he recognized his family at these times. This somnolent period was followed by a period during which he was unable to sleep at night, and was very sleepy during the day. He would fall asleep while standing up. He was admitted to Bellevue Hospital, where the examination was as follows: An undersized boy of twelve years of age. Peculiar stooping attitude while standing, recalling that of the Parkinsonian syndrome. When a narcoleptic attack began, while the patient was standing up, the head would fall forward, then the torso would flex at the hips and the knees begin to bend, and the patient would fall to the ground if not caught by someone near by. There was double paresis of the facial nerves of central type, the arms were in the Parkinsonian position, the right more than the left. The fingers were in the pill rolling position. There was no change in sensation. The tongue was thick, the teeth spaced, general cretinoid appearance. Since his visit to the hospital, dribbling at the mouth has been noticed. The rest of the examination was quite negative.

During the presentation of the history, the boy began to bend forward in the above described manner, his head drooped on his chest. When Dr. Kraus called attention to his condition he noticed that he was being spoken of, smiled, and straightened up again. His tongue protruded slightly and remained so for some minutes. Photographs taken during the narcoleptic state show him with body almost doubled. Combined with day sleeping there is almost total sleepless-

ness at night. This is the inversion of the sleep mechanism found in many cases of epidemic encephalitis.

The laboratory tests were as follows: Wassermann was negative in both blood and spinal fluid. The spinal fluid contained four cells. Test for globulin was negative. An estimation of the total sugar in the spinal fluid showed 0.95 per cent. (normal 0.40–0.60 per cent.). The colloidal gold was as follows: 0, 011, 112, 110. The urine was negative. The red blood cells, 4900000, hemoglobin 90 per cent., white blood cells 8800, polymorphonuclears 50 per cent. At the time of presentation, (at night) Dr. Kraus considered it striking that the attacks were not occurring with the same intensity as during the day. They had been frequent in the ward and had been observed that afternoon. The case is typical of the group showing involvement of the basal ganglia.

PROGRESSIVE LIPODYSTROPHY

Dr. Kraus showed a second patient, a young woman suffering from progressive lipodystrophy. Not more than twenty-five such cases have been reported in the literature. At the age of eight it was noticed that the fat about her face began to disappear and the hips grow heavier. The disease progressed for fourteen years, and now there is a marked atrophy of the subcutaneous fat down as far as the first lumbar segment, with fatty deposits below that point. There is a condition of the legs which appears to be edema, but does not pit on pressure.

Examination shows nothing else of consequence. Dr. Kraus suggested that this condition was analogous to the trophedema of Meige. Pathological examinations in progressive lipodystrophy show that there is a subcutaneous accumulation of fat and a proliferation of connective tissue. The same thing applies to trophedema, except that the accumulation may involve both legs only, one leg or only one side of the body. It would appear that in typical progressive lipodystrophy there exists in the lower extremities a condition of trophedema upon which is superimposed a further disorder of the subcutaneous tissues manifested as a localized multiple lipomatosis.

In the October, 1919, issue of the *Revue Neurologique*, there is a critical study of progressive lipodystrophy by Boissonas. This author concludes that the cause is not known, but that it is thought that a spinal cord origin is most probable.

AN EXPERIMENTAL STUDY OF THE EFFECTS OF RADIUM EMANATION ON THE BRAINS OF ANIMALS

Radium Treatment of Tumors of Nerve Tissue, by Drs. Bagg, Ewing, and Quick. The first paper was read by Halsey J. Bagg, Ph.D.

This investigation was undertaken with the primary purpose of determining a suitable technique for the use of radium emanation

as a therapeutic agent in the treatment of brain tumors. The experiment were designed to throw light on three points of interest, necessary to know about before radium emanation could be used with any degree of assurance as a therapeutic agent in the treatment of this type of neoplasm. First: The nervous tissue reaction from a histological standpoint, of the normal brain after exposure to radium emanation. Second: The question of dosage, with an idea of the amount of radium emanation to which the normal brain could be safely exposed. Third: The most practical method, or methods, of applying the radiation.

Four methods of experimentation were used. First: Unfiltered radium emanation in minute quantities, 0.2 to 1.5 millicuries each, was permanently inserted beneath the scalp in small animals, rats, and directly into the brain tissue in others, rats, guinea pigs, rabbits, and dogs. Second: Unfiltered radium emanation in considerably larger doses, sixty-three to two hundred and fifty-five millicuries was inserted directly into the brain substance of rabbits and dogs, and left in place for varying intervals of time. Third: A comparatively large amount of radium emanation, filtered by 1 mm. of platinum and in the form of capsule applicator, was inserted into the brain of a dog for thirty-five minutes. Fourth: Two large doses of heavily filtered radium emanation, consisting of 4000 and 9000 millicurie hours respectively, were applied externally over the head in the case of dogs, and a still larger dose of 12030 millicurie hours was applied, in a similar manner, over the left temporal region of a monkey.

Lantern slides were exhibited showing the technique. A long, fine, steel trocar was passed through a small hole drilled in the skull, and by means of this instrument a minute glass tube containing the radium emanation was permanently inserted into the brain. The traumatism incident to the insertion of the trocar was very slight. A radiograph showed the platinum capsule after insertion into the brain. The capsule was removed by means of an attached fine brass wire. The so called lead tray that was used in the external applications gave a filtration of two mm. of lead, and in addition one-half mm. of silver was used. This applicator, in the case of the three treatments that employed heavy external radiation, was held from the scalp at distances of two, ten, and fifty mm. respectively.

The most interesting results were three in number. First: The characteristic localized effect of radium destruction was the most marked feature of the method wherein small amounts of unfiltered radium emanation were permanently imbedded in brain tissues. This localized effect was accompanied by a pronounced polymorphonuclear leukocytic infiltration, which surrounded a completely necrotic area of destroyed brain tissue. The amount of destroyed tissue was about one cubic cm. in nearly all cases, generally exactly that amount, seldom less, and never more than one or two mm. more in diameter.

Second: A considerably greater amount of destruction accompanied larger doses of unfiltered radium emanation, left in the brain

for shorter periods of time, although the dose, as judged by the number of millicurie hours, was the same as for the small doses which acted over a comparatively long period.

Third: Comparatively slight, if any, brain changes followed exposure to strong doses of heavily filtered external application of radium emanation, although such doses were considered of sufficient strength to affect the cells of a brain tumor materially.

In comparing the above results it is interesting to note that a considerable amount of brain tissue was destroyed by the first method, without the animals showing any discernible neurological disturbances, even though they were under observation for over six months, but that when the same dose in number of millicurie hours was given by means of a comparatively large amount of radium emanation, acting over a short period of time, the neurological reactions accompanying this more severe and rapid destruction were pronounced and generally terminated fatally a few days after treatment.

The three large doses of radium emanation, heavily filtered and externally applied, supplied the evidence that the normal brain, as judged by gross and microscopical examination, as well as the absence of neurological symptoms was markedly, what might be called resistant to exposure to gamma radiation of radium emanation. In the case of the two dogs thus treated, care was taken to protect the scalp, and the animals were apparently well and active at the end of a month. In treating the monkey the radium dose was greatly increased and the applicator was placed near the scalp, thus increasing the intensity of radiation on the skin as well as within the brain. A careful study of the animal's neurological reaction showed nothing abnormal. The animal had previously been trained, by the behavioristic method, to obtain its food by opening a puzzle box fastened by three catches, and it is interesting to note that its reactions to the box situation were only very slightly different before and after treatment, and the changes that did occur were probably referable to disturbing factors arising from a severe radium burn, which later developed over the side of the head that was exposed to the radiation. The results of the burn culminated after a month's time in the death of the animal, and the study of the brain in this case, although the radiation had been increased to the limit, showed no gross changes, except a certain amount of anemia of the cortical blood vessels of the brain directly exposed to the radiation, and a microscopical examination showed no definite degenerative changes.

Of the four methods that have been tested, one may consider the surface application of heavily filtered radium emanation as a relatively safe procedure in the treatment of brain tumors. The burying of small doses of unfiltered radium emanation is also suggested as an especially favorable method of treatment. The relatively sudden destruction produced by comparatively large doses of unfiltered radium emanation makes this method a doubtful procedure. While the imbedding of filtered radium emanation is still uncertain, it is possible that by using still larger doses than were employed in these

experiments, and decreasing the filtration, this method might also be considered applicable.

THE STRUCTURE OF NERVE TISSUE TUMORS WITH REFERENCE TO RADIUM THERAPY

Dr. James Ewing discussed the types of tumors that have been treated by radiation and noted that regardless of its future as a therapeutic agent, radium therapy has demonstrated certain biological properties of malignant tumors previously unrecognized.

Basal cell carcinoma is susceptible to radium, but squamous carcinoma comparatively insusceptible. Lymphosarcoma disappears readily under gamma rays.

The structural characters which determine susceptibility to radiation are a cellular character, an undifferentiated form of the cells, rapid growth with abundance of mitoses, vascularity especially when due to abundance of delicate capillaries, and absence of much intercellular substance. When the cells are differentiated and adult in type, when they grow slowly and mitoses are few, when the blood supply is through well formed adult vessels, and when there is much intercellular substance, the tumors are relatively insusceptible.

Neurofibroma or neurosarcoma structure presents features of the resistant tumor. This is unfortunate since it is so common and since it is especially prone to recur after excision. More than one hundred recurrent cases of this type have been received at the Memorial Hospital during the past two years. Most of these tumors are not recognized, and are designated sarcoma. The structure of intertwining fibrils and long spindle cells is quite specific, however. They differ in reaction to radium from the soft and vascular fascial sarcomas. They first occur at apparently innocent movable tumors of the subcutaneous tissue or intermuscular planes. If surgical intervention is not successful, little aid from physical agents may be expected. Neurofibroma of the acoustic nerve has an unfavorable prognosis, usually, but there is a myxoglioma of the optic nerve occurring in young subjects which does not recur after enucleation.

Of the endotheliomata, psammoma since usually subdural in location, might be affected by radium, especially if the radium is applied directly to the tumor. True angioendothelioma or perithelioma, composed of large polyhedral or cubical, occasionally flattened cells surrounding blood channels, occur in the rare diffuse sarcoma of spinal meninges, and should be more susceptible to radium.

Angiosarcoma, one of the few tumors that has been satisfactorily traced to a traumatic origin, should be markedly influenced by radiation, since its nutrition is unstable, but whether slow and safe regression can be accomplished is doubtful especially with bulky tumors.

Glioma, however, of all tumors of brain and spinal cord, presents most of the structural features that favor susceptibility to radiation. It is the most frequent brain tumor, and is chiefly cortical.

Its comparatively rapid growth, lack of encapsulation and secondary effect on surrounding brain tissue are unfavorable features. Of the three main types, astrocytoma, gliosarcoma, and neurocepithelioma, only the first contains anything like resistant intercellular material.

Primary carcinoma of the brain assumes an embryonal type of ependymal glioma ,or has the adult type of papillary adenocarcinoma. These latter usually have small cells, and very delicate mucinous stroma grow slowly. Their structure indicates a high degree of susceptibility to radium. The group of hypophyseal tumors includes cysts, chronic adenomatoid hyperplasia, cellular adenocarcinoma, glioma and hypophyseal duct tumors. There are no data suggesting that radium can affect the accumulation of fluid in the cysts. Chronic hypophyseal struma with acromegaly has already been definitely influenced by x rays directed through the temporal regions.

The possibility of applying radium successfully and safely depends upon the obstacle presented by the skull and the distance of the tumors from the scalp. These obstacles are met by increased dosage. Effective dosage of radiation can be delivered through the skull to influence the growth of cellular tumors, as has been demonstrated experimentally by the work of Dr. Bagg on dogs and monkeys. In the brains of normal dogs and monkeys a dosage of 2000 millicuries of emanation filtered through 2 mm. of brass and placed for six hours at a distance of 6 to 10 cm. from the skin, has not produced any structural changes, although it has produced rapid regression of deep glandular carcinomas, metastases of testicular carcinoma and retroperitoneal lymphosarcoma. A much higher dosage, resulting in caustic necrosis of the scalp may be tolerated by normal brain tissue. When the tumor can be exposed it becomes accessible to direct application of radium or the insertion of emanation needles. If the latter are to be used it is very important that the tumor tissue should not be disturbed by partial excision.

CLINICAL RESULTS OF TREATMENT OF NERVE TISSUE TUMORS BY RADIUM

Dr. Douglas Quick said that there were few cases that have been studied clinically and the literature is deficient. Most of the cases to which radium treatment was applied were pituitary tumors. Bieleva, Loeb, Cauvin and Gunsett are the chief exponents abroad. The general opinion is that the pressure symptoms may be relieved to a considerable degree by the use of radium. Pressure symptom cases are extra sella, and therefore usually inoperable. Headache, eye symptoms are relieved rapidly in many cases. When changes are due to cysts there is less likelihood of favorable results.

There is marked improvement in pressure symptoms with checking of the metabolic and trophic symptoms. The tumor is in a favorable location for treatment. Exposures may be from the front and sides or from the nasal route. The floor of the sella may be removed giving more direct access.

Of three cases on which Dr. Quick has already reported, one

patient died. This patient had a pituitary tumor removed some time previously. A second operation had been performed followed by treatment by radium radiation. The patient had profuse corrhyza at the time of the treatment. Meningeal involvements appeared and the patient died. The infection had been introduced by the nasal route.

The second case was that of a young woman who had had two operations for adenoma the year before. There was blindness in the right eye, partial blindness in the left eye, projectile vomiting. She was treated externally and by the nasal route. The condition improved, the vomiting was relieved and the dizziness also. The eye symptoms were stationary. The patient two and a half years after treatment is able to get about and is fairly comfortable. Nothing can restore the vision.

The third patient was relieved from severe headache and pressure symptoms. An operative procedure without exposure of the tumor was carried out for exploratory purposes only. The patient returned with severe headache which was relieved by treatment. Dr. Quick's earlier experience with intercranial tumors, he stated, was limited and unsatisfactory. One was of a cortical tumor in which there had been previously a right temporal decompression. This was radiated with extremely small doses, the treatment was short, the patient died and nothing was accomplished. A second case was of cerebellar tumor in the region of the vermis, in which decompression was advised and refused. Treatment was applied on either side and posteriorly. There was improvement for six weeks, then cerebellar ataxia, vomiting, the patient had to be carried to the office. Six weeks later he could walk. Then the symptoms recurred with increased pressure. A decompression was done, and the child being in poor condition, died. The tumor had not been localized. The case of a child of four, who had an orbital tumor was also cited. The mass in the upper right orbit was removed, and recurred. External radiation treatment was applied for five months. The mass could be promptly reduced, but would recur. The eye was then removed, and radiation carried on in the orbital cavity. The tumor was attached to the orbital nerve. The growth was essentially a spindle cell myxosarcoma. It was not entirely removed. Radiation was applied directly to the base. Although only a short time has elapsed since the operation, recurrence has not yet been noted.

In over one hundred cases of neurosarcoma at the Memorial Hospital only one was a primary growth while the recurrences ranged from one to twenty-one operations. This type of tumor is discouraging in general. A given area may be destroyed, another recurrence may take place somewhere else along the course of the nerve, not necessarily by continuity. It can be destroyed locally if large enough dosage is used.

Dr. Quick said that our knowledge indicates the judicious use of radium and surgery combined. Operation should not be resorted to unless radium is at hand to be applied at the same time if it be found possible to bury it in the tumor.

Two patients were presented at the meeting, the first of whom was a boy of seven who three months before had had frontal headache, projectile vomiting, double vision and ataxia. He had a convulsive seizure two months before. A decompression operation was performed on him at Mt. Sinai and a neoplasm in the left lateral lobe of the cerebellum and vermis was found. A bilateral decompression was performed which relieved the pressure symptoms and vomiting. He was unable to walk when admitted, was ataxic and fell to the left. There was bilateral and vertical nystagmus. The disc outlines were hazy. Radium treatment consisted of three separate treatments, one dose of 8712 millicurie hours at the left occiput, 8000 millicurie hours at the right occiput, and 7000 millicurie hours posteriorly. Ten days after the first dose he was able to sit up and could coordinate better. After the second series of doses his station improved. There is now no evidence of cerebellar disturbance. Epilation of the hair is marked over the radiated area. In all 53,728 millicurie hours was applied, practically all of it at six centimeters distance.

The second patient, a young woman of twenty-three, was referred to Mt. Sinai for tenderness in the right lower chest and right scapula. She had been injured in some amusement park six years before. The right leg was stiff and tense, and dragging. For three weeks she had complained of girdle like pain. X ray showed deviation to the left, and a mass to the right of the fourth dorsal spine was located. It seemed to be bony in consistency, and was apparently connected with the vertebral column. A portion of the tumor was removed. The infiltrating base was adherent. Eleven days after operation the patient was sent to the Memorial Hospital. The tumor tissue was found to be composed of polyhedral and spindle cells, chiefly nuclei. The tumor was classified as an anaplastic glioma. Its origin from ependymal cells was considered possible.

A large dose of radium was applied to the site of the tumor. Packs at a distance of 10 cm. with a dosage of 18,000 m.c.h. were first used, twelve days later, 11,000 at 6 cm. She was then able to move her legs more freely. Four weeks later, three doses of 6,000, then 7,000, then 12,000 were given. In all 60,378 millicurie were applied all except the first dose at a distance of 6 cm. She now has control of her extremities to a large extent. The improvement has been gradual but is pronounced.

The amount of radium found necessary for use externally was 50,000 or 60,000 if filtered. It was found relatively safe to use radium directly in the substance of the brain. Therefore exporatory operation and radium therapy should be carried out at the same time, and should be provided for in every case. In the boy's case much less radiation would have been sufficient and the result would probably be more permanent.

The *discussion* on the papers of the evening was opened by Dr. Charles H. Frazier (by invitation) of Philadelphia. Dr. Frazier's interest in the effect of radium upon tumors of the central nervous system was first aroused in 1914. He called attention to a number of points in which malignant tumors of the brain differed strikingly

from malignant tumors in other parts of the body and why there was a larger field for radium here than in the other organs or structures. Much information must be derived from the experimental work in matters of technique. Dr. Pancoast will report on this. Dr. Frazier's experience includes altogether twenty-five cases of which number six were gliomata, six endotheliomata or sarcomata, one teratoma and twelve undetermined. He cited the clinical histories of three cases which he had selected because they had been under observation the longest; one seven, one six and one four years. He then discussed the question of radium therapy in pituitary lesions and called attention to the fact that these lesions lent themselves to radium therapy because of the opportunities, after a sellar decompression to place the radium tube in close proximity to the lesion. He gave as his opinion that he believed the first step in surgery of pituitary lesions was a simple subsellar decompression without attempting removal of tissue, except perhaps for diagnosis, this operation to be followed by x ray treatment to be repeated at such intervals as seemed desirable.

As to the results obtained, in the total series, eleven of the twenty-five cases have died since the treatment began and there are fourteen still living. Of the survivors: three are alive six years after treatment, one is alive five years after treatment, four are alive three years after treatment, two are alive two years after treatment, four are alive one year after treatment.

Of this number there were four in which the tumor was removed and two of these are known to have recurrence. Of the latter, one is a sarcoma of the right cerebellar hemisphere which is being treated by direct implantation of radium needles. After the last treatment there was within two weeks a substantial improvement.

In analyzing the results he found that the best work had been obtained in pituitary lesions and in endotheliomata. He has no evidence whatsoever that leads him to hope that radium has any influence on gliomata. The series which he has reported should not be regarded as a criterion because it has been impossible always to apply radium at such intervals as seemed desirable. Patients living at a distance from the hospital often could not be persuaded to return when ordered to report. As to the conclusions, the evidence at hand justifies the following statements:

1. That radium will retard the growth of endotheliomata; two patients still under observation for six years.

2. That there is no evidence warranting the assumption that radium influences the course of the gliomata.

3. That radium has proven effective in lesions of the pituitary body.

That radium is now employed:

1. As a prophylactic against recurrence always after the removal of the growth.

2. As a prophylactic against recurring visual disturbances after sella decompression.

3. As an active agent by direct implantation in all inoperable growths exposed on the operating table.

4. As an inactive agent by indirect application in all inoperable growths.

Dr. H. K. Pancoast (by invitation) said that there are many reasons for regarding tumors of the brain as an admirable field for treatment by radiation. In order to determine the effects of radiation upon normal brain tissue it was necessary to carry out preliminary experiments upon the brains of lower animals and dogs were selected for the purpose. Over a year ago under the direction of Dr. Frazier and himself some third and fourth year medical students took up the work of implanting radium tubes in dogs' brains and studying the effects after a period of time which should have been sufficient to show any changes. After a lapse of four to five weeks following the implantation the dogs were killed and the brains removed and sections made of the areas treated. The exposures were made over the motor area in order that any resulting motor disturbances could be observed in addition to the effect of the radium upon the brain tissue. The men started with small doses of three hundred milligram hours and this was increased up to nine hundred milligram hours. One tube of fifty milligrams of radium, well filtered in order to remove all beta rays was employed in each instance. The tube was placer directly upon the motor cortex.

The results of these experiments have already been published but brief mention will be made of the results in order to compare them with the results of other experiments by Drs. Pancoast and Frazier and by other individuals.

Microscopic sections of the brains of the dogs exposed to nine hundred milligram hours showed that for a distance of two millimeters approximating the tube there was a necrosis of brain tissue. Outside of this there was an area two millimeters wide in which the blood vessels showed an endarteritis and for a distance of another millimeter there was a zone of hyperemia.

These experiments assured them that comparatively large doses of radium could be employed in the treatment of brain tumors without the danger of serious destruction of brain tissue surrounding the tumor. In other words, in using a reasonable dosage of radium, the effects of the radiation upon the surrounding normal brain tissue can be disregarded. Other experiments were recently carried out by Dr. Prendergass assisted by some fourth year medical students in order to determine the effects of larger doses of radium made upon the motor cortex and of implantation of radium into normal brain of the motor cortex. Two dogs were used. In one a dose of 2100 milligram hours and in the other a dose of 2500 milligram hours was applied over the motor cortex directly on the surface. Both dogs died in about one month. There was no paralysis and no necrosis of the flaps. The adjacent brain area was found to be congested and indurated. Death probably resulted from the effect upon the brain but sections have not yet been made. These experiments show that there is a limit to the direct exposure which can be applied to the brain of an animal the size of a dog.

Further experiments were carried out by implantation of two needles containing twenty-five milligrams implanted in the motor cortex of two dogs for eighteen and twenty-four hours respectively, giving a dose of 450 and 600 milligram hours. No paralysis resulted. Both dogs died suddenly within a week, but were well two days before death. The autopsy showed no infection of the flap or the brain. There was a general serositis including the peritoneum, pleura and joints. The peritonitis was of a very virulent form. Unfortunately, no cultures were made but if the same experiments are carried out again and with the same results this will be done. The needles were carefully sterilized in alcohol for one hour before implantation which would seem sufficient to bring about sterilization. These experiments are not conclusive and need to be carried further.

It is interesting to note the results of one experiment carried out by Dr. Bagg in which a large dose of 400 milligram hours was applied outside of the skull and the brain exposed by cross firing to that large dosage, with no subsequent microscopic changes in the brain tissue. Much valuable information can be gained from the results of these experiments and it is quite possible to base a fairly safe technique upon them.

The application of a very safe technique for treatment of tumors of the brain by radiation requires a careful observation of the following points:

1. A knowledge of the type of growth to be treated.

2. A knowledge of the relative amount of radiation required in the treatment of such a growth.

3. The size of the growth from the center to the periphery where the tumor is actively proliferating, if central implantation is practiced.

4. If the growth is irregular and not truly spherical there is still greater reason for carefully guarding against undue effects upon normal brain tissue.

5. It is best to give an under dose by implantation and to supplement this by cross-firing from the outside of the head.

6. Drs. Frazier and Pancoast are as yet unwilling to advocate implantation of needles at the actively growing periphery of tumors until the action of radiation upon brain tissue is better understood and the margin of safety has been better demonstrated.

Tumors may be grouped in the following manner for treatment:

1. Tumors found at operation and which cannot be removed. A moderate dose of radium may be applied by implantation of the tube in the center of the growth and this supplemented by cross fire radiation from the outside of the head.

2. Tumors found at operation and partly removed. These may be treated in the same manner.

3. Tumors not localized and not found at operation or inaccessible at operation. Such tumors may be well treated by cross-fire radiation from the outside of the head in all possible directions. This may be done apparently without any danger to normal brain tissue.

4. Pituitary growths. These growths may be treated after decompression, after partial removal or at a time subsequent to operation when there is a recurrence of symptoms. The technique employed by Dr. Frazier and Dr. Pancoast has been the application of radium below the sphenoid sinuses for a period not sufficient to cause serious damage to the structures in this neighborhood. This is supplemented by cross-fire radiation with x rays through each temporal region toward the hypophysis.

Dr. Robert Abbe said that during eighteen years of earnest study and use of radium in every surgical condition he had had only three cases of cerebral or spinal tumor referred to him for treatment, and these were post operative, where the gliosarcoma had been impossible to remove and the wound was closed over them. The bone, however, had been removed by trephine and rongeur so that radiumization could be given (through an inch thickness of fleshy tissue). No benefit had followed that he could see. Dr. Abbe believed that the better technique would be to apply radium (25 or 50 milligrams) in a small sterile tube without filtration of metal, directly to the tumor in the open wound under anesthesia for thirty minutes. Then close the wound completely.

His experience with this method in true cancer in other parts of the body, as suggested by Dr. Wickham of Paris in the early days of radium work, had given him more wonderful results than by any other method.

To some degree the skin seems to act as an insulator against penetration of the best soft beta rays which are the most fruitful of results.

In fibrosarcomas of the dura he had found no benefit from radium.

Dr. Abbe had never seen cerebral disturbance from radium applications externally in human subjects.

Dr. Abbe had treated four cases of sclerosis of the cord (syringomyelia) referred to him by neurologists. In three cases no benefit followed. One case showed extraordinary beneficial results. The patient had led a very active life until eighteen months before Dr. Abbe saw him. Then an ascending hemiplegia began in the leg and arm, with other characteristic symptoms, eliminating cerebral or cortical lesion. Exhaustive study by the eminent men of the Neurological Institute gave no hope.

When seen by Dr. Abbe he could walk two blocks with unsteady gait by aid of a cane. The arm had spastic paralysis with cramps as well as the foot.

Radium, 250 milligrams, shielded by $\frac{1}{10}$ millimeter of lead, and two inches of gauze was applied for two to four hours at a time at suitable places on the spine, from the occiput to the mid lumbar region, once or twice a month. In six weeks he showed improvement, and in three months walked four miles daily. Later he gave up his cane and walked ten miles daily in his business. His spasms and paralysis improved markedly and he has had no relapse up to date, four years after treatment. He uses his paralyzed hand to

cut his food and turn the key in his door and for all other uses. No other medication or treatment was given. Wassermann reaction was negative.

Dr. Israel Strauss said that direct radiation of tumors at the surface and in parts of the brain where removal would incapacitate the patient, would be advantageous. In such cases neurological surgeons should *not* remove the tumor and then apply radium. Dr. Strauss recalled an inoperable tumor where radium was used with each recurrence of the growth after the surgeon had removed the obvious neoplasm. He considered this method of treatment incorrect. In the boy shown by Dr. Quick, the tumor was in the left lateral lobe of the cerebellum and vermis. At operation the vermis was enlarged, gelatinous in appearance and displaced to the right. Symptoms pointed to involvement of the left lateral lobe. It would have been risky in this case to insert radium. It was considered far better to carry out the decompression and then turn the patient over to the radiologists. Not a symptom of tumor is visible at the present time. It is too early to state whether the results were attained by the radium or by the decompression but in this case it seems that the proper method has been pursued.

In the case of the woman the nature of the growth was responsible for the excellent result of the radium treatment. There was a hard mass to the right of the vertebra, near the angle of the rib. This mass appeared attached to the rib, and the surgeon was asked to remove it under local anesthesia, in order to obtain the diagnosis of its nature.

At the operation the surgeon found that while the mass was attached to the periosteum, it grew inward, toward the vertebral column, and could not be separated from this. The neurological symptoms were those of an extra and not an intramedullary growth, and the diagnosis of a bone tumor, probably sarcoma, was made. The section of the tumor in the opinion of the pathologists at Mt. Sinai and Dr. Strauss, was that either it was a small round cell, or small spindle cell sarcoma. It could not have arisen from the glia because the symptoms, as stated above, were not those of an intermedullary neoplasm, and glioma cannot arise from other than glial tissue. However, Dr. Ewing did not know these facts, and was given only a single section from which to make his diagnosis. Dr. Strauss said that he understood that the sarcomata were particularly susceptible to treatment by radium. An operation involving the vertebral column was not permitted, because in their experience, when these growths are operated upon, thy spread with great rapidity. Hence it was decided to try radium with the very good result which was demonstrated at the meeting. It would appear that this patient had every opportunity to make a perfect recovery.

In a case of pituitary disturbance observed some four years ago applications were started right after sellar decompression in the nasal pharynx. The radium was put into the tumor. This was a mistake for meningitis resulted in forty-eight hours. The procedure should have been, sellar decompression to save the eyesight, then radium applied in the nasal pharynx, but not put into the

tumor. Enough radium should be used to go through the sphenoid. The removal of the floor of the sella turcica offers an opportunity for herniation. One case in which there had been great improvement for a time, showed return of symptoms, a mass was found in the nose which was subjected to manipulation with resultant streptococcus infection and death. Dr. Ewing thinks radium if used early enough is sufficiently penetrating to use without sellar decompression.

Glioma ought to be susceptible to radium. Surgery does not cure glioma of the brain in most instances, since it is so difficult to get at, so difficult to remove, and since it usually recurs. Radiotherapy, therefore, ought to be tried and may, when we know more about it, furnish a means of treating these growths successfully.

Dr. I. Abrahamson said that it was important to see what effect radium had on the choroid plexus and cerebrospinal fluid.

Current Literature

I. VISCERAL NEUROLOGY

2. ENDOCRINOPATHIES.

Abderhalden, Emil. The Problem of the Possibility of Tracing Certain Malformations of Intrauterine Origin to the Insufficiency of Definite Maternal or Fetal Organs. [Archiv f. Psych., 1919, Vol. 59, p. 506.]

In experiments on a large material the author was able to show that, in polliwogs, organs could be replaced by administering products of their decomposition or the organ extract. The results of these experiments place the study of the effects of certain inner secretions and their influences on growth and the organism generally on a new basis. It was found very easy to produce malformations. The same observation was made in regard to axolotls, entirely anomolous forms being obtained—arrested development, disturbances of evolution, hypo and hyperplasms, etc. Experiments were made on some 10,000 animals. These observations give a stable foundation to the view that many malformations originating in the uterus are due to insufficiency of the inner secretory organs. It is possible that a defect of this nature in the maternal organism influences the fetus in a definite manner, and it is also possible the organs in the fetus which receive the materials for development fail in their activities, thus also leading to disturbances of determinable nature. The author states that he does not here refer to merely visible bodily forms of development, but also to the spiritual and psychic forms. Naturally the organism of the father must also be taken into consideration in this connection. Unfortunately it is very difficult to undertake sufficient tests for the conditions of the inner secretory functions where malformed children are born and the defects are probably not due to mechanical causes. For some years the author has subjected the blood of women who gave birth to deformed children to tests for defense ferments in order to obtain an insight into possible disturbances of the organism, and the regular presence of these ferments in certain inner secretory organs is noteworthy.

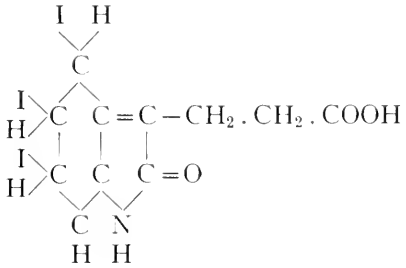
Albo, L. Influenza and Hypothyroidism. [Prog. d. l. Clinica, Nov., 1919.]

Two cases of extreme somnolency and headache after influenza, cured or materially improved by thyroid treatment, are reported by

López Albo. He had a third case in a man of 65 in which the post-influenzal hypothyroidism took the form mainly of neuralgias; these disappeared also under thyroid treatment.

Kendall, E. C. Iodine Compound in Thyroid. [Jour. Biol. Chem., 39, 1919.]

An account of the isolation of thyroxin, the active principle of the thyroid gland, being 4, 5, 6 tri-hydro, 4, 5, 6 tri-iodo, 2 oxy beta indole propionic acid.



The number of factors influencing the yield have been shown to be very large, in fact, it took four years of hard experiment to repeat the original lucky isolation.

Hume, J. B. Thyroid and Malaria. [B. M. J., Nov. 22, 1919.]

Hume has not found the occurrence of marked thyroid enlargement greater than from 5 to 10 per cent.—the cases with slight temporary enlargement immediately after a malarial attack probably representing another 10 per cent.—yet he thinks the changes in the ductless glands in malaria may be far more marked than supposed. Sporulation of the parasites in the capillaries of the gland, analogous to the condition in cerebral malaria, may account for the changes. This would mean no supply of iodothyrin from the blood stream, and an upset of "thyroid equilibrium." To regain this, compensatory hypertrophy takes place. The rest of the thyroid swelling becomes purely a hyperplasia; but sometimes there is compensatory hypertrophy of the other ductless glands. Enlargement of the thyroid may be compensatory for the exhaustion of other parts of the endocrine system. Degenerative changes have been described in the suprarenals in malaria; this disturbance probably is the cause of the "algid type" of malaria, in which injections of epinephrin are most valuable. The low blood pressure and subnormal temperature, often lasting for days after an attack, indicate a condition of hypo-adrenia. The effect of the disease on the testes may account for the loss of sexual power often seen after attacks of treated and untreated malaria.

Barrett, A. M. Hereditary Hypothyroidism. [Am. Arch. Neur. and Psych., Dec., 1919.]

Sixty-one members of a family belonging to six generations which Barrett investigated had hair and nails affected in fourteen instances. The nail defect seemed to be equally developed in all, but there was greater variation in the loss of head hair. The greater number showed an extreme scantiness. None had a total loss, the most extreme cases showing a fine lanugo-like covering of the scalp. There were other features showing in this family group conditions active in the production of a variety of disorders of much interest to neuropsychiatry. One was the high frequency of feeblemindedness and neurologic disorders of a degenerate type. The third generation who had dystrophies of nails and hair, and all of their descendants, numbered twenty-nine persons, and twenty-two were definitely abnormal. Twelve of the latter had the characteristic family dystrophy: ten others lacked this, but showed other constitutional and nervous disorders; one case of epilepsy, one of hysteria, one of severe tic, four cases of feeblemindedness, one of nocturnal enuresis, while four died early from marasmus. Those who had the nail and hair dystrophy had other abnormalities. One was epileptic; one had cancer; four were feebleminded, one had nocturnal enuresis. Barrett says the well known association of abnormalities of hair and of nails in hypothyroidism, and two fairly well defined cases of juvenile myxedema which led to this study, and the reaction of one patient to thyroid feeding, seem to warrant the conclusion of the fundamental disorder in this family being of the thyroid gland.

LeClerc, R. Alcoholism and the Thyroid Gland. [Bull. de L'Académie de Médicine de Paris, Dec., 1919.]

The author wishes to contribute further indications of the harmfulness of alcohol, and to show that intoxication in the father alone plays a predominating part in thyroidal agenesis. This effect of alcoholism on the paternal side is not surprising in view of the affinity of alcohol for the spermatozoid. Apert calls attention to it when he wrote that the destiny of the children of alcoholics "is no less terrible when only the father is alcoholic, than only the mother, but rather more so." This work is based on four observations, the three first of which are the author's own. The first case is that of patient 30 years of age, a dwarf, who had shown infantile myxedema for which an appropriate treatment had been followed. The second case is that of a child of 11, of an alcoholic father, in whom the myxedema began its development at about two and a half years. Thyroidal treatment was begun in February, 1919. The following August the improvement was already marked from the point of view of size and speech. The third case observed was that of a little girl of 14 who had mongolism with imbecility and lisping, but without microsphygmy.

The fourth case was one of *sporadic hemophilia in the myxedematous son of an alcoholic*. This case is reported in the Bulletins de la Société des Hôpitaux de Paris, July 11, 1919. [Author's abstract.]

Rennie. Exophthalmic Goiter Combined with Myasthenia Gravis. [Med. Journ. of Australia, November 15, 1919.]

Rennie gives the sequel to a case previously reported by him in the Review of Neurology and Psychiatry (Vol. VI, part 4, 1908). A man, aged 27, who, in 1907, had exophthalmic goiter with myasthenia gravis and was not expected to live, but in May last reappeared seemingly in good health. On leaving hospital in 1907 he had gone up country and continued to take the mixture of strychnine and belladonna. Gradually the symptoms disappeared; at the end of a year he could do light work, and became stronger until about three years ago when he had a severe attack of typhoid fever. Strenuous work for many hours together brought pain in his back muscles, but not the condition of exhaustion he had previously. He had gained flesh and strength, the symptoms of exophthalmic goiter and of myasthenia gravis had gone, though the eyes were not quite normal, paresis of the external ocular muscles, giving rise to occasional diplopia, being still present. The other muscles seemed to be unaffected and the cardiac muscle had not been involved, for, although the pulse was soft and the blood pressure low, no cardiac weakness was present, although he had recently passed through an attack of typhoid fever.

Dubois. Lymphatic Foci in Addison's Disease. [Berl. klin. Woch., Dec. 15, 1919.]

A very extensive and striking development of lymphoid tissue, with typical germ centers, in the thyroids of four out of six cases of Addison's disease, has been noted by Dubois. He thinks this of importance as depending on some alteration of the thyroid function which ensues when the gland is deprived of the stimulus normally communicated to it by the internal secretions of the suprarenals. Possibly it may be related to the status lymphaticus constantly observed in this malady.

Nordentoft, S. X-Ray Treatment of Graves's Disease. [Ugeskrift for Laeger, July 17, 1919.]

Since 1915 the author gathered 100 personal cases and finds results as satisfactory in the latter as the earlier cases. In some astonishingly good results were obtained by a single exposure, even in severe cases. In some several exposures failed to cure, though great improvement was effected. Of the 100 patients only 8 were males. The area exposed was invariably confined to the region of the thymus, as great significance is attached by the author to the thymogenic origin of Graves's disease. Regarding recent publication of X-ray fatalities in Graves's disease, a

certain number are inevitable in spite of, not because of, this treatment. Other fatalities are of thymogenic origin—the result of neglecting to submit the thymus to the X-ray treatment. Again, one large dose is much safer than several small doses. If X-ray treatment is prescribed early, and the system of single "massive" dosage adopted, severe cases and deaths will become exceedingly rare.

Lereboullet, P. Treatment of Diabetes Insipidus by Pituitary Extract. [Paris méd., Nov. 1, 1919.]

Five years previously the author reported a case of diabetes in which the symptoms were temporarily relieved by subcutaneous injection of the posterior lobe of the hypophysis. Many similar cases have been reported indicating that diabetes insipidus is often a manifestation of a change in the hypophysis which can be favorably influenced by subcutaneous injections of the posterior lobe. Its action, however, rarely lasts more than twenty-four hours. The prognosis of diabetes insipidus is not thereby modified. It cannot cause a disappearance of the causal lesion, nor render an etiological treatment unnecessary—for example, when the condition is due to inherited or acquired syphilis. It does not prevent a subsequent operation, which is always serious and often fatal. Its value lies in the temporary relief given, dispelling the intense thirst for a few hours, calming the nervous system, and gives sleep. The treatment is quite harmless, and daily injections of 1 to 2 c.cm. of the extract of the posterior lobe may be continued for a long period, and have a favorable action, not only on the diuresis and thirst, but also on the obesity, general condition, development of the genital system, and even on growth.

Straudberg, J. Thyroid Treatment in Alopecia Areata. [Acta Medica Scandinavica, Vol. 52, Fasc. I–II.]

Nine cases are given by the author, three women and six men. In all the alopecia areata had progressed to almost complete baldness. In none were endocrine disturbances demonstrated with certainty. In only one case was syphilis present. Two had dementia præcox. A renewed growth of hair as a result of the thyroid treatment, given in tablets of 0.10 to 0.15 grams (two to three grains) three times a day, occurred in three. In two others the treatment was of too short duration to draw any conclusion. In one, unresponsive to thyroid medication, a new growth of hair appeared during a subsequent pregnancy, but disappeared again at the onset of menstruation. In one dementia præcox case the patient was not benefited by organotherapy, but a hirsute development set in with the improvement of the psychic condition.

Harvier, P. Familial and Hereditary Graves's Disease. [Paris méd., Dec. 6, 1919.]

A man whose mother, maternal grandmother and paternal aunt had Graves's disease had shown the first symptom of it—tremor—when 3 years old. The thyroid became enlarged at the age of 12, but the onset of the exophthalmos could not be determined. In some cases the symptoms develop much earlier. Schmauch reports a woman, aged 35, who at the end of her first pregnancy developed a goiter, which increased in size with each subsequent pregnancy. Undoubted signs of Graves's disease were manifested in the fourth pregnancy and she gave birth to a child at seven and a half months, which showed some exophthalmos five weeks after birth. No mention, however, was made of the size of the thyroid, tremor, or state of the pulse, so that the diagnosis of congenital exophthalmic goiter is doubtful. Transmission is usually on the female side. Sometimes the father alone has the disease. Inherited exophthalmic goiter occurs spontaneously without obvious cause or develops after an infectious disease or an injury. In some cases the symptomatology is complete, and in others, while the exophthalmos and tachycardia are present, tremor may be absent or disappear.

Lahey, F. H. Preliminary Ligation in Hyperthyroidism. [Boston Med. and Surg. Jour., Nov. 20, 1919, Vol. CLXXXI, No. 21.]

Preliminary ligation is indicated in all cases of hyperthyroidism in which there is even a suspicion that the patient is unable to endure the complete operation. The writer is convinced that by submitting to it an increasing number of patients, the risk of the final operation can be diminished. Since it is fairly well established experimentally that the disease is the result of sympathetic stimulation, it may be said that the operation of pole ligation is based upon sound grounds, interrupting, as it does, conductivity of impulses between the cervical sympathetic ganglion and the gland. Its actual effects are gain in weight and general return toward normal as evidenced by diminished basal metabolism. The writer's choice as to the period of waiting has been approximately eight weeks where both poles have been ligated, and from one to three weeks where a second ligation is to follow a single one. The latter period being determined by an improvement in the patient's general condition. The choice of ligation is the superior pole ligation, because sympathetic nerves, vessels, and lymphatics may all be blocked by one ligature, and because the adjacent upper pole gives assurance of the ligation of the proper vessels. The disadvantage of pole ligation are only the additional scars, occasional difficulty in freeing the upper poles at the second operation, and the time consumed in waiting for the complete operation. The latter can hardly be said to have been lost, as during this period there is a progressive improvement in condition. [Author's abstract.]

II. SENSORI-MOTOR NEUROLOGY

1. CRANIAL NERVES.

Griffith, C. R. Effect of Repetition upon Nystagmus. [The Laryngoscope, 1920, 30, January]; Decrease of After-nystagmus during Repeated Rotation. [The Laryngoscope, 1920, 30, March.]

The otological nystagmus test for vestibular normality is based upon the assumption that the ocular movements resulting from rotation are simple unchangeable reflexes. If this assumption is correct, and if the central course of the fibers connecting the vestibular end-organs with the ocular muscles is known, it should be possible to take account of modifications in the appearance of the ocular movements and to relate them, as is done with other well-known reflexes, to definite pathological disturbances within the central nervous system. As a matter of fact, the nystagmus test, like others of a similar nature, attempts just such a diagnosis. It is obvious that the reliability of the test depends upon the assumption that the ocular movements are simple and relatively unmodifiable reflexes. Now, there is considerable evidence that these ocular movements—commonly known as vestibular nystagmus—are not simple reflexes. For example, dancers and whirling performers, as well as aviators of considerable experience, may have little or no nystagmus. Again, the fact that sailors rapidly lose some of the related organic effects of vestibular excitation suggests that the ocular effects may also be modified. And finally, it was demonstrated at the Mineola Laboratory that the ocular effects in question do decrease during repeated rotation in a Bárány rotation chair, and that, in some cases, they may even disappear. Certain otologists observed a similar decrease; but since such a modification of nystagmus is fatal to the reliability of the clinical nystagmus test, they sought to explain the decrease by alleging (*a*) pathological conditions, (*b*) fatigue and (*c*) gaze-fixing. These explanations are not satisfactory. The first has been disproved. The appeal to fatigue is ruled out because the effect of repetition persists over long intervals of time. Furthermore, nothing like fatigue, as the term is commonly understood, is observable. The appeal to gaze-fixing has suggested an *experimentum crucis; e.g.*, rotation under conditions which preclude fixation. The otologists themselves sought to eliminate fixation by requiring their subjects to wear magnifying lenses. But they failed to observe that such lenses do not really eliminate fixation, although by the use of them, the duration and the character of the ocular movements are profoundly modified. Now, the white rat does not possess the organic means of fixation and yet the eyes give after rotation a readily observable nystagmus. By rotating ten rats several thousand times, under appropriate experimental conditions, it was found that in every case nystagmus completely disappeared. Furthermore, the discovery was made that all the other

organic effects of continued rotation finally disappear under repetition. Retching lasted but a short time, and, as the various series proceeded, there was a gradual return of the scratch-reflex. This conclusive evidence in the case of the white rat that the decrease in duration of nystagmus is not a matter of "wilful gaze-fixing" is an adequate defense of the fact that the decrease found in human subjects is not due to such a cause. Rather the facts indicate that a profound modification of the equilibratory mechanism itself takes place during repeated vestibular excitation. The otologist's nystagmus test is not, therefore, an absolute test of vestibular normality, and the assumption that the ocular movements are simple reflexes is based upon an uncritical generalization from the facts of equilibration. [Author's abstract.]

Bilancioni, G., and Romagna-Manoia, A. SPONTANEOUS NYSTAGMUS. [Policlinico, Dec., 1919. Med. Sect. 12.]

Bilancioni and Manoia who noted spontaneous nystagmus in 150 of 3,000 aviation candidates found nothing to suggest pathologic conditions in the labyrinth, but functional disturbance in the nervous system, exaggerated reflexes, dermographism, tremor, were more or less present. Four cases are given of pure spontaneous nystagmus, and of 8 with heart, kidney or nervous disturbances. Two had a fall while flying, and in 2 cases there was an old healed otitis media. Abnormally long reaction to visual and auditory stimuli was noted in two. Their conclusion was that there was some causal functional disturbance in the centers which control the movements of the eyes, probably of embryonal origin and located in the center itself or the cortex or connecting nerve fibers, and consisting in the lack of normal balance between the acting and antagonist elements. It was only when the eyeballs were rotated to the farthest limit that the nystagmus occurred.

Dighton, A. MENIÈRE'S DISEASE. [Jour. of Laryng., Rhin., Otol., Feb., 1919.]

Dighton gives one of his cases, a man, æt. 47 years, non-smoker, teetotaller, with a normal blood pressure, during a period of five years, usually at intervals of a few months, had severe attacks of vertigo—sudden falling attacks, accompanied by violent sickness and swishing noises in the head—which prostrated him sometimes for days together. The right ear was normal, but the tympanic membrane in the left thick and retracted, tinnitus present. Rinné's test was negative; Weber's test led to a lateralization to the right; Schwabach's reaction was increased; hearing for high tones was markedly diminished and the caloric test (15 c.cm. of water at 27° C.) produced violent reaction. Hypertension and hyper-irritability of the labyrinth (non-suppurative labyrinthitis), was diagnosed. The author did a radical mastoid opera-

tion on the left ear and two days later a complete Jansen-Neumann intracranial labyrinthectomy. Recovery was uneventful and the patient was back at work three and a half months after operation. Three years later he stated that he had had no recurrence of the vertiginous attacks, tinnitus or other symptoms referable to his ear, and was in excellent health.

Lermoyez, M. Labyrinthic Angiospasm. [Presse Méd., Jan. 2, 1919.]

Lermoyez has noted cases resembling reversed Menière's syndrome, *i.e.*, a progressive tinnitus, with increasing deafness, which becomes almost absolute, but which recovers after a sudden and violent attack of vertigo. He thinks the train of symptoms may be due to a spasm of the vessels of the labyrinth analogous to the blindness due to a spasm of the ocular vessels. Owing to the transient nature of the symptoms, hemorrhage into the labyrinth is improbable. Vertigo corresponds to pain in the vestibular nerve; subjective noises represent pain in the auditory nerve and deafness indicates anesthesia.

Cheval, V. Physiology of the Eighth Nerve. [Revue de Laryngologie, June 30, 1919.]

V. Cheval finds the rapid component of vestibular nystagmus is comparable to the tendon reflexes, as the nucleus of the trigeminal is connected with the nuclei of the third, fourth and sixth nerves and the contraction of one set of muscles produces a contraction of the antagonists. As the rapid contraction of the antagonists occurs always suddenly and the sensation of kinesthesia of the ocular muscles is transmitted by the trigeminal, it follows that the reflex of the rapid phase has a trigeminal origin. The afferent impulses from the extrinsic muscles of the eye presumably travel by the trigeminal. Injection of novocaine into both orbits of a rabbit caused disappearance of the rapid phase. Unilateral section of the trigeminal trunk sometimes suppressed it, while section of both trigeminals was invariably followed by disappearance of the rapid phase and onset of persistent conjugate deviation.

Maxwell, S. S. Effects of Removal of Otolith Organs and Semicircular Canals. [Jour. Gen. Phys., Nov. 20, 1919.]

The assumption of a clear differentiation of function between the otolith-bearing vestibular portions of the labyrinth and the semicircular canals seems indefensible. Maxwell points out that between the effects of extirpation of the one and of the other set of structures there is more resemblance than contrast. Certainly they reënforce each other. Reactions produced by either one alone are always slower and less vigorous than when both sets of organs are intact, but it is not safe to affirm that the functions are identical. In one respect a difference is obvious, namely, in the response to rotation in a horizontal plane. If

the ampullæ are uninjured, compensatory movements occur when the animal is rotated around its dorsoventral axis. This reaction in the absence of the ampullæ of the horizontal canal has not been noted by the author.

Gregory, L. T. Laryngeal Crisis with an Unusual Complication. [Jour. A. M. A., March 20, 1919.]

The author's case was apparently a syphilitic laryngeal paresis, corresponding to a gastric crisis. It might have been an unsual type of diphtheritic paresis, but this is not likely, as there was no history of any diphtheritic process and no local evidence of diphtheria in an active form. Furthermore, it was a paresis, transient in type, and not a paralysis, as usually seen following diphtheria. Finally, the Wassermann reaction was strongly positive with other evidence of syphilis as seen in the sluggish pupil, perforated septum, scars on the back and chest, and painful and roughened tibia, with a history of chronic sore throat and nocturnal pains in the lower extremities. The immediate response to antisyphiiitic treatment confirms the diagnosis.

Kickhefel, G. Influenzal or Diphtheritic Paralysis of Soft Palate? [Berl. klin. Woch., October 13, 1919.]

Four cases of partial paralysis of the soft palate after a typical attack of influenza were seen by the author. The first was a woman, aged 33, who in October, 1918, developed high fever which lasted three weeks. Head and limbs ached, there was a severe cough and much catarrh of the throat, but she was not attended by a doctor. After the temperature had fallen her speech became nasal and slurred. On examination in hospital on January 16, 1919, the movements of the soft palate were seen to be slow on both sides, and occlusion of the rhinopharynx by the palate was incomplete. No regurgitation of liquids by the nose occurred. The quality of the voice was abnormally affected by closure of the nostrils (Gutzmann's test). The author notes that the febrile illness preceding the paralysis of the soft palate in all cases was invariably characteristic of influenza; pain in the limbs, violent headache, great lassitude, pain in the eyes, and catarrh of the respiratory tract were uniformly present. All patients denied the existence of a membranous deposit in the throat, of dysphagia or swelling of the cervical glands. Dipththeria could, therefore, be excluded. Paralysis was only partial, the subsequent course of which the author does not record. Such cases often clear up spontaneously, and when this does not occur the persistence of the symptoms may be due to functional disturbances having succeeded an organic lesion. A. Peyser (ibid.) doubts the existence of a genuine influenzal paralysis of the soft palate, suggesting that undetected diphtheria might account for some of the cases labelled as influenzal. He recorded a case of paralysis of the

soft palate with a recent history of influenza but not of diphtheria. He was about to demonstrate it as one of influenzal origin when he saw another case in which there was no history of diphtheria. But when the discharge from the right ear was examined typical diphtheria bacilli were found. Finder's experience (Ibid.) also points to a diphtheritic origin of the socalled influenzal paralysis of the soft palate. Paralysis of the soft palate was diagnosed in one of his patients, a married woman, who complained that she had not been able to speak properly since a recent attack of influenza. She denied having suffered from a sore throat, but only from such characteristics influenzal symptoms as fever and pains in the limbs, the existence of diphtheria seemed improbable. On further investigation it transpired that she had experienced some difficulty in swallowing, and, when a bacteriological examination was made, diphtheria bacilli were found.

Boorstein, S. W. Postdiphtheritic Paralysis. [Jour. A. M. A., Feb. 21, 1920.]

Two cases, one in a 3-year-old boy and another in one aged 7, are given by S. W. Boorstein, New York. He describes the symptoms and varieties of this disorder. While severe, the disease may be curable. Orthopedic treatment was probably of more value in hastening the recovery of the first case than the antitoxin administered. In the second case, which had lasted altogether two months, antitoxin was early administered, but still paralysis developed. In this case what skepticism he had as to the value of the orthopedic treatment in the previous case was dispelled by the greater and more notable success. The article is illustrated.

Yamada, S. Auricular Flutter. [Mitt. aus der Med. Fak. der Univ. zu Tokyo, Oct. 11, 1918.]

Eight double-page tracings of the heart action in a man of 40 with nephritis and auricular flutter are given by Yamada. This flutter was up to 230 per minute, and not influenced by any measures. It never changed to fibrillation, even under digitalis. The ventricle could not keep pace with the auricle, and the ratio altered under epinephrin to 3:1, and under atropin to 2:1.

3. SPINAL CORD.

Loewenstein, Sally. Traumatic Origination of Chronic Disease of the Spinal Column. [Neurol. Centralbl., August 16, 1918, No. 16, Vol. 37.]

The traumatic origin of diseases of the spinal cord is received with so much skepticism by modern neurology that, for the acceptance of such an origin, proof of the following connections between the trauma and the disease is regarded as indispensable: First, that there has been

a severe concussion of the skull and vertebral canal; secondly, that every other cause is excluded; thirdly, that there was a healthy state of the nervous system before the trauma; fourthly, that there is indisputable connection in time between the trauma and the disease. With these requirements in view six cases are described by the author in which disease of the cord followed trauma. These cases were selected from a large material as the only ones showing possible traumatic origin. In case one, there could scarcely be any doubt that the disease was multiple sclerosis. Owing to peculiar circumstances surrounding the case it was possible to ascertain that all four of the conditions for assuming a traumatic origin had preceded the disease and the author thinks the multiple sclerosis was probably due to a direct injury of the medulla oblongata. Cases two and three were also diagnosed as multiple sclerosis and might have been considered as due to trauma, had there not been proof of a previous affection of the nervous system. In case four the patient, a stone mason, had fallen on his back. There could be no doubt as to the diagnosis of spinal muscular atrophy, for which taking all the circumstances into consideration, the trauma must be assumed to be the cause. The accident had led to a severe injury of the vertebral column, doubtless to an intravertebral bleeding. The severe chronic disease began before the initial symptoms of paralysis had entirely subsided. The nature of the trauma and the very close connection in time between it and the beginning of the disease, are to be regarded as certain proof that the accident was the cause of the disease, confirmed also by the unusual localization of the disease; it began in the legs which are usually the last members to be attacked by paralysis. This unusual circumstance can be fully explained as a result of the injury of the lower vertebral column. Cases five and six had suffered trauma leading to the development of tabes under such circumstances that the trauma must be assumed to have been responsible, in case five, for an extraordinarily early development of the tabes after the infection, and, in case six, for the production of a particular symptom, for which the patient received indemnity.

Huebner, A. H. Atypical Myotonia. [Neurol. Centralbl., June 1, 1918, No. 11, Vol. 37.]

In recent years a series of cases of atypical myotonia have been published which are in need of further study. In a previous paper the author published such a case and Albrecht observed another closely resembling it. The author here adds another. This is the case of a merchant thirty-one years old. In the patient's family, his father and two of his father's brothers had suffered from Thomsen's disease. This disease was noticed in the patient in early childhood. When the weather was cold or when the patient's face was washed with cold water, the eyes closed or the mouth was distorted. Spasms in the hand also oc-

curred at an early age. When the patient was examined by the author nothing extraordinary was discovered in the eye-lid and face muscles, and jerking movements of the hands led to no conditions of tension. As soon as the weather became colder, however, prompt contractions of the muscles were observed when the fist was suddenly closed. The hand could only be opened slowly and by overcoming great resistance. The patient was able to perform the clerical duty connected with the military service to which he had been assigned until the month of December. Then the peculiarity that he could not open his eyes while walking along the cold streets, and the return of the facial spasms led to his being sent back to the author for observation. The electrical examination revealed the myotonic reaction as on the former occasion. This is therefore a case in which in addition to the phenomena belonging to myotonia there was a muscle rigidity lasting hours produced by cold, but only in the parts of the body which were most exposed. The case resembled the atypical cases described by Eulenburg and Lewandowski. The question arises whether these deviations may not belong to the disease picture, or whether they are caused by some accidental circumstance. The author states that in his case the atypical phenomena seemed to be essentially connected with the disease. Evidence confirmatory of this is that the symptoms described have been repeatedly observed together; the same causes (cold and long-continued strained movement) which produced the rigidity and weakness also increased the myotonia; that both series of symptoms existed from earliest youth, and that both series were hereditary. The only circumstance going to show that they are separately existing disease processes is the fact that muscle rigidity occurs without myotonia. To this objection it may be answered that certainly all cases are not explicable in the same way, a circumstance realized by various writers, for example Lewandowski, who in the case with somewhat similar clinical phenomena observed by him found no certain proof of a relation to myotonia. It may be that some of these cases stand in closer relation to the "familial cortex spasms" described by Rülf. In the author's case besides the symptoms which he considered to be due to the same disease process as the myotonia, there were other signs of degeneration which could not be thus accounted for and these disturbances as well as certain phenomena connected with the blood vessel innervation and the vasomotor reactions stand in need of further study to obtain a complete understanding of the case.

Hillel. Unusual Case of Disseminated Sclerosis. [Med. Klinik, Oct. 26, 1919.]

The case of a girl aged 18, was remarkable because for more than two months a unilateral choked disc was the only physical sign. The diagnosis of syphilis could not be admitted, in view of the negative re-

sult of the Wassermann and examination of the cerebro-spinal fluid, as well as the subsequent course of the disease in which the cranial nerves were not affected. Subsequently the diagnosis was established by the occurrence of Babinski's sign, horizontal nystagmus, and absence of the abdominal reflex. The occurrence of a unilateral choked disc is explained by morbid changes in the brain, causing a rise of cerebral pressure, but not of the intense and progressive character of that present in cerebral tumor.

Strümpell, Adolf. Remarks Concerning the Etiology of Multiple Sclerosis. [Neurol. Centralbl., June 16, 1918, No. 12, Vol. 37.]

The recent communications of Kuhn and Steiner as well as of E. Siemerling concerning the discovery of living spirochetes in the foci of multiple sclerosis have aroused the greatest interest among neuroolgists. This discovery and the proof that the disease could be communicated from man to lower animals by inoculation with the spirochete seemed at once to explain the cause of the disease. But the conclusion must not be immediately formed that the whole etiology of multiple sclerosis is made clear thereby. The presence of the causal agent does not alone condition the disease; there are many other factors to be taken into consideration, the reciprocal relation in which this causal agent stands to the tissues of the body attacked by it, how it produces its injurious effect on the organs, what are the defense reactions called forth, and what are the consequences in the various tissues and fluids. The purpose of the author's article is to discuss the question from these points of view. Concerning the manner in which multiple sclerosis enters the system nothing certain is as yet known. Though attention has recently been called to the fact that this disease sometimes follows other infectious diseases (measles, scarlet fever, influenza) this is only true of a very small number of cases and has no essential significance. Some writers have suggested occupational intoxications as cause, and others traumas, but these are obviously only accompanying circumstances which do not go to the root of the matter. As a rule multiple sclerosis seems to develop "of itself" so to speak. Some light on the manner in which the disease enters the system might be obtained from the history of the patient and that the profession has still to learn the importance of the anamnesis in this disease, recalling how long it was before physicians realized the necessity of studying the anamnesis in tabes. Further, in regard to the assumption that the disease is of infectious origin, attention is called to the fact that these features are absent which are almost always indicative of the infectious nature of a disease; for example, there is no evidence that the disease is communicated from one individual to another; the disease is never found spreading to various members of the same family; it is never found in epidemic form. The few cases reported in former times where it seemed

to take a familial form were probably cases of an entirely different disease, and the assertion that multiple sclerosis does not exist in Japan seems to be without corroboration. Everything considered, it would seem that transmission of the disease by contagion is somewhat problematical. The author, besides, does not find that the clinical phenomena in multiple sclerosis furnish very strong proof of its infectious nature. The fact that the disease sometimes begins with an acute attack, that there are remissions and then again quite acute relapses is often cited as evidence of its infectious nature and the author concedes that the most simple explanation of these peculiarities would be that the disease is infectious, but he adds that this course is only observed in a small number of cases, multiple sclerosis being usually a steadily progressing disease of long duration, and that there is even doubt whether acute multiple sclerosis (often accompanied by neuritis optici) really belongs to the classical form of the disease. In the author's opinion there are cases of acute and chronic "disseminated myelitis" which are clinically and anatomically and, therefore, also etiologically distinct from multiple sclerosis proper. Further it must be admitted that there are cases of multiple sclerosis having other peculiarities not easily reconcilable with infectious diseases, namely, those cases where there are premonitory symptoms long before the development of the disease—symptoms which not rarely begin in early childhood; for example, the transient amaurosis of one or both eyes without any discoverable anatomical changes. If these symptoms are the result of an acquired infection then the manner in which they are produced stands in need of explanation and the question also arises how it is possible for the infecting agent to remain latent many years without causing any signs of disease. Also, when the symptoms of multiple sclerosis are fully developed many of those signs by which infectious diseases are characterized are absent; for instance, there is no rise in temperature, and the changes in the spinal fluid are very inconsiderable in comparison with those found in disease processes of the central nervous system certainly known to be infectious. The pathologico-anatomical changes too require explanation. The author states that the exudative infiltration in the blood vessels and the presence of rod cells (A. Westphal) in the foci of multiple sclerosis seem corroboratory of the infectious character of the disease, but there are other circumstances not in keeping with this view, namely, the sharply defined boundary of the separate foci, which are so distinct as to be perceptible without microscope. It is not easy to understand how foci produced by a specific infectious agent could be so distinctly marked off. Another inexplicable peculiarity of the foci is that the axis-cylinders remain intact for a very long time in the affected tissues. Still another point is remarkable if multiple sclerosis is really an infectious disease; *i.e.*, notwithstanding the fact that it runs a course of many years it attacks regularly only

a single organ, the central nervous system. No one has ever found any changes in any other organ due to this disease which would indicate a spreading of the disease. The main ground for suspecting that other chronic diseases were infectious was the manner in which they spread to various tissues in the body. It was for this reason that tuberculosis and syphilis were assumed to be infectious before proof of the fact was forthcoming. The author does not deny the infectious nature of multiple sclerosis but points out that to an unprejudiced mind there are as many reasons for assuming it to be non-infectious as there are for entertaining the opposite opinion. Siemerling says: "It is not excluded that in multiple sclerosis there may also be other effective causes." But if the spirochete found by Kuhn and Steiner is the real exciting agent of the disease, the *causa essentialis,* it must naturally be the sole essential cause, in the same manner as the tubercular bacillus in tuberculosis and the tetanus bacillus in tetanus. If this were not the case multiple sclerosis would cease to be a single disease and would become a disease group like the anginas or acute nephritis. If the spirochete etiology of multiple sclerosis should be certainly proved and could be easily determined in every case a question would be solved which has long puzzled neurologists and this solution would be a most interesting and important, but even then there are numerous questions connected with the pathogenesis of this disease which would stand in need of further research.

Westphal, A. Rod-cell Findings in Multiple Sclerosis: second communication. [Neurol. Centralbl., June 16, 1918, No. 12, Vol. 37.]

A short time ago the author published a case of multiple sclerosis in which numerous rod cells were found at post-mortem. The question whether such findings were frequent in this disease he left to be decided by future research. Since then he has had opportunity to examine two further cases and now gives the results. The diagnosis in the first case was "hemiparetic form of multiple sclerosis" (Oppenheim) which was confirmed by the post-mortem. In various places in the medullary substance of the frontal sections of the brain were gray sclerotic foci ranging from the size of a pea to that of a bean. In the Nissl preparation the foci in the medulla seemed to be poor in nuclei. There were rod cells in limited number scattered irregularly in the glia tissue. No relation to the vessels could be determined and there seemed to be no vessel increase. In many places there was small-cell infiltration of the adventitia of lymph sheaths. There were only isolated plasm cells. In the cortex were found rod cells without any apparent connection with the foci, but only in some places of the first cortex layer were they numerous. The branching, tuft-like form of the cell bodies were, in many specimens, very distinct. The second case was one of encephalomyelitis disseminata. The post-mortem showed a great number of rod

cells in the extremely numerous fresh foci as well as in the other ones of the brain medulla and cord. They were often situated in the tissue without any apparent connection with the foci and were also found in the spinal nerve roots, which, in some places, were affected by the disease. The most usual form of these cells were those with long, narrow, dark-colored, needle-like nuclei and nuclei with many bends and twists. Nuclei with long-drawn-out protoplasm threads were present only in small numbers. Though the number of rod cells in the medulla was large, yet they were present in much greater number in the cortex where they were scattered irregularly between the glia cells, in some places seeming to be attached to them. In the first layer of the cortex the peculiar branching of the protoplasma cells was distinctly recognizable. There were inflammatory changes in the vessel apparatus, vessel increase, strong round cell infiltration of the adventitia of lymph sheaths. Accumulation of plasma cells was present in most pronounced form, but in such a way that no direct connection could be discerned between the vessel adventitia and the rod cells, such, for instance, as Alzheimer has described in progressive paralysis. Professor Marburg communicated to the author that he had also found rod cells in acute multiple sclerosis. The fact that rod cells and plasma cells are found in multiple sclerosis of both the acute and chronic type is not without interest, in view of the much discussed relation of these two forms. Reference is also made to Henneberg's finding in disseminated encephalitis (which he would separate from acute—malign—multiple sclerosis and would class with one of those types of disseminated encephalomyelitis that are related to multiple sclerosis) of rod cell elements which in part seemed to belong to the vessels and in part to lie free in the tissues. The fact that in the author's observations the rod cells were much more numerous in those cases in which the inflammatory changes in the vessels were most pronounced makes the assumption probable that the presence of the cells stands in some connection with the vessel apparatus, and, like the plasma cells, is to a certain extent an indication of the infectious character of the disease. Further research in regard to the presence of the rod cells in multiple sclerosis will be of special interest in connection with the experimental results of Steiner and the recent discovery of Siemerling of living spirochetes in the foci of a case of multiple sclerosis. The author calls attention to the discovery of rod cells in hydrophobia by Achucarro, who, however, did not regard them as products of the adventia of the vessels but "as altered glia cells adapted to the ganglion cell processes" he considers that both origins might be possible and then the term "rod cells" would only be a common designation for elements of different origins. Achucarro calls particular attention to the resemblance which the histological picture of rabies bears to that of sleeping sickness and paralysis, a resemblance arising from the extreme involvement of the vessel apparatus by the infiltration of the plasma cells and lymphocytes.

Book Reviews

Weygandt, Wilhelm. Erkenntniss der Geistesstörungen. J. F. Lehmann's Verlag, München. 1920.

Weygandt's Atlas of Psychiatry which appeared in 1906 and which appeared in English dress shortly thereafter has always enjoyed a very definite place of interest and of respect in the development of American psychiatry.

The present volume is an entirely rewritten, amplified and much more thoroughly expanded second edition. As a matter of fact it is greatly more than this as it is an entirely new work of a very high order on the diagnosis of mental disturbances.

The author first discusses general diagnosis including an extremely richly illustrated series of chapters on the Anamnesis of the Phylogeny—Heredity—General Deportment, Physiognomy,—Psychopathological Symptoms— Physical States and Conditions including some Endocrinological Data and a large and detailed chapter written by Dr. V. Kafka on Serological Diagnosis.

Chapters on Special Diagnosis then appear which in general follow the Kraepelian concepts.

The reviewer would like to consider in fuller detail the many excellent features of this interesting volume, but is restrained by lack of space. This much can be said however, that for a comparatively short and concise presentation of the present day descriptive psychiatry this volume of Weygandt's is preeminent. We feel sure it will find the favor that his shorter atlas found with American readers.

Jelliffe.

Schmidt-Kraepelin, Toni. Ueber die juvenile Paralyse. Julius Springer, Berlin, 1920.

This volume of one hundred and twenty-four pages is No. 20 of the Monograph Series inaugurated by Alzheimer and Lewandowsky, now edited by Foerster and Wilmans, and contains a scholarly and complete discussion of practically all of the problems connected with hereditary juvenile paresis.

We know of no similar work with which to compare this and the psychiatrist may turn to it as an encyclopedic summary of the subject written with great care and in a scholarly manner.

It is not a work which has issued from the activities of the literary shop but is essentially clinical and deals with a wide choice of clinical material chiefly from the Heidelberg psychiatric clinic (three hundred cases) and from the Pediatric Clinic of Munich.

Morgan, T. H. The Physical Basis of Heredity. J. B. Lippincott & Company, New York and London.

To the student who is searching for a complete, yet authoritative statement of the present day stage of the fundamental aspects of heredity problems, as worked out in the biological sciences, this short work can be most highly recommended. Should he seek a short cut to knowledge from a boiled down, quiz compend type of book, which simplifies a thing so much that it is not a guide but a hindrance, he will not find it here. This is not meat for those who do not wish to concentrate when they read, but to one who will work as he reads, this volume will prove useful and permanently valuable.

Sanguineti, Luigi Romola. Les Allures Cliniques de la Syphilis et les Formes de Paralysies Générale Consécutive. Jouve et Cie, Paris.

A Paris thesis which would in a sense try to go further into an analysis of the syndromy of paresis on the basis of differential involvements of different anatomical substrata.

The more one observes paretic patients the more one is struck by the differences in symptoms. Why one patient has one syndromy and another a variant or a quite different one, while frequently made the subject of gossipy conversation, has not received the attention it should. Thuillier-Landry has recently discussed the problem of dementia præcox from a similar point of view and has stated that "it is impossible to correlate the psychical symptoms with anatomical lesions, even though these lesions are known." Readers of this Journal know of the highly interesting and suggestive efforts made by Southard in this direction, and from time to time, attentive readers may have noted the comments made on the work of Potzl, Adler, Jelliffe and others relative to the different aspects of this same problem, in which the latter group mentioned, as well as Osnato have indicated, or specifically stated, that unless the psychological factors are viewed in the light of the psychopathology of unconscious symbolizations, the problem will still remain insoluble. For paresis Osnato has stated this in quite clear and unequivocal terms.

From another viewpoint however, we have the work of the present author who seems to follow the suggestion of A. Marie, who it will be recalled, has described a neurotreponema, as a varietal form to account for the varying syndromy. Thus we have two types of treponema giving rise to different syndromes. Whereas the author does not emphasize Marie's later announced discovery, he nevertheless follows the general idea of a change in type of the invading organism. The banal treponema which produces a slow, or rarely very rapid onset, with mental confusion, psychosomatic depression, motor disturbances, somatic disturbances. The physical signs augment, the psychical ones remain subordinate. The body goes, the spirit is conserved. Arterio paralysis is the name given to this trend.

The neurotreponema causes a more rapid attack, with excitement, grandiose deliria, and marked psychical and minor physical participation. These are the palio-paralytic cases.

Two, three, four years—or twenty, are the usual time signs of the former type—nine, ten, twelve or twenty of the latter. Nervous heredity is dominant in the first type; toxi-infections in the second. Other features are mentioned but enough has been shown, and tends to prove, we believe, that ultimate truth does not lie along the lines followed by the author.

Harrower, Henry R. Practical Organotherapy. Harrower Laboratory, California. 1920.

This is a frank commercial product comprising a series of general summaries upon the actions of the endocrinous glands with a catalogue of the products sold by the founder of the laboratory, Dr. Harrower. It makes suggestive, if not always sound reading, and at the same time apprises the physician what forms of preparations may be of service in opotherapy, a subject much in vogue at the present time and still in its efflorescent bubbling-fermenting stage which will ultimately settle down to sound principles for therapeutic guidance.

Souza, O, e de Castro, Aloysio. Dystrophia Genito-Glandular. Imprensa Nacional, Rio de Janeiro.

South American observers have contributed very largely within the past ten years to the study of the endocrinopathies. The authors of this very valuable monograph have been among those who have given to neurology material of great moment, combining as they have the best scientific traditions with sharp and penetrating capacities of gifted imagination.

The present volume of approximately two hundred pages is one of the best discusisons on gonadal dystrophies and richly illustrated which has appeared in recent years in which one may find a very complete discussion of all of the factors involved from the interrelationship view point.

The contributions of these observers are known to many by their brilliant studies in the French neurological press. They have here gathered together the results of their experience, which though in Portuguese can be readily mastered by any interested reader conversant with a working knowledge of the Romance languages.

Athanassio-Benisty, Mme. Les Lésions des Nerfs. Traitement et Restauration. Masson et Cie. Paris.

We have called attention in these pages to the excellent volume on the Clinical Forms of Nerve Lésions which this author has already issued and would simply commend this small brochure, which deals particularly with treatment and restoration. The chief plea contained in this small manual is to insist upon exact neurological diagnosis, then with precise indications the patient can be passed on

to the surgeon or orthopedist for carrying out the therapeutic indications. The principles for carrying out both these indications are ably, concisely and scientifically set forth.

Paton, Stewart. EDUCATION IN WAR AND PEACE. Paul B. Hoeber, New York.

That the war gave occasion for a great uplift for a reappraisal of all human values is a trite comment. Yet true as it may be there are plenty of indications that mankind would settle back in its old ruts and try to forget all of the valuable lessons learned.

That this tendency may in part be hindered and that we may not lose all that have been learned at so great and tragic a cost the author here reminds us of some important first principles which through the sudden prominence of obvious situations demanded thoughtful consideration.

In three very readable essays Dr. Paton discusses Human Behavior in War and Peace, War and Education and The Psychiatric Clinic and the Community. We commend them to our readers.

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Original Articles

A STUDY OF NISSL'S STAEBCHENZELLEN IN THE CEREBRAL CORTEX OF GENERAL PARESIS, SENILE DEMENTIA, EPILEPSY, GLIOMA, TUBERCULOUS MENINGITIS AND DELIRIUM TREMENS[1]

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CONTENTS

[1] From the Neuropathological Laboratory of the Evans Memorial for Clinical Research and Neuropathological Department of Boston University.

I. Introduction

The staebchenzelle is a peculiar rod shaped cell with a markedly elongated nucleus, hence its name. Nevertheless bizarre shapes are frequently encountered. These cells are found in the cerebral cortex in various diseases of the central nervous system, especially in general paresis. In paresis they are recognized as among the most important histopathological findings. The elongated nucleus of these cells takes the stain faintly, and sometimes displays one or several nucleoli. Frequently the only evidence of protoplasm is a faintly staining threadlike substance given off from the poles of the nucleus. This kind of cell is more numerous and may be regarded as the type, but thicker and shorter nuclei which sometimes are twisted, sometimes are oval, and sometimes are sausagelike or needlelike, are by no means rare. Furthermore some staebchen cells show a more abundant protoplasm with more or less extended ramifications and with pigment inclusions. Other shapes may also be included in the group, as one may be readily convinced by their staining reactions and their relation to the surrounding neural and mesoblastic elements.

Nissl was the first (1899) to call attention to the rod cells (staebchenzellen) in the central nervous system. At a meeting of the Suedwest deutscher Irrenaerzte and Neurologen, Nissl described the various glia cell forms, calling attention to a peculiar elongated form of cell which he believed was of glial origin. Later, in his now classical paper "Zur histopathologie der paralytischen Rindenerkrankung" (1904), he advanced a different opinion, namely, that the staebchen cells originate from mesodermal elements. Alzheimer also, in 1904, insisted upon the mesodermal origin of staebchen cells. Since then many interesting observations on rod cells have been published, notably in papers by Cerletti (1905–1910), Straeussler (1906), Agostini and Rossi (1907), Dupré (1908), Perusini (1909), Ulrich (1910), Achucarro (1908, 1909, 1910), Simchowicz (1911), and many others.

While many interesting details concerning the staebchen cells in the central nervous system have been established, perhaps, the last word has not been said. The writer believes that a further discussion of these interesting elements with reference to their origin and possible function is desirable.

The special contributions on staebchen cells to be found in the literature written concerning the origin of staebchen cells may be briefly classified as follows:

1. the ectodermal origin,
2. the mesodermal origin—from adventitial and endothelial cells,
3. origin in part from mesodermal elements in part from ectodermal elements.

Moreover, Nissl believed that it was possible for pial cells to become transformed to staebchen cells and De Ruck maintained that the staebchen cells may originate from the fibroblasts.

This study is presented because of the many interesting points still unsettled concerning these cells—staebchenzellen—which it is hoped will supplement our knowledge.

Historical

The first reference in the literature to the staebchen cells of the cerebral cortex is found in a paper by Nissl. In this paper, Nissl stated as his belief that the staebchen cells originated from glial elements. But later, Nissl substituted for this the view that staebchen cells were derived from mesodermal elements as already mentioned in the introduction. According to Nissl's statement, the staebchen cell is an elongated structure with a rodlike nucleus and from the poles of the cell delicate threadlike processes are given off. The

cell protoplasm stains faintly but in the nucleus numerous colored granules disposed in a somewhat columnar fashion, are shown. These elements are found especially in the cerebral cortex of general paretics, and there form one of the important histopathological features of this disease. Nissl could not find any glia fibers given off from these cells and so concluded that: "The staebchen cell was a type of mesodermal cell, that their general direction was parallel to the vessels, but if staebchen cells were numerous they were then irregularly distributed. Staebchen cells can hardly be distinguished morphologically from adventitial cells. Sometimes, staebchen cells are found in the nonparetic cortex, resulting from a lively proliferation of vessels subsequent to blood effusion." Nissl though doubting its probability admitted a possible origin of staebchen cells from pial cells.

Alzheimer (1904) in his great work, "Histologische Studien zur differential Diagnose der progressive Paralyse," described the staebchen cells in detail. According to this observer, the staebchen cells were found in extraordinary number in the cortex of general paresis. Especially, in the outer layers of the cortex, that their direction was vertical to the cortex and parallel with the cortical vessels. In the deeper layers, however, the general direction was irregular. Sometimes it was almost impossible to distinguish staebchen cells from glia cells, at least by their shapes. Staebchen cells Alzheimer thought could hardly be considered as having the power to reproduce themselves, even though they had emigrated from vessel walls. Frequently, fat or pigment granules in the protoplasm, strangulation or partial destruction of the nucleus, and shrinking of nucleus were found in these cells, shrinking of nucleus was regarded as evidence of an advanced alteration. Alzheimer expresses himself on staebchen cells as follows: "The staebchen cell does not originate from the glia elements because of their morphological differences and also because they produce no glia fibers. Staebchen cells have no relation to the nervous elements in their genesis. Thus by excluding glial and neural origins, staebchen cells therefore must originate from mesodermal elements. In fact, a great number of staebchen cells appear around the adventitial spaces in general paresis, a disease which especially shows marked proliferation of adventitial cells. And it was noted that if the adventitial cells have short nuclei, staebchen cells have also short nuclei and *vice versa*. Moreover, some of these cells separating from the vessels are sometimes found connected with the adventitia by their protoplasmic prolongation. Sometimes in cross section of the vessels, numerous staebchen

cells radiating in all directions are found. Staebchen cells and adventitial cells are very much alike in morphology. The presence of a great number of staebchen cells is a striking feature of the paretic cortex and this fact together with the equally striking vascular alteration in paresis makes an effort to determine the origin of staebchen cells a matter quite worth while.

Cerletti was among the first to call attention to the glial origin of staebchen cells. In an early paper (1905), Cerletti mentioned the special relationship between the nerve cells and staebchen cells, and pointed out that these latter were derived from the rodlike nucleus of the glial elements. Cerletti concluded therefore that the staebchen cells were glial in nature and that their peculiar form was the result of the manner in which they adapted themselves to nerve cells. On two other occasions, in 1910, Cerletti reported the results of his studies on the origins of staebchen cells. In a study of the histopathological alterations of the cerebral cortex in malaria perniciosa, Cerletti found typical staebchen cells, the glial origin of which he believed was clearly demonstrated. In a second paper reporting a study of staebchen cells in cases of general paresis, senile dementia and in other elderly subjects, Cerletti still adhered to the glial origin of staebchen cells. He employed special staining methods, while numerous staebchen cells were found in sections stained with toluidinblue, sections from the same area, often times the same section when stained with Mann's solution or with toluidinblue after resorcin-fuchsin staining exhibited only a few such cells. In seeking an explanation for this phenomenon, Cerletti thought it wise, after careful examination of the topographical localization of staebchen cells in the section stained with toluidinblue, to decolorize and then restain with Mann's solution or double staining with resorchin-fuchsin and toluidinblue. When this was done, Cerletti reports that most of rod cells exhibited in the toluidinblue staining could be demonstrated as a part of the mesodermal elements (adventitial and endothelial cells) and could be shown in direct relationship with the walls of vessels. The apparent isolation of these cells in toluidinblue stained sections he felt was due to regressive alteration of vessel walls which made the affected areas unstainable with toluidinblue which however were readily visible with the other methods. Cerletti, therefore, interprets the usual staebchen cell as part of an otherwise invisible blood vessel.

Straeussler (1906) also believes in the glial origin of staebchen cells, basing this belief on his study of the histopathological changes of the cerebellum in paresis, multiple sclerosis, gumma and cerebral

atrophies. Straeussler found the majority of staebchen cells in the molecular layer and white substance of the cerebellum, the granular layer showing but few. According to Straeussler the general direction of staebchen cells in the molecular layer is vertical, in the marrow longitudinal. He claimed to have found glia fibers given off from the protoplasmic processes of staebchen cells (Weigert's stain) but fibers were only demonstrable where staebchen cells were numerous. Conversely staebchen cells are not numerous except in cases where glial elements are numerous. This, then, is the basis for his belief in a glial origin of staebchen cells.

Spielmeyer (1906) found the staebchen cells in a case of meningo encephalitis tuberculosa accompanied with general paresis, and noticed that their distribution was chiefly in the deeper layers.

Ris (1907) noticed that staebchen cells were placed in a radiating manner and while he believed that the staebchen cells were glial elements, he stated that the staebchen cells massed around the capillaries were in general indistinguishable from the adventitial cells of vessel walls.

De Ruck (1907) stated a belief in the fibroblastic origin of the staebchen cells.

Agostini and Rossi (1907) do not attribute the shape of glia cells alone to purely mechanical factors, but also, as indicated, in the researches of Guadinas, to alterations in osmotic pressure and surface tension, which as a result of pathological processes may produce all kinds of changes in the shape of normal glial elements.

Mott (1907) stated briefly in his report on the histological observation on changes in the nervous system in the trypanosome infections that "these staebchen cells I consider are probably collapsed capillaries."

Ranke (1907), in syphilitic cases of the new born, found many staebchen cells in the vicinity of plasma cells, mast cells, increased glia elements and cell fragments, especially in and around infiltrated vessels, in the marrow as well as in the cortex. Ranke interpreted these cells as the result of proliferated adventitial elements without, however, entering into a detailed discussion of their origin.

Dupré (1908) studied the staebchen cells in general paresis, and found them more numerous in the large pyramidal cell layer than elsewhere. Here they were also larger than in other areas. Dupré noticed that in the regional distribution of staebchen cells in general paresis, a large number of them appear in the frontal and central convolutions, while the temporal and occipital convolutions displayed the fewest. In the outermost layer of the cortex staebchen

cells were irregularly disposed, generally around the large pyramidal cell, and parallel to the axis cylinder. In a case of general paresis complicated with arteriosclerosis, Dupré also found staebchen cells and he maintained that they were also to be found around the foci of softening in true arteriosclerosis. Dupré regarded staebchen cells as a result of the paretic process.

Perusini (1909) in the report of four cases which showed rather characteristic clinical symptoms and equally characteristic histological findings (types of cases now called Alzheimer's disease) described what he regarded as transitional cell stages in the formation of staebchen cells from glia cells. Perusini saw glia cells and staebchen cells grouped together to form what he believed to be socalled glia Rasen, and also staebchen cells taking part in the encapsulation of senile plaques. All of this confirmed Perusini in the opinion of a glial origin for staebchen cells.

Rosenthal (1909) believes that the staebchen cell arises from the adventitia.

Bonfiglio (1909) studied staebchen cells and vessels and also glia cells of the cerebral cortex. He employed for this study dogs intoxicated with lead. Bonfiglio's conclusion is as follows: "The staebchen cells are perhaps derived from both the adventitial and glial elements."

Rondoni (1909) studied the relationship between staebchen cells and adventitia, especially the process of new vessel formation, so called spross or budding as described by Alzheimer and Nissl. Rondoni concluded that Nissl's staebchen cells were abnormal products resulting from the progressive process in the vessel wall.

F. Marchand (1909) in his description of a case of softening of the dorsal and lumbar marrow states that in parts of the process glia cells of elongated structure were shown from which fibers were given off and often around such cells was an intricated plexus of fibers.

Martha Ulrich (1910) reported in detail a study of the staebchen cells based upon fifty brains from subjects dying of various diseases,—general paresis, senile dementia, arteriosclerosis, cerebral hemorrhage, encephalomalacia, brain tumor, multiple sclerosis, meningitis tuberculosa, meningitis purulenta acuta, tabes dorsalis, alcoholic delirium, epilepsy, hebephrenia, chorea, diabetes, etc.

In general paresis, she found the greatest number of staebchen cells in the precentral convolution, especially in the polymorphous layer and here around the vessels. She noticed that the staebchen cells in the marrow of the cerebellum were irregularly placed, but

in the cases where staebchen cells were present in great numbers, their general arrangements in the marrow corresponded with the general direction of the deeper radiating fibers of the white substance. Their position in the cortex was vertical to the surface, especially in the cerebellum. Ulrich denied any special relationship between staebchen cells and nerve cell alteration, but recognized a certain parallelism between the appearance of staebchen cells and vessel alteration, especially in the capillary sheath infiltration. She also recognized a parallelism, though not constant, between the staebchen cells and glial increase, and found numerous trabant staebchen cells where glial increase was prominent.

In meningitic cases, Ulrich found the greater number of typical staebchen cells in the molecular layer, especially beneath the pia mater. Some staebchen cells according to this observer, emigrate from the pia mater into the molecular layer of the cortex.

On the basis of morphology and distribution, Ulrich classifies staebchen cells under six types: Group 1, the typical delicate rodlike cell regularly found in general paresis, most numerous in molecular layer. This type is less common in non paretic cerebral lues and still less so in multiple sclerosis, tuberculous and acute purulent meningitides. Group 2 is characterized by a short and broad nucleus and scant cell protoplasm. This type is quite common in senile dementia, arteriosclerosis and multiple sclerosis. Occasionally this type was encountered at the periphery of hemorrhagic cysts of softening. Group 3 has an even shorter nucleus and scantier protoplasm than group 2, and always appears in the marrow. Group 4 also a short nucleus type is found only in the white substance of the cerebellum. Group 5 has a spider cell like distribution of its protoplasm and is found in the molecular layer, particularly in tuberculous and acute purulent meningitides, while group 6 has the so called gitter (fenestrated or compound granular) structure. Ulrich found this last type surrounding hemorrhagic softening and infiltrated areas.

The main conclusions of Ulrich's observations are as follows: "Staebchen cells are of significance in the histopathological diagnosis of general paresis, also lues cerebri. Staebchen cells are important findings in meningitis and multiple sclerosis. Staebchen cells in other diseases, however, are of little significance for histological diagnosis. Staebchen cells have no special function or origin, but have a various genesis. Most staebchen cells in general paresis originate from mesodermal elements, especially from endothelial cells. In multiple sclerosis, staebchen cells arise from glial ele-

ments and some staebchen cells in the meningitides emigrate from the pia mater into the brain."

Torata Sano (1909) in his study of the cell forms in twelve cases of glioma, found Nissl's characteristic staebchen cells in two cases. Why this was so, he could not explain, nevertheless he contended for a glial origin of staebchen cells. But Olga Lotmar (1912) who studied seven cases of glioma found typical staebchenlike cells in her cases.

Achucarro in the description of his experimental research on the histology of rabies (1909), and in a work on rod cells (1908, also in 1910) discusses the origin of staebchen cells. According to him, the staebchen cells appeared almost exclusively in the stratum radiatum, while the other cortical layers, though equally affected by the pathological processes, were almost entirely devoid of these elements. The explanation for this, Achucarro believed, was to be found in the peculiar structure of the stratum radiatum, which offered favorable conditions for the development of elongated cells, even of those rod shaped cells which are sometimes seen adapted to the pyramidal cells and their prolongation. Many of these elements were loaded with products of degeneration which could be shown by staining them with scarlet red and hematoxylin. This fact led him to believe that all these elements.—elongated, rodlike and otherwise, represented forms of adaptation of the interstitial cells to the nervous elements in degeneration and that these adaptations were probably produced as the result of the elaboration of the products of degeneration of the nervous structure.

Later in his studies on general paresis, Achucarro found typical rodlike cells adapted to the protoplasmic prolongations. Sometimes the staebchen cells were adapted to the pyramidal cells over a great extent of its surface, so that not only were they shown applied to the cell body and to protoplasmic processes, but stretched across the entire cell from pole to pole. He also found products of degeneration even in elongated cells free from fat. This fact seemed to him to give additional support to the view expressed in an earlier article, namely, that adaptation and elongation were accomplished by cells which probably fulfill the important function of accumulating and chemically elaborating the degenerative products of the nervous structure. Achucarro did not detect any neuroglia fibers given off from elongated cells. The interstitial elements of the neuroglia were, therefore, separated by this observer into two categories, fibrous neuroglia cells of stellate form, found in connection with the vessels, and elongated elements placed in the same general direc-

tion as the nerve cell prolongations. Achucarro blieves, as a result of his observations, that staebchen cells develop in part from ectodermal cells, in part from mesodermal cells, as shown by the drawings of Alzheimer where such cells are separating from the adventitia of vessel walls.

Simchowicz (1911) observed certain elongated cells in the cortex of senile dementia and believed on morphological grounds that these elements belonged to the staebchen cell group. According to Simchowicz, in senile dementia the staebchen cells have generally a shorter nucleus than in general paresis, but cells of this type are not always present in cases of senile dementia. Simchowicz states that the staebchen cells appear more frequently in those cases having a rapid course, while in the chronic cases coursing for many years or in the normally aged person undergoing involution, these elements appear only as an unusual finding. Moreover, he found occasionally colonies (Rasen) of staebchen cells and glia cells, with glia fibers being given off from rodlike cells and the numerous transformations between staebchen cells and glia cells, but was unable to demonstrate any special relationship of these cells to the vessel walls. Simchowicz found occasionally in the reticular structure of the protoplasmic threads of these cells fat granules, but he was unable to decide whether these fat granules were derived from the pathological metabolism (Abbau) of nerve cells or from the degenerative processes in the staebchen cells themselves. Simchowicz, however, believed that staebchen cells in senile dementia arise from glial elements.

Fuller (1912) found the staebchen cells in Alzheimer disease. His description is as follows: "Rod-shaped cells (staebchen cells) are quite frequently encountered, particularly in the three outer cortical laminae but these appear to be of glial origin, not a few of the so called trabant or satellite cells being of this form."

Recently, Bassoe and Hassin (1919) described the rod cells found in a study of cases of epidemic encephalitis. In their cases, a great number of staebchen cells were revealed especially near the markedly infiltrated vessels in the pia tissue as well as in the cortical layers.

II. General Paresis Group

This group comprises ten cases of general paresis, five from the Danvers State Hospital collection and the other five from Westborough State Hospital.

The Clinical and Anatomical Abstracts of the General Paresis Group

Case 1.—Danvers State Hospital case No. 18681, a married man, farmer, sixty years of age. The patient had always been quick tempered and egotistical. The father was mentally deranged two years prior to his death, otherwise family history was negative. About one year before admission, patient began to talk to himself, was restless, and had difficulty in sleeping. He became grandiose and deteriorated rapidly. He was admitted to Danvers State Hospital June 22, 1915.

On admission, he talked in a rambling and raving way. He exaggerated and boasted. For example:—he tells what a wonderful ball player he is, and how he can pitch a ball a mile a minute and how many hundred dollars he is going to get. In appearance, he was rather dull, and listless. There was a slight motor speech defect and considerable memory impairment for both recent and remote events. The right pupil was larger than left, reacted very sluggishly to light and to distance. The knee jerks were slightly increased; slight Romberg; no Babinski. The Wassermann reaction on blood serum and spinal fluid was positive. The gold sol test was also positive; cells 18.

Following admission, he improved for a time, but soon failed considerably, mentally and physically. In April, 1917, congestive seizures developed and he had several from this time on to July 13th 1917, when he died. The whole period of the disease was about three years.

Anatomical Diagnosis. Fibrous myocarditis; coronary sclerosis; bronchopneumonia, both lungs; right pyelonephritis; left acute nephritis. Adherent scalp; eburnated calvarium; chronic pachymeningitis; chronic leptomeningitis; basal sclerosis, granular ependymitis; frontal atrophy; gliosis; anomalous gyration.

Case 2.—Danvers State Hospital, case number 17070, a married white male, forty-seven years of age, worked at the shoe trade. The family history was negative. He had always drunk to excess. In September, 1911, he fell out of a saloon door and was unconscious for several hours. Since then, he had done no work and very little was known as to what had happened to him during the past several months, as he had not lived with his wife.

He was admitted to Danvers State Hospital, December 26, 1912. On admission he was noisy, talkative and excited, very euphoric, and had many delusions of grandeur and wealth. Memory was poor, judgment very much impaired. Physically he showed marked tremor of extended fingers and hands, also tremor about his lips and of the tongue. The pupillary reactions were impaired; knee jerks very much increased, the left more prominent than the right. He had the characteristic general paresis speech defect, and a well developed Romberg. The Wassermann reaction was positive, on blood and spinal fluid; globulin increased, cell count 20.

Following admission, he continued very euphoric and talkative, and

had many delusions of grandeur. He fabricated freely, was disoriented and hallucinated. During spring of 1913, the above noted condition was less pronounced and he had partial insight. August, 1914, he again became deluded, hallucinated. Disorientation and speech defect were marked. From that time on he failed mentally and physically, dying December 11, 1917. The whole period of the disease was 6 years.

Anatomical Diagnosis. Decubitus, pyorrhoea; coronary sclerosis; congestion of the lungs; atheromatous plaques of aorta; arteriosclerosis; chronic spleenitis; chronic passive liver congestion; gall stones, marked chronic leptomeningitis; atrophy of frontal lobes; basal arteriosclerosis; slightly dilated lateral ventricles.

Case 3.—Danvers State Hospital, case number 20104, an unmarried white male, a musician, thirty-one years of age. The family history was negative except for one of his aunts who had been in an insane hospital. He had a syphilitic infection seven years before admission.

A speech defect was noted two years ago and one year later, he had his first seizure which was apoplectic in character. Since then there have been several shocks, but these have not been severe, in some consciousness has been clear. The patient had difficulty in writing, and a memory defect had developed. He was at times depressed. Shortly before commitment, he attempted to cut his throat. During 1916, he was treated at the Massachusetts General Hospital for his neurosyphilitic condition. He was admitted to the Danvers State Hospital, May 24, 1917.

At the time of admission, he was quiet, showed an ironed out facial expression, with tremor of the facial muscles. He had a pronounced speech disturbance. All the time, he was conscious of his surroundings, and oriented in all spheres. He gave no evidence of hallucinations, but there was impairment of memory, especially for remote events. He had partial insight. At times he was somewhat emotional.

The left pupil showed decreased reaction to light while the right was stiff. The knee jerks were absent, coordination poor and muscle sense impaired. There was a positive Romberg. Wassermann reaction in the blood serum and spinal fluid was positive; albumin and globulin positive; cells 14; gold sol reaction positive.

Following admission, he became excited and was grandiose. Speech defect was marked. March 11, 1919, patient suddenly became excited, following lumbar puncture. He had many grandiose delusions, said he was to be married Saturday, was the greatest dancer in the world and could earn $1,000 a week dancing. Speech defect was very marked and he was very euphoric. The patient died suddenly in a convulsion on the morning of March 17, 1919. The whole period of the disease was four years and several months.

Anatomical Diagnosis. Chronic appendicitis; coronaries slightly sclerotic; chronic adhesive pleuritis; tuberculosis of left lung; hypertrophic trabeculation of bladder; chronic leptomeningitis; basilar artery

sclerosis; marked subpial edema; atrophy of frontal and anterior part of parietal convolutions; increased cerebrospinal fluid.

Case 4.—Danvers State Hospital, case No. 20177, an unmarried white male, a laborer, fifty-six years of age. Patient was infected with syphilis at twenty-six years of age. He gave an alcoholic history, but claimed never to have been at the point of intoxication. The onset of present psychosis was rather sudden four years before admission and was ushered in by a shock. He was admitted to Danvers State Hospital June 22, 1917.

Neurological Examination. The pupils did not react to light and there was some anesthesia especially marked in the arms and some loss of coordination of movements. The knee jerks were greatly exaggerated, the cremasteric and abdominal not obtained. There was a speech defect. The Wassermann reaction was positive in the blood serum and spinal fluid; albumin increased; cells 26; the gold sol reaction positive. The facial expression was rather dull and ironed out. The speech was thick and at times trembling. He was unable to repeat the test phrases correctly.

He was oriented for time and place. He gave the day of the week but was unable to give the name of the Governor, President of the United States or the King of England. He was too demented to cooperate well. Memory was considerably impaired for both recent and remote events. There was considerable slowing and a very limited range of thought, possibly confused at times. He had no insight and had no knowledge of anything special occurring in Germany or France at the present time.

July, 1917, he was disoriented and markedly demented; August 30, 1917, the patient was in a weak physical condition, never talked to anyone, but replied briefly to questions and was somewhat confused. December 16, 1917, the patient died and the cause of death was given as general paresis of insane. The whole period of the disease was about four and a half years.

Anatomical Diagnosis. Decubitus; atheromatous plaques of the aorta; hypostatic congestion of the lungs; capsular fibrosis of the spleen; chronic nephritis; chronic leptomeningitis; atrophy of the frontal lobes; slight sclerosis of basal arteries; enlarged lateral ventricles.

Case 5.—Danvers State Hospital case No. 18655, a married white female, thirty-eight years of age. Two cousins were insane. Patient was of a cheerful disposition, though inclined to be seclusive and high tempered. At one time, she had struck her husband because he spoke to another woman. Four years before admission she began to be irritable and became careless in the care of her home. Her speech became affected. One day a year ago, she had an idea that a man was chasing her and was excited over this. Following this, she went into a stupor, which lasted for three days. She now became more clumsy in her movements and had fallen several times in going up and down stairs. Her

memory became impaired and she grew talkative. Two days before admission she had threatened suicide.

Patient was admitted to Danvers State Hospital June 13, 1915. On admission, the patient showed some confusion, a mild euphoria and was very talkative. Speech defect and an unsteady gait were noted. The remote memory showed less impairment than the recent. The Wassermann reaction of the blood serum was positive and also positive in the spinal fluid. Thirty-two cells, numerous plasm cells, albumin and globulin strongly positive, gold sol reaction positive.

The pupils were small and reacted sluggishly to light. The patient complained of some numbness of the right hand. The knee jerks were hyperactive, the left being more so than the right. There was also suggestion of ankle clonus of the right side. The finger to finger tests were poorly performed and in Romberg position there was marked swaying. There was tremor of the left arm and some dragging of the left foot. The patient showed many characteristic mental symptoms of general paresis. The patient gradually failed and died May 12, 1917. The cause of death was given as general paresis. The whole period of the disease was about five years.

Anatomical Diagnosis. Congested lungs; decubitus; atheromatous degeneration of aorta; fibrous spleen; biliary cirrhosis; chronic nephritis; chronic pachy and leptomeningitis; marked atrophy of frontal and parietal convolutions; granular ependymitis.

Case 6.—Westborough State Hospital case No. 10915, an unmarried white male, thirty-seven years of age.

Family History. The mother died of cancer, other family history negative. The patient was injured in the head in an accident which necessitated trepanning. About twenty years ago he began drinking whisky and beer. Promiscuous sexual intercourse is admitted, but venereal disease denied. The onset of present psychosis was gradual, developing over a period about a year and a half previous to his admission to hospital. Defect in writing and in figuring were first noted, then slurring in his speech. He would have unconscious periods after which he would be unable to speak for a while.

September 18, 1913, he was admitted to the Westborough State Hospital. On admission there was a gross defect of memory for both past and present events. He was moderately euphoric, there were no delusions or hallucinations elicited, except that he complained of pains, like sensation of needles and pins going up his right arm to the shoulder. There was a marked slurring of speech, also marked inability to do simple arithmetical sums. He left out letters and syllables in writing. The pupils were irregularly dilated, the left more than right and while they did not react to light, reaction to accommodation was not disturbed. There was a retractile tremor of the tongue. Romberg symptom; knee jerks unequal, right more than left; Achilles tendon reflex

absent. Marked tremor of extended fingers. The Wassermann reaction was positive for both the blood serum and spinal fluid.

Following admission, there was little change in his condition until about June, 1915, when he became markedly worse.

November 17, 1915, the patient was in bed because he had become so ataxic that he was almost unable to walk. He continued to become progressively weaker and there were many spasmodic twitchings and contractures. November 27, 1915, he became unconscious and expired next morning. The whole period of the disease was about three and a half years.

Anatomical Diagnosis. Congestion of dura, edema of pia, chronic proliferative leptomeningitis, granular ependymitis, chronic congestion of spinal pia; moderate pulmonary edema; acute degeneration of the pericardium; congestion of the gut; moderately cyanotic kidneys.

Case 7.—Westborough State Hospital case No. 10083, a white male, a physician and surgeon, forty-nine years of age. The family history was negative. About a year previous to his admission he began to complain of dizziness. He went on long trips twice for the benefit of his health but these did not have the desired effect. At this time he had slight difficulty in his speech. A couple of weeks later he began to talk of harmless little business schemes and later of more complicated and expensive ventures, getting excited about them and writing the Pope, the President and various priests and doctors concerning them. He also went to lawyer's offices with impossible plans. One morning he escaped from the house and drew $200 from a bank with which he bought two tickets for Montana, then wandered aimlessly around the station until he was taken into custody.

He was admitted to Westborough State Hospital April 9, 1912. On admission, the patient had grandiose ideas, but these were very changeable. He had no idea of the value of money, even in conversation he left out words. He did not seem to be in the least interested in his business. His conversation was incoherent, rambling and irrelevant. He was markedly exhilerated, and was completely disoriented for time, place and persons, and recognized old friends in almost anyone he saw about him. He was destructive and would not keep on his clothing.

The pupils were unequal, the right larger than left, did not react to light but did to accommodation. The knee jerks were exaggerated, ankle clonus and Oppenheim were present. There was tremor of fingers, tongue and eyelids, also Romberg symptom, unsteady gait and speech defect.

May, 1912, the patient continued restless, destructive, and untidy. He was mildly exhilerated and gave expression to grandiose ideas about his professional ability.

September, 1912, he became very untidy, spitting about the room a great deal, and talked to himself. He declared that he was president

of all black automobiles and was going to retire from medicine and go abroad. Recently, he attempted to escape from the walking party.

March, 1913, a scratch about two inches long extending lengthwise through the scar of an old trophic ulcer on right buttock was found. The patient seemed to be slowly going down hill. He was still untidy and sometimes at night very noisy.

January, 1914, patient had been failing both mentally and physically during the past three months.

February 14, 1916, for past two months the patient failed rapidly, becoming extremely emaciated and bed sores also developed. The patient expired that day at 3:05 A. M. The whole period of the disease was about five years and ten months.

Anatomical Diagnosis. Congestion of dura, edema and congestion of pia, chronic proliferative leptomeningitis, congestion of spinal cord, cerebral atrophy, granular ependymitis, chronic endocarditis, fatty myocarditis; bronchitis; passive congestion of kidneys, small abscess of right kidney.

Case 8.—Westborough State Hospital case No. 10749, a white female, an orphan, twenty-nine years of age. She was brought up by the Catholic Sisters in an orphanage. Her father died of cancer and an older sister died of tuberculosis. The patient was for a time at Rutland State Sanatorium where she took treatment for tuberculosis. She went for three months into the country as a domestic, returning in a highly nervous condition, following which she went to the Massachusetts General Hospital for treatment and from there to the Carney Hospital where she was discharged in January, 1913. She gradually failed in health until June, 1913, when she was sent to Boston City Hospital and from there was committed to Westborough State Hospital, June 9, 1913.

On admission she was very quiet in her attitude and manner, although she cried for no apparent reason, this taking the form of severe crying spells. Her flow of thought was relevant and coherent. There was nothing to indicate delusions or hallucinations. She was inclined to be a little irritable, but at other times seemed happy. Orientation was slightly impaired, also memory for both recent and remote events. She had difficulty with her speech and as her disease progressed this became more and more pronounced until it was scarcely intelligible. The pupils were equal, contracted, inactive to light. She was unable to stand or walk without support. The knee jerks were absent. The speech was slurring. There was tremor of the outstretched fingers, coarse tremor of limbs and whole body. The Wassermann reaction was positive in the blood serum.

She died November 11, 1914, and the cause of death was given as bronchopneumonia and general paresis. The whole period of the disease was several years, exact number not determined.

Anatomical Diagnosis. Congestion of dura, congestion and edema of pia, general cerebral atrophy, granular ependymitis, congestion of

spinal cord, chronic endocarditis, bronchopneumonia, small necrotic foci of lungs.

Case 9.—Westborough State Hospital case No. 12199, a divorced white male, a cigar maker by trade, forty-nine years of age. Twenty-seven years previous to admission, he had erysipelas of the head. He also had a syphilitic infection. For seven years previous to admission he had been very extravagant, had kept obscene pictures about him, and had been constantly with loose women. He was admitted to Westborough State Hospital, November 9, 1915.

On admission, the patient was very much excited and talkative, gesticulating and shouting wildly, voice harsh and appearance unkempt. He claimed to be the greatest athlete in the world, that he was a posthumous child and that gave him the power to cure people. When asked if he had cured anyone, he said "not yet." The pupils were small, regular, did not react to light or accommodation. The knee jerks were absent. Wassermann reaction was positive in the blood serum.

December 2, 1915, the patient continued extremely active and agitated. Today patient exhibited marked symptoms of collapse, and his temperature rose to 103.6, pulse 104, respiration 34. There was edema of left lower leg, a murmur heard at apex of heart, and some signs of pulmonary congestion in both lungs. The urinalysis showed albumin, broad hyaline and granular casts with attached fat globules.

December 29, 1915, he had grown much weaker during past few weeks and died at 11:15 P.M. today; the cause of death was given as general paresis. The whole period of the disease was about seven years.

Anatomical Diagnosis. Congestion of dura, chronic leptomeningitis; chronic endocarditis, aortic insufficiency; chronic adhesive pleuritis; parenchymatous nephritis.

Case 10.—Westborough State Hospital case No. 11876, a married white male, a letter carrier, forty-four years of age. The father died of alcoholism and was evidently from the history elicited a dissipated man. Father deserted his family when the patient was three years old. The patient used alcohol and tobacco in moderation.

Six years previous to admission, the patient had been working at night and also running for reelection to office in a labor organization where he was afraid that he would not be reelected because of the dislike of some of the members. He went to an election meeting but before his time to speak suddenly collapsed and was sent home in an unconscious condition from which he emerged muttering irrationally. The next day he was very violent, threw objects at his wife and at everything in sight. Lately he has shown a disposition to fight. At this time also he became very religious, wanting to save souls and demanding that every one who came near him was to make the sign of the cross.

The patient was admitted to Westborough State Hospital December 1, 1913. At this time he was irritable and did not cooperate with ex-

aminer. He could not answer all questions relating to geography and political events with ease. All questions answered irritably and some sarcastically. He was greatly excited on the matter of religion and tried to convert all with whom he came in contact. The pupils were round, equal, reacted sluggishly to light. The gait was unsteady, and station was swaying. The knee jerks were very active. The Wassermann reaction was positive in the blood serum, also in the spinal fluid, and there was a cell count of 16 cells.

During his first stay at the hospital, his grasp was fairly good but he was too excitable to read the papers. In test phrases he would leave out syllables and slur over phrases. Physically there was some swaying to Romberg and tremor of outstretched fingers. About a month after his admission he showed some mental improvement although physically he was not so well, being troubled with bowel and urinary incontinence. He had severe gastric disturbance. Patient was allowed to go home, November 12, 1914.

He again became moody, and was despondent over his disability to go back to work. He would sit for hours at a time in a sort of melancholic stupor. He was admitted again May 13, 1915.

On second admission, the pupils were unequal, left dilated over right and did not react to light. The station and gait were unsteady and showed marked Romberg. The knee jerks were active; a Babinski demonstrated on the left, suspicious on right. The patient died January 25, 1916. The cause of death was given as general paresis. The whole period of disease was about eight years.

Anatomical Diagnosis. Increased density of calvarium, congestion of dura, chronic proliferative leptomeningitis, granular ependymitis, degeneration of posterior column of spinal cord; chronic endocarditis, aortitis, fatty myocarditis, hypertrophy, glissinitis, gastritis, pyelonephritis, focal pleuritis.

Microscopical Observations on General Paresis Group.

Methods Employed. In each case the blocks of tissue were taken from the first frontal, pre and post central, Heschl's transverse temporal, and superior parietal convolutions of left hemisphere, also calcarine region, cornu Ammoni and cerebellar cortex of left hemisphere. Formalin material was cut on a freezing microtome for staining with hematoxylin eosin or Van Gieson, glia methods, fat staining, modified Weigert-Pal's method and Bielschowsky's silver impregnation. Besides, blocks of tissue were fixed in alcohol and embedded in paraffin for staining with thionin or toluidinblue (all Danvers cases however were first fixed in formalin and later put through alcohol). All of the technical methods mentioned were not employed in every case, but all of these were stained with toluidin-

blue or thionin, Weigert neurologia method and sudan three or scarlet red.

General Histological Findings in General Paresis. The clinical diagnosis was in every case of this group histologically confirmed. To describe in detail the sections from each block of tissue studied would not only make tedious reading, but would also extend unnecessarily the length of this article. The description of the histological observations, therefore, will be limited to a sort of summary of the findings.

The histological alterations were characteristic in all cases and case 10 was a taboparetic.

The pia mater was thickened and infiltrated with lymphocytes, plasma cells, etc. In some cases, a hemorrhagic infiltration was found in the pia.

The nerve cells showed marked alterations in every case. The cell lamination of the cortex was altered in lesser or greater degree. Tigrolysis, in parts was central, around the nucleus, in other parts diffused through the cell body. Nissl's chronic cell alteration, decay of nerve cells and fatty pigmentary degeneration, were common findings. In all cases a greater or less number of cells were completely destroyed. These findings were less in the occipital cortex, while the frontal, parietal and many times the temporal convolutions, were greatly involved.

Weigert-Pal's preparations showed that in all cases, there was a widespread loss of fibers especially among the most external tangential fibers, those coursing parallel to the surface and horizontal fibers of the outer cortex layer.

More or less prominent alterations were demonstrated in the neuroglia elements. The new formation of glia fibers was greatest in the surface layer of the cortex and also usually around the capillaries. In case 1, especially, this was very pronounced. Greatly thickened glia fibers were shown running from the surface network to the deeper cortical layer. Proliferation of glia cells and fibers was constant in all cases. In many cells, there was an abundance of protoplasm and increase of chromatin particles. The glia nuclei showed various forms and sizes, some many chromatin granules, some dark and some almost homogeneous. Many socalled spider cells were demonstrated especially around the vessels and in the deeper layers of the cortex, and these were attached to the capillary walls by means of cell processes. Besides the numerous proliferative processes in the neuroglia elements, there were also degenerative changes: sclerosis, pigmentation, vacuolization and destruction

of nucleus. Many trabant glia cells were found and not a few of these showing rodlike shaped nuclei (later these will be described in detail). Among colonies of glia cells (Rasen) rodshaped cells were sometimes found.

Mesodermal Elements. The vessels were markedly affected in all cases. There was the characteristic infiltration of adventitial spaces with lymphocytes, plasma cells, socalled gitter cells, etc. In a few cases plasma cells were found only in small number. In almost all cases, these infiltrations were less pronounced in the occipital region. There was more or less marked increase of the cells of vessel walls, adventitial and endothelial elements. There was also a marked increase of capillaries and often degenerative changes among these vessels, hyalin degeneration of the vessel walls. Frequently, in the vessel walls brownish or yellowish pigmentation and fat deposit were demonstrated, and sometimes the fat deposit was very prominent.

Observation on Staebchen Cells in General Paresis

Ever since Nissl in 1899 and 1904 called attention to the histopathological significance of the staebchen cell in the diagnosis of paresis, much has been written concerning these cells. The most notable subsequent contribution, perhaps, was that of Alzheimer in 1904. However, the staebchen cell still remains a matter of interest to neuropathologists. The question as to the genesis of these cells is still debatable, some like Alzheimer holding to a mesoblastic origin (from adventitial or endothelial cells) some like Cerletti contending for a glial origin, while others recognize a mesoblastic as well as an epiblastic origin. There are those who regard all rodshaped cells in a given specimen, quite irrespective of their origin, as staebchen cells. The writer shares this view, holding that the morphological feature is more characteristic than the genetic factor.

Numerous staebchen cells were found in all of the cases. There were many transitions between staebchen cells and glia cells, and sometimes it was difficult to decide whether certain cells were to be regarded as glia cells or staebchen cells.

Regional Distribution. Staebchen cells varied in number in various portions of the brain and also in the various cortical layers. On the whole, a great number of staebchen cells existed in the frontal convolutions and cornu Ammonis regions, a lesser number in the parietal, anterior and posterior central convolutions, while the temporal and occiptal convolutions and the cerebellar cortex,

displayed the fewest. But in case 7, here reported, the regional differences were slight, almost infinitesimal. In the cerebrum, the number of staebchen cells was on the average a little less in the white matter than in the gray matter, while, in the cerebellum, the contrary was true, sometimes twice as great. There were often numerous transitional forms of glia cells in the marrow of both the cerebrum and cerebellum, which rendered difficult an estimate as to the number of staebchen cells.

Laminar Distribution. In the cerebral cortex, the number of staebchen cells was greatest in the middle cortical layers, especially in the small and large pyramidal cell layers (Brodman 3 and 5a and 5b), next in number the molecular layer. But in case 1, the molecular layer displayed the greatest number. Sometimes staebchen cells were very numerous, averaging ten or more in a single microscopical field (no 15 oc., 0,4 mm obj, sections cut 6–8 micra).

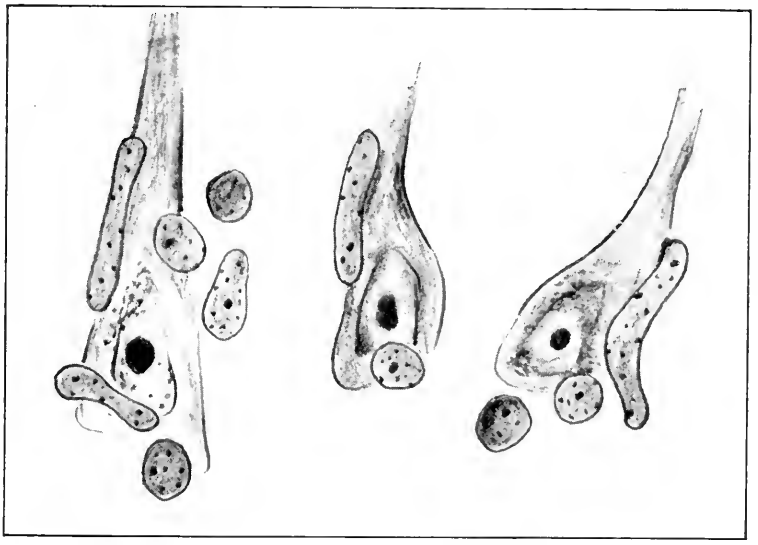

FIG. 1. Weigert neuroglia method. Staebchen shaped trabant cells, General paresis.

The long axis of the staebchen cells in the cerebellum was vertically disposed to the surface in the molecular layer, but in the Purkinje cell area, some were horizontally arranged. In the marrow of the cerebellum, the long axis of these cells were parallel with the marrow radiation, as a rule, while in the cerebrum, their general direction was parallel with the radiation only in the deeper portion, elsewhere they were irregularly placed. However, in the

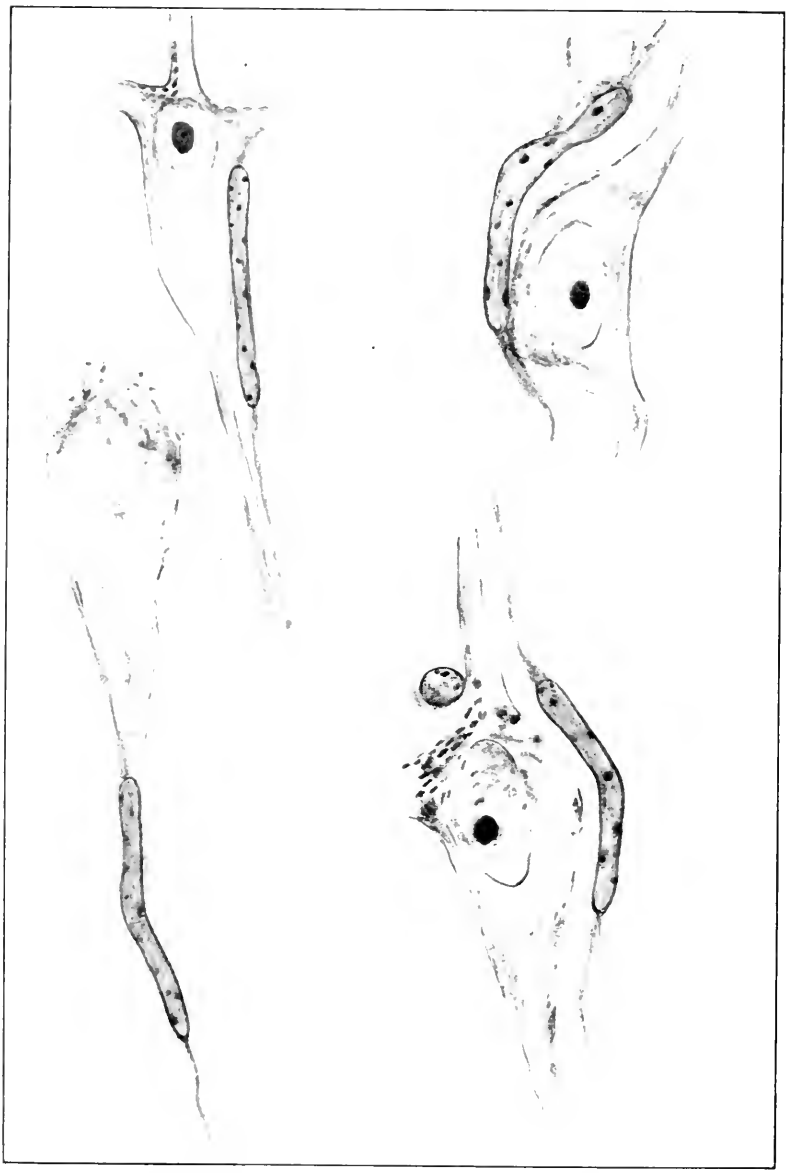

FIG. 2. Thionin staining. Adaptation of staebchen cells to the nerve cells. General paresis, cornu Ammonis, Case 6.

cerebral cortex, their general direction was vertical and in a majority of instances parallel with the long axis of nerve cells, especially in the small and large pyramidal cell layers, but in periphery of molecular layer, some were occasionally horizontal.

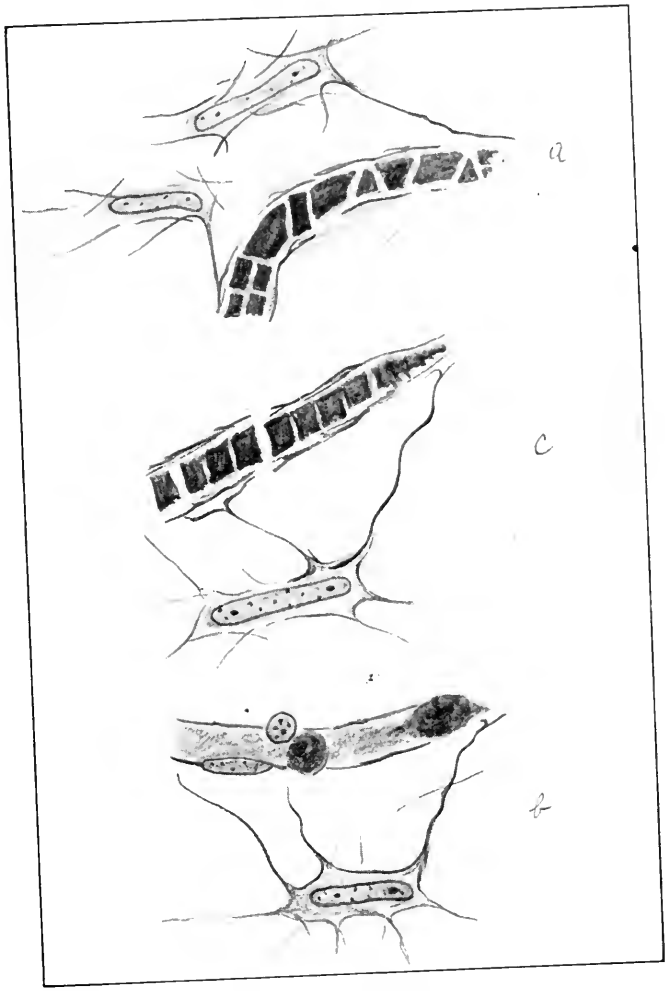

FIG. 3. Weigert neuroglia method. Staebchen like spider cells. *a* and *b* general paresis, *c* senile dementia.

Relation of Staebchen Cells to Nerve Cell Degeneration. There was no remarkable relationship between the number of staebchen cells and the extent of nerve cell alteration. Many socalled trabant cells were rod shaped (fig. 1) and a majority of these were to be

found at the sides of the nerve cell, rather seldom at the base. These rod shaped trabant cells were numerous whenever there was an increase of the trabant cells, especially in the small and large pyramidal cell layers of the frontal convolution and cornu Ammonis. In the ten cases of general paresis, this was conspicuously displayed in cases 2, 3, 5, 6, and 7. Achucarro has called attention to typical staebchen cells along the apical prolongation of nerve cells, and that sometimes, these staebchen cells were closely adapted to the nerve cell body with an elongated nucleus and delicate threadlike protoplasmic prolongations. (Fig. 2 shows such adaptation of staebchen cells to nerve cells, thionin staining.)

Relation of Staebchen Cells to Glial Elements. There was also a parallelism between the presence of staebchen cells and glia proliferation. In other words, when remarkable glia alteration was shown, a large number of staebchen cells were almost always encountered. In such cases, as stated above, there were various transitional stages between staebchen cells and glia cells. Sometimes, so-called spider cells with markedly elongated nuclei were found, rather generally so in Weigert glia preparations. Figure 3 shows a spider cell with rodlike nucleus. Moreover, staebchen cells were often located parallel to newly proliferated glia fibers, running like a stream from the surface to the deeper layers of the cortex. Sometimes, in the molecular layer, colonylike elongated nuclei in the intricate glia net work were found, and staebchen cells surrounding them were often distorted and irregularly disposed. As a rare finding, in a few cases, there were rod shaped cells taking a part in the formation of colonies of glia cells (socalled glia rasen). Figure 6 shows a rod shaped cell taking a part in the glia rasen.

Relation of Staebchen Cells to the Walls of Vessels. In these cases, there seemed a certain parallelism between the number of staebchen cells and the extent of perivascular infiltration. A tendency to the display of a number of staebchen cell around the infiltrated and proliferated capillaries was shown. Often, the writer encountered elongated vessel wall cells (mostly adventitial cells sometimes endothelial cells) connected with each other which showed regressive threadlike capillary walls, unstained, colorless but somewhat lustrous in appearance. These elongated elements frequently appeared like the usual isolated staebchen cells, especially in thionin or toluidinblue preparations, and were difficult to recognize as regressive capillaries. The writer believes that these cells would eventually become isolated as a final result of the vascular regression, and that possibly many staebchen cells have such an origin.

Alzheimer pointed out the separation of adventitial cells into the tissue from the vessel walls, but in this study, there was no process encountered such as Alzheimer described. Alzheimer also noticed a certain parallelism between the length of staebchen cells and adventitial cells, but the writer was unable to demonstrate this, rather sometimes the contrary seemed to hold.

Morphology of Staebchen Cells. The general morphology of staebchen cells was characteristic in sections stained with thionin or toluidinblue. As mentioned in the introduction, and also by all observers who have studied staebchen cells, these elements were rod shaped with an elongated nucleus. Often these nuclei contained several nucleoli located sometimes in the central portion, sometimes near the poles, and sometimes irregularly disposed. The well stained chromatin granules were usually seen in the nucleus, and at times it was hard to distinguish these from nucleoli. Occasionally, these chromatin granules seemed to be connected with the reticular structure of the nucleus when viewed by the oil immersion. The nuclear membrane stained distinctly, but was sometimes pale. Occasionally, the membrane was wrinkled and showed a partial disintegration. The poles of the nucleus were usually round, but sometimes club-like swellings were seen on one or both poles. Curiously shaped nuclei were often encountered, twisted, constricted, curved in various ways, right angles, sometimes S-like, U-like or V-like, and other bizarre shapes. There were oval shaped nuclei which seemed to be undergoing a transformation from staebchen cells to glia cells.

Remarkable elongated threadlike protoplasmic prolongations were given off from the poles, mostly in straight lines, but sometimes these were tortuous, sometimes quite crooked. At times, the only evidence of protoplasm was shown around the nucleus. Moreover, there were some prolongations given off at right angles from the sides of the nucleus, and occasionally extended ramification of these protoplasmic prolongations were shown. The termination of these prolongations into the tissue were not traceable. The staining of the protoplasm was faint in color and occasionally the reticular structure was shown. The length of the protoplasmic prolongations varied, in remarkable instances measuring several times the length of the nucleus, sometimes barely discernible. The staebchen cells in the pyramidal cell layers were mostly provided with protoplasmic processes.

The length of the nucleus was not uniform, but in typical forms it measured 15–25 micra. Some very long nuclei measured 30 micra. In the pyramidal cell layer of cornu Ammonis, in case 6,

a staebchen nucleus was encountered which measured 38 micra. The width of the nucleus measured 2 to 4 micra and as a general rule, was in inverse ratio to the length of the nucleus.

Cases which exhibited numerous staebchen cells, as a rule, were those in which a great number of long nuclei were found. The staebchen cells of the cerebellum were usually shorter than those of the cerebrum. In the cerebrum, the most elongated nuclei were found in the pyramidal and ganglion cell layers, especially in the frontal convolution and cornu Ammonis. In the molecular layer and marrow, the staebchen cells were shorter than elsewhere. The longer nuclei stained moderately, while the shorter ones stained deeply.

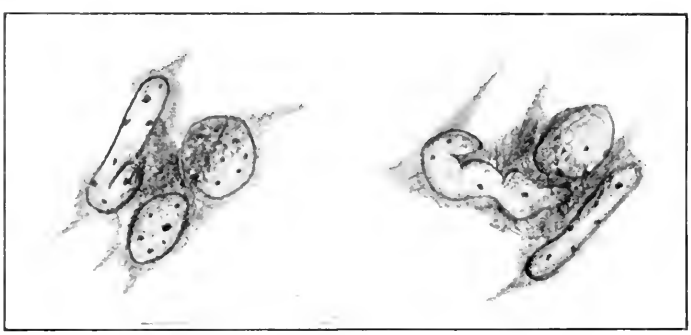

FIG. 4. Thionin staining. Staebchen shaped cells taking part in the formation of glia colonies (Glia Rasen). General paresis.

As evidence of regressive changes the shrunken, shrivelled, darkly stained nuclei were so regarded and in the molecular layer the largest number of such changes were found. Also regarded as regressive changes were faintly staining nuclei, nuclei with indistinct outline and homogeneous appearance of the nuclear substance. The entire nucleus was sometimes completely destroyed, sometimes shadowy, having much the appearance of a fragment of a nerve cell.

Frequently staebchen cells contained engulfed pigment granules within their protoplasms, sometimes in great quantity. These granules were brownish or yellowish in color and mostly displayed at the poles, but sometimes at the side of the nucleus. These pigment granules seemed like the same granular substance found in the nerve cells and glia cells. In the sections stained with sudan III or scarlet red, there were many rod shaped cells loaded with fat granules, sometimes in the vicinity of the poles, sometimes laterally massed (Fig. 4). Vacuoles in the protoplasm or nucleus were rare.

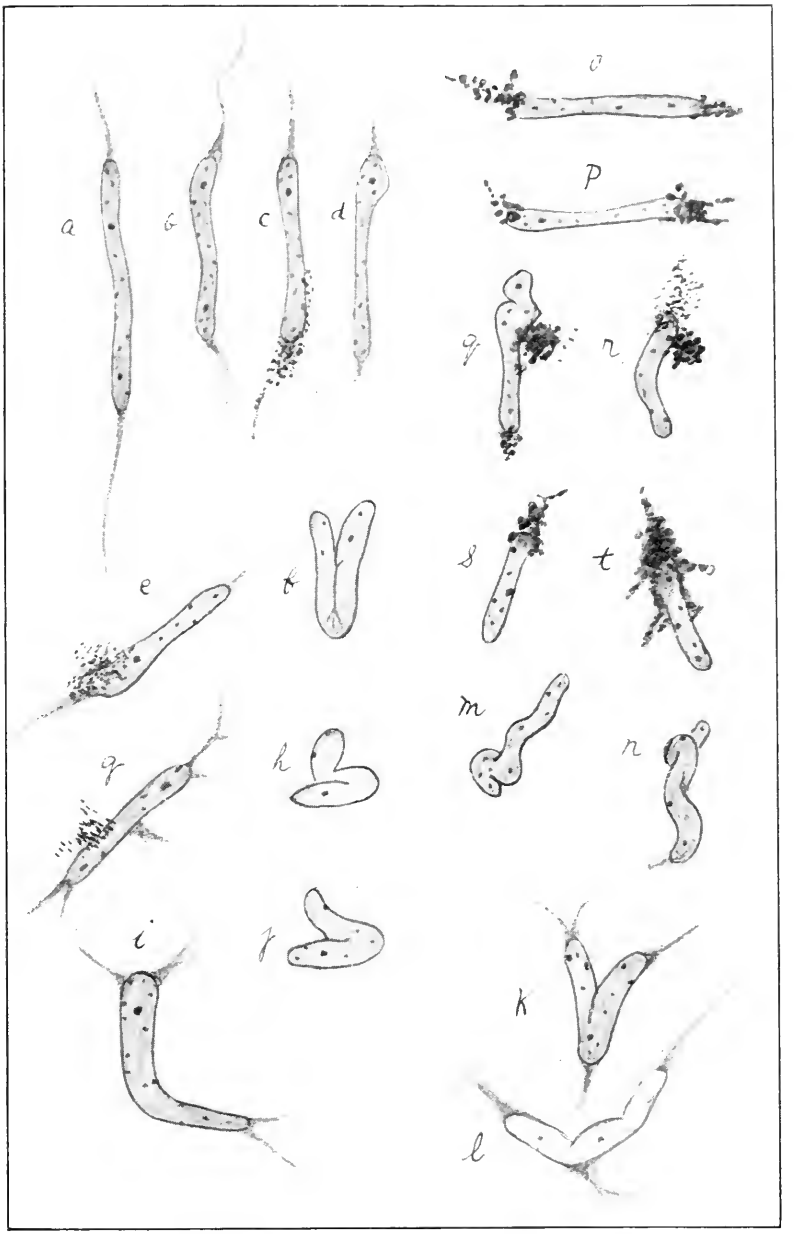

FIG. 5. *a–n* thionin staining, *o–t* sudan III staining. Various forms of staebchen cells. General paresis.

Findings in Weigert Glia Preparations. Staebchen cells were well demonstrated in these preparations, a description is omitted since their appearance is the same as already described. Straeussler and Simchowicz have described glia fibers given off from staebchen cells, but most observers have been unable to confirm this. The writer, in studying carefully stained Weigert preparations in all the cases here reported, is convinced that glia fibers are sometimes given off from staebchen cells. In such instances most of these staebchen cells have courses parallel to vessels to which they send their fibers.

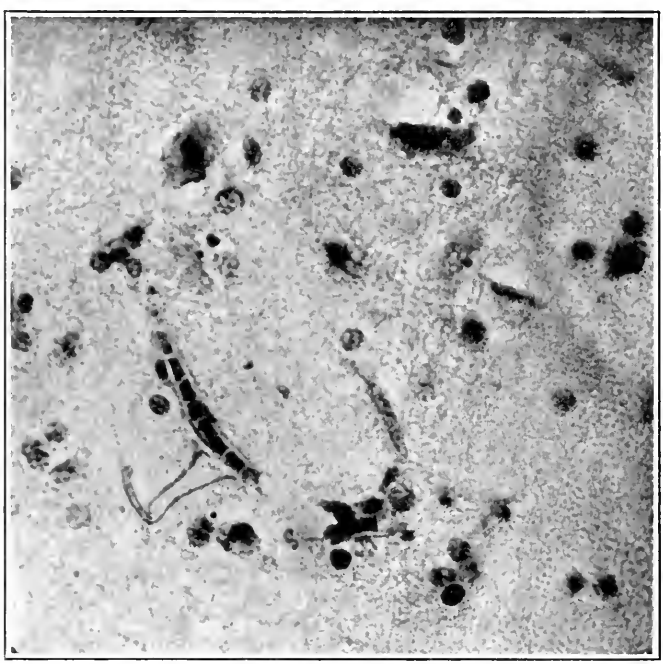

FIG. 6. Weigert neuroglia method. Glia fibers given off from the nucleus of staebchen cell. General paresis, Case 1, frontal convolution. Photomicrograph.

This was also shown in toluidinblue or thionin sections, in so far as concern location of staebchen cells. These glial fibers were given off mostly from the poles of cells, but sometimes from the side. Such cells, however, are not numerous (Figs. 6 and 7).

Besides the typical staebchen cells, there were glia cells of the so-called spider type with markedly elongated nuclei, which the writer believes should be called staebchenlike spider cells, and he also believes that these rodlike spider cells in sections stained with

thionin or toluidinblue are mistaken for typical staebchen cells (Figure 3).

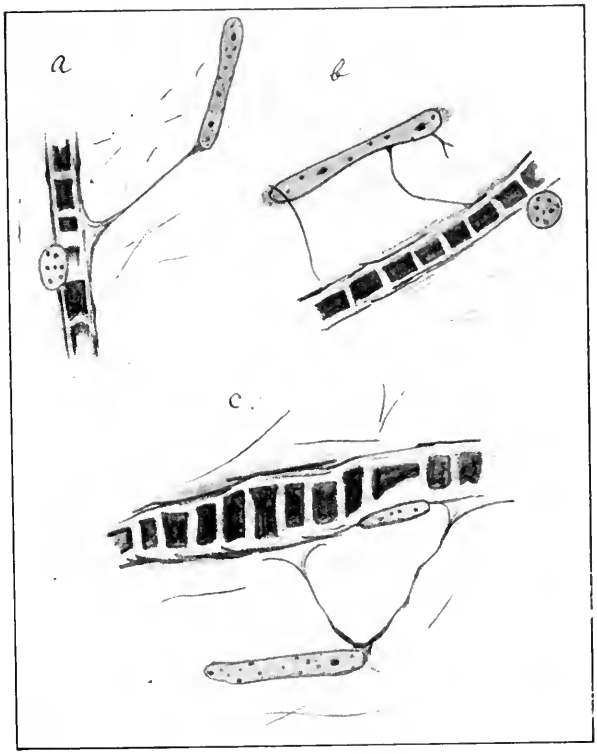

FIG. 7. Weigert neuroglia method. Glia fibers given off from the nucleus of staebchen cells. *a* and *b* general paresis, *c* senile dementia.

III. SENILE DEMENTIA GROUP

This group comprises six cases of senile dementia, five from the Westborough State Hospital collection and one from the Danvers State Hospital.

The Clinical and Anatomical Abstracts of the Senile Dementia Group

Case 11.—Danvers State Hospital case No. 20719, a married white female, seventy-eight years of age. There was no history of insanity in the family. The patient had no sickness until twenty years ago when her eyesight began to fail. She was naturally of a genial, kindly disposition, very optimistic, and well disposed toward others.

Four years ago she began to show memory defect, although she was in her own home stated that she wanted to go there and wanted to see her father and mother. Also patient stated that she could not find her children, that she had two small children and she was hunting for them. She accused people of stealing things from her and did not want to go to bed at night because she saw a strange man around. Patient denied that her husband was her husband. She had been continually quarrelling with the family and she would go off, wander about, and be unable to find her way home. On several occasions she threatened suicide, and stated that she would jump into the canal. She was admitted to Westborough State Hospital March 25, 1918.

On admission she was extremely restless, wandering about the wards, at times slightly resistive and occasionally noisy and profane. Consciousness was clouded and showed marked memory defect, especially for recent events. At times patient realized that her memory was failing, at other times she was unable to appreciate her condition. In conversation she fabricated experiences. The heart action was somewhat irregular, sounds roughened, the pulse was full, strong and intermittent. There was some thickening of the radial artery and it rolled slightly under the finger. There was a slight trace of albumin, few hyaline casts. The pupils were contracted, vision extremely limited. The knee jerks were active. Patient maintained good station on Romberg test, with only very slight swaying.

Following admission, the patient's condition remained almost the same until 1919, since then she has been in bed, failing both physically and mentally. About the middle of February, 1919, well marked bronchopneumonia developed with rales scattered over both lungs and some areas of dullness. Patient died very suddenly on morning of February 15, 1919. The cause of death was given as bronchopneumonia. The whole period of disease was about five years.

Anatomical Diagnosis. External adhesive and internal hemorrhagic pseudomembranous pachymeningitis, chronic leptomeningitis, sclerosis of cerebral arteries, atrophy of frontal lobes and left temporal lobe; adhesion of both apices of lung and posterior part of left lung, early stage of bronchopneumonia, coronaries sclerosed and tortuous; periplenitis, chronic nephritis, thyroid sclerotic, decubitus over sacrum and trochanter.

Case 12.—Westborough State Hospital case No. 11802, an unmarried white male, day laborer, seventy-four years of age.

Family History. A son of patient's brother was insane and a brother had epilepsy. Otherwise family history was negative.

He had always been a great reader but for two years previous to his admission had not read but would sit gazing off into space by the hour. About that time he had been examined by a physician who said that he was mentally unsound. He was unclean and unable to care for himself. The patient thought that he was being accused of being the father of a

number of illegitimate children. He was never violent but lived in an imaginative state of mind for a few years before his commitment. He was admitted to Westborough State Hospital April 2, 1915.

On admission, he was disoriented for place and time, and answered questions correctly except where his memory was defective. There was no attempt at romancing; no definite delusions or hallucinations. Pupils were equal and reacted sluggishly to light. Swaying in Romberg position. The knee jerks were slightly increased. Hearing diminished in both ears. Wassermann reaction was negative in blood serum.

Following admission, the patient demented gradually without any exciting symptoms and also failed physically, dying April 20, 1916. The whole period of the disease was about three years.

Anatomical Diagnosis. Chronic external pachymeningitis, congestion, edema, opacity and subpial hemorrhage, moderate cerebral atrophy, cerebral arteriosclerosis, granular ependymitis; chronic endocardial thickenings, fatty myocarditis, bronchopneumonia; hepatic congestion; fibrous proliferation of capsule, splenic congestion; congestion of gastric mucosa, renal congestion, congestion of bladder, small prostatic abscess.

Case 13.—Westborough State Hospital case No. 11597, a married white female, seventy-six years of age. The patient had eight children, five boys and three girls. Three of the boys and one of the girls died of cancer. She has had no previous attacks of mental disease and always enjoyed excellent health. Patient fell down stairs four years previous to admission, injuring her head. She was irritable, rambling and excitable, but neat and orderly in person.

The onset of the present psychosis was gradual, beginning about ten months before admission to hospital. Patient became forgetful, suspicious and thought she was being terribly persecuted. She was admitted to Westborough State Hospital December 15, 1914.

On admission, her delusions were mostly of a persecutory nature. She thought poison was being put into her food and that a certain doctor was putting powders into her food to make her love him. She also believed that this same doctor visited a neighbor for immoral purpose. She imagined that she saw people in her room and leaving the cellar at places where there were no entrances. She also heard voices of people talking and swearing. Recent memory was very defective, remote memory somewhat better though rather vague as to details. She realized her memory defect but otherwise had no insight into her condition.

Physical Condition. The pupils were equal, reacted to light and accommodation. There was slight Romberg, also slight tremor of outstretched fingers. Smell and taste sensations were defective. The knee jerks were slightly increased. Following admission, she had been very restless and disturbed, especially at night and she slept poorly. Patient thought that she was to be killed at night.

March, 1915, patient was partially oriented. When questioned in

regard to her recent delusions and hallucinations, she became evasive and was quite without insight.

In February, 1916, an examination showed heart to be irregular, intermittent and strong in its action, with a loud, systolic, harsh murmur audible over whole precordium but most intense at aortic area and transmitted to the right supraclavicular space though also transmitted in other directions.

March 19, 1916. When patient attempted to arise from her bed the day before yesterday morning she found difficulty in using her left leg. An examination showed a disordered gait suggestive of paresis of the left limb. Patient was very angry with physician for insisting upon making examination.

April 20, 1916. A urinalysis showed slight trace of albumin, pus corpuscles. The heart action was very irregular and rapid, some slight dyspnoea.

April 29, 1916, moist rales were audible over both lower lobes of lungs, worse on right side.

May 2, 1916, the patient seemed to be in great distress; her general condition grew worse during the night and she died next morning. The whole period of the disease was about two years and a half.

Anatomical Diagnosis. Chronic external pachymeningitis, edema, congestion and opacity of pia, multiple hemorrhagic cysts of softening, cerebral atrophy, advanced cerebral arteriosclerosis, hydropericardium, cardiac hypertrophy, chronic vegetations of aortic valve; pleuritis, pulmonary edema; moderate fatty infiltration of liver; chronic perisplenitis, splenic congestion, congestion of gastric mucosa; chronic interstitial nephritis.

Case 14.—Westborough State Hospital case No. 8021, a married white male, seventy-two years of age.

Family History. One maternal aunt was insane and all of mother's family troubled with nervousness.

Patient worked in a Boston dry goods store until the age of thirty-two, when his father left him a fortune of $150,000. But he invested it in wild cat schemes of unscrupulous men who gathered around him at that time. He worked hard to support the family and did not like to meet his old friends. He began to accuse his wife of unfaithfulness. He thought himself a great railroad magnate. Patient was admitted to Westborough State Hospital August 21, 1908.

On admission, patient showed absolutely no regard for his family, had ideas of wealth and grandeur and thought himself a great financier. He was very untidy about the house and threatened his wife with death. He was abusive in his language, not only to his family but to practical strangers. Memory was defective. Sometimes his speech was slurring in character. The knee jerks were active, also elbow reflexes. There was some fine tremor of the fingers and tongue. Hearing was slightly disturbed.

During 1908 there had been a continued improvement. His general condition was one of mild exhilaration but he did not talk of money schemes unless questioned and then his replies were often evasive.

He continued in almost the same condition physically and mentally during his hospital life. His attitude was cheerfully indifferent and he was not dangerous to himself or others.

March 29, 1919, lobar pneumonia developed, to which he succumbed and became very feeble and died on that day. The whole period of the disease was about ten years.

Anatomical Diagnosis. Chronic external pachymeningitis, slight congestion and edema of pia, slight sclerosis of middle cerebral artery, cerebral atrophy; cardiac enlargement dilatation of right ventricle; emphysema of lungs lobar pneumonia of right lung; slightly enlarged spleen; chronic diffuse nephritis.

Case 15.—Westborough State Hospital Case No. 13795, an unmarried white female, eighty-two years of age. Patient lived with a niece and nephew after the death of her only sister with whom she had always made her home.

Her mind began to fail three years previous to her admission when she failed to realize that her sister was dead. She began to eat abnormally, and could not remember the slightest things. If her niece disagreed with her, she would attack her. She was admitted to Westborough State Hospital May 24, 1918.

On admission, patient was disoriented for time, gave the name of place because she had been repeatedly told. She talked incessantly. Memory defect was the most prominent feature of her condition. She realized her memory defect but did not regard herself as insane. The pupils were round, equal and reacted to light. The patellar reflexes were slightly active.

August 13, 1918, she died and the cause of death was given as an accidental fracture of hip, cause of accident unknown. The whole period of the disease was about three years and three months.

Anatomical Diagnosis. Markedly adherent dura, congestion, edema and opacity of pia, pia arachnoid cysts; moderate apical pleuritis, bronchitis; congestion of liver and glissonitis, congestion of gastric mucosa, congestion of gut, chronic interstitial proliferative nephritis; double impacted fracture of surgical neck of left femur, extensive hemorrhage in soft stricture of left thigh.

Case 16.—Westborough State Hospital case No. 12947, a married white male, eighty-seven years of age. The patient had a number of accidents during his lifetime; about forty-seven years of age he had his head run over, and four years previous to admission had a fall, after which he was much worse. He thought the people in his town were trying to poison his food, and after that would eat no salt in his food. Patient was always opposed to the government and laws of the state. He was very difficult to deal with in business matters, one time he would

work for nothing and the next time charged such an exorbitant price that no one would pay it. Patient was admitted to Westborough State Hospital January 19, 1917.

On admission, he was demented, and had delusions against his relatives and friends. He talked continually of love, religion and the bible. Memory was defective and he was disoriented for time and place.

Physical Condition. He had total alopecia and was poorly nourished. The pupils were small, equal, round and reacted sluggishly to light. Arcus senilis; knee jerks sluggish; plantar reflexes equal and active. Hearing greatly diminished, almost totally deaf. Wassermann reaction negative in blood serum.

March 11, 1917. Nothing of interest had taken place in the patient's condition until today when he showed signs of collapse and was unable to take any nourishment. Following this, patient grew weaker rapidly and expired March 15, 1917. The whole period of disease was about three years and several months.

Anatomical Diagnosis. Chronic external pachymeningitis, multiple pia arachnoid cysts, cerebral atrophy, cerebral arteriosclerosis, well defined *Affen Spalte* on left occipital convexity; mitral stenosis; chronic interstitial hepatitis; chronic perisplenitis; aneurism (ruptured) of right iliac artery; cystic degeneration of kidneys, hypertrophy of prostate.

Microscopical Observation on Senile Dementia Group

Methods Employed. Blocks of tissue were taken from the prefrontal and precentral convolutions, calcarine region, cornu Ammonis and cerebellar cortex of the left hemisphere. These blocks were fixed in formalin, cut on a freezing microtome for staining by the Bielschowsky silver impregnation method, Weigert's neuroglia method and sudan III. Blocks were also fixed in alcohol, embedded in paraffin and stained with thionin.

General Histological Findings of Senile Dementia Group. For the reasons above stated, the description of the histological findings will be limited to a sort of summary of findings.

In most of the cases this group displayed more or less arteriosclerotic changes, and especially marked was this in case 13, an advanced cerebral arteriosclerosis with multiple hemorrhagic cysts of softening.

The pia mater was markedly thickened, the result of connective tissue fibers and fibroblasts proliferation. Occasionally, koernchen cells and lymphoid cells were seen in the pia and in some of the cases, though rarely, a few mast cells were observed. Here and there in sections of the pia, pigment granules and sometimes corpora amylecea were to be observed.

Pronounced swelling and splitting of the elastica were frequently shown in the larger vessels. Occasionally, adventitial and endothelial cells were proliferated, and such cells were frequently loaded with lipoid granules. In the cortex of some of the cases, connective tisue fibers were markedly proliferated, in small as well as in large vessels. This was especially well displayed in Bielschowsky sections. Frequently, hyaline degeneration of the walls of small capillaries was encountered.

The most striking changes of the nerve cells were the chronic atrophic alterations. The apical prolongations were traceable for a considerable distance in thionin and Bielschowsky preparations. Pigmentation (lipoid granules) was marked, and this was very conspicuous in frozen sections stained with sudan III. Some of the cells were like shadows, and frequently vacuole formation and sclerotic changes were shown. The neurofibril changes were such as previously described by Simchowicz, Fuller and others.

The glia changes were progressive as well as regressive in character. A striking proliferation of glia fibers and cells were seen in the molecular layer. Most of the glia cells showed a rich pigment content, and in sudan III sections, there were well stained. These granules were shown to have the same character as that seen in ganglion cells resulting from the products of pathological metabolism. Many trabant cells were seen in the neighborhood of ganglion cells. Among the spider type of glia cells, some showed markedly elongated nuclei.

In all cases of this group, socalled senile plaques were demonstrated in greater or less number. In general, the frontal convolution and cornu Ammonis exhibited the greatest number of plaques. Bielschowsky's method revealed these structures distinctly, they were of variable size in which a dark, circular, sometimes homogeneous, central mass was shown. In the outer portion of the plaques, glia and nervous elements and undetermined structures were found. These latter were sometimes fibrilar, sometimes granular, sometimes globular in shape. The occipital convolution exhibited the fewest plaques, but case 1 presented a considerable number in the occipital convolution. In the cerebellum, the senile plaques were found only in the molecular layer of case 12 and 15. As regards the stratigraphic distribution of senile plaques in the cerebral cortex, this was variable, but on the whole, they were most numerous in the middle layers of the cortex.

Observation on Staebchen Cells in Senile Dementia Group

Staebchen cells in this group were not numerous. In six cases, in the review of a number of fields, two such cells was the highest number found in a single field (4 mm. obj., oc. 15).

Of the topographical distribution, it may be said no great preference is shown, though in the cornu Ammonis frontal convolutions and cerebellum the greatest numbers were found.

Of the stratigraphic distribution of staebchen cells, there was apparently no special predilection, though most numerous in the molecular layer of cerebrum and white substance of the cerebellum.

The general direction of the long axis of staebchen cells was in the main like that described for the general paresis group. Trabant staebchen cells were rare, although there were numerous trabant glia cells.

Staebchen cells in the senile group showed shorter nuclei than those of general paresis, an average length of 10–15 micra. The excessively elongated nuclei found in general paresis was not seen in this group. Numerous transitional types between staebchen cells and glia cells were encountered.

The protoplasm of staebchen cells was visible in a majority of the cases, though never as abundant as in paresis and was polar in reference to the nucleus. Laterally branching protoplasm, as in general paresis, was observed only in a few instances. The staining reaction of staebchen cells was almost identical with that described for the general paresis group. Many more staebchen cells showing regressive alterations were observed among the senile cases than among the general paresis group. Not infrequently, these staebchen cells contained lipoid granules which were not unlike the lipoid found in other elements.

Elongated mesodermal cells, almost isolated into the tissue but connected with markedly degenerated vessel walls showing hyaline changes, were observed in thionin preparations.

In sections stained by the Weigert neuroglia method, some of the spider cells displayed markedly elongated nuclei like the nuclei of staebchen cells, though the fiber process given off to the vessel walls could be distinctly seen as in the more typical spider cells, especially in the frontal convolution and cornu Ammonis. Rod shaped glia cells taking part in the formation of colonies were found only infrequently.

Relation of Staebchen Cells to the Senile Plaques. Perusini pointed out that staebchen cells took part in the encapsulation of senile plaques. The writer studied his cases carefully to determine

if his material would substantiate this interesting finding. Glial elements in and about the senile plaques have been noted by many observers, though interpretations have differed. The writer also observed the glia cells taking part in and about the plaques in the sections treated with Bielschowsky silver impregnation method. Among these glia elements, some of the nuclei indicated rodlike elongated shapes and some were recognizable as a sort of staebchen cell. Some cases were found in the interior of plaques, but more frequently around the plaques. Infrequently, the rod shaped nuclei were placed in the center of the plaque. These elements were usually stained very darkly and on this account their interior structure was difficult to study. The writer has frequently encountered rod shaped nuclearlike substances which either stained darkly or were homogeneous in appearance and could not determine whether or not these belonged to glia elements or were to be recognized as pathologically altered neurofibril substance, or pieces of small capillaries and the like (Fig. 8). Besides these staebchenlike glia cells, socalled rodlike spider type glia cells were found taking part in the encapsulation of the plaques (Fig. 8).

IV. Epilepsy

Clinical and Anatomical Abstracts

Case 17.—Westborough State Hospital case No. 12105, a boy, eleven years of age. The family history was negative. The first epileptic attacks were at the age of three and were of the petit mal type. No cause can be assigned for the first convulsion, an average of about two attacks a week without aura has been maintained throughout. He was eight years old when first admitted to the Monson State Hospital, from which he was discharged after two years. While at that hospital it was noticed that he practiced masturbation. On May 30, 1914, a vasectomy was performed under ether to correct the habit of masturbation and he was not afterwards seen to practice it. The patient was admitted to Westborough State Hospital September 12, 1915.

On admission, no hallucinations nor illusions could be elicited. The patient realized that his father brought him here because he was sick. His education was evidently poor for he could only do the simplest sums $(2+2)$ but was unable to do $3+3$. He could write his own name, but that is the limit of his ability in that line. The patient did not know the name of the state but had heard of the United States. He appeared to be deteriorated. The patient tested to the age of 8 with the Binet-Simon test. Physically, the pupils were normal, the patellar reflexes active, and all other neurological signs negative.

The patient's condition offered nothing of interest during the first

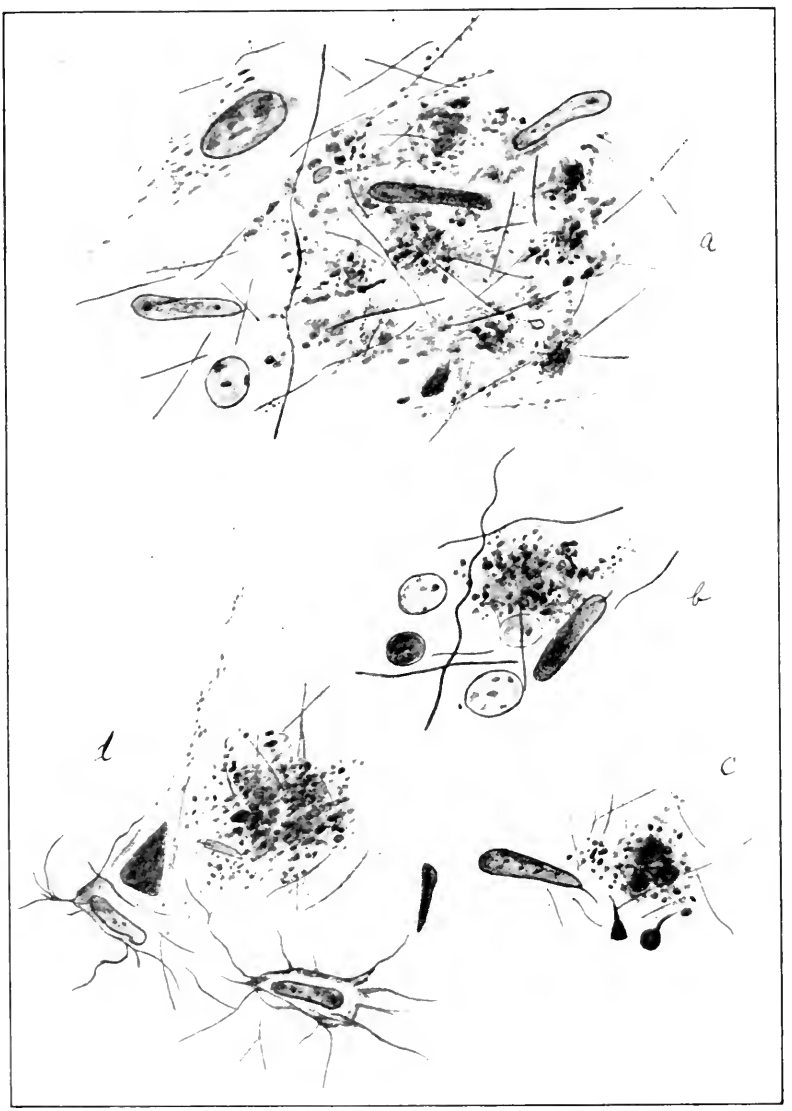

FIG. 8. Bielschowsky silver impregnation. Staebchen shaped glia cells and staebchen like spider cells taking part in and about senile plaques. *d* Bielschowsky method after fixed in Weigert neuroglia mordant.

week at the hospital. September 19, while he was playing cards and going on in his usual way, he was seized at 1 P.M. with an epileptic convulsion from which he rallied. At 2:45 P.M. he was seized with more convulsions and continued going from one to another. The spasms were confined to left extremities and left side of the neck and face, with great congestion and severe spasmodic twitchings which continued until death at 11:15 P.M.

Anatomical Diagnosis. Focal chronic external pachymeningitis, intense congestion of pia, cerebral myelomalacia, focal cerebral gliosis (gliosis of each cornu Ammonis); hemorrhagic infarcts of lungs, congestion of larynx and trachea, congestion and fatty infiltration of the liver, congestion of spleen, cyanosis of kidneys, absent right testicle, persisting thymus gland.

Microscopical Observation

The blocks of tissue were taken from the prefrontal and paracentral convolutions, calcarine region, cornu Ammonis and cerebellar cortex of left hemisphere. These blocks were fixed in alcohol and embedded in paraffin for staining with thionin.

General Microscopical Findings. The pia mater was edematous, thickened and slightly infiltrated with lymphocytes. There was a slight proliferation of the capillary cells, shown especially in the prefrontal and paracentral areas. There was a little infiltration with round cells in the vessels of the outer cortical layers, especially in the paracentral and prefrontal convolutions. In the nerve cells, chronic cell alteration, pigmentation, chromatolysis, etc., were seen.

The glial elements in the cortex showed proliferated and regressive changes. Especially, in the cornu Ammonis, there was a striking increase of glia cells. The sizes and forms of these glia cells varied. The trabant type of glia cells were few. In this case the writer did not employ any other staining methods, but he believes that the findings correspond with that of genuine epilepsy with gliosis of Ammon's horn described and classified by Alzheimer.

Observation on Staebchen Cells

Staebchen cells were demonstrated in small number, averaging not more than one in a single microscopical field. The prominent distributional difference of staebchen cells as seen in the paretic group was not shown in this case. The cornu Ammonis displayed the greatest number, next the frontal and then the precentral convolutions, while in the calcarine and cerebellum the fewest were encountered.

Staebchen cells having long nuclei as seen in the general paresis group were not shown. The average length was about 10–15 micra. Pigment containing cells and regressive changes were sometimes encountered. The staebchen trabant cells were not found.

This case also displayed a number of elongated capillary cells which seemed connected with markedly degenerated unstained vessel walls. These elements sometimes seemed like isolated rod-like cells in the tissue.

V. Delirium Tremens

Clinical and Anatomical Abstracts

Case 18. Westborough State Hospital case No. 10066, a white male, an engineer by trade, forty-three years of age.

Family history was negative except that a maternal uncle was insane. Very little previous history of the patient was given. He had indulged frequently in intoxicating liquors. The patient was married but had no children. This was the third attack, but the date of previous attacks and where he had been admitted was unknown. The patient was brought to Westborough State Hospital April 3, 1912.

Mental Condition. On admission, the patient said that he had three children (had none) and gave irrelevant and incoherent answers to questions. He was untidy in bed and in personal appearance. The patient wandered about room and attempted to go without his clothes. He had hallucinations of sight.

Physical Condition. The pupils were dilated but reacted to light and accommodation. The station was poor, could not stand alone and was also unable to walk. All of deep reflexes were increased. There was marked tremor of extended fingers and of entire figure. Disorders of sensation were impossible to determine, because of lack of cooperation. Following admission, the patient suffered from lobar pneumonia and died April 14, 1912.

Anatomical Diagnosis. Cerebral congestion, chronic leptomeningitis, slightly atrophic convolutions; chronic endocarditis; lobar pneumonia, fatty liver; hour glass contraction of stomach.

Microscopical Observation

The blocks of tissue were taken from the first frontal, pre- and postcentral convolutions, occipital calcarine region, cornu Ammonis and cerebellar cortex of the left hemisphere. Formalin materials were cut on a freezing microtome for staining with the Weigert glia and Biel-chowsky silver impregnation methods. Blocks of tissue were also fixed in alcohol and embedded in paraffin for staining with thionin.

General Microscopical Findings. The pia mater was slightly thickened. The chronic alteration and pigmentation of nerve cells, marked edema and chromatolysis of pyramidal cells, increase of glial elements, and progressive and regressive changes in the walls of blood vessels, with very slight infiltrated process were the most prominent features of the Nissl and Bielschowsky specimens. Weigert-Pal preparations showed a pronounced degeneration in the outer cortical layers. The sudan III specimens disclosed an abundant accumulation of fat in the nerve cells and also in glia cells.

Observation on Staebchen Cells. In this case, staebchen cells were few, an average of about 0.2–1 in a single microscopical field. There was no remarkable distributional difference in staebchen cells, but the molecular layer seemed to display the largest number.

The nuclei were comparatively short, the most of them measuring about 10 micra, the longest one about 15 micra. The protoplasmic prolongation was also short, often found lacking. The tincture of nuclei was sometimes dark and granular, and sometimes pale and homogeneous. A majority of the staebchen cells were loaded with fat which was well demonstrated in sudan III specimens. Socalled rodlike spider cells were only rarely encountered. Elongated capillary cells connected with unstained hyaline vessel walls were also displayed.

VI. Tuberculous Meningitis

Clinical Abstract

Case 19.—Massachusetts Homeopathic Hospital, neurological service, case No. 116820, a white girl, twelve years of age.

Family History. Mother suffered from tuberculosis. One uncle and mother's sister died of tuberculosis, otherwise the family history was negative.

Previous History. In January, 1919, she began to cough and in July to have pains in the abdomen. Then she began to have a tired feeling, following which headaches. About Christmas she began to feel very tired and would frequently stay in bed. One week previous to admission, a severe headache developed and she became very nervous and restless. She was admitted to the Massachusetts Homeopathic Hospital January 1, 1920.

On admission, the pupils were equal, and reacted to light. Right internal strabismus, moderate rigidity of the neck. Abdomen tympanitic and tenderness throughout. Koernig's symptoms on both sides, slight left Babinsky, diminished knee jerks.

During the day of admission patient was at times delirious and stuporous. She had difficulty in swallowing and complained of consid-

erable pain in abdomen, neck and thighs. On the next day she died, after having been in a comatose state for several hours.

Anatomical Abstract

Lungs. Left lung congestion, right lung chronic fibrous pleurisy, tuberculosis.

Liver. Tuberculous perihepatitis, hepatic congestion.

Spleen. Congestion, multiple discrete tuberculous nodules.

Pancreas. Congestion.

Stomach and intestine. Congestion of gastric mucosa, congestion and old adhesion of gut, advanced and universal tuberculous peritonitis.

Brain and cord. Calvarium of normal thickness and normally adherent, dura congested and tense, intense congestion of pia, serofibrous pial exudate on basis of cerebellum, ventral surface of medulla and pons, also over anterior and posterior perforated spaces, imbedding of cranial nerves, 2d–9th in pia exudate of basis. Cerebral and cerebellar gyri of good volume, general diminution in brain consistency, congestion of ependyma of lateral and 4th ventricles, purulent and caseous content of hypophyseal fossa, the process also involving the hypophysis.

Congestion of spinal cord, pial thickening and opacity in cervical region, also intense congestion and opacity in lumbar and lower thoracic areas, no gross evidence of tract degeneration, general diminished consistency.

Microscopical Observation

Methods Employed. Blocks of tissue were taken from the prefrontal, anterior and posterior convolutions, calcarine area, cornu Ammonis, base of cerebellar cortex, and pons area of the left hemisphere. These blocks were fixed in alcohol and stained with thionin. Blocks were also fixed in Cajal's mordant for demonstrating the cellular glia.

General Microscopical Findings. The most striking features were the enormous infiltration and thickening of the pia mater. Under higher magnification, the chief infiltrated cells were lymphocytes, leucocytes, and few plasma cells. These cells were frequently found in the neighborhood of pial vessels and occasionally beneath the pia in the outer edge of the molecular layer. The fibroblasts and the vascular cells were markedly proliferated. Many of these cells showed staebchenlike shapes and often it was difficult to differentiate them from true staebchen cells.

The nerve cells showed tigrolysis and sometimes were stained darkly, sometimes palely and homogeneously. Occasionally, tortuous apical prolongations were encountered. Pigment granules

were seen in the ganglion cells, and also in glia cells, and were yellowish or brownish in color.

The cortical vessels of above stated areas showed greater or lesser alterations. The vascular apparatus extending downward as far as the pyramidal layer, showed a moderate perivascular infiltration, mostly of lymphocytes. There were also moderate progressive changes in the walls of the cerebral capillaries. There was an increase of glia cells, particularly in the outer layers of the cortex and this was most marked in the molecular layer. There was also an increase of glia cells about small capillaries of the cortex. Many trabant cells were shown.

Observation on Staebchen Cells

In this case, staebchen cells were a little more in number than in the cases of the senile dementia group, though not so numerous as those of the general paresis. The largest number was displayed in the outer cortical layers, especially the molecular layer. Frequently staebchen cells of crooked shape were encountered. In general, these staebchen cells were found most numerous in the portions where infiltration and proliferation of the vessel walls were most pronounced. Such changes were most marked at the junction of cortex and pia mater, where often it was difficult to determine where pia ended and cortex began. In such instances, staebchen shaped cells were often seen immigrating into the cortex from the pia mater. It was difficult to determine whether or not these migratory cells were fibroblast or cells from the endothelium vessels.

The general direction of the long axes of these staebchen cells followed no definite plan. Most of the staebchen cells in this case were of the typical form, showing the characteristic extended protoplasmic prolongations given off from the poles of nuclei. The nuclei were short, averaging about 15 micra, the longest about 25 micra, the latter only few in number. A few long nuclei were found in molecular layer when the Cajal gold chloride method was employed. Cajal method employed in this study demonstrated the cellular glial elements well though the interior structure of the nuclei was not shown distinctly.

Staebchen trabant cells were comparatively numerous. The staining reactions were similar to those described above. Some of the staebchen cells enclosed pigment granules while vacuole formation was rare. Staebchenlike cells connected with hyaline degenerated vessel walls were not numerous, because the noticeable regressive changes in the vessel walls of this case were not shown.

VII. Glioma Group

Clinical and Anatomical Abstracts

Case 20.—Massachusetts Homeopathic Hospital, neurological service, case No. 114307, a laundry worker and driver, a married white male, fifty-seven years of age.

The family history was negative, except that the father died of quick consumption.

Previous History. The patient had scarlet fever in childhood and also had an operation for an opening of the left leg for relief of cellulitis fifteen years ago.

The first symptoms were noted about the beginning of February, 1919. While he was carrying some bundles on the street, he suddenly had an uncomfortable feeling in his legs, as if something were creeping up his legs. He fell unconscious and the next he remembered he was in the City Hospital, his wife by his bed talking to him. He was able to go home the same day, remaining there a week and then he went back to his work, feeling as well as usual. In March, 1919, a month and a half later, he felt again the same creeping sensation in his legs, felt ill at ease and trembled. He was admitted to the hospital March 21, 1919.

An examination showed that the body was studded with small fibromata, varying in size from a pinhead to an English walnut. The deep reflexes were equal and normal. The plantar reflex was suggestive of an extensor type. The pupils were regular, reacted to light and accommodation. There was no paresis or disturbance of sensation. Patient was discharged in an improved condition June 11, 1919. But following this, he became nervous and complained of general uncomfortable feelings and headache. He was again admitted to the hospital September 21, 1919.

On second admission, the patient was very unsteady on his feet. The pupils reacted very sluggishly to light. The Achilles and knee jerks were obtained with difficulty.

October 1, 1919, examination of fundi showed an edema of right disc, and October 11 another examination showed a mild optic neuritis in each eye, the left pupil slightly raised above surrounding structures.

October 20, 1919, patient was confused, disoriented. He thought he was driving his horse.

October 29, 1919, an eye examination showed the choked disc in each eye with a number of hemorrhages, marked in left.

October 28, patient seemed very weak but responded readily to questions.

November 7, an operation was done. A flap of scalp was turned back on the right side above the ear. A small incision was made and a flap of bone removed by making an opening with a Gigli saw. The bone flap was removed and the dura was diagonally incised in two directions,

after which the flap of scalp was sutured over the wound. After operation, the patient was very quiet. The pupils were widely dilated and inactive to light and convergence. The Achilles and knee jerks were absent, also the plantar reflexes.

November 8, 1919, during the night the patient became very restless, pulse almost imperceptible, and expired at 2:37 A.M., November 9, 1919.

Anatomical Abstract. Cranium. In the right half of the cranium, involving upper right extremity of the temporal bone, the parietal and posterior half of the temperosphenoidal region was the circular flap of a recent decompression wound.

Brain. The dura was normally adherent, the groovings for the meningeal vessels were shallow. Numerous depressions along the sagittal suture, which corresponded to the position of Pacchionian granules. The dura was congested, moist, tense and bulged posteriorally and laterally. The longitudinal sinus was barely moist, containing a thin, fibrinous clot. Cerebral gyri of parietal and temporal sphenoid area slightly flattened and dry. Cranial nerves offered apparently no gross lesion. Vessels of the base basilar, posterior and middle cerebral showed rather advanced arteriosclerotic changes. The cerebral gyri were generally of good volume, but flattened. Vertical section through the corpus callosum showed in post 3/5 a large, softened hemorrhagic area; the underlying structure firmer than normal, and displayed a few hemorrhages. The corpus callosum in this area was thickened three to four times the normal. The gyri immediately above were involved by a tumor mass which extended vertically to within 1 cm. of the surface of the brain, the tumor mass involved an area 3 to 4 cm. in posterior portion of corpus callosum and extended caudally to the parietal occipital fissure. The tumor mass could not be shelled out but infiltrated the surrounding tissues. Brain weight 1570.

Heart. No gross lesions. The ascending aorta showed a few atheromatous patches. Lungs. The cut surface was congested. Liver. The cut surface was somewhat congested. Spleen. Small, capsule slightly wrinkled. Stomach. Dilated. Intestines. Congested and inflated. Kidneys. The left kidney showed no gross lesions. The right kidney presented some general increased consistency. Bladder. No gross lesions. Genitals. Nothing worthy of note. Skin. Numerous small fibromata over the body, described in the clinical abstract.

Case 21.—Massachusetts Homeopathic Hospital, neurological service, case No. 119434, a white female, a nurse, fifty-five years of age.

The family history was negative except that one sister was suffering from arteriosclerosis.

Previous History. The patient had always enjoyed good health. January 10, 1919, she went to Florida to nurse in the south during the remaining months of the winter. She attended a conference of nurses on the first of April and was then planning to return north. April 17

she was taken ill after eating some meat which she thought responsible for her nausea and vomiting. The next day she began to feel drowsy, but journeyed with a friend from the south, arriving in Boston on Monday. She took various cathartics but continued to feel ill, and during the week became steadily worse. She began Saturday night to be troubled with hiccoughs and for the first time lost control of her stools. Monday she simply took milk and medicine, and seemed to be in a stupor. She was aroused with great difficulty. On this day she was sent to the hospital, arriving in a stuporous condition, and troubled with persistent hiccoughs.

On admission, the attention of patient was held with difficulty. She responded to some questions and dropped off to sleep without fully answering. She would say, "I can't think," "I don't understand." There was decided ptosis of the left lid, otherwise no paresis. The Achilles and knee jerks were exaggerated, and there was a positive extensor plantar reflex.

Following admission, the breathing was shallow and irregular, pulse weak, and only 50. Patient became more restless. Sometimes she waved her arms and clenched her hands.

May 2, patient swallowed with considerable difficulty and passed urine involuntarily.

May 4, patient has been somnolent most of the time, and she has been vomiting. Double Koernig and double Babinsky are present.

May 8, respirations very labored, pulse very weak and slow, jaws clinched. This afternoon she had bad coughing and choking attacks.

May 11, patient became cyanotic, respiration very shallow, pulse much weaker, 120, but rapid. She remained in a comatose condition until death, May 12, 1919.

Anatomical Abstract. Permission for examination was limited to the head.

Skull cavity. The calvarium was slightly more adherent than normally, irregularly thickened and its inner table rough. The groovings for the meningeal vessels were of normal depth. The dura externally was rougher than normally, due to adhesions. This membrane was congested, dripped blood, and was tense, bulging laterally. The inner surface of dura was free from exudate or pseudomembrane. The longitudinal sinus was filled with dark fluid blood. Through the dura and on either side of longitudinal sinus, near vertex, were herniae of Pacchionian granulations. The pia was well ingested, but rather lusterless and comparatively dry. Over the left temperosphenoidal lobe and base of cerebellum the congestion was more intense. The larger vessels of the base collapse on section, but nowhere was there evidence of arteriosclerotic changes.

The cerebral gyri were edematous and somewhat flattened, particularly left hemisphere in temperosphenoidal area. Horizontal section

through left hemisphere, traversing the basal ganglion, disclosed a grayish pink tumor mass extending to within 4 mm. of cortex which involved the temporal lobe extending from the anterior pole caudally to the anterior area of the posterior limb of the internal capsule, being limited sharply mesially by the deep or main portions of the Sylvian fissure, leaving the insula entirely unaffected. The tumor mass shaded imperceptibly into the surrounding structures and cannot be shelled out. The cut surface of cerebrum as well as of pons, medulla and cerebellum was quite congested. No other coarse lesions were encountered.

Microscopical Observation

Methods Employed. In both cases blocks of tissue were taken from the tumor area, first frontal, anterior and posterior, central, parietal, temporal convolutions, calcarine region, cornu Ammonis, and cerebellar cortex. Mallory's neuroglia staining, Cajal's method for the cellular glia, hematoxylineosin (tumor area) and thionin staining (alcohol materials) were employed in the study of these cases. It so happens that both cases showed practically analogous microscopical structures. For convenience, therefore, the microscopical findings will be summarized as one.

Microscopically, the tumors of both cases were composed of areas consisting chiefly of neuroglia fibers and of other areas where a cellular structure dominated. These two types of structure were not sharply marked off from each other. Here and there, the glia cells showed a tendency to form clumps with fusion of their protoplasm. The walls of blood vessels were of two varieties, thick walled types which were nearly occluded, and hyaline types which were more patent in character. The remains of old hemorrhages were seen in surrounding areas of the blood vessels containing numerous pigmented cells. Mitotic figures of glia cells were commonly seen, especially in the second case of this group.

The neuroglia fibers varied in thickness, some of them were fine and others were extremely coarse. The fibers coursed in all directions between the cells and in cell clumps. The cytoplasm of glia cells was abundant in the majority of cells. In some instances, the cytoplasm was sharply defined, in other instances it faded into surrounding tissue.

The glial nuclei varied in shape, but a majority were remarkably elongated, especially was this so in the first case of this group. These elongated nuclei were provided with protoplasmic processes given off from the poles and in appearance greatly resembled so-called staebchen cells, not only in their general form but in their

internal structure. These staebchenlike cells were sometimes irregularly placed, but for the most part their long axes were parallel with each other and the course of the glia fibers. (Figure 9.) These staebchenlike cells found in the two glioma cases, however, possessed

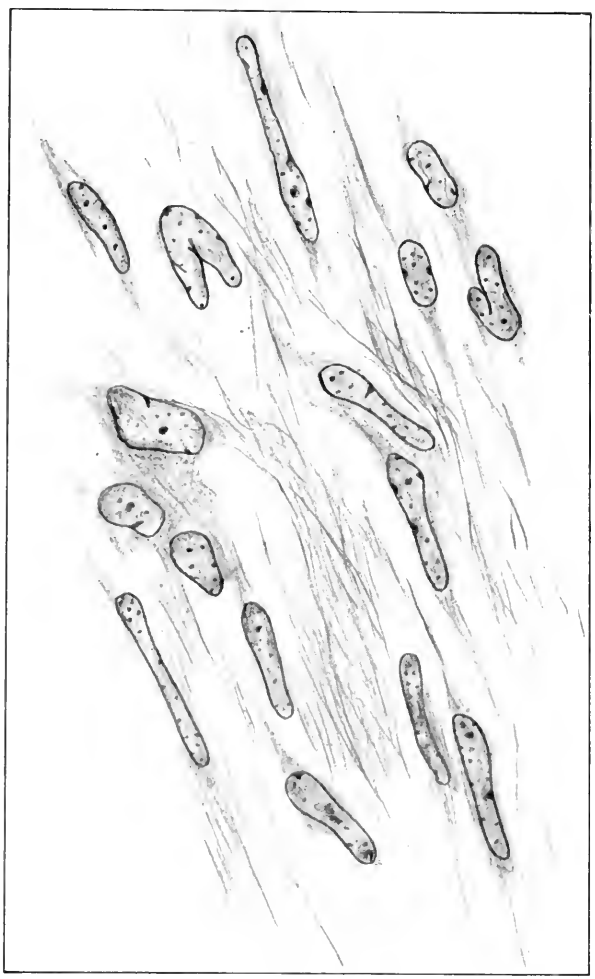

FIG. 9. Mallory glia method. Structure of a gliomatous area in Case 20.

more cytoplasm than the typical staebchen cells of general paresis. The width of these nuclei seemed larger in proportion to their length and the protoplasmic processes were shorter in comparison with those of general paresis. Extremely long nuclei like those found in general paresis were not shown. The longest nuclei measured 25

micra. Here and there, aside from the staebchenlike type, various other forms of glia cells were seen, round, oval or spindle shaped; especially was this true in the second case.

These cells also varied in size, the largest were approximately as large as middle sized ganglion cell. In general, the larger forms stained lightly, while most of the smaller cells stained darkly. Some homogeneous structures were encountered. Vacuoles in the cytoplasm and nuclei were rare.

Necrotic areas were seen in the central part of the tumor. Here were encountered undetermined substances of destroyed tissue, pigment granules and remains of glia fibers. The surrounding portions

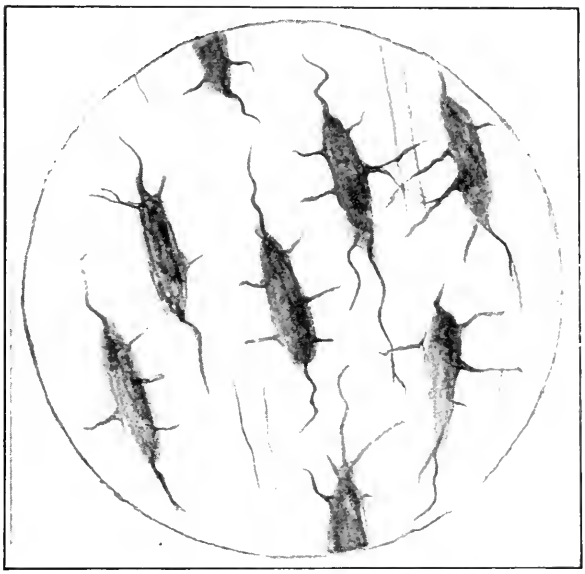

FIG. 10. Cajal gold chloride method. Reactive gliosis area of Case 20.

of the tumor areas were infiltrated and no definite boundaries could be determined, but there was a remarkable reactive fibrillary gliosis around them. In these proliferated gliotic areas there were numerous staebchenlike cells, their long axes parallel with each other. These staebchenlike cells showed a structure similar to those seen in the tumor area proper (figure 10).

In addition to the tumor areas, the cerebral cortex was studied in each case. Here there was a slight proliferation of glial elements, and to a less degree was this true of the cerebellum. Staebchen cells, however, were found in somewhat noticeable numbers. Their

nuclei were short and protoplasmic prolongations were scant. The staebchen cells were more numerous in the tumor regions, elsewhere there was no noticeable regional or laminar predilection.

VIII. Discussion and Explanation

As repeatedly noted, ever since Nissl and Alzheimer called attention to staebchen cells, many observers have made these cells a subject for investigation. Abstracts from the literature have been given above, therefore need not be again mentioned.

In this study, staebchen cells were demonstrated in the cortex of various diseases in greater or smaller numbers. In general paresis, these cells were one of the most important microscopical findings which were essential for the histopathological diagnosis of the disease. In meningitis, staebchen cells were also shown in appreciable numbers. Other diseases described in this series—senile dementia, epilepsy and alcoholism—also displayed staebchen cells though in fewer numbers since they showed no special characteristics. But the two glioma cases revealed a great number of staebchenlike glia cells in the tumor areas and also in the areas of proliferated glial elements.

Concerning the morphology of staebchen cells, the descriptions of most of the observers have substantially agreed. Besides typical forms, there are numerous transformation types of which mention should be made, but such cells must possess the basic characteristic of the staebchen cell, namely the elongated form. Ulrich classified staebchen cells into six groups as already mentioned, but her classification it seems to me makes more for confusion than elucidation. For convenience, the writer classifies staebchen cells into four types, as follows:

Type 1. Markedly elongated nuclei almost always showing attenuated protoplasmic processes, given off mostly from the poles. This type is found most frequently in general paresis. *Type 2.* Staebchen cells with relatively short nuclei and scant protoplasmic processes. This type may be intermingled with typical forms, and are seen in the neighborhood of focal glial proliferations and in the white substance. This type is, however, more common in senile dementia. The number of staebchen cells in senile dementia, however, is not great. *Type 3.* This type comprises all the curious and bizarre shapes of staebchen cells described by the various observers and also by the writer. *Type 4.* Here are included what the writer regards as transitional forms between staebchen and glia cells. This type appears in the cortex where proliferation of the cellular glia is

marked. Staebchenlike spider cells (glial) are also included in this group.

Concerning regional and laminar distribution of staebchen cells, Nissl, Alzheimer and Dupré found the greatest number in the layer of large pyramidal cells. Spielmeyer, in a case of meningoencephalitis (T. B.) associated with general paresis, claimed that he had found the greatest number of staebchen cells in the deeper layers of the cortex, while Straeussler in his study of the paretic cerebellar cortex found them most numerous in the molecular layer and white substance. Ulrich found the greatest number in the polymorphous layer of anterior central convolution. This was on paretic material. Ulrich's study, however, is based upon only three areas, anterior central, calcarine region, and cerebellar cortex. The writer has studied more or less systematically various areas of the paretic cortex and believes that in general paresis, the greatest number of staebchen cells are to be encountered in the frontal convolutions and cornu Ammonis, and here in the pyramidal and ganglion cell layers. But in meningitis, staebchen cells are more numerous in the molecular layer.

What is the general direction of staebchen cells in the tissue with reference, say, to the cortical laminae? As already stated in the review of the literature, most observers and also the writer himself have found that staebchen cells show a tendency to adapt themselves to surrounding elements, and generally, are parallel to the surrounding elements,—nerve cells, marrow radiation, neuroglia fibers, vessels, etc.

The Origin of the Staebchen Cell. This is still unsettled. Nissl, Alzheimer, Mott, Ranke, Dupré, Rosenthal and Rondoni support the view of a mesodermal genesis, an origin from endothelial and adventitial cells (Alzheimer, Rosenthal) of blood vessel walls.

Cerletti was the first to call attention to a possible glial origin. In this he has been supported by Straeussler, Agostini, Rossi, Perusini, Sano Torata and Simchowicz.

Ulrich, Achucarro, Bonfiglio, and others contend for a multiple genesis,—ectodermal and mesodermal, while Achucarro believed from his experimental research that some staebchen cells have a glial origin. He also believed that some originate from adventitial cells, basing this upon Alzheimer's observations.

The writer's own views, based on the study here reported may be briefly stated. Almost all points which form the basis of argument for the supporters of the glial origin, namely, the various transitional stages between glia cells and staebchen cells, staebchen cells

in the glial encapsulation of senile plaques and also in the glia cell colonies, trabant staebchen cells, the parallelism between the number of staebchen cells and proliferated glia cells, and discovery of glia fibers attached to staebchen cells, have all been confirmed. Glia fibers attached to staebchen cells were demonstrated only by Straeussler and Simchowicz, while the other observers mentioned above either did not employ special staining methods for glial elements, or were unable to detect glia fibers by the methods employed.

It is well known that in certain gliomata the glia cells of which they are composed are generally spindle shaped or elongated. Recently, Sano Torata has described two cases of a staebchen type glioma among a group of twelve cases which he studied. Sano believes that this of itself gives an answer to the question of the origin of staebchen cells. Lotmar also has described a staebchen type cell in glioma, though he did not use this as an explanation of origin of staebchen cells. In the two cases of glioma, here reported, the writer found numerous staebchen like glia cells and considers it quite possible that glia cells may be transformed even from round shapes to staebchen cells of typical form.

The arguments for the mesodermal origin of staebchen cells have been given in the literature cited above. The writer believes that his study offers evidence that some staebchen cells are also of mesodermal origin, being derived from elements of the vessel walls as a final result of regressive alterations. In the paretic cortex, the proliferation of vessel wall elements and capillary increase (Spross formation) are most striking figures, and these proliferated processes undergo regressive changes sooner or later. This may be one of the reasons for numerous staebchen cells in the paretic cortexes.

The writer, as will be seen, believes in an origin for staebchen cells, partly ectodermic, partly mesodermic. It seems probable that the mesodermal staebchen cells originate from cells not greatly differentiated, adventitial and endothelial.

Nissl doubted the possibility of a pial origin for staebchen cells, but De Ruck argued for an origin from pial fibroblasts. A more recent observer, Ulrich, maintains that in meningitis staebchen cells immigrate from the pia mater into the cortex. In one of our cases, a tuberculous meningoencephalitis, emigration of staebchen cells from the pia into the outer cortical layer was observed, but only where there was a pronounced pial infiltration. This was by no means common.

Still more recently and during the progress of this study, Uyematsu, a friend of the writer, has reported a case of diffuse cerebro-

spinal sclerosis, in which he described rod shaped cells. Some of these cells of Uyematsu correspond to typical staebchen cells, others found mostly in the deeper layers, to Ulrich's second type. Knowing of the writer's studies on staebchen cells and in comparing notes, Uyematsu came to the belief of a gliogeneous origin for all staebchen cells found in his case. The writer believes, however, that Uyematsu's opinion as to staebchen cells can only be accepted for the case which he reported and not for the genesis of staebchen cells in all instances. But these observations of Uyematsu are confirmative of the glial origin of some staebchen cells, as the writer and others have maintained.

If then, some glia cells undergo transformation to staebchen cells, what are the conditions which cause this to take place? Several theories may be advanced. (a) A mechanical theory, whereby rodlike forms are produced by adaptation to the available spaces surrounding nerve cells, nerve or glia fibers, which for the most part would be an elongated space. (b) The theory of osmotic pressure. (c) The theory of a special function which glia cells can best exercise in an elongated shape. A mechanical explanation is very probably an influential factor, but does not account for all gliogeneous staebchen cells. For it is a fact that staebchenlike glia cells are not always found in equal numbers in the various disases where glia cells are increased, or even in the same disease showing evidences of glial increase. For example, in glioma, staebchenlike glia cells are sometimes numerous as in one of the writer's cases noted above, while in other glioma cases, few or no staebchen cells are found. Generally, glioma cells vary considerably in shape and size, but as a rule all the cells of a given tumor are more or less of the same type and size. From this, the writer concludes that there must be some cause other than purely mechanical factors for the elongation of glia cells. Probably different biochemical processes produce different but more or less definite histopathological reactions.

Have staebchen cells any special function? This is a difficult question to answer categorically. However, Cerletti and Achucarro believe that the adaptation and elongation are accomplished by the cells which probably fulfill the important functions of accumulating and elaborating the degenerative products in the nervous structures. There are those who do not concede any special function to staebchen cells. Lipoid inclusions in staebchen cells are common findings, but are relatively fewer than the number of staebchen cells present, in other words staebchen cells without fat enclosures are more numerous than those showing such changes. As Fuller has

pointed out, "we have learned that the glia is more than a support structure of the central nervous system and possesses scavenger functions which, perhaps, are as important as any other of its functions." Held, Alzheimer and others have also attributed a certain ameboid power to neuroglia cells which are particularly noted in some of the socalled Gitter cells and the specially reactive glia cell described by Alzheimer as "Amoeboid-cell." According to recent experimental studies, all the fat granular cells of the Gitter cell type in the central nervous system are believed to be derived from either glial, or mesodermal elements. If such is true of Gitter cells, and there is abundant evidence, may it not be possible for staebchen cells to have a similar origin, since in many ways their functions are alike?

IX. Summary and Conclusion

This study is based upon twenty-one cases of cerebral disease, ten of general paresis, six of senile dementia (accompanied with more or less alteriosclerosis), one each of epilepsy, delirium tremens, and tuberculous meningoencephalitis, and two of glioma. Some of the findings lead to rather positive conclusions, others await still further investigations. The results of this study may be summarized as follows:

A great number of staebchen cells are exhibited in all of the ten cases of general paresis. Staebchen cells are of great significance for the histopathological diagnosis of the general paresis of the insane.

Staebchen cells are also found in the cortex of meningoencephalitis, but never so numerous as in general paresis.

The two cases of glioma have displayed numerous staebchenlike glia cells in the tumor tissues, and also a moderate number in the cortex, especially in the area where glial proliferation has been marked.

In the remaining cases (epilepsy, delirium tremens and senile dementia), only a few staebchen cells were found and these apparently were of no pathological significance.

Staebchen cells show a certain relation to pathological alterations in various central nervous diseases, especially to the alterations in mesodermal and ectodermal elements.

Staebchen cells have a multiple genesis, some from mesodermal cells, others from glia cells. Some staebchen cells occasionally immigrate from the pia to the cortex, at least this was shown in our case of tuberculous meningoencephalitis.

The writer wishes to express the sincerest thanks to Dr. Solomon C. Fuller, Associate Professor of neuropathology, Boston University School of Medicine, for his warm hearted, helpful kindness. The writer also wishes to thank Dr. Macdonald, superintendent of Danvers State Hospital; Dr. Lang, superintendent of Westborough State Hospital; Dr. Spalding, formerly superintendent of Westborough State Hospital, for permitting a study of the material in their collections.

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TWO CASES OF ATYPICAL EPIDEMIC (LETHARGIC) ENCEPHALITIS WITH A HISTOPATHOLOGIC REPORT

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Epidemic encephalitis often exhibits atypical clinical syndromes which render the proper diagnosis difficult. Of the great number of atypical forms recognized by the discoverer of this disease, G. V. Economo (1), and described in this country by Tilney (2), Riley (3), Bassoe (4), Hunt (5), La Salle Archambault (6), we might mention the meningitic, hyperkinetic (myoclonia, chorea, paralysis agitans), delirious and tabetiform types which, however, have so far been recorded only clinically, that is, they were not confirmed by postmortem studies. Bassoe's case is the only American one on record in which a reliable histopathologic examination was made. To this we might add two more cases which are even more striking as to the clinical and pathologic findings.

Case I.—A thirty-three-year old Ruthenian, bartender by occupation, entered Cook County Hospital's neurologic service on June 8th, 1920, with a history of seven days' illness. Neither the onset, nor the nature of the initial symptoms could be ascertained as the patient was delirious and unable to give intelligent answers.

Examination.—A well developed and nourished male, with a large square head, and normal bony and muscle systems. There were not deformities, signs of injuries, paralyses or atrophies Voluntary and passive movements were carried out with ease, in spite of continuous muscular twitchings of the abdomen, thorax, face, upper and lower extremities. The twitchings were in the form of rapid

clonic jerks involving a larger or smaller portion of the muscle when they showed as fascicular contractions. Especially numerous were they in the abdominal musculature which was in a state of constant restlessness without stopping for a moment until the patient's death.

Aside from the muscle twitchings there was profuse sweating of the entire body, especially marked on the face. The cranial nerves showed no visible abnormalities, except a sluggish pupillary reaction even to a very strong light. The movements of the eye balls, eyelids, the facial expression, including mimical and voluntary movements of the face muscles, the tongue, the deglutition, all were normal. The reflexes—tendon, abdominal, cremasteric, corneal, conjunctival, nasal—were normal; there were no Babinski Oppenheim phenomena, nor clonuses.

The sensibility appeared highly blunted, the patient having failed to perceive the strongest painful irritations.

The urinary and rectum controls at the first examination were normal.

The mental condition was at times apparently normal, at times, there was marked delirium, but apathy and lethargy were absent.

The urine as well as the Lange and Wassermann tests in the blood and spinal fluid were negative. The cell count and globulin test could not be determined, as the spinal fluid was bloody. White blood cells numbered 12,400; blood pressure, 142 systolic and 68 diastolic. The abdominal and chest organs showed no abnormalities. Temperature was 100, pulse 114, and respiration, 24.

Course.—June 9th, 1920. The temperature was 101, pulse 120, respiration 30; patient perspiring profusely and very restless, noisy, irrational; tried to get out of bed, and had to be restrained. The restlessness continued the whole night; involuntary urination. June 10th, 1920. The patient is extremely noisy and restless; takes water, but is irrational: does not sleep; temperature (forenoon) 102, pulse 120, respiration 30; at noon time—temperature 99, pulse 108, respiration 24; delirious; the entire body twitches.

June 11th, 1920: Morning temperature 100 (rectal), pulse 96, respiration 24; at 4 P.M. temperature 104, pulse 120, respiration 28; perspiring profusely and stuporous. June 12th; swallows with difficulty; temperature (morning 8 A.M.) 106, pulse 96, respiration 60. At 11 A.M. rectal temperature 109, pulse 124 (?), respiration 48; death at 11:20 A.M.

Autopsy (Dr. Stangl).—The head is large; the calvarium very

thick and heavy; it is easily removed and is 19 cm. long by 16.2 cm. wide, by 10 cm. deep and 6 mm. thick. It weighs 560 grams.

The leptomeninges are close to the cortex; the convolutions are broad and flat, the corresponding sulci being narrowed and very shallow. The blood vessels in the visceral arachnoid even to the fine radicles are filled with red blood. There is an escape of abundant fluid from the region of the chiasm when the brain is removed, fluid apparently escaping from inside the ventricles. The brain is boggy, large, and weighs without the dura 1,720 gm. No further examination was made because of the limitations of this autopsy permit, since only fifteen minutes were allowed by the relatives to remove the brain. Further examination showed a marked internal hydrocephalus with distension of all the ventricles of the brain.

Microscopical Examination.—Various portions of the cortex, midbrain, cerebellum, pons, medulla were fixed in alcohol (95 per cent.), imbedded in celloidin and stained with toluidin blue. The pia especially of the base was slightly infiltrated, the subarachnoid space showed greatly distended meshes containing foci of freely scattered red cells. In some places, like the base of the brain, around the pons, the pial large vessels were markedly infiltrated chiefly with lymphocytes, very few plasma cells and an abundance of pigment granules. The cortex and other portions of the brain tissues showed no hemorrhages but a great abundance of vessels and capillaries which were mildly infiltrated chiefly with lymphocytes. The ganglion cells of the deeper cortical layers showed marked changes; they were homogeneous in appearance with densely stained processes and frequently invaded by glia cells (neurophagia) which were numerous all over the cortex and subcortical areas. All these phenomena—infiltration, ganglion and glia cell changes—were somewhat more marked in the large basal ganglia, but especially so in the pons region, midbrain (around aqueductus Sylvii) and locus niger. The infiltration in these regions was enormous, confined not only to the perivascular spaces but also invading the parenchyma itself, which was abundantly covered with plasma cells.

We must point out that the cortical regions were subject to a very careful study in view of the marked cortical symptoms presented by the patient, in whom the classical symptoms of epidemic encephalitis—apathy, lethargy, ocular palsies—were absent and replaced by delirium, restlessness, sleeplessness, muscular twitchings and profuse sweating. The sole indication of a probable midbrain involvement was a sluggish pupillary reaction to a very strong light.

Yet pathologically it proved to be a typical instance of lethargic encephalitis.

Case II.—The history and brain of this patient were kindly furnished to one of us (Hassin) by Dr. H. Gideon Wells, Professor of Pathology at the University of Chicago. Unfortunately the clinical facts are too meager and incomplete.

History and Examination.—A thirty-four year old clerk in the army ordinance department was admitted in November, 1919, to Washington Park Hospital (the exact date could not be obtained) complaining of severe headache, weakness and fever. The temperature was 99 degrees and 102 for two or three days, after that 103 and 104 degrees. The patient was delirious and most of the time unconscious, so that an accurate history was not obtainable. Neither could his relatives furnish any information relating to the onset of the disease or the previous condition of patient's health.

The examination revealed almost rigid pupils which did not react to light; some rigidity of the neck with a negative Kernig; exaggerated tendon reflexes with negative Babinski and Chaddock phenomena. No sensory disturbances, like anesthesia or hyperesthesia; for the last thirty-eight hours, a foot drop. There were a few râles in the lower posterior part of the chest on both sides, a decreased precussion resonance in the right lung anteriorly to the axillary and posteriorly to the nipple line. There were no signs of fluid. The examination of the abdomen and of the urine was negative. Serologic tests and the Widal reaction were also negative. Leucocytes were 5,000 on entrance with 60 per cent. polymorphonuclears, 33 per cent. lymphocytes, 7 per cent. large mononuclears, red cells—3,500,000, hemoglobin was 80 per cent.

The patient was given an intraspinal injection of arsphenamin according to Swift-Ellis method. On the third tapping a large amount of thick bloody fluid was obtained. The autopsy performed on November 15th, 1919, by Drs. Fink and Long showed: lethargic encephalitis, slight atrophic cirrhosis (of the liver), hypostatic hyperemia and edema of the lower lobes of both lungs, beginning bronchopneumonia of the lower lobe of the right lung, postmortem digestion of the stomach with large perforations and extravasations of its contents into the lesser peritoneal cavity. The histologic examination of the viscera and chest organs, showed practically normal heart, pancreas, spleen, suprarenal bodies. *Lungs*—Hemorrhages, edema, emphysema, extreme anthracosis and a beginning bronchopneumonia.

Kidneys.—Slight increase in the round cells particularly under

the capsule, otherwise they were fairly normal. *Liver*—slight increase in the interlobular connective tissue and no increase in round cells under the capsule.

The brain tissues carefully studied in celloidin sections stained with thionin showed the same changes as in the previous case; namely very mild meningeal infiltration which consisted mostly of mesothelial cells and only on the base showed lymphocytes; interstitial and parenchymatous changes in the cortical areas, somewhat more marked changes in the large basal ganglia and an enormous perivascular infiltration of the midbrain, pons and medulla.

Comment

Like the previous case this one did not show any of the signs commonly found in typical epidemic enchephalitis, the clinical symptoms having been delirium, rigid pupils and an acute febrile course with negative serologic findings. Yet, like the previous case this also proved to be pathologically a typical lethargic encephalitis. In other words, many cases of the latter disease may be clinically atypical, but pathologically perfectly typical. Whatever the clinical type might be the lesion is always in midbrain, especially in the region of the Sylvian aqueduct and the peduncles. The sole manifestation of this anatomic lesion is principally involvement of the third nerve which was also present in both of our cases. However, this nerve lesion did not show as ptosis or other ocular extrinsic paralysis, but rather as an intrinsic palsy in the form of sluggish or rigid pupils. The latter, therefore, should always be carefully examined in every case suspected as epidemic encephalitis, for it is inconceivable that such a wide spread lesion of the midbrain such as occurs in lethargic encephalitis, whatever its type, should run without some ocular manifestations.

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Society Proceedings

BOSTON SOCIETY OF PSYCHIATRY AND NEUROLOGY

Regular Monthly Meeting, November 18, 1920

Everett Flood, President, in the Chair

ORGANIZATION AND FUNCTIONS OF THE NEUROLOGICAL DEPARTMENT, MASSACHUSETTS GENERAL HOSPITAL

Dr. E. W. Taylor

Dr. Taylor made a statement regarding the organization and purposes of the Neurological Department of the Massachusetts General Hospital. He spoke of the fact that this Department in common with practically all others at the Hospital are now under the continuous service plan and felt that by this method a very decided increase of efficiency was attained. Owing to the very decided increase of late in neurological work in general and the consequent larger personnel it has been possible to make special assignments for individual research to care adequately for the teaching which is practically continuous throughout the academic year and to conduct the clinic in a systematic fashion, for example, the detailed and constructive work on the spinal fluid undertaken by Dr. J. B. Ayer has been rendered possible by the division of labor. Dr. C. A. McDonald has devoted himself rather particularly to the relation of the eye to nervous diseases in connection with the clinics of the Eye and Ear Infirmary. Dr. W. E. Paul has made a special study of peripheral nerves. Dr. George Clymer has worked particularly with Dr. S. J. Mixter on the surgical aspects of neurology and others associated with the clinic have devoted themselves particularly to some one subject. A special aim of the hospital has been to link its work up with that of other departments rather than to insist upon a further separation. In other words an integrating policy rather than a disintegrating one, which is one of the dangers over-specialization has developed. This has been helped by the whole-hearted cooperation of other departments of the Hospital and particularly of the surgical and medical sections of the Hospital proper.

A further aim of the Neurological clinic has been to effect alliances through its members with the Harvard Medical School.

One of its members last year, Dr. Stanley Cobb, was closely associated with the Physiological Department as well as with the Department of Industrial Medicine. Assistance in teaching anatomy of the brain was sought from the Neurological Department of the Hospital and this was done by Dr. Henry Viets. The importance of associating the work of the Neurological Clinic with the work in the first place of other departments of the Hospital and, second, of the Medical School especially in the fundamental branches there taught is of the utmost importance. Section teaching should be done by one man who, while he is teaching, should have no responsibility regarding the general conduct of the clinic. On the other hand those assigned to the conduct of the clinic should not be burdened with teaching.

Mention was made of the importance of the social service department in linking up the work of the clinic with social questions in general and the problems of treatment in the broad sense. A final necessity of a well-organized clinic is the office of a clinic secretary whose duty it is to see that the clinic runs smoothly, that the patients are attended to, that the needs of the physicians are met and that the work of the clinic in general is properly performed.

RESIDUAL SPINAL CORD SYMPTOMS FOLLOWING INTRASPINAL ANESTHESIA

Dr. W. E. Paul

Dr. Paul reported two cases in which, following intraspinal anesthesia, loss of sphincteric control was an immediate sequel; in both anesthesia of the saddle back area existed, in partial degree at least.

The first case was of a single man, fifty years of age, operated for fistula in ano in September, 1913, at the Massachusetts General Hospital. He passed his urine the first day after operation but the second day was unable to do so. From that time a catheter was required. When the dressings were removed the anal sphincter was found to be incompetent and involuntary dejections occurred without normal sensations. There was a typical saddle back area of anesthesia except that the skin of the penis was not involved and the scrotal skin was less deeply anesthetic than the perianal and posterior thigh regions. The blood Wassermann was negative. The knee jerks were present but the ankle jerks were not obtained. The pupils were equal and reacted normally. In August, 1915, the bowels were constipated and a laxative was required but care was needed to prevent accidents. The patient felt his sphincter was improving a good deal in function. For fifteen months a catheter was used continuously. Then for the first time some urine was passed voluntarily at the time of a bowel movement. The patient did better and better and for three months used a catheter only once a day. About the twentieth month after operation he ceased using

the catheter regularly and for three months used it only three times. But he noted there was some escape of urine at times and on passing urine the amount was small and the urine would start and stop. The anesthesia persisted over the saddle back area twenty-three months after it first developed. For a year he had little if any sexual feeling but after a year there was some return with good erections.

The second case was a married man forty-five years old, operated on the middle of June, 1920, under spinal anesthesia, for double inguinal hernia. He had retention after the operation and required a catheter. Constant drainage was resorted to for a time and he left the hospital at the end of three weeks. Possibly he had some trouble in controlling gas immediately after the operation but no incontinence of the bowels. Some two months after the operation he had involuntary urination especially at night. Four months after the operation he was using a catheter twice daily but passed considerable urine voluntarily with effort and straining. He has urgent desire to urinate when urine accumulates but after catheterization is comfortable for about three hours. He has involuntary passage of urine every night. The blood Wassermann was reported negative. The knee and ankle jerks were normally present. The abdominal reflexes were lively but the cremaster reflex was absent. The skin around the anus was anesthetic in moderate degree but the scrotal and penile skin sensation was preserved. The sexual function was preserved in good measure.

These two cases demonstrate that spinal anesthesia is not absolutely free from risk of damage to the lower sacral nerve supply. Dr. Paul refrained from attempting to state what the lesion might be in these cases. It did not seem likely that the needle or trocar caused the lesion as the symmetrical distribution of the anesthesia would not be likely to be due to direct trauma from the needle. The site and character of the lesion are matters for ingenious speculation.

Discussion.—Dr. George G. Smith stated that he considered spinal anesthesia a very valuable method of anesthesia and one which can be used in cases where ether would almost certainly be fatal. The occasional bad results should be balanced against the probably fatal results which might have occurred had ether been used. In urological work spinal anesthesia is particularly useful and is very practical in cases of retention from stricture especially where there has been an over-distended bladder for a long time and a kidney function reduced below normal. In such cases ether would almost certainly be fatal yet with spinal anesthesia the stricture can be cut, the patient can begin immediately to drink water and a successful result obtained. It is hard to explain such results as Dr. Paul has reported. As Dr. Paul very truly said, no injury from the prick of the needle itself could give as widespread neurological disturbance. On the other hand the prick of the needle entering a vein and causing a hemorrhage might have something to do with it. The hemorrhage outside the dura in forming a clot may have caught the roots of the sensory nerves in the scar and deprived them of their

complete function. Such instances as the use of too hot a solution of anesthetic may be passed over. It is possible for these things to happen but not probable. As to the toxic effect of the drug used one might like to know what drug was used. Novocain is preferable, and in a solution 2½ per cent. in strength, that is a 5 per cent. solution diluted with an equal amount of spinal fluid, would undoubtedly have no toxic effect on the nerve substance itself. It is possible that tropacocain, which was formerly used, would be a little more toxic. The disturbance of the anal sphincter in these cases of Dr. Paul's suggests a resemblance to the sphincteric disturbances in a typical tabetic case except that in the second case reported the patient, although unable to void well, had a sensation of discomfort when his bladder was filled. That is not usually the case in the tabetic. It seems unlikely that there would have been complete sensory paralysis since if there were, the patient would have had no sensation from his bladder as it became filled.

A NOTE ON CERTAIN ELEMENTARY VISUAL HALLUCINATIONS IN THE PRE-SLEEP STATE

DR. SIDNEY LORD

The word elementary is perhaps not happily chosen in designating the varieties of sense experiences in question, but it seems to be used in different ways; for instance, in specifying the origin of the experience in the sense organ itself in conditions of clouded consciousness, or as denoting the fact that such experience is elementary in duration and constancy, insignificant in influencing behaviour or in causing any falsity of belief, or again elementary in elaboration or completeness, that is, elementary in the sense of being unorganized rather than organized.

The phenomena in mind are elementary as concerns resultant behaviour or deception of the intelligence, but are not truly elementary in the physiological sense. That is, they are elaborated sensory images and are called hypnagogic hallucinations, hypnagogic illusions, perception phantasms or visions. Yet though they are sufficiently well known to receive the colloquial name of "faces in the dark" they are perhaps never entirely normal, and if almost invariably benign in prognosis have not always been regarded as free from possible sinister import. There is not a large recent literature. These phantasms are not therefore frequent problems for the clinician. But occasionally they are so often repeated or accompanied by such perturbation of mind as to significance and course, occur with such vivid objectivity, and, at the moment, a fear so harrassing, that they compel more than the usual scant attention accorded them by the consultant. Moreover when these phenomena are observed critically the conviction is forced upon one that they differ in various ways. There seems no doubt that some are pathological and that some are not.

Case 1. A woman of about 30, in a state of profound nervous exhaustion. Her illusions at sleep time were elaborate landscapes. There was no doubt in her mind as to their unreality but there was a general anxiety about the presence of these illusions.

Case 2. A woman of 80, of alert and remarkable mind, but highly neuropathic, had from time to time been subject to seeing ugly faces when the eyes were closed at night. No especial emotion accompanied these, or at least none was mentioned.

Case 3. An Armenian about 50, presents himself at the Nerve Clinic of the Massachusetts General Hospital complaining of insomnia and haunting visions at bedtime. He is intelligent, quite sane, sad, and much disturbed in his mind by the presence of these phantasms, profoundly so at the moment of their appearance, asking himself, "My God, why has this evil thing come to me, I am not crazy. What is it?" He describes what he calls "bad heads," "never a good head," and says, "The mouth keeps opening." Always a man picture or an animal picture, he says. Asked what kind of an animal, he answers, "Never any kind that I saw before," except that the vision is, rarely, that of a serpent. This production of an image of a partly imaginary type is rather unusual. At least some of the images are gross exaggerations of anything in experience. He sees usually only the heads and not the other parts of the animals and men. They are not stationary; they always move in one direction. The vision disappears on opening the eyes, to reappear on again closing the lids, but in "always different" guise. Sometimes it comes when his eyes are open and it vanishes when he shuts them. He sees it moving away, and though he knows it is unreal, he is afraid; he pulls up the coverlet to try to hide from the horrid thing, closing his eyes to blot it out. It is grotesque, mysterious, unnatural; he is "awful afraid" but never deceived in his estimate of it. He tortures himself with the query, "Why does nothing beautiful ever come to me like this?" He never sees these things in the day, and never in the middle of the night; always at the first coming on of slumber. Graphically he states they are like moving pictures—never any noise. Asked why they come, he says, "I don't know why they come; they come themselves." Again, "Sometimes I watch it and then anything I remember comes." This last is a slightly different state suggesting the childish power of voluntarily evoking phantasms.

Case 4. A man of 50, intelligent, sane, neuropathic, subject for years to a variety of sensory shocks in the praedormitium, to use Weir Mitchell's phrase. The visual images are commonly seen at times of over-doing and exhaustion. One type is the grotesque face which appears with opening and shutting mouth. It is described as an unpleasant experience, accompanied by a general feeling of mental distress. Opening the eyes dispels the vision, but it tends to recur once or twice before sleep is obtained. This is the common type; a much less frequent occurrence in this individual is that of an extraordinary vivid visual hallucination of scenery, of landscape. This occurs just before going to sleep, when the senses are off their

guard, but with the fully retained power of opening the eyes instantly to dispel the vision, which begins with rudimentary, indistinct outlines of an object. Strikingly like a developing photographic plate this expands rapidly in detail and assumes the aspect of a landscape, surpassingly vivid and complete, indescribably clear and actual in appearance. The perception seems to be one of transcendent brilliancy, vividness and beauty, quite beyond the realm of experience. It seems therefore unnatural. It seems awful. Fear arises and seems to become overwhelming as the picture takes on a quality of being too real to be bearable. The feeling is as if the subject could put out his hands and pull out of the picture the objects which he sees. This is all so manifestly incongruous and false as to arouse the fear of something wrong and sinister—and the vision is then dispelled voluntarily, by opening the eyes.

Such sensory impressions are different from dream-material. More nearly allied to dreams seems to be the vaguer imagery arising under similar conditions without any accompanying feelings of inappropriateness or dread of the unknown. The typical dream image is accepted by the subject without definite protest, so to speak, whereas these vivid phantasms are recognized as such and not accepted. Freud affirms, in speaking of hypnagogic hallucinations in general, their continuity with the dreams of the true sleep following. Dr. Lord is inclined to doubt this in relation to the more vivid and fear-compelling illusions spoken of.

These illusions are reported in part to emphasize two things which are not urged in the descriptions so far noted, namely, the quality of ultra-real objectivity felt by the perceiver and secondly the degree of alarm experienced at the moment of illusion.

Discussion.—Dr. A. W. Stearns brought up the question of the relation between these emotional fears and the illusions. He believed that the emotion was primary and advanced the argument that the person being afraid had the illusions rather than that the person having the illusions became afraid.

Dr. Sidney Lord, in answer to Dr. Stearns, stated that he had described the sensation of fear as it appeared to the individual who had the emotions. To him there was a sequence in time. He saw the rudimentary vision begin without any emotional accompaniment. As it grew it was so unreal and extraordinary that it seemed to him to signify something sinister even though he recognized at the moment that it was a phantasm. Hence, as he thought, the fear.

Dr. E. W. Taylor mentioned a case of remarkable hallucination in an hysterical young man under his care consisting in repeated hallucinations of hearing and sight while he was lying in bed presumably not asleep. The experience was as follows: he was aroused by hearing a sound as of knocking immediately followed by a violent explosion. This was so vivid that he got up, lighted the light, went to the hall door and looked out, expecting to smell smoke. He naturally found nothing and returned to bed. This experience repeated itself in all three times, the explosion occurring in different parts of the room accompanied by vivid red flashes of light. The

realism continued so that each time he felt confident of the actual explosion in spite of his immediately previous experience. This same night while the lights were out he had the illusion that the furniture was being violently moved, which again was immediately allayed by turning on the light. He had not before and has not since had similar hallucinations.

SOME INTERESTING OBSERVATIONS ON THE EYE IN DISEASES OF THE NERVOUS SYSTEM

Dr. C. A. McDonald

By coöperation with the Eye Department of the Massachusetts Eye and Ear Infirmary many interesting eye conditions have been brought under observation and investigation. Eight cases were reported with considerable data. Three of these cases had double choked disc. One of these was diagnosed as a cardio-vascular renal condition. This case showed an unusual degree of choking for this condition but a low functional kidney test corroborated. Another case with a milder degree of choked disc with cardio-vascular renal condition had a trace of albumen, blood pressure 230–140, retinal vessels tortuous, but with a red renal of 50 per cent. There was also a positive blood Wassermann, a positive spinal fluid Wassermann and a spinal fluid pressure of 350. A third case of this group had double choked disc with a spinal fluid pressure of 90 and central chorioretinitis and numerous citreous opacities, but the Wassermann of the blood and spinal fluid was negative under potassium iodide and mercury treatment. The patient has improved much but is yet under care and mercury treatment.

Of the second group there were three cases of unilateral choking of the disc, two following injury to that side of the head. The other, in addition to the choking of the disc, showed chorioretinitis in the vascular region and spots on Descemet's membrane. The importance of an examination of the media in eye conditions was emphasized.

Of the last group there were two cases, one with optic atrophy, with a negative blood and a positive fluid, which showed considerable improvement by intravenous diarsenol treatments. The other case was of a man with an optic atrophy of the left eye, with no vision; and the right eye with a failing vision and a pale nerve head of four weeks' duration. The vision was 20/40. The blood and spinal fluid were positive for syphilis. After five diarsenol intravenous treatments given weekly the vision in the eye was 5/200.

The dispute between the syphilographer and the ophthalmologist as to the value of intravenous treatments in the syphilitic eye condition was touched upon and, in the treatment of such cases, more frequent media examinations advocated.

EXPERIENCE WITH SPINAL CORD TUMORS DURING THE PAST TEN YEARS

Drs. George Clymer, W. J. Mixter and Hugo Mella

Dr. George Clymer gave a report of cases occurring at the Massachusetts General Hospital since 1912, with non-traumatic lesions involving the spinal cord upon which laminectomy had been performed or at least considered. In all of them the outstanding clinical picture is that of cord compression, with or without nerve root irritation.

The group consists of 52 cases of which 37 were operated, and a lesion accounting for the symptoms was found in 29. Fifteen were not operated on. Of those operated, in eight cases no lesion was found. One of these at autopsy showed a tumor of the cord at a level slightly higher than that at which it had been clinically localized, although it was thought at the time of operation that due allowance had been made to take care of the possibility of that very error. In four cases a lesion not found at first was found at a second operation. The final diagnosis in the remaining seven, in whom no lesion was found at operation, were: multiple sclerosis, myelitis, question of brain tumor, sciatica, cord tumor, question of syringomyelia and lateral sclerosis. Of the twenty-nine cases in which a lesion was found, four were operated twice, the lesion not being found until the second operation, or if demonstrated at the first operation, an attempt to remove it was not made until the second operation.

The total symptomatology of the cases as they appeared in the hospital was: Pain occurring in thirty-two cases, numbness of legs in twenty-one, inability to walk with loss of strength or stiffness of legs in twenty-one, unsteady gait and ataxia in four, dragging of feet in three, limping in two, incontinence of urine in eight, incontinence of feces in eight (these two symptoms did not always occur in the same patient), urinary delay in two, constipation directly associated with the onset of other symptoms in two, constriction band occurring in three, spasmodic twitching of legs in one. These symptoms are not separated according to type of lesion because they seemed to occur rather indifferently in all types.

The age at the onset of the symptoms varied from three to fifty-eight, the average being forty. The duration of the symptoms prior to operation varied from three months to twelve years, the average being between two and three years. The final results of operations are not at present available on the whole series. In eight cases the lesion was removed at operation. Twelve were discharged relieved, Fifteen were unrelieved and two died.

Diagnostically pain is the most frequent symptom in lesions causing cord compression, but is not universal even in cord tumors. The next important symptom is a sensory level, but this again does not always occur. The greatest help in the diagnosis of these lesions has been given recently by Dr. J. B. Ayer in his use of combined cisterna and lumbar puncture.

(The above is the outline of a preliminary report. A full report of the Neuro-surgical work at the Massachusetts Hospital since 1912 is in preparation.)

Dr. W. J. Mixter spoke on the surgical difficulties attached to the removal of spinal cord tumors and described the technique of operation in detail. The operative mortality should not be excessive but shock is to be expected.

In a series of forty laminectomies he had had but one death and that was due to operative shock. Another death, however, in the series following operation was of a woman with malignant disease of the spine. A specimen was removed for diagnosis and a laminectomy was not done. Death followed shortly after.

The prognosis of spinal cord tumors depends on the type of tumor. The intramedullary tumors have all resulted badly. In only one case could it be removed and then no improvement followed. Another type giving a poor prognosis is metastatic malignant disease of the spine. Operation is justified for relief of pain but this lasts only for a few months. Tumors arising from nerve roots and tumors of the dura respond to operative treatment. Another important factor is the position of the tumor in the canal. Those situated anterior to the cord are more difficult to remove and the danger to the cord is much greater. Tumors of the cauda equina give more satisfactory results. Tumors of the dorsal region are easiest to remove, those in the lumbar region come next and the cervical tumors are the most difficult. The most recent advance in technique is the examination of the spinal fluid by combined cisterna and lumbar puncture. This gives very definite and positive information as to the presence and absence of block in the canal. It is of great importance in eliminating certain of the degenerative processes involving the spinal cord. Cisterna puncture is a dangerous procedure in untrained hands. It should never be performed except by a person skilled in it. This procedure is a definite advance but should be used sparingly and with the greatest possible care and precaution. It should be definitely withheld from the hands of the untrained.

Dr. Hugo Mella stated that in the cases reported by Dr. W. J. Mixter and Dr. George Clymer a definite pathological diagnosis was made in twenty-nine. The types varied greatly, in their order of frequency. There were found recurrent metastatic carcinoma, fibro-sarcoma, tuberculosis of cervical spine, endothelioma, neurofibroma, glioma, myeloma, dermoid cyst including cholesteatoma, cyst of cauda, enchondroma, adamantinoma, malignant leiomyoma, solitary tubercle and chondroma. Carcinoma was found both intra and extra medullary. Sarcoma arose from either the vertebrae or meninges and usually invaded the cord substance. Kyphosis following tuberculosis of cervical spine caused a "kink" in the cord which if not corrected may cause a complete destruction of the cord at that point. The solitary tubercle is difficult to locate in life and may break down, causing a transverse myelitis since they are usually intra-medullary. Attention was called to the work of Mallory on

the so-called endotheliomata. In his article in the Journal of Medical Research, March, 1920, he shows that the cells from which these tumors grow are a part of the arachnoid and should therefore be named arachnoid fibro-blastoma as they "invade" the dura secondarily. Closely allied to this group we find neuro-fibroma, fibroma molluscum or Von Recklinghausen's disease which may involve the nerve roots or the cauda. The perineurium, according to Mallory, is probably not an extension of the arachnoid along the nerves but an analogous differentiation of the mesenchyma around them and if we accept these findings, should be named peri-neural fibro-blastoma. Dermoid cyst including cholesteatoma do harm by causing cord compression. Adamantinoma was found in the region of the cauda. It is a rare tumor developing from remnants of the enamel organ and is usually found in the lower jaw. The cyst of the cauda was probably the result of an incomplete closure of the neural canal, the remaining sack being filled with fluid; these are probably related to hydromyelia. These cases did not include those of trauma, gumma or abscess. In general the outstanding feature of these cases from the pathological standpoint is their remarkable diversity.

NEW YORK NEUROLOGICAL SOCIETY

The Three Hundred and Eighty-fifth Regular Meeting
Held at the Academy of Medicine
January 4, 1921

The President, Dr. Walter Timme, in the Chair

CASE OF ENCEPHALITIS LETHARGICA WITH UNUSUAL OCULAR SYMPTOMS

Dr. B. Onuf presented a case seen by him in his consulting service at Ellis Island, and diagnosed as lethargic encephalitis with resulting bilateral ophthalmoplegia and a slight titubation of gait, besides some muscular disturbances of which latter he expressed some doubt whether they were the result of the encephalitis or due to a juvenile muscular dystrophy.

The data of anamnesis are somewhat meagre as the patient, Nicola De Filippi, an Italian boy of fifteen, could not give any reliable data of family history nor of personal history preceding his last illness, and Dr. Onuf had no opportunity of questioning his relatives. The development of the illness which led to his present ophthalmoplegia, patient himself briefly described as follows: While coming from Italy to the United States, and three days before the arrival of the ship in New York Harbor, he was taken with headache and what he calls weakness of the lower extremities, being unable to stand and walk without support, and for these three days,

i.e., until December 19, 1920, he wanted to sleep day and night. He had also loss of appetite, but allegedly no fever. On December 22, 1920, he was admitted to the Immigrant Hospital on Ellis Island, where Dr. Faulkner and Dr. Doran recognized the ophthalmoplegia and swaying gait and referred the case to the speaker for further neurological examination and opinion. The patient on admission showed a slight elevation of temperature as evidenced by the chart exhibited at the meeting. Neurological Examination December 24, 1920: Patient presents an ophthalmoplegia of both eyes. Eyeballs appear quite immobile. Only when patient looks into mirror there is a slight convergent movement of both eyes, the right eye also moving slightly outward when following the mirror to the right side, while in the left eye only the convergent movement is noticed. There is a slight ptosis of left side, but none on the right. Pupils show slight inequality—left is smaller than the right. Some light response present in both eyes, but decidedly diminished in extent. Accommodative response practically absent. Consensual reaction present in right eye, but diminished, and still more diminished in left eye. No distinct asymmetry of facial innervation, but occasional twitchings on either side, more of character of choreic tic than peripheral twitchings. Tongue is put out straight and shows no atrophy. Speech of somewhat nasal character and lacks a little in distinctness. Gait swaying, with no preference to one side. Romberg slight, cannot walk on a straight line on floor, heel to toe. Knee jerks, ankle jerks, wrist jerks, absent. Epigastric reflex, present on both sides; fairly lively. Cremasteric, very slight on both sides. Plantar reflex, flexion of small toe and the one next to it on either side. Motor power of upper extremities: well preserved but slight deviation in index to index pointing test with eyes closed, also to index to nose pointing test. Slight adiodokinesis. Touch, pain and localization, preserved everywhere. No areas of hyperalgesia. Slight degree of winged scapulae and lordosis which disappears on sitting down. No pronounced atrophy of any group of muscles except perhaps scapular muscles, but there is a poor muscular development in general. *Mental condition:* Patient appears serious, perhaps slightly depressed, but prompt and to the point in all his answers to sensory tests. Promptly gives day of week, month, and day of month. Says this is a hospital. Says he came here two days ago (correct). Is intelligent. Coöperates well. *Eye grounds:* Not seen by an ophthalmologist, but the speaker's own examination revealed absence of optic neuritis, but the discs were perhaps slightly grayer on temporal side. December 27, 1920, x ray examination of head by Dr. T. B. H. Anderson. Findings reported: Sella turcica does not show up in either of two plates taken. December 28, 1920. About 12 c.c. of cerebrospinal fluid withdrawn by lumbar puncture. Fluid clear and under normal pressure. Examination by Dr. R. P. Sandidge shows: cell count 4 cells per c.mm.; globulin slightly positive; Wassermann negative. December 30, 1920, Wassermann of blood (Dr. R. P. Sandidge) reported negative. December 30, 1920, Examination of urine: amber in color:

acid; specific gravity 1025; no albumin; no sugar. January 4, 1921, Blood count, by Dr. J. F. Paulonis:

R. B. C.	4,800,000
W. B. C.	7,800
Polynuclear	71%
Small mononuclear	23%
Large mononuclear	4%
Eosinoph.	2%
Hemoglobin	95%

In conclusion Dr. Onuf expressed his gratitude to the Medical Staff of Ellis Island for the help given in working up this case and for the privilege of its presentation to the society.

In discussion, Dr. I. Abrahamson said that at present he knew of no lethargic encephalitis, except chronic and remitting cases. Poliomyelitis and polioencephalitis were in existence, presenting certain features of polioencephalitis, but belonging to the group of poliomyelitis. Severe and very complete ophthalmoplegias were unusual in lethargic encephalitis. The loss of knee jerks might be either of spinal origin or from lesion in Deiter's nucleus. The history of unsteady gait would indicate that the case might fit into the latter category. He had lately seen patients in whom there had been lethargy and diplopia, and finally total focal paralysis, which he regarded as polioencephalitis.

Dr. Walter Timme said that there had been a recrudescence early in December of lethargic encephalitis. In the case presented, the number of cells was small for poliomyelitis.

Dr. Onuf stated that he had thought of poliomyelitis, but the history of the lethargic condition decided him in favor of encephalitis. The patient had been taken ill on the boat coming from Italy, which might make a difference in the possibility of the affection being lethargic encephalitis.

DYSPITUITARISM WITH HYPERTENSION

Dr. E. David Friedman presented the case of a student, aged nineteen, who for nine years had shown dwarfism and obesity, hypertension, and recently, recurrent pains in the region of the spine. The lad is the third of seven children. The parents and one sister are short and stout. One brother suffers from *petit mal*. The patient's personal history includes measles and scarlet fever, but it is not known whether the kidneys were involved at that time or not. The birth was normal and development normal up to the age of nine years when he began to grow stout. There has been little gain in height since then. His abdomen became pendulous, his fingers stubby, feet remained small and his face became ruddy. Thyroid extract was administered in 1915 for over a year and he grew two inches in height. The treatment was then stopped. The patient

felt well and went to college. About six months ago he complained of shooting pains in the region of the spine and chest. Examination of the urine showed "kidney involvement." He now has shortness of breath and palpitation of the heart after exertion. Speech is somewhat hesitant, and some impairment of memory has made itself apparent. Dimness of vision has been reported during the last two months, and occasional headaches. There is nocturia and no polydipsia.

The physical examination reveals a short, obese individual 136½ cm. in height (normal for his age, 175 cm.): the weight is 46.4 K. There is erythema of the face and a pendulous distended abdomen. The teeth are somewhat spaced, the approximation poor, the lateral incisors projecting at a marked angle. Pupils are normal and fields also normal. No sclerotic changes of the vessels of the fundus are reported. There were two pinpoint hemorrhages in the left fundus at one time. The thyroid is not enlarged. Examination of the lungs was negative; the heart is somewhat enlarged to the left and the aortic second sound accentuated. Blood pressure is increased to 198/110. The genitals are small. There is an overgrowth of hair at the bridge of the nose, and the body is covered with fine lanugo hairs. The only pathological neurologic findings are the slightly diminished deep reflexes which may possibly be accounted for by the existent glycosuria and hyperglykemia. Other laboratory findings were normal. There is perforation in the septum of the nose and the tonsils are moderately enlarged. The skin is very dry and presents three distinct peculiarities: ring worm in the axilla and pubis; erythema and telangiectasis of the face; and striae distenseae of the abdomen. X ray examination showed undeveloped sinuses, the left being opaque. The lower molars were unerupted and impacted. The examination of the skull showed a normal sella. Posterior clinoids as well as the bones of the body of sphenoid bones markedly atrophic and thin. A dense shadow is seen in the middle fossa, and a shadow at the root of the neck, extending up from the aorta and probably due to the large vessels, is also seen. The x ray of the hands showed bony development such as is usually seen in an individual of thirteen. Epiphyseal lines are still present. Libido was absent. Urine showed glycosuria. Electrocardiogram showed a left ventricular preponderance, tachycardia, sinus arhythmia. There was slowing of the rate on holding the breath and after vagus pressure. A slight alteration of the size and shape of the pulse wave reveals instability of the cardiac pacemaker. There is an unstable vagus and sympathetic balance. Intramuscular injection of atropin and pilocarpin produced no striking results. Adrenalin was not tried due to high blood pressure. The conjunctival adrenalin test of Loewi was negative. The title for the presentation was chosen to indicate the predominating features. But other glands are involved as well. The stunted growth points to a deficiency of the morphogenetic principle of the anterior lobe of the pituitary. The glycosuria and the hypertension might be interpreted as a hyperactivity of the posterior lobe. (The absence of a pathological

blood chemistry aside from the increased blood sugar and the presence of a normal phthalein output would seem to exclude true interstitial nephritis.) The hypertrichosis, the increased cholesterin content of the blood indicate some involvement of the adrenals. The dry skin and delayed ossification of the bones show that the thyroid is not functionating normally. Reichmann in the *Deutsches Archiv für klinische Medizin*[1] has designated a new pituitary syndrome differing from the two characteristic types hitherto described, hyperpituitarism producing acromegaly and hypopituitarism causing dystrophy adiposogenitalis of Froelich. Reichmann's case resembles ours very much with the exception that his patient showed exophthalmos and bradycardia instead of tachycardia seen in this case.

Dr. Timme asked whether the abdominal viscera had been examined. Dr. Friedman replied that with the exception of the palpation for the liver, the edge of which could just be felt, no examination had been made. Dr. Timme also asked whether the shadow of the chest had been considered from the viewpoint of a possible thymus shadow, to which Dr. Friedman answered that this point had been carefully considered and the possibility excluded. There was an absence of relative lymphocytosis characteristic of thymic cases. It was of interest, Dr. Timme also noted, that the genitals showed lack of differentiation.

In closing, Dr. Friedman said that the treatment had consisted of anterior lobe pituitary and thyroid for the past six months without any real change. The patient has had thyroid more or less constantly since 1915, the dosage varying from one-half to one grain three times a day.

JUVENILE TABES WITH CASE TO ILLUSTRATE SAME

Dr. Charles Rosenheck sketched the development of the recognition of juvenile tabes as a distinct clinical entity, from the day when Remak first reported three cases in 1885 and cited a discussion ten years earlier at a meeting of the Berliner medizinisch-psychologische Gesellschaft where Henoch reported the fact that he had seen tabetic symptoms in a six-year-old child. The discussion on this occasion brought out the fact that others had also seen such cases. O. Marburg made the next important contribution in 1903 with cases observed at the Fuchs Eye Clinic and cited thirty-four cases from literature. The Frenchman, Cantonnet, an ophthalmologist, has given the greatest contributions on the subject, and Dr. Rosenheck considered it particularly interesting to note that the first reported cases, those of Remak, were also from an eye clinic.

The difference between juvenile tabes and Friedreich's hereditary ataxia was not always apparent to earlier observers and Hildebrandt first called attention to the error, drawing the distinction between such cases and those that might be considered true juvenile

[1] Vol. 130—Heft 3 and 4.

tabes. The diffidence of observers in accepting juvenile tabes as a true clinical entity is thought to have been due to the fact that up to 1910 no autopsy had been recorded to prove the existence of such a disease process.

The various factors that create the syndrome in the young and the respects in which it differs from the accepted orthodox type as observed in the adult are as follows: The average of incidence is placed at fifteen years. Mingazzini and Baschieri-Salvadori report an onset at three years of age as the youngest recorded case. Hereditary lues is responsible for the development of tabes in the young in the majority of cases. A few cases of infection in infancy are reported. According to Cantonnet's analysis nearly twice as many females as males are affected, a striking reversal of conditions pertaining in later life. The mode of onset in a large number of cases was an early visual difficulty rapidly proceeding to optic atrophy and blindness. The percentage of this form of onset is much higher than in adults. Lancinating pains come next in order of frequency, 25 per cent. of the patients showing these as compared to 70 per cent. of adult patients. Bladder disturbances and gait defects were observed in fewer cases. Cantonnet remarks that ataxia in juvenile tabes is conspicuous by its absence, and the absence of marked gait disturbances in the tabetic blind has been commented on by all writers on the subject. Crises and girdle-like pains have not been observed at any time, nor have trophic phenomena been reported.

Thorough neurological study renders the diagnosis a matter of simplicity. Stephenson says a diagnosis of tabes should be made in the young who present evidences of amblyopia and optic atrophy. Cerebrospinal lues and Friedreich's ataxia are the only affections that simulate it to any serious degree. Scoliosis, foot deformity, pyramidal signs, nystagmus speech defects, etc., are never found in tabes, however; and the syndrome of cerebrospinal lues is somewhat different.

A patient, a young woman, eighteen years of age, was next presented. She is the second of five living healthy children. The patient says that she did not have the usual diseases of childhood, nor any illness in recent years. She finished a complete high school course successfully. Pupillary inequality was observed at the age of twelve by a school physician, and she was advised to wear glasses. The first subjective disturbances appeared at the age of fifteen and took the form of severe lancinating pains. This was the only symptom for two years. Paresthesias, variable in character but always affecting the lower extremities, principally the toes, have been noted in the past year. There have been no visual difficulties during the period of the development of the malady. Examination of the patient shows no abnormal attitudes of the voluntary motor system. The gait is somewhat disturbed by an ataxia which varies. In general, all coördinative activity is performed in a fairly creditable manner. Skilled test acts showed no gross defects. Deep reflexes are completely abolished; superficial reflexes are present and equal.

No pathological reflex could be elicited. The peripheral neural apparatus shows no pathological alteration nor impairment. Examination of the cranial nerves shows the pupils fairly regular, markedly unequal and not responsive to light. Accommodative and consensual reactions are likewise abolished. The fundi showed a narrowing of the larger vessels and indistinctness of the smaller ones; the disk is grayish and shows clear evidence of early atrophy. Systemic examination shows general deficiency in growth and development. Hutchinsonian teeth are present. Laboratory examination showed a positive blood Wassermann. Spinal fluid showed 130 cells per cu. mm., increased globulin, Lange colloidal gold reaction, 5544334555, in addition to the positive Wassermann. The prognosis in general, Dr. Rosenheck said, after summarizing the main conclusions reached, is excellent for life but extremely poor for vision.

Dr. D. J. Kaliski (by invitation) said that he wished to supplement the report by findings in an interesting case recently seen. Here there had been no diminution in vision until about the middle of last August the patient suddenly became blind. Investigation showed that there had been symptoms soon after birth but no treatment had been pursued after the child was one year old. There were many stigmata present, such as Hutchinson teeth, complete optic atrophy, Argyll-Robertson pupil which also reacted sluggishly, a positive Wassermann and a positive cerebrospinal fluid. Cells were not so greatly increased, but there was increased globulin, and a paretic curve resulted with gold solution. The child is becoming more and more unruly, and the outcome will probably be taboparesis. A similar case was seen four or five years ago in which the signs of tabes were clear. Taboparesis developed and the patient died.

Dr. Rosenheck said that such cases were so rare, his being only the second that he had seen in twelve years, and the first certain one, that he regretted that fuller discussion had not been opened.

Dr. Abrahamson said that it would be interesting to study the endocrinous glands in the patient's family, to try to determine why one child was affected and the others spared.

Dr. Timme remarked that the girl showed numerous glandular disturbances, and the teeth especially were very small.

INCIDENCE OF ALCOHOLIC AND SYPHILITIC PSYCHOSES

Dr. George H. Kirby drew attention to the fact that until very recently one often encountered the statement that alcohol and syphilis together were responsible for from one quarter to one third of all cases of mental disease that required hospital treatment. During the past decade there have been certain developments which must exercise a great influence on the prevalence and potency of these two important causes of mental disorder.

There can be little doubt that during recent years there has been

a general movement against the intemperate use of alcohol. The Federal prohibition amendment is but one indication of this movement. A striking reflection of this trend against inebriety is seen in the admission rate to the Bellevue Hospital alcoholic wards for the past eleven years. During this period the total number of cases of acute or chronic alcoholism (exclusive of the psychotic types) totalled 75,333. The high point was in 1910 when nearly 32 per cent. of all admissions to Bellevue Hospital were diagnosed as cases of alcoholism. Since then there has been a persistent decrease, the low point being reached in 1918 when a little over 6 per cent. of the cases were diagnosed as alcoholism. A slight upward turn of the curve in 1919 was due to a relative falling off of the general admissions to the hospital. The actual number of alcoholic cases in 1919 was less than in 1918. The figures for 1920 are not yet available but preliminary estimates show a smaller number of cases than in 1919.

Dr. Kirby regarded the continuous decline in the ratio of alcoholic cases as all the more significant when one takes into consideration the increasing population of New York City and the fact that there has been apparently no important shifting of alcoholics to other hospitals or institutions for treatment.

The percentage distribution of alcoholic psychoses admitted to all of the New York State Hospitals also shows a decline for the past twelve years. A marked fall has occurred from the high point in 1908 (when nearly 11 per cent. of the State Hospitals' admissions were diagnosed alcoholic psychoses), to less than 2 per cent. in 1920. It was thought that the diminishing number of alcoholic psychoses reported might be accounted for in part by a change in diagnostic attitude; but the separate listing of the Korsakoff cases, which presents little room for diagnostic error, gave a curve which showed a decline similar to that for the other psychotic types.

Turning to the syphilitic psychoses Dr. Kirby remarked that during the past ten or fifteen years a number of forces and influences have come into play which may possibly be lowering the incidence of syphilis as a disease, or modifying its later manifestations, especially the neuropsychotic forms. During recent years the public interest in syphilis, its prevention, consequences and treatment, has been vastly increased. The therapy of syphilis has been revolutionized since the introduction of salvarsan in 1910 and the lessened amount of alcoholism may perhaps also be reckoned as a favorable influence. Possibly it is too soon to expect to see results on account of the time which usually elapses after the infection before neurosyphilitic lesions become manifest.

Dr. Kirby showed a chart drawn up from State Hospital data on cases of paresis admitted during the past twelve years. The ratio of these cases has held fairly uniform at about 13 per cent. of the total admissions. There has, however, been a slight fall during the past two years from the relative high point of 13.4 per cent. in 1918. Moreover, by using the recent census and calculating the rate of paresis per 100,000 of the State's population, it appears that there

has been a decline from 9.0 in 1918 to 7.9 per 100,000 in 1920, the lowest figure on record. The actual number of cases of paresis admitted to the hospitals has also declined since 1918. This reduction may be somewhat significant in view of the steady increase in the population of New York State.

The data at hand would seem to justify the conclusion that alcoholism has declined perceptibly in recent years and coincident with this decline there has been a marked fall in the number of alcoholic psychoses.

Mental disorder (paresis) due to syphilis reached a high point in 1918 with a subsequent decline in the relative and actual number of cases entering the hospitals.

Dr. L. Pierce Clark opened the discussion of Dr. Kirby's paper with the suggestion that since dermatologists so frequently report that they see the early signs of syphilis at skin clinics, this would seem an excellent field for therapeutic work. If preventive workers would concern themselves with the earlier stages of the disease better prophylaxis would be obtained.

Dr. Onuf asked how the diminution in syphilis and alcoholism has affected other psychoses. He thought it would be interesting to find out whether substituted drug habits if such occurred, would also result in psychoses.

Dr. Clark asked whether the information collected by Dr. Kirby might not be turned over to Mental Hygiene publications so that the reading public might have correct data concerning the incidence of alcoholic psychoses and syphilitic psychoses and the relative decrease.

Dr. Onuf said that Dr. Brill had spoken of a case of alcoholism treated by psychoanalysis with an entire cure. The patient then proceeded to forge checks, so that Dr. Brill did not feel proud of his achievement and thought that the patient might have been better off as a drunkard. Dr. Onuf also said that Dr. Gregory had reported a recent very great increase in cases of alcoholism admitted to Bellevue.

Dr. Irving J. Sands said that his experience at Bellevue would lead him to believe that there was no such thing as a new form of psychosis resulting from prohibition. Furthermore, he stated that he had discussed that question with Dr. Barnes, and many of the older men who had charge of the alcoholic service in years gone by, and it was their impression that the old alcoholic repeaters were not coming now to Bellevue with a psychosis. It was true that admission in general to the psychopathic ward was increasing, but that was due to other factors, and not to prohibition. He felt that prohibition had helped considerably.

Regarding the problem of general paralysis, he felt that the early recognition of neurosyphilis and the favorable impressions made by intensive treatment on mesodermic syphilis helped materially to lessen the number of paretics. He referred to Dr. Gregory's work on the modern conception of inebriety which was published in 1917.

Dr. Kaliski (by invitation) asked whether the decrease in paretic admissions to state hospitals had been brought about by the increase in facilities for treatment in other institutions. The state hospitals used to be the only refuge. Now more widespread and better known treatment centers and clinics, and the increase in treatment in private practice, may have helped to lessen the admissions.

Dr. Kirby, in closing the discussion, said that he had seen no signs that other psychotic types were appearing as substitutes for alcoholic psychoses. The total admissions to the State Hospitals have diminished, due, he thought, chiefly to the falling off of alcoholic psychoses. There has been no increase of drug psychoses, in fact the number admitted to the State Hospitals has decreased, although drug psychoses have always formed a relatively small group among the admissions to the State Hospitals.

The suggestion that the decline in the number of syphilitic psychoses admitted might be due to more frequent treatment of these cases in general hospitals and in private practice, especially early cases of paresis, should be taken into consideration. Dr. Kirby did not feel, however, that this factor would modify greatly figures for the entire State over a period of years unless actual curative results were being obtained in the treatment of early neurosyphilis. Unfortunately, experience shows that many cases of paresis that have been treated in general hospitals or in practice eventually reach State institutions.

REMARKS UPON CONSCIOUSNESS IN THE EPILEPTIC FIT

The ordinary definition of the epileptic fit, Dr. L. Pierce Clark said, is a loss of consciousness attended with or without a convulsion. This accepted loss of consciousness Dr. Clark finds from patients' reports to be questionable. One patient states: "When a *petit mal* occurs, I can usually control myself and go on talking or continue whatever I am doing. . . . There is a sort of turmoil in my mind. This would last only a second. . . ." Another says: "I feel intensely aware of myself. . . ." A third patient reports: "During the confused spell I have a feeling that I must not let anyone know there is anything unusual, and that I must retain my poise at all costs. . . . Consciousness so far as outside affairs are concerned is suspended and my attention is directly turned in upon myself." Another patient says: "I could always control these attacks if I really wanted to, but I let them come up. It was a gratification, I think, to something inside me. . . ."

From these statements, Dr. Clark infers that instead of there being a loss of consciousness in totality, the subject consciousness is increased. *Awareness of surroundings* may be greatly or entirely lost, but there is in its place heightened *awareness of self*. In more severe epileptic reactions the individual may not be able to report his subject awareness; but from his appearance and manner it is

apparent that he is in a state like that experienced by individuals able to record twilight states. Still more complete submergence of self to a condition resembling that of birth or earliest infancy is met with in deeper grades of disordered consciousness. The patient may answer questions and will always answer in disjointed sentences in the optative mood, such as "I am trying to," "I'd like to," etc.

The state of epileptic reaction, then, said Dr. Clark, is an involution of the normal development of consciousness. This latter is gradually evolved out of egoconsciousness to a rich combination of subject and object consciousness or to a unified composition of both. The epileptic reaction then has an enormous psychic importance, principally in the deteriorating influence upon the power of sustained interest and attention, and the orderliness of normal objective life. Each attack refreshes and satisfies the patient's cruder egoconsciousness and enriches his egoistic interest. It is therefore to be expected that he will not be interested in recovering from his disorder and in foregoing his unconscious self gratification. To appeal to him, his personal satisfactions in everyday life must be increased beyond those obtained from his habit.

Dr. John T. MacCurdy thought that Dr. Clark had brought out an important clinical point in regard to the mental state of many epileptics. He agreed with Dr. Clark that particularly in cases with a prolonged aura a heightened sense of personal awareness was a frequent phenomenon. This is well illustrated in the account of an epileptic attack given by Dostoevsky in the "Idiot." On the other hand, Dr. MacCurdy wished to take exception sharply to Dr. Clark's contention that such heightened sense of awareness was in opposition to the loss of consciousness so generally recognized as pathognomonic of epilepsy. He insisted that consciousness was used in two senses. In the sense in which Dr. Clark was now using it, it meant a direction of attention to the patient's own ego. Clinically, however, consciousness usually means the reciprocal function of attention to the environment—objective consciousness as Dr. Clark says. With any weakening of consciousness in the clinical sense there is always a tendency to an increase in the attention to the patient's own personality. In fact this is the essence of introversion. A good example is seen in the normal phenomena of dreams. In them there is usually a heightened sense of the dreamer's personality, while objectively the subject is unconscious.

Dr. Gregory Stragnell (by invitation) said that in discussing the consciousness of the epileptic, the conscious, introverted attitude of the individual must be looked upon as an escape from the individual's obligations. It would hardly be analogous to unconsciousness. Two characters, famous in history, who were addicted to epilepsy, Napoleon and Dostoevsky, illustrate this. From the journals and letters of both of these individuals it is seen that both at about the age of twelve wrote home and threatened to simulate insanity to compel the state to look after them if they were not forthwith supplied with funds to maintain the position which they felt was their due. Each of these men found a compensation for

an initial inferiority and the same form of retreat in later life when the carrying out of the compensation became too difficult. The mechanism in each of them was first the recognition of an initial inferiority of the ego which the one sought to compensate for by war, the other by literature; and if the struggle became too difficult, sought a retreat in the epileptic attack. This should give a clearer concept of the struggle going on in the consciousness of the individual.

Dr. C. P. Oberndorf said that epilepsy was caused by many things and cured by many things. The term epilepsy does not mean very much as it is loosely applied to many convulsive conditions. Many psychogenetic convulsions closely resemble the phenomenon called epilepsy and he had even seen the Babinski and incontinence in convulsions considered by him as psychogenetic. Nevertheless he considered it a distinct mistake to attempt to force the so-called "idiopathic" epilepsies into the psychogenetic group. The progress of the study of epilepsy had tended toward a limitation of the "idiopathic" group and the discovery of organic causes. That the ordinary "idiopathic" epileptic convulsion represented a flight from reality, seemed to him far from proven or even suggested.

Dr. Irving J. Sands said that he considered Dr. Clark's contributions to the epileptic problem epoch making, and that all students of mental disorders were indebted to him. However, epilepsy, in his opinion, was an organic condition, and the fit was caused by the reaction of the brain to some stimulus. That in his opinion there were definite structural (cerebral) alterations, macroscopic, microscopic or physicochemical in nature, caused by endogenous or exogenous toxins. He had had an opportunity to conduct an intensive study of epilepsy at the Manhattan State Hospital. The results obtained there by the administration of proper drugs convinced him all the more that epilepsy was an organic condition. In May, 1919, when sedatives such as chloral, bromides, hyoscin and paraldehyde were used in controlling the psychotic epileptics, there were 502 recorded seizures; while in May, 1920, after the system of luminal therapy had been worked out, there were only eight seizures in the same ward. He stated that he had been able to follow up this therapy in Bellevue Hospital, where many of the epileptics had been sent because of some postepileptic unfavorable complications, and there too had obtained satisfactory results on that drug. There was no doubt but that psychogenetic factors played an important part in many of the epileptics and especially in those having epileptic equivalents. Recently he had seen a case which might well fit into the group described by Dr. Clark. It was that of a twenty-eight year old woman, a nurse, of unusual intelligence and ability, who was in charge of a big ward of mental cases. For the past four years she had been having attacks lasting one or two days, once every six months or so, and which had been characterized by intense hemicrania, nausea, vomiting and scintillating scotomata. She was seen two weeks ago in one of these attacks. She left the ward suddenly, packed her trunks, cabled that she was coming home. She

had had intense unilateral headache, nausea, vomiting and scintillating scotomata characteristic of migraine. After three days she felt greatly relieved. She stated that during this time she had thought of only herself, had a sense of heightened self consciousness, and felt that several distressing conflicts which had been troubling her for a few weeks had been solved. She also added that all the other attacks would come on whenever confronted by some perplexing problem, and following these attacks she felt a sense of security in employing the mode of procedure indicated by her subconscious trend. This case Dr. Sands regarded as more or less of an epileptic equivalent associated with migraine.

Dr. Onuf inquired concerning the relation between the injuries sustained during the attacks, and the theory of the wish of the individual to escape from consciousness and to return to intrauterine life.

Dr. Clark closed the discussion by stating he emphasized time and again that he considered there was a definite group of essential epilepsy exclusive of groups involving organic conditions. He had always limited his remarks to cases where no specific cause could be found. The epileptic fit essentially does not differ from what can be seen in the psychotic ward, and is a pure retreat to gain a certain result. Essential epilepsy is a mental disease with physical objective manifestations. Any diagnostic critique must keep this in view. It has been practically agreed that essential epilepsy may be considered a definite clinical phenomenon.

In reply to Dr. MacCurdy's comment, Dr. Clark said the sleep phenomenon was analogous but not parallel. As to medication, speaking from his own experience, he felt that luminal was probably the most insidious and destructive drug we have ever used. Its disastrous effects can be appreciated only after several years, whereas bromides reveal the harm they do on the surface after a short period. Luminal is deadly because of its character deterioration. It is worse than bromide medication since the mere stoppage of the drug does not do away with apparent deterioration, as in taking away bromides after prolonged use.

Epileptoid attacks, tabetic convulsions, etc., do not concern the idiopathic group. Their pathology may have been demonstrated, but until we obtain more data, every possible investigation should be continued.

Current Literature

I. VISCERAL NEUROLOGY

2. ENDOCRINOPATHIES.

Leob, L., and Hesselberg, C. Studies on Compensatory Hypertrophy of the Thyroid Gland. [Jour. Med. Research, 40, 265, 1919.]

In this—a second paper—on the hypertrophy of the thyroid gland the authors compare first the hypertrophy in remnants of thyroid after extirpation of the major part of the gland with the behavior of glands which were autotransplanted in guinea pigs after extirpation of the greater part of the remaining gland. They find a similar frequency, character and degree of hypertrophy in autotransplants and remnants.

In remnants, as well as autotransplants, three periods can be distinguished: that of regenerative growth, of proliferation connected with hypertrophy, and the resting period.

They also compare the fate of autotransplanted thyroid lobes in cases in which a whole lobe is left back and in cases in which the extirpation has been almost complete. On the basis of these experiments they come to the conclusion that, contrary to the usually accepted view, a deficiency in functional (metabolic) activity of thyroid tissue does not noticeably influence those processes in organization and especially vascularization which determine the heeling-in and preservation of the graft. This conclusion is confirmed by the result of multiple transplantations of thyroid. The success of the transplantation does not depend upon the physiological need of the organism which is supplied by the transplanted tissue. [Author's abstract.]

Williamson, R. T. Relation of Graves's Disease to Diabetes Mellitus and Glycosuria. [Lancet, Sept. 6, 1919.]

A number of cases are given to show the relationship between Graves's disease and diabetes or glycosuria, the cases illustrating the following relations: 1, That Graves's disease may be followed by marked or mild diabetes, or associated with it. 2, There is often a temporary or intermittent glycosuria in the course of Graves's disease. 3, In rare instances mild diabetes is followed by Graves's disease. 4, Graves's disease is frequently associated with an alimentary glycosuria. 5, Both Graves's disease and diabetes mellitus sometimes develop directly following sudden mental shock, or great mental anxiety. 6, There is not infrequently a family history of diabetes in cases of Graves's disease. 7, Finally, acetonemia may develop. The author believes these rela-

tionships should be considered in the treatment of Graves's disease to the extent of limiting the use of sugar, or even of eliminating it entirely. If a nonnitrogenous diet must be given in Graves's disease, sugar should be eliminated or much restricted. If, in a case of Graves's disease, glycosuria is frequent or permanent, carbohydrates are undesirable in the dietary. On the other hand, in a case of Graves's disease with acetonemia, but without sugar in the urine, its administration along with alkalies may be of great help for a time.

Labbé, M. Diabetes and Exophthalmic Goiter. [Bull. de la Soc. Méd. des Hôpitaux, Nov. 7, 1919.]

In five cases given by Labbé of this combination the glycosuria seemed to be more resistant and less dependent on the diet than in ordinary diabetes. One woman developed goiter at 20; glycosuria became installed at 50, and at 54 the symptoms of severe exophthalmic goiter developed, the diabetes becoming aggravated. A hyperthyroid attack, with tachycardia, occurred each time, the sugar content of the urine and blood ran up high, scarcely modified by dietetic measures, but subsiding with the paroxysm and hyperthyroidism. He cites Manby, Lancereaux and others' reports of instances of diabetes in some members of a family and exophthalmic goiter in others. An exceptional tendency to acidosis is shown by diabetics with exophthalmic goiter probably from the derangement in nitrogen metabolism. The action of drugs also tends to individualize this form of diabetes; drugs like quinin and salicylate, which act on the goiter, modify likewise the glycosuria. In two cases described, treatment with iodin proved effectual; at the same time that the palpitations and tachycardia subsided, the glycosuria declined also. The multiplicity of types which the diabetes may assume is well illustrated by the five cases. Many writers have called attention to the frequency of alimentary glycosuria in *basedowiens*.

Crile, G. W. Surgical Treatment of Exophthalmic Goiter. [Surg., Gyn. and Obstet., Jan., 1919.]

Crile in giving his conclusions as to the surgical treatment of exophthalmic goiter quotes his personal experience in 2,250 thyroidectomies of which 1,169 were for exophthalmic goiter; of the latter, 660 cases, or 56 per cent. were ligated. No patient was rejected for operation unless in the state of dissolution. In the last series of 331 thyroidectomies, 116, of 35 per cent. were first ligated, and no case was rejected; there was only one death. The series of 1,169 began with operations under ether alone, and with no special precautions. The mortality rate in these early cases was 16 per cent. After the adoption of anociation-nitrous oxid-oxygen and local anesthesia with the anesthetization of the patient in his room—the mortality rate fluctuated between 2 and 5 per cent., until by the adoption of a new system of management the mor-

tality rate for all goiters among the last 331 thyroidectomies dropped to 0.6 per cent. The new system consisted of the adoption of nitrous oxid-oxygen, local anesthesia, the multiple stage operation, the exclusion of the psychic factor, and the application of the principle of carrying the operation to the patient. In moderate cases the entire operation may be completed at one seance. In grave cases the thyroid activity should be diminished by multiple steps, even a month or more being left between each step. Some cases require a lobectomy in bed, under nitrous oxide analgesia and local anesthesia. Above all, the psychic side must be controlled by surgeon and staff. Thyroid extract is given before a lobectomy to avoid the danger of too sudden a withdrawal of thyroid secretion.

Marañón, G. Symptom of Hyperthyroidism. [Rev. Esp. de Med. y Cirurgía, Nov., 1919.]

In ninety-two of 100 cases of hyperthyroidism Marañón found that rubbing the skin in the neck lightly made it turn very red in the region of the thyroid, redder than by rubbing the skin elsewhere. This reaction may be pronounced in milder cases, and is more distinct in the nervous, in the young, at the menopause, in women, and in persons inclined to sympathicotonia. No mention in the literature seems to be made of this symptom.

Kimball, O. P., J. M. Rogoff, David Marine. Goiter in Public School Girls in Akron, Ohio. [Jour. A. M. A., Dec. 20, 1919.]

This—the third report—gives figures the results of nineteen months use of iodin. The paper is mainly an explanation of the tabulated findings, and shows a steady decrease of slight and moderate enlargements in all the examinations. The subjects included were all new pupils and presumably had not previously received the iodin treatment, but owing to the common use of it in some form, it is probable that some had. The progressive increase in the percentage of normal thyroids (43.6, 47, and 55.4 per cent.) for the three periods is due to the preponderance of fifth grade girls in the second and third groups. Fifth-grade girls average 10 years of age, and are mostly below the age of greatly increased incidence of thyroid enlargement. The most striking fact brought out is that not a pupil in whom the thyroid was normal at the first examination, and who took iodin, showed any thyroid enlargement; while of those not taking iodin, 15.9 per cent. showed definite enlargement. Also a distinct therapeutic effect of the iodin was shown in 36.11 per cent. of the pupils with slightly enlarged glands as against 27.82 per cent. of those not taking the drug. The authors conclude that simple goiter in man can be prevented by the use of safe doses of iodin, and recommend it as a public health measure. Two gm. of sodium iodid given twice yearly seem adequate.

Curschmann, Hans. Climacteric and Myxedema. [Zeitsch. f. d. ges. Neur. u. Psych., 1918, Vol. 41.]

The author describes a case in which a postoperative climacteric led directly and quickly to severe chronic myxedema. He gives other cases where myxedema followed normal menopause. Although well known that insufficiency of thyroid secretion causes myxedema and arrests development of the generative glands, it is not sufficiently recognized that removal of the generative glands acts as a strong and lasting inhibition on the thyroid function. The symptoms following natural or postoperative climacteric should be carefully differentiated into those due solely to the cessation of function of the generative glands and those resulting from the check exercised on the thyroid by the cessation of generative gland function. In the author's experience symptoms of thyroid character yielded immediately to treatment with thyroid preparation though they had been uninfluenced for a period of years by ovarian preparations. In one case immediately after normal climacteric, beside the myxedema, there were also typical signs of osteomalacia. There is no doubt, in the opinion of the author, that there is a causal relation between the appearance of the climacteric and the myxedema on the one hand, and the osteomalacia on the other. In the course of osteomalacia, sometimes at its first onset, thyrogenic symptoms (either hyperthyroid or hypothyroid) are manifested. From this it may be concluded that unknown pluriglandular disturbances of the inner secretions which usually lead to osteomalacia, may, at the same time, give rise to either the symptom of myxedema or to Basedow's disease, or both together, or, finally, to tetany. In a further case there was myxedema after the extirpation of a cystoma ovarii in a woman 62 years of age. The question whether the removal of the ovarian cystoma is to be regarded as the cause of the myxedema, which appeared immediately afterward in a manner quite analogous to the disease process after the natural or postoperative climacteric, the author thinks, may be answered in the affirmative. There is reason to assume that tumors of the ovaries possess inner secretory qualities corresponding to those of the physiologically intact organ. Under these circumstances the removal of the tumor would have the same effect as castration, causing a check of the thyroid secretions and consequent myxedema.

Koopman, J. Influence of the Thyroid Gland on the Form of Antibodies. [Endocrinology, 1919, 3, 318.]

The author injected a rabbit, one who after many injections of sheep corpuscles did not give a hemolytic amboceptor of a sufficient titer, with thyroid extract and was able to improve in this way the titer from 1:100 to 1:1200. In another rabbit (a young one of the first animal) this treatment raised the amboceptor from 1:150 to 1:2000. [Author's abstract.]

Stoeltzner, W. Mongolism. [Münch. m. Woch., Dec. 28, 1919.]

Three women developed signs of hypothyroidism in pregnancy, such as loss of appetite, constipation, obesity, loss of hair, absence of sweating, drowsiness, and indifference, and all gave birth to mongolian imbeciles. On the other hand, in seven other cases of mongolism there was no history of thyroid insufficiency during pregnancy. Stoeltzner, however, has published the cases in the conviction that positive results are of more value than negative, especially for the purpose of practical therapeutics. If mongolism be due to hypothyroidism of the mother in pregnancy, thyroid opotherapy will not only cure the mother, but will also prevent the birth of a mongolian imbecile.

Troell, J. Hyperthyroidism. [Hygeia, Jan. 31, 1920.]

In this paper the author first emphasizes the struma, tachycardia, and exophthalmus. He next discusses other evidences, as emaciation in the presence of normal appetite and the neuropathic symptoms, notably those of motor activity, which may be numerous and varied. The method of Goetsch he has tested on his own material. In one patient in whom the disease has existed for many years the injection of adrenalin raised the pulse frequency from 106 to 130 and the blood pressure from 145 to 175. Hemistrumectomy was then performed, after which the increases were as follows: pulse 80 to 88, blood pressure 130 to 135. In another case with severe type of disease, but relatively low pulse and blood pressure, the provocative injection caused an increase of pulse from 98 to 128 and of blood pressure from 145 to 228. But after ligation and subsequent strumectomy the adrenalin test was no less positive than before, although patient had rapidly improved and had gained 17 kilograms. The results in general do not appear to show any definite necessary relationship between adrenalin hypersensitiveness and the degree of severity of Graves's disease.

Murray, G. R. Myxedema. [Br. Med. Jl., March 13, 1920. Med. Rec.]

Professor George R. Murray reviews the history of the first case of myxedema successfully treated by thyroid extract, the results obtained in this case not only affording definite proof that the thyroid gland produced an internal secretion, but showed that the thyroid insufficiency of myxedema in man could be made good by maintaining an adequate supply of thyroidal hormones from an external source. He recalls the publication of the report, in 1888, of the special committee which was appointed by the Clinical Society (London) in 1883 to investigate the relation of myxedema and allied conditions to the thyroid gland. The experimental work of Sir Victor Horsley, which was undertaken at the request of this committee, first proved that myxedema and cachexia strumipriva were due to loss of function of the thyroid gland. Although at that time it had not been proved that this function was to provide

an internal secretion, he suggested that grafting a portion of healthy thyroid gland would be a rational method of treating these maladies. The striking improvement which followed the adoption of this suggestion in the case of Bettencourt and Serrano led Murray to suggest and carry out the treatment of myxedema by thyroid extract in the case whose life history he now records as an example of the value of observation of individual cases over long periods of time in the elucidation of certain problems in medicine. This patient, a woman of forty-six when the treatment was begun, in 1891, lived until early in 1919, when she died at the age of seventy-four. By the regular and continued use of thyroid extract she was enabled to live in good health for over twenty-eight years after she had reached an advanced stage of myxedema. During this period she consumed over nine quarts of liquid thyroid extract or its equivalent, prepared from the thyroid glands of more than 870 sheep.

Woodbury, M. S. METHODS FOR DETERMINING THYROTOXICOSIS. [Journal A. M. A., April 10, 1920.]

In a selected group of eleven patients the author found what was considered sufficient evidence to warrant the diagnosis of thyrotoxicosis, as determined by clinical observations, pathologic study of the portions of the thyroids removed at operation, and postoperative progress. These patients after rest responded positively to the epinephrin chlorid test and negatively to estimation of basal metabolic rate. They were all of the nonexophthalmic (adenomatous) type; more toxic cases of the exophthalmic and adenomatous types observed during the same period showed increased metabolic rates ranging from 20 per cent. to 85 per cent. above the normal base line. Woodbury is of the opinion that complete methods of examination with special attention to the possibility of errors in case of psychoneurotic patients should furnish the basis for diagnosis, rather than reliance on any functional test, though the functional tests are of great value in the compilation of evidence, especially in relation to the degree of toxicity.

Book Reviews

Low, Barbara. Psycho-Analysis. A Brief Account of the Freudian Theory. Introduction by Ernest Jones. New York, Harcourt, Brace and Howe. 1920.

Our own reading public owes a debt to the British workers in psychoanalysis that one of their number has presented so helpful an account of the subject. The writer sets forth concisely, in the simple form that makes such a book of special practical value, the fundamental principles of psychoanalysis and the elementary facts of the unconscious mental life evidently from a thorough practical acquaintance with these on her own part. She speaks with no arbitrary authority but necessarily in the brevity of her work she states without too great elaboration of proof her own firm convictions. Hers is the authoritativeness which psychoanalysis is everywhere coming to assume, that of undeniable practical effect convincingly witnessed and candidly stated.

Beside offering to general readers an opportunity to obtain a well ordered presentation of psychoanalysis as a form of psychology, profound in its theory and deeply practical in a variety of applications, the book affords also a stimulating review of the subject to those already trained in these fundamental facts. For both classes of readers there is the refreshment of a broad cultural basis on the part of the author. This enables her to comprehend psychoanalysis, more completely than its critics have been able to accept it, as a movement issuing out from the slow evolution of humanity and as related to every branch of human culture. It is therefore not entirely new nor is it an arbitrary graft of some capricious mind. Its place in development of thought is rather that of a deeper psychology than has heretofore been propounded and a scientifically utilized method of illumination of the hidden meanings of human life. It explores the deepest recesses of the mind and follows out the mechanisms by which psychic impulses express themselves. This gives it its peculiar relation to readjustment of mental content and activities in the case of mental disturbances.

These things Low has presented in her discussions. She touches upon the history of the psychoanalytic movement, one purpose in so doing being to make clear Freud's own fundamental structure on which he has based the work. She describes the mental life, as existing chiefly in the unconscious, which comprises the field of psychoanalysis and gives it its practical significance. In treating thus of the mental life in its conscious and unconscious portions she mentions the factors of repression, censorship, the conflict of ego interests and social interests, the partial resolution of the conflict which permits of antisocial manifestations or of psychoneuroses, or the more complete solution which results in sublimation. She presents

anew the part of the dream in the mental life serving also as a means of understanding it and thus leads into the matter of treatment and of the social and educational function of psychoanalysis. This review is enlivened in its more technical details by frequent illustration of the workings of the mental life and also by constant recognition of the mutual light which the special psychoanalytic method and general culture throw upon one another.

Swisher, Walter Samuel. RELIGION AND THE NEW PSYCHOLOGY. A Psychoanalytic Study of Religion. Boston, Marshall Jones Company. 1920.

This is a book which serves both psychoanalysis and religion. Such service is not due to a onesided plea made for either in the name of the other. It lies rather in a broader background of understanding of the needs of human nature through its unconscious psychic life. Religion has arisen as one expression of these needs and one attempt at fulfilment of them throughout human history. Psychoanalysis in turn has appeared as a method of discovering and explaining both the needs and any of the mechanisms by which they express themselves. Its aid in interpreting the religious aspirations and activities of man is an example of this. Moreover, because the writer is writing from this bzroader outlook, he shows hiw inseparably intertwined religion is with every other practical phase of life and why therefore a consideration of it is inseparable from the psychotherapeutic function of psychoanalysis. This the writer has well though briefly stated. The world has always recognized and acted upon the close relationship of religion to health. This study explains on what fundamental facts in the human psychic nature the relationship rests and thus through psychoanalytic illumination explains the efficacy of various forms of undeniable religious healing. At the same time it brings into sharper focus the essential clearness of psychoanalysis itself and its principles in relation to healing generally since they are based on such ultimate and scientifically comprehended facts.

It is through this that psychoanalysis becomes also so direct an interpreter of the origin and meaning of religion, even if, as the writer states, the consideration of the fundamental facts on which religious development is based may at first sight shock the more accustomed forms of conscious reasoning. To Swisher, in close practical touch with the effect of religion in human lives, both its beneficial power as an agent of security and progress and the pathological traits in which it is often manifest, he can view such origins as only those which are to be found at the base of all phases of evolution, developing as humanity develops, their higher forms losing nothing in value, their cultural significance nothing weakened if basic facts in regard to them are honestly accepted. He does not concern himself here with the content of religion and its particular relation to each individual or group as to what constitutes its inner meaning. He believes this is not the place for that. It is enough for him that it has a specific value according to each man's interpretation and the relation of that toward his practical life.

He does, however, interest himself in explaining the mechanisms by which it has developed its relation to human lives, the methods by which it becomes part of the expression of individual psychic factors. Viewed in this way man's religion is sometimes a means of sublimation and advance, sometimes it is merely an expression on a less complete plane of certain tendencies which thus utilize religion for more or less morbid expression. Religion may therefore present cure for the imperfection and incompleteness of character which burden man or it may grant opportunity and seeming justification for the partial undisciplined traits and so fail largely of its social and individual mission.

The special subjects under which the writer has grouped his chapters show how comprehensively he has approached his subject in order to study religion thus psychologically. They show also the careful attention he has given to the various psychic elements at work in men which the new psychology has examined and how well he has mastered the cardinal principles upon which this psychology rests. He has not only given in brief an evolutionary history of religion and its effect in the lives of men, but he has presented these psychological problems in a refreshing manner in their close relation to his own topic. Thus whether in the discussion of the unconscious, of determinism and freewill, of the relation of mysticism and neurosis or in the timely discussion of the occult in religious systems, there is clearness of thought which dispels much of the cloudy confusion of the present day. The book is an unusually stimulating one for general perusal and will serve to refresh and clarify the thought of the mental specialist.

Smith, G. Elliot. THE EVOLUTION OF THE DRAGON. Manchester: At the University Press, Longmans, Green and Company, London, New York, Chicago, Bombay, Calcutta. Madras, 1919.

It may appear folly to take issue with a writer when he himself has anticipated the objection to be made. Besides Smith has fortified himself at the outset by certain principles of great psychological importance. They are such as would put any work upon a sound basis. They keep the writer alert toward human facts which lie deeper than the obvious. They make him suspicious of the merely ingenious devices of the human intellect for concealing more than they explain. In such ways these principles, adhered to by the author, make this book a vigorous tool of investigation plowing wide and rich furrows into the mythological past. The way is followed through the beliefs of many peoples and into the customs and myths that follow from these.

Yet the old controversial question arises. The author answers it to his satisfaction, not to that of all his readers. For he insists as before upon the idea of a limited origin of the things of which he writes followed by their transmigration then over most parts of the world. Egypt he considers the richest cradle of these human products which then sweep in broad currents over the globe. He really mistakes the point of the contention against him. In the first

place no one would deny a good deal of truth in such spread both of methods and products of human activity as are found in mythological conceptions as well as material things. Smith does not however sufficiently refer these to first causes which lie in human thinking and feeling. He does not go deeply enough into this as regards the territory which interests him as the cradle. It follows therefore that he misses the important fact that these same causes must be operative autochthonously wherever humanity exists. Any migrating product finds fertile soil in which even similar products may already be developing—although still in the scarcely formed sproutings. Study of the unconscious soil of man today surely confirms such a view. No one indeed would seek to believe that a "long chain of chance circumstance should have happened a second time in America" or anywhere else to give rise to what is unmistakably to some degree a furrowed feature. That admission still leaves ample room to accept, it even demands as a background a similar human nature animated by universally similar impulses. Shall we believe with Smith that the northern peoples of Europe combined in their mythology a mouth-finger erotic only because the Egyptian child Horus was thus symbolically pictured? This then is the origin of thumb sucking among the infant population of the entire globe, we are to believe? Frazer,[1] against whom the footnotes contain various mutterings, is content to weigh migration and indigenous origins as mutually cooperative factors. Do we not gain enormously in fruitful understanding of all this rich material by doing likewise?

Rich material this book undoubtedly contains. Smith need hardly have apologized for the incompleteness of some of his chapters. That is inevitable in the pursuit of his subjects, vanishing as they do into the interpenetrating mists of the past. Yet he has opened the paths of interest in many directions. He has pursued always those chief themes by which man's gropings show themselves swinging in certain unified directions. He has revealed these elaborated with every device of the fertile activity of man's wish stimulated phantasy. In it all the author has not been afraid to strike into the simpler reproductive impulse at the base which breaks itself forth into such diversified and forceful symbolism. It is to be hoped that the promises for fuller pursuit of these subjects are on their way to fulfilment.

The discussion of the Great Mother presents peculiarly stimulating matter for directing attention to those problems which lie today still at the heart of man's conflicts. One asks why however there is an overweight of attention given to the Great Mother aspect of the Dragon figure. It is important that attention should be called to that. It is equally important that its vigorous masculine aspect should be emphasized. Might his underemphasis of this factor be at one with the author's oversight in regard to the impregnating quality of indigenous origins and his tendency to lay weight upon the mere migration of the already existing?

[1] See Folk-Lore in the Old Testament. Macmillan and Company, London, 1919. Chapter IV, The Great Flood.

Rockwell, A. D. Rambling Recollections. An Autobiography. New York, Paul B. Hoeber, 1920.

A book of such pleasant remembrances forms part of that social fabric in which fellow workers realize their mutual relations. As new workers come and go in the field the continuity of progress through their interests is thus brought to mind. The discursive style of this book recalls the variety of scenes through which the writer has lived, the experiences which have been his in establishing his life of activity and in carrying on his professional service. It brings back in amiable personal recollection men in various walks of life with whom the author has joined hands. Some of these were school or college friends, some were those known in the occasional intercourse of the chance meeting at home or abroad, others were fellow physicians or patients who are so well known in the business or political world that this friendly touch brings them into closer human contact. Dr. Rockwell has dwelt but briefly upon his professional activities. His book is rather devoted to the flitting reminiscences with which conscious memory retrospectively picks out the pleasanter spots from the past and forgets the strain and stress which gave these life. This is true to some extent even in the interesting story of his participation as surgeon in the Civil War. The book serves thus for a certain type of refreshment of acquaintance with men and events of the past, with certain localities of the past also. Yet one inquires whether one who has all this to record does well not to give more of the inspiration of activity, of conflict and forceful effort, even, which mark all life at least internally if not externally. Such a note breaking the mere dead level of appreciation stimulates its readers to "carry on."

Pfeifer, R. A. Das menschliche Gehirn. III Auflage, W. Engelmann, Leipzig. 1921.

This is a third edition of this compact yet comprehensive discussion, with 93 illustrations, of the development and functions of the human brain. As a student of Flechsig's it is natural that Pfeifer should accent the myelogenetic aspect of development within the nervous system; and his recent studies on the cortical end stations of the optic pathway have been called upon in this general presentation. The speech and sight mechanisms are chiefly dealt with in this most attractive small work.

Jelliffe.

Obituary

THE CAREER AND ACCOMPLISHMENTS OF THE LATE DR. WILLIAM J. MORTON

Dr. William J. Morton practiced medicine in the City of New York for over thirty years. He was at one time editor of the JOURNAL OF NERVOUS AND MENTAL DISEASE. For about five years he was professor of nervous and mental disease in the medical department of the University of Vermont, and for fifteen years or more he was professor of nervous and mental disease and medical electricity in the New York Post Graduate School. Dr. Morton made some important contributions to X ray and radium therapy, to ionization methods, and to electrotherapeutics. He was a member of the American Neurological Association and was a member and at one-time president of the New York Neurological Society. He was neurologist to the Metropolitan Throat Hospital, to Randall's Island Hospital, and to the New York Infant Asylum.

Dr. Morton was born in New York in 1846. He graduated from Harvard College in 1867 and graduated in medicine from the Harvard Medical School in 1872. He studied medicine in Vienna and Paris in the following years. He practiced in the Diamond Fields of South Africa in 1874 and 1875. He later traveled in Europe and finally settled in practice in New York in the year 1878, taking up definitely the specialty of Neurology and Electrotherapeutics.

I met Dr. Morton first in the early 80's. He had then a beautiful home on West 56th St., a well-equipped office, and was full of ambition for a neurological career. He had an inventive and mechanical turn of mind and was busy when I first knew him in patenting a new type of water motor which was to revolutionize dynamics.

He was in Washington with me at the time of Guiteau's trial and execution. This was about the time of the appearance of Moritz Benedict's book on the Brains of Criminals and we jointly made a description of the brain of Guiteau from the criminologist's standpoint. It appeared in the Medical Record, July 5, 1882, and I can aver that it was a good, objective piece of work as neither of us knew enough about criminology or insanity to establish a bias.

After this I did not meet Dr. Morton very much. He was always cordial and agreeable in his manner but seemed a little shy and shut in or shut off, having generally some interesting scheme which he was about to realize, or was realizing.

Dr. Morton had an inventive turn of mind and his interests went towards physics and chemistry in relation to therapeutics rather than to pathology and clinical medicine.

A list of his published articles showed that he was a pioneer and an original worker and discoverer in certain lines.

In 1895 and 1898 he published articles on cataphoresis. He was among the first to contribute to a therapeutic method which is now accepted under the name of ionization, as a useful procedure. "Local anaesthesia by cataphoresis and by mechanical pressure," 1905, and "Cataphoresis or Electrical Medicamental Diffusion as applied in Medicine, Surgery and Dentistry," 1898, are the titles of his papers.

He was one of the first workers in X ray and radium therapy for cancer, lupus, and various skin diseases. "Radio-therapy," 1902, "X ray therapy and radium," 1903, "Radio-therapy and surgery with a plea for preoperative radiations," 1905, "Radium for the treatment of cancer and lupus," 1907. Artificial fluorescence of living tissues in relation to disease, 1904. "Some cases treated by the X ray—acne, cancer, carbuncle, keloid," 1903.

Dr. Morton was one of the early users of the large static battery, and he evolved from it what is still called the "Morton Current." He described it in 1891 under the title "Franklinic Interrupted Current," or "my new system of administration of static electricity."

This current was a rapidly interrupted Leyden jar discharge passed through the patient. It is really a current of the same character as what is now called the general high frequency. Jones, in his work on Medical Electricity, describes and upholds the utility and originality of Morton's invention. Jones also gives credit to Morton for his contributions to ionization.

It appears then that the history of radium and X ray therapy and of ionization and electro-therapeutics can not be written without giving credit to Morton's inventiveness and originality.

Dr. Morton was a man of pleasing personality, handsome, courteous, kindly, and unaggressive. He had something of the adventurous in his character. He practiced in South Africa and he traveled extensively in Europe and visited Mexico. It was this spirit I think that led to his misfortunes, for he was a man blameless in his social life and one never heard unkind things said of him in his professional relations, except perhaps that he saw things very optimistically. His last years must have been sad ones, but I think he should be remembered as a genuine contributor to therapeutics, and one who helped and solaced many and incurred the enmity of none.

A full list of his contributions is given in the Who's Who of New York Physicians.

CHARLES L. DANA

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Original Articles

INFLUENZA AND MELANCHOLY

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For nearly four hundred years it has been recognized that depressions follow influenza. The current conception of the medical mind is well voiced by Osler (1), who wrote that "the most important of the nervous sequellae (of influenza) are depression of spirits, melancholia, and in some cases dementia." There is no doubt but that the internists and general practitioners, who, after all, see the great bulk of the influenza cases, see and even themselves experience this sequence of influenza—depression, frequently. "Since I had influenza" is the touchstone of many a clinical history of depression.

So general has been this phenomenon that Clouston (quoted by Pritchard) (2) considered that the "nervous tone" of the entire European continent was lowered by the epidemic of 1890–1892, and Mills (3) thought the same true of this country. I have suggested (4) that it is conceivable that this, through a general loss of mutual confidence, optimism, and faith, brought about the financial panic of 1893, and may be in part responsible for the general unrest of the present moment, generally ascribed to the late war alone.

Now it is all well enough for internists, general practitioners and historians to speak of "depression of spirits," "melancholia," "hypochondria," etc., as if they were synonymous, or at least allied terms. Psychiatry has long been handicapped by the confusion of symptoms and diseases. Our delimitation of entities followed so tardily the historic conceptions of many more strictly somatic diseases (for example, influenza itself) that there is still great difficulty

in getting any general agreement as to when *terms* should be used and when *names*. We think now in the psychiatric world we can be rather proud of an emergence, however gradual and incomplete, as we are reminded by Jelliffe and White (5), from a descriptive to an interpretative psychiatry, but this is not to say that our description is perfected. Symptoms and syndromes are no longer synonymous, but they are still very much confused.

"Depression of spirits," then, as well as the "melancholia" and the "dementia" are not sufficient for the psychiatrist. He conceives of depression as a *symptom* of many diseases. Neurosyphilis is frequently characterized by depression, both in the paretic and the tabetic forms. Epileptics sometimes commit suicide in fits of depression. Depression, as Shuster (59) has shown, is frequent as a leading symptom in brain tumor. It is familiar to us all in the apoplectic hemiplegiac, where it may be accompanied by irritability and "dementia." Depression is present in some types of schizophrenia; it is frequent in the paranoid psychoses; it is very frequent among psychopaths of the various sorts. And finally one recalls it as the most conspicuous symptom in some phases of the cyclothymic or "manic-depressive" psychosis and in many of the psychoneuroses.

One deduces, then, that depression is a very general index of acute mental pathology and is no more specific or diagnostic than an increase in body temperature or a decrease in red blood corpuscles. However obvious this may appear upon analysis, it is a point not generally grasped *a priori*. Ample proof is provided by a review of the psychiatric literature concerning influenza. Symptomatic "depression" and the Kraepelinian entity of depression are hopelessly confused. Melancholy and melancholia are not distinguished.

Historical and Bibliographical

Hennisch I, according to Espagnol (6), spoke of extreme prostration, somnolent states, "lypothymias" and other disquieting incidents in the epidemic of 1580. "Patients tormented with sad ideas" are referred to by Petrequin (7) in 1837 and he also referred to "four or five suicides in the hospital of Paris" during that epidemic.

Jaccoud (8) and others, writing in 1872, list nine groups of nervous symptoms subsequent to influenza, of which the first is "profound lassitude, prostration, etc.," and the seventh a "state of anxiety difficult to describe." The epidemic of 1890 called forth much comment from psychiatrists and upon these observations there arose the current conceptions of a depression as the usual postinfluenzal psychopathy.

Kraepelin (9) wrote early in the epidemic describing eleven cases, of which there were "simple psychic depression," one was "depression in a psychopath" and one a "mania," a boy who, after influenza, was first depressed and irritable, and whose symptoms as described in the remainder of the article were indisputably schizophrenic.

Classification made by writers subsequent to the epidemic of 1890 throw a helpful light on the matter. Kirn's (10) grouping was: acute exhaustion states, melancholia, manias. Ladame's (11) grouping was: (1) melancholia and hypochondriasis, (2) asthenic psychoses, (3) other mental forms. Bidon's (12) grouping was: (1) psychical depression, (2) maniacal excitement, (3) idiopathic psychoses brought out (eclatant) by the occasion of influenza.

Espagnol (6) concluded that "melancholia is of all postinfluenzal psychic manifestations the most frequent." He points out that of one hundred cases reported by Jutrosinski (13) 38 were melancholia, 13 were mania; Knapp (14) 93 melancholia and 60 mania. Espagnol goes on to say "one often sees after influenza states of mild depression and all the intermediaries between simple neurasthenia and melancholia." This is concurred in by Solbrig (57) and Laehr (58) and Kraepelin (9). "Most frequently one sees simple melancholia with insight." Espagnol further states that the mild melancholic forms are the most frequent, that they get well in from six to eight weeks, but may be prolonged in the grave forms for months or even indefinitely. It may remain stationary and may assume a hypochondriacal character with delirium. The dominant idea of the disease is that the patient is unable to get well or that he is going to die all the time. Others imagine themselves menaced by a trouble which will ruin their fortune and their honor. There are those who are the picture of despair and disgust with life with ideas of attempts at suicide.

He refers to four cases of Van Deventer (15), three of whom attempted suicide and the fourth had "a horrible fear of death." He quotes Krause (16) as having commented in one case "ideas of persecution, ideas of suicide, and in one case dread of food." He quotes suicidal cases of Ladame (11) and Snell (17) and of Martin (18).

Mispelbaum (20) described "grave forms of melancholia with phenomena of mental inhibition, catalepsy, stupor, anxiety and horrible hallucinations, sad delirious ideas, refusal of food and fatigue of life."

Jastrowitz (21) states that the most frequent form of psychosis

following influenza was melancholia. Althaus (22) thought it to be acute hypochondriacal melancholia with lethargy. Aust (23) thought acute confusion with hypochondriacal and agitated melancholia. Reill favored mania and the excited states.

Suicidal cases are further listed by Bossers (25), who mentions cases by Smith (24) in America, Webber (26) in England and Weynerowski (27) and Van Deventer (15) in Germany. He also lists presumably as forms of depression the obstinate refusal of food, complete insomnia and delusions of being followed, which occurred in the cases of Borchardt (28), Kirn (10), Leledy (30), Krause (16) and Becker (32).

Landouzy (33), in 1837, is quoted by Bossers (25) as one of the earliest mentions of depression. He wrote: "The prostration of strength was instant and universal and attended with extreme depression of spirits. It is a reaction of the whole organism to the lesion of the central nervous system. The prostration of strength was at times so severe that many patients could not walk and indeed even the arms were for a while as good as paralyzed."

Some of Espagnol's cases given to illustrate depression are also illuminating as to what was regarded as a depression.

"A merchant of 60 with negative family history after a second attack of influenza became irritable, impatient and choleric. He refused all solid food because digestion became difficult, the stomach became dilated, and he had eructations and constipation. Under the influence of treatment by Vichy water, sodium arsenate, quinine, and kola, he improved slightly, but his strength was diminished and he was obliged to give up work and take a vacation. . . . The neurasthenic (sic!) state persisted. He complained of throbbing of the abdominal aorta. A year later he was seen in consultation by various other doctors and under various forms of medication improved slightly. In general, however, he remained as described.

"A woman of 48 with negative family history and past personal history after an attack of influenza lasting 20 days began to have a dread of food and suffered from anorexia, constipation, and amenorrhea. She developed a state of anxiety, sat immobile with fixed stare, and displayed such erratic conduct disorder as one day rushing off to the city, wandering about alone and purposeless for four or five hours. . . ."[1]

[1] (Free translations by the writer.) It must be obvious from these brief and fragmentary illustrations that the confusion of symptom and syndrome, melancholy and melancholia, has led to much idle polemic. The relation of such instances as the above, with their suggestions of psychoneurosis and of schizophrenia, to post-influenzal melancholia vera is interesting, but is certainly not identity. Espagnol writes of "Post-influenzal neurasthenia," but cites "melancholia" as a type.

Richard Jutrosinski (13) concludes that mental diseases are released by influenza chiefly in those nervous dispositions preeminently in the convalescent period, without favoring either sex, occurring from 20 to 50 years of age, and while all different forms of psychoses occur the majority are of a melancholy hypochondriacal character. Of 104 cases 28 were acute delirium, 15 were delirium tremens, 15 were mania, 38 were melancholia.

Savage (37), in England, analyzed 54 cases from the 1890 epidemic of which 20 were melancholia and 13 acute mania "of the ordinary type."

Kalischer (34) thought that when manic-depressive psychosis followed influenza it should be regarded merely as common "pseudo-influenza psychosis."

Such were the reactions of the European psychiatrists to the data of the 1890 epidemic. The American opinion was similar.

Church (35), in 1891, pointed out that "influenza might not only give rise to mental troubles, but that, in the predisposed, grippe is competent to cause marked excitement or great depression of motor, sensory and mental nervous apparatus."

Chas. K. Mills (3) writes of "nervous and mental prostration, which occurred during and after the acute illness." "The mental depression often present as an initial symptom has been, in some cases, simply overpowering." He decides that the most frequent type of postinfluenzal mental trouble is "a form of melancholia" or "lypemania." This was so frequent, he thought, that "the influenza epidemic has impaired the morale of the community. Lack of spirit in work and an apprehensiveness in reference to health, business, and all matters of personal interest have been abnormally prevalent. Hypochondria has displaced hopefulness in the individual commonly possessed of courage and fortitude." Mills' description of postinfluenzal depression is worthy of quotation verbatim.

"The commonest type of grippe mental disorder, as I have just stated, is a form of melancholia or lypemania; but as this not infrequently assumes the form of melancholia agitata, it is often regarded as mania by practitioners not accustomed to differentiate the varieties of insanity. These patients are intensely depressed and emotional; they are filled with apprehensions of disgrace and ruin; they believe that they will never recover their former health; they are suspicious and delusional with reference to those who surround them; they are frequently unwilling to eat, or to rest, or take medicine; and in some cases they have definite delusions of terrible char-

acter, for the most part hypochondriacal or religious. They are frequently plagued with the thought of suicide, and sometimes make successful or unsuccessful suicidal attempts. They have been deprived by the ravages of the disease of mental and moral stamina. In the majority of these cases, but not in all, some hereditary or acquired predisposition is present."

These are representative quotations from the writers of the previous epidemic. As a matter of fact the descriptions are far more valuable than the nosological statistics for the reason that the diagnosis of mania and melancholia at that time would by no means coincide with our present conceptions.

Recent Epidemics

What of the recent epidemic? In a statistical analysis of 80 cases, which was the first study of psychoses associated with influenza of the recent epidemic, I pointed out that as a *symptom* depression was distinctly uncommon. Thus, whereas delusions and hallucinations were present in three fourths or more of the cases, depression was a clear symptom in only about one fourth of all the cases and in these it was rarely constant when present. It seems to have been relatively more frequent in the feebleminded who showed postinfluenzal mental symptoms (29).

Exception was taken to these figures by Fell (38), who, at the Walter Reid General Hospital, found that "in twenty cases depression was the by far most common symptom" and points to the work of Jelliffe (39) in confirmation. What Jelliffe says is that "it has seemed, not only in my experience but apparently from the many reports of others, quoted in part in the bibliography . . . that depressed states may be termed the most frequent of grippe psychic conditions." As a matter of fact this, then, is simply to say what we have just said above, that in the epidemics of the past years depression has been a symptom very frequently observed. The present question is whether it was a frequent symptom in this most recent epidemic. In 20 cases Fell's experience showed that it was.[2] In 175 cases our experience showed that it was not.

Aside from this, Fell's findings and ours coincided precisely, namely, that the characteristic picture was "hallucinatory confusion with schizophrenic symptoms." [Delirium schizophrenoides.]

Most other writers from the recent epidemic report in agreement with me. Harris (40) discusses the effects of influenza on the nerv-

[2] Of his 20 cases 8 were put in the manic-depressive group. Of our 175 cases only 10 were clearly cases of this group.

ous system, mentioning all sorts of neuropsychiatric complications and sequellae. In a review in the Boston Medical and Surgical Journal John B. Hawes, the phthisiologist, writes: "It is curious that, in this article, the author does not mention the intense mental depression, even with suicidal tendencies, which has been so marked in the epidemic in this country." A. E. Harris (41) analyses 18 cases of postinfluenzal psychoses as to symptoms and found depression the preeminent symptom in only three cases, whereas delusions and hallucinations were present in ten and excitement and mania in fourteen. Barnes (59) speaks of "neurasthenic reactions with an exaggerated depressive coloring" and recalls the conventional view that depressive psychosis has been the most frequently observed, but does not state his own experience.

Moreira (42) makes no mention of depression in his summary of his experiences in Rio de Janeiro. De Campos (43) mentions depression in a list of the symptoms, but does not refer to it in his summary.

Harris and Corcoran (44) analyzed fifty postinfluenzal psychoses at the Brooklyn State Hospital and found sixteen, or 32 per cent., to belong in the manic-depressive group. Closer scrutiny of details, however, reveals the fact that only three of these were melancholias and that the authors have considerable misgiving as to the correct placing in that group.

Waterman and Folsom (45) analyzed 51 cases at the Manhattan State Hospital, 12 of which were diagnosticated manic-depressive, 6 of which were depressed.

Valdizan (46) does not discuss depression as a symptom or disease in his studies in Peru.

Schlesinger (47) in Switzerland discusses the varieties of influenzal delirium and does not mention depression. Demole and Alikhan (48) did not find depression to be a frequent symptom of the mental disturbances caused by grippe in the insane. In another article, however, Demole (49) divides his groups into the melancholic and the aesthenic psychoses.

Ladame (50) includes a tendency toward depression, "idees noires," etc., during delirium and towards suicide, but of the psychoses themselves he does not discuss the depressed type. On the other hand he points out that the question is complicated by "psychic depression" dependent upon the demoralizing circumstances of the war and the general malnutrition of the people.

Ordway (51) analyzed 31 cases at the Boston City Hospital, out patient department. "Mild depression and restlessness" is mentioned in one case.

G. Roussy (52) discusses the neuropsychiatric sequellae of influenza in France and points out the relative infrequency of mania and does not mention depression.

Courbon (53) does not mention depression in discussing the nervous and mental complications of grippe.

Conner (54) observed, in a delivery of reports to the Surgeon General of 72 army hospitals in this country that many other nervous symptoms, "great apathy, mental dullness and somnolence marked the early stage of the attack in most cases, and with these symptoms there were usually also great depression of spirits and loss of 'nerve.'" In a few of the reports, insomnia is described as of frequent ocurrence.

Gordon (55) does not mention depression. Reilly (56), also speaking of nine psychotic cases, points out that "melancholia and sleeplessness were prominent" and the latter is emphasized.

Rossi (60) encountered nine cases in which a manic-depressive psychosis developed during the weakness following influenza. He ascribed it to the suprarenal insufficiency which was manifest. This assumption was confirmed by evidences of suprarenal insufficiency in six other patients with manic-depressive psychoses who had not had influenza. It was placed on a still more solid basis by the efficacy of suprarenal treatment (quoted from abstract in J. A. M. A., confirmed by personal communication).

In connection with the matter of cure, the case of Gauster (61) of "the cure of a severe melancholia by severe influenza" should be recalled. It is referred to by Stransky (62) who strangely has nothing to say for his own part relative to influenza and depressive psychoses.

Summary of Literature

A summary of the literature would seem to indicate three facts:

1. Many people, after influenza, experience an emotional depression with more or less general psychic depression for a greater or shorter period of time, but which is usually *not* severe enough to be regarded as a psychosis or even as a neurosis. It was ascribed thirty years ago by Church to cardiac incompetency, and since then by divers writers to various physical inadequacies, the most recent of which has been hypoadrenalism. It is generally agreed that it consists in feelings of lassitude, weakness, fatiguability, incompetence, irritability and melancholy.

2. After the influenza epidemic of 1890–92 there were many cases of psychoses in which depression was a preeminent symptom,

and although it is scarcely likely that all of the cases which were given the name melancholia wholly deserved it, it is possible that there were relatively more cases of "manic-depressive psychosis" than have been observed following the recent epidemic.

3. Depression has not been a frequent symptom in the psychoses subsequent to the recent influenza epidemic, nor has the manic-depressive psychosis been even a relatively frequent form of disease entity. The great mass of literature agrees on this point.

Presentation of Cases

Depression, we are now fairly well agreed, is a symptom and not a syndrome, at least not a disease entity. It may occur under much the same garb in neurosyphilis, hypophrenia, brain tumor, psychoneurosis, etc. As psychiatrists we are apt to think of it as characteristic of the cyclothymic group, the atrociously christened "manic-depressive" psychosis. For reasons of pragmatic advantage, then, and waiving all philosophical considerations of monism, dualism and the concept of entity, we may say that all depressions severe enough to be considered definite indices of mental disease, may be classed as:

1. Belonging to the syndrome of melancholia ("manic-depressive" or "cyclothymic" psychosis).

2. Belonging to some other syndrome of which it is merely a conspicuous, but not a characteristic symptom: e.g., paresis, brain tumor, psychic trauma, etc.

In short, all psychotic depressions are clinically either cyclothymic or symptomatic.[3]

Before presenting our cases, we should perhaps settle once and for all the matter of the non-psychotic depressions, if I be permitted this paradoxical and possibly wholly unwarranted phrase. I refer to the mild dysthymic manifestations persisting for a few weeks or months after influenza in some cases, and however frequent or however discomfiting, probably evoking more lament from the patients and less consideration from the profession than they deserve. I say this for the reason that they are scarcely ever severe enough to be regarded as psychoses, and hence are rarely seen by psychiatrists. Bonhoeffer (63) has wept in print over this, and as a fact they come all too infrequently to the undivided attention of the general practitioner. Casual and incidental references to such a

[3] I avoid the adjective "reactive" since it is more properly used as Meyer proposes, to connote the interrelations of etiology and diagnosis. I am trying to narrow this discussion down to matters of nosology purely, and that in a very broad sense.

condition are heard commonly enough, but I have taken pains to examine the records of representative men in general practice and internal medicine and I have questioned numerous such, and aside from a few cases that would very likely fall into groups of psychoneurotic or cyclothymic depressions, few cases come to them for postinfluenzal depression. Those cases where it is mentioned have been observed in a course of a consultation for some other complaint. Thus it is not infrequent for a patient with a postinfluenzal otitis media to complain also of depression.

Consequently, postinfluenzal depressions of the mild grade are not well enough known to anyone for us to be very dogmatic. Some interesting points are worth mentioning. They seem to recover spontaneously in a few months and they do not recur. They are not always of the depressed type. I have previously mentioned an incident reported to me of a typical though mild hypomanic state subsequent to influenza in a Jewish student never regarded as other than quite well mentally.

Returning now to the two groups of cyclothymic depressions and symptomatic depressions, I present, classified according to these groups, cases from our Boston series (19).

CASE 1. *Illustrating the precipitation of a cyclothymic depression by influenza in a man of 24 without known predisposition or previous attacks.* (This case is abstracted from a full account given in a previous communication.) (36).

Family History.—Negative.

Past History.—Negative.

Present Illness.—Ten weeks prior to admission he was very severely ill with influenza. He returned to work for two weeks, although still pale and weak, and then had a "relapse" and was again in bed with chills, sweats and fever. After this he was incapacitated, "thought he was dying," was easily frightened, probably hallucinated and certainly deluded. He wore constantly a pained, doleful, anxious expression. He had an imperfectly formulated delusion that he had recently contracted venereal disease. His thought processes showed a conspicuous retardation. He sat about the wards all day, with head hung, and without interest in anything. When obliged to move he did so with slow, irresolute movements, and with an air of lugubrious torpor. He was "blue," "lonely," "worried," "down-hearted."

Physical Examination.—Negative except for exaggerated reflexes and a tremor of the hands.

Laboratory Findings.—Negative.

Results.—His condition remained unchanged. He was removed against advice on the ninth day.

Diagnosis.—Depressed phase of cyclothymic psychosis (manic-depressive, depressed).

CASE 2. *Illustrating cyclothymic depression precipitated by influenza in a patient perhaps predisposed by temperament but without history previous attacks.*

Margaret, case 160, was a woman of 36. She was described as having "always kept to herself," and having periods of "feeling sad and blue." She had two children, 3 years and 15 months respectively, and was about 3 months pregnant again. Otherwise her medical history was unimportant.

In October she had influenza. After she had recovered, the family moved from Medford to Boston, but her husband did the packing to save her the exertion. She had felt increasingly depressed. She worried much because she seemed incapable of caring for her children. She had wanted to die, and even thought she might kill the children and herself in her despondency. She was finally brought to the hospital the last of April.

A *mental examination* confirmed the picture of depression, retardation, some anxiety; with a psychological rating of 11.5, hindered by her aprosexia. Orientation, memory, accessibility and conduct were normal.

Laboratory and physical findings were negative except for a few minor points which are interesting from the endocrinologic standpoint, namely, cyanosed hands, headache, "barely palpable" thyroid gland, blood pressure of 105/65.

Diagnosis.—"Manic-depressive psychosis, depressed phase."

CASE 3. *Illustrating a case of cyclothymic depression precipitated by influenza in a patient predisposed by temperament and with history of previous attack.* (Serial No. 133.)

This was a man of 29 born in Cambridge whose family and past history contained nothing relevant except for a period of depression lasting four months seven years previously.

In January, 1919, he had influenza and during the convalescence began to be depressed. He complained that his friends did not visit him and then decided he had no friends and became very sad indeed.

Although his physical condition improved his depression grew worse. He became retarded and then even paranoid. For two weeks prior to admission, March 31, he thought people on the street watched and followed him. *Mental examination* showed depression, retardation, paucity of ideas and a few scattered delusions of persecution. Otherwise it was negative. His psychometric rating was 18 plus. *Physical examination* was negative except for a slow pulse, 52.

He was discharged without improvement and against advice after eight days with a diagnosis of manic-depressive, depressed.

CASE 4. *Illustrating a profound depression in a patient whose previous history was not fully learned.* (Serial No. 49.)

This was a German woman of 57 who had a serious attack of influenza followed by pneumonia. A week after recovery from the latter she became noisy, unmanageable and suicidal. For this reason

she was brought to the hospital, where she showed none of these symptoms, but was profoundly depressed. She was hypokinetic, much retarded, and to most questions put to her she replied only with a low moan. She gradually improved and became more accessible and much less obviously depressed.

Physical Examination was negative. On the sixteenth day she was discharged.

It is interesting to note that a diagnosis of toxic psychosis (postfebrile delirium) was favored by two of the staff, presumably because of the rapid improvement. The question was raised as to the influence of the senium. Manic depressive, depressed, was the diagnosis favored by the majority of the staff (5).

CASE 5. *Illustrating the precipitation by influenza of cyclothymic psychosis of mixed type in a man without previous attacks.* (Serial No. 152.)

This man was an Armenian of negative family history and whose past history was said to be negative. In point of personality he was described as being "timid, easily excited, sociable, energetic and ambitious."

Ten weeks prior to admission he had a light attack of influenza. He developed the fear that he might have pneumonia and after his recovery continued in this fear. He became very worried and depressed and was very much afraid of dying. On January 12 he said his face looked like a dead face and a few days later expressed a disinclination to be with people. A week later he became self-accusatory with ideas of reference. It was nearly two weeks later that he was admitted and at this time he was quite disturbed, having spent the previous two weeks in a private sanitarium where he was said to have been uneasy, excited, profane and even violent.

At our hospital he was quite restless, showed a variable emotional tone, but was usually depressed, prayed much, seemed at times erotic, was frequently self-accusatory and had a few grandiose delusions. No memory defect was noted and there were no hallucinations. A diagnosis of mixed manic depressive was made.

CASE 6. *Similar to the above except that the psychosis was precipitated in a man who had previously had numerous attacks of a similar nature.* (Serial No. 50.)

This was a Russian Jew of 40 who three times previously in the past five years had been admitted to this hospital in a very similar condition. Each time he had cleared up and gone home to conduct very successfully a small retail store.

He had a brief, mild attack of influenza and during the convalescence became excited and then depressed, and entered the hospital in a typical mixed manic depressive condition. It was very difficult to tell whether he was very depressed or was about to become very excited. He would burst into a series of explosive sounds which some maintained were sobs and others that they were guffaws. After he recovered we asked him whether he had been laughing or crying and he laughingly said he did not know himself, but insisted that he had felt badly all the time.

He remained rather inactive, usually mute, said "I will be better in a few days and then I will talk," and made the most of his prolonged baths. On the third day he semed well, and after a week or so was discharged as recovered.

It is interesting to note that three months later he returned in a similar attack and was again discharged well after a very brief stay.

CASE 7. *A case of encephalopathic depression precipitated by influenza.* (This case is abstracted from a previous account where the case is reported in full.) (65). (Serial No. 168.)

Family History.—Negative.

Past History.—Woman, age 51, born in Italy, married at the age of 27, and had nine children living and well, one dead of acute indigestion and no miscarriages.

Present Illness.—Until September 10 the patient was considered well in every respect. On that date she went to bed with an acute attack of influenza. She then tried to get up after a few days but had "a spell" of an hour's duration, during which she was tremulous, "nervous," suffered from palpitation, and had a fear of death. This fear persisted and prevented sleep. She made many pretended attempts at suicide and finally one confessed bona fide attempt. About ten weeks after the onset of the influenza she was brought to this hospital.

On the day of admission, when she tried to cut her wrist vessels, "she was excited for the first time, and pushed her husband away and did not want to see any one." The admission notes at this hospital, condensed, read as follows:

"Patient is an agitated and apprehensive Italian woman who answers questions promptly and accurately. Since influenza in September . . . she has been depressed, afraid she would die, worried over her physical condition. 'I feel sick all time. I think I die. If I shut my eyes I see bad people with big eyes. If I go to sleep I wake up and worry and think never get well. It all is come for my stomach. If I eat I feel bad; if I don't eat my stomach empty, I feel better. My nerves are all excited and my nights are terrible.' She complains of palpitation, constipation and insomnia in addition."

Physical Examination.—Entirely negative, except that the knee jerks were not obtained.

Laboratory Findings.—Negative.

Course.—On the fifth day after admission the staff made the following vote on the diagnosis: Psychoneurosis, 2; manic-depressive, depressed phase, 1; undiagnosticated psychosis, 4. On the 19th, six days after admission, she was found to have a pulse of 140, a temperature of 104, and was apparently unconscious. In this condition she remained for over two days and died.

A necropsy was performed by the assistant pathologist to the Massachusetts Commission on Mental Disease, Dr. Myrtelle M. Canavan, and the brain in toto and in section was examined by the pathologist, Dr. E. E. Southard. The chief findings were: An extensive cerebral hemorrhage of large size with evidence of many petechial hemorrhages through the cortex, and bloody fluid in the

third ventricle. There were numerous "flea-bite-like dots" of blood between which the tissue was softened and of a gray to grayish-red color, as described by Leichtenstern. In addition, there was chronic fibrous endocarditis of left auricle and of mitral and aortic valves, old pleuritis, purulent bronchitis, gall stones in duct, slight vascular nephritis, aortic sclerosis, petechial gastric hemorrhages, hemorrhagic uterine lining, acute leptomeningitis.

CASE 8. *Another encephalopathic case of cyclothymia, in this instance exhibiting the manic phase.*

Family History.—American stock throughout. The father died at Westboro State Hospital when 84. He had a cerebral hemorrhage, no paralysis, lost his memory, thought people were coming into his room; said he saw apples being thrown up to him. Died in four months after admission. Occupation, traveling salesman. No alcohol. Seclusive, sensitive, suspicious, quick tempered.

Mother died of Bright's disease. Lively, sociable disposition. One sister living and well, aged 53.

Personal History.—Patient was born in Portland, Maine, age 49. Has always been "nervous."

Educational.—Her schooling was very irregular as she was "nervous." She would start to say a lesson, become shy and forget it. Was very sensitive to reproof. She left school when seventeen, at the end of the eighth grade. Part of the time she was in a private school, as she did not get on with one of her teachers, then returned to public school when the teacher left. The advanced age of graduation is accounted for by the absence from school.

Economic.—She learned the millinery trade, after that she was a children's nurse. Since her separation from her husband she had done nursing on confinement cases, working steadily and earning about $15 a week. For the past six weeks she worked at putting up tea and coffee, wages $9 per week.

Marital.—She was married when 21. Her husband left her 17 years ago. He was a moderate drinker, not a steady worker, and was away a good deal.

Children.—F., 27, an engraver, living and well, steady, non-alcoholic. D. (informant), 25, living and well. H., 23, in the U. S. army. R., 21, shipper in a drug store, living and well. No miscarriages.

Personality.—Patient is quiet, talks very little, has friends, likes to read, and goes occasionally to the theater. Is good natured and easy to get on with. Good habits, normal religious interest.

Medical.—In 1902 patient had a "mental attack" and was in Westboro State Hospital for 13 months. This attack came on suddenly and she became happy and excited; sang, tapping her foot to keep time. Heard bells ringing. No visual hallucinations. No ideas of reference, persecution or suicide. While in the hospital she was in straight jacket for three months. Before going to hospital she did not know her sister. After leaving she knew she had been "ill with her nerves," but was then as well as ever and unchanged. While in school she was subject to fainting spells, was

unconscious but had no convulsive movements. Ever since then she faints if frightened or in a crowd. She had menopause a little over a year ago with no trouble.

Present Condition.—Patient had influenza September 6, and was in bed a week. She remained in the house several days, then went out and was apparently well. Her mental symptoms began October 4. She was living with her sister and began to make fun and laugh at her in an unnatural way. She began to swear (not her habit) at every one. She rhymed, making no sense, sang, and seemed very happy. She slept when given powder. Ate unnaturally well. She talked continually of her son who was in the army, said he had been mangled to death; said he was in the Tuscania and had been drowned. At another time she made a noise like a boat whistle and thought it was his ship coming in. Noticed her surroundings. Memory good. Never said things that could not be understood. No ideas of suicide, poisoning or persecution. She said she had "starved nerves." Kept talking of going to work soon. She spent her time rocking in a chair, talking continuously even when alone, and would answer herself rationally, common conversation as if she had a caller. She did not work, but cared for herself. No history of shock, no hallucinations. When advised to come to this hospital by Dr. C. she remonstrated and refused to dress, but was persuaded by a neighbor to do so.

Physical Examination.—Entirely negative, including the neurological tests, except that the knee jerks were obtained with difficulty. The heart was 5 cm. by 6 cm., the apex being in the fifth space within the nipple line. The blood pressure was 140–75.

Laboratory Examination.—Urine, blood and spinal fluid were entirely negative except that there was a positive complement fixation test for tuberculosis.

Mental Examination.—Ward Admission Note—November 1: "Patient is euphoric, distractable, mildly hyperkinetic, has marked flight of ideas, is approximately oriented. This is October, 1918, near the 12th of the month. After attempting to give a name to the hospital she said, 'It is a place for me to get well.' Patient greeted examiner with, 'How do you do, I wish I could play the brass band for the cooties. Say, where am I anyway? What day is this? Oh! excuse me, I've forgot. I'm not a spiritualist, but I am the lightning bug of the XYZ. I'm a great thinker—no, I'm a peacherina—a pear and a peach together—hinkle, tinkle, winkle, red, white and blue," etc.

"Psychomotor activity increased during the day. Reported to have slept eight hours last night. Tearful when talking to examiner. Says she is nervous, but not insane, therefore, wishes her sister to come and take her out of this noisy place. Headache reaction to lumbar puncture, but will not remain in bed for long at a time."

November 2, 1918: Patient was lying quietly on the bed when approached by the examiner. As soon as an effort was made to engage her in conversation she began a rapid flow of words and phrases, showing a characteristic pressure of mental activity. Orien-

tation approximately correct. She says that this is the homeopathic hospital.

November 3, 1918: Restless, somewhat noisy at times, talking and singing, attention easily gained but difficult to hold.

November 4, 1918: 9 P.M.—Patient was seen in convulsions at 8:50 by night supervisor. She is now unconscious. Corneal reflexes absent. Respiration rapid. Has passed urine 9:05 P.M.—Has regained consciousness, though is confused. Mutters "Brittania" and many indistinguishable words. 9:15 P.M.—Again unconscious, respiration strenuous, corneal and plantar reflexes absent, no convulsive movements.

November 5, 1918: Seizure at 10:30 A.M., unconscious 5 minutes. Relatives now state that she has had "fainting spells" age of 15. Not as often as once a month. She loses consciousness, according to their history, but does not have convulsions though she often "looks as though she were going to." Does not bite tongue or pass urine involuntarily.

November 6, 1918: Pulse not good quality.

November 8, 1918: Patient died today, 10:45 P.M.

Diagnosis.—Manic depressed insanity—manic, with organic brain disease.

An autopsy was performed by the assistant pathologist of the Massachusetts Commission on Mental Disease, Dr. Myrtelle M. Canavan, and Doctors Noda and Uyematsu. The brain was examined by the pathologist, Dr. E. E. Southard. A large cerebral hemorrhage was found.

Autopsy Report.—Cause of Death: Cerebral hemorrhage. Acute Lesions: Cerebral hemorrhage, choked disc, focal congestion of lungs. Chronic Lesions: Coronary sclerosis, arteriosclerosis, cyst of liver, atrophy of ovaries.

Details of Brain Examination.—No hemorrhages under periosteum. Dura not adherent. Base of Brain: First nerves short, bulbs plump. Second nerves: ? Flattening of right optic, left negative. Left third nerve caught in thickened pia mater and bound to lobus pyriformis. Left fourth bound. Other cranial nerves not remarkable on gross inspection with the possible exception of right seventh which seems softened.

Marked pressure ring of cerebellum impinging upon the medulla, perhaps this pressure ring at a fixed point indicates there is a marked depression on the under surface of the medulla, perhaps due to the fixation of it and pressure of cerebellum against it; also lipping of both lobus pyriformes.

The left cornu ammonis is softer than right; neither of them firm. Brain has a rounded appearance, particularly marked in left side. Hemispheres appear unequal, left temporal tip shorter with suggestion of notching. Right occipital tip rounded and plump.

Vertebral vessels equal, unite far up *on* pons. Basilar vessel somewhat thickened, also middle cerebral but not beaded.

Superior Surface: Left hemisphere everts and rolls to left side, exposing a markedly distended frontal pole. There is a hemorrhagic area involving the cortex measuring 6 x 5 cm., the marginal

gyrus and the first and portions of the second frontal, also there is an area following the second on the superior cerebral veins for an extent of 4 cm. in length x 1.2 cm. in width in the post central gyrus. This subpial hemorrhage with cortical destruction follows this vein to the temporal lobe. Subpial hemorrhage is seen and suprapial hemorrhage seen extending over the remainder of the brain.

The left hemisphere is thinner but shows some pressure effects, i.e., flattening of gyri with some subpial and extra pial hemorrhage.

The corpus callosum appears firm. The cingula of left nodule prominent. Whole left hemisphere softer than right.

Brain weight, 1190 grams, Tigge's formula 8 x 148 : 1184. Gain 6 grams.

Left optic nerve shows some edema of disc and the right optic nerve shows more.

Attempt at withdrawing fluid from third ventricle yield whole blood.

CASE 9. *Illustrating another cyclothymic psychosis, manic phase, this time without evidence of encephalopathy and without history of a previous attack* (this case again is abstracted from a previous article where it was given in full) (36).

The patient was a boy of seventeen with an entirely negative family history. Aside from stammering, with which he was troubled from seven until thirteen his past history was entirely negative.

Present Illness.—He was working very hard all fall while in attendance at a boys' academy, but had kept in excellent health until October 1. At that date he contracted influenza and was very ill for three days. He was able to be out by the sixth day, but a cough and much restlessness continued. He played tennis, went automobiling and took a short vacation, but continued to show a distinct hyperlogia, making extensive plans for the immediate and distant future. On the twelfth day this became very noticeable. He "talked rapidly from one subject to another," spoke of being nervous and wondered if he wouldn't go crazy.

October 13, 1918: *Mental Examination.*—"I am absolutely perfect. Have a cigaret? Here are two strings which they gave me for a test. Hello there, Major. We are all going to be in uniform before night. How old are you? I am 17 years and 9 months today and in 3 months I will receive a commission. . . . Girls? Yes, girls by the thousand. Girls from Wellesley, girls from Dartmouth . . . no, there are no girls from Dartmouth . . . girls from Smith, girls, girls. We'll put this thing across, and have all those beds put in. Can you see it? Will you help it? Never mind, not necessary." (Whistles.)

The patient showed hyperlogia and hyperactivity, elation, playfulness, flight of ideas, distractibility, etc.

Diagnosis.—Cyclothymic psychosis, manic phase. Committed.

CASE 10. *Illustrating again the precipitation of manic phase cyclothymic psychosis, this time in a patient with a history of a previous attack of depression.* (Abstracted from the same source as above.)

This was a Jew of 25, happy and sunny in disposition who had had a distinct phase of depression lasting two months. While at Camp Devens, a private in the infantry, he contracted influenza and during convalescence manifested increased activity and elation which necessitated his transfer to Boston.

He was alert, accessible and loquacious, mildly elated and quite hyperactive.

Physical and Laboratory Findings.—Negative.

Diagnosis.—Hypomania.

CASE 11. *Illustrating manic attack in a patient who had had two previous attacks of depression.*

This was a physician of 45 in whose family history there were at least two instances of "probable" manic depressive attacks. He himself had had two previous attacks of depression, the last one in November, 1918. He returned home, worked very hard in the epidemic of influenza and contracted the disease himself on December 3. In spite of the fact that he was ill he worked on, and it was noticed that he was becoming very nervous and talkative by the tenth of the month. A week later he was admitted to the hospital in a very severe attack of mania. He rolled about on the floor of his room, jabbered and shouted until the saliva foamed at his lips and kept up a constant flow of conversation, vituperative or approbative, according to the stimulus. He was committed.

CASE 12. *Illustrating another cyclothymic psychosis of the manic phase, precipitated by influenza in a patient with cyclothymic temperament but without previous attacks.*

Male, 38, born in Russia. Negative family history. He was quite well educated (speaking eight languages) and while distinctly cyclothymic in temperament (voluble, very active, gay, etc.) he had never had a psychotic episode.

Influenza at Christmas time for three days, and again four weeks before admission, this time for two weeks. March 4 he complained of being "nervous," cried because someone "excited" him, and suddenly decided to go to Montreal. He returned from there in less than a week, and continued to be hyperactive. "He had the feeling that he wanted to be good to everyone and kissed nearly everyone who came into his shop."

At this hospital he showed typical elation, hyperkinesis, and acceleration of thought processes, without definite delusions or hallucinations.

Physical and Laboratory Findings.—Negative.

Committed with a diagnosis of manic depressive, manic.

CASE 13. *Illustrating a type of manic depressive psychosis which might be called "schizophrenic mania" or Cyclothymia schizophrenoides.*

This was a nurse of 26 whose brother had died insane at the age of thirty and whose family history was otherwise negative. Her past history was negative except that, during training, she had had scarlet fever and diphtheria.

Present Illness.—During the convalescence from influenza and pneumonia, which lasted 15 days, she became noisily talkative and restless. Two days later she was violent and destructive, deluded and hallucinated. She was alternately depressed and exhilirated, querulous and amorous.

She was admitted at once to this hospital, where she was uncooperative but accessible, hyperactive, denudative, irrelevant, distractible and without insight. She gestured and laughed much, was frequently silly, incoherent and incomprehensible, manneristic and notably erotic.

A provisional diagnosis was made on the fifth day—manic depressive, manic, 5; dementia precox, 1; undiagnosed psychosis, 2.

The final diagnosis here was manic depressive, manic.

Commitment was recommended.

At the hospital to which she was transferred she admitted that she had heard voices at the psychopathic hospital but denied hearing them any longer, and elaborated a delusion about marrying a certain man. She had a few periods of excitement but recovered sufficiently to be discharged after seven months "recovered."

CASE 14. *Illustrating another case of "Cyclothymia schizophrenoids," this time depressed type, precipitated by influenza.* (Serial No. 77.)

This was a Lithuanian housewife who had a prolonged but not very severe attack of influenza. It was nearly a month afterward that she began to be depressed and needlessly apprehensive so that she was brought to the hospital. It was difficult to understand her broken English, but not so very difficult to understand her sobs and pleas. She seemed to rapidly improve, however, so that on the fifth day of her stay, in the absence of definite hallucinations or delusions, the staff favored a diagnosis of postinfluenzal depression despite the late occurrence. In the writer's notebook the case is recorded as "probably manic depressive, depressed." She was discharged at the end of ten days apparently nearly well, only to be readmitted a few months later because of a persistent delusion that her husband was going to kill her, which was accompanied by a great show of tears. Her husband "would not let her have enough money, overworked her and mistreated her, poisoned her food, prevented the doctors from treating her, and, in short, felt like getting rid of her the easiest way possible." She was under observation for a month and continued to be apprehensive, deluded and depressed, at times indifferent, occasionally blocked. She slowly improved somewhat.

CASE 15. *Illustrating the "reactive" or psychogenic type.* (Serial No. 158.) This was an Irish woman of 34 who had undoubtedly been much abused by her husband, but who stayed with with him with the faithfulness so frequently observed in her sex and race. There was a suggestion of syphilitic infection but physical and laboratory findings were negative.

She was sick with influenza in October for four days, her tem-

perature reaching 102°. In December her daughter died, which was a great shock to her, and from that time on she was very much depressed. In spite of this her husband continued to be very abusive. For this reason it was difficult to determine whether or not ideas of persecution which she expressed frequently and which she dated back many years were delusions or expressions of fact. In addition to this, however, she showed profound depression with some agitation. She was undoubtedly suicidal and had made attempts in this direction. Her thinking was scattered and retarded. She was undoubtedly a case of manic depressive, depressed, tending toward the "reactive" or "psychogenic" type.

CASE 16. *A similar case, illustrating the reactive type of depression precipitated to a near psychotic degree by influenza.* (Serial No. 91.)

A pleasant and deferential young woman of 26, whose cup of trouble, especially domestic, has been rather overfull, but who shows no evidence of hypophrenia or seclusiveness. She was severely ill with influenza for five weeks, and since then has complained of floating specks before her eyes, aural discomfort with tinnittis and emotional depression. The worry over her misfortunes (past record—gonorrhea, etc.) became worse, interfered with her work, and she finally came here at advice of her physician. There was no suicidal tendency. She distinctly improved, although was still somewhat tearful at times. She always greeted the examiner with a smile and a cheerful salutation, was correctly oriented, not amnesic or misbehaved, and neither deluded nor hallucinated. The eye difficulty disappeared after mydriasis, and ophthalmoscopic, serological and physical examinations were negative. She was not hypokinetic, her train of thought not retarded. Not hypophrenic.

Summary of Psychological Examination.—The patient graded somewhat irregularly (V. T. 12) at a mental age of 13.5 years.

Physical Examination.—Negative.

At a full meeting presided over by Dr. E. E. Southard she was presented and it was finally concluded, in Dr. Southard's words, that, at that moment, "She is not psychotic, not psychopathic, but has a train of symptoms following influenza that have no more relation to psychopathia than the delirium of typhoid fever."

CASE 17. *Illustrating a simple depression in a simple mind, probably a cyclothymic depression precipitated by influenza, and an instance of the type of case frequently called postinfluenzal depression.* (Serial No. 118.)

Female, 45, born in Ireland.

Family History.—Negative.

Personal History.—Negative. "Always of quiet, even disposition, but always a worrier." Present status had been incipient for three months, dating from the time her daughter had influenza and she herself perhaps that, and perhaps merely a "cold." She had a slight fever and spent a few days in bed (?).

Two weeks later she began to be forgetful, disinclined to talk,

inactive, etc. Menses did not appear. She "looked sad," but denied it. Finally she was sent here by her family physician, upon the occasion of her wandering away from home twice, and walking aimlessly about the streets.

The mental examination showed mild depression, occasional slight retardation, but nothing further. Physical and laboratory findings were negative.

She was discharged improved after about three weeks.

Diagnosis.—Manic depressive, depressed.

Case 18. *Illustrating a depression in a tabetic precipitated by influenza* (Serial No. 48) (this case was previously reported in an article dealing with the effect of influenza upon neurosyphilis) (31).

A man of 50 who was diagnosed tabes dorsalis in a competent general hospital 15 months prior to admission here. At that time he had had incontinence of urine for three or more years, failing vision for two years, and typical neurological signs. He received ten treatments intraspinally and an indefinite number of intramuscular and intravenous injections. From his history it is presumed that the disease had been considered arrested and treatment discontinued.

After a brief attack of influenza he had been up and about for something over a week when he rather suddenly became excited, and agitated. He insisted upon discussing his syphilis with relatives, declared that he knew he never could get well, that his bowels hadn't moved for weeks, that his case was hopeless, etc.

With these delusions and an apprehensive, mildly agitated depression he entered this hospital. He was retarded and hypokinetic without striking abnormalities in other fields.

The diagnosis of the staff were: Manic depressive, depressed, superimopsed on tabes dorsalis, 3; depression with tabes, 6.

Summary

If we divide all the depressions into cyclothymic and symptomatic we find that there are four of the former and six of the latter. Of the manias there are four of the cyclothymic type and two of the symptomatic. To the representatives of cyclothymia must, of course, be added the two cases of "mixed" type.

From this one is scarcely justified in making any more sweeping deductions than that cases of affective psychoses precipitated by influenza are approximately equally divided between those corresponding fairly typically to the "manic depressive psychosis" of Kraepelin and Stransky and symptomatic depressions dependent more or less obviously upon gross physical pathology.

It is interesting to classify these another way. Of the six cases of mania, three had had previous attacks, three had not. Of the two mixed cases, one was a first attack and one a fourth. But, on the

other hand, of the ten depressions, nine were first attacks and only one had had previous attacks. This was case No. 3, which seems to have been a typical instance of cyclothymic psychosis. This is a very striking point, even though the emphasis is somewhat slurred by the small total of the figures.

Eighteen cases are not enough to justify any conclusions smacking of dogmatism, but the indication is that influenza may, at times, produce depressions of the manic depressive, or again of a symptomatic type, and that it is more likely to do this than to produce attacks of mania. It seems more likely to bring about first attacks of depression than first attacks of mania, but least frequent of all are recurrent attacks of depression.

It is interesting to emphasize statistically the infrequency of depressive psychoses, particularly the cyclothymic types, after influenza. Thus, of our approximately 175 cases of psychoses associated with influenza, something over 50 were cases of avowed schizophrenia, 10 of neurosyphilis, an equal number of drug psychoses, and 7 (or more) of hypophrenia. But as we have just shown, there were altogether only ten of the group "manic-depressive" and only four of these were depressions! Of all essential depressions there were only ten! We may add to our reiteration that depression as a symptom in the psychoses of influenza is comparatively infrequent the deduction that the affect psychosis, par excellence (manic-depressive psychosis) is itself comparatively infrequently precipitated by influenza.

Conclusions

1. The question of emotional pathology as the product of influenza is a point of much practical and theoretical interest.

2. Depression has been regarded as an almost universal sequella of influenza, but upon analysis it appears that three distinct types of depression should be recognized.

3. First, there are the mild syndromes frequently seen by the general practitioner in normal individuals for some time after the attack of influenza and variously ascribed in the literature to cerebral toxemia, cardiac incompetence and hypoadrenalism. These never, or rarely, become severe enough to be regarded as psychoses. Aside from these the number of cases of postinfluenzal depressions is remarkably small!

4. Secondly, there are severe depressions even reaching the frankly psychotic degree, and frequently terminated by suicide, which, because of more or less obvious dependence upon some gross

physical pathology such as cerebral hemorrhage, tabes dorsalis, exhaustion, etc., might be adequately called reactive or symptomatic depressions. The literature would indicate that these were far more frequent after the influenza epidemic of 1890–92 than they have been in the recent waves of influenza.

5. Thirdly, instances of manic-depressive psychosis of typical forms (manic, mixed and depressed), may be precipitated by influenza either as the first attack or as recurrent attacks in individuals with a history of previous episodes.

6. Cyclothymic depressions are more frequently precipitated than manic attacks, and are far more apt to be precipitated as first attacks; the manic or mixed forms on the other hand occur in equal numbers as first and later attacks.

7. The occurrence of manic depressive psychosis is, on the whole, relatively infrequent. Of 175 cases in our series of psychoses associated with influenza, only ten belong in this group.

8. Depression as a symptom in the other influenzal psychoses was relatively infrequent in the recent epidemics.

9. Eighteen cases, illustrative of emotional pathology subsequent to influenza are cited, and the literature of both previous and recent epidemics is summarized.

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REDUCTION OF NERVOUS IRRITABILITY AND EXCITEMENT BY PROGRESSIVE RELAXATION*

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It is generally admitted that there is a lack of adequate treatment for what is commonly called nervousness. Often the patient is told that there is nothing the matter with him, that he should go home and forget himself. If there is an apparent pathological condition, as in postoperative cases, little is done to quiet the nervous system, although the suffering here may outlast the organic. It is forgotten that relief from a functional ailment may aid the organism in its struggle against other disorders. In consequence of repeated futile efforts to get relief from legitimate sources, the public naturally turns to Christian Science, chiropractic and other charlatans or healers.

The medical public has generally considered the Weir-Mitchell rest cure a step in the right direction. Yet there seems to be a strange neglect on the part of that discoverer and his followers of the underlying physiology; the method seems to have been used in an empiric way, without penetration to the cause of its success; for, evidently, the aim is to achieve habitual relaxation, yet this word seldom occurs in his works or in those of most other neurologists. Accordingly, it seems logical to search in the direction of physiologic relaxation for a more direct and efficient means of bringing quiet to the nervous system.

This point was indirectly suggested by experiments begun at Harvard University in 1908, later continued at Cornell, and recently at the University of Chicago. The significance of relaxation was noted, and observations were made of the behavior of individuals as they progressed toward mental and emotional passivity. In this way we obtained objective signs of progress toward relaxation which we could compare with the individual's own reports.

It seems evident, when attention is called to the matter, that excitement and irritability of the cerebrospinal nervous system will

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show itself in the form of motor symptoms or signs. Striated muscles will be overactive, and speech or other functions will reveal the disturbance. There may be observed: wrinkling of the forehead; frowning; eyelids widely opened or tensely squinting; frequent winking; eyes moving restlessly or prolongedly staring; tightness of the lips, perhaps with a downward curve at the angles of the mouth; face muscles tense or quivering; speech rapid or broken, with variable or high pitch; frequent swallowing; the head held stiffly or moving restlessly; thoracic or abdominal breathing, rapid or irregular and violent; the limbs and trunk tense or shifting restlessly from time to time. This list, of course, is far from exhaustive. Overactivity of a group of striated muscles may show itself in quivering and tremor, in restless, jerky movements, or in a tensely fixed position. The observer may interpret what he sees and hears and say that the patient appears anxious or worried or fearful or mentally overactive. In everyday life we make such interpretations unawares, without stopping to note and classify how we do so. Accordingly, we may fail to note fine signs of nervous or muscular tenseness, such as restless movements of perhaps only a finger, or slight shifting of the eyes. It would seem that excitement, even if mild and chronic, cannot readily be concealed from an observer who makes free use of his eyes and ears, to say nothing of tests of reflexes and passive movements and palpation of tenseness of muscles.

Symptoms and signs of overactivity of the autonomic system may accompany those of the cerebrospinal system, but are familiar to all and need not here be described. It is rather the latter that have been neglected.

Overactivity or increased tonus of the central nervous system, as shown in tenseness or exaggerated or excessive movement of striated muscles, is subject to voluntary control. Every individual uses this natural function when he goes to rest. It would seem strange, therefore, if it could not be specially cultivated to counteract an excess of activity and bring quiet to the nervous system. Such is the aim of the present method. As may be readily noted, the neurotic individual has partly lost the natural habit or ability to relax. Usually he does not know when to relax, and cannot judge accurately whether he is relaxed. These things must be cultivated. Accordingly, it is usually futile to tell the sufferer to relax or to have him take exercise to this end in gymnasiums. Furthermore, relaxation as heretofore understood is not adequate as a clinical method. Following previous standards, a patient may

be apparently relaxed in bed for hours or days, yet be worried, fearful or otherwise excited. In this way the individual has been wrongly considered relaxed, overlooking voluntary or local reflex activities shown by such slight marks as wrinkling of the forehead, tenseness about the eyes, or restless shifting of a limb or even of a finger. The present method notes such signs in attempting to bring about nervous and mental quiet.

According to my experience, if the patient is shown how to relax the voluntary system, there later tends to follow as a rule a similar quiescence of the autonomic apparatus. Emotions tend to subside as he relaxes. To be sure, there may be a vicious circle: autonomic overactivity seems to stir up local or general cerebrospinal reflexes, and these again autonomic reflexes. The one system must become quiet before the other system can become quiet. So in certain chronic cases, relaxation becomes a gradual progress, a matter of habit formation, wherein the presence of pain or disordered internal secretion or other organic disturbance may partially or completely block the way.

In this connection it seems pertinent to inquire what is the relation of nervous and muscular relaxation to the quieting of mental excitement? We are reminded that the relaxation of natural sleep as well as that produced by narcotics and anesthetics is accompanied step by step by mental quiet. Furthermore, the question apparently can be answered by taking into account observations familiar to experimental psychologists. For example, Meumann (1) observes, "The occurrence of tenseness (Spannungen) in the muscles of the body accompanies concentration of the attention." He refers to the muscles of the sense organs, eyes, face, limbs, neck, jaws and others. In certain of the experiments mentioned, I found that as such motor signs subside, the individual's mental activity or attention diminishes (2). If they subside sufficiently, he naturally falls asleep. Similarly, according to my clinical experience in about twenty-five cases, as motor signs subside the individual becomes less excited and irritable.

In calming mental excitement by physical relaxation, two difficulties must be overcome: 1. The patient will not be able to relax at first if it is not possible to remove the stimulus to the mental irritation. The unfortunate person wishes to worry and fret, wishes to find a solution of his problems, and in so doing becomes tense, as may be externally observed. In the presence of grave troubles, as is well known, it does little good to tell the afflicted one to stop thinking, to stop fretting. On the other hand,

he may be more readily shown how to bring about this mental control through physical relaxation. 2. According to my observations, apparent contraction of the muscles of the eyes, lips and facial expression play an important rôle in mental irritability and excitement. Some patients have called my attention also to those at the back of the head and neck. It is of course by expression in these parts, by varying tenseness and relaxation, that persons are accustomed to convey their meanings, so that in the face of the individual one may read his state of mind. The muscles here involved are small, and the sense of contraction is relatively faint. Accordingly, it sometimes becomes a delicate matter to make the patient recognize tenseness in these small muscles. He may lie on a couch with limbs, trunk and neck well relaxed, but with slight wrinkling of the forehead or quivering of the closed eyelids indicating the presence of mental activity. Special drill may have to be given at this point in chronic insomnia.

It is of course true that the average person does not know when he is tense. Psychological experiments have made clear how sensations of tenseness or contraction constitute some of the very essence of the process of thinking, but this does not mean that the thinker is aware of the sensations as such. In the present method the patient is made aware of sensations of contraction, and later may observe such contractions taking place while he thinks or is excited. He may note how tense he becomes, and his attention, thus drawn to the point, leads him to relax or again, when he becomes tense, the habits that he has newly acquired may lead him automatically to repose.

When the unpracticed person lies as quietly as he can on a couch, it is found from external signs and tests that the relaxation is incomplete. There remains over what may conveniently be called *residual tension*. The same may also be inwardly observed, of course, through the kinesthetic sense. Many years of observation on myself have suggested that insomnia is always accompanied by a sense of residual tension and can always be overcome when one successfully ceases to contract the parts in this fine degree. Residual tension, accordingly, appears to be a voluntary fine contraction. On the other hand, of course, it may be reflexly stimulated, as by pain; yet relaxation may be of service even here.

Doing away with residual tension is, then, the essential point of the present method. This cannot happen in a moment, even in the practiced person. The tension only gradually disappears; it may take fifteen minutes progressively to relax a single part, such as the

right arm. The desired relaxation begins only at the moment when the patient might appear to an inexperienced observer to be very well relaxed.

The present method consists of voluntary continued reduction of contraction or tonus of muscle groups and of motor or associated portions of the nervous systems. The relaxation is progressive in three respects: 1. The patient relaxes a group, for instance, the biceps-brachial of the right arm, further and further each minute. 2. He learns consecutively to relax the principal muscle groups of his body. With each new group he simultaneously relaxes such parts as have previously received practice. 3. As he practices from day to day, he progresses toward a habit of repose. He tends toward a state in which quiet is automatically maintained. In contrast with this, the individual who indulges in unrestrained excitement renders himself liable to further increase of excitement. This is the familiar physiologic law of augmentation.

Before learning to relax any muscle group, the patient is first made to contract it, with closed eyes noting the sensation from the contraction (3). This accomplishes two things: 1. It enables him to recognize the location of tenseness during moments of excitement and so specifically to relax that part. 2. It brings home to him that the tenseness which takes place in nervous or mental excitement is a part of his own voluntary activity and therefore can be relaxed.

It has not seemed best to me to secure the patient's cooperation by suggestion and promises. Rather, his symptoms of overactivity are pointed out, if he has not already noticed them himself, and he is shown how to do away with them in an independent manner. In this way improvement takes place *pari passu* with progressive relaxation and not by dint of suggestion. To be sure, the present method may be combined with suggestion or other psychotherapy, with drugs, surgery, or with whatever may be required.

Instructions may be carefully but colloquially worded. The patient is directed to relax the part or parts "further and further each minute." Movements soon come to be recognized as interfering with relaxation, but he is not to make any effort to hold himself still. No task is set, but rather he is "not to bother to do anything with his arm" or "not to bother to look at anything." For example, after most of the muscle groups have been covered, the instructions delivered quietly and with many pauses may be: "Now relax your right arm in front and in back, above and below! Just let it go further and further every minute! Let the left arm go! and the right leg; the calf and in front; and the thigh—in back and

in front—and the hip behind and in front! Let the left leg go also! Don't bother to do anything at all with your arms and your legs! Now let the back become as limp as a rag! And the abdomen and the chest: just let your breathing go of itself! And your neck! Let the head go completely! And the forehead! Don't bother to wrinkle your forehead! The eyes! Let them go completely! Don't bother to look anywhere! The tongue and lips and face! Just let the throat go entirely!" Of course, instructions vary according to the progress of the patient and the location of tenseness. The practiced person aims to note the location of tenseness himself and to do away with it. However, he is not to concentrate his attention on his muscles, since this requires effort, which is to be avoided. He is just to let go and not even to "bother" if he fails to relax. All effort, including effort to relax is, of course, to be avoided.

Relaxation may be called general when the whole body is on a couch or bed. Perfect general relaxation does not take place. As repose progresses, the individual tends to fall asleep. Occasionally some persons, even insomniacs, do so in the very first hour of practice. Individuals differ, some being able to relax better in the absence of the physician. Needless to say, no suggestions to sleep in the technical sense are given, and no *rapport* is established.

Relaxation may be called relative when the patient is active, provided only such muscles are in use as are needed. For example, a pianist may be excited while he plays, as shown by a frown, frequent restless movements of the head, and needless shifts of position; or he may play in a relaxed manner. After acquiring general relaxation, the patient sits up with eyes closed, and is practiced in relaxing one muscle group after another, as before. Those muscles engaged in maintaining posture need not be markedly relaxed. Thereafter the patient may open his eyes and engage in conversation while the physician watches closely for signs of undue tension, drawing notice to these when they appear. Again, the patient may be observed while at some occupation and shown how to keep relatively relaxed during his activities. In this way he may avoid irritability and excitement, forestalling periods of nervousness even while he continues to be active.

What is the relation of suggestion to the present method? The use of suggestion is to be carefully avoided. One need not tell the patient that he will benefit. It suffices to show him how to relax. The student of the subject will know that relaxation does not depend on suggestion, but rather is a fundamental or elementary physi-

ologic process. It may be found in low grade forms of life, such as nerve muscle preparations in the laboratory, where no question of suggestion can arise. Of course, in the human organism neuromuscular relaxation may be brought about under appropriate conditions by means of suggestion, as well as by change of scene, good fortune, sedatives, baths, psychotherapy and other means. However the present method rests not on such means, but simply on cultivating the natural ability of the individual to relax his parts.

The relation of the present technic to what is popularly called relaxation and to the methods of a few physicians who have recommended muscular relaxation will be discussed in a later paper. It is important to avoid confusing what I have called progressive relaxation with means previously taken to get the patient to relax; for hitherto, as a rule, residual tension has been overlooked, although doing away with this is the *sine qua non* of thorough and successful treatment. Apparently it is possible for an individual to remain inwardly excited—worried, enraged, anxious, or restless—unless residual tension has been overcome.

Treatments vary in duration according to the condition of the patient and the time at the disposal of the physician. In my own practice they have taken from one half to two hours, one case requiring as few as two treatments, another as many as ninety. However, for general practice the periods doubtless may be shortened to twenty or thirty minutes.

The method may be abridged in any one or more of four ways: 1. The patient may be shown how to recognize tenseness serially in the principal muscle groups of the entire body and how to relax them, in a single session or two. This may suffice for quick results in acute cases. However, in stubborn cases it has been my practice to devote the first session to one arm or a portion thereof. 2. Cultivation of the ability to recognize tenseness may be omitted. 3. In its simplest form, the method consists of directing the patient to relax whatever parts appear to the physician to be tense, without previous training as to muscle groups, and without noting his sensations. 4. A simple way to shorten the procedure is to select only a few representative muscle groups for practice. For instance, only the biceps-brachial group in the arm may be used, and only the calf muscles in the leg. In this way the patient proceeds at once to relax the whole arm when he begins to relax the flexors of the forearm. The assumption here is that progressive relaxation of one part tends to bring with it a similar condition in other parts.

The present method may be used in conjunction with any other

form of treatment. It is not offered as a panacea for mental disorders, and is submitted in the hope that it will be thoroughly tested by others in cases for which it is found suitable. In several of my cases there have been relapses, and in at least two improvement was but temporary, possibly because treatment was not long enough continued. It would seem to be too early to present a statistical record of results. The reason for presenting this method thus early is not because of the results obtained, although these have been satisfactory thus far in most cases; but rather because observation of the behavior of the neurotic individual suggests the importance of the principle of relaxation. Relaxation for nervousness may be like diet or hygienic measures in gastrointestinal disorders. The permanence of the results may depend on the care with which the physician gives his instructions, and the zeal with which the patient follows them.

It is hoped that this method may be adapted to the use of the general practitioner. However, time and patience are required; the physician himself must know how to relax before he can show the patient. The principle is simple and obvious, but the technic involves many points for thorough operation (4).

Report of Cases

Case 1.—Mrs. Z., an excitable, restless and talkative society woman, who feared the approach of the menopause. She is subject to occasional pyrosis, pruritus ani, frequent urination, and to seasonable spells of hay fever and bronchitis. General physical examination was practically negative, including blood, urine, and x rays of chest. She is somewhat obese.

Since she gave a history of a homosexual strain and anomalous sexual difficulties dating back to childhood, treatment was begun with psychoanalysis. This seemed to assist toward better mental adjustment, but left her excitable and overactive as before. A more restful attitude and a more quiet deportment have been secured with progressive relaxation, in weekly or bi-weekly sessions for six months.

Case 2.—A case of compulsion neurosis in a woman aged thirty-one. An excavated ulcer near the middle of the right sternocleidomastoid muscle, about 3 by 1.5 cm. in size, was caused by picking at it with her fingers. A few small scars remained on the face from previous self mutilations. Torn between two loves, one for her husband from who she was perhaps to part, she was wretched

with indecision. As these mental causes of disturbance could not be removed, she was shown how to relax. Her attention was called to the physical manifestations of her excitement and worry, including the nervous movements of her hands toward her neck. She did not succeed in acquiring relaxation of the eyes and face sufficient for marked mental repose, but after a month's treatment she felt that her equilibrium was restored and she returned to her work and domestic problems with no further medical assistance for many months. After relaxation was begun the ulcer rapidly healed, with the aid of hot boric acid dressings.

Case 3.—This illustrates the use of progressive relaxation in addition to drugs in organic disorders. A woman, aged forty-three, complained of attacks of fearful palpitation accompanied by tremor, chilliness, nausea and fear of death, as well as trembling in the epigastric region. These attacks began three years ago when she was jaundiced for a whole year. Salpingectomy in 1912 followed chronic suppuration. Examination disclosed, principally, loss of weight, hemorrhoids, and purulent fissure *in ano*. Wassermann test ++. There was no other marked abnormality. The patient was of course reassured that there was no organic affection of her heart. She had heard this from previous physicians. She received three half-hour treatments per week of progressive relaxation. Practically from the outset, with few exceptions, she became able to avert the attacks and to relax away the symptoms of anxiety. The case is still under treatment. In this manner it has been possible to proceed in an unimpeded way with mercury and iodids.

Case 4.—Insomnia and restlessness in a girl, twenty-six years of age, under general treatment for early hyperthyroidism. She complained of daily spells of nausea for many months. Among the diagnostic signs were: moderate general enlargement of the thyroid, a somewhat rapid pulse, afternoon rise of temperature, flushing of skin, positive Goetsch test and alimentary hyperglycemia following the glucose test meal. The first basal metabolic test was 18 above normal. The gastric content lacked free hydrochloric acid. X rays of lungs, stomach and intestines were negative, as also Wassermann and tuberculin tests. The uterus was in retroversion.

Foci of infection were removed from the teeth, and a prolonged rest cure given, with early use of x rays on the thyroid, later quinine hydrobromide, sodium phosphate and empirical remedies for the nausea.

Before I saw her, the patient had received bromides and other sedatives for insomnia and restlessness. She complained that these

drugs failed to quiet her at night, but depressed and confused her mind by day. Accordingly these drugs were stopped, and the insomnia was relieved at once after one or two treatments with progressive relaxation. She soon regained her former mental buoyancy. Treatments have been continued toward perfecting her ability to relax.

Case 5.—This illustrates the obvious application of progressive relaxation to the treatment of tics. The patient, a married woman, aged thirty-one, had a spasmodic, rotatory movement of the head at irregular intervals of years' standing. It was apparent that she was generally tense. After she had learned to relax her limbs, she failed to return for further treatments, owing to illness in her family. When last seen she reported that with daily practice at relaxation the movement had been largely absent. This perhaps indicates how relaxation of one part—here the limbs—may bring with it relaxation of another part—the muscles that move the head.

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Society Proceedings

NEW YORK NEUROLOGICAL SOCIETY

THREE HUNDRED AND EIGHTY-SIXTH REGULAR MEETING

HELD AT THE ACADEMY OF MEDICINE, FEBRUARY 1, 1921

The President, DR. FOSTER KENNEDY, in the Chair

PRESENTATION OF CASE OF INFANTILE NUCLEAR APLASIA OR INFANTILE MOTOR DEFECTS IN THE CRANIAL NERVES

DR. I. ABRAHAMSON considered this condition a congenital and hereditary one, often affecting many generations. According to Zappert the ocular defects are the most frequently observed and occur with preference where there has been a neuropathic family history. Alcohol or lues play very little part. Infantile nuclear aplasia is often combined with other congenital defects, such as hernias, genital dystrophies, muscle defects, aplasias of other organs; while facial defects are often combined with malformation of the ear or temporal bone. Facial hemiatrophy has been observed; also skin changes. The face may look atrophic and mask like. Moebius first described the condition in 1892 as infantile nuclear aplasia. It has been shown, however, by Schultz, Bernhardt, Zappert, and others that this is not anatomically, or invariably, true. A nuclear lesion need not be primary even if it can be proved to exist. The nucleus, motor nerve and muscle are a biological unit. In the peripheral facial palsy all three branches are affected; in the supranuclear (central) and in many bulbar palsies the lower two thirds are mainly affected; in the congenital motor defects the upper third is motionless, the lower two thirds still may functionate.

The little patient presented, a girl, four years and nine months old, showed a characteristic facial expression. She also had had nursing difficulties due to the facial involvement, and epileptic seizures, another common feature of the condition. The birth had been normal by new gas treatment (not twilight sleep). The baby cried at once. No otitis was reported. At three months of age the facial palsy was first noticed on crying or laughing. Teething occurred at seven months, standing at eighteen months, walking at twenty-two months, speaking at ten months. She was normal in every way except for the facial palsy and is very bright today men-

tally. During rest the mouth is not crooked at first, then draws up to the right side. The left aperture is greater than the right. There is a flattening of the face on intention; the left facial middle section reacts more quickly than the right. On closing the eyes the face is drawn up on the right side, while the left side is flattened. On laughing, the difference in the two sides of the face is greatest. The involvement may be designated as belonging to the eye, face, and tongue group. There is weakness in both external recti, especially the left. Lateral movements are poor, although up and down movements can be made without difficulty. The jaw jerk is more lively on the left. The forehead cannot be wrinkled at all. There is an atrophy of the left side of the tongue with a deviation of the tongue to the left. Faradic irritation is present, and the tip and abductors give normal reactions. The case belongs to the congenital nuclear amyotrophies, and the question raised in Dr. Abrahamson's mind was whether an anastomosis with the spinal accessory nerve would be worth while. He was not very optimistic about the operation in this case.

Dr. Foster Kennedy said that he had seen something of such cases and thought that it would be unwise to embark on operative procedure. What is obviously present in some of the nuclei is probably present in others and the grafting operation might be without avail since the graft material might also be affected. The deformity, he felt, would probably become less as time went on.

Dr. Walter Timme asked whether there had been any diplopia.

Dr. Abrahamson answered in the negative. He said that at the time of the patient's birth an epidemic of poliomyelitis had been raging which persisted for some time later. The patient's mother had made every effort to keep the baby away from other children on this account. The possibility of intrauterine infection Dr. Abrahamson touched upon as well as the possibility of infection in early infancy, but felt that these were practically negligible.

THE WIDENING FIELD OF NEUROLOGY

Abstract of Address of the Retiring President

Dr. Walter Timme first recalled certain of the noteworthy meetings of the past two years. He paid special tribute to the memory of Dr. Southard and the last hour he spent with the Society just a year ago. The radium treatment of nerve tissue tumors as described by Dr. Ewing and his associates he considered a contribution of inestimable value. Some lack of advance in purely formal neurology there may have been, due to pessimism concerning the efficacy of the treatment of organic central nervous disturbances. The age has shown the tendency of mathematical application to the diagnosis of human ills rather than to their correction. The philosophy of nervous affections, studies of personality, psychoanalytic aspects of nervous disease, analyses of character defect have all had their reflections at the meetings. The recognition of a new disease entity, lethargic encephalitis, however, has urged attention once

more to the intensive study of the physiology and pathological anatomy of the central nervous system. In this field the work of J. Ramsey Hunt on the basal ganglia and the expounding of a new theory of kinetic control, and the monumental work of Tilney and Riley, the first of its kind, on the forms and functions of the central nervous system are matters of great achievement.

Perhaps the most important of the activities of the Society during the past years has been the entrance of neurologists into the social-industrial-economic field. The threatened socialism of medicine has brought the physician into direct contact with law, politics and the government of the state, and it is of the utmost importance that if the physician is to be controlled by certain laws he should assist in framing them. The public has the right to know why the physician considers himself the guardian of public health rather than various naturopaths, osteopaths, chiropractics and so called scientist healers. We must meet our wards in their every day life, guarding them from dangers of employment, of transmitted disease, and those of social environmental origin. The Society has established two committees as an initial step in the task, one on occupational neurological disease, and the other on neurological standards, or the minimal standards of neurological training with the necessary basic education. The committees have begun their work and it is to be hoped that there will be added in the future a legislative committee to make the results of the work of the two other committees effective.

Finally, the Society has not only inaugurated the Association for Research in Nervous and Mental Disease, but this association has held the first meeting and has presented the findings of the symposium (in this instance on lethargic encephalitis) before a representative gathering. Neurologists of the entire country, and some in Canada and England have been interested by a novel method of procedure adopted by the association, viz., the commission method of jury investigation into the merits of each scientific presentation, in which the proponents are questioned as to their methods of work, their observations, and conclusions. This method, which has been used with success, is being made the model of many old time medical societies as the best and most economical in time expenditure, and the most meritorious that has yet been devised in the scientific results obtained.

AN ADDRESS BEFORE THE NEW YORK NEUROLOGICAL SOCIETY

Abstract of Address of the Incoming President

Dr. Foster Kennedy taking as his point of departure the findings of the Association for Research in Nervous and Mental Disease on encephalitis lethargica proposed to examine the knowledge available concerning the routes by which organic and inorganic bacteria and toxins gained admission to the central nervous system.

It was found that the bulk of individuals with encephalitis had evidence of an injury to the mesencephalon, to the striate bodies and to the red nucleus. The first sign of infection other than general malaise was usually diplopia dependent on a disintegration of function in the oculomotor nuclei, a district not considered easily accessible to exogenous poisons. The explanation for the attack and the route followed was not made clear, it was merely assumed that the poison or group of poisons responsible for the disease had unknown properties of specific chemotropism for the nerve structures initially damaged. This explanation is not enough. When the anatomical and physiological properties of nervous tisues were first under investigation little or nothing was known of infection, and the constant warfare between the cells and humours of the body and the host of microscopic and ultra microscopic organisms not even conceived of. The morbid courses of infections are for the first time becoming explicable to us by the portal of the endocrines. A consideration of the pathogenesis of the infections of the nervous system may reveal a unity of morbid process in many ailments clinically unlike, a pathological synthesis as valuable as the anlayses of symptoms customarily made. The reaction of each individual varies with the different physical personalities, possibly in accordance with the different kinds of endocrine balances in each of us. But the minute variations require training to detect the differences between similar appearing objects. Individual reactions to toxins from without will then become visible, reactions which we now look at but do not see. Further, just as one man differs from another in his reaction to infection, so in a single organism there are a host of unknown and little thought of circumstances which determine the incidence and distribution of the lesions,—a case of Addison's Disease has tuberculosis of the adrenal gland but one would like to know why tabes mesenterica, or a fibroid phthisis are not present instead. A statement of such an example shows our modern wish to be dissatisfied with the mere nomenclature of disease and our desire to dig into the basic study of the conditions of liability and resistance to infections in the various tissues and organs of the body.

The most common route of infection of the central nervous system is by the airways, guarded by the cilia of the mucosa and perhaps the mucoid material with which the mucosa is lined. It is probable that ferment action from dead or living bacteria effects the first rent in the epithelium giving access therefrom to the lymphatic and blood systems. Over the respective rôle of these two systems in conveying noxious material there has been much controversy. It would appear that the defensive mechanism of the choroid gland in excluding all hematogenous material unsuited to its purpose coupled with the anatomical continuity of the lymph system with the cerebrospinal pond, make it more than a working hypothesis that by the perineural and endoneural lymph channels of the cranial and spinal nerves toxins can reach with unfortunate ease the cerebrospinal axis. Attempts at producing brain and cord lesions by the intravenous injection of bacteria have failed on account of

elective filtration of the choroid plexus whereby large colloid molecules are forbidden access to the central nervous tissue, and the whole group of albuminoid toxins are thus cut off from direct invasion of the brain space. These large molecules can pass easily through the walls of capillary vessels thus breaking from the blood to the lymphatic chain. This permeability of the capillary wall is an important factor in the mechanism of many infections, notably of tetanus. Trismus, one of the earliest signs of the onset of generalized tetanus even when the initial lesion has been in one of the lower extremities, appears to be an evidence of a blood borne toxemia though the mechanism by which the motor root of the fifth nerve is thus early irritated is not clear. In diphtheritic nerve intoxication oculomotor palsy is a constant feature, and the infection of the third nerve nuclei in epidemic encephalitis is common. This especial susceptibility to react to general infection may not be due simply to delicacy of structure but may depend on anatomical avenues for invasion as yet not comprehended. The diphtheric infections studies by Walsh in the Palestine campaign, often taking the form of so called desert sores gave nearly pure cultures of Klebs-Loeffler bacilli, and numerous cases of peripheral neuritis ensued. Most important was Walsh's observation that invariably there was an initial focus, a local paresis related anatomically to the site of the infective focus, a circumstance suggesting the perineural lymph stream as carrier to the nervous elements. The poliomyelitis virulence of the mesentreic lymph glands of subjects whose blood is innocuous is another circumstance of moment.

Two cases were described where diphtheritic infection was followed by local polyneuritis and with these Dr. Kennedy correlated certain other cases described as acute infective neuronitis. These occurred as a minor epidemic among soldiers in the field and were characterized by fever, peripheral neuritis and ascending signs of involvement of spinal roots and ganglia. A constant feature was peripheral paralysis of the face and of the lower muscles of deglutition. The pathological picture resembled those obtained experimentally by Orr and Rows in their work on lymphogenous infections.

Dr. Kennedy felt that it was a particular detriment to science that medical talent had developed into a variety of fields distinct and separate from each other, and that no adequate head quarters had been evolved where reports could be received and correlated. The modern student receives instruction in animal physiology from physiologists who never enter a ward, in chemistry from chemists often without interest in either physics or biology. This segregation of different branches of learning is continued into adult professional life. As a society for the advancement of learning it would be to our advantage to arouse interest in our problems among physiologists and biological chemists, among pathologists and anatomists, even to include them in our body. Their science would be made humane, our medicine more scientific.

NANISM OF PITUITARY ORIGIN AND OR PALTAUF TYPE COMBINED WITH A POST INFECTIOUS STRIATE SYNDROME

Dr. Walter M. Kraus reported the following case:

History.—Joseph Gowdy, twenty-eight years of age. This patient was normally born and is said to have been normal up to the age of eighteen months. At this time an attack of whooping cough confined him to bed for three months. Contractures, involuntary movements and so called paralysis followed. He had pneumonia two years ago.

Family History.—Mother died at the age of fifty-two, of a second stroke and paralysis. Father died at the age of fifty-two of cirrhosis of the liver and chronic alcoholism. There are two brothers and one sister, all living and well. One brother died in infancy. He is said to have been normal. The patient came to the surgical wards of Bellevue Hospital for treatment of an abscess of the neck and was then transferred to the neurological service.

This case represents two pictures which are described separately for the sake of clearness. The first condition is that of dwarfing, nanism. A few of the autopsy notes from Paltauf's original description of the condition are first quoted, giving the identical or similar elements in this case later on.

Paltauf's case was described in 1891—thirty years ago. "He had been for twenty-one years servant to a Colonel of the Austrian Army, and had served through two campaigns in this capacity and had subsequently worked as a gardener. He had twice suffered from rheumatic affections of the knees and subsequently, on two occasions, from general edema. In both instances this was relieved after a few weeks. Three weeks before coming under notice, however, the general edema returned, and for it he was admitted to the Hospital. He died twelve days later. He showed the following peculiarities: height (at the age of forty-nine) forty-five inches, taken during life; for the head: horizontal circumference—twenty-one inches. There was a slight scoliosis with convexity to the left in the upper dorsal region; the lower dorsal and first lumbar vertebrae showed a slight compensatory curve, convex to the right, while the lumbar column showed, in addition, marked lordosis. The development of the external genitals was that of childhood; the prepuce was phimotic; the left testicle was in the scrotum, the right, in the inguinal canal. Autopsy showed, in addition to dwarfing of growth, "chronic lymphatic glandular tuberculosis, acute disseminated pulmonary tuberculosis, hypertrophy with dilation of the right side of the heart, fatty degeneration of the myocardium and recent hemorrhage into the pons. . . . The head was relatively big, the face short and broad, with prominent malar bones, the bridge of the nose was depressed, broad and saddle shaped; the nose itself was blunt. The neck was short, the thorax convex, at least in no wise flat. The abdomen was hemispherically arched forward. Apart from general edema and other changes stated, there were no noteworthy abnormalities in any part except the skeleton. The

thyroid gland was, however, 'very small and pale red.' It is enough to say that as a whole compared with the normal, the skeleton corresponded to that of a boy of seven years of age" (quoted from Riechbieth).

The patient presented at the meeting showed the following findings, taken in the order in which Paltauf described them.

Height: Fifty and one-half inches as compared to forty-five inches in Paltauf's case. (This is the normal height for a boy between ten and eleven years.)

Lordosis and scoliosis.

The genitals of a child. There was almost complete phimosis, the opening in the prepuce being just visible. The testes are very small, the left is in the scrotal sack, the right in the inguinal canal.

There was an abscess in the right supraclavicular fossa which had been opened and drained within the month. It was probably tuberculous in origin.

The features were of the same type and the skin is wrinkled and pigmented like that of an old man.

The mentality is normal. Joe is very alert, was graduated from the public schools, reads books such as are understood by the normal adult and has a good sense of humor. He is now reading "Mrs. Warren's Daughter." He can beat most of the other patients on the ward at checkers. Our impression of his mentality is that it is normal. His voice is high-pitched.

These findings establish the type of dwarfing. His appearance and mentality rule out cretinism. His mentality differentiates him from the Lorain type who are childish in their mental development. The sexual development rules out the simple ateliosis of Hastings Gifford.

As to etiology, Riechbieth, in his long monograph, published in 1912, and dealing with dwarfs of various types, remarks as follows:

"There remains as the possible primary cause of ateliosis, abnormality or defect of the pituitary body or hypophysis cerebri, and this at the present time seems, on the whole, the most probable. In Paltauf's case it is clearly stated that the cavity of the sella turcica was much enlarged and that the pituitary fossa showed measurements, which were in all directions greater than those of the mean of several adult skulls of average size, whereas the rest of the sphenoid bone showed measurements which were less than those of a child of seven years (of a child of a height that is equal to that of a Paltauf's dwarf). It is to be supposed, therefore, that in this case the pituitary body was considerably enlarged; but there is no note of the pituitary itself being examined. This is the only definite evidence that there is upon this aspect of the subject. The number of autopsies made have been very small, and in none of them, except the above instance, was this point investigated. In Hastings Gifford's autopsy the pituitary fossa appeared normal, but the hypophysis cerebri was not examined. So that the view that ateliosis is due to abnormality or defect of the pituitary gland must at present remain hypothetical but it appears probable at the present day."

Up to the time when Riechbieth wrote this, 1912, the evidence

was in favor of pituitary origin of the Paltauf type of dwarf. Since that time the evidence has accumulated so that by now we may be reasonably certain of this.

Dr. Kraus reported a case of a dwarf of this variety about five years ago in which an investigation of the pituitary was made at autopsy. The striking thing was a replacement of nearly the entire gland by brownish material. Practically no normal tissue remained. The patient also had the general edema which Paltauf described. In the case under consideration there is clinical evidence of the pituitary origin of the condition. The patient looks like a miniature adiposis-genitalis of Froelich. His breasts are large and soft, his abdomen is pendulous, fat and square in shape at its lower part. There is a large mass of fat above the pubis which looks like the prominent mons veneris like pad seen in the Froelich cases. There is no hair on the body except that of the head, eyebrows and lashes. The teeth, the second set, are short and stubby, not spaced and not extensively decayed. The hands and feet are quite small.

It seems apparent, therefore, that there is now good evidence to show that the Paltauf type of dwarf is due to diminution of the function of the pituitary gland and is usually due to a cystic formation.

The second element in the case can be quickly described.

About three months after the beginning of an attack of whooping cough which occurred when the patient was eighteen months old, he had several convulsions and then lapsed into the state of contracture and choreiform movements of the face and extremities which he now has. The condition is therefore not progressive. He is spastic throughout, more so in the upper extremities than the lower, and more in the right arm than in any of the other extremities. However, he is able to walk. He walked to the hospital when admitted recently. He sometimes has difficulty in starting to speak, sputtering a good deal. However, when undisturbed by involuntary movements, he can speak normally. There is no definite history of dysphagia, and none has been noticed on the ward. He has frequent seizures in which the arms move at a slow rate and in a choreoathetoid fashion, and the facial muscles give the impression of either laughing or crying. The pupils react to light and accommodation. There is almost continual hippus. The reflexes in the upper extremities are normal. The abdominals are not obtained, possibly due to the flabby abdomen which has been described. The tendon reflexes of the lower extremities are normal. The great toe is held in the position of extension as frequently as not and has a greater tendency to do so when the patient is on his back than when sitting. Stimulation of the sole sometimes produces extension of the great toe, sometimes flexion. The Oppenheim and Gordon reflexes were also extremely variable. In brief, the continual change in the position of the great toes made it difficult to state just what their reactions were. The thyroid is palpable and hard. There is impaired percussion note over the left lower lobe of the lungs and a few dry râles are heard.

Due to the continual movements, x ray pictures could not be

taken to determine the condition of the lungs, epiphyses and sella turcica.

The clinical picture is that of a striate level lesion, due to an encephalitis and following one of the acute infections, whooping cough.

Dr. Timme said in discussion, that the cases of Froehlich's dystrophy that we see are invariably accompanied by endocrinopathic familial disturbances. This case though it presented some characteristics of Froelich history has no familiar history. He was inclined to believe that the whooping cough and synchronous disturbances in the pituitary occurring at such an early age would give the rôle of causative factor of the disturbance to the infection.

Dr. Onuf was not convinced of the superior mentality of the patient. He felt that he was an infantile endocrine type. His expression and attitude indicated it.

Dr. Kennedy thought that the patient might appear infantile emotionally, yet be intellectually mature. His choice of reading matter and ability in checkers would seem to indicate adult mental power.

Dr. Onuf referred particularly to the manner in which he followed the proceedings at the meeting, which he considered very infantile.

Dr. L. Pierce Clark asked whether psychological tests had been made to determine the patient's mental status. He agreed with Dr. Onuf in regard to the impression given of infantility.

Dr. Kraus thanked Dr. Timme for bringing up two puzzling issues; one the relation of the two conditions to each other, the other the possible congenital origin of the pituitary disorder. The proof of either is not convincing. However, the presence of undescended testicles suggests a congenital origin and hence a separate origin for the pituitary disorder, the infection having come on later and having caused the striate level syndrome.

In reply to Dr. Clark, Dr. Kraus said that psychometric tests had not yet been done.

A CASE OF BRAIN TUMOR—CLINICAL AND PATHOLOGICAL NOTES

Dr. E. D. Friedman reported the case of a forty-nine year old sea captain who complained of pain in the left side of the face and progressive loss of hearing. The left eye at first became "smaller." Examination showed the left pupil smaller than the right, the left palpebral fissure narrower. There was hyperalgesia in the distribution of the fifth nerve on the left. Hearing was impaired on the left and a tumor mass was felt in the neck on the left in the angle of the jaw. The rest of the neurological examination was negative. A positive Wessermann reaction indicated antiluetic treatment. A month later the patient complained of diplopia and there was weakness of the left sixth. Shortly after this the patient complained also of a persistent objectionable taste in the mouth described by him

as resembling that of Jamaica rum. He then had three seizures, each preceded by a sharp pain in the left side of the face, things grew dark before him and he had to struggle to keep from falling. Vertigo was present, objects seemed to move to the left; there was no loss of consciousness, but drooling from the mouth and the taste persisted. The attacks which came about a week apart lasted five to ten minutes. Four months after the first admission the patient felt that his symptoms were considerably worse; he had lost vision in the left eye, the eye was very prominent, the swelling of the neck was larger. There was complete paralysis of the third nerve on the left with the exception of the fact that the pupil was small. Fibrillary twitchings were noted in the motor fifth. The sensory fifth was completely paralyzed on the left, there was no "herpes," the sixth nerve was paretic. The seventh was normal on voluntary innervation, although there was a slight drooping of the left angle of the mouth. There was no nerve deafness on the left. In the Weber test the tuning fork was lateralized to the left. The vestibular tests were not made. The ear drum was retracted on the left. There was percussion tenderness of the skull on the left in the front parietal region. No brain stem phenomena were ever observed. The patient became rapidly worse and died after a period of neuroparalytic conjunctivitis and evidence of retrobulbar pressure, rather than choked disk on the left. X ray examination of the chest showed no metastatic foci in the lungs or chest wall. X ray examination of the head was negative.

The general physical examination was negative with the exception of considerable edema of the palate. Blood pressure was normal. Wassermann of the blood was positive. The spinal fluid was clear and under fair pressure. There were 234 cells, globulin was plus, the colloidal gold curve was normal, and the Wassermann was positive. Visual fields on the right were normal. There was no aphasia.

Because of the positive serologic findings and the involvement of the nerves at the base of the skull, the patient was at first thought to have a luetic meningitis and he was subjected to intense antisyphilitic treatment. In spite of this however his symptoms gradually got worse and he rapidly lost ground. The diagnosis was then changed to tumor involving the middle fossa of the skull on the left. The behavior of the left pupil was explained on the basis of an injury to the dilator fibers of the third. The slight drooping of the angle of the mouth on the left was thought to be due to the sensory loss in the face with resulting diminution of muscle tonus. The seizures were looked upon as probably gustatory fits which found their explanation in the adhesions between the tumor mass and the tip of the temporal lobe. Posterior fossa neoplasm was excluded by the absence of the nystagmus, nerve deafness, cerebellar signs and true papiledema.

The pathological findings in this case were reported by Dr. B. H. Fairbanks. At the post mortem examination the following condition was found. The dura was adherent and removed with the calvarium: the brain appeared normal except for some flattening of

the convolutions and was not involved in the growth although some resistance was felt in disengaging the tip of the left temporal lobe, which was slightly adherent to a neoplasm apparently growing from the dura of the middle fossa. The tumor roughly occupied the center two thirds of the middle fossa on the left side, and had overgrown the pituitary body, and overlapped part of the lesser wing and the basilar portion of the sphenoid, and some of the petrous portion of the temporal bone. It had surrounded the third, fourth, fifth, and sixth cranial nerves at the points of their exit from the skull, and a protrusion forward into the orbit had surrounded the left optic nerve.

A further projection of the tumor extended downward through the foramen lacerum into the pterygoid fossa for about 3 cms., where it ended abruptly, no connection being made out between it and a nodular mass on the left side of the neck, deep to the sternomastoid, about 8 cms. in length.

Both middle ears were full of turbid fluid and the left maxillary antrum contained pus.

Histologically the growth did not conform to the appearances associated with sarcomata or endotheliomata of the dura, these being the types of neoplasm most frequently found in the middle fossa, and which moreover not infrequently metastasize in the neck. The microscopic preparations of the nodular mass in the neck however showed it to be an endothelioma of the variety occurring primarily in the lymph glands, and as no further tumor was found on careful examination of the rest of the cadaver, the somewhat unusual conclusion must be reached that the intradural growth was secondary to that in the neck. The histological findings in this case bore out the clinical deductions to an unusual extent, the deafness of the left ear was doubtless occasioned by sepsis and not nerve defect. The exophthalmos may have been due to mechanical pressure of the tumor forward as it did not invade the contents of the orbit. Although the brain substance did not appear to have been invaded, pressure on the temporal lobe may have been sufficient to account for the gustatory hallucinations. The nerves corresponding to the loss of function noted in the clinical course of the disease were readily identified as those caught in the tumor growth.

EFFECTS OF PROHIBITION AT BELLEVUE HOSPITAL

Dr. John W. Brannan (by invitation) reported that with the going into effect of the National Prohibition Amendment the number of admissions to the alcoholic wards was markedly lessened. When the Volstead law went into effect the same decrease was expected and for the first two months in 1920 there was a marked decrease, but shortly thereafter the admissions began to increase and the last half of 1920 gave a total of 1,386 admissions or only 18 less than the total admissions for the first half of 1919. The totals for the years, however, showed 2,211 for 1919 and 2,312 for 1920. It had been observed that the admissions had been gradually de-

creasing since the entry of the United States into the war and a chart drawn up to cover the admissions since 1917 gave the marked decrease in totals from 5,714 in 1917 to 2,439 in 1918. America's entry into the war in April, 1917, was followed by a drop from 628 to 547 in May, 413 in June, 345, 376, 405, 358, 295, and 372 for the succeeding six months.

An improvement in general conditions is evident from the fact that the number of patients showing symptoms of chronic poisoning (twenty years ago one of the most important factors in the history of and condition of patients in all wards of the hospital) has decreased strikingly.

In order to explain the increase in admissions in the past six or eight months, Dr. Brannan thought that the unconcealed operation of the innumerable saloons and the apparent winking of authorities in charge of enforcing the Government laws might be adduced as sufficient cause. In handling the alcoholic patient in years past a repeater would occasionally be sent to court, where the magistrate would usually rule that drunkenness was not a crime and would discharge the offender. Recently it was suggested that an alienist should testify as to the patient's condition and accompany him to court to try to have the frequent offender committed to the work house. Dr. Brannan saw Mr. Justice MacAdoo to determine whether the patient could be made to testify under the Volstead act as to where the liquor was obtained, and was told that the courts had no authority to compel the giving of such information. Dr. Brannan next went to Col. Cathey, U. S. attorney, with the suggestion that the offenders be sent to the Island on charges of vagrancy. In this case he was told that any magistrate would send the patient home to support his family. The records of the patients admitted to the hospital showed that a number of bachelors were usually in preponderance, but even so some family duties it was thought would be arranged. Finally Dr. Brannan went to the Police Department and the inspector intimated that he might be able to do something with the list of saloons that were operating openly and with which Dr. Brannan supplied him. No reports had come in of any action at the time of the meeting. Dr. Brannan said that he had come to the conclusion that Federal aid would not be forthcoming and that local authorities would have to act on these matters themselves. In fact the U. S. Attorney said to Dr. Brannan that enforcement was only a very small part of the work to be done by his department.

REMARKS ON THE DIMINISHED THERAPEUTIC USE OF ALCOHOLIC STIMULANTS AT BELLEVUE HOSPITAL, BEGINNING BEFORE PROHIBITION

Dr. Brannan presented charts to show the decrease in consumption of prescribed whiskey in Bellevue Hospital from an average of .59 oz. a day per patient in 1903 to .06 oz. in 1920. This reduction has been observed in other hospitals and has been pro-

gressing slowly, almost without attracting attention. It used to be customary to give alcoholic stimulation fairly generally in the general medical and general surgical wards, and even to the alcoholic cases. These latter now receive no whiskey ration, and this may possibly account for their exceedingly short sojourns in the hospital at the present time. But even the general medical and surgical wards show a marked decrease, although this decrease varies somewhat according to the superintendence. A marked increase in the *per capita* consumption in January, 1919, the time of the dying out of the influenza epidemic is undoubtedly to be explained on the ground of the vast number of influenza patients in the hospital at that time. Here again individuals in charge of wards showed a variability in the doses given, ranging from only a fraction of an ounce to 16 to 24 ounces in some wards during the height of the epidemic, October and November, 1918.

This change has been going on undirected by any outside or inside force at the hospital and has apparently escaped general attention.

Dr. George O'Hanlon (by invitation) in opening the discussion said that he could not add much encouragement to the hopefulness of sending bachelors to court in an effort to have the alcoholic offenders committed, since they all proved to have dependents. At a hospital conference the question of the use of alcoholic liquor in the hospital was brought up. Practically all the representatives at the conference had had the same experience. One hospital was noted to have been prescribing extensively since the beginning of prohibition. No reason for this could be found except the attitude of the staff. The Philadelphia hospital had had the same experience as Bellevue. They had been able to close the alcoholic wards. During the last three or four months an increase in patients has led them to consider reopening the wards. The Cook County Hospital in Chicago reported the same experience. In short with the coming of prohibition there has been a large diminution in the number of individuals applying for admission to the hospitals as well as to the Municipal Lodging House. The employment problem has probably had an effect here also. An increase has been noted in the last few weeks; four years ago the admissions were 2,320, recently the number went down to 35, and is up to 350 at present. Commissioner Coler reports also a decided decrease in applications to the child-welfare bureaus since the advent of prohibition. No recent increase has been noted in this branch of public-welfare work. During the first few months of prohibition there was a decrease in the ambulance calls, although the cause for this cannot be determined. Still there is a marked decrease from the number of calls of three or four years ago.

Dr. Craig asked whether the beds vacated during the period when the admissions were few were filled with legal types of illness. Dr. Brannan said that they were.

Dr. O'Hanlon said also that the Bellevue authorities were glad to be able to close wards formerly used for alcoholics and thus release part of the nursing staff. The wards formerly assigned to alcoholic patients are now used for mental defectives.

DR. KIRBY, who had presented at the last meeting of the Society a study of the incidence of alcoholic psychoses in the State hospitals, and of alcoholism at Bellevue Hospital during a twelve year period, expressed his interest in Dr. Brannan's figures which dealt more particularly with alcoholism during recent months, especially since the prohibition amendment went into effect. According to Dr. Brannan's figures, there has been some recrudescence in alcoholism during the last few months, but this may be regarded as insignificant when one compares the number of cases now appearing at Bellevue to the number a few years ago. There is no doubt but that the habits of people have changed in recent years and one must regard the passage of the prohibition amendment as the culmination of a movement which has been advancing steadily for a decade or more. The emotional reaction of the population to the war as expressed in terms of alcoholism was interesting. There had been a steady decline in the number of cases of alcoholism at Bellevue Hospital and also in alcoholic psychoses for some years until just before the United States entered the war, when there was a perceptible rise. Following the declaration of war by the country there occurred a marked drop which, so far as alcoholic insanity is concerned, has continued without further interruption.

DR. HARTWELL (by invitation) discussed the lessened use of alcohol as a therapeutic measure. He said that alcohol has been proved to be a depressant rather than a stimulant as usually believed, and the experiment of using it as the latter was naturally discontinued, all surgeons becoming more and more convinced that to use it was a failure and actually harmful. In the medical wards the same process took place. The decrease has been the result of the gradual education of the medical profession in the real nature of alcohol. As far as the effect of prohibition is concerned, the country is confronted with the complete overthrow of conditions of long standing. To be told suddenly to stop the use of alcohol on a certain day naturally caused a struggle, but this will be accepted within a decade. The time is approaching when it will not be used either by the rich or the poor.

DR. KENNEDY said that he had hoped to have Dr. Pearce Bailey present at the meeting to give some interesting draft statistics. The general conclusion had been that the feebleminded were more alcoholic than normal people; but Dr. Bailey's observations showed that the more feebleminded individuals were the less they drank!

THE BOSTON SOCIETY OF PSYCHIATRY AND NEUROLOGY

Regular Monthly Meeting, December 16, 1920

Dr. John J. Thomas in the Chair

DEMONSTRATION OF A CASE OF DISTONIA MUSCULORUM DEFORMANS

Dr. Morton Prince

Discussion.—Dr. E. W. Taylor agreed in the diagnosis and called attention to the fact that in describing various diseases of similar character, so-called lenticular degeneration or Wilson's disease had been omitted. In discussing the case Dr. Prince spoke of an apparent muscular atrophy which presumably was a general nutritional disturbance rather than a local neuromuscular defect. In classifying the case Dr. Taylor thought that sharp clinical distinctions in the present state of our knowledge should not be made and that it was very doubtful whether such dystonias should be regarded as entities in spite of the characteristic symptomatology. A better term for the present is dystonia lenticularis rather than dystonia musculorum deformans.

The remainder of the program was presented by members of the staff of McLean Hospital.

APPLICATION OF THE RATING SYSTEM TO NURSES' NOTES

Dr. James S. Plant

Dr. Plant considered that nurses' notes at present are not objective enough; they cover the same field as the medical notes and have practically no final determinative value. They should be entirely conduct notes. He described the application of a rating system to nurses' notes as follows: By dividing the entire conduct field into some eighteen categories and giving in each category five ratings, a set of ninety fairly simple, definite, objective conduct entities are given the nurse, who has only, in each category, to give the approximate rating. Number 5 in each category fits the isolated ego—4, 3, 2 and 1 representing increasing adaptation. The resulting average represents a "coefficient of sociability." If for recovering average and clear cases there is a high coefficient of correlation between the various ratings, the standard deviation may give us insight into the amount of confusion present. The difficulties seem large and are dependent for their solution entirely on expe-

rience. The mathematical implications are far reaching and interesting. The chief danger lies in becoming too mathematical—in arriving at figures and curves so sophisticated as to fall of their own weight.

Discussion.—Dr. Donald Gregg stated that in private hospital work he considered it very important to have full nurses' reports and that he had worked out a chart which gave opportunity to record not only the conduct morning, afternoon and evening but the occupation of the patient as well. In this way the nurse is given a chance to express how she is helping the patient and it is more interesting for her. This record of occupation day by day gives a very good idea of the progress of the case.

Dr. H. I. Gosline said that a study of a somewhat similar nature was made at Danvers in 1914 except that the nurses' notes were not controlled by categories. It was found that the terms the nurses used were very often much more objective than those of the physicians, who were apt to use terms allowing of a variety of interpretation and which also expressed not what they saw but what they thought they saw. It was found that symptoms classed as hyperkinetic over a period of years often became hypokinetic in the same patient. This was expressed mathematically in the study referred to.

DIAGNOSTIC DIFFICULTIES IN THE EARLY STAGES OF MENTAL DISORDERS

Theodore A. Hoch, M.D.

Dr. Hoch stated that psychoses in their early stages are subject to marked variations in symptomatology depending partly on the personality, the causative agents and on the environmental factors. The psychotic picture may also be given a certain twist by accidental happenings of an emotional character. Thus an acute psychosis may be colored by dementia praecox-like reactions, or atypical cases of dementia praecox may have a predominating tone of depression. The presence or absence of hallucinations or delusions are of less significance than the mechanism back of them. Diagnoses cannot be made on the presence of isolated symptoms but every obtainable clue past and present relating to the patient and the psychosis must be carefully studied. Even then at times the difficulty is cleared up only after months of observation or after recovery. Peculiarities in conduct, eccentricities, suspiciousness, difficulties in making adjustments and other oddities in the make-up of the individual are carried into the psychosis when it appears and must be given their proper place in considering the diagnosis. Depressed emotional states, delusions, hallucinations in any field, silly affect or periods of exhilaration may be found in bewildering array and surprising combinations in the formative stages of mental disorders. The greatest difficulty naturally lies in differentiating dementia praecox from manic-depressive insanity and at times even careful analysis of every factor may leave the diagnosis in doubt.

Discussion.—Dr. Arthur H. Ruggles considered Dr. Hoch's paper valuable especially in that it indicated the difficulty in differentiating the manic-depressive and dementia praecox cases. He emphasized that, while the study of the personality and the grouping of the individual according to his personality and environment is of the greatest value in trying to determine the type of psychosis, too much confidence cannot be put into making the diagnosis purely from the personality. The type of personality is almost always bound to appear in the psychosis but does not always determine the psychosis. Dr. Hoch's paper tends toward making the psychiatrist put emphasis on the combination of personality, plus environment, plus the descriptive study of the condition that is under treatment. It will reinforce the conclusion that there are certain cases that must be held without diagnosis, for often, as Dr. Hoch has said, only time and the results of the case will give the correct diagnosis.

THE "CLINICAL" PSYCHOLOGIST

Dr. F. L. Wells

Dr. Wells stated that there is a type of psychological work which is appropriate for the management of certain clinical and social groups. These groups include some medical and some non-medical cases. This field of work is not now covered by ordinary medical training, nor, save exceptionally, by medical men. It is being covered more and less by persons more and less competent in psychology. It is the desire of responsible psychology to organize the training in these lines of work. That they are not parallel to medicine is perhaps evidenced by their occasional collisions therewith. This at least rationalizes an effort with the conscious purpose of bringing these related spheres into better definition and harmony. Is there any part in the diagnosis or management of a person's adjustment problem which, being particularly contributed by psychology, can to advantage be handled by the psychologist? If not, no professional standing belongs to clinical psychology. If yes, it will be well to accord such standing as will keep its activities in proper limits towards society and the medical profession. The question is raised if intelligence examinations should be functions of the medical man, or associated rather with a type of training that is non-medical. The latter situation is one that seems to be working itself out in practice, both within and outside of medical direction. Facility with these methods is gained only with much practice and quickly lost if not continually exercised. The time required is no little tax on the busy practitioner. The required portion of the medical curriculum is not exactly inviting additions to itself. The standard examinations can be made with considerably less training than is required of the physician, so that it seems doubtful economy for him to undertake them on the considerable scale which alone gives facility. These considerations weigh heavily towards the con-

clusion that "intelligence" measurement, like the Wassermann, is a task for delegation to technologists specializing in that class of work.

In contact with the fields of law and medicine but little assimilated into either, is a province dealing with behavior adjustments of the personality to its surroundings. With such problems, for example, the Judge Baker Foundation deals, and its director can assure you that the medical problem—that is, the problem with which medical education specially fits one to deal, is in most cases absent from these. It means something additional to what medical training has hitherto envisaged, the analysis of environmental and conduct history, personal capacities and tendencies. To meet it, the physician must superadd psychological experience to his medical education, or work under conditions where the judgment of the psychologist is available. Such problems do now come to the primary attention of those practising or attempting to practise psychology as a profession. No competent consulting psychologist will neglect to provide for the medical factor by proper medical means. But where the controlling problem is psychological, persons of the stamp of Thorndike, Scott or the Hollingworths seem not incompetent to have charge. Such persons may be expected to know and abide by the limits where their competence adjoins the proper responsibilities of the physician. The value of a profession for individual practice, depends essentially on what it can do to get somebody out of trouble. Clinical psychology has developed along this line; touching medicine at feeblemindedness, the law at delinquency, though in these cases the individual is brought to the psychologist rather than goes to him. If psychology is to develop further as an individual practice, it must show itself able to take care of a certain class of human troubles better than they can now be met by the aid of the lawyer or physician.

Discussion.—Dr. C. Macfie Campbell spoke of the tendency in the psychiatric service to look upon the clinical psychologist with a great deal of skepticism. It may be feared that the motive is not altogether generous. It is quite true that clinical psychologists make mistakes, but they are perhaps not more numerous than those made by the medical profession. The clinical psychologist may be a very useful collaborator in many tasks which medical training does not especially prepare for and which the demands of specialized medical work do not allow time for, so that it is rather a dog-in-the-manger attitude to be too suspicious of the clinical psychologist and to over-emphasize the fact that there are some who are untrained and incompetent.

It is very fortunate that the American Psychological Association has itself taken up the question of standards for the clinical psychologist, so that the medical profession may be able to have some sort of guide to the personnel and will know that, if collaboration is wanted along certain lines, a group of men can be found whose training is more or less guaranteed.

Dr. F. L. Wells, in concluding the discussion, read the proposed law defining consulting psychologists:

"Any person shall be held as a consulting psychologist who shall make a practice of diagnosis or evaluation of mentality of special mental traits or abilities of supposedly normal human individuals, and who shall analyze and describe mentality with a view to determining mental status; or who shall diagnosis degrees of mental defects of individual human beings and make classifications upon such diagsis; and who shall profess under that title to give expert advice regarding the educational and vocational treatment of both normal and abnormal individuals, or who shall publicly profess to be a consulting psychologist."

Current Literature

II. SENSORI-MOTOR NEUROLOGY

1. PERIPHERAL NERVES.

Casamajor, L. Ascending Paralysis. [Am. Arch. Neur. and Psych., Dec., 1919.]

The author only saw one of the patients living, but the spinal cords from two cases were used as material for his paper. The live man, a soldier, had had fever for about twenty-four hours, five days before the onset of the paralysis. While working with a pick he suddenly became weak in the knees. He went to his dugout and lay down, and after a few hours was unable to move his legs. The next morning he could not move either legs or arms. There was no incontinence of feces or urine. The arms were completely paralyzed with the exception of the fingers of the right hand, which he could move voluntarily to a slight extent. Pulse rapid and a temperature of 101 F.; breathing labored and he had a beginning edema of the lungs. The paralysis was of an extreme flaccid type with complete abolition of all reflexes. No sensory loss could be determined anywhere. In less than three days after the onset of the paralysis he died, and the pathologic findings were practically identical in both cases. The histologic findings were approximately the same: (1) Hyperemia, hemorrhage edema, and fibrous swelling in the arachnoid; thickening of the pia. (2) No changes in blood vessel walls; no round cell infiltration. (3) Increase of the cellular neuroglia in the central gray, around the root fibers and in the posterior root ganglions. (4) Evidence of beginning degeneration of both a secondary and primary character in the anterior horn cells and some tract cells. Hyperemia of the central gray. (5) Marked degeneration of primary and secondary character of the nerve fibers where they lie in the arachnoid, always most marked in the motor fibers. The second case showed a beginning degeneration in the posterior nerve roots just outside the dura and marked degeneration of the posterior root ganglion cells with neuronophagy.

Albo, L. Mercury Polyneuritis. [Plus Ultra., July, 1919.]

What is thought to be the third case of the kind on record is given by López. Acute polyneuritis followed ingestion of 2 gm. of calomel in three doses and extreme constipation prevented elimination by the bowel. The patient, a woman, of 36, had taken three doses with three

and eight days' intervals. Chronic polyneuritis from mercurial poisoning is comparatively common; a long list of cases of this chronic kind is given.

Pollock, L. J. Peripheral Nerve Lesions. [Journal A. M. A., Ap. 3, 1920.]

As a graphic method of showing peripheral nerve lesions, by making impressions of the hand and foot Pollock finds records of the palm and sole of great value, but only five of the peripheral nerves show distinctive changes in large enough percentage to be utilized in this method. These nerves are the ulnar, median, radial internal popliteal and sciatic. The picture produced by a combined lesion of the ulnar and median is in itself distinctive. When the external popliteal nerve lesions show a characteristic picture, it is the same as that produced by lesions of the internal popliteal. With ulnar nerve lesions, the clawing of the inner two fingers is well shown by the absence of any part of these fingers except the tips. Hypothenar atrophies are shown by a notch on what normally should be a rounded contour of these muscles. Other notches appear when the atrophy is very severe. Other points are described, such as the median nerve lesions, showing the disturbance of the whorl formation on the tips of the index and middle fingers. The most characteristic feature of radial nerve lesions in the imprint is the position of the thumb, which is adducted. These details are given quite fully and illustrated, but their description can hardly be condensed for an abstract. The imprints of the sole of the foot, showing characteristics of popliteal and sciatic nerves, are given more briefly. While not diagnostic, such records are of value in determining the progress of atrophy and deformity in peripheral nerve lesions. Imprints are easy to take, requiring very little time.

McCarrison, R. Edema in Beri-beri. [Proc. Roy. Soc., 1920, B. 91, p. 103.]

Edema was found associated with enlargement of the adrenal glands in avian beri-beri, and, as estimated by chemical methods the adrenalin content was found to be slightly less per gramme of gland than in health or in so-called dry beri-beri. Yet the total quantity of adrenalin greatly exceeded the amount found in healthy animals; specially so in cases of wet beri-beri. It may be concluded that a greatly increased production of adrenalin follows a deficiency of certain accessory food factors also that this excessive production of adrenalin is connected with the production of edema found in this order of cases.

Anderson, L. H. Neurofibromatosis. [Journal A. M. A., April 10, 1920.]

Anderson reports a woman, aged 38, who has more than 3,000 various-sized tumors on and below the skin surface. The patient is one of

five children, one brother having the same condition in much less degree. One paternal uncle is said to have had the same affection. Otherwise the history is negative. The first tumor appeared when the patient was 6 years old. A number of representative tumors were subjected to microscopy, but no tissue that could be construed as of nervous or ganglion-cell origin was found. No frank evidence of malignancy or excessive proliferation was found. The type cells were rather large, puffy, succulent fibroblasts, unstratified, but thin and elongated in the region of the pedicle. The entire body surface was studded with these tumor masses: scalp, back, chest, abdomen, extremities and genitalia. Usually this patient is not inconvenienced in any way except by the mental anxiety. Sudden temperature changes, however, produce tingling, and a feeling of tenseness and swelling in the nodules. Sudden mental stress, anxiety or anger produces the same result. There is no evidence of intracranial pressure. The right olfactory, optic, oculomotor, trigeminus, facial and cochlear branches of the eighth cranial nerves, however, appear to be involved.

Elsberg, C. A., and A. H. Woods. Diagnosis and Treatment of Injuries to the Peripheral Nerves. [Am. Arch. of Neurology and Psychiatry, Dec., 1919, Vol. II, pp. 645–666.]

The paper is based upon observations made upon 170 patients with injuries of the peripheral nerves who were under the care of the writers at U. S. Army Hospital No. 1. They believe that the so-called Tinel sign—tapping distally to the site of the nerve injury causing tingling referred to the area of distribution of the nerve only when the nerve in question is regenerating—is of doubtful value from the practical diagnostic standpoint. The skin area over which a given sensory nerve is distributed was found to vary considerably in size in different individuals and this must be considered in making inferences based on sensory findings. The writers describe a number of substitute movements that they observed in patients with nerve injuries: extension of the wrist in musculo-spiral paralysis through the device of flexing the fingers and thus drawing the extensor tendons taut over the knuckles, etc. The finer anatomical structure of the peripheral nerves should form the basis for a correct nerve suture, and the authors describe certain characteristic funicular nerve patterns. These should be understood for the proper suture without rotation of the nerve ends. The nerves should be handled with care, the upper end exposed last, intact nerve bundles salvaged. They used perineural and epineural sutures of fine silk, the union always being made without tension. This was aided by appropriate position of the affected limb. In divided nerves, suture is always preferable to nerve grafting, but if the latter is unavoidable, an autograft is to be preferred. Autografts of cutaneous nerves (external cutaneous of thigh; internal saphenous; cutaneous branches of musculo-

cutaneous; internal cutaneous), were used and cable grafts made by a technic of their own.

They believe the peripheral nerve surgery of the future will be based upon a minute and detailed knowledge of the finer anatomy and physiology of the nerves, and a consequent advance in the finesse and delicacy of technic. (Authors' abstract.)

Reder, Francis. Nerve Suture.[1]

After referring to contributions on this subject by Blake, Sir Berkeley Moynihan, Mackenzie and others, the author points out that no matter how perfectly the severed nerve can be demonstrated, and how satisfactorily the nerve ends can be apposed, as long as they are not properly vivified and secured by a correct suture, the normal process of repair will be hindered and the conductivity of the nerve proportionately inhibited.

The essential requisites for a successful nerve suture are a thorough knowledge of topographical anatomy so that the least amount of trauma may be inflicted on the soft tissue during the search for the injured nerve. The executions during the dissection must be that of a well trained surgeon. The finger should never be placed in the wound and the most perfect and scrupulous asepsis must be maintained. When the nerve is exposed, instruments, especially forceps, must be used with the utmost care lest the nerve should be bruised by seizing it, nor should it be twisted or unduly handled. In liberating it from any adhering structures it is far better to dissect these from the nerve than the nerve from them. Two points should be observed, which can materially aid in placing the suture provided the anatomical findings are favorable. By not freeing the nerve entirely from its adhesions and allowing only a partial attachment at some advantageous point, a delicate fixation of the nerve is maintained facilitating the placing of sutures. Furthermore, axial rotation is not so liable to occur, thus insuring the maintenance of greater accuracy of the internal topography of the nerve. Again, in the liberation of the nerve any adventitious tissue which may adhere to it might serve as a far better medium in placing the sutures and causing them to hold, than with the nerve dissected entirely bare. Devascularization of the nerve must be guarded against. It should not be stripped bare for too long a distance, nor unduly separated from its bed. The wound, and in particular the nerve, must not be allowed to become dry, yet the former must be entirely free from blood collecting through oozing from capillary vessels. (Nerve ends often bleed considerably.) This can be readily accomplished by gently holding bits of muscle tissue over the nerve ends, the procedure in no way damaging the internal architecture of the nerve. Blood between the nerve ends materially aids the amount of connective tissue formation during the reparative process.

[1] Read before the Missouri State Medical Association, May 26, 1919.

The regenerative potency of a divided nerve constitutes a most interesting chapter in tissue repair. In surgery the action rests wholly on the neuron principle, the neuron being the unit of the nervous system. It is made up of a central cell body with a nucleus. Long extensions called axons are attached to it. Some of these extensions are short and are known as telodendrites and go to the central cell body; others are still shorter and go to the muscle plates. These are called telodendrones. Nerve bundles, the brush-like ends of the fasciculi, are held together by neuroglia. It is the object of the surgeon to have a nerve union produced by the neuroglia type of connective tissue, to permit the transmission of axis-cylinders better than through the ordinary connective tissue type of union. Repair must be made by means of the proliferation of glial tissue in the large axons. Every nerve axon is made up of three elements, an axis cylinder, a medullary sheath and a neurilemma. For this reason the surgeon must use all possible means for preventing the intervention of connective tissue from the outside.

In the regeneration of a nerve after operation a congestion of the cells composing the neurilemma takes place. The neurilemma being the regenerative sheath of the nerve, it prepares the connective tissue tube through which the axons from the proximal side can pass to the periphery, thereby contacting with the peripheral portion of the axis cylinder.

Accuracy of apposition without tension of the nerve ends may, under certain conditions, be found impossible. When the surgeon is confronted with such a problem, various procedures to shorten the course of the nerve may be adopted. Flexion of the limb may sometimes be sufficient to bring the nerve ends together without endangering the suture line. Division of the median nerve low in the forearm, if the defect is not too great, may by flexion of the wrist secure apposition of the nerve ends favorable to suture. In case of injury to the ulnar nerve, its route may be shortened by dislocating the nerve from its bed and bringing it to the front of the inner condyle.

An injury to the musculospiral where difficulty in apposition is encountered may demand an excision of a portion of the humerus to permit the bringing together of the nerve ends.

No matter what the obstacles for a proper apposition of nerve ends, they must be overcome to insure a successful suture. The suturing under tension will invariably result in failure. Another important consideration for success rests with proper vivification of the nerve ends, *i.e.*, in those cases where a secondary suture is undertaken. In recent injuries where an immediate suture is attempted, such tissue changes do not exist about the nerve ends and the suture is placed in normal tissue. A severed nerve, where time has permitted a connective tissue capping, presents a condition analogous to an ununited fracture of a bone. So long as the ends of the bone fragments are covered by a fibrous capsule, soft tissue, or any other interposed material, union cannot take place. Likewise in a divided nerve the ends are covered by an

interposing material which prevents axonal contact, and this interposing tissue must be removed from both the distal and proximal ends of the severed nerve before the suture is placed.

In the preparation of the nerve ends for suture infinite gentleness and care must be exercised in handling. The section should be made with a very sharp knife, preferably with the blade of a safety razor. Every particle of fibrous tissue must be removed. The section must reveal the living axons, that the axis-cylinders coming from above can have free entry into the nerve below. This is an exceedingly delicate part of the operation and experience is the infallible guide. Although the placing of the nerve suture would appear a minor procedure when compared to the preparatory measures necessary for its introduction, certain niceties become imperative: *i.e.*, the proper suture material and an appropriate needle; the most advantageous manner in placing the suture; the best protection for the newly created juncture. Of the suture material is may be said that the finest catgut (000) should be used for nerves whose size will permit its introduction. An exception must be made for very small nerves, and here the finest silk should be used.

The needle for a nerve suture should be a round intestinal one, not too large, with either half or full curve and possessing a spring eye. In practice it is usually the simple transverse division of the nerve which demands an end-to-end union. Occasionally a nerve is divided obliquely. The union in such cases will be by lateral suture. No matter how the nerve is divided, the principle of placing the suture remains the same. During the introduction of the sutures it should be emphasized that the manipulation of the nerve must be scrupulously gentle. Delicately toothed forceps should catch hold of the nerve sheath only and under no circumstances must the nerve ends be squeezed.

In estimating the probable result the first consideration is that the ends of the axons are contacted, the second that there will be no intervention of ordinary connective tissue between these ends after they have been approximated by suture, and the third is the proper protection of the new juncture. [Author's abstract.]

Bard. Heat Sensation. [Rév. de Méd., No. 3, 1919.]

The theory of specific nerves and nerve endings for heat and cold, and Goldscheider's demonstration of them, meets with no acceptance from Bard. The fact that the two sensations are mutually exclusive shows they arise from a common organ. The two opposite sensations of heat and cold originate as a warning to the organism by means of pain of dangerous changes of temperature in either direction and of provoking the corresponding reflex action. The classical explanation of the separation of the two sensations by the existence of distinct points of heat and cold is in contradiction to the fundamental fact of the displacement of the physiological zero—that is, of the variability of the

threshold separating the two sensations. The thermic corpuscles are sensitive to two physical modes of thermic change—the centripetal radiation from a body warmer than the skin and the centrifugal radiation from the skin to a cooler body. It is to the orientation by the thermal corpuscles of the direction of radiation that the discrimination between heat and cold is due.

Platt, H. Bridging Nerve Defects. [Brit. Jour. Surg., 1920, 7.]

Giving the results of bridging gaps in injured nerve trunks by means of either autogenous nerve grafts or autogenous fascial grafts fashioned as tunnels Platt quotes 18 cases upon which careful and complete neurological examinations had been carried out before and after operation. In none had any regeneration taken place. The average time elapsed since operation was seventeen months. In four secondary exploration was carried out. In all the nerve trunks were silent to direct faradic stimulation. Partial or complete obliteration of the lumen of the fascial tube was noted and confirmed histologically. Both the nerve graft and fascial sheath have been regarded as valuable methods of treatment.

Dubois, M. Cervical Ribs. [Arch. Méd. Belges, July, 1919.]

Three cases are reported by Dubois, but the disturbances from the supernumerary ribs were not pronounced enough to warrant operation. Two were men of 39 and 60, with pains and impotence in one arm, symptoms had been noted for six months in one case and twenty years in the older man, who was a pianist and could not play for more than half an hour at a time. There was a pair of cervical ribs in this case. The third was a woman of 29, in whom a pair of cervical ribs had induced the complete Claude Bernard-Horner syndrome. The condition was found unaltered when reëxamined six years later. The diagnosis of cervical ribs is generally made only by exclusion but the X-ray confirms it. Pains, atrophy, circulatory disturbances and paresthesias should suggest a supernumerary rib, especially when the smaller muscles of the hand are affected; or there may be symptoms suggesting paralysis of the cervical sympathetic. The literature on operative intervention is reviewed.

Meucci, T. Cervical Ribs. [Rif. Med., Oct., 1919.]

Thirty-five operative cases of cervical ribs have already been given by Meucci; he now adds another, a young woman who had noticed for four winters various nervous disturbances in one arm, formication, prickling, weakness, etc., which disappeared during warm weather, returning in a more serious form each winter, until the entire arm and shoulder were weak, and any pressure caused pain. Tonics gave no relief, nor massage and electricity. Palpitation finally revealed a cervical rib which was resected through an incision along the trapezius.

Stopford, J. S. B., and E. D. Telford. Compression of Lower Trunk of Brachial Plexus by a First Dorsal Rib. [British Journal of Surgery, Vol. VII, No. 26, 1919.]

A few cases of brachial compression neuritis by a normal first dorsal rib have been recorded previously, but an account is given here of ten cases observed within a period of two years proving the condition not so rare as formerly believed. The writer emphasises the fact that, even if an X-ray examination fails to reveal a supernumerary rib as cause of the compression, it must be remembered that a first dorsal rib can produce precisely similar manifestations. Probably a large proportion of obscure cases of atrophy of the hand are due to compression of the lower trunk by a first dorsal rib. All the patients suffered from neuralgic pain along the ulnar border of the forearm, which was induced or accentuated by anything producing depression of the shoulder girdle. Paresis and atrophy of the intrinsic muscles of the hand were noticeable about the same time as the pain, and, in some, the weakness affected the flexors and extensors of the wrist also. In 9 out of the 10 cases objective sensory disturbances were present, and in all nine the loss of protopathic sensibility was greater than the epicritic loss—a dissociation which the writer suggests as characteristic of nerve-compression. Trophic and vasomotor phenomena were very constantly present. In two patients the causation of the onset of the symptoms was clearly trauma, which had caused prolapse of the shoulder and stretching of the plexus over the rib. In other patients the onset occurs most frequently about puberty or early adult life the etiology probably being the same as in cervical rib. Three chief factors are suggested as contributing to the onset of clinical manifestations, and in most patients there is probably a combination of two or more:

1. A predisposing cause seems to be the anatomical relation of the nerve trunk and the rib; as when the bone is "bevelled" by a trunk which receives a large contribution from the upper two dorsal roots.

2. Excessive descent of the shoulder after birth.

3. Weakness or loss of tone in muscles which support the pectoral girdle; therefore all debilitating conditions may be the exciting cause.

In the majority, treatment is surgical, consisting of excision of that portion of the rib which is causing the compression. For the traumatic cases and a proportion of the early non-traumatic, development of the trapezius by faradic stimulation, exercises and massage are best. Patients were cured by this procedure. It is further recommended that similar methods should be employed as a routine after excision of the rib.

Where any underlying systemic condition is the cause of muscular loss of tone it is of fundamental importance to treat this. Early diagnosis is essential if a perfect recovery is to be expected. [Authors' abstract.]

Jones, Frederic W. Muscular Movements in Nerve Injuries. [Lancet, November 22, 1919.]

The scientific neurologist, by reason of special training, is accustomed to think in terms of the central nervous system, whereas the surgeon naturally thinks in terms of the peripheral motor nerves. The orthopedic surgeon, and his many trained assistants, may possibly have somewhat overlooked the importance of the cerebral cortex in the technical refinements of operative procedures on peripheral nerves; whereas the scientific neurologist looks first to the cortex in his dealings with those derangements of sensation, dependent upon wounds, relegated to his care as a physician. As far as the so-called sensory area of the cortex is concerned, the quality of sensation lodged within the gray matter of the post-central gyrus consists in a discriminative appreciation of the spatial relations of a part. As a corollary, it may be said that within the so-called motor area of the pre-central gyrus is lodged the voluntary power to initiate an alteration in the position of a part, the spatial relations of which are appreciated in the post-Rolandic area. This power of altering the spatial relations of parts is conferred by the agency of the contractile muscles, and since these react in response to a volition for spatial alteration, we misname them as voluntary muscles. Muscles are the ministers of movement, and some of them take part in voluntary movements, since the spatial relations of the parts upon which they act are appreciated by the cortex; but only to that extent may any muscle properly be termed "voluntary." Most act in four separate capacities. When a muscle group directly affects the movement of volition, it acts as a *prime mover*. When one acts in direct (but in coördinated and harmonious) opposition to the movement of volition, it acts as an *antagonist*. When one prevents some undesired but possible action of the prime mover, it acts as a *synergic*, one acting in order to steady a part from which a prime mover acts, acts as a *fixation* muscle. In the whole range of muscular activities there is only one rôle (that of prime mover) which at all fulfils the conception of a voluntary muscle performing the task set by the will. Many who have performed the operation of tendon transplantation have imagined that an elaborate preparation by reëducation would be necessary before the muscles could take up their new rôle as prime movers. It has commonly been supposed that a flexor muscle would need some special training before it could play the altogether different part of an extensor. If the technique of the operation fall short of perfection some difficulty is experienced by the patient in bringing the transplanted muscles into play, but some simple mechanical reason for this is usually apparent. If the technique of the operation leave the transplanted muscles in a mechanical position for discharging their new function at once, this function will be readily exercised. The flexor muscles have become the mechanical ministers of the movement of extension, and the cortex desiring the realized spatial alteration connoted by extension will use whatever agents are at

hand. The only physiological problem to be solved in the central nervous system is dissociation of the transplanted muscles from the action of the undisturbed members of their group, a difficulty as a rule readily overcome, and the transplanted flexors act as prime-moving extensors without exciting any antagonistic action in the untransplanted flexors. It may indeed be questioned if the after treatment of cases of tendon transplantation is best carried out by those instructed to appreciate the apparent great disturbance that has taken place in neuromuscular physiology. It is certain that if both patient and attendant are innocent of any desire to probe into abstruse details of the laws of movement extremely good restoration of function may be obtained. While a muscle the tendon of which is transplanted may readily perform its new function as a prime mover, it is very different with other activities in which it normally takes part. As an illustration: in a case of perfectly successful tendon transplantation, a wrist flexor turned into a wrist extensor does not act in this way. When the patient can extend the wrist and the digits in a perfectly ordered and powerful manner, his transplanted muscles still fail him as synergics. Under these circumstances flexion of the digits is accompanied by flexion of the wrist, and the greater the effort to grasp the more completely flexed does the wrist become. The readiness with which transplanted muscles are used to carry out movements not normally performed by them affords an excellent example of the utter disregard which cortical volition displays for its agents. Faulty estimates of the exact damage done to nerves by war injuries were nearly always the outcome of the clinician expecting graver and more widespread loss, both of sensation and of movement, than is met with in actual practice. For this and other errors of judgment in the diagnosis and prognosis of nerve injuries present methods of anatomical teaching are held responsible. Failure to realize the cortical power for utilizing any agent of movement leads to disaster in muscle re-education. This art comprises the terrible monotony of repetitive mechanical movements (which the writer likens to a form of punishment formerly reserved for criminals) to the intelligent coöperation of attendant and patient in voluntary and purposive efforts. Much good has resulted from this last type, but the more the cortex of the patient is employed in the task, the more must one be on guard against stimulation of muscles which are not paralyzed to perform the task normal to muscles which are, or have been, but which with proper surgical treatment may yet recover. It is over this very point that the best type of reëducation breaks down. It is easy to train a patient and take substituted or trick movements as evidencing recovery, when, as a matter of fact, no sort of recovery of the original nerve lesion has taken place.

4. MID BRAIN.

Stahelin. Encephalomyelitis Epidemica. [Schweizerische med. Wochensch., March 11, 1920.]

Stahelin describes so-called lethargic encephalitis under this name. As far as known there has been no suggestion of direct transmission. The malady has never been seen during the crest of a grippe pandemic. The disease picture is pleomorphous, rendering diagnosis difficult. In atypical cases a great variety of symptomatology is comprised. A subject with an ataxic syndrome was operated on for cerebellar tumor. Landry's paralysis and other myelitic syndromes have been described. But despite this clinical variability the anatomical lesions in fatal cases appear to be one and the same, and there is no difficulty about the post mortem diagnosis. One case appeared soon after eating preserved meat. The symptoms suggested paratyphoid and later after the supervention of diplopia botulism. Of four cases narrated the diagnosis was easy through the presence of the usual fever, somnolence, and diplopia. In a fifth case the diagnosis lay between lethargic encephalitis and apoplexy. By reason of diplopia an eye specialist was consulted, who found myosis and irresponsive pupil, which reacted very slowly to atropine. Complete unconsciousness was followed by death. In other cases the presence of the epidemic led to correct diagnosis, but had the cases been sporadic this diagnosis would at the best have been tentative. An analysis of 17 cases shows that Landry's paralysis and apoplexy may be simulated. By reason of the spinal component the author would introduce the term encephalomyelitis. The undoubted presence of influenza in several cases is placed by the author among the coincidences of disease. Otherwise we must admit identity or at least anatomical correspondence of the two maladies. Or in the absence of a known cause it may be necessary to assume that more than one organism may be able to cause the same clinical affection, and among them the unknown virus of influenza.

Bosman, J. F. M. Encephalitis Lethargica.

After C. von Economo had written on a slight epidemic of lethargic encephalitis in 1917 in Vienna (Neur. Zentrblatt, No. 21, Wiener klin. Wochen., No. 19) more of such cases were described in England by Wilson (Lancet, July 6, 1918), in France by Netter (Académie de Médecine, May 5, 1918, and Paris Médical, August 3, 1918). Next to a very apparent weakness, the symptoms consist in headache, vomiting, nuclear paralyses of the motor nerves of the brain, chiefly paralyses of the eye-muscles, of the n. facialis, of the palate, of the pharynx and of voice- and swallowing-muscles. Paralysis of the limbs is rather rare and so are divergences in sensibility. The spinal fluid is generally quite normal. By some people this encephalitis is considered as an influenza. However, von Economo keeps them strictly separate; per-

haps after all there is a kind of link between the two, whereas the encephalitis is a precursor to the influenza. In Holland some cases have appeared also, which have been described in the Nederlandsch Tijdschrift voor Geneeskunde April 26, May 10, and June 21, 1919. These agree with each other in so far, that all three had drowsiness added to the paralysis of the eye muscles as the most prominent symptom. With the patient whom I saw the chief symptoms consisted in disturbances of sensibility and that mostly in the part of the n. trigeminus. As this seems to be rather a rare case, I give the history.

Mrs. X., aged 32 years, came to my office on June 10, 1919. She told me that, suddenly, on June 7, she had felt dizzy, that she had frequently vomited, and had felt a cold, stiff feeling, which began a little above the left corner of the mouth and which had extended all over the left side of the face and temple, to the top of head. On the right side of her mouth she could taste food, whereas on the left side a sharp, incisive pain was felt. There was no headache. The patient made a dull impression, whereas in ordinary circumstances she is rather bright. Examination showed that on the left side of that part which is innerved by the sensoric trigeminus there was much less sensibility. The difference between the head and the point of a pin was still felt by her. When the mouth was being closed, the left half followed with a jerk. When moving the jaw-bone sideways it was easier to do so to the right than to the left. No signs of any affection could be found in the part of the n. facialis, nor in the movements of the eyes. The eye-pupils were equal and reacted upon light and converging. The corneal-reflex did not exist. Romberg's symptom was distinct. She walked easily backwards and forwards with closed eyes. I did not find anything extraordinary when examining her with eye- and ear-glasses. Her temperature was 36.9° C., her pulse very regular, 76. In expectation of further occurrences I sent the patient to bed. Her urine, which she sent the same day, showed nothing abnormal.

June 12. Her condition was the same.

June 14. Very sleepy, but answers quite correctly, she reacts slowly, and immediately goes off to sleep again. Complains of a cold feeling in her right foot and also in the underpart of her leg. Examining her slightly I found: hypesthesia, the difference between head and point of pin was still felt. The reflexes of the knee-tendons and of Achilles tendons were stronger on both sides and the plantar-reflex was lessened on the right side in comparison to the left; there was no Babinski, no ataxia, the knee-heel test was performed successfully; muscular sensibility was normal and the strength superficially examined was the same on the right side as on the left. The patient told me, that she had double-sight yesterday, but it had passed. Just now she had a lumpy feeling in her throat when swallowing, as if food would not go down. She does not vomit any more. There is no more stiffness, nor does

Kernig's sign exist. The temperature was 37.22° C. (armpit, 3 o'clock p. m.).

June 16. Patient vomited frequently, also had a cold feeling in her right arm. Was able to taste a little better with the left half of her tongue than before, and also felt her left jaw-teeth with her tongue. No fever.

June 20. Much better. More drowsiness. She had not vomited. The cold-feeling in her right arm and leg had disappeared; there still existed a stiff feeling in the part of the fifth branch of the left n. trigeminus. Tasting was normal. The corneal reflex had come back.

June 25. A cold feeling above the left cornea of the mouth was the only symptom that remained, also a slight paralysis of the motoric trigeminus.

June 26. Patient quite recovered and has remained very well since.

As to the question, if this encephalitis must be looked at as an influenzal encephalitis, it must be taken into consideration that the husband of this patient went through a severe attack of influenza and inflammation of the lungs about New Year, 1919. After that none of the members of the family has been ill. At the end of the illness of my patient there were no other cases of influenza then or afterwards. [Author's abstract.]

Neve, G. Influenzal Encephalitis. [Hospitalstidende, November 12, 1919.]

One of his patients was a butcher, aged 46, whose family suffered from influenza. He was also "out of sorts" and lost appetite, but did not at once go to bed. After a few days he felt very ill, tired, and restless, with a sense of pressure in the head. A week after the development of symptoms he came into the hospital, but seemed very debilitated, and his movements were very sluggish. He could hardly move his head, but his neck was not painful. There was contraction of pupils; reaction to light was slow, and to accommodation almost absent. He collapsed, sometimes to the right, sometimes to the left, when Romberg's test was made. There was drowsiness and complaints of feeling heavy and giddy. He could read only for a short spell, and for some days he complained of pain in the back of his head. When he was discharged from hospital, about six weeks after admission, his symptoms had vanished and his pupils reacted to light.

The author gives details of all his cases, and found the clinical picture strikingly uniform, the differences noted being a matter of degree only. Every patient treated in hospital was given hexamethylenetetramine, and the recovery of all the patients was probably the result, in part, of this treatment. Drowsiness, spasm or rigidity of certain muscles, nystagmus, diplopia, and paresis or paralysis of the iris were the leading symptoms. Only in one case was the interval between the

influenza and the encephalitis as long as two months; this case, which was particularly severe, was attributed to reinfection with influenza.

House, William. Epidemic (Lethargic) Encephalitis. [Journal, A. M. A., Feb. 7, 1920.]

Lethargic encephalitis, according to House, appeared first on our northwestern coast in October, 1919. Thirteen cases, indisputably of this disease, occurred, and at least four others in which the diagnosis was not absolutely clear. Of the first five patients, three dated their symptoms definitely from October 12; these were widely separated and knew nothing of each other. He is convinced that the disease is not contagious in the ordinary sense of the term, and he sees no reason for quarantine. House recognizes the slow and the rapid type, the former being most common. The chief symptoms of the slow type were, from the beginning, double vision, slight mental confusion reaching slight delirium in some cases, followed by other symptoms indicating local cerebral and cranial nerve involvement. After a week or ten days, the patient seemed to improve, and then developed the so-called lethargy. During this interval, most patients suffered from insomnia, but with the beginning of the lethargic stage this disapproved. The second type is more severe: "In this type, patients complained of some head pain followed by a rapidly developing delirium, which was acute and attended by hallucinations of sight and hearing of the most vivid character." The three cases observed suggested a probability that the infection had reached the brain from different points—in Type 1 causing local cranial nerve paralysis—and he sees no reason why it should not specially affect the anterior portion of the brain, as was the case in these three patients. The delirium was of a type seen in victims of rabies, and in paresis, with intense congestion and hyperemia of the anterior portions of the brain. Very curious was the euphoria, the feeling of well-being being present in all. Apathy is a better term than lethargy to describe the tendency to quiescence. They are not exactly somnolent, as Bassoe has also observed. Double vision was present in eleven during the first week, but seldom lasted more than four or five days. It suggested weakness of all the ocular motor nerves. Distinct pain referable to the branches of the fifth nerve was seen in three cases. The ninth and tenth nerves were apparently involved in one case in which death seemed to be due to paralysis of the heart and respiratory centers. There was one case of twelfth nerve involvement. The optic nerve seemed to escape generally. The seventh nerve was once involved causing paralysis of the muscles of expression. Most of these patients were seen at about the end of the second week, but temperatures of over 100 were reported in the earlier days. Two patients had no fever, and in most the fever went down at the end of a week or ten days. In several cases, stiffness of the neck was complained of but was not like that of menin-

gitis. It was easily overcome and gave but little discomfort. Involvement of viscera was notably absent, except in two instances in which heart and lungs were involved. Epidemic cerebrospinal fever was suggested by consultants in one case, and ptomain poisoning was diagnosed. The attending physician in three cases attributed the illness to ptomain poisoning, the patients attributing their trouble to eating canned goods. House thinks that many cases reported as cranial nerve palsies following influenza are really cases of epidemic encephalitis. Out of thirteen patients four died, and one was in a critical condition at the time of writing. Treatment is necessarily symptomatic. The patient should be encouraged to eat and should be given abundance of fluid and semisolid food.

Arana, G. F. Lethargic Encephalitis in Guatemala. [Juventud Méd., July, 1919.]

For five days this woman slept continuously when first brought to the hospital. At first, drunkenness was suspected. There was slight fever, but no other symptoms. Under mercurial treatment, facial paralysis and ptosis developed, and the somnolency became more intense, with mild delirium at times. Lumbar puncture showed the tension and albumin content slightly above normal. The fifteenth day hexamethylenamin was given systematically by the mouth, and 1 gm. of peptone injected by the vein, repeated with one day intervals six times. Reaction was severe, with chill and fever, but great improvement was manifest after the second injection. Lumbar puncture on the twenty-sixth day still showed high tension but the fluid was otherwise normal. By the fifth or sixth week recovery was complete, with no traces of the disease, neither was there memory of any of the weeks of the somnolency. No bulbar paralysis, vertigo or vomiting occurred at any time. Arana ascribes the favorable outcome in large part to the proteosotherapy.

Re, G. Lethargic Encephalitis. [Rif. Med., Sept. 20, 1919.]

Re is convinced that it is a nervous complication or manifestation of influenza. He gives a résumé of 13 cases seen within five months.

Bond, E. D. Epidemic Encephalitis and Katatonic Symptoms. [Amer. Jour. of Insanity, Jan., 1920.]

This article compares cases of "lethargic" encephalitis with a case of chronic depression showing a katatonic episode. The point is made that many psychoses show symptoms of brain trouble which may easily be overlooked in the first place because of lack of coöperation in the patient and in the second place by lack of care in the physician's examination and history. There will be much to reward repeated routine physical examinations in the psychoses—perhaps beginning with as simple a thing as a continued daily temperature record. [Author's abstract.]

Hamill, R. C. Post-Encephalitic Involuntary Movements. [Medical Clinics, May, 1920.]

Two cases were shown which presented involuntary movements coming on during and remaining after attacks of encephalitis. The first, a boy of eleven, was seen in November, 1919, in delirium and semicoma. He had had pains in the right face for a week, vomiting off and on, and a convulsion the morning he was first seen. His position in bed, head retracted, thighs and legs flexed, suggested meningitis, but there was no rigidity of the neck. The pupils were dilated, the reflexes not obtainable because of patient's constant movements when touched. The spinal fluid contained over 1,000 cells per c.mm. The optic nerves were normal. For about six weeks he remained more or less irrational, had frequent involuntary evacuations, was very restless. Out of this restlessness emerged a fairly rhythmical, simultaneous, movement of the sterno-cleido-mastoids, the pectorals, and the latissimus dorsi on either side. The twitch was as though touched off by an electric spark, occurred about once per second and caused a definite inspiratory hiss. There was also a more frequent simultaneous twitch of the frontal portion of the right occipito-frontalis, and right retractor anguli oris, occurring about eighty per minute. For the most part the twitch of the chest and neck muscles replaced the normal respiratory movements, but he could take several deep inspirations, during which it seemed apparent that the twitch was of the nature of an epi-phenomenon continuing its rhythm, merely much reduced in the amplitude of its excursion. The patient was unconscious of the movements.

The second case, a man of fifty, was seen six weeks after the beginning of his acute illness. He was struck on the head about January 1, not knocked down, and continued his work on that day and for the next four days. On the night of the fourth day he woke with very severe pain in the right parieto-occipital region which continued for two or three days, when he lost consciousness, or at least from which time he had an amnesia for three weeks. It has been impossible to obtain information concerning this period. When first seen there was a twitch of both sterno-cleido-mastoids, of the erector muscles in the back of the neck and the right trapezius. This was rhythmical, about fifty per minute, and was more marked during sleep. Its occurrence was unknown to the patient.

The fact that in both these cases, and in another case under observation, the twitches were bilateral, seemed to speak against their being of cortical origin. They were repeated with great regularity, were always the same, they occurred without the patient being conscious of them. The movements they occasioned suggested a sharp inspiratory effort. It was a question as to whether they and the delirium were expressive of cortical involvement, or whether they represented the involvement of some basilar structure or complex, such as is touched off by the needs of the respiratory centers during oxygen hunger. [Author's abstract.]

Achard. VARYING SYMPTOMATOLOGY OF LETHARGIC ENCEPHALITIS. [Bulletin de l'Académie de médecine, February 3, 1920.]

Even the fundamental symptoms of this disease, somnolence, is subject to variation. Some cannot be awakened by external stimuli. Others wake up when spoken to loudly, answer questions, and go to sleep again. Somnolence may be intermittent. Thus, one patient each morning walked about, made his bed, then slept again for a long time. This condition persisted in spite of return to normal temperature and descent of the originally high spinal lymphocytosis to an even standard of ten cells per cubic millimeter. In some cases there is no true sleep but merely a "dazed" condition. The patients partly sit up in bed, with their eyes open, and without the head resting on the pillow. They remain motionless; their limbs, if moved, frequently show a catatonic condition. The open eyes do not appear to see, and fail to move when anything is passed in front of them. The lids close only at long intervals. They do not answer questions, nor appear to hear or understand, and seem to be afraid to move. Two young patients showed this condition temporarily before regaining consciousness. Another, a young girl, remained thus for several days, and when finally up and dressed, showed a tendency to fall backward. Mental depression is in some instances replaced by a low delirium, even during somnolence. One patient, though asleep, talked of events and moved restlessly about. Spoken to loudly, he usually answered, in a weak, poorly articulated, and monotonous voice. Ocular paralyses are frequently lacking, or may be very transitory, slight, and of limited extent. Other cranial nerves may be affected, typically, in the discrete, partial manner emphasized by Widal. The limbs may be involved. One case, a young man, admitted with a temperature of 40° C. and unable to answer questions, showed a flaccid monoplegia of the left upper limb; his cerebrospinal fluid showed only about ten lymphocytes a cubic millimeter. Next day he was all right mentally; no fever, no paralysis. Spasmodic manifestations may be added to or replace the motor disturbances. Some of the reflexes may be exaggerated and circumscribed myoclonia occur. One patient was in a profound sleep when admitted. He had myosis, loss of knee jerks, normal cerebrospinal fluid and high temperature, but woke up the next morning and showed myoclonic movements in the shoulder and left side of the thorax. Subsultus tendinum was witnessed in four patients, in a more marked form than is generally seen in typhoid fever, and with extension to the lower extremities. In general, the motor disturbances are varied, disseminated, fragmentary, and mobile. Constitutional manifestations are likewise inconstant. Very high temperature is seen in some, but others have no fever. Constitutional symptoms may precede somnolence by a considerable interval. One patient had had high fever—up to 40.5° C.—for ten days, with headache, slight noctural delirium, no paralysis, very slight anisocoria, no facial motor involvement,

and no somnolence. The characteristic somnolence was seen two days later; lumbar puncture yielded normal fluid. Fever may continue after cessation of somnolence. Again, in two patients who had shown a pronounced meningeal reaction, intermittent somnolence was still present two weeks after defervescence. Some diagnostic importance may be attached to this polymorphic and acyclic character of the symptoms in lethargic encephalitis.

Howard, C. P., and Royce, C. E. Lenticular Degeneration. [Arch. Int. Med., Nov. 19, 1919.]

The histological diagnosis was: progressive degeneration of the neuron and glial elements of the basal ganglia, most extensive in the lenticular nucleus but involving the optic thalamus, caudate nucleus, internal capsule and red nucleus and, to a slight extent, the white matter just beneath the gray matter of the cortex; chronic interstitial hepatitis; lymphoid hyperplasia manifest in spleen and retroperitoneal lymph nodes; acute congestion of spleen and kidneys; colloid cystic degeneration of the parathyroid glands. Anatomic diagnosis had shown cystic degeneration of the basal ganglia; cirrhosis of the liver, colloid cystic degeneration of the parathyroid glands; bacteremia; uniform congestion of the lungs. The brain, after it had been hardened in liquor formaldehydi, disclosed the changes in the lenticular nuclei characteristic of Wilson's disease, a bilateral symmetrical cavitation and atrophy. The cavitation is not sharply confined to the lenticular nucleus but, to a less degree, involves the internal capsule and optic thalamus on both sides. A slight grayish discoloration of the globus pallidus was noted.

Wechsler, I. S. Hereditary Chorea. [Neurolog. Bull., Sept., 1919.]

The clinical picture of the patient herself was typically Huntingtonian in behavior. There was no doubt about its hereditary nature, three generations showing chorea of a continuous nature. The patient was 36, had had chronic, non-progressive chorea sixteen years, the father a non-degenerative type for twenty. Two brothers had a mild form for three years; another brother and sister were nervous. But the patient did not have two prominent symptoms of Huntington's chorea. Her condition is not progressive, in fact, stationary, if not somewhat better; there is no defect mentally, no signs of dementia. Attention alone is defective. Attacks of fainting or so-called spells of weakness, speak in its favor, but there is nothing else. Chorea gravidarum is a remote possibility as the condition began ostensibly with a miscarriage, but that type generally stops with the emptying of the uterus and only rarely becomes chronic and is never hereditary. Paramyoclonus multiplex is ruled out because of the absence of the lightning-like rapidity and universality of contraction generally found; also the bizarre character of gait, facial and tongue movements; the hereditary or familial attributes are lacking.

Tsunesuke, Fukuda. Fibers Constituting the Anatomic Connection between the Nuclei of the Thalamus and the Frontal Lobes (Frontal Region) in Man. [Schweizer Archiv f. Neurol. u. Psychiat., 1919, Vol. 5, No. 2, p. 324.]

Seeking to explain this anatomic problem, the writer studied thirteen cases with clearly defined lesions of the frontal brain. The secondary degenerations in the thalamus opticus were altogether confirmatory of the view that the localizations of the foci in the frontal lobe determine degenerations of particular areas in the thalamus, but showed further that the areas over which the fibers from the different nuclei spread, varies considerably in extension and that separate systems of fibers from thalamus to frontal cortex seem to intermingle. The areas of the cortex disturbed in the author's cases were irregular in outline, sometimes spreading extensively over the convolutions, sometimes penetrating into the deeper sections. Usually several fiber systems belonging to quite different section of the thalamus were destroyed, but the trend of the secondary degenerations never failed to show the close connection of the separate areas of the anterior parts of the thalamus with definite convolution areas of the frontal lobes, and this relation was not manifested solely in regard to localization, but was also apparent in delicate histological resemblances of the two areas, indicated by an elective affinity of variously localized degenerative process for certain cells in the thalamus. Even where there is very extensive degeneration representing large areas of the frontal lobes, certain small cells or intercalary cells remain relatively intact. This elective extension of the destructive process of definite regions to certain cell groups is not in conformity with Nissl's experiments with guinea pigs. After experimental extirpation of the entire subcortical medullary substance of the frontal lobe he found that the entire thalamus opticus to the commissura mollis (consequently including the central gray substance) was destroyed by the secondary degeneration. According to the author's observations this does not hold good for man. In the pathological material used by him there were always certain nerve cell groups within the degenerated thalamus nuclei which were not completely destroyed, being almost without exception the small cell elements which are to be found in proximity to the large cells. It may be assumed for these cells that they do not stand in direct connection with the thalamus fibers radiating to the frontal lobe, but are rather structures connected with the reciprocal functional activities of various sections of the thalamus gray matter. In a guinea pig in which the retro-thalamic fiber sections had been severed there was a very considerable secondary degeneration of the substantia molecularis (which is rich in these small cells) in the anterior thalamus nuclei corresponding to the area operated on. Here the small cells were atrophied while the other cells which are regularly found degenerated after destruction of the frontal cortex were rela-

tively intact. These findings strengthen the assumption that the large cells are not dependent on the retro-thalamic fibers, but on the frontal cortex, while the small nerve cells scattered in the gray substance of the thalamus as well as those in the substantia molecularis seemed connected with the retro-thalamic fibers coming from the tegmentum region. They may form a connecting station between the oblongata, cerebellum, mesencephalon and metencephalon projection systems on the one hand and the thalamo-cortical projection system on the other.

Brouwer, B., and Coenen, L. Connections of the Inferior Olives. [Jl. f. Psychol. u. Neurol., 1919, xxv, p. 52.]

After a short critical digest of the recent literature on the inferior olives the authors give a detailed description of two series of sections from the cerebellum, pons varolii and medulla oblongata of two cases in which lesions of the olives complex were observed. The first case was characterized by the presence of a relatively small and well circumscribed area of softening in the mid-ventral region of the right cerebellar hemisphere without any alteration of the corresponding dentate nucleus or of the vermis. This softening had caused remarkable degeneration of the ventro-lateral parts of the principal olivary body of the opposite side, whereas its oral portions as well as the accessory olivary bodies and the pontine gray formations looked quite normal. The second case was one of occipital encephalocele in a newly-born baby with atrophy of the right half of the cerebellum and malformation of the cerebellar pyramid, uvula and nodule. The encephalocele was united to the vermis by a thin pedicule and contained traces of undeveloped cerebellum. The examination of the serial cuts showed the existence of remarkable alterations in the frontal half of the inferior olivary body and mid-ventral accessory olive of the opposite (viz., left) side, as well as in the most frontal parts of the inferior olivary body and in the mid-ventral accessory olives of the right side. These observations together with former ones and with the results attained by other investigators, allow of the following general conclusions: (1) The cells of the pontine nuclei send their axis-cylinders to regions of the cerebellar hemispheres different from those representing the end stations of the phylogenetically younger portions of the olives' complex. (2) The tonsil and the surrounding portions of the cerebellar hemispheres represent an ample area of projection for the inferior olives. (3) The results of recent investigations afford fresh support in favor of the conception according to which the accessory olivary body and the frontal pole of the inferior olive are fibro-anatomically connected with the palaeocerebellum, while the greater part of the inferior olive is connected with the neo-cerebellum. (4) The mid-ventral accessory olivary body is fibro-anatomically connected with the pars postrema cerebelli, viz., the pyramid, uvula, nodulus, flocculus and paraflocculus. (5) Just as the mid-ventral olivary

body of aquatic mammalia is strongly developed, so the pars postrema cerebelli, particularly the paraflocculus, is greatly enlarged. [Da Fano.]

Frantz, M. H. HUNTINGTON'S CHOREA.

Frantz relates a case of Huntington's chorea where the patient was a man of 34, with a negative family history. Personal history was also negative except for an accident to his arm to be described. The patient complained of "shaking of various parts of his body," partial loss of function of left arm, with inability to use it very much. Four and one half years ago, he jammed his left arm between the wall and the door and six months after, he began to show these nervous phenomena. He shakes all the time, throws his hands loosely about, as well as his head. Makes grimaces, snorts, smiles at times without any cause. Besides carious teeth and some cardiac irregularity, he shows a badly ankylosed left elbow joint. He is well oriented and shows no mental clouding. At present he is doing skilled mechanical work and is quite happy. After reviewing the disease the author points out that the interesting features here are the absence of a similar condition in the remote or immediate family, and that the patient had been apparently well until six months after the accident to his arm. The question is, was the injury the precipitating factor in bringing out this condition? [Author's abstract.]

Schultze, Friederich. THE THEORY OF PSEUDOSCLEROSIS (WESTPHAL-STRÜMPELL). [Neurol. Centralbl., Oct. 16, 1918, No. 20, Vol. 37.]

In the author's textbook on nervous diseases, in a discussion of the difference between multiple sclerosis and pseudosclerosis, he gives a case which he now wishes to describe more fully because Wilson and Westphal have referred to it and because Volsch has called attention to the fact that no information was offered concerning the condition of the internal organs. In that case the diagnosis of multiple sclerosis was made from the clinical picture, as the symptoms generally seemed typical of this disease, though the exaggeration of the tendon reflexes was tardy in making its appearance and there was no nystagmus (the symptoms of the early absence of abdominal reflexes was at that time unknown). The occasional contractions, especially of the cervical and masseter muscles, were remarkable symptoms. To the author's surprise, however, no signs of multiple cerebrospinal sclerosis, either macroscopical or microscopical, were found at the post-mortem. On the other hand, a chronic interstitial hepatitis was found—the same finding as in Wilson's disease, "The liver seemed somewhat smaller than normal"; its surface showed very strong coarse granulation. If the clinical picture of the author's case is compared with that of pseudosclerosis and that of Wilson's disease, it may be seen that the most essential signs of these diseases are present, especially those of the first mentioned, including the

negative findings in the pyramidal tracts. The disease developed in youth (patient was 25 years of age); made slow progress up to time of death; there was headache, fatigue, vertigo, tremor, tonic spasms, long-continued contractions, uncertain vacillating gait, with pronounced Romberg, dysarthric disturbances of speech, long-continued unilateral paralysis, without any considerable exaggeration of reflexes, no disturbance of pupils, no reduction of sensibility. Worthy of note was the inflammation of the gums, as mentioned by C. Westphal and Volsch. As far as a negative diagnosis is of worth, the case may be assumed to be pseudosclerosis; a postive one cannot be given with certainty because an examination of the lenticular region and brain generally was not made to determine whether those changes which are described by Westphal were present. In Dziembouskis' case, the changes in the brain set in only a few months before death, being localized principally in the lenticular nucleus, while the severe changes in the liver were much older. The author thinks it may be possible in his case that the changes in the brain had not yet become discernible at the time of the patient's death. It has not yet been determined whether the pathological changes begin simultaneously in the brain or liver, or whether those of the liver or those of the brain are the first to set in. The case was in all probability not of syphilitic origin. Alcohol, also, could not be assumed to be the cause of the cirrhosis. The disturbance must be referred to some unknown cause which plays a rôle in other cases of liver cirrhosis as well as in many cases of an acute yellow atrophy of the liver. The great difference in the brain symptoms existing in different cases of this disease depends on the extent and degree of the changes produced by the pathological agent. The peculiar discoloration of the cornu seems, according to the experience of the present day, not to be a conditio sine qua non for the symptomatology and diagnosis of the disease.

Malagueta, T. New Studies of the Anatomy and Pathology of the Corpus Striatum. [Archivos Brasileiros de Medicina, Brazil, June, 1919. No. 6.]

Study of the corpus striatum has long drawn the neurologist's attention. Many syndromes were created specially referring to the lenticula. Thus in 1911, Mrs. Vogt stated a symptom-complex depending upon the double lesion of the corpus striatum: clinically, a pure double athetosis; anatomically, a lesion of the corpus striatum called by her "état-marbré." In 1912, Kinnier Wilson gave a description of a new symptom-complex, "Progressive Lenticular Degeneration," a syndrome chiefly motor, extra-pyramidal, with a cirrhosis of the liver. A new era was beginning in the study.

On the one hand, new cases were cleared up at necropsy, Stöcher's case, Cassirer's, De Lisi's, Cadwalader's, Farnell's and Harrington's, Hamilton's and Jones', Pfeiffer's case, etc.; without necropsy, Sawyer's,

Nammack's case, Rocha Vaz's two cases, etc. Some one also had had a lesion of the internal capsule (Jenks Thomas's, etc.). Moreover, nearer syndromes began to be known as: "van Woerkom's," "Davidenkoff's"; and also other diseases were connected with Wilson's: pseudo-sclerosis, paralysis agitans (Strümpell, Oppenheim). There was also Huntington's chorea, Mrs. Vogt's symptom-complex, dystonia musculorium deformans, progressive athetosis, Bechterew's apoplectic hemitonia and some poisoning by carbon monoxid (Spiller).

On the other hand, Ramsay Hunt seeks to individualize in the corpus striatum, two organizations. This dissociation, really, is founded on the comparative anatomy (Ariens Kappers, De Vries), on the embryology (Dejerine and Mrs. Dejerine-Klumpke) and on the cyto-techtonic (Mrs. Vogt). One of these constructions is constituted by the Palio-Striatum (*Globus Pallidus*)—the other by the Neo-Striatum (*N. lenticularis and n. caudatus*). The lesion of the first should give the syndrome of the progressive atrophy of the *G. Pallidus*, affection of the type of *Paralysis agitans;* the second, the syndrome of Neo-Striatum, is supposed to express itself by Huntington's chronic chorea.

Finally, with Wilson and Mrs. Vogt was created a new extrapyramidal motor syndrome without disturbance of the sensitiveness. On the one hand they have tried to collect under Wilson's disease other syndromes making a new nosological group. On the other hand they tried to determine in the corpus striatum itself special points which would explain certain symptom-complexes.

This shows that new studies must be made: (*a*) to ascertain which rôle the corpus striatum plays in every one of the diseases connected with Wilson's syndrome; (*b*) and to ascertain which part pertains to every one of the corpus striatum nuclei in the symptom-complex. [Author's abstract.]

7. NEUROSYPHILIS.

Müller, E., and Singer, G. Fate of Syphilitic Children. [Archiv für Kinderheilkunde, May 17, 1919, J. A. M. A.]

Müller and Singer review the experiences since 1909 when the first Welander home for children with inherited syphilis was inaugurated in Germany. They devote nearly 130 pages to the tabulated findings year by year in 214 children who have been inmates of the institution, and call special attention to eighty-four who have been kept under surveillance for two, four, nine or ten years. All this material is classified according to treatment and other features of the cases. The data demonstrate that far better results were realized by this prolonged systematic treatment than by other means, but the final judgment will be possible only when the children get to be 30, 40 or more years old. But even already it is evident that the most serious consequences of congenital syphilis can be essentially attenuated or even completely

cured. The mortality differed widely in different years: of late the children seemed to succumb to the syphilis itself and not to intercurrent disease so much as formerly, especially the infants. The total mortality among 202 syphilitic children was 22.8 per cent. The Wassermann reaction was negative on the final examination of the sixty-nine children given the full course of treatment. The children were given usually from seven to nine courses of treatment as they lived in the institution for three or four years.

Rohde, Max. CONTRIBUTION TO THE QUESTION OF LUETIC MENINGITIS. [Monatschr. f. Psychiat. u. Neurol., 1919, Vol. 46, No. 5, p. 281.]

The diagnosis of lues cerebri is often difficult because of the variability of the disease picture, due to the fact that the disease process may be localized differently in different cases, and that the symptoms are not constant but subject to repeated fluctuations. For this reason all the pictures that the disease might assume must be constantly kept in mind, not only the three general types enumerated by Nonne, namely, that characterized by neoplasms; or by chronic hyperplastic inflammations, or by disease of the vessels, but also the various modifications of these types conditioned by the special part of the brain attacked by the process. When the disease is localized in certain regions of predilection, as, for example in the brain trunk, in the internal capsule, the symptoms are quite manifest and characteristic. But the case is quite different if the process takes the form of a meningitis of the convexity for example, for, if the motor zone is not affected, the fundamental disease may be easily overlooked. The same is true if the meningeal process of the lues cerebri is situated in the neighborhood of the posterior cerebral fossa when the point of exit of the brain nerve is not involved and the phenomena are not very pronounced. To illustrate these difficulties of diagnosis the author describes two cases, one of each type. The second case the author considers as especially instructive from the absence of characteristic symptoms, which would reveal the fundamental disease.

Claude, Henri, and Quercy. SYPHILITIC MENINGO-ENCEPHALITIS AND THE ENDOCRINE GLANDS.

The authors describe a case which shows an interesting relation of the following symptoms: Chronic syphilitic meningitis with ependymitis accompanied by dilatation of the ventricles, especially of the infundibulum and of the stalk of the pituitary with compression and atrophy of the hypophysis, resulting secondarily in lesions of the hyophysis together with functional and anatomic modifications of the other inner secretory glands (glandular synergies). The hypophysis was atrophied, but the normal elements were discernible, normally colored and in their normal arrangement. It seems highly probable that in this condition the gland

had poured into the circulation only insufficient and abnormal products. Contrary to that which usually takes place, however, in disturbances of the hypophysis the centers in the floor of the third ventricle were not involved, which explains the absence of polyuria and narcolepsy. The glandular equilibrium alone was disturbed, so that the other secretory glands disturbed in their functioning by the hypophisary insufficience set up a vicarious and transitory energy which then became permanent and caused hypertrophies resulting finally in manifest lesions, for example, in the suprarenals, a medullary hemorrhage, in the thyroid atrophy, in the interstitial and seminal glands considerable hypertrophy with functional hyperactivity. The specific syphilitic infection was the pathogenic factor which dominated the picture, but the syphilis in this case took a very unusual form and the immediate cause of the ependymitis is obscure. Perhaps the vascular lesions of the choroid plexus and of the large arteries in this region may have been partly responsible for some of the symptoms. However that may be, after the first phase, in which there were complicated meningo-cortical and ependymitic phenomena, the nervous and glandular symptoms were developed.

Nonne, M. Hypophyseal Form of Lues Congenita. Antisyphilitic and Organ Therapy. [Neurol. Centralbl., March 16, 1918, No. 6, Vol. 37.]

In a previous work the author reported three cases of dystrophia adiposogenitalis with psychic infantilism as an expression of lues hereditaria. That the hypophysis is susceptible to syphilitic disease has been known since the researches of Weigert, Virchow, and others, and that it is affected by congenital lues is proved by the anatomical examinations of M. B. Schmidt and especially of Simmonds, who found gummata, and necrotic and inflammatory changes of the hypophysis in lues congenita and thinks that affections of this sort are frequent in congenital lues. Reports of clinical symptoms of such disease of the hypophysis, however, are rare, having been mentioned, so far as the author knows, only by Goldstein, Wagenmann and Weygandt. The author describes a case of hereditary lues in the third generation, a young man of nineteen showing pronounced signs of a habitus adiposo-femininus, with retarded genital development and psychic infantilism. He was treated for six months, at intervals, with iodide of mercury given internally, and also constantly during the entire period with hypophysis tablets. After three months the adiposity and feminine characteristics began to disappear and at the end of six months he presented the appearance of a normal youth, with normal genitals and hair distribution, and nearly normal psychic development. This case shows that in dystrophia adiposogenitalis in adolescents the possibility of hereditary lues should always be taken into consideration, and that the combined antisyphilitic and specific organ therapy seems effective against the disease, if caused by congenital lues.

Hutinel, P. Hereditary Syphilis and Dystrophies. [Archives de médecine des enfants, Jan., Feb., Mar., and Apr., 1920.]

Lesions dependent upon hereditary syphilis may be divided into two groups. The first group contains the specific alterations which are in general more localized if the malady is of long standing and more benign, and in which we find if not treponema at least the characteristic reactions which it has produced. In the second class we find nutrition difficulties, the *dystrophies*. The dystrophies have many different forms. Some are *local*, partial, sometimes highly circumscribed. Their nature often makes it possible to suspect syphilis: the majority of the stigmata of this disease may be found in this class. Usually they are multiple and their grouping is of such revealing nature that they often enable one if not to detect at least to suspect the existence of the infection. The main stigmata are the deformations of the skull, the nose, the teeth, alteration of the cornea, of the ear, of the testicles, etc. Others are made up of visceral scleroses. They have not all invariably got a specific character. They are the results of local lesions and are direct manifestations of the illness. Still others are *general*. They are characterized by nutritional difficulties, or difficulties in development which affect all the parts of the same apparatus (bones, articulations, nervous centers, genital apparatus, etc.) affect an important organ or some tissue (skin, blood, etc.). In these organs and tissues there are favored sections and the stigmata are not evenly distributed. Although they are at times isolated, more frequently they are grouped and associated and form true pathological entities.

They arise from specific lesions which attack the organs of nutriment, especially those which are localized in the endocrine glands (thyroid, hypophysis, suprarenals, pancreas, genital organs), but other organs (liver, kidneys, nervous centers, lungs, etc.) cannot be seriously altered without the organisms manifesting its infection. It is equally true that the organs governing nutrition when seriously affected are particularly inclined to reveal pronounced dystrophies. Thyroidal dystrophies, hypophyseal, suprarenal and genital dystrophies and pluriglandular syndromes accordingly hold an important place in this study. They do not appear as the immediate and direct result, but rather as the indirect and slow result of specific infection; they have no features individual to hereditary syphilis and may be brought about by other infectious and toxic processes; they may not accordingly be awarded specific treatment exclusively, but often require the intervention of opotherapy. To these two classes of dystrophies a third should be added which in specificity is still more distant from the second variety. These are the hereditary dystrophies. When the nutritional difficulties, imputable to glandular or organic lesions have been caused by hereditary syphilis or by some other morbid processes, they may be transmitted from parents to children. Thus it is that two or three successive generations may present indications of thyroidal or hypophyseal insuffi-

ciency. The special disease such as Basedow's disease is not so often transmitted, but rather an organic debility. A child whose mother has Basedow's disease is frequently a hypothyroid. In hereditary syphilitics of the second generation this dystrophic inheritance is more common than infectious heredity. Hereditary syphilis in affecting the organs of the new born modify them in function and in resistance. It is accordingly frequently met with at the outset of pronounced dystrophies in childhood (athrepsia, hypotrophy, rachitism, status lymphaticus, infantilism, etc.) but it is not always the only cause and it is not always easy to determine exactly the part that it played in the production of the dystrophy. As the dystrophies caused by hereditary syphilis draw away from their infectious origin, the importance of specific medication decreases gradually. Opotherapeutic medication, on the other hand, is more and more needed as infection recedes. It is especially in cases where the dystrophies outlast the infection that these preparations give the best success, especially if hygienic precautions are not neglected. [Author's abstract.]

Barewald, C. L. HEREDITARY SYPHILIS. [Jl. Iowa State Med., Jan., 1920.]

About seventy-five per cent. of syphilitic mothers suffer abortion. Of the syphilitic children born alive, about seventy-five per cent. die in the first year of existence. Of all children born, one in every one hundred and fifty is found to be syphilitic. In all obstetrical wards the physician should have the Wassermann test performed as a routine measure. In private practice this procedure would also be advisable. Persons who have been cured of syphilis can procreate healthy children. Some syphilitic children are apparently healthy at birth, but usually there are certain indications which should not be overlooked. Some of these are obscure, others very apparent. The physicians should be inclined to suspect syphilis in weak children with high piped, strident voices, wheezy breathing, sero-purulent blood, streaked nasal discharges, impetigo neonatorum, purpura neonatorum, purpura hemorrhagica neonatorum, bullae on the palms of hands or on the soles of the feet. Exostosis and synovitis are pronounced indications. Slow and painful dentition, asymmetry in form, scantiness of hair, irregular features, enlargement of liver and spleen are all indications, but from the third to the sixth months evidence of hereditary syphilitic taint show themselves. Often in case where the hereditary taint is least suspected the Wassermann test and the administration of salvarsan and mercury will clear up the case.

The Wassermann test of blood not only in parents and children, but also in the apparently healthy as an eugenic measure is endorsed. [Author's abstract.]

Wohlwill, Friederich. Pathologico-Anatomical Examinations of the Central Nervous System of Syphilitics without Clinical Nervous Systems (including Congenital Syphilis). [Archiv f. Psych., August, 1918, No. 2–3, Vol. 59.]

In forty-two cases of the late form of acquired syphilis the central nervous system was examined after death and as the author suspected pathological changes were found in the brain and medulla oblongata where there were no neuropathological symptoms. There were twenty cases with changes in the nervous system which could, with more or less show of probability, be ascribed to the fundamental disease. In six cases there was perivascular infiltration which was possibly of luetic origin. In three cases the author found small foci of decomposition in the brain as result of exudative processes. In three other cases there was infiltration in the pia. In eight cases there were indications of beginning tabes, paralysis, or lues cerebri. Answering the question whether there is any relation between the positive findings in the anatomical examination of the central nervous system in these cases and the special syphilitic disease forms discovered in the rest of the body, the author calls attention to the fact that where positive signs in the central nervous system were discovered, there was striking frequency of disease of the aorta. He remarks that disease of the aorta seems to be very frequent in cases where there is pronounced or rudimentary syphilitic disease of the central nervous system. Twenty-one cases of congenital syphilis were examined with the result that deviations from the normal histological structure were found with much more regularity. These alterations were severe and extensive in proportion to the youth of the individual. In very young infants the changes in the nervous system were profound and manifold, but as the child grows older the exudative and inflammatory changes recede, while the peculiar proliferating processes in the pia are frequently met with after a half year of extra-uterine life. Contrary to what was found to be the case in acquired syphilis, there was in congenital syphilis no evidence that would permit certain clinical disturbances in other parts of the body to be regarded as forming a transition to a metasyphilitic process.

Plaut and Steiner. Relapsing Fever in Paralytics. [Neurol. Centralbl., 1919, Vol. 38, No. 22, p. 717.]

The introduction into the body of dead microörganisms (tubercule bacilli, streptococci, staphylococci, etc.) has up to the present time shown but little good result. After the inoculation of paralytics with living virus (malarial plasmodium) Wagner v. Jauregg observed improvements. But it seems preferable for various reasons to produce relapsing fever instead of malaria—because of the close relationship between the spirochetes of this fever and syphilis, because a higher temperature is repeatedly produced, and further because the relapsing

fever can be controlled by means of salvarsan. The close relationship of the spirochetes of these two diseases suggests that the defence substance produced by the fever spirochetes or the antibodies produced by them may have some influence on the pallida. It might even be possible that by a combination of the immunizing process and the salvarsan treatment a favorable paralysis therapy could be arrived at. Plaut and Steiner obtained no good results from their first experiments with domestic relapsing fever virus, but virus from Africa produced a sufficient infection though the fever was refractory to salvarsan treatment. Six paralytics and two cases of dementia præcox were inoculated. The clinical course of the fever was the same in all of these cases and the disease notwithstanding the failure of the salvarsan treatment led to no dangerous symptoms. The disease picture in the two cases of dementia præcox were not at all influenced by the intercurrent fever. Of the paralytics—all advanced cases—one showed a remission and two others showed improvement. It is not certain whether these effects were directly caused by the treatment or whether they were only coincident with it. In one case of juvenile paralysis there was, at the beginning of the relapses, epileptic attacks, usually before the temperature had risen to any great degree.

Labbé, M., and Langlois, S. Purpura Hemorrhagica from Arsenical Poisoning.

The bloody diarrheas and hemorrhages met with in the course of arsenical poisoning are known. Labbé has just published a case of acute, febril, fatal purpura hemorrhagica caused by injections of neoarsenobenzol. It occurred in a young girl of 25, without any personal or hereditary history of hemophilia. She contracted syphilis in April, 1918, and was treated by intravenous injections of neoarsenobenzol from the 15th of July on in doses varying from 0.15 to 0.90 centigrams; the first two series were taken fairly well; the third produced bleeding of the nose and of the gums transient at first and then more constant, finally complicated by petechiae and cutaneous ecchymoses, a final injection of 0.30 of neoarsenobenzol called forth numerous hemorrhages. From this time on the purpura progressed; the nasal, gum, and tongue hemorrhages continued; anemia made rapid progress (the blood contained only 1.600 000 blood globules); an anemic breath could be heard in the heart. The length of time for bleeding at the level of the lobe of the ear exceeded 60 minutes; coagulation of blood on the blade took place in 19 minutes; thereafter it became more and more slow and finally exceeded 60 minutes; there was sedimentation of the blood clot and irretractibility. The liver was hypertrophied. In spite of treatment by injections of fresh serum and peptonized water the purpura continued its development accompanied by a higher and higher temperature and death followed in a coma at the end of ten days.

This is a typical case of acute purpura hemorrhagica recalling in its development the serious cases of infectious purpura. The blood showed characteristics associated with hemophilia and purpura: anemia depending both upon the hemorrhages and the hemolysis. There is no doubt about the etiology for it clearly developed as a result of injections of neoarsenobenzol. It looks as if the toxin had acted through the intermediary of the liver for this organ was hypertrophied and other observations have showed the frequency of jaundice caused by neoarsenobenzol. Moreover M. Leredde who took care of this patient has already reported two other cases of purpura hemorrhagica, one curable, the other fatal, in syphilitics treated by neoarsenobenzol. One of his patients had hepatic antecedents and presented congestion of the liver with subicterus. M. Crenet without observing purpura gravis had also seen hemorrhages of the gums and hemoptysis in patients who had been treated with neoarsenobenzol. It is accordingly necessary, M. Labbé thinks, to give consideration to the cutaneo-mucous hemorrhages which constitute an alarm signal in the course of arsenical treatment of syphilis, and to stop the injections if these accidents are continuous, so that a fatal outcome may be avoided. [Author's abstract.]

Gibson, H. E. A Comparison of Two Methods of Administering Arseno-Benzol Compounds in Syphilis. [British Medical Journal, January 24, 1920.]

In the series quoted, two courses of salvarsan substitutes of arsenolbenzole compounds were tried—a concentrated course, consisting of 0.3 grm. for first dose, followed by 0.6 grm. for subsequent ones, and a prolonged course, in which subsequent doses were 0.3 grm. for second and third, and 0.4 grm. for fourth and fifth and 0.5 grm for sixth and seventh.

Total in each case limited to 2.8 grm., when Wassermann was taken. If this was positive, further treatment was given, bringing total to not more than 4.0 grm. Criterion of "cure" was a negative Wassermann reaction. In primary cases, there was little difference in the two courses, showing 82.35 per cent. and 80 per cent. for concentrated and prolonged respectively up to 3.0 grm.

In secondary cases, advantage lay with the prolonged course, this showing 45.71 per cent. against 32.69 per cent. for the concentrated, up to 3.0 grm., and 45.71 per cent. against 19.23 per cent. for additional treatment bring total up to 4.0 grm.

Taking all cases together results were:

Up to 3.0 grm.: Concentrated course 52.80%, prolonged 68%.

Up to 4.0 grm.: Concentrated course 25.84%, prolonged 38%.

Thus the advantage on the whole rests with giving these drops in small doses, rather than in large ones *ab initio*. In both series injections were given at weekly intervals, with a fortnight's rest in the middle

of the course. Weekly intramuscular injections of mercury were also given in both series. [Author's abstract.]

III. SYMBOLIC NEUROLOGY

1. NEUROSES–PSYCHONEUROSES.

Wirschubski, A. A Case of Polydipsia as a Variety of "Hysteria Monosymptomatica." [Neurol. Centralbl., April 16, 1918, No. 8, Vol. 37.]

Polydipsia or pathological thirst is a symptom which accompanies various diseases, as, high fever, diabetes mellitus and insipidus, localized diseases of the brain, diseases of the hypophysis, psychoses, etc. Oppenheim and Bing have mentioned this symptom among the numerous ones of hysteria. The author thinks a case observed by him in which polydipsia was the only distinct symptom of hysteria may be of interest. A thirty-year-old Jewess, a widow, of robust appearance and good health suddenly began to suffer from pathological thirst, drinking from thirty to forty glasses of water in twenty-four hours. When the patient came under the author's observation no signs of physical disease could be found. After two weeks' treatment in a sanatorium without result the origin of her disease was found to be hysterical. She took her physician into her confidence, telling him that some weeks before she had begun relations with a man and had become pregnant. Because of the social blame that would follow revelation of her condition she was under great emotional stress. It could be easily understood that this extremely intense emotional moment had produced an acute hysteria in the peculiar form of polydipsia. Three physicians concurred in the opinion that it would be advisable to interrupt the pregnancy in order to remove the psychic trauma to which the neurosis was due. This step was taken and seven days after the operation the patient left the sanatorium fully recovered.

Heinicke, W. Psychogenic Spasms of the Antagonists as Hindrance to Recovery from Peripheral Paralysis due to a Shell Wound. [Neurol. Centralbl., May 16, 1918, No. 10, Vol. 37.]

The author's patient was wounded near the elbow by a splinter from a shell, as result of which there was a paralysis of the radial nerve. A few weeks after the suture of the nerve movements in the paralyzed region could be carried out but the recovery of the power of motion to a certain extent remained stationary. It was found that only the hand extensors and the supinators reacted, while the extensor digitorum communis innervated by the radial nerve together with the extensor indicis and extensor minimi digiti and the thumb muscles could not be brought into activity in spite of all the patient's efforts. There was every indication that the difficulty was not due to any physical inadequacy in the

radial region. The solution of the problem was at last found. A psychogenic radial paralysis had been superimposed on the original organic paralysis. The therapy consisted in first assuring the patient that he would not be called upon to return to the front for some time, because it is a fact of experience that the subconscious horror belli very often prevents a cure of psychogene symptoms. Electrical and suggestive treatment was then applied with the result that in a few weeks the patient had fully recovered and was able to return to the front. The author in his further experience met with similar cases where recovery was hindered by contractions of the antagonists after peripheral paralysis due to gun shot wounds, especially where the paralysis was in the radial region.

Klaus, O. Hysteria in an Infant. [Wien. klin. Woch., October 23, 1919.]

A 3-year-old boy is here reported upon. He returned home one day from picking fruit to find that his mother had given birth to a child a few hours earlier. At first the boy was well and cheerful; half an hour later he collapsed on the floor, with limbs and head flaccid, and eyes closed except at short intervals. Now and then spasmodic contractions of certain muscles were observed. The author arrived to find nine women wailing over him. For thirty-six hours the child had not eaten or spoken, but he had occasionally screamed. There were incoördinated movements of the limbs, and he did not respond in any way when spoken to. It transpired that two years earlier a child had died in the family on the same day that another had been born, and that a year earlier the birth of yet another child had occurred on the day that the 1-year-old child had developed cerebro-spinal meningitis, of which it died a few days later. These two extraordinary coincidences had been discussed in the hearing of the patient.

Gordon, R. G. Hysterical Complications of Rheumatism. [Edinburgh Medical Journal, October, 1919.]

The word rheumatism is used much too loosely. The only true justification for the term is acute rheumatism or rheumatic fever. In the army myalgia was used to designate other conditions but this became as loose a term as the former. Under this head were included all forms of fibrositis and arthritis. The diagnosis of the former is only justified by the discovery of nodules and fibrous thickenings which give rise to localized pain and tenderness, and of the latter by swelling and roughness or grating indicative of changes in the synovial fluid and surfaces. Both in military and civilian practice many cases occur in whom these signs are not found, but who complain of pain and stiffness. These should be regarded as hysterical and the product of suggestion. In the majority of cases the suggestion has been given by the presence of a

transient inflammation in the fibrous tissue or joint, the stiffness persisting after the inflammation has subsided, as a hysterical symptom. In these cases the pain is no longer due to the inflammation but to the cramped positions assumed by the muscles in consequence of the stiffness. This is proved by the fact that pain disappears on removal of the stiffness. In this category are included those cases in which pain persists after trench fever.

Treatment consists in explaining to the patient exactly how his present disability has arisen. The rigid muscles are demonstrated to him and his coöperation is invited in learning to relax them. Passive movements are carried out while the patient is urged to allow full relaxation. These movements should not be attended with much pain. When passive movement is free active movement must be started and should be persisted with till movements are freely carried out. The completion of treatment in one sitting is the key to success for thereby the patient sees what he can do and feels that it is worth while to persist. The reason why massage and electricity so often fail in such cases though persisted in for months is that so little improvement is produced at one sitting that the patient is not sufficiently interested to maintain this and he relapses before the next treatment commences. After treatment consists in appropriate employment or hobby which will retrain the part to efficiency in delicate manipulations. Illustrative cases are described. [Author's abstract.]

Damade and Dunot. Astasia-Abasia in the Servian Army. [Jl. Méd d. Bordeaux, July 10, 1919.]

Astasia-abasia, a hysterical affection, in which the patient immediately collapses on attempting to stand or walk, although he may be able to move his legs normally when lying or sitting, is described by the authors and said to have been remarkably frequent among the Servian troops. They observed no less than 115 cases among 500 cases of functional nervous disorder. It appeared in troops overworked, exhausted and exposed to distressing circumstances, or suffering from cerebral concussion. In addition to the classical form, they describe "the quasi-paraplegic," "the man who breaks in two," "the arm-chair walker," "the pseudo-tabetic," who has phobic Rombergism, "the Parkinsonian" and the man who walks like "a sailor in a storm." All these manifestations are hysterical, all thrive on a basis of physical exhaustion and all can be removed by psycho-therapy.

Krisch, H. Special Treatment of Hysterical Phenomena. [D. Zschr. f. Nervhlk., 1918, Vol. 60, p. 240.]

This article is a summary of the results obtained in 129 cases treated from February, 1916, on at the Greifswalder psychiatric clinic. The methods used were chiefly waking suggestion with support by electric

current, and hypnosis to a certain extent; in psychotic hysteric phenomena and convulsive states the patients were transferred to the restless division. Ninety per cent. were cured.

Rehm, O. Hysteria and Nerve Shock. (Examination of Blood Pressure, Pulse, and Ability to Perform Mental Tasks. [Zeitschr. f. d. ges. Neur. u. Psych., 1918, Vol. 42, p. 89.]

The author made a study of fifteen cases of slightly wounded soldiers, five cases of hysteria, three cases of hysteria with diseases of the lungs or heart, seven cases of nerve shock, and one case of commotio cerebri, comparing the results obtained with those from twenty-four healthy persons. There were abnormalities in the blood pressure and pulse frequency, the deviations in separate cases being little pronounced, but the average being very characteristic. At the beginning of the disease there were vasomotor disturbances in all the nervous diseases. In the cases of hysteria and especially of the hysteria with somatic symptoms these phenomena were of permanent character. The mental performances were decreased in all individuals suffering from nervous diseases as well as in all the wounded. The sovereign sign of fatigue in mental tests is the alteration in the general reviving effect of the pauses for rest (in Kraepelin's addition method). The decrease of this reviving effect in hysterical and wounded patients was very marked, showing presence of fatigue due to the wound or disease. This phenomenon was not observed in nerve shock. In the case of commotio cerebri the fatigue during the task was the main feature, revealing a tendency to fatigue, a fatigability. In the test the will power becomes apparent in the zeal with which the task is entered upon, and this was reduced in cases of nerve shock. The immediate first effect of the pauses for rest is a resultant of the will force and of the revival capacity for performance. In all nervous diseases except the nerve shock cases this first effect was heightened due to the volitional element. The capacity for improvement by practice was diminished in all groups of nervous diseases, but not in the wounded. In nerve shock, then, the will is the factor principally involved, while the characteristic of hysteria is intense fatigue. With these facts in view certain foundations for the prognosis and therapy are given.

Book Reviews

Kraepelin, E. Arbeiten aus der Deutschen Forschungsanstalt für Psychiatrie in München. Vol. I. Edited in December, 1919. Berlin, Julius Springer. 1920.

The introductory paper in this first comprehensive publication of the new institute for psychiatric research at once engages the reader's interest. It is a review from Kraepelin's own hand of the history of psychiatry for the past hundred years. The spirit of alert responsibility with which this broad souled worker looks out over the future of psychiatry, inspired by his vision of the opportunities of the future in which this new institute shall have large share, pervades his recounting of these previous developments. He presents in a living way to the special student's notice the record of facts which once formed a too dry historical background for his medical studies. Here the attention is caught in a different fashion by the profound development of psychiatry, slowly making its way into its present surer position as a science which has its very grounding in human needs. These constitute its claims upon intellectual study and practical application of knowledge thus acquired.

This review of developments in the world of psychiatry makes one more keenly aware of the slowly yielding resistance of the human mind to acknowledging a possibility of sympathetic understanding of the mentally sick rather than adherence to a prejudiced relegation of these unfortunates to an inhuman separateness from the rest of men. It is the naturalness of this latter view which has given it its pertinacity. It arises out of the self protectiveness of the human being with which he timidly armours himself against facts which would arouse in him any uncertainty of himself. Human experience, however, enlightened by the continued advance of science, has forced upon us the conviction that there is no such fixed distinction between the mentally diseased and the average person. There has come about therefore a participation through understanding in the sufferings and vagaries of such diseased which is manifest in more humane treatment and actual efforts at bettering or curing the mental condition. Kraepelin's telling of this story of the awakening of humanity to the more intelligent treatment of the insane is well adapted to win popular as well as professional interest. His aim has been to enlist general intelligent interest both in the history of this advance and in the possibilities which open before psychiatry. He would spur all to a more cooperative concern for psychiatric undertakings lessening not only the self protective ignorance of mental conditions but also that distrust of institutions and other means of help which is still active among the populace.

The reader feels the existence of that continuity of endeavor, even in sometimes relativly fruitlss forms, so long as they lie in the course of experimentation which belongs to sincere effort after progress. He therefore obtains a greater sense of the significance of the further progress of science in the aims of the institute here presented. Both the unity and the purpose of psychiatry are touched with a new enthusiasm. Yet there is a distinct feeling of disappointment that the writer's outlook upon the fruitful possibilities in the psychiatric field could not have more fully comprehended the unmistakable signs of opportunity in the strictly psychic territory. No less stress would have been laid upon the important fields which are more fully pointed out to the student. One field is indispensable to the other and physiological and anatomical research are only broadened into their most significant application by emphasis upon the psychically functional aspect of health and disease. The facts here discovered give the only adequate reason for the physical studies and indeed stimulate most vitally toward them. Approaches have been made to psychiatric problems through the psychic avenue which have proved too definite and also too illuminating to be overlooked. There is also too vast an army of sufferers who need preeminently this approach to allow it a subordinate place. This is not to say that so active a thinker as Kraepelin has failed to record the psychic features which have played their share in the history of psychiatric advance, but the relatively scant attention they receive fails to give either a correct estimate of their importance or to include them with sufficient clearness in the province of future research.

In two other articles by the same writer they find somewhat scanty recognition in the discussion of the aims and methods of the new institute and the mode of research into psychic disorders. Here are presented the various angles from which mental disease is to be approached. The causes of disease to be considered include the influence of everyday psychic factors upon the patient but there is no penetration into the deeper significance of these causes or the deeper psychic life in which they work themselves out. The too descriptive note sounds over all these pages. So excellent is the stimulus to the more external fields of research that one can only wish the force of the writer's words could have given instigation also toward these profounder territories.

The remaining papers in the collection are examples of the scope of the work in the anatomical and physiological fields at least and the zealous elaboration with which such work will be carried forward. The extended notice of Brodmann's work by Nissl, both of whom death has removed from the service, gives the stamp of these men to the work of their successors. Spielmeyer's articles on the alterations in the central nervous system in typhus and on the relation between ganglion cell changes and glial phenomena, reveal the complete character of the research undertaken and its importance in the problems of disease. These articles, as well as that by Spatz upon immature nerve tissue tested for a special reaction, are richly illustrated. Kraepelin has contributed a short study of epilepsy and

Steiner one upon experimental multiple sclerosis. Plaut reports a lengthy investigation of the Sachs-Georgi reaction in syphilis and he and Steiner report a study of recurrent infection in general paresis. This first volume has the value of a collection of important scientific articles and with Kraepelin's stimulating historical review and outline of work to be done presents the subject of psychiatry in a manner to enlist wide interest.

Bergson, Henri. MIND-ENERGY. LECTURES AND ESSAYS. Translated by H. Wildon Carr. New York, Henry Holt and Company. 1920.

Bergson's words stir as an invigorating breeze the heavy mists of stagnant psychology and metaphysics. He himself has given another symbol in regard to the man of action, which may apply to his own thought. "His action," Bergson says of the man who leaves his mark upon events, "like an arrow, flies forward with the greater force the more tensely in memory his idea has been strung." So tensely equipped is Bergson as a leader of thought. He not only acknowledges the possession of the past stored through memory. He also experiences the freedom of admission of such past through into the present to project his thought forward into daring speculations as well as discoveries leading into the knowledge which shall be in the future.

He dispels rather than creates mystifying fogs because the eye which he turns upon the facts of the past in the mental life and which he flashes toward the future is steadied by cautious experimental observation but it is not narrowed to dogmatically constructed theories. He may suggest "probabilities" to be verified. He is too sincere a scientist to accept them unless they prove themselves undeniably established by facts yet to be discovered as such. His own memory content, wish infused if one will, may incline him to certain acceptances but his intellect is too clearly alert for any indecent metaphysical or dogmatic haste. The value of the group of studies comprised in these collected lectures and essays lies not in a few suggestions which may startle timorous critics or reassure those who would establish wish doctrines by the use of any scientific jugglery. A few incidental admissions here and there of the possibility, even the probability as it seems to him, of the objective reality of a larger activity of mind than that we know through the machinery of the body, of telepathy or other psychic phenomena are merely some of the hypotheses which his prospective thought furnishes as incentives to scientific mind study for the future. Even if, as in his chapter on Phantasms of the Living, his scientific reasoning may show some logical slip, slight confusion in the handling of fact, he is still undeniably a trustworthy leader in thought. Without visions, the power of forecasting, a scientist is only an uninspiring plodder on a dead level. The suggestions of a forceful and honestly inquiring mind like Bergson's are those that rouse not to slavish acceptance or to an idolatrous enthusiasm which claims infallibility. His right to be called a leader is that he stimulates to thought. The mind that is not merely obsessed by a desire to slumber on in its

own indolence will gladly test the leadership of the vigorous statements wherewith Bergson looks backward into the observable facts of the mind's workings and forward into its careful exploration of the problems stretching out before.

Bergson has this ability to turn about both to probe into the secrets of the mind's workings in order to define them and to obtain therefrom a sense of the nature and the unmeasured power of the mind. In this he proves himself a psychologist with a comprehension that sets him beyond the mere prosaic observer. He is the something more which is the metaphysician, but the modern one whose basis is found in the actual facts of human mental activity. His living sentences are directed in these essays not alone to the interpretation of the facts he observes underlying the possibilities which form his further hypotheses. They are directed also to ancient concrete questions which his tensely strung comprehension of facts throws into a dynamic picture vastly different from the speculations of the philosophies and the barren observations of the psychologies which have taken little account of profound human functioning.

His first chapter contains a redefining of mind in terms of consciousness, or rather, for he avoids definition, an interpretation, explanation of mental activity as one with life in its effort to set free energy, and closely related to its inverse, matter, "action unmaking itself." This relation, particularly as it pertains to mind and its material organ, the brain, is taken up in special chapters, The Soul and the Body and Brain and Thought. There is discussion of Phantasms of the Living and False Recognition, or the sense of having experienced an event before the latter being contrasted in its mechanism with the ordinary intervention of memory into experiences. The chapter on dreams is not recent enough to grant much that is new. It forms rather a brief preliminary study which offers some of the groundwork for the conception of the nature and function of the dream known through the Freud school. That Bergson himself has considered dreams still more fully is seen from further words of his upon dreams to be found in his chapter on False Recognition. The study of the sense of intellectual effort and the mechanism in the thought process by which it is produced gives a most interesting exposition of the thought process backward into memory and forward into creation of new thought. There is to be found here a helpful understanding of the mental mechanisms by which the free association work is done. Bergson's writings invigorate even if they rouse opposition. For his own dynamism of thought sets other minds in motion.

Lay, Wilfrid. MAN'S UNCONSCIOUS PASSION. New York, Dodd, Mead and Company. 1920.

Nature's lavishness is not in all respects for man's copying. The mind of man is a distinct force which has risen above the welter of animate and inanimate manifestations with the function of selecting and directing. Consciousness, the directive attitude of the mind, certainly should exercise this function in the making of a book.

The writer of a book must be urged by a mass of interests within and without him and all this force he must concentrate, redefine to make of it a new and telling message.

Lay is infused with such wide material. He has looked below the surface of human life. He has examined its inner motives, probed into the hidden reasons for its success and failure. In each book of his series on the unconscious he has chosen one particular direction for his study, has applied the discoveries in the unconscious to some practical phase of life. First he looked into the unconscious as a whole in order to inform his readers of its existence and the need in general of understanding it. Then he applied it to child training. Now he has directed it to the question of the perfect or the imperfect marital union. The basis of either must be sought in the unconscious. Only by a union in which man and woman are able to meet and adapt in each element of character can the perfect marriage be attained. These elements lie mostly in the unconscious and if not recognized and utilized hinder that complete adaptability the opposite of which is antagonism in petty things with vague or more bitter misunderstanding and unhappiness. The elements of such dissonance and the still more serious inhibitions which prevent true outgoing of love toward one another are found in the unconscious alone. They depend, particularly the strong but little understood inhibitions, upon the infantile fixations which retain the attachment upon the past and prevent its being made toward the present reality.

Lay goes on to show how prostitution is an offshoot of this and therefore finds its psychological hold in man's infantile. Incidentally he introduces many apt explanations and illustrations of facts and principles belonging to the psychology of the unconscious. His book is adapted to the attention of the general reader. It is fitted to arouse such interest in these vital matters and to offer explanation for facts too long accepted as inexplicable or even inevitable. Yet even for such popular reading, and perhaps particularly because there is greater danger here of misleading, it is unfortunate that Lay has not used more of the concise guiding function of the intellect. His mass of unconscious material is somewhat clumsily allowed to struggle out unguided, especially in the first part of the book. Then we ask where is his psychological acumen that has allowed him to fall back into the old confusing attempts at distinction of terms. The psychology of the unconscious is a striving to discover and establish the fact of unity in the human psyche, emotion and intellect informed by one living urge. It does not help in the seeking of this nor in the understanding of its branching out through the marital life, through all human existence, to begin breaking this up again verbally into different types of emotion. Are affection and passion separate from one another or different types of the emotional surging? The public needs revelation of the unconscious. It needs presentation of its facts in compelling manner. This should be made however with strict adherence to the function of intellect to clarify the mass of material into directive stimulating statement.

Placzek. FREUNDSCHAFT UND SEXUALITÄT. Fünfte vermehrte Auflage. A. Marcus and E. Webers Verlag., Bonn.

Various types of friendship and their relations to general problems of sex and ethical morality are here taken up in a series of more or less unified essays. The idea and ideals of friendship are sketched from the earlier discussions of Socrates and Alcibiades, Aristotle and Cicero to those of Emerson, Nietzsche and Wagner. The author is of the general opinion that the general literary documents concerning friendship cannot be taken as telling the entire story, and although he has some strictures concerning Freud's teachings, and especially as they are being developed through the "wild psychoanalysis" of untrained and often unscrupulous pseudo analysts, nevertheless the general problems of friendship can best be put upon a sound basis by means of the psychoanalytic method.

Villiger, Emil. GEHIRN UND RÜCKENMARK. Fünfte bis Siebente Auflage. Wilhelm Engelmann, Leipzig, 1921.

Villiger's masterly study of the brain and spinal cord is known to us chiefly by the excellent translation of the fourth edition. This new, three combined editions 5–7 is now before us in a greatly modified and completely rewritten form. Both the morphological and tract descriptions are amplified, the illustrations increased from 122 to 262 and the entire aspect of the work so remodeled as to render it an entirely new work.

It stands as possibly the best short work of its kind.

Kraepelin, Emil. MANIC DEPRESSIVE INSANITY AND PARANOIA. Translated by R. Mary Barclay. E. S. Livingstone, Edinburgh, 1921.

This is a translation of the respective chapters from the eighth edition of Kraepelin's Lehrbuch, originally published in 1915 and reviewed in these pages. One might wish that they were but the forerunners of other translations from this most important monographic treatise. English speaking psychiatry has now available the chapters on General Paresis, Dementia Precox and Paraphrenia, Manic Depressive Psychoses and Paranoia, each in single volume form. All of the descriptive chapters might advantageously follow.

Of the importance of Kraepelin's general conception to modern psychiatry, American psychopathology has been most keenly aware. It is a great boon to the general body of psychiatrists to have this monograph in its English dress.

Obituary

E. G. FEARNSIDES, M.A., M.D., F.R.C.P.

Edward Greaves Fearnsides, who met his death in a boating accident near Holyhead on June 26, 1919, was born at Horbury, Yorkshire, in 1883. He was educated at Dewsbury, became a senior scholar of Trinity Hall, Cambridge, and obtained a first class in both parts of the Natural Science Tripos, taking physiology as his chief subject. In 1906 he entered the London Hospital with a high academic reputation, and obtained first a university entrance scholarship and later one in medicine.

After holding all the usual appointments he became medical registrar, and filled this post for the unusually long period of four years. During this time he took part in a series of researches on syphilis of the nervous system in conjunction with Drs. Fildes, McIntosh, and Head.

He was appointed assistant physician to the Hospital for Paralysis and Epilepsy, Maida Vale, and threw himself into this work with his accustomed energy and devotion; during the earlier part of the war there was no duty he would not assume to help the hospital to carry out its responsibilities towards its military and civilian patients.

In August, 1916, he obtained a commission in the R.A.M.C. and was sent to Rouen, where he worked for six months; but in the early part of 1917 he returned to be attached to the Springfield Military Hospital, which was devoted to the treatment of functional nervous disorders. When the Home of Recovery was established at Golders Green, in connection with the Ministry of Pensions, Fearnsides was chosen to direct it. This was one of the happiest periods of his life. Here he could entertain his friends, and he made the hospital a rallying point for those who were interested in the scientific problems of neurology or the treatment of functional neuroses. Finally, in September, 1918, when the Home of Recovery was taken over by the Royal Air Force, he received the rank of major in that force and continued to work at Golders Green until his death.

Throughout the whole of his career, whether in Cambridge or in London, his most striking characteristic was an untiring devotion

to his work. His mind was acquisitive rather than original; but, in spite of the wide range of his scientific interests, his knowledge was astonishingly accurate. The review he gave in Brain (Vol. XL, 1918) of the innervation of the bladder and urethra was a remarkable summary of our knowledge on the subject. Throughout the whole of the work on syphilis of the nervous system he acted as liaison between the laboratory and the wards; every patient was known to him personally, and it was he who furnished the final protocol. He had a genius for order and thoroughness; no one was a better critic of the success or failure of an attempt to present some difficult subject. He réad widely in French and German scientific literature, and was responsible for a large number of the neurological abstracts in the Medical Supplement to the Review of the Foreign Press, compiled by the Medical Research Committee, which had so great a success during the war. But his interests extended beyond medicine; a keen geologist, he made many excursions in the company of his brother, the Professor in the University of Sheffield, and he published with Dr. Shipley a paper on the metazoan parasites.

He was beloved and trusted by his patients, both in hospital and private practice, and he filled many an awkward administrative gap by his genial efficiency. Unfortunately he did not live to reap the reward of that self-sacrificing devotion to both the science and art of medicine, but he had already made a place for himself in neurology, which cannot be filled now he is dead.

HENRY HEAD in *British Medical Journal*

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Original Articles

CHANGES OF GOLGI'S APPARATUS IN NERVE CELLS OF THE SPINAL CORD FOLLOWING EXPOSURE TO COLD

PRELIMINARY NOTE[1]

BY C. DA FANO, M.D.

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INTRODUCTORY

During my earlier attempts to use cobalt nitrate as a fixative for the study of Golgi's internal apparatus, I had (through the kindness of Dr. W. Cramer of the Imperial Cancer Research Fund) the opportunity of collecting the spinal cords from white rats which had been exposed for two and twenty-two days to cold outdoor temperature, instead of being kept, as usual, in the warmed animal rooms of the laboratory. Rats, being small animals and having therefore a comparatively large surface in proportion to their mass, are particularly exposed to the influence of the variations of outdoor temperature. They are, nevertheless, able to maintain their normal body temperature, even if kept in the open during the winter, provided they receive an unlimited supply of food. Under such conditions in the present case, their weight had diminished a little but their body temperature had remained practically normal.

The material was investigated by the method for the demonstration of Golgi's apparatus which I have recently communicated both to the Physiological and to the Royal Microscopical Societies

[1] Most of the preparations described in this paper have been shown at a demonstration given by the author at the *Congrès de Physiologie*, Paris, July 16–20, 1920.

(4, 5). On examination of various regions of the spinal cords I was rather surprised to find that in many cells the apparatus appeared composed of threads thicker and more irregular than usual.

At that time, however, being busy studying whether my method could be used for routine work, I did not give much importance to this observation. But quite recently the opportunity again arose of collecting some more material of the same kind and the same facts were again noticed. This time four rats had been exposed in winter to outdoor temperature for three and four weeks, and one of them, moreover, had been made wet one hour before death in order to lower its temperature by as much as 1.2° C. The spinal cords were investigated by the same cobalt nitrate method and the results of their examination completed with a more extended study of the material previously collected, and of the spinal cords of healthy rats of about the same age. I can now, therefore, briefly state that the exposure of small animals, such as white rats, to cold, is sufficient to cause in the Golgi internal apparatus of certain cells and groups of cells of the spinal cord the peculiar changes here briefly described.

I am quite aware that changes of this sort require careful investigation particularly because some light might be thrown through them on the unsolved problem of the function of Golgi's apparatus. Moreover, the phenomenon must be further studied in order to find out whether alterations in other components of the nerve cells, such as Nissl's bodies and neurofibrils, are produced by the same factor and are in part responsible for the changed appearance of the internal apparatus. Nevertheless the facts observed are, I think, such as to justify a preliminary communication on the subject.

Description of Observed Changes

These are more profound and apparent after brief but severe exposure of the animals to cold sufficient to lower their body temperature, than after relatively long periods during which they have apparently become accustomed to the new conditions and have maintained their normal temperature. The alterations appear to be limited to a variable number of cells of the dorsal horns, intermediolateral and middle cell columns, grey substance surrounding the central canal, particularly at the level of the cervical enlargement; whereas the large motor cells of the anterior horns are apparently unaffected.

The nature of the changes is sufficiently illustrated by Figs. 3 to 7, 9 and 10, drawn like all the others, under the same magnifica-

tion, and in which various stages of the process are shown, while Figs. 1 and 2 give an idea of the usual aspect of the apparatus in nerve cells of the spinal cord of apparently healthy rats of the same age.[2]

Fig. 3 shows the aspect of the apparatus observed in many small cells of the above mentioned regions after variable periods of exposure of the animals to outdoor cold sufficient to cause a slight diminution of their weight but not a lowering of their body temperature. Fig. 3 is also a good example of the slightest degree of alteration noticed. I recognize that it has been chiefly the knowledge of the existence of more remarkable changes in other cells that helped me at first to differentiate specimens of this sort from the usual morphological variations exhibited by the apparatus in conditions which we are in the habit of considering as normal. After a time, however, the more experienced eye found no great difficulty in perceiving that even at a stage such as that represented in Fig. 3 the apparatus had on the whole a more robust appearance and that its finely reticular threads were somewhat thicker than one generally observes in normal cells of about the same size and from the same regions.

A similar change can be seen in Fig. 4 reproducing a cell in which the thickening of parts of the apparatus was so evident as to favor the supposition that at a certain stage the apparatus may perhaps undergo a process of hypertrophy.

Another fact shown by both Figs. 3 and 4 and observed by me in many of the affected cells, is the tight arrangement of the apparatus, particularly of its thickened parts, in the deepest portions of the cytoplasm and round the nucleus. The internal situation of the apparatus and the existence of a thin protoplasmic layer between apparatus and peripheral limit of the cell body are well known since the very first communication of Golgi (1) on the subject, but in cases like those shown in Figs. 3 and 4 both the protoplasmic margin free from apparatus and its deep perinuclear arrangement were so remarkable as to suggest the idea of a sort of defense set round the nucleus for its protection. Some evidence in favor of this suggestion can be found in the persistent perinuclear arrangement of parts and fragments of the apparatus even when its alteration has so far progressed as to reach the stages shown in Figs. 5, 6, 7 and 9.

All these facts are also clearly seen when comparing Figs. 3 to

[2] All figures were drawn by Mr. W. Pilgrim with the help of an Abbe-Zeiss' camera lucida. Comp. Oc. 6, obj. 2 mm. ap. 1.4 Z, drawing sheet at the level of the microscope table.

FIG. 1. Golgi's internal apparatus within medium sized nerve-cell of ventral horn. From sacral region of spinal cord of adult normal rat.

FIG. 2. Golgi's internal apparatus within relatively large nerve-cells of dorsal horn. From cervical enlargement of spinal cord of adult normal rat.

FIG. 3. Unusually robust appearance and tight perinuclear arrangement of Golgi's apparatus in small nerve-cells of grey matter surrounding the central canal; apparent canaliculi in the cytoplasm as formation distinct from the apparatus. From the cervical enlargement of a rat exposed to cold outdoor temperature for 22 days.

FIG. 4. Large nerve-cell of dorsal horn showing in a more striking degree the changes represented in Fig. 3. From the same material and region as Fig. 3.

FIG. 5. Small nerve-cell of intermedio-lateral cell column showing Golgi's apparatus formed by large indistinctly reticulated portions, many of which are united by thin threads. From cervical enlargement of a rat exposed to cold outdoor temperature for two days.

FIG. 6. Nerve-cells with Golgi's apparatus formed by irregular pieces united in places by thin threads; beginning of disintegrative process. From the same specimen as Fig. 5.

FIG. 7. Nerve-cells of dorsal horn with reduction of the apparatus to irregular clumps. From the same specimen as Fig. 4.

FIG. 8. Nerve-cells from the ventral horn of spinal cord (lumbar enlargement) of a rat kept on reduced diet. Golgi's apparatus did not show any special alteration but stood out very sharply from the surrounding cytoplasm. For comparison with changes following exposure to cold.

FIG. 9. Perinuclear arrangement of remainder of Golgi's apparatus in nerve-cell of intermedio-lateral cell-column. From cervical enlargement of spinal cord of a rat the body-temperature of which was rapidly lowered after it had been exposed for four weeks to mild outdoor temperature.

FIG. 10. Disintegration of Golgi's apparatus in large nerve-cells of the intermedio-lateral cell-column. From the same specimen as Fig. 9.


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7 with Figs. 1, 2 and 8 in which the apparatus, independently of its more or less complicated appearance, is formed by obviously thinner threads provided with the finely reticulated enlargements to which its peculiar structure is partly due.

With regard to Fig. 8 it should be pointed out that it was drawn from a section of the cervical cord of a rat which had been kept for some days on a reduced diet, but at the usual temperature of the animal rooms. This rat, which I obtained from the same source as the others, had become rather thin but its body temperature was normal at the time it was killed. In the various regions of the spinal cord, investigated by the same cobalt nitrate method, no definite alteration of Golgi's apparatus could be traced, but it appeared composed of particularly well stained threads, standing out from the surrounding cytoplasm more sharply than in preparations of normally fed animals. Though this fact also requires more complete investigation, it increases my conviction that the changes described in this preliminary note are directly connected with the exposure of small animals to cold and not with their general decline, however caused.

Another fact, observed in many of the affected cells of spinal cords from rats exposed to cold, was an appearance of canaliculi and spaces coursing through the cytoplasm in various directions. As shown by Figs. 3, 4, 7, 9 and 10, their aspect and arrangement are such as to remind one of the pictures of Holmgren's trophospongium. At the present stage of my research I find it difficult to express any definite opinion in regard to such appearances, which were first observed by Nageotte and Ettlinger (2) after various experimental intoxications. They were subsequently made the subject of further investigations which failed, however, to give a satisfactory explanation of their significance. I would, therefore, accept for the present the suggestion put forward more recently by Nageotte (3) that they may consist of an exaggeration of a normal condition, brought about in my case by a certain degree of edema possibly due to vasomotor changes resulting from exposure to cold. Future experiments will show how far this supposition may hold good, but the fact was worth being pointed out, both because it forms part of the changes described in this communication, and because it shows, for the first time as far as I know, that in certain conditions it is possible to demonstrate the coexistence in the same cells of Golgi's apparatus and of appearances similar to, if not identical with, Holmgren's trophospongium.

Cells such as those shown in Figs. 3 and 4 were found particu-

larly in the dorsal horns and gray matter surrounding the central canal of rats exposed to outdoor temperature for about three weeks. In the dorsal horns of the same animals cells of the type represented in Fig. 7 were also frequently observed. Cells showing somewhat different changes I saw especially in the intermediolateral and middle cell columns of the cervical cord of rats which had undergone relatively brief exposure to cold. Two of these cells are drawn in Figs. 5 and 6. In Fig. 5 the apparatus has to a certain extent the aspect above described and shown in Figs. 3 and 4, being mainly formed by large indistinctly reticulated portions irregularly arranged round the nucleus, and united in places by thin filaments. In other places no uniting threads can be detected and detached pieces are seen scattered in the cell body giving the impression that a beginning of the final disintegrating process has taken place in the

That this is the case is indicated by the appearance noticeable in Fig. 6. Here the apparatus has evidently lost much of its typical arrangement being formed of pieces of different size and shape, the largest of which, however, are still united by thinner threads and form an irregular structure in the central parts of the cell body.

At the present stage of my investigation I am inclined to consider the changes shown in Figs. 5 and 6 as stages following that illustrated by Figs. 3 and 4, and leading to the more remarkable one represented in Fig. 7. This is a good example of a further degree of alteration characterized in many cells by a reduction of the apparatus to clumps of argentophil substance in which hardly any structure can be detected.

Such a suggestion finds confirmation in the changes observed in spinal cords of rats in which, after a period of exposure to a moderate degree of cold, a sudden lowering of the body temperature had been produced by means of a rapid cooling of their body surface. To all appearances this is sufficient to cause a quick and quite pronounced disintegration of the apparatus in the same cells and groups of cells as above. As shown in Fig. 9 it is then formed by pieces and clumps generally disposed round the nucleus in a manner similar to that represented in Fig. 7. Sometimes however it is reduced to fragments scattered at random in the cell body (Fig. 10). It is interesting to note the persistence, even in these greatly altered cells, of an appearance of canaliculi and spaces, as formations quite distinct from Golgi's apparatus.

Summary

With due consideration of the incomplete state of my investigation one can, in summarising, say that relatively protracted exposure of small animals to a moderate degree of cold is sufficient to cause peculiar changes of Golgi's internal apparatus in the nerve cells of the dorsal horns, intermediolateral and middle cell column, and grey matter surrounding the central canal. Such changes are characterized by an unusually robust aspect of the whole apparatus and of its constituent parts which show a tendency to occupy a tight perinuclear situation. In more affected specimens the apparatus gradually loses its characteristic structure and becomes transformed into irregular and variously arranged masses and pieces. These alterations are accompanied by an appearance of canaliculi and spaces similar to those generally spoken of as Holmgren's trophospongium.

If the exposure to cold has ultimately been such as to lower considerably the normal temperature of the animals experimented upon, the same apparatus undergoes a further form of almost complete disintegration.

London, August, 1920.

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BLOCKING THE SPLANCHNIC NERVES[1]

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In recent years Kappis, Wendling and Naegeli have carried on researches in the blocking of the splanchnic nerve and its application to abdominal surgery.

Kappis reached the splanchnic nerve in four places, seven cm. on either side of the vertebral column directly underneath the twelfth rib and the other pair seven cm. on either side of the median line above the processes transversus of the second lumbar vertebra. When the needle reaches the lateral convexity of the second lumbar vertebra he injects ten to forty ccm. of a one per cent. Novocain-Suprarenin solution on both sides. Patients who are more than sixteen to eighteen years old receive 0.05 gr. of veronal on the evening previous to the operation and 0.01 gr. morphine and 0.0003 gr. scopolamin half an hour before the operation. Under this treatment two hundred cases of splanchnic anesthetics passed through the hands of the surgical clinic at Kiel (Anschütz), the results being more successful with increasing attention to technique. As to the duration of the anesthesia Kappis makes no statements. The anesthesia of the abdominal wall is paravertebral or by regional injection. In case of incomplete anesthesia, completion is obtained by secondary injections in the lesser omentum, in the retroperitoneal tissues, etc., according to the region of the operation or by slight inhalations of chlorethyl or ether.

Wendling approaches the splanchnics through the abdominal wall and injects fifty to eighty ccm. of a one per cent. novocain-adrenalin solution one centimeter below the apex of the xiphoid and half a centimeter to the left of the median line, penetrating without regard to the organs there; he injects the loose retroperitoneal tissues below the passage of the nerves through the diaphragm and thus obtains the blocking of the splanchnic nerves before their entrance in the solar plexus. According to his statements complete anesthesia of the upper abdominal cavity takes place after ten minutes for a period of one and a half hours. (Anesthesia of the abdominal wall by Braun's method.) A quarter of an hour before the operation

[1] Zentralblatt für Chirurgie, 1919, No. 52.

the patient receives 0.01 gr. morphine and if necessary 0.0002 gr. scopolamin.

Wendling reports thirty-six cases with only one complete failure and one severe complication. The cases were chosen with special care, as the dangers of his technique demanded.

Naegeli on the other hand favors the rear method. His point of injection is exactly the same as that of Kappis, but in the majority of cases he only made one injection on each side below the twelfth rib. Each injection consists of the twenty-five to thirty-five ccm. of a one per cent. novocaine solution. The splanchnic injection ought to be preceded by infiltration of the abdominal wall with a weak solution of novocaine (fifty to sixty ccm.) Naegeli reports on eighteen cases with three total and two partial failures, the latter on account of insufficient anesthesia of the peritoneum parietale. On the occasion of a therapeutic injection the anesthetic effect lasted five to six hours. For the rest the experimenter has nothing to say about the duration of the anesthesia.

During the compilation of this report Denk published the results of eighty-five experiments of splanchnic anesthesia conducted by him in the Eiselberg clinic. His technique was that of Kappis. The patient was prepared for the operation by 1.0 to 1.5 centigrams of morphine or pantopone. In thirty-four cases that is to say in a relatively large percentage ether had to be used to complete the anesthetic effect.

All the above operators emphasize the strikingly good postoperative results especially of the more serious cases.

For the past four months we of the surgical clinic in Zurich have also applied the splanchnic anesthesia with almost every case of intraabdominal operations, after experiencing the previous unsatisfactory results of paravertebral anesthesia.

Hitherto we have not used secondary injections with the abdominal cavity laid bare as Kappis proposes.

Amongst the eighty-nine cases we have had four complete failures when narcotic inhalations had to be applied. In one case we had to deal with a stomachic cancer which was beyond treatment by operation and in which the tumor, starting from the center of the back wall of the stomach spread to the retroperitoneal tissues on the left side of the aorta. Obviously the injected novocaine solution could not block the splanchnic nerves for this reason.

In a second case the same reason may have been responsible for the failure, but this could not be proved by palpation. Here it was

a question of a fixed cancer of the cardia (again beyond operation) where jejunostomy had taken place.

The eighty-nine cases can be tabulated as follows:

Operation	Number of Cases	Completing Narcotic Necessary	Morphine Before the Operation
1. Appendectomy	50	4	31
2. Resection of the stomach	13	2	8
3. Gastroenterostomy	5	–	4
4. Gastrostomy	1	–	–
5. Exploration laparotomy	6	1	4
6. Resection of smaller intestine	1	–	1
7. Resection of ileocecal segment	1	–	1
8. Jejunostomy	3	–	1
9. Colostomy	1	–	–
10. Larger incarc. abdominal hernia	1	–	1
11. Cholecystectomy	2	–	2
12. Double decapsulation of the kidneys	1	–	1
13. Nephrectomy	2	1	1
14. Splenectomy	1	–	1
15. Ovarectomy	1	1	–
Total	89	9	56

The third case was one of very severe acute inflammatory appendicitis. The peritoneum parietale was so very sensitive after the local anesthesia of the abdominal wall that at the patient's request a general narcotic was at once applied (forty ccm. of Billroth mixture).

The fourth case concerned an ovarectomy, an operation which is not suitable *a priori* for splanchnic anesthesia. The abdomen was opened, ileus being suspected.

Five cases are to be mentioned as partial failures when narcotics were applied; two of these belong to the three first cases observed, which are still to be mentioned.

Complications during the injection were twice observed. In one case ten ccm. of a two per cent. novocaine solution were introduced into the vena cava. After a severe collapse and stopping of the breath complete recovery followed after about ten minutes. Three weeks later splanchnic anesthesia was repeated—this time with excellent result, and the intended resection of the stomach could be carried out.

In a second case the lower part of the lung was penetrated. The patient at once exhibited desire to cough and some blood was expectorated. These symptoms lasted for two days, after which convalescence proceeded without complications.

In all the other cases anesthesia was good (slight sensitivity to pressure and tension), indeed generally excellent (with no sensitivity at all).

As far as technique is concerned we adhered strictly to the depositions of Kappis. The course of the needle was often prepared by a one half per cent. novocaine solution. It must be specially borne in mind that each time before injecting the solution which is to act on the splanchnic nerve, great care must be taken that the point of the needle is not in a blood vessel, *e.g.*, vena cava. (In order to ensure this, aspiration is made with the syringe.)

After being convinced by numerous experiments conducted on human bodies that the solutions had spread surprisingly well and quickly in the loose retroperitoneal tissues we were frequently quite satisfied with only one injection on both sides, and in this way operated upon nearly all cases of appendicitis.

Also in the composition of the solution, we retained in the first three cases the one per cent. Novocaine-Suprarenin solution used by Kappis. These were the least satisfactory results (two partial failures).

The anesthesia was not so complete and successful by far as that later obtained when we modified the composition, so that we should not be obliged to use such large quantities; we applied two per cent. novocaine to which we added kalium sulfuricum as Härtel proposes in his monograph, in order to increase its effect.

The solution was made up as follows: Novocaine 1.0, aqua distillata 50.0, suprarenin 0.001, natrium chlorat. 0.35, kalium sulfuricum 1.2.

For each injection ten to twenty ccm. of this solution were used and in this way twenty to sixty ccm. were injected altogether. To children under fourteen years of age only twenty ccm. in two injections were given, and the operation (appendectomy) could be accomplished without any symptom of pain.

Here the place of injection was only five to six centimeters laterally from the median line, directly under the twelfth rib. Our patients thus received *in toto* for splanchnic and regional anesthesia of the abdominal wall together 0.8 to a maximum of 2.35 gr. novocaine, in short, more than 2 gr. in seventeen cases.

Our patients were generally prepared one hour before the operation with 0.01 morphin or 0.02 pantopone. This was not done in the case of thirty-three patients. The anesthesia was so complete even in long operations, that we had the impression that these means are not necessary for the support of the splanchnic anesthesia. On the contrary we think we may even presume that a successful state of anesthesia is only reduced by the effect of morphin or pantopone.

At any rate we were able to observe less cases of undesirable

sensation for example, feeling of thirst, desire to vomit, unusual perspiration, if a preliminary narcotic was not used at all. The complete anesthesia obtained was all the quicter for it and pleasanter for the patient himself.

The only sensations of pain occurred when manipulations took place in the little basin. The patient did not receive a hypnotic on the previous evening.

The length of the operation varied between thirty minutes and three hours, once up to four and one half hours for a resection of stomach and esophagus. Often the anesthesia lasted for hours after the end of the operation, especially in smaller operations. In several cases pain was again felt two and one half hours after the injection. Indeed it seemed to us that the anesthesia lost its power sooner, if the operation was longer. It is perhaps not improbable that purely mechanical causes, for example, frequent tension of the mesentery or continuous palpation, determine the speedier propagation and resorption of the anesthetic solution.

The youngest patients were eleven years old, the oldest seventy.

A death which could be proved by surgical autopsy to follow splanchnic anesthesia has not come to our notice. Also certain other complications, for example, of the kidneys were not observed, although attention was paid to these details.

Beyond occasional paleness and desire to vomit in the course of the operation, and also, rarely, some vomiting we have not been able to observe any undesirable consequences of splanchnic anesthesia. Poisoning and severe collapse did not occur in any case. Blood pressure was inconstant as noted also by the other experimenters.

The state of the patient after the operation was almost always strikingly good and convalescence especially with regard to the subjective condition generally excellent.

Finally we should like to point out, that with the object of perfecting our technique in order to form a sure opinion of the new proceeding in anesthesia we operated in many cases with splanchnic anesthesia, which we shall treat in the future by general narcotics.

From our experience, however, it is to be laid down, that the new method by Kappis is an excellent one which with care should have little or no attendant dangers.

Its results can be considerably improved by the application of a two per cent. Novocaine-Suprarenin solution with addition of 0.4 per cent. Kalium sulfuricum to the 0.7 per cent. Natrium chloratum solution and the failures reduced to a minimum (in our cases ten per cent.). The splanchnic anesthesia can also be applied with per-

sons under sixteen years and has been used with complete success by us with children, without any ill affect, attention being naturally paid to the relation of the quantity of poison to the bodily weight.

Splanchnic anesthesia may be used not only in the major operations on all the organs in the abdominal cavity, but also in operations for the more severe acute inflammations of the peritoneum (perforating peritonitis).

BLOOD ANALYSES IN CASES OF CATATONIC DEMENTIA PRAECOX

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INTRODUCTION

The obscureness which prevails concerning the etiology of dementia praecox led investigators to study the chemical constituents of the blood of patients suffering from this diesase. But, in spite of a number of studies devoted to this subject, nothing definite has been learned.

Miller[1] studied the various constituents of the blood of dementia praecox patients, which cases he treated by intravenous injections of sodium chloride. He stated that there was practically no variation in the figures obtained from analyses made before treatment and those made three days after treatment. The values found were within the normal range. Analyses of blood from untreated cases of dementia praecox, manic depressive insanity, and epileptic psychoses gave practically the same figures as those shown in the cases of dementia praecox treated.

According to Horiuchi,[2] the quantity of chlorine in the blood of catatonic dementia praecox is noticeably low, i.e., from 0.199 to 0.220 per cent., while the normal is given as 0.462 to 0.669 per cent. (Meyers and Short[3]). In the cases of dementia praecox by Miller, there was no deficiency of chlorine in the blood, and there was no deficiency in any of the fifteen other cases examined.

Pighini[4] states that acute cases of dementia praecox would show

[1] Treatment of dementia praecox by intravenous injection of sodium chloride. Am. Arch. of N. & P., p. 314, Vol. I (1919).

[2] Results produced in dementia praecox by the infusion of sodium chloride solution (N. Ishida) Amer. J. of Ins. 73, 541 (1917).

[3] The estimation of chlorides in blood. J. of Biol. Chem. Vol. XLIV, No. 1 (Oct. 1920).

[4] Kraepelin's Psychiatrie, VIII Auflage.

an increased output of nitrogen, phosphorus, sulphur, urea, uric acid and xanthin bases, and that this condition is to be ascribed to the abnormally increased disintegration of phosphorus and sulphur containing nucleoproteid substance. In chronic cases, contrary to this, retention of nitrogen and phosphorus and loss of calcium and sulphur was noticed. Rosenfeld[1] observed a daily retention of nitrogen from one to two grams, regularly. Grafe[4] found in stuporous catatonic dementia praecox a decrease of metabolism and a drop in body temperature. Various investigators often observed an alimentary glycosuria in catatonic dementia praecox.

Folin's[5] metabolism studies are, so far as we know, the most complete and extensive experiments on record in connection with mental diseases. "From among the other classes of the insane (except general paralysis)," he concluded, "individual peculiarities or abnormalities of metabolism, i.e., pronounced variations from the standard values, are very numerous, but so far it has been found impossible to identify any one metabolism peculiarity with any particular form of mental disorder. It is believed that the data given prove the untrustworthiness of all those metabolism experiment, old and new, which report a 'characteristic increase' or 'diminution' of any of the urinary constituents as associated with any particular one of the ordinary mental disorders." He did not mean, however, to deny that there may exist a characteristic metabolism in certain diseases, but he believed that the experiments on record were insufficient to demonstrate the fact.

Most former observers, as we understand, tried to find some pathognomonic changes, either metabolic or histopathologic, common to all groups of dementia praecox. We do not know, however, whether or not the catatonic group of dementia praecox is genetically the same as hebephrenic and paranoid types of the disease. For the clinical study it is, no doubt, convenient to put them together under the same disease entity, but for pathological study it seems, to us, hardly justifiable to select random cases out of entire groups of dementia praecox. The same can be said for metabolic studies. One cannot expect "characteristic" peculiarities, if any, from such different groups of the disease. This is the reason we were interested in catatonic dementia praecox only for our present blood analyses studies. Another advantage in studying dementia praecox is, that this disease is easily differentiated from others, and errors in diagnoses are safely avoided. From the same point of view complications, especially tuberculosis, renal diseases, or those manifesting metabolic disturbances, etc., were strictly excluded.

[5] Some metabolism studies: With special reference to mental disorders. Amer. J. of Ins., LX and LXI (1904-1905.)

Methods Adopted for the Experiment

We did not attempt the quantitative dietary regulation, although it was desirable for this kind of experiment. However, as the hospital breakfast consisted of the same material during the experiment (from July 1 to September 25) the individual difference due to the diet would be the difference of the amount taken and the difference of the digestive faculties. To know this condition is as necessary as to know the other metabolic activities.

The blood was taken from cubital veins uniformly, two and one half hours after breakfast. During this period none of the patients were engaged in any of the hospital occupations.

From each sample of blood total nitrogen, urea, uric acid, creatinine, creatine and sugar were estimated. For these examinations Folin's system of blood analysis was closely followed.[6] His methods are, it seems to us, of greater advantage and convenience, as a number of different analytical procedures are combined into a compact system of blood analysis. A protein free blood filtrate was made from a whole given sample of blood and was used for a number of different determinations, such as given above. Folin also endeavored, in his work, to reduce the amount of filtrate to be used for each determination, for in this way the total usefulness of the filtrate is increased, and consequently the smaller amount of blood is needed for the same number of determinations. For example, 7 c.c. of blood is sufficient for our present experiments.

Important parts of procedure of method in regard to our present study will be briefly given. For the preparation of non-protein blood filtrate sodium tangstate and two thirds normal sulphuric acid were used. We were careful not to use an excess of sulphuric acid, which might cause a loss of a large part of the uric acid (weakly acid to congo paper). Urea was determined by the "urease decomposition and distillation method." The urease was tested by decomposing a known amount of urea, and was found to be satisfactory. The conversion of creatine into creatinine was accomplished by means of the sealed tube, instead of the autoclave which we lacked. Sugar was estimated by Folin's improved method introduced in his later contribution.[7] Otherwise the technique was practically the same as recommended by Folin.

[6] A System of Blood Analysis. J. of Biol. Chem. XXXVIII, 81 (1919).

[7] A System of Blood Analysis. Supplement 1. A Simplified and Improved Method for Determination of Sugar. J. of Biol. Chem., KLI, 367 (1920).

Control Experiments

The control experiments were made on normal blood from doctors, nurses and employees of this institution. The results are shown in the following table:

Table I

The Amounts of Non-protein Nitrogenous Constituents in Mgs. per 100 c.c. of Normal Blood

No.	Non-p. N.	Urea		Uric Acid		Creatinine		Creatine		Sugar
		N.	%	N.	%	N.	%	N.	%	
1.....	42.0	22.0	52.5	0.00	2.1	0.56	1.3	—	—	69
2.....	30.0	20.4	52.2	0.93	2.4	0.45	1.2	1.27	3.2	91
3.....	30.1	15.3	42.5	0.77	2.1	0.48	1.3	1.48	3.8	89
4.....	35.9	15.0	41.8	0.69	1.8	0.48	1.3	1.56	3.8	78
5.....	35.0	19.7	54.8	0.97	2.7	0.52	1.4	1.30	3.6	92
6.....	33.9	13.8	40.7	0.77	2.3	0.41	1.2	1.66	4.7	97
7.....	33.7	17.1	50.9	0.80	2.2	0.49	1.5	1.14	4.6	82
8.....	33.5	17.7	52.8	0.83	2.1	0.41	1.2	1.48	4.4	85
9.....	32.4	16.0	49.5	0.72	2.2	0.52	1.6	1.20	3.7	72
10.....	26.9	13.5	50.3	0.70	2.6	0.52	1.9	1.34	4.5	70
Ave....	34.8	17.1	48.8	0.81	2.3	0.48	1.4	1.31	4.0	82

Clinical Abstracts of Cases Studied

Case 1. A. H. Female, 20 years old. 3 years' duration. Mute, destructive, indifferent, silly, seclusive, untidy, auditory hallucinations.

Case 2. R. B. Female, 21 years old. 6 months' duration. Mute at times, negativistic, motor restlessness, auditory hallucinations, delusions, persecutory and unreality in character, partially oriented, erotic, inordinate appetite.

Case 2'. The same patient. Condition slightly improved. A little more active than before.

Case 3. M. E. Female, 24 years old. 3 years' duration. Resistive, negativistic, mute, untidy, impulsive, inactive, stuporous.

Case 4. A. C. Female, 31 years old. 1 year's duration. Depressed, inactive, suspicious, mute, resistive, delusions unreality in character, auditory hallucinations, excited when blood was taken.

Case 5. C. M. Female, 20 years old. 1 year's duration. Mute, tube fed, inaccessible, anxiety, cyanosis of acra.

Case 6. E. S. Female, 15 years old. Colored. 1 year's duration. Had always been inferior. Disoriented, negativistic, mute, inactive, untidy, indifferent, tube fed, cerea flexibilitas, inaccessible.

Case 7. G. O. Female, 36 years old. 1 year's duration. Disoriented, poor memory, confused, delirious, irrelevant, motor restlessness, impulsive, inaccessible, tube fed, auditory, hallucinations, stuporous.

Case 8. F. F. Female, 31 years old. 2 years' duration. Self accusation, suicidal threats, impulsive, motor restlessness, auditory hallucinations, occasionally mute.

CASE 9. H. H. Female, 32 years old. 6 months' duration. Mute at times, depressed, negativistic, inactive, tube fed, auditory hallucinations.

CASE 10. E. F. Female, 26 years old. 7 years' duration. Seclusive, mannerisms, indifferent, untidy, suspicious, somato-psychic delusions, auditory hallucinations. Wassermann reaction on blood serum doubtful.

CASE 11. L. H. Female, 35 years old. 1 year's duration. Depressed, resistive, suspicious, evasive, impulsive, tube fed, psychomotor excitement, somato-psychic delusions, auditory hallucinations, suicidal acts.

CASE 12. L. B. Female, 26 years old. 2 years' duration. Insomnia, silly, irrelevant, irritable, inaccessible, seclusive, auditory hallucinations.

CASE 13. R. K. Female, 22 years old. 6 months' duration. Disoriented, confused, mute, negativistic, tube fed, motor restlessness, inaccessible, somato-psychic delusions. Patient cleared up considerably two weeks later.

CASE 14. M. M. Female, 26 years old. 7 years' duration. Silly, resistive, irritable, impulsive, violent, suspicious, allo-psychic delusions, suicidal threats.

CASE 15. E. R. Female, 28 years old. 4 years' duration. Stuporous, mute, negativistic, cerea flexibilitas, incoherent, impulsive, tube fed, motor restlessness, somato-psychic delusions, emotions labile.

CASE 16. E. H. Female, 33 years old. 12 years' duration. Silly, euphoric, impulsive, cerea flexibilitas, untidy, auto-psychic delusions, visual hallucinations.

CASE 17. R. F. Female, 24 years old. 2½ years' duration. Apathetic, listless, silly, untidy, laughed often to herself, destructive at times, inordinate appetite, impulsive, auditory hallucinations, somato-psychic delusions.

CASE 18. E. H. Female, 33 years old. 9 years' duration. Impulsive, motor restlessness, visual and auditory hallucinations, disoriented, silly laughter, irrelevant, untidy, violent, obscene and profane, incoherent.

CASE 19. J. B. Male, 25 years old. 4 years' duration. Disoriented, demented, stereotypy, echolalia, indifferent, auditory hallucinations, suicidal threats, inordinate appetite.

CASE 20. E. C. Male, 37 years old. 15 years' duration. Mannerisms, negativistic, irritable, impulsive, violent, demented.

CASE 21. J. M. Male, 59 years old. 32 years' duration. Echolalia, echopraxia, stereotypy, cerea flexibilitas, deterioration, mannerisms.

CASE 22. J. G. Male, 27 years old, 9 years' duration. Dull, restlessness, mute, untidy, cerea flexibilitas, moist with perspiration.

CASE 23. C. M. Male, 33 years old. 7 years' duration. Dull, indifferent, mute, untidy, cerea flexibilitas, stereotypy, resistiveness, dementia.

CASE 24. G. N. Male, 52 years old. 4 years' duration. Mute, resistive, negativistic, untidy, auditory hallucinations.

Case 25. T. E. Male, 30 years old. 11 years' duration. Cerea flexibilitas, mannerisms, mute, resistive, impulsive, untidy.

Case 26. S. G. Male, 30 years old. 1 year's duration. Confused, restlessness, resistive, inaccessible, suspicious, deteriorated, auditory hallucinations, somato-psychic delusions.

Case 27. C. C. Male, 25 years old. 4 years' duration. Mute, negativistic, mannerisms, occasionally tube fed, untidy, persecutory delusions, auditory hallucinations.

Case 28. C. S. Male, 33 years old. 5 years' duration. Apathetic, impulsive, suspicious, demented, auditory hallucinations, negativistic.

Case 29. E. O. Male, 35 years old. 2 years' duration. Seclusive, untidy, inactive, cerea flexibilitas, auditory hallucinations, suicidal acts.

Case 30. J. D. Male, 30 years old. 7 years' duration. Indifferent, disoriented, impulsive, violent, negativistic, mannerisms, stuporous, allo-psychic delusions.

Case 31. R. C. Male, 27 years old. 1½ years' duration. Resistive, evasive, irritable, impulsive, auditory hallucinations, mannerisms.

Case 32. M. C. Male, 38 years old. 15 years' duration. Cerea flexibilitas, negativistic, somato-psychic delusions, stereotypy.

The Results of Analyses on Patients' Blood

Explanation of the Data Obtained

Non-protein Nitrogen.—Varied from 26.0 to 56.8 mg. in 100 c.c. of blood. The total average is almost the same as the normal. The average amount of the female is slightly higher than that of the male. Case *19* shows an exceptionally high value, but not only for the non-protein nitrogen but also for the rest of the constituents. The peculiarity of this particular patient is probably due to his inordinate appetite and a larger amount of food taken.

Urea.—Somewhat decreased in amount when compared with the normal. All the cases, except No. *19*, showed more or less uniform result. There is no marked difference between male and female.

Uric Acid.—Among the chemical constituents studied the uric acid showed the most striking deviation from the normal, the average amount being decidedly lower than that of the normal. While the lowest normal presents 0.69, the lowest of the patients gives only 0.13. Twenty-four cases out of thirty-two, i.e., 75 per cent., showed a decreased amount when compared with the lowest normal. Six cases are in normal range, and two are above the normal. Here also, Case *19* showed an abnormal increase.

TABLE II

THE AMOUNTS OF NON-PROTEIN NITROGENOUS CONSTITUENTS IN MGS. PER 100 C.C. OF BLOOD OF CATATONIC PATIENTS.

No.	Name	Non-protein, N.	Urea		Uric Acid		Creatinine		Creatine		Sugar
			N.	%	N.	%	N.	%	N.	%	
1	A. H.	48.7	17.6	36.1	.40	0.8	.52	1.1	1.49	3.1	93
2	R. B.	45.0	15.3	34.0	.30	0.7	.34	0.8	1.15	2.6	80
2′	R. B.	35.3	11.8	33.4	.60	1.7	.45	1.3	1.64	4.7	123
3	M. E.	42.5	13.3	31.4	.17	0.4	.48	1.1	1.45	3.4	107
4	A. C.	38.9	12.3	31.6	.40	1.0	.48	1.2	1.90	4.9	108
5	C. M.	37.7	17.2	45.6	.57	1.5	.41	1.1	1.56	4.2	89
6	E. S.	37.7	18.6	49.4	.37	1.0	.45	1.2	1.41	3.7	121
7	G. O.	37.5	14.7	37.2	.23	0.6	.45	1.2	1.45	3.9	100
8	F. F.	36.8	17.5	47.5	.70	1.9	.41	1.1	1.45	3.9	92
9	H. H.	34.4	14.7	42.8	.73	2.1	.48	1.4	1.71	5.0	126
10	B. F.	34.2	16.5	48.3	.23	0.8	.48	1.4	1.27	3.7	87
11	L. H.	33.9	16.6	49.0	.20	0.6	.52	1.5	1.53	4.5	106
12	L. B.	32.6	15.8	48.5	.60	1.8	.48	1.5	1.60	4.9	127
13	R. K.	32.4	13.2	40.8	.67	2.1	.45	1.4	2.23	7.2	92
14	M. M.	32.4	15.4	47.5	.57	1.8	.41	1.3	1.56	4.8	99
15	E. R.	31.9	10.8	33.9	.17	0.5	—	—	—	—	91
16	E. H.	30.9	16.8	54.4	.37	1.2	.48	1.6	1.23	4.0	142
17	R. F.	29.1	14.0	48.1	.47	1.6	.52	1.9	1.34	4.6	77
18	H. E.	28.0	13.5	48.3	.03	2.3	.52	1.9	1.19	4.3	134
19	J. B.	56.8	38.7	68.1	1.47	2.6	.89	1.6	1.41	2.5	94
20	E. C.	41.9	17.7	42.3	1.23	2.9	.52	1.2	1.38	3.5	92
21	J. M.	36.6	16.7	45.5	.33	0.9	.45	1.2	1.82	5.0	83
22	J. G.	35.8	14.2	39.7	.60	1.7	.45	1.3	1.19	3.3	80
23	C. M.	34.3	14.6	42.6	.57	1.7	.41	1.1	—	—	93
24	G. M.	32.8	13.0	39.6	.13	0.4	.56	1.7	1.64	5.0	105
25	T. E.	32.4	13.6	42.0	.80	2.5	.48	1.5	1.27	3.9	82
26	S. G.	31.7	16.4	56.7	.50	1.6	.48	1.5	1.75	5.5	120
27	C. C.	30.2	14.7	48.7	.83	2.7	.48	1.6	1.15	3.8	92
28	G. S.	29.8	12.7	42.6	.60	2.0	.59	2.0	1.71	6.7	90
29	E. O.	29.3	12.4	42.3	.50	1.7	.45	1.5	1.19	4.1	86
30	J. D.	28.4	12.1	42.7	.70	2.5	.63	2.2	1.34	4.7	79
31	R. O.	27.4	13.6	49.6	.37	1.4	.41	1.5	1.15	3.7	103
32	M. C.	26.0	12.3	47.4	.83	3.2	.45	1.7	—	—	101
Female ave.		35.2	15.2	41.3	.43	1.5	.46	1.3	1.60	4.0	104
Male ave.		33.8	15.9	46.5	.63	2.0	.52	1.5	1.42	4.3	93
Total ave.		34.9	15.5	44.5	.54	1.6	.49	1.4	1.47	4.15	99

We had the impression, while studying, that the cases less active, having poor peripheral circulation, presented uniformly a lower value. We feel justified to say that a certain condition of the catatonic patients would show a regularly diminished value of uric acid. This condition, however, would not seem to depend upon the duration of the disease, nor upon a certain phase of the disease, but upon the condition existing during the period when the blood was examined.

Female average is noticeably lower than that of the male, pointing to the justice of our assumption, since we had more inactive female patients than male.

Another peculiarity in regard to the amount of uric acid is the great irregularity of the result. The value varies from 0.13 to 1.47, while the normal from 0.69 to 0.97. This fact will be further discussed under a separate heading.

Creatinine.—The amount obtained is in normal range. There is no marked change between the sexes.

Creatine.—The average amount is slightly increased and irregular in result.

Sugar.—The amount is noticeably increased when compared with the normal. Fifteen cases, 47 per cent., showed higher value than the highest of the normal. The rest of the cases are within the normal limit. The average female value is decidedly higher than that of the male. We observed that most of the patients who showed high sugar value were more or less excited when the blood was taken. Emotional movements, fear and anxiety have been claimed to change the amount of sugar. How much the higher value, here obtained, is due to the emotional movements is difficult to determine. However, since the abnormal emotional reaction is to be regarded as one of the symptoms of the patients, the increase in amount of sugar may also be interpreted as one of the characteristics of the disease.

Average Deviation

We mentioned above that the amounts of blood constituents in catatonic dementia praecox varied in greater extent than those of the normal. This irregularity can be represented by so-called "average deviation," which is obtained from the following formula:

$$\frac{\sum_{i=1}^{n} A - a_n}{A \times n} \times 100$$

A—Average amount of each constituent.
a—Amount of a constituent in each case.
n—Number of cases.

As is seen in the table, the average deviation of each constituent in catatonics is greater than that of the normal. A striking contrast is noticed in those of uric acid, showing 49.5 versus 10.0, while the rest present a less marked difference. The increase of average deviation in general would indicate the unstableness of the metabolic activity as a group. While some show an increase of metabolism the others show a decrease. We could not find an absolute increase or decrease of any of the individual constituents studied, even though the uric acid and sugar showed a decided tendency toward decrease and increase respectively.

TABLE III

THE AVERAGE DEVIATION OF EACH CONSTITUENT IN NORMAL AND CATATONIC DEMENTIA PRAECOX.

	Urea, N.	Uric Acid, N.	Sugar	Creatine	Non-protein, N.	Creatinine, N.
Normal.....	13.6	10.0	9.5	9.3	8.0	7.9
Catatonic.....	16.0	49.5	13.4	16.5	13.8	11.4

To what is this irregularity of the metabolism of the catatonic dementia praecox to be ascribed? To answer this question the present study is not sufficient. We examined only one specimen of the blood (except in Case 2) from each patient, and did not follow the change which may occur in different phases of the disease. But so far as we are able to judge from the histories of the cases, and the conditions of the patients observed during our examination, we are inclined to think that there is no definite relationship between the various phases of the disease and the various formulae of the blood. Case 2′ was the same patient as Case 2, and the blood was taken two weeks after the first examination. The patient was practically in the same condition as before, except that she was a little more active than she was two weeks previous. In spite of the little change in mental and physical conditions, the blood constituents showed a well marked deviation. We have already mentioned that there was apparently no relationship between the duration of the disease and the blood constituents. Therefore, it would seem to us, that each catatonic patient has unstable metabolic activities according to various temporary conditions, leading to the increased average deviation of each constituent, obtained above.

CONCLUSIONS

1. There is no definite and absolute blood formula for the catatonic dementia praecox group.

2. In 75 per cent. of the cases studied there was a decrease of the uric acid—these cases being mostly inactive with poor peripheral blood circulation.

3. In 47 per cent. of the cases there was an increase of the amount of the blood sugar.

4. The *average deviation* of each constituent of the patients' blood is higher than that of the normal, suggesting an unstable metabolic activity.

Society Proceedings

NEW YORK NEUROLOGICAL SOCIETY

The Three Hundred and Eighty-seventh Regular Meeting
Held at the Academy of Medicine

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The President, Dr. Foster Kennedy, in the Chair

CASE WITH ACROMEGALIC FEATURES

Dr. B. Onuf presented a case for diagnosis. The patient was a boy, eighteen years of age, Hebrew, who showed some acromegalic features, but the picture was incomplete and some manifestations did not tally with acromegaly. The hands and feet appeared acromegalic as confirmed also by radiographs. There was likewise a slight dorsal kyphosis, and the face was a little large. But a distinct prognathism was lacking and there was no recession of the forehead and no thickening of the supraorbital ridges. Most unusual, moreover, was the marked asymmetry of the upper extremities, the entire left one and particularly the left hand being markedly larger than its fellow and showing, if anything, some increase of motor power. Another unusual feature, which could not be explained on an acromegalic basis was a peculiar vascular or vasomotor condition. There was a mottling over a great part of the body and in some regions, particularly the enlarged extremity, a succulence, an increased vascularity of the skin. The mottling varied considerably under influence of temperature and other factors, being at times very marked so as to have first suggested a type of exanthema, at other times being just faintly visible.

Elephantiasis was thought of but none of the authors who have studied this disease speak of any osseous enlargement of the parts affected; only the entoneous and subcutaneous tissues are mentioned as the seat of the disease. The case thus presents marked difficulty of classification.

It should be mentioned that the patient alleged the condition—referring particularly to the enlarged left upper extremity—to be congenital and his mother ascribed it to a maternal impression received while pregnant with patient. She told him that while in that state she saw a woman with a very large upper extremity looking similar to that of patient and that this sight affected her very much. In that connection Dr. Onuf mentioned another case

seen by him casually in a business transaction. It concerned a man of about forty years of age, a banker, who also had one unusually large upper extremity, which however showed nothing abnormal aside from its size, as compared with its fellow, and the rest of the body being otherwise well proportioned and of greater strength than its fellow. In this case also a history of maternal impression was given, the mother allegedly having been much impressed by the sight—while pregnant with patient—of the Statue of Liberty with its one arm raised and holding the torch.

Dr. W. C. Brush said in discussion that a case similar to the one presented by Dr. Onuf had been seen by him fifteen years ago, viz., that of a boy of seventeen years, who was seven feet tall. The disturbance was apparently of an endocrine nature and was familial, since one sister was a cretin, another had elephantiasis. In the whole family also the features were asymmetrical.

Dr. L. Pierce Clark said that he was seeing similar cases associated with adolescence. Dr. Walter Timme had told him that it was not uncommon to have these cases improve spontaneously because in time an erosion of the sella allowed for a proper glandular activity of the pituitary, but as yet he himself had not been able to verify this teratological adaptation. He said he would like to ask whether any other systemic symptoms, such as fainting or epileptoid attacks, had been observed.

Dr. J. H. Leiner asked whether the blood pressure differed between the two extremities. Dr. Onuf replied that he did not think that there was complete synchrony between the extremities.

TUMOR OF THE MIDDLE FOSSA

Dr. I. S. Wechsler reported a case of tumor of the middle fossa which was clinically parallel to the case presented at the last meeting by Drs. Friedman and Fairbanks. There was transient pain at first on the left side, then it became constant on the right. The first neurological examination was negative. The pain was not shooting or typical in any way and was thought to be psychoneurotic, although the possibility of a neoplasm was suggested since a minute area of anesthesia on the right upper lip was noted. The patient was not seen for two months, during which time the pain gradually diminished, on account of developing anesthesia of the fifth. Meanwhile complete ptosis developed on the right side, gradually receded, and is slight at the present time. At the end of another month there was complete paralysis of the right external rectus. The pain had completely disappeared. The patient vomited once, but, curiously, never saw double. At one time there was an herpetic eruption in the right corner of the mouth. On reëxamination the deep reflexes were normal, the right possibly a little livelier than the left. All forms of sensation had been lost in the right side of the face, the right side of the tongue, and buccal mucous membrane. There was corneal anesthesia, keratitis, neuroparalytica

and beginning ulcer of the cornea. The disks showed no abnormality. Smell was not impaired. Weakness of the facial nerve was noted on the right, the eighth nerve was normal. X-ray examination of the skull showed normal sinuses; the right clinoid process could not be brought out clearly, there being apparently some erosion. Otherwise the skull was normal. Study at Mt. Sinai Hospital confirmed all the findings. Despite a negative Wassermann antiluetic treatment was given, but with no apparent benefit.

That the case is one of neoplasm of the middle fossa seems probable. The question, however, is whether the involvement is primarily of the fifth nerve, of the brain itself, or of the bone. The condition of Dr. Friedman's patient was very like this, except that he had a disturbance of smell. Tumor of the bone in the case under consideration is perhaps excluded by the X-ray and the fact that the motor fifth is intact. The herpes would suggest involvement of the Gasserian ganglion. Some pressure on the sphenoidal fissure will account for the involvement of the sixth, third and the ophthalmic division of the fifth. Possibly there is pressure on the cavernous sinus, which would account for the recession of the ptosis. The growth probably is not a sarcoma of the bone or glioma of the brain. An endothelioma of the Gasserian is most probable. A basilar meningitis is not likely to be limited to so small an area. The question of surgical interference is important.

Dr. E. D. Friedman in opening the discussion, said that the transitory character of ocular palsies was not uncommon. Serologic observations on the spinal fluid were lacking. Luetic meningitis, however, is rarely unilateral. Operative interference is not urgently indicated since there is no choked disk nor other evidence of increased intracranial pressure.

Dr. I. Abrahamson said that he belived we were dealing with a tumor, that the tumor was an endothelioma, rather flat and not encroaching to any extent on the cranial cavity. That in the absence of vital or more pathognomonic signs, an operation had better be deferred and other methods of treatment first instituted. Complete removal of endotheliomata in that situation was very difficult.

Dr. Foster Kennedy asked whether the motor fifth had been involved late or early. If late, it was improbable that the case was one of bone tumor but was probably an endothelioma. If it came from bone an operation would be useless, but if it should be an endothelioma a time will come when it cannot be operated upon, and the waiting policy deprives the man of any chance of recovery. Since he evidently shows no involvement of the bone, this would be the time to operate if ever, or the growth will eventually kill him.

ANALYSIS OF A CONVERSION HYSTERIA SUPERIMPOSED ON AN OLD DIFFUSE CENTRAL NERVOUS SYSTEM LESION

Dr. Philip R. Lehrman pointed out the difficulty of detecting symptoms of hysteria when associated with organic neurological

signs. This combination, not seldom, appears to be a definite syndrome of an organic nervous disorder. A case in illustration of this was that of a young woman twenty-three years old, who came to Vanderbilt Clinic for advice concerning a coarse, irregular, intention tremor of both hands and fingers, which had begun at the age of twelve years, and had progressed unfavorably despite treatment for the past eight years. At one hospital a foot deformity was operated upon and the condition was diagnosed as "pronated feet and Friedreich's ataxia." She was almost entirely incapacitated by the tremor. She complained of a great deal of pain of a deep burrowing character, starting in the base of each thumb and travelling up the forearms to her elbows.

Past History: At two and a half years of age she fell off a high chair, following which she states that she had a left hemiplegia and aphasia which soon improved. But until twelve years of age she dragged her left foot and showed weakness of her right hand. This was regarded by some physicians as residuals of poliomyelitis.

Family History: Her father and mother are short of stature. The maternal uncle showed tremor of hands when writing. One sister's deep reflexes are absent. No other mental or nervous disease in both ancestral branches.

Physical Status: The positive findings were: Height 4 ft., 5 in. Pes cavus; hyperextended fingers at knuckles; toes plantar flexed. Gait showed slight dragging of left foot. Unsteady in Romberg posture. Non-equilibratory tests (f:f f:n) badly performed on account of tremor. Right dysmetria present. All deep reflexes absent. Babinski questionable on right. Muscle strength absent in toes, limited to dorsal flexion of feet especially on the left, limited in upper extremities more on left. Present Grasset-Bychowski. Sensation diminished to touch in toes and fingers; vibratory diminished in lower extremities. Right pupil larger than left. She reacted peculiarly when a vibrating tuning fork was placed near her ears; the sound seemed to startle her and she would tremble. All other findings were negative.

Exploration of the unconscious, since hysterical symptoms are unconsciously motivated, was resorted to in order to try to find evidence of a definite mechanism. The analysis, January to May, 1920, covered a period of about thirty-seven interview hours. The problems to be solved were: Why did she develop her neurosis? Why the choice of the particular symptoms, and their meaning in terms of the unconscious? The patient's account of her early life in Russia, then in America, indicated mistreatment of her by her parents. The father was said to have deserted his family, the mother, however, followed him to America and a reconcilliation took place. The patient always hated her father and he reciprocated this antagonism. She felt constantly abused, thought she might be an illegitimate child and on the birth of a sister when she was eleven years old, who became the center of the affections of the parents the patient felt that her surmises were true. Other brothers and sisters had died of neglect. She herself had been

injured as a child purposely—she felt. When the little sister was about ten months old the patient accidentally dropped her down the stairs. This frightened her, for she knew that she would be punished. Her whole body trembled with fear. The next day she was unable to write at school because of the trembling of her hands. This was the beginning of the tremor.

Her increasingly intolerable position in the home led to day dreaming of Cinderellalike situations where she would finally be vindicated and taken to a pleasant home by some rich old gentleman. The major part of her narration suggested in tone inflection, and phraseology, a complaining twelve year old child. From an emotional child, however, she would at times change with striking rapidity into a sneering, ill mannered adult, and would assume an emotional stupidity, a sort of Ganzer syndrome on the emotional level. For the most part she lived as a child of twelve.

It was readily seen that all her day dreams were made of the same fabric, that of a suffering personality. It was therefore reasonable to suspect that her view of her life was distorted, and her tale spun of a material, the underlying basis of which was the predilection for suffering situations. The question suggested itself: If she could invent phantasies in which she suffers, why could she not have invented real situations in her home in which she could suffer? When the events of her life were retraced in this more critical light, an entirely different story was apparent. The patient's trouble was not alone the tremor of her hands, but what perhaps was more important, her distorted view of life. It was necessary to correct the latter, to make her view critically her inadequate reactions to certain situations of early childhood and adolescence, and not until that was accomplished did she gain sufficient insight of the motives in the productions of her symptoms and their final abandonment. Because the beginning of the tremor had coincided with an intolerable situation at home where she was supposedly abused, it did not necessarily follow that the alleged abuse caused the tremor. Instead we note that there was a common basis in the patient's unconscious for the alleged abuse, (which was not a cause but a symptom of the neurosis) and the resulting tremor. The forces at work were an accentuation of the sadomasochistic component with a masturbation and a prostitution conflict. The analysis indicated the manner in which these forces began to exert their pathological effect. The patient was handicapped early in life by being crippled. Since her father had emigrated to America she had a "thousand fathers and a thousand mothers," relatives and village neighbours, and got more than her share of pity. Circumstances prevented her mother and father from giving her the normal amount of love. Whatever she got was from strangers who pitied her, and she sensed early that it was her suffering which made them do it. This started her "career" of suffering. Finally a number of events precipitated the tremor. At eleven years she began to menstruate and had masturbatory experiences. About that time also her infant sister

consumed all the attention of her parents. Jealousy was aroused and the "accidental" fall of her sister followed. The tremor developed the next day. The function of the tremor, therefore, was to prevent her from doing things which she unconsciously desired. In dreams, her hands always saved her from frank sexual situations and in the neurosis her disability performed the same function of protection.

As the patient gained insight into her unconscious motives the tremor gradually began to disappear until the patient was able to manicure her nails and thread a needle. Conditions at home she said were becoming much more pleasant. She realized that it was she that had changed and not her environment. For the first time in years she began to be on speaking terms with her father.

Dr. L. Casamajor reported that at the Vanderbilt Clinic the case was considered one of maldevelopment of the central nervous system. The choreoathetotic movements led to the belief in an organic cause for the condition. The patient's violent fright reaction to the tuning fork gave the first suspicion of hysteria. Only after the analysis did the tremor disappear. When the patient was last seen, the organic features, foot deformity, etc., still remained, but the psychic features had disappeared. The patient was extremely short in stature and this with the organic handicap gave a basis for psychic compensation. After the removal of the neurotic elements the primary organic disorders still remain.

Dr. Stern said that analysts could realize the great difficulty in putting into a short paper, the many months' work which the analysis of a case entails. Also that a period of thirty-eight hours which was the time given to the patient by Dr. Lehrman, was a remarkably short period of time for such good results. Another interesting feature was the association of a functional with an organic condition, necessitating careful weighing of symptoms present; in this connection it may be mentioned that the organic condition is not necessarily a causative factor, for similar psychic states exist in patients not so handicapped. The important factor is the psychic make up of the individual and his way of reacting to certain situations. Dr. Lehrman's paper also gives us a glimpse into the causes of human behavior, indicating, at least in neurotics, behavior in adult life having factors that should be traced back to infancy for proper understanding of that individual's adult behavior.

Dr. John T. MacCurdy said that Dr. Lehrman deserved hearty congratulation for the success of his analyses. All those who have ever attempted psychoanalytic work in dispensary practice are well aware of the extreme difficulties attending this procedure. Dr. Lehrman's paper is further interesting in that it presents the problem of diagnosis in cases where both organic and functional symptoms exist. Dr. MacCurdy wished to express his opinion that such diagnoses are much more easily made if the view is held that functional symptoms are the product of definite etiological factors, just as are symptoms with an organic basis. In other

words, a diagnosis of psychoneurosis should be made when a faulty make up is demonstrable and the precipitating cause determined which is of a kind that we know to precipitate neurotic reactions. Without such data the condition is probably purely organic, but if these factors are present the condition is either purely functional or has a large functional element. In this connection Dr. MacCurdy mentioned a survey that had recently been made of one hundred consecutive admissions to the Medical Dispensary at Cornell. Each patient was first questioned by a psychopathologist who made a diagnosis of the organic or functional condition on the basis of the mental attitude and history of the patient. This meant a positive diagnosis of functional disease and a diagnosis of organic disease by exclusion. Each case was then examined thoroughly by internists who made organic diagnoses on a positive basis and functional diagnoses by exclusion. In correlating the results there was a difference of opinion in only six cases out of one hundred, and forty-two per cent. were found to be purely functional. Dr. MacCurdy expressed the opinion that an adoption of the method of positive diagnosis of functional condition, rather than diagnosis by exclusion, would greatly increase the accuracy of our diagnoses in general practice.

PROGRAM FOR THE STUDY OF HUMAN BEHAVIOR

Dr. Stewart Paton (by invitation), of Princeton University, outlined his program of action for treating some of the human problems of the day. A more prominent part must be taken by the medical men in public affairs now and a definite program is still lacking. The great human problem in the world at present is that of human behavior. Dr. Paton's program would include a study of this. During the war psychiatrists were asked to help the Government determine the predisposition of drafted individuals both in the Army and Air Service for warfare. Those whose systems would probably crack during the strain were weeded out and not sent for over-seas duty. The leaders of men could be recognized and used where they would be most efficient. Now there is just as great a field for neurologists and psychiatrists to pass upon the predisposition of individuals to be leaders. If it is believed that leaders already in power are not effective an effort should be made to educate the public to this point of view. Moreover the selection of trained men for industry, for negotiating labor problems, is an all important question. Labor problems often owe their very existence only to the predisposition of the opponents and their consequent misunderstanding. In the present crisis abroad, only the arguments in favor of peace are considered while the predispositions favorable for peace are not taken into account. The wishful thinker, superidealist, is doing a great deal of harm in the world to day, and is allowed to act without restraint. The dangerous precedent has been established of judging men by the wandering of desire and not by actions. It is time for the world to emphasize

the importance of the study of the human personality. Public men must be imbued with this idea. The financial end of establishing departments for the study of human behavior in medical schools is a stumbling block. Yet other departments in universities get endowments and special research funds. The astronomers have formulated their problems and are able to show what they want and need. The business man appreciates definiteness in detail and his money and interest go to further work where the end is known. The tendency of the program for the study of man is to overemphasize the importance of the analytic side, *i.e.*, the study of different organs and parts of the machine. A synthetical side, the study of the reaction of the individual as a whole, has been neglected, and this should be developed.

A pure research center for psychiatry situated in New York is urgently needed. New York should have been the greatest center of this kind in the world since she has the greatest need of it. Provision should be made in this Research Center for training neurologists and psychiatrists as well as those interested in educational, social, and ethical problems. Here human behavior could be observed and checked up by clinical study. It is not necessary, however, to wait for the Research Clinic. The practitioner interested in the analytical side of his work should widen his interest so as to include the synthetic side and observe his patients as living beings adjusting to meet actual situations in daily life. This kind of study can be carried on to great advantage in general medical dispensaries. The opportunities for psychiatrists here would be limitless but the difficulty will always be, until special training centers are founded, to get men properly equipped to fill the positions. In presenting these suggestions and hints of ways and means, Dr. Paton said that he hoped to have full and severe criticisms now and later which would enable his readers and himself to clarify their views and perhaps bring a little nearer realization some practical program.

A new and untouched field for the study of human behavior is opening up in the university where there is no medical school. The average college student is trying to find himself emotionally and mentally. A sizing of process is constantly active, problems of the individual in relation to religion, sex, attitude toward the world, and the world's attitude towards him. Several types of students may be readily picked out. The socalled normal student who makes an easy adjustment; the inadequate who assumes an imaginary importance based on his record in sports or studies, to the university. This type never comes quite up to the mark in spite of their swagger and bluff and is constantly trying to adjust. Some of these pass through the university and others drop out. Then there is the "sorehead" who because of his failure to adjust feels that he is singled out for special injustice. This injured, defensive attitude in such individuals unfortunately lasts through most of their lives. The attempt to correct these defects should be made before the university period, in early school days. Another

interesting type is that of the boy with the original mind. This type as a rule is not fully appreciated. His intelligent curiosity and genuine interest in life does not lead him to books, nor does it develop the qualities necessary for passing academic tests. Gradually his inquisitiveness is killed and he becomes intellectually indifferent. He has very little chance of passing through the university if he refuses to conform to convention. A great deal can be done for this type especially, and should be done. The world should be educated to the point of giving such a boy a better chance to develop his natural endowment.

Over twenty years ago a similar plea was made by the speaker before the Philadelphia Neurological Society for better facilities for the study of the problems of human behavior. Possibly after the hard lessons taught by the War New York may be willing and ready to make "man the true study of man."

Dr. E. J. Kempf said that he believed in the material presented by Dr. Paton. He was particularly interested in the psychopathic individual in high school, college and in business. Study of such characters will have to be carried on on an individual basis. The worker for normal and abnormal behavior must try to analyze his subject's difficulties and help to synthesize a career for him which would gratify his unconscious as well as conscious cravings. The choice of a profession in business men is motivated by unconscious repressed wishes, these design his friendships, his enmities, his failures for him. His whole business life consists in an effort to work out his unconscious cravings and he tends to remain blind to his own defects. Here is an enormous field for study and interpretation.

Dr. Gregory Stragnell (by invitation) expressed his interest in the presentation. The approach to these problems by the educator is unlimited once he understands what he can do. He has the opportunity of taking up the problems where the parents have failed. Education even in the primary classes should encourage the child to give expression to his personality instead of putting him through a machinelike process. A training institution would have scope for work at both ends, and educate the educator as well as the child. So many of the youths in Dr. Paton's third class fail simply because the educator feels that he must keep down to certain levels, where he can retain his dependence on books.

Dr. L. Pierce Clark said that the question of predisposition for business success or any form of success is one of development of mind and character. With some it is a natural gift. Personality has much to do with it. The fundamental thing for the present seems to be the restatement of the development of the successful life which may be presented to adolescents.

Dr. I. Strauss said that any hope of reaching a solution is lost if we have to define a successful life. It is nothing new to hear a professor say that the college does not educate. The problem in Dr. Strauss' opinion must first be attacked analytically. It is too early to make the synthetic attack. When education is to be attacked we must begin with the parents.

The exceptional boy has no outlet, and the educator could not make an adjustment for this individual. Something might be achieved if these types could be segregated and specially instructed. The seal of approval is the desired goal of most men however. One good move has been made by the founding of a clinic where the exceptional boy can be studied and analyzed and a prescription for future conduct issued. This process is however a very expensive one.

Where are men to be educated? As soon as research work shows the need of such special training the work will begin. The medical school does not pay enough attention to behavior, it is true. The successful practitioner is the man who by reason of his personality can handle human beings as such. The medical schools should aim at this individualistic concept. Courses on human behavior which might be developed would not find acceptance yet in the medical schools since the need has not yet become apparent, and there is no interest outside of actual technic. The tendency has been for the medical profession to shut itself off, remain quiescent on a high pinnacle. Until we can come down to the level of the rest of the community nothing can be done. The same apathy has been striking whenever questions of public cooperation have been raised, the Workmen's Compensation Act for instance. Advances have already been made in the study of the personality in connection with employment in business but the medical profession is doing nothing to direct this work. First must come research, then propaganda, then after showing the need for this type of work we can begin to plan a program.

Dr. Rosenbluth told of his experience with people, mostly of the working class, whom he has given the facility to come in to see him at stated intervals. The great want of peoples, experience with this class shows, is the desire for discussion of their problems so that they can make their own conclusions, from the premises of the discussion. The sense of loneliness of the individual was the most striking feature. This results from the necessity of each person working for self. The Army experience is valuable because self was eliminated, and the value of the individual is estimated for communal good. That is, a man must be a factor in relationship to the safety and efficiency of the whole unit, and not in relation to himself. This experience should really be applied to civil life, and the individual should be taught that existence is not for self only but in relationship to others.

The strength of the individual is only the strength as far as it is the strength of the social unit to which he belongs. Hence education should be directed to adjust the individual automatically to those about him, and not merely to adjust himself into some part of his community where he finds himself comfortable.

The failure and "sore head" is the individual who only sees himself, and feels that nobody can appreciate the qualities which he knows he has.

Dr. Foster Kennedy pointed out that the Roman Catholic

church asked for the education of the child up to the age of seven years, realizing the importance of the early education. Doctors as a rule do not read enough history. If they did they would notice that those nations in the past have stood highest where the *potestas patris* was strongest. With the decline of control in the family, the nation as a whole declines. Rome, China, the Jewish race all show this. The maintenance of the family unit is the integral factor in the maintenance of the herd. The exceptional boy will take care of himself eventually, but it is the mass that must be educated. The problem of education will be greatly simplified when children are reared properly in the nursery.

Dr. Paton in closing said that he believed there were reasons justifying optimism in regard to carrying out the program. The deans of colleges were anxious to cooperate and were greatly interested. If the medical profession can supply the men, those who understood and could interpret human behavior, the services of these experts would be sought for. The recognition of the need for men trained in the subject of human behavior was developing faster than the supply of experts. The fate of democracy depends upon the measures taken to supply the demand.

Current Literature

I. VISCERAL NEUROLOGY

2. ENDOCRINOPATHIES.

Cajal, R. Y. The Nervous Mechanism of the Ovary. [Trabajos, XVI, 1919, 279.]

Cajal finds that the Golgi method proves itself superior to any other in revealing certain interesting points in the structure of the ovary particularly in regard to its *innervation*, the exact formation of the *Graafian follicle* and the relations of this with the *pellucid membrane*.

Sistrunk, W. E. Exophthalmic Goiter. [J. A. M. A., Jan. 31, 1920.]

The successful treatment of exophthalmic goiter by surgical measures for a number of years past and the increasingly lowered mortality form the subject of this paper.

It is possible now, he says, to operate by modern methods in a large number of consecutive cases without a death. There are still a few cases that present risks, but on the other hand poor judgment in selecting the type of operation, and in advising operation in unfit cases increases the mortality. If the disease is allowed to run its course, it progresses in several different ways. In a few instances the onset is sudden, and it progresses so rapidly that the patient soon becomes a bad risk for surgery. In the majority of cases, however, the onset is so gradual that it is hardly recognizable at first, by any but an expert. The symptoms gradually increase in number and severity, and thyroid enlargement occurs. As a rule the disease reaches its height during the second six months, the symptoms become exaggerated, and marked damage occurs in the vital organs, such as the heart, liver and kidneys. Unless death occurs, the majority of patients improve rapidly after a period of from one to several weeks, though with a general impairment of health, lasting from a few months to several years, when in a majority of instances a second or even a third crisis occurs, and the patient suffers more from the degenerative processes produced than from the disease itself. In a minority of patients, the disease runs a chronic course from the start without any acute crises. Fortunately, and also unfortunately, patients improve with medical treatment only—fortunately, because patients unfit for surgical treatment may be made better risks by these measures, and unfortunately, because the improvement leads them to avoid curative surgery until they are unfit for it. It is

often a perplexing problem to decide just how toxic a patient is or what operation he will safely endure. A condition that may be bettered by thyroidectomy in one patient might be counterbalanced in another by a factor making operation dangerous. In operating at the Mayo Clinic certain factors are considered in deciding. The ideal surgical procedure is partial thyroidectomy as soon as the first symptoms appear and hyperthyroidism can be definitely proved. At this stage, many patients can be restored to normal health. It is undeniable that many apparently recover under medical treatment, and it is impossible to distinguish these, sometimes, from others in whom operation is really needed; hence the great responsibility in making diagnoses. The metabolic rate is a definite index of the degree of hyperthyroidism and a valuable diagnostic aid in the early stages. As a rule, in the clinical picture the metabolic rate and pulse pressure go hand in hand, but this is not altogether universal. Some patients seem to show an extreme tolerance to increased metabolism, and conditions may change in the same patient making the operation safe at one time and not at another. The metabolic rate gives no indication of damage already done. At Rochester they make a careful selection of the type of operation for patients with a rate above 40 per cent., and hesitate to operate when it is 60 or 70 per cent. above normal. In most of such cases, without cardiac damage, and that otherwise seem good risks, they perform a preliminary ligation to test the endurance of the patient to operation. If a mild reaction follows the ligation, the thyroidectomy is performed after seven or eight days, but if the reaction is severe it is best to perform a second ligation and wait several months. Some patients who have had the disease some months call for treatment for increased symptoms, and if the loss of weight and general strength is marked and if the patient is nervous and irritable, they found that there is considerable risk. In such instances two superior polar ligations are performed under local anesthesia at one operation or at intervals of seven or eight days. In the acute crisis, the patients are considered extremely dangerous risks until with proper treatment this is past. Then, on account of the marked degenerative changes in vital organs and weakened heart muscles, it is still likely to be dangerous, and in such cases they have found it safer to perform two superior polar ligations under local anesthesia, seven or eight days apart, thus preparing the way for thyroidectomy several months later. Similar measures are used on a few patients in whom an operation does not seem warranted, after having made one or two injections of quinin and urea hydrochlorid solution or of hot water into the thyroid gland. Such injections seem to lessen the tendency to severe reaction after ligation. "It will be noted that ligation is performed with two ideas in view: first, as a means of testing patients who seem fit surgical risks for thyroidectomy but concerning whom there is enough doubt to make ligation the safer procedure, and second, as a means of preparing patients for thyroidectomy." Patients standing a ligation well can usually stand a

thyroidectomy. The reaction is much less marked than after a thyroidectomy, and if they stand the double polar ligation there is usually a marked abatement in symptoms and increase in weight. A surgeon may hesitate to perform the latter operation, but observation has shown that hyperthyroidism may recur unless this is done. The degree of improvement following thyroidectomy depends on the amount of damage already done to vital organs. In thyroidectomy, they have found at Rochester that in order to bring the metabolic rate to nearly normal it is necessary to remove all of one lobe, the isthmus, and enough gland tissue from the other lobe to leave from one-third to one-half. If not enough is removed the patient may be benefited but not cured, and in a few cases, the remaining portion hypertrophies after operation and the symptoms recur. In either case if the metabolic rate indicates hyperthyroidism enough to affect health they reoperate, taking away another portion of the thyroid tumor.

Kohn, L. Winfield. Gastro-intestinal Symptoms in Disturbances of the Thyroid. [N. Y. Med. Jl., 1920, No. 4.]

The author emphasizes the extreme importance of recognizing the associationship of gastro-intestinal manifestations with thyroid disease and this enjoins us to regard every gastric or abdominal complaint with thyroid suspicion until proven otherwise. He contends that it is possible for the thyroid gland, which when basically at fault can produce many vagal or sympathetic symptoms, to be so disturbed as to not give rise to the more prominent consequences of vegetative nerve stimulation as exophthalmos, tachycardia, etc., and the gland itself may hardly, if at all, be enlarged; yet may present minor manifestations that center their attack particularly upon the physiological activity of the alimentary tract and he has cited his experience with a case of mild hyperthyroidism that evinced a predominant, almost entirely uncomplicated, gastro-intestinal history.

In order to strengthen the correctness of his contention, the author quotes the findings in the records of a series of different types of thyroid cases that were treated by the Surgical Service at the Johns Hopkins Hospital, Baltimore, from December, 1911, to February, 1915, and it is amazingly interesting to note the distinct exposition of different gastro-intestinal symptoms in a majority of the 111 cases investigated. He also cites a number of symptoms that many authorities have shown, through experimental study upon animals, to exist following artificially created disturbances in the glands of internal secretion. These symptoms he has enumerated under the headings: vagotonic, sympathicotonic and vago-sympathicotonic. From the foregoing, it is evident that gastro-intestinal disturbances are a common accompaniment of thyroid disease and the author feels constrained to believe that gastro-intestinal symptoms may often precede in assertion, let alone follow, the more

definite significations of thyroid affection. It, therefore, becomes logically imperative for us to not overlook this possible relationship, for very often by respecting this kinship, investigation will reveal the fact that the prominent gastro-intestinal symptoms of which the patients complain are associated with other vagal or sympathetic symptoms that coexist but seem for the moment overshadowed. By so doing, we may possibly recognize the existence of a mild or early hyper or hypo thyroidism.

The author believes that it is the duty of the clinician, during the process of making a diagnosis, in those patients complaining of stomach or bowel symptoms to exclude the existence of thyroid disease. [Author's abstract.]

McCaskey, G. W. The Differential Diagnosis of Hyperthyroidism by Basal Metabolism and Hyperglycemia.

This paper is a further discussion of basal metabolism and alimentary hyperglycemia with special reference to the differentiation of hyperthyroidism from similar clinical conditions. There is a definite relationship between hyperthyroidism and increased metabolism, due to an increased thyroxin content of the body cells. These facts definitely establish that there is a quantitative variation of thyroid secretion in thyroid disease.

Regarding the clinical aspects of the question, it can be assumed that the symptoms of hypo- and hyper-thyroidism are due to quantitative variations of thyroxin in the body cells, causing a disturbed metabolic rate. Heat production, which is a process of oxidation, and equivalent to the metabolic rate, can be accurately estimated by the use of the Benedict portable respiration apparatus. The so-called basal metabolism is estimated from the findings with this apparatus under appropriate conditions, and has been found nearly constant in normal individuals, varying from 10 per cent. above, to 10 per cent. below normal. The "normal" for each individual, when possible, must be taken into consideration. Other conditions where an increased basal metabolism has been noted are the chronic infections with pyrexia such as lues and tuberculosis; severe cardiorenal disease, and cardiac decompensation with dyspnea, in the latter the rise being attributed to overwork of the respiratory muscles and the bringing into play of the secondary muscles of respiration. In pernicious anemia, during a severe attack, it will be increased, while during a period of improvement it will be found to be normal. There is a rise, likewise, in the severer forms of leucemia, and after the recent ingestion of coffee. Decreased basal metabolism has been noted in edematous patients, due to the water-logging of the tissues and consequent decreased oxygen consumption. When these conditions are ruled out clinically, which can be done by the blood picture, history and physical findings, basal metabolism furnishes our most

reliable index of thyroid activity. Alimentary hyperglycemia has been found to be present in practically all cases of thyrotoxicosis, but is seldom present at the end of the first hour in normal individuals. It occurs also in alcoholism, diabetes, malignancy and the chronic arthritides. While its presence in suspected thyrotoxicosis is only strongly corroborative, its absence is of the utmost value in ruling out the existence of this condition. [Author's abstract.]

Lisser, H. Coöperation by Internist and Surgeon in the Treatment of Graves's Disease. [Endocrinology, Vol. III, No. 1.]

1. *Treatment by Operation.*—At the outset it must be frankly admitted that the most rapid, permanent and spectacular results, are achieved by surgery. There can be no question of such a contention. No medical maneuvers, however skillfully executed, can quite approach the prompt decisiveness of surgery. Consequently and naturally, some surgeons insist that operation should be the only method employed. They would not concede a place for medical procedures. No issue can be taken with this viewpoint, if the surgery of Graves's disease were a comparatively harmless procedure attended by a very small, negligible mortality. But it would probably be conservative to estimate the average mortality of the great majority of surgeons as at least 10 per cent. and it is probably much higher. If surgery were our only resort, and no other measures available, we would necessarily have to be content. But certain other procedures are available and not unworthy of consideration.

2. *Medical Measures including Roentgen Radiation.* (*a*) *Prolonged Rest.*—Physical exertion, mental strain and emotional excitement are all injurious to the hyper thyroid patient; obviously, then, the removal or reduction of these factors by "rest cure" constitutes a form of therapy of considerable value. It helps to slow metabolism, reduces diarrhea, diminishes sweating, soothes the nervous emotional excitability, quiets the thyroid heart and adds body weight. A real rest cure, skillfully managed—even without medication or X-rays—is often all that a mild case requires for restoration to normal health, and moderately severe cases undergo astonishing improvement ofttimes.

(*b*) *The Ice Bag.*—Cold applied to the vascular goiter in the form of a collar ice bag encircling the neck, and an ice bag over the heart is a simple measure not to be overlooked. Though it is difficult to estimate just how much good it accomplishes, it would seem to be beneficial and is frequently greatly appreciated by the patient.

(*c*) *Diet.*—A high caloric diet—2500 to 3500 calories—helps to restore weight and strength, and is an important adjutant to any form of treatment, even if it be preparatory to operation.

(*d*) *Medicine.*—By far the most important and effective, is the Forchheimer combination of quinine hydrobromate 0.30 (gr. v) and

ergotin 0.065 (gr. 1), given in gelatin coated pills, 2 to 4 times daily. Many who have given this preparation a fair trial, are decidedly impressed by the patient's improvement both subjectively and objectively. A fair degree of benefit can usually be anticipated from the exhibition of this medicine, but cure can rarely be attained by its use alone.

(c) *X-ray Application to the Thyroid and Thymus.*—This form of therapy is a notable contribution. In a fair number of cases it can accomplish cure, and in the majority of instances, perhaps, it produces surprising improvement. Occasionally no benefit results. If administered in proper dosage and at proper intervals by a roentgenologist experienced in its application, it will usually prove itself worthy of trial. I have seen diarrhea cease, the pulse drop from 120 to 80, and a gain of 20 pounds result from 3 to 5 roentgen treatments. Under such conditions there can surely be no indication for surgery.

Summary of Medical Treatment.—In a general way then, it would seem reasonable to conclude that the medical measures described above—sometimes one or the other alone, more often a combination of all of them—will cure Graves's disease not infrequently; and the majority of cases will show an appreciable improvement. It follows at once, and this is important that some cases of Graves's disease do not require surgery. Surely, then, in communities where the expert thyroid surgeon is not available, medical treatment deserves and demands a careful and serious trial.

3. *Treatment by Internist and Surgeon.*—The best results for the individual patient will be attained most often by early consultation between the internist and surgeon. Just when medical measures should cease and surgery begin is sometimes difficult to determine. This constitutes a borderland zone, where there exists legitimate room for difference of opinion. Perhaps the wisest decision at such a time would be as follows: if an experienced, reasonably safe thyroid surgeon is at hand, let him operate; if he is not available, postpone surgery a little longer; 10–20 per cent. mortality is not to be trifled with, while less dangerous means may still be good.

Conclusions.—1. The treatment of exophthalmic goiter by the experienced thyroid surgeon leads most frequently to rapid and permanent cure.

2. The average non-expert surgery of Graves's disease is, however, accompanied by a heavy mortality.

3. Rest cure, certain medicines, and X-rays, skillfully administered, will cure some cases and improve the majority, without the help of surgery.

4. The best results are obtained by early consultation in each case between internist and surgeon, and by cordial coöperation throughout the course of treatment, whether that be purely medical, purely surgical, or combined.

5. Surgeons should not rush their patients to operation. Internists should not try medical measures too long. [Author's abstract.]

Phillips, Norman R. GOITER AND THE PSYCHOSES. [Journ. of Mental Science, Oct., 1919.]

Systematic examination of the thyroid demonstrates the fact that enlargement of the gland is of fairly frequent occurrence in the insane, especially in female cases. It is not surprising that more attention has been drawn to this circumstance in areas where goiter is endemic. This is due partly to the more marked enlargement of the gland and the resulting disfigurement in this variety. Thus it has been observed that the goitrous, including congenital cases, are eight times more susceptible to insanity than the non-goitrous in one such district.

There is trustworthy evidence showing that where an enlargement of the thyroid exists the amount of secretion is altered, producing signs of hypo- or hyper-thyroidism, or the two conditions alternating in the same subject—thyroid instability. Any marked excess or diminution of thyroid secretion produces disorganization of the delicate hormonic balance of the body and results in auto-intoxication, the effects of which would be at once felt by the nervous system.

The author examined two hundred insane patients at St. Andrew's Hospital, Northampton, and out of this number twenty-four were found to have enlargement of the thyroid gland: of these twenty-four cases of goiter no less than seventeen were suffering from manic-depressive insanity, four were cases of dementia præcox, and three of paranoia.

Most of the twenty-four cases under observation showed signs of hyper-thyroidism. It is noteworthy, however, that the dementia præcox cases all showed signs of more or less marked hypo-thyroidism. Phillips draws attention to the fact that certain observers in endemic districts found that the majority of their goitrous patients belonged to the dementia præcox and congenital idiocy groups, the number of cases of manic-depressive insanity being comparatively small. In the opinion of the author this disparity can be accounted for by the fact that sporadic goiter is more often accompanied by hyper-thyroidism, and that this latter condition plays an important rôle in the production of manic-depressive insanity. On the contrary, there is reason to believe that endemic goiter is associated, as a rule, with hypo-thyroidism, which condition appears to favor the onset of congenital idiocy and dementia præcox. A study of the cases examined emphasises the great importance of heredity as an etiological factor in thyroid abnormalities. Another important predisposing cause is the presence of an emotional or neurotic temperament.

The exciting causes are divided into physical and mental:

1. Physical: under this heading are grouped the various toxemias which are known to weaken the secretory value of the thyroid gland

and may result in thyroid insufficiency. It should be noted that endemic goiter is due to a chronic toxemia.

2. Mental: a goiter may develop as a result of emotional states, *e.g.*, fear, anger, anxiety, etc., prolonged mental stress.

During the recent great European war attention has been frequently drawn to the occurrence of goiter accompanied by symptoms of hyperthyroidism in men from 20 to 45 years of age. The condition being attributed chiefly to emotional exhaustion and, in a lesser degree, physical exhaustion.

The treatment of the psychoses associated with goiter depends on the nature of the functional disturbance of the thyroid gland. It is essential in every case of goiter to look for, and deal efficiently with, any source of toxic absorption. If the signs point to hypo-thyroidism treatment by thyroid extract should be at once instituted. If hyperthyroidism is present the treatment should be directed to the removal of the mental element, which is now admitted to be of great importance in the etiology of this condition. The only satisfactory method of accomplishing this is by the employment of psychotherapy. It is all-important to commence treatment as early as possible. The author gives an interesting clinical résumé of the cases observed. [Author's abstract.]

II. SENSORI-MOTOR NEUROLOGY

1. PERIPHERAL NERVES.

Breslauer, F. Trophic Changes after Nerve Injury. [Deut. Zeit. f. Chir., June, 1910.]

The local effect of heat or of mustard oil applied to the area innervated by a damaged nerve has been studied by Breslauer on himself, on war-wounded men, on other men and on dogs. In a few weeks the capacity to react with active hyperemia to irritation from heat, mustard oil or other stimulus is lost, suggesting that the lack of this normal hyperemia defensive reaction allows irritating factors to injure the skin, and set up processes named trophic changes. They are thus essentially the result of defective conditions in the circulation, and for this the nerve injury is responsible. Although the capacity was lost for active hyperemia reaction to the irritation from mustard oil, etc., yet the capacity for vasoconstriction under the application of cold or epinephrin persisted unimpaired and indefinitely. To explain this opposite behavior of the vasodilating and constricting apparatus he theorizes: The skin does not redden under mustard oil when all sensation has been abolished by nerve blocking. As sensation returns, and the area begins to smart, it begins to turn red too, yet the vasoconstricting action of epinephrin proceeds whether there is sensation in the region or not.

Humbert, G., and Naville, F. Familial and Hereditary Central Neurofibromatosis. [Annales de médecine, 1918, No. 2.]

Peripheral neurofibromatosis or Recklinghaus disease is now a well-known hereditary and familial disease picture. Cases of extended central neurofibromatosis are much rarer. In these the tumor is located in the central nervous system, inside the skull or spinal cord. The authors describe the case of a patient suffering from peripheral neurofibromatosis with other nervous phenomena such as headache, dizziness, vomiting, disturbances of sight and hearing of many years standing and hemiatrophy of the tongue, pointing to an old and by this time considerably extended central neurofibromatosis. The patient's father, who died at the age of thirty-one, had had double central deafness and a cerebral or cerebellar tumor. No autopsy was made but the various nervous symptoms point to a central neurofibromatosis. A younger brother who had a lumbar fibroma had protracted nervous disturbances at the age of seventeen and died at eighteen during an attack of violent headache accompanied by somnolence and stupor.

2 AND 3. SPINAL CORD: MEDULLA.

Moore, J. E. The Cerebrospinal Fluid in Multiple Sclerosis. [Archives of Internal Medicine, XXV, 58 (January, 1920).]

Reports of the laboratory examination of the cerebrospinal fluid in multiple sclerosis, with particular reference to the colloidal gold curve of Lange, are few and contradictory. Thus in 40 cases gathered from the literature, fourteen gave paretic gold curves, twenty-five were negative and one was atypical, while usually no reference was made to the globulin test and the cell count. Because of this lack of uniformity, the Johns Hopkins Hospital material was reviewed.

The cerebrospinal fluid findings in twenty-eight cases of multiple sclerosis are reported. In twenty the diagnosis was clinically certain; in the other eight cases, clinically doubtful. In the first group, the findings were (*a*) negative blood and spinal fluid Wassermann (all cases); (*b*) pleocytosis (eight cases); (*c*) positive globulin (eighteen cases); (*d*) paretic gold curve (eighteen cases). In the second group the findings are the same, except for the gold curve, which was syphilitic in three cases and negative in five cases. Together with the clinical evidence, it is believed that the spinal fluid picture is fairly constant, and that, other things being equal, such a picture is a strong argument in favor of a diagnosis of multiple sclerosis. In its absence the diagnosis becomes at least doubtful. [Author's abstract.]

Tibor, Alfred. Paralysis of Cervical Sympatheticus in Multiple Sclerosis. [Neurol. Centralbl., August 1, 1918, No. 15, Vol. 37.]

Although clinical study has almost exhausted the symptomatology of multiple sclerosis and it is possible to construct the entire typical picture

of Charcot's disease, the author had opportunity to observe in several cases of disseminated sclerosis a very remarkable symptom complex. In these cases (three) the diagnosis of multiple sclerosis could be made with certainty, because of the symptoms, the duration of disease, the constant variation of the phenomena, and the multilocular form of the same. The other symptoms not in conformity with the disease picture of multiple sclerosis, namely, the miosis, the ptosis, the enophthalmus, components of Horner's symptom complex, besides certain vasomotor phenomena observed in one of the cases, indicate an unusual complication of the disease, namely a lesion, and in truth a paralysis of the cervical sympatheticus. The occurrence of miotic pupils has been mentioned by Uhthoff and O. Marburg and by the latter has been brought into connection with the concurrent changes of the opticus. Oppenheim holds that the enophthalmus is not a constant symptom in the Horner complex and, with Necati, explains the origin of the same as due to the gradual disappearance of the orbital fat. The inconstancy of the vasomotor disturbances in paralysis of the cervical sympatheticus is attributable to the different localizations of the centers concerned, throughout the course of the sympatheticus paths, and Necati thinks these vasomotor phenomena occur only during the first stages of sympatheticus paralysis. In the author's case the motor and oculo-pupillary symptoms did not appear singly but are connected with a symptom complex, and for this reason an anatomical change could with probability be assumed as foundation for the same, at the level of the ciliospinal center, so that in the clinical picture of multiple sclerosis there seems to be included an involvement of the innervation sphere of the cervical sympatheticus. The author states that in the neurological literature accessible to him he finds no mention of a lesion of the cervical sympatheticus in multiple sclerosis and the complication seems, therefore, to be rare.

Simons, A. Transmissibility of Multiple Sclerosis [Neurologisches Centralblatt, February 15, 1918, No. 4, Vol. 37.]

The author describes his experiments in transmitting multiple sclerosis to animals by inoculation, following the experiments of W. E. Bullock, who succeeded in producing symptoms of this disease in rabbits. In Bullock's experiments the length of the period of incubation (fourteen to twenty-two days) suggested a living organism as the cause of the disease. Kuhn and Steiner also had success in the same direction. By inoculation with the blood and spinal fluid of a fresh case of multiple sclerosis they produced in guinea pigs and rabbits a paralysis leading to death, which was further transmissible. Using the blood streak preparation of Loeffler they discovered a spirochete resembling that which gives rise to Weil's disease. Though the spirochete was not found in man, its discovery in numerous experiments in animals renders its presence in man highly probable. Such a discovery would throw

light on the question whether a microörganism is the sole cause of multiple sclerosis or if there are other infectious factors, as would seem to be the case from clinical indications. Malaria, for example, may run a course either as multiple or pseudosclerosis, and H. Duerk has even proved the presence of granuloma in the central nervous system in malaria, which he is inclined to regard as multiple sclerotic foci in an initial stage. The author thinks that the picture which Duerk describes as multiple sclerosis bears more resemblance to acute encephalomyelitis, though this latter disease is not a form wholly contradictory of multiple sclerosis of the type usually encountered. The author inoculated rabbits with the spinal fluid of two fresh cases of multiple sclerosis. The fluid was sterile, excluding lues. Nine days after one animal manifested slight paralysis in the hind leg together with other paralytic signs. The other animals remained healthy. In the next ten days the forelegs of the affected rabbit were paralyzed; the animal was helpless and refused food. In nineteen days after the injection it died without spasms. On section, the place of injection, the spinal cord, the skin, the brain and the internal organs were found to reveal not the slightest pathological changes, either generally or upon transverse section. A rabbit inoculated with fresh sterile fluid from this animal showed signs of severe paralysis of the hind leg. The animal was killed after fourteen days but there were no pathological findings. The author agrees with Siemerling and Raecke, whose patient attempts to transmit multiple sclerosis were unsuccessful, that failure to find the exciting cause should not discourage, when it is remembered how many years of fruitless search preceded the discovery of the cause of lues.

4. MIDBRAIN: CEREBELLUM.

Maas, Otto. Dystonia Musculorum Deformans. [Neurol. Centralbl., March 16, 1918, No. 6, Vol. 37.]

In 1908 Schwalbe described three cases in one family where during childhood muscle contractions of varying intensity made their appearance followed in later years in one case with total inability to walk, and in the two others by extreme disturbances of gait. There were no symptoms of the pyramidal tract and no disturbance of sensibility. Ziehen described a similar case which he called "tonic torsion neurosis." Oppenheim, who had opportunity to observe a large number of cases of this disease extended the knowledge of the clinical picture, showing that tonic cramps as well as clonic are present and that in isolated muscle groups there is hypotonia. He was of the opinion, in contradiction to other writers, that the symptoms were due to a disease of the central nervous system, and proposed the name dysbasia lordica progressiva or dystonia musculorum deformans. The author gives a case in which a disturbance in gait set in following typhus. A tendon operation was performed which only increased the difficulty. Soon a trembling of the

head and arms began and a curvature of the body. Some years afterward a second operation on the tendon of the leg was performed. It is to the course of the disease after the second operation to which the author would call attention. The patient claims that it resulted in marked improvement and her assertion was confirmed by two physicians who had observed her during the earlier period of the disease. Other authors who have described similar cases claim that this disease is progressive. Ziehen asserts that no cases of improvement have been observed, that the disease progresses until it reaches a certain chronic standstill. Oppenheim says that the spasms may improve in certain muscle regions, especially in the arm, but that the general course is progressive. In his case the author found the whole condition improved and during a period of years there was no regression. Again, Flatau and Sterling state that in this new sort of spasm the face is not affected, as is nearly always the case in athetosis; a second difference in the author's case from the former experiences is that there was a tremor of the face. Schwalbe and Ziehen mention psychic symptoms, while Oppenheim says that he does not believe they belong to the picture of this disease; in the author's case they were present. Further, there was close resemblance of this disease to Wilson's disease and to pseudosclerosis. He thinks that none of these diseases are hereditary but arise gradually, from unknown causes in youth and the abnormal muscle tone is their principal feature, but, in his case of dystonia, the trembling did not seem to be as great as it is in pseudosclerosis. Just how close the relation is cannot be definitely decided, because there have not been any anatomical examinations of dystonia. The two points emphasized are that his observations lead him to believe, contrary to his predecessors, that psychic symptoms belong to the clinical picture of the disease, and that, in the course of the disease, considerable improvements may take place.

Paulian, D. E. Stunted Pyramidal-Cerebellar System. [Rev. Neur., Nov., 1919.]

Paulian had two cases, a woman 31 and her brother 26. They both had arrested development of the pyramidal system and afferent cerebellar tracts. They were both about 20 when first ill. An uncle had a history of spinal cord disease, and the mother had unmistakable signs of syphilis. Paulian labels them familial pyramido-cerebellar dysgenesia, emphasizing also the inherited taint.

Brouwer, B. Chronic Diffuse Disease of the Cerebellum. [Neurol. Centralbl., Nov. 1, 1919, Vol. 38, p. 674.]

The author describes two cases, the first being important from both clinical and pathological points of view; it shows that the same symptom complex may occur in "atrophie lamelleuse des cellules de Purkinje" as

in "atrophie olivo-ponto-cerebelleuse" which had always been considered a much more serious disease; the degeneration of the Purkinje cells, if the affection covers a sufficiently extensive area of the lamella of the cerebellum, giving rise to the same disturbances as the degeneration of the three layers of the cerebellum cortex with accompanying degeneration of the pons, of the olivary bodies, and of the spino-cerebellar system. It is also of special importance from the point of view of pathological anatomy, for it gives rise to the question how the immunity of the olivary bodies, the pons ganglia, and the nuclei laterales, and Clarke's column are to be explained. Three distinct systems can be distinguished in the cortex of the cerebellum: the afferent, the association, and the efferent system. The latter is represented by the Purkinje cells. These send their axis-cylinders to the cerebellum nuclei. The author's case is a pure type of centrifugal degeneration, and proves that the disease process attacks one system of fibers to the exclusion of the others; the spino-cerebellar system, the pons cells, the olive cells with the fibers being preserved as well as the associative system in the cerebellum. Besides in the silver preparations, the empty basket cells were visible, proving that the Purkinje element had been electively destroyed. The second case was only observed clinically, and was diagnosed as a diffuse disease of the cerebellum. There was an abducens paralysis on the left side which did not belong to the symptom complex and closer analysis showed that it was of congenital origin and, as such, was evidence of hereditary inferiority of the nervous system. The disease of the cerebellum was in all probability due to a prolonged abuse of alcohol. The whole picture was that of a "fixed intoxication" and the other factor producing the atypical symptom was to be sought in the nervous inferiority. [J.]

Meier-Müller, Hans. PHYSIOLOGICO-ANATOMICAL EXAMINATION OF THE SO-CALLED ARM REGION OF THE CORTEX OF THE CEREBELLUM. [Schweizer Archiv f. Neurol. u. Psychiat., 1919, Vol. 5, No. 2, p. 270.]

Sherrington and Brown (1913) showed that a chimpanzee, after total extirpation of all the foci of the so-called arm region of both sides, was able in a relatively short time to grasp a glass, pour water into it, and drink from it, in a manner which the experimenters thought could not be distinguished from normal movements, though v. Monokow considered that distinct synkinetic movements could be detected. These experiments disproved the prevalent view that there was a narrowly circumscribed localization in the cortex for voluntary movements of the arm. The animal on which these experiments were made died shortly after the extirpation of a sixth cortex area. The brain, with sketches and descriptions of the motor defects resulting from the successive extirpations, was sent to the Brain Anatomical Institute at Zürich where the author continued the study of it. It was found that from the cortex

region extirpated, paths of secondary degeneration extended to the optic thalamus. Ever since the connection of the thalamus opticus with the cerebrum cortex was established by v. Monokow, the degenerations in the various nuclei of the thalamus have been recognized as an index for certain definitely localized cortical destructions. This chimpanzee's brain presents perhaps for the first time an opportunity to follow the secondary degenerations resulting from destruction of the clearly defined arm area, thus rendering it possible to determine the exact part of the thalamus therewith connected. In the left hemisphere where the arm region alone had been destroyed this degeneration was found to affect only the nucleus lateralis, the dorso lateral part being most intensely involved. In the right hemisphere, however, where, beside the arm region in the cortex, a portion in the posterior central convolution opposite it was destroyed, not only the nucleus thalami lateralis showed degeneration, but also the middle third of ventral nucleus (Flechsig), a fact in conformity with the view that certain definite areas in the cortex are connected with certain definite areas in the thalamus. The author thus sums up the results of his examinations: The convolutions of the frontal lobe seem to be the region reached by the fibers from the frontal third of the thalamus in fronto-occipital direction. The most profound degenerative changes were found in the middle third of the thalamus and these secondary degenerations must be considered to stand in causal relation with the extensive lesions in the two hemispheres. The middle section (dorso-ventral) of the lateral part of the nucleus lateralis thalami is the optimal field of cortical representation for the arm movements. Localization in the thalamus both in fronto-occipital and in dorso-ventral direction conform to the topographical order of the fasciculi. In regard to the physiology—destruction of the so-called arm region does not cause permanent loss of purposive movements. The so-called arm region is not the only localization for the motion memories involved in the ordinary purposive movements, but contains the aggregate foci of stimulation for certain sorts of practised movements in which there is delicate reciprocal play of agonists and antagonists. [J.]

Camis, M. Cerebellar Action Currents. [Archivis Sc. Biolog., Nos. 1 2, Dec. 15, 1919.]

The investigations were made on dogs with a view to ascertain if electric phenomena might be made to arise from the cerebellum in a similar manner to that already ascertained in the case of the cerebrum. For this purpose various sets of experiments were made consisting chiefly in changes of the situation of the head in regard to space and stimulations of labyrinth of the anesthetised animals. The consequent electric phenomena were recorded by means of an Edelmann's string galvanometer. The results obtained have been summarized by the author as follows: (1) The mechanical stimulation of the labyrinth causes

electric phenomena to arise from the cerebellum. (2) These must be considered as action currents which can be derived from the cerebellar nuclei (dentate and roof nuclei), but not from the cortex cerebelli. (3) Action currents can be made to arise chiefly from the homolateral cerebellar nuclei, but in a weaker degree also from those opposite to the stimulated labyrinth. (4) The electric stimulation of the labyrinth provokes manifestations of the same kind but it is less suitable than mechanical stimulation. (5) Changes in the situation of the head in regard to space causes action currents of remarkable intensity to arise from the cerebellar nuclei.

These results are in accordance with our knowledge regarding the excitability of the deep gray matter of the cerebellum and the inexcitability of the cortex cerebelli. They harmonize also with Edinger's supposition that the cortex should be considered as a sensory organ, and the nuclei as motor centers. [Da Fano.]

Sztanojevits, L. TERATOMA OF CEREBELLUM. [Neurol. Centralbl., December 1, 1918, No. 23, Vol. 37.]

This was a teratoma the size of a man's fist, which existed for a long time without any objective symptoms, and, in nerve pathology, tumors which exist for a long time without noticeable symptoms are rare. The patient was a Roumanian, thirty-two years of age, a war prisoner. He had been in the habit of drinking constantly, but in moderation. There was no evidence of lues. When examined by the author only slight symptoms of nervous disturbances were discovered, fine tremors of the distended hand and tongue, sluggish reaction of the pupils to light and in accommodation. Death occurred suddenly with phenomena of suffocation. The section revealed hydrocephalus internus in the fissura intersphærica and, at the place of decussation of the falx cerebri and cerebelli, a tumor as large as a man's fist and of jelly-like consistency. The cerebellum hemisphere was so closely connected with the tumor that it could not be distinguished from the same macroscopically, and was so overgrown with the neoplasm that the right half of the cerebellum was one half smaller than the left. In the medulla oblongata there was a mass also connected with the tumor about as large as the stone of a small plum and of the consistency of marmalade. On the border of the dough-like cyst, which in places gave the amyloid reaction, could be discerned, microscopically, traces of bone, fat, gland substance, and hair. Obviously this was a typical case of epignathus, in the structure of which all three germinal layers participated. The case is the more interesting because, contrary to the experience in the majority of cases of this sort, the pathological changes produced, during the life of the patient, no disturbances of coördination or other clinical symptoms indicating a disease of the cerebellum, but, nevertheless, causing death by pressure on the medulla oblongata, when the capsule of the tumor burst. It is

further of interest for pathologists that the tumor was localized at the point which is known to be the point of predilection in the animal world for dermoid tumors.

Bikeles, G. A Tonic Patellar Tendon Reflex in Chorea Minor. [Neurologisches Centralblatt, January 16, 1918, No. 2, Vol. 37.]

The author describes a case and remarks that it is interesting in relation to the manner in which the tonic patellar reflexes in chorea minor are produced, because here the phenomenon occurred not with heightened, but with pronounced diminished knee reflex and could be produced by passive, *i.e.*, involuntary, movements of the lower extremities.

Gordon, A. Cerebellar Lesion. [Phila. Neurol. Society, Feb., 1920.]

J. O., male, 13 years of age, has been complaining of severe headache for the last two years. During the last six months he has had many attacks of vomiting without any indication of a genuine gastrointestinal disorder. Soon he commenced to complain of vertigo which is still present but which is not continuous. Upon examination the following symptoms are observed:

When the eyes are in primary position and the patient looks in front of him nothing special is observed. When he turns his eyes sharply to the left, nystagmic movements appear; the latter are absent when the eyes are turned to the right. An occasional and very slight nystagmus is present when the eyes turn upwards. Both nerve heads are hazy at the margins. There is some fundus atrophy and the retinal veins are decidedly tortuous. The left temporal field of vision is somewhat diminished. Further examination reveals a diminution of pain sense over the entire right side of the face. The hearing is impaired on the right side.

Reflexes, station, gait—are all normal. In testing the upper extremities, pastpointing to the right is observed repeatedly in the right hand, but not in the left hand. A Bárány test performed by Dr. L. Fisher reveals the following nystagmus data: Upon turning test to the right the duration is 38 seconds, to the left 35 seconds. With the caloric test a right douche produces a nystagmus of 50 seconds, a left douche of 70 seconds. In view of the right pastpointing of the localization of the nystagmus of the finding with Bárány test, also of the eye grounds, of the headache and vomiting, the presumption is in favor of a cerebellar lesion situated on the right side. As to the nature of the lesion it is well to bear in mind that the patient has a purulent bilateral sinusitis; the ethmoids on both sides are badly diseased and there is a profuse discharge of pus from both nares. The question arises as to the possibility of a purulent focus in the right cerebellar region. On the other hand intracranial syphilis cannot be entirely eliminated in view of the fact that only the blood was examined for a Wassermann, with negative results. [Author's abstract.]

Rohardt, Walter. Pointing and Falling Reactions in Diseases of the Cerebellum. [Zeitschr. f. d. ges. Neur. u. Psych., 1919, Vol. 49, p. 167.]

The author undertook the diagnosis of eight cases with cerebellar symptoms by means of Bárány's cerebellar pointing and falling tests. Post-mortems were performed in all of the cases and, in five, tumors of the cerebellum were found; in one, abscess of the cerebellum; and in two, extracerebellar tumors (of the right temporal lobe and of the left thalamus opticus). Bárány's theories concerning the direction centers and labyrinthine tonus centers are confirmed, as well as the approximate localizations of the arm and leg centers assumed by him. The errors in pointing to the right or left of objects when the motions are undertaken spontaneously only attain diagnostic value when they are compared with the movements resulting from the calorific reactions. In order to explain certain apparent contradictions between the spontaneous movements and the results of the calorific tests the author proposes a modification of Bárány's views. He assumes that the labyrinthine tonus centers are divided into two components, a vestibular and a sensory one. When one component is impaired there is not a hypertonus of the opposing center but an overcompensation of the other part of the same center, which causes an exaggeration of tonus, resulting in the deviation of the arm, or leg, or trunk toward the side controlled by the center affected. It might be assumed, for instance, that in a certain case the sensory center causing outward movements of the left arm was intact, but that the vestibular component was injured. There would then be spontaneous indication past the point in an outward direction as result of overcompensation with absence of response in the same direction when the calorific reaction test was employed. The author remarks that Bárány's theory is complicated by this understanding of it and, at first view, it might seem that its value as a means of making topographic diagnoses is lessened, but this is not the case. These interpretations are only amplifications of the theory, permitting facts to be brought into harmony with it, which apparently were irreconcilable with it. [J.]

Pulay, Erwin. Abscess of the Cerebellum with Encephalitis Hydrocephalus Internus. [Neurol. Centralbl., July 16, 1918, No. 14, Vol. 37.]

There is perhaps no other special branch of medicine where the report of every case observed, with the post-mortem findings, is so much to be desired as in neurology. The author, therefore, presents the following case. It was that of a young man 21 years of age. The principal symptoms were severe headache, diplopia when the patient's glance was directed downward; nausea; roaring in the ears; attacks of dizziness in which patient thought he was falling to the right side; difficulty in swallowing; head turned somewhat to the right side; skull sensitive to pres-

sure, on the right more than on the left; ptosis and hemianopsia; disturbance of the sense of smell; trigeminus branch one and two sensitive to pressure; hypesthesia on the right half of face; facialis affected in the right frontal branch and in the left buccal branch; when patient frowned the right half of the forehead did not respond normally. In the extremities there was anesthesia on both sides, bilateral ataxia and intention tremor; Romberg sign strongly positive; patellar tendon reflexes, cremaster, Achilles all exaggerated; Babinski positive; abdomen reflexes could not be elicited; Bárány's pointing test strongly positive. The patient had to be held when standing to keep him from falling. In walking the whole body is inclined backward to the right. The internal examination gave evidence for assuming a status lymphaticus. On both sides large cleft tonsils in which pus was found; hyperplasia of follicles at base of the tongue. The heart showed some abnormalities and the lungs diffuse bronchitis. Death followed within a week of the first examination of the patient. From the clinical examination only tumor cerebelli and encephalitis were suggested. The author thought that brain abscess could be excluded because of the absence of every etiological moment, the normal conduct of the pulse and temperature. A diagnosis of encephalitis with hydrocephalus internus was made. The post-mortem revealed an abscess on the right side of the cerebellum with encephalitic foci, brain edema, and hydrocephalus internus. Pneumococci were also found. The fulminating course of the disease and the difficulty in making the diagnosis of brain abscess was interesting. Oppenheim emphasizes the possibility of mistaking encephalitis, when it runs a subacute course, for tumor cerebri, and Nonne describes a case of abscess which assumed the picture of brain tumor. The author's case had similarity with that of Gower's in which the disease picture resembled that of a tumor of the ponto-cerebellum. Hemorrhagic encephalitis following abscess has been described. Sahli discovered pneumococci in the pus of a cerebellar abscess, and Carre, Fraenkel and others have described encephalitis following pneumonia. It seems very probable that, in the author's case, the disease may have entered the system through an infection of the tonsils, because the main symptoms were on the same side as the infected tonsil. The abnormal constitution, the status lymphaticus, is probably responsible for the extraordinary fulminating course of the disease, and perhaps the constitution was also responsible for the unusual form of reaction to the infection, *i.e.*, for the formation of the abscess in the cerebellum. [J.]

Mochi, A. Metastatic Solitary Cerebral Abscess. [Presse méd. d'Egypte, February, 1920.]

This is a very rare condition, according to the author. Virchow showed in 1853 that the primary suppurative lesion in cases of metastatic cerebral abscess was almost always in the lungs, and later Böttcher

found lung pigment in a cerebral abscess of metastatic origin. These observations have been confirmed by all subsequent writers, who are agreed that cerebral abscess is very rare in ordinary pyemia, whereas it is a relatively frequent complication of pulmonary suppuration. Out of 98 cases of severe pulmonary suppuration collected by Nather 8 developed a cerebral abscess. The majority of metastatic brain abscesses are caused by chronic suppurative processes in the lung, such as purulent bronchitis, bronchiectasis, empyema and pulmonary gangrene. Although pneumonia is a much more frequent disease than purulent bronchitis or bronchiectasis, the latter supplied a contingent of 51 per cent., whereas pneumonia was represented in the etiology of metastatic abscess by only 4 per cent. of cases.

5. BRAIN: MENINGES: VASCULAR LESIONS.

Head, H. Some Principles of Neurology. [Brain, Parts III and IV, 1918.]

(1) When any level of activity is attacked, the most complex functions and those which have appeared most recently are the first to suffer; they are also disturbed to a greater degree and to a wider extent than those which are simpler or more inevitable in their expression. This is seen in the effect of a lesion of the sensory cortex on the appreciation of the spacial aspects of an external stimulus. (2) The negative manifestations of a lesion appear in terms of the affected level. Thus, if those parts of the cortex associated with speech are injured, the negative manifestations are presented to us in the form of a disturbance of speech, not as a destruction of visual or auditory images. (3) A negative lesion produces positive effects by releasing activities normally held under control by the functions of the affected level. Spastic rigidity in hemiplegia is an example. (4) The functions of the central nervous system have been slowly evolved by a continuous process of development. The methods by which this gradual progress from lower to higher efficiency has been reached are still manifest in the phenomena of its normal activity. Thus, the lowest reflexes give the most definite response; there is little or no choice, the answer is inevitable. With the progress of evolution came voluntary control. (5) Integration of function within the nervous system is based on a struggle for expression between many potentially different physiological activities.

Galluser, E. Rhinogenous Headaches. [Correspondenz-Blatt f. Schw. Aerzte, Nov. 27, 1919.]

This author emphasizes that some long unsuspected nasal disease, which has never given recognized subjective or objective signs of its existence may entail headache for which no cause can be found. He describes several cases of this sort and mentions certain features that may give a clue. The headache is generally frontal. Oppression, a

heavy feeling in the whole head, with occasional paroxysms of severe pain are present. The severe pain on arising develops but wears off later, but after sneezing, bending over or emotional stress may reappear. This is likely to give the pain a misleading neuralgic character. Another symptom is the pain on pressure of the internal angle of the eye, over the frontal sinus. The most violent pains also are sometimes promptly and completely relieved by cocain to the upper interior of the nose. This immediate relief by cocain calls for exploratory opening of the frontal sinus. One man of 48 had had headache on the right side daily for ten years, incapacitating him at times, but none of the numerous physicians consulted had ever detected any symptoms on the part of the nose. No treatment had given any relief and he had been exempted from military service on account of habitual headache. Tapping the right side of the skull and pressure on the roof of the right orbit were painful. The middle turbinate was unusually thick. To get a better view, Galluser pushed this turbinate to one side, and the patient exclaimed at the relief this afforded. This encouraged high resection of the middle turbinate, opening the frontal ethmoidal cells and exposing the opening into the frontal sinus. Nothing pathologic could be detected, but the headache was cured once and for all. In another case long martyrdom from headache was cured by opening up the frontal sinus although nothing pathologic could be detected in it except that it was extremely sensitive to the probe. This woman of 44 tried to commit suicide on account of her headaches, which by exclusion had been long qualified as nervous. In neither of these two cases was any sign of suppuration found.

Salomon, A. Injuries of Middle Meningeal Artery. [Deutsch. med. Woch., Oct. 16, 1919, J. A. M. A.]

The diagnosis of injury of the middle meningeal artery, while an easy matter in typical cases, becomes exceedingly difficult if the classical symptoms of cerebral pressure are absent or are obscured. Salomon gives as convincing evidence of the difficulty attending the diagnosis of epidural hematomas the fact, as cited by Brun, that of thirty-nine cases of hematoma in Krönlein's service at Zurich only nineteen were diagnosed before the death of the patients, and thus could be given operative treatment. To add to the difficulties, patients are often admitted to the hospital in an unconscious state, nothing of their past history being known, while the brain is completely paralyzed. Salomon thinks a more widespread knowledge of atypical lesions of the middle meningeal artery would lead to better results. The diagnosis and the indications for operation should not be allowed to depend so exclusively on the classical symptoms of pressure on the brain. Though aphasia may be the only focal symptom, this alone may at times be taken as an indication for operation. If after two or three days' observation, in spite of temporary

improvement, the typical brain pressure pulse, the aphasia and the mental condition remain the same, we are justified in assuming the presence of a good-sized, unabsorbable extravasation of blood, the removal of which is clearly indicated. Salomon is convinced that extension of the operative indications will reduce quite perceptibly the number of cases that come to necropsy, which now amount to about 50 per cent. of all cases.

Skoog, A. L. Measles: Brain Complications. [Am. Med. Assoc., Section Neurology, 1920.]

This essay deals with the report of two of the author's cases. He discusses, in a general way, briefly what is known and not known regarding the etiology of measles. It was found that the literature on this subject is not much more abundant in later times, compared with the ancient. There are reported a large variety of pathological lesions involving the brain, spinal cord and peripheral nerves. Among the brain complications, by far the most numerous are those involving the meninges. The author's cases include a very uncommon one with a cerebellar syndrome, which made a complete recovery within a few weeks. The chief symptom in this case was ataxia, involving all parts of the body. The second case was first seen in the eighth week of the illness. The original trouble was undoubtedly measles, complicated about the sixth day with meningitis. A cerebritis attended the meningitis. Some septic organism was undoubtedly the cause of this secondary infection. In his final discussion of the subject the author has divided all of the cases reported into three groups: The first group, a very small one, would include those in which the complication was merely incidental to the measles. The second group would include the very largest percentage, accounted for by secondary infections of the brain and meninges. The third group would include those caused directly by the toxin or the supposed virus causing measles. The prognosis and treatment would depend entirely upon the type of lesion in the brain, and the extent of the involvement. The author believes that very probably many moderate involvements of the brain following measles, and unrecognized have occurred, and might account for some of the milder neurological disorders seen many years later. They are often difficult to catalog, and might include some with so-called neurasthenic syndrome. [Author's abstract.]

Galant, S. Method for Testing Language Ability. [Neurol. Centralbl., September 1, 1919, Vol. 38, No. 17, p. 546.]

The author is impressed by the fact that in the multiplicity of methods for testing the various mental faculties (even suggestibility!) there are none for testing language ability; in both psychiatry and psychology sufficient attention is not given to this very important subject. Some

tests which are really language tests are brought forward as tests for other faculties; for example that of word building (the formation of the largest number of words from a given number of letters) is, to the surprise of the author, considered a test for invention. The author suggests eleven tests—for macronyms (the longest word known to the individual), homophones, etc. Three are especially difficult, that for synonyms, for neologisms, and for descriptive words. Various experiments with this method were made which demonstrated its practical value. As development of speech and of intelligence go hand in hand this method reveals the degree of intellectual ability in both children and adults and the tests are arranged on the principle of the Binet Simon scale so that the method may be used as a substitute for other intelligence tests or as a control for the results obtained by other methods.

Knapp, A. Disturbances of Speech in Epilepsy. [Archiv. f. Psychiat., 1919, Vol. 60, p. 226.]

Various speech disturbances in epilepsy are described. To the first group belong the preëpileptic disturbances, as motor aphonia or aphasia. During the convulsions motor aphasia is more frequent than sensory, but after the attack the opposite is the case, and, according to the author's observation, post-convulsive paraphasia is always a part phenomenon of a sensory aphasia and is never of motor character. In the confusional and dazed conditions both motor and sensory aphasia may exist in the same individual, or they may occur as isolated phenomena; in these conditions perseverations, echolalia, and verbigeration are also frequently observed. It seems to be little known that motor as well as sensory aphasia may occur as an epileptic equivalent. When aphasic disturbances are observed in the intervals free from attacks, there is nearly always a lesion of the brain, of which the epileptiform convulsions are only secondary symptoms, and the author has never encountered motor or sensory aphasia in these free intervals, although amnesic disturbances of speech may sometimes be evident, even when it can be determined with certainty that the phenomenon is not due to bromide. Less generally recognized and studied than other speech affections in epileptics are the disturbances of articulation, though this symptom is of value for the differential diagnosis of the disease; sometimes it is not directly due to the epilepsy, but is caused by chronic bromide poisoning of which it is also a symptom. Bradyphasia is a part phenomenon of the general retardation of all movements and reactions, and this quantitative change in articulation is the one most frequently observed. The author has met with stuttering, not only of transitory character in connection with convulsions, but also as a permanent symptom in the intervals between the attacks. The most important speech symptom for the differential diagnosis of epilepsy is pararthria syllabaris. The author examined about 500 cases for this symptom and in nine found pro-

nounced and permanent pararthria. In less marked form it was observed in many other cases, especially in patients with neurasthenic signs. According to Wernicke's view three disease processes produce pararthria: progressive paralysis, motor aphasia, and chronic alcoholism, especially delirium tremens. The author adds epilepsy to this list, though this phenomenon has hitherto scarcely been counted among the symptoms of this disease. Psychiatrists and neurologists should never lose sight of the possibility of the occurrence of pararthria syllabaris in epilepsy to avoid confusion of this disease with progressive paralysis.

Regard, G. L. Projectiles in the Cerebral Ventricles. [Presse Médicale, No. 64, Nov. 1, 1919.]

In general projectiles that have lodged in a cerebral ventricle have not penetrated thither in the first place, but have got there secondarily. Driven by very great but nevertheless limited force, they have originally stopped in the immediate vicinity of the ventricle, have pointed towards its cavity, then have fallen into this cavity several hours or several days later. This secondary penetration is due to the density of the projectile and above all to the pressure and the consistency of the brain which tends to force out foreign bodies that have partially penetrated it. In the lateral ventricle even a large projectile such as an entire bullet may be displaced with great ease. Under the influence of gravity it quickly slips through the frontal as well as the temporal and occipital prolongation. But the favorite route is into the ventricle and the entrance into the occipital prolongation. When in that position it is fatal. This is the position it would normally occupy when the wounded man is lying on his back. Once it has reached this position it is very difficult to cause it to pass above the optic layer and to go back into the frontal prolongation. A projectile which has penetrated into the lesser ventricle may escape from it and fall into the lateral ventricle. A bullet situated transversely in the lesser ventricle sometimes projects from the two lateral ventricles and thus occupies all three ventricles at once.

The lesions caused at the level of the ventricle are very slight when the projectile penetrates the ventricle secondarily. On the other hand the lesions are very serious when a large projectile penetrates the ventricle directly and forcibly. The ventricular lesion is usually less important than the damage caused by the projectile before it reaches the ventricle. The projectile on account of its weight, especially if it rests in the same place all the time, produces contusions of the ventricular floor. It is also accompanied by a general irritation which is manifested by an extravasation of the cephalorachidien liquid which distends the ventricle and increases the mobility of the projectile. But while the concommitant lesions are not followed by immediate death, the real danger is, undoubtedly, ventricular meningitis. The effect of a very large projectile is instant death. Foreign bodies that reach the fourth

ventricle are always deadly. The tolerance of the lateral and lesser ventricles for the first hours is such that no clinical sign reveals the position of the projectiles. The wounded man is obnubilated; he has a violent headache; the pulse is slow; the pupils are myotic. After a day or two the ventricular irritation increases; the temperature rises. But these signs do not reveal the localization of the projectile nor even its presence. They only indicate that the wounded man is not getting on well and that a fatal outcome must be feared.

In spite of the absence of special clinical symptoms the diagnosis of intraventricular placement is almost always possible thanks to radioscopy When a fixed or slightly mobile projectile is situated just beneath the sagittale suture and projects sagittaly up to 25 mm. above the zygomatic arch and from 0 to 20 mm. in front of the auditary hollow, it is probably situated in the third ventricle, but this is only a diagnosis based on surmise. When a projectile is in the lateral ventricle two points must be distinguished: (*a*) If it is very large and immobile, the diagnosis is simple because the foreign body occupies the ventricular region. (*b*) When the projectile is small its mobility becomes an essential condition of the diagnosis. The foreign body is intraventricular when, situated in the center of a hemisphere, it can be displaced from front backward and from back forward along a constant axis which passes approximately through the suborbicular cavity and a point situated 2 cm. outside of the external occipital protuberance. It is to be found in the frontal prolongation when it will displace 6 cm. along a plane passing three finger's breadths above the base of the skull; it is in the temporal and occipital prolongation when its more posterior displacement is only 4 or 5 cm. and one finger's breadth above the base of the skull.

The general prognosis is extremely gloomy on account of the multiplicity and the severity of the lesions which may be associated; but the concomitant circumstances are what render the situation so serious. Intraventricular penetration, aside from hemorrhage only becomes alarming in the secondary stage. It then has the double danger of irritation and ventricular meningitis, both of which constitute a serious danger for the patient. Only the extraction of the projectiles can improve the prognosis and enable the wounded man to obtain complete restoration of all his faculties. The treatment is accordingly operative and usually involves a double operation since it must be combined with cleansing the wound where the projectile went in, and where it was extracted. The cleansing of the wound and the extraction of the projectile may be carried on without any difficulty in the course of the same operation when the entrance opening is close to the place where the projectile is to be taken out. When the entrance orifice is at a distance, two separate operations are necessary; the second operation, extraction of the projectile, is performed as soon as the patient has recovered from the first operative shock. The extraction of the projectile is performed under

radioscopic control, at the level of the ventricular route or at the entrance to the occipital prolongation. A large cranial flap in the occipito-temporal-parietal region is used. The dura itself is incised. Exploration for the projectile is carried out by means of pincers or an electromagnet along the path which seems deepest and corresponds best to the foreign body. The dura mater and the flap are restored to place. The skin is sutured without drainage. The operation may be performed in one or in two sessions. The danger of the operation is hemianopsia, but the integral curing of the wounded man may be expected. [Author's abstract.]

Pedrazzini, F. Cerebral Pulse and Encephalo-Spinal Circulation. [L'Ospedale Maggiore, 1918, Nos. 8 and 10.]

Clinical observations and experimental investigations on dogs which lead the author to the conclusions summarized here as follows: (1) The encephalo-spinal circulation is regulated by physical laws different from those regulating the general circulation. (2) When the skull is uninjured there is no cerebral pulse, viz., no rhythmical raising of the encephalic mass, owing to the resistance opposed by the rigid skull and to the elastic reaction of the dural sac. (3) The graphic records taken through openings of the skull and eventually of the dura mater, generally considered as the expression of a cerebral pulse, are only an indirect and very often incomplete representation of the changes of pressure in the cerebro-spinal fluid, these being due to pulsatory and respiratory changes of volume of the blood-vessels plunged in the fluid. (3) The so-called cerebral pulse is not a physiological but a pathological phenomenon due to the absence of normal resistance opposed by the skull and the dural sac to movements of the brain. [Da Fano.]

LeCount, E. R., and Apfelbach, C. W. Skull Fractures. [J. A. M. A., Feb. 21, 1920.]

In a paper based on findings in post-mortem examinations at the Cook County Hospital during the years, 1911 to 1918, these authors say there are six fundamental facts generally accepted that first need brief mention. 1. We must consider that there are six regions where the greater thickness of the cranial bone forms arches, thicker below and gradually thinning out in the vault—one in front from the root of the nose and glabella; one behind, including the inion and external and internal crests of the occipital bone, as well as the torcular eminence; one on each side from the external processes of the frontal bone and prolonged obliquely back into the body of the sphenoid in the bones of the skull base, and, finally, one on each side formed by the petrous bones and continued externally in the protuberance of the mastoid. "2. With violence applied to the cranium, these arches hinder horizontal bending; whereas the bone between the arches can more easily bend vertically. As a

result, the bone between the arches flattens the more in a horizontal plane and breaks across, the linear fractures radiating up into the vault and down into the bones of the base of the cranium between the arches. 3. With the head in motion, the brain lags behind the more rapidly moving cranium, and as a consequence is closer to the cranial bones opposite where violence is applied; and with the axis of the skull abruptly shortened at right angles to where violence is applied, the brain is the more bruised opposite that place. 4. The resistance (weight) of the trunk and extremities transmitted to the skull via the condyles of the occipital bone tends to bend in the bottom of the skull, especially the arches, and is one factor in determining the course and distribution of the fractures. 5. When the cranial bones are broken with the head in a fixed position, contrecoup bruising of the brain is reduced to the minimum and the bruises are direct, at the place of fracturing." 6. The general direction taken by fractures, which course between the arches, is also well known, and is illustrated in this article by figures. About 85 per cent. of the total 504 cases studied were simple linear fractures or linear fractures with branches. In the others there were extensive comminution and some depressed fragments. In a table given were included a few fractures partly healed. The concomitant brain injuries were preponderantly on the outside. Most fractures of the cranium result from causes which first put the head in rapid motion and then suddenly stop it against a firm object, the brain receiving its greatest injury from being forced against the broken bone. Injuries to the back of the head have the largest percentage of contrecoup bruises, injury to the sides is next, while injuries to the front are largely direct injuries. The various forms of bone injuries and their percentages according to their location are given in more or less detail, as is the case with regard to subdural and extradural hemorrhages. There were decompression operations in twenty-three of the large extradural hemorrhages, as well as several others in which the post-mortem condition precluded conclusions as to whether a large clot was present before the operation. Bleeding into the subarachnoid space occurred in about 95 per cent. of all fractures. Their extent and the amount of hemorrhage caused are dependent on the size of the tear of the arachnoid, and are not always proportional to the extent of the bruising of the brain. Traumatic edema of the brain was the most frequent condition observed in patients dying from skull fracture. A number of cases are briefly reported, illustrating the sequences of skull fracture. The article is fully illustrated.

Bychowski, Z. Cerebral Polyplegias after Wounds of the Skull from Projectiles. [Ztsch. f. d. ges. Neurol. u. Psychiat., 1919, Vol. 52, p. 163.]

The author here describes a symptom complex to which he directed his attention from the very first years of the war, becoming familiar with

its entire clinical course. These were cases resulting from tangential projectile wounds in the region of the sagittal suture resulting principally in paralysis of both lower extremities. Of these the author here gives eighteen cases, which present the clinical picture of what may be most fittingly called cerebral polyplegia. The initial phenomena were nearly always of stormy character, paralysis of the lower extremities, paralysis or paresis of one or both of the upper extremities, disturbances of speech. The author divides these cases into four groups: 1. Those cases in which the clinical symptoms, after the lapse of several months or even years, showed no signs of improvement (these being usually the cases which were at first characterized by pronounced paralysis of both lower limbs and one or both of the upper). 2. Cases which presented the picture of a hemiplegia or hemiparesis, but where more careful examination revealed pronounced traces of lesions in other psychomotor regions. 3. Cases where, notwithstanding alarming initial phenomena, the recovery was sufficient to permit the patients relatively free use of the limbs. 4. Cases of so-called transverse polyplegia. The author discusses the various theories on restoration of function of movement both from phylogenetic and other points of view, giving examples where recovery seemed to be due to compensatory activity of centers on the side of wound and adding: "It must be confessed that the cerebral polyplegias here described seem to offer evidence in disproof of homolateral cortex compensation, because, in many of the cases the centers on both sides were destroyed and, notwithstanding this fact, recovery, to a great extent, took place." The author is of the opinion that in some of these cases, the centers were only temporarily injured—by subdural hemorrhage, diaschesis, concussion, etc., and that later they were again brought into activity. He calls attention to the differences in the final results in these soldiers wounded in the field compared with the similar cases usually met with in peace times. These latter are nearly always forms of hemorrhage or encephalomalacia in the brains of syphilitics and alcoholics where the whole organism is suffering from serious pathological processes. Here the cases were all young men, in the very best condition physically, and with high degree of education in coördinated movements because of gymnastic exercise, marching, target practice, etc. In these patients, even where they presented an initial picture resembling that of most severe pseudobulbar paralysis there was a steady recovery of function, while in the ordinary hospital cases there would have been decline into complete helplessness.

Pfeifer, B. Concerning Homolateral Hemiplegia from a Shell Wound of the Brain. [Archiv f. Psych., 1919, Vol. 59, p. 687.]

The author describes a case of homolateral purely motor hemiplegia after a shell wound of the brain. The Roentgen picture revealed that there was a splinter of the shell in the cerebral peduncle of the side

opposite to the wound, thus explaining the paralysis on the homolateral side. The author remarks that this case shows anew what mistakes may arise from an incautious assumption of a congenital absence of the decussation of the pyramids. He reviews cases of homolateral paralysis to be found in the literature expressing the opinion that they can all be explained as due to some such cause as secondary injury of the contralateral pyramid through pressure or hemorrhage, etc. Homolateral hemiplegia can also be counterfeited by functional paralysis, by multiple foci in organic brain disease, etc. A true homolateral hemiplegia as consequence of congenital absence of the pyramidal decussation could only be assumed if it were proved by unequivocal clinical signs, confirmed by the most careful anatomical examination of both hemispheres from the motor cortex to the crossing of the pyramids.

Schmidt, Adolf. Homolateral Hyperesthesia with Hemiplegia. [Archiv f. Psych., 1919, Vol. 59, p. 501.]

The skin and deeper parts are often found to be abnormally sensitive, in new cases of hemiplegia, on the side which is not paralyzed. Even when in an unconscious condition the patients make motions of defense indicative of the hyperesthesia. The author describes two cases from his own experience. In one there was complete paralysis of both legs and arms on the right side, while the motility of the left side was not affected. There was, however, extreme hyperesthesia on the left. The section revealed apoplexia sanguinea on the left. This hyperesthesia is not merely a phenomenon of contrast for it is observed in cases where there is no impairment of sensibility on the paralyzed side. The hypoesthesia on the paralyzed side and the hyperesthesia on the non-paralyzed are not connected phenomena; one may occur without the other, both being dependent, not on the severity, but on the localization of the lesion. According to the author this indicates that the centers controlling sensibility must be situated near the point where motor paths of the controlateral side are most usually found affected, *i.e.*, in the medullary layer below the motor cortex region and in the internal capsule. In lesions situated in the brain stem the conditions seem to be otherwise; at least the author observed a case of hemorrhage in the pons in which there was very pronounced hyperesthesia of the skin and muscles on the side of the paralyzed extremities. The author believes that the homolateral disturbance of sensibility must be due to the stimulation of special paths in the brain which are distinct from the cortico-thalamic paths. It is known from other experiences that probably each half of the body is not exclusively connected with the cerebrum cortex of the other side, but that in some instances centripetal impulses from the homolateral side stimulate the cerebrum cortex. It could be assumed that in lesions of one of the cerebrum hemispheres, sensory fibers which lead from this to the other hemisphere are stimulated and that

from the intact brain cortex the stimulation is carried to the contralateral, intact side of the body. This idea is at least more simple than the wholly hypothetical assumption of a special uncrossed system of fibers from the periphery to the cortex.

7. NEUROSYPHILIS.

Giannelli. Tabes Accompanied by Active Syphilitic Lesions. [Il Policlinico, Sez. Med., October, 1919.]

The association of secondary or tertiary syphilitic manifestations during life, according to this author, is not frequent, though such an occurrence is not absolutely rare. Adrian collected 65 cases from literature, to which must be added 4 reported by Gutzmann and those of Nonne, who, though he does not give the exact number, states that he has repeatedly observed this association. Giannelli reports a typical case of tabes of ten years' duration in a man, aged 42, who had contracted syphilis, for which he had had no treatment, at the age of 25. When seen by Giannelli he presented gummatous lesions of the perineum and left leg, and, in addition, a perforating ulcer on the sole of the left foot, in the tissue surrounding which a typical *Spirochæta pallida* was found. No previous instances have been recorded in which the spirochete has been found in connection with perforating ulcer.

Pandy, K. Leukoplakia Buccalis as a Sign of Previous Lues. [Neurologisches Centralblatt, January 16, 1918, No. 2, Vol. 37.]

One of the most difficult tasks of the physician is to ascertain whether an individual has been previously affected by lues. This fact is of special importance for the nerve specialist and one which it is impossible to determine through the anamnesis, or by the Wassermann or any other reaction. The author claims that leukoplakia of the mucous membrane of the mouth is the most unequivocal, most easily recognizable, and most frequent sign of a previous luetic infection. Schwimmer in 1878 made important additions to the knowledge of leukoplakia mucosae oris but was wrong in assuming both a luetic and non-luetic leukoplakia. It seems now to be fully proved (Landouzy, Gaucher, Kaposi) that leukoplakia is always due to lues and that the subject affected by it has formerly suffered from luetic infection or may still be suffering from the disease. Gutzmann whose opinion the author sought stated: "I am firmly convinced that pronounced leukoplakia is, without any exception, developed upon a luetic foundation. I would place this symptom in the category with tabes, paralysis and luetic sortitis as a secondary luetic phenomenon." The frequency of leukoplakia in those suffering from nervous and mental diseases is explicable on the ground that a large number of such patients are suffering from acquired or inherited lues. The question as to what the pupillary reactions were in individuals with leukoplakia naturally arose, as it is well known that the pupillary reac-

tions betray the luetic changes in a very refined, if not in an always reliable, manner. In the author's experiments the pupillary reactions of only twenty per cent. of patients without paralysis but with leukoplakia were good, while the reactions of forty per cent. without paralysis and without leukoplakia were good. In women the difference in the percentage was even greater. The author states that, in determining the presence of hereditary lues, the leukoplakia must be considered in connection with the other signs of lues and to illustrate this gives the case of a fourteen-year-old girl whose seizures were determined to be of hereditary luetic origin by the presence of leukoplakia and defective teeth together with the scapulae scaphoidae held by Graves to be a sign of hereditary lues in the sense of a defect in development of the bones conditioned thereby. The author also calls attention to the fact that leukoplakia in parents may permit the interpretation of pathological symptoms in children. [J.]

Lafora, G. R. General Paralysis. [Med. Ibera, Nov. 29, 1919. J. A. M. A.]

Lafora reiterates that three years of experience have convinced him that general paralysis in the first six months is capable of complete remission under appropriate treatment. The main thing now is to detect it during these first six months or better yet, before it has induced the classic symptoms. This is possible by systematic periodical exploratory lumbar puncture, and he describes two cases in detail to show the importance of this. The two syphilitic men of 36 and 49 presented an almost identical clinical picture, insomnia, a tendency to aphasia and absentmindedness but no hallucinations, etc. As only two years had elapsed since infection in the younger man, the diagnosis of cerebral syphilis seemed certain in his case, while progressive paralysis seemed equally certain in the other case, the symptoms not coming on until twenty-three years after infection. But the lumbar puncture fluid told another story, the findings showing general paralysis in the younger man and merely vascular syphilis in the other—all confirmed by the later course of the cases.

Grossman, M. The Maloney Method in the Treatment of Ataxia. [Med. Record, New York, August 16, 1919.]

The author writes that Maloney's method of treating tabetic ataxia is based upon the thesis that perfect thinking is essential to perfect moving, and that perfect moving is the outward sign of perfect thinking. Psychological treatment is as essential as physiological treatment. Maloney has shown that vicious attitudes in tabes are mainly due to mental causes. This mental state, fatigue and fear he combats with "rest exercises." The technique of the rest and other exercises must be read in the original; briefly put, they consist, as a preliminary, in

regulation of the breathing, the induction of complete muscular relaxation and the performance of varied passive movements. This is done in a darkened room and it is said that the tabetic thus trained to rest is endowed with the necessary preliminary to all effort—the power to recuperate. Attention is next directed toward training cerebral control. Movements are ordered which must be accurately defined and precisely performed; they must be carefully regulated in their time relations by means of a metronome. The more an ataxic walks uncorrected, the more ataxic he becomes. Certain mechanical devices to strengthen the weakened ankles, knees and back may be employed. Blindfolding is useful, because it decreases competition for attention between postural images and images derived from other sensory fields. Fatigue must be avoided. Grossman reports fifteen patients, of whom twelve were returned to a non-ataxic state and enabled to go about in public. It is further remarkable that attacks of pain and crises were much reduced in frequency and severity. Eight weeks was an average period of treatment. [Med. Jl. Austr.]

Goodwin, G. M. Syphilis of Anterior Horns. [Journal, A. M. A., Feb. 7, 1920.]

Goodwin gives the following history of a young Spaniard, suffering from a paralysis of gradual onset without pain, but with symptoms of muscular atrophy and fibrillation. There were no bulbar symptoms, and sensory discrimination was retained. The picture generally seemed to correspond with that of progressive muscular atrophy, though the predominating atrophy in the leg suggested the Charcot-Marie-Tooth type of progressive neural atrophy. The blood Wassermann reaction was +, while the spinal fluid showed a ++++ Wassermann reaction, a cell count of 80 with 92 lymphocytes in the smear, a positive globulin reaction, and a colloidal gold curve of the taboparetic type. It was evident that the patient was suffering from syphilis in spite of his denial, and that the anterior horns were especially affected. This has been a very rare type in Goodwin's experience. A further report after longer observation, is promised.

Weeks, Patrick H. Early Recognition of Paresis. [Penn. Med. Jl., Oct., 1919.]

Paresis is active syphilis of the brain and nervous system, rapid in progress and terminating fatally. The paretic is a dangerous individual to be at large, especially during the early stage of the disease. Repeated blood and spinal fluid examinations should be made in all cases of syphilis long after active symptoms have disappeared. Observations should be made for neurological symptoms and when they do appear the patient should be confined in a hospital immediately. No person showing a positive Wassermann on the blood and spinal fluid

and any neurological symptoms should be permitted to hold a position of trust and responsibility.

Every practitioner should keep a case history file for his syphilitics; record each case that comes under his care and make it a practice of posting notes on each case at least twice a year. No patient should be discharged as cured after two or three years' regular treatment, even though all active manifestations have subsided. He should be warned of the serious conditions that might arise and advised to visit a reputable physician once or twice a year, and have his blood and spinal fluid examined for at least ten or fifteen years or even for the remainder of his life. When the patient changes localities his attending physician should furnish him a complete statement showing the treatment he has received, result of repeated blood tests, etc., in order that his next physician can continue treatment properly. There is no excuse for not having blood and spinal fluid examined. If the physician cannot make the tests himself the State Board of Health will make them for him free.

Much valuable knowledge relative to the incipiency of paresis would soon be gained if these measures were carried out systematically. [Author's abstract.]

Freudenberg, A. The Pathogenesis of Disturbances of Micturition in Tabes. [Med. Klinik. November 9, 1919.]

The author says that it is frequently taught that the disturbances of micturition in tabes are due to a paralysis of the detrusor of spinal origin or to degenerative changes in its musculature. He regards both these views as incorrect, and maintains that the condition is to be explained by a lack of coördination between the detrusor and the sphincter vesicae internus when an effort is made to empty the bladder. The detrusor contracts and the sphincter, instead of being relaxed, also contracts to a greater or less degree. The grounds for this view are as follows: (1) The theory of a permanent paralysis of the detrusor or changes in its muscle is negatived by the fact that the disturbances in micturition in tabes are an early symptom, and often the serious symptom, in the disease. (2) Cystoscopic examination of the bladder in tabes always shows the presence of trabeculae, which could not occur if there was a paralysis or primary change in the muscle of the detrusor. (3) The remarkable variability in the bladder symptoms, apart from the development or aggravation of complications such as cystitis. Thus the amount of residual urine may vary from 400 or 500 c.cm. one day to only 30 or 50 c.cm. the next. (4) Urethroscopy frequently shows a contraction of the sphincter vesicae internus when the patient strains or when pressure is made on the bladder region. (5) Division of the sphincter internus, which Freudenberg carried out in some cases, completely cured the condition—the external sphincter, which was not divided, taking on the work of the sphincter internus.

Boulos. Treatment of General Paralysis by Tuberculin. [Journ. de méd. et de chir. prat., November 25, 1919.]

Twelve cases of general paralysis are here reported upon in which improvement followed from injections of tuberculin. The author does not claim a cure, but he thinks that remissions of long duration were obtained by this method. The idea of using tuberculin in general paralysis was not due to a belief that the disease was of tuberculous origin, but was suggested by the fact that improvement in general paralysis has often been observed after an intercurrent febrile disease. Donath had previously produced an artificial fever by injection of sodium nucleinate, and Wagner and Pilcz by injection of tuberculin. Boulos recommends that one should start with extremely small doses, which should be increased very gradually, and only if the temperature does not exceed 102.2° F. As a rule five injections were given—one every week—followed after an interval by another series. Tuberculosis in the patient is a contra-indication, and the treatment should be at once suspended when signs of intolerance appear, such as hyperpyrexia, rapid loss of weight, and incontinence of urine and feces. In favorable cases there is a slight or moderate reaction, and one to six weeks after the last injection improvement is shown by an increase in weight, improvement in the mental faculties, and return of memory, so that some patients can resume active work. But there is no change in the reflexes or cerebro-spinal fluid, in which the lymphocytosis and excess of albumin persist.

Kolmer, J. A. Neurosyphilis. [Jour. A. M. A., March 20, 1920.]

Describes rather elaborately a plan of treatment of neurosyphilis with mercurials and arsphenamin which avoids some objections that may be made to the Swift-Ellis method. In addition, it takes advantage of the probable value of drainage treatment advocated by Dercum and Gilpin. Care is taken to exclude all cases of probable brain tumor before the treatment is begun. The description is minute and can hardly be well condensed into an abstract. The advantages are summed up as follows: "(1) The patient receives arsphenamin both intravenously and intraspinally. (2) Blood is removed at once, insuring in the serum a larger amount of arsphenamin than is secured after an interval of an hour, as in the Swift-Ellis method. (3) Plasma or serum is secured at once, rendering the complete treatment possible within two or three hours instead of an interval of over night between the intravenous and intraspinal treatments. (4) The removal of from 20 to 30 c.c. of cerebrospinal fluid, followed by the injection of but 10 to 12 c.c. of arsphenamized serum, very probably leaves cerebrospinal fluid pressure reduced for some time, producing increased vascularity of the cord and probably also of the brain, while the beneficial effects ascribed alone to spinal drainage. Indeed, the injection of the arsphenamized serum

within an hour of the intravenous injection may increase extravasation from the vessels of the meninges by reason of the irritation produced by the serum and arsphenamin in the subarachnoid space, in addition to the increased vascularity and transudation ascribed to reduction alone of cerebrospinal fluid pressure. (5) The patient receives the benefit of treatment with mercury and iodids and of spinal drainage conducted while under the influence of these anti-syphilitic medicinals." The disadvantage of the method, encountered once in the author's practice consisted in a reaction of flushing and chills. A second specimen of blood was drawn later in the afternoon of the same day and placed in a refrigerator over night, followed by separation of the serum next day, and arsphenamizing by the addition of 0.1 c.c. of a solution of arsphenamin, prepared by dissolving 0.1 gm. in 30 c.c. of 0.8 per cent. salt solution neutralizing with a normal solution of sodium hydroxid (about 4 per cent.), adding 2 or 3 more drops of alkali, and then salt solution to bring the total volume to exactly 33 c.c.; 0.1 c.c. of this solution added to the serum represents 0.0003 gm. of arsphenamin. After heating the arsphenamized serum at 56 C. for thirty minutes, a spinal puncture drainage and intraspinal injection was done as before and the patient was kept in bed for another twenty-four hours. The article is illustrated.

III. SYMBOLIC NEUROLOGY

1. NEUROSES: PSYCHONEUROSES: GENERAL PSYCHOLOGY.

Myerson, Abraham. The Nervousness of the Jew. [Journal of Mental Hygiene, Jan., 1920, p. 65.]

The thesis of the author is that the very evident liability of the Jew to the psycho-neuroses need not be explained by a biological predisposition, but has its roots in the history of this race. He approaches this thesis by stating that there are two kinds of heredity: the biological, of which we know comparatively little insofar as human beings are concerned, and a social heredity which can be more easily examined and understood. By social heredity is meant that group of traditions, customs, education influences, and environmental pressures into which the individual is born. This social heredity differs from age to age and from place to place so that conduct changes surprisingly both in time and space.

For the Jew, the social heredity into which he is born predisposes him to the psycho-neuroses through the following mechanism: First, the race has become almost entirely urban through restrictions placed upon it by the people of the countries where the Jew found hostile lodging. Second, being restricted in occupation, the Jew was born in an atmosphere which makes for an intense cerebral and emotional activity, and bars him from the relief and sanity found in hand-mindedness.

Third, it naturally followed, partly because of the above restrictions and partly because of the reaction of the Jew against gentile interests and amusements that the race became non-athletic, became lowered in physique, and lost that self-confidence that comes from a good musculature. Fourth, the Jew lived and still lives in an atmosphere of fear and introspection. The fear is easily explained on the basis of the persecution, liability to expulsion and to individual assault; the introspection in part perhaps is increased in effect and amount by the recoil from the hostile world. The effects of the fear were and are intensified by the close familial and racial life. This solidarity, while responsible for the survival of the race caused a reverberation of emotion, caused an intense solicitude, especially towards children which in its turn bred fear and hypochondriacism. Living by his wits in a hostile world, sharpened in his purposes, intent on his goal with a threshold lowered to fear and the depressing emotions; and especially because he became a sedentary, non-muscular individual, the Jew's liability to the psycho-neuroses may be at least tentatively explained through the kind of social heredity above analyzed. That the Jew has not innately poor athletic ability is shown by his excellence in boxing and swimming, the only two athletic sports in which he at present has taken much interest. Those who see the trend of things athletic, know that the Jew is little by little developing champions in every line. The good health of the race, at least from the standpoint of the psycho-pathologist, will depend upon his emancipation from the fear-breeding and excessively cerebral factors of his life. A more harmonious development is easily possible for the Jew and one towards which he himself is tending. [Author's abstract.]

Sterling, W. Concerning a Peculiar Form of Hysterical Stupor Following Immediately after Awakening from Sleep, and its Relation to Lethargy and Narcolepsy. [Ztsch. f. d. ges. Neurol. u. Psychiat., 1919, Vol. 45, p. 45.]

Among the great variety of pathological conditions to which hysteria may give rise are anomalies of sleep. The author describes two cases illustrating types of these hysterical phenomena. The history of the first case fell into two phases. When the patient was fifteen years of age she was seized with sleeping spells. Inflammatory processes of the brain or meninges were excluded, as well as brain tumor. The sleeping fits could be suggested which indicated hysteria rather than epilepsy, as did also the facts that the patient fell asleep suddenly while standing, or sitting, or while eating or engaged in conversation and that the sleep was superficial, the patient being able to remember all that took place about her. In the second phase, which set in eight years later, the patient upon awakening in the morning fell into a deep stupor which lasted from five to fifteen minutes. The stupor was followed by

a series of psychotic conditions and strange motor automatisms, the whole lasting from one half to two hours. In the second case there were also peculiar transitional stages from sleep to consciousness. For two years the patient passed through these stages upon awakening in the morning. If he was awakened by force he remained unconscious for several hours. If he awakened spontaneously he remained for several hours in a state of half-consciousness and there was complete amnesia afterward for this period. Sometimes the sleep was so deep that it was impossible to awaken the patient by mechanical or acoustic stimulus or by pain. The psychotic conditions in the process of awakening were also noteworthy. In the stages of deep unconsciousness the patient would not respond to questions at all. When the condition was less deep he gave stereotyped replies, the negativistic, and only after from 25 to 40 minutes did he beg'n to reply rationally. The higher psychic functions, however, seemed better aroused than the lower. Indeed in the stage where consciousness was so clouded that the patient could not recognize his bed, could not read a word, he was able to solve quite readily little complicated sums and could explain the difference between various objects. The author regards these phenomena as acute transitory symptoms of hysteric nature. The two cases do not correspond exactly to any hitherto published types of hysterical stuperous conditions, but contain various features of a number of these forms. The peculiarity of the author's second case is that the symptoms always set in at a certain time in the morning. The question arises whether the patient's sleep during the night was natural or was a form of narcolepsy, or hypnotic or lethargic sleep. The author is of the opinion that from the evidence the sleep could not be considered lethargic or in any other way pathological, but that the hysterical stupor on awakening, from a pathogenic point of view, bears resemblance to lethargic stupors described in other connections. In the early phase of the author's first case there were lethargic fits such as are typ'cal of hysteria, while in the later phases of the same case there were stuperous conditions similar to those in the author's second patient, which goes to confirm that the conditions in the second patient were also of hysterical origin. [J.]

Book Reviews

Stewart, James Purves. The Diagnosis of Nervous Diseases. Fifth Edition. Revised and Enlarged. New York, E. B. Treat and Co. 1920.

A book which has already proved its value reappears with nothing lost but several important things added to its pages. As before there appears first a review of the important anatomical and physiological facts of the nervous system. These chapters like all the rest of the book are plentifully interspersed with clear and distinct illustrations.

A brief presentation of the method of case taking precedes the more distinctive chapters. These deal with various disturbances of nervous functions as they present themselves for diagnosis. The subjects contained in these chapters are not therefore taken up in the sequence of a discussion of varieties of nervous disorders, but as they strike the clinician from his first observation From this the writer's discussion leads on from each group of symptoms to the less obvious, the more hidden diagnostic implications of the various phenomena.

Chapters succeed one another on coma, fits, involuntary movements, aphasia and disorders of articulation. In a special chapter the cranial nerve disorders are discussed as related to the various pairs of nerves. The definition of pain and its manifestations in various symptoms receives separate attention. An excellent survey of the variety in forms of headache and the various casual connections to be considered occupies a part of this chapter.

Motor and sensory disorders, including incoördination, postures and gaits are reviewed in the light of diagnosis. The many reflex phenomena to be observed are described and their diagnostic value outlined. Trophoneuroses are discussed and the place of the vegetative nervous system is reviewed in its relation to various disorders. There is room for even more of that comprehensive interrelation of all parts of the organism than is distinctly insisted upon. The author has however extended his work here to include some of the later advances into correlation, through knowledge of this system and the influence of the ductless glands and so suggests the still larger possibilities awaiting medicine.

The progress in all branches of mental and nervous medicine towards which Stewart has evidently kept his attention directed, would lead one to expect a more interpretative attitude toward neurotic and psychotic manifestation. Here again his subject is approached from the clinical point of view, presenting the symptoms to be understood. Description of them seems however inadequate

both as to the range included and because of the lack of the deeper causal interpretation. The terms used do not sufficiently explain what really confronts the physician in the various neurotic disorders. Hysteria is treated rather extensively but even here a deeper interpretative background would give more light both into causation and therapy.

Material has been incorporated in regard to war lesions and war neuroses. Thus the new edition continues the presentation of problems vital for the practising neurologist. It keeps the subject open in the directions where progress is being made. Yet one might plead for an even more fundamentally dynamic attitude towards the subject.

JELLIFFE

Bechhold, H. COLLOIDS IN BIOLOGY AND MEDICINE. Authorized Translation from the Second German Edition, with Notes and Emendations by Jesse G. M. Bullowa. 54 Illustrations. New York, D. Van Nostrand Company. 1919.

Neurology and physicochemistry long since met together in the paths of research. A book therefore which throws light upon the inexhaustible subject of the colloids lies within the interest of the neurologist. Continuous activity marks life whether looked at in the varying movements of minutely defined particles of matter, in the impulse traveling over nerve cells or in the psychically comprehended need behind such impulse. The dynamic conception of such movements from whatever point of view considered has been gaining ground in recent decades. At the same time chemistry itself has been moving among the phenomena of such activity, in its growing occupation with the subject of colloids.

Bechhold presents here a comprehensive review of the work thus done. He points out the discoveries that have been made referring these to the various fields of interest upon all of which they throw an especial illumination. These fields belong to inorganic as well as organic chemistry. They pertain to plants and animals, they are those of biology, of physiology and of medicine, in all of which colloid chemistry has its particular task in peering deeply into subjects of increasingly practical significance.

Not only do colloids constitute "plants and animals and all the things we manufacture from them, such as our clothing and the greater part of our household goods." Further than this, colloids are capable of a diversified change in form and condition which gives them their wonderful functional significance in all territories. In fact they are in more or less constant transitional relation to that other form of chemical substance, the crystalloids. Together therefore all life processes and all stable conditions are dependent upon these two forms of matter and largely upon their interdependence.

The writer defines each form and points to their continually interacting relationship. He lays weight upon the properties of the colloids which give their functional capacity. He discusses the physical and chemical phenomena they display. He presents the

methods used for colloid research depending on these properties. He then passes on to the part the colloids play in the food elements and gives especial attention to the function of the enzymes as dependent upon colloid characteristics. Immunity reactions are discussed from the same point of view.

The latter half of the book emphasizes the significance of the fact that the living organism is really a colloid system. It is only through a knowledge of colloidal chemistry that metabolism and the distribution of material in the organism can be understood. The dependence of these upon the colloids is elaborately set forth as are also the relation of growth and development to the colloids. Movements of organisms as well as the various vital processes, such as circulation, respiration, also absorption and secretion and excretion are shown to be explainable only in terms of colloids. Cell structure and activity must also be thus considered. There is brief reference to the relation of colloids in structures and activities of nervous tissues, including cerebrospinal fluid. Toxicology and pharmacology obtain their significance likewise from colloid phenomena.

It has been the author's purpose in this work to present in an extended review of the subject the importance of colloid chemistry and the significant points of entrance it has made into all the reform of chemistry important to medicine. He has reported the work of those who have carried forward investigation in these many directions. In all he has carried through the thread of his own interest which finds all these phenomena bound together in the nature of the colloids and the inseparable connection of colloids with all life. His translator has rendered his work into English with the sympathetic interest of one also at home in the field.

The aim of the book is to apply the results of colloid research to biology even while realizing the present incompleteness of the material at hand for such an undertaking. One could wish that the importance of some of these fields could have been even more emphasized but the nature of the discussion even when briefest is such as to stimulate research and an eagerness for further knowledge.

JELLIFFE.

Appelt, Alfred. THE REAL CAUSE OF STAMMERING AND ITS PERMANENT CURE. A TREATISE ON PSYCHO-ANALYTICAL LINES. Second Edition. Methuen and Co., Ltd., London. 1920.

This book offers no spectacular treatment of the subject of stammering. Its somewhat lengthy explanatory title presents it for just what it is worth, as a solid and carefully worded discussion of stammering from the new aspect of psychoanalysis. The writer recalls to his readers how long stammering has been recognized as a disablement.

Moses seized upon it to avert the heavy task Jehovah was putting upon him; a removal of its burden is one of the notable blessings that shall outflow from the establishment of Christ's Kingdom on earth.

Later when science turned upon it a more exact attention methods of many sorts were applied to stammering and its causes and mechanisms became the subject of much debate throughout the medical world. The affliction made an equal appeal to attention outside of strictly medical circles so that the study and the efforts of many others were devoted to its alleviation. Of course this gave opportunity for charlatanism and mere commercialism. Because of the deeply psychic elements which underlie speech and its disturbances marvels appeared as having been wrought. The real basis in a rousing of fluctuating emotions was not discovered. These effects found their ephemeral character often because the emotional background was not investigated and the psychic change made really effective. All this the author reviews in comprehensive and instructive manner. His statements are supported by the fact that he himself passed through these superficially conducted experiments of all sorts.

Then he found the way through psychoanalysis to the hidden complexes underneath: those of inferiority, fear, whatever may be operative unconsciously to disturb any motor activity. These therefore underlie also this disorder of the complicated speech mechanism. The principles of psychoanalysis the writer has been able to apply to the cure of the disorder in others through a period of years. His simple yet fundamental discussion of these, offering as it does another practical outline of psychoanalytic theory, forms a valuable part of the book. The discussion is general, the definite application of the principles in the actual treatment of a case of stammering is reserved for another time. Those who may cavil at the only general statements in regard to psychoanalytic cure and who cannot accept the writer's belief in its unique efficacy would do well to acquaint themselves with the simple straightforwardness of this book. Then if need be they may await the fuller concrete presentation.

For those who are specially interested in the function of speech in its ordinary working and in its disturbances will find the chapter on The Mechanism of Speech as well as those on Pathology and Etiology of Stammering of particular value.

Lowie, Robert H. PRIMITIVE SOCIETY. Boni and Liveright, New York. 1921.

Anthropology is the last subject that can be presented in cross section. A study that deals with the behavior of man below the scale of recorded history has too wide a field and too ungraded a material to give a clean cut section across it at any time. Even the attempt to approach the material genetically fills the hands to overflowing with growths of all sorts. We are always tempted to search in every direction.

It is not quite clear in this book what we have. The author is well aware of the impossibility of confining the facts of primitive society within any limit, certainly within any one plane limit. Therefore he makes no attempt merely to cut across social institu-

tions as they might be found in a sort of parallelism and so given to the student. He is pressed upon by the dynamic variety of differently developing factors. Yet he has not a sufficiently genetic comprehension to move, as it were, with these facts of human development from the central core out. One misses such centralizing interest in it that push from the psychic heart of things which one feels must have been operative to produce just the phenomenon described in the book.

On the other hand, in order that an acknowledgment of such a psychic outgrowing shall be more than mere feeling or more than a merely hoped for hypothesis one must have just such data as are gathered in this book. They are presented here as such material. Perhaps not enough emphasis is laid upon the possibility of deeper causations which lie in a unifying dynamism. Yet surely such a point of view is not excluded. It is even partially urged in the writer's insistence upon a hospitality both to the theory of diffusion of cultural activities and products and that of their scattered spontaneous origin. How can either be denied in the genuine consideration of the identity of interests and needs belonging to the human being wherever found which is however influenced and differently modified by differing environments? And then, again, these modified products are interchanged, or certain forms of expression are brought to new territories in which nothing like this form has been independently developed. Diffusion is an undeniable fact in human history but in its very nature—never necessarily exclusive of spontaneous development.

Lowie has attempted discussion of many prominent phases or groupings of cultural development. Here in his choice of subjects he gives one that feeling of having taken out of their genetic setting these prominent features. If one reads however between or beneath his lines one feels his own impression of that powerful unity of human development of which he attempts only to set out these special topics to draw interest to the greater background.

With this in mind, we follow with great interest and profit, the discussion of marriage, with its closely related freer sex relations, the savage's expression of the polygamous tendencies of human nature. The family with its peculiar regulations belonging to different groups of people presents various kinship, divisions and customs, which illustrate both the striving for expression and the restraint of unconscious biological needs or cravings. Lowie gives much space to show the various divisions that exist in different parts of the world or even in the same group. These may be based upon age, sex, marriage, relationship, which belong to exogamous rulings, or in such clan divisions which he chooses to name and define as the "sib" groupings. In all this there is testimony both to diffusion and to spontaneous development from internal causes.

The chapters upon various economic, legalistic and governmental aspects of more primitive civilization are instructive in tracing the history of these factors as they precede present day civilization. One is struck by the high grade often attained among those peoples

studied. The closer acquaintance the writer has with certain American tribes brings into prominence some of the features of family relationship, taboos, which come very close to the conflicts still active today, but under strong social repression. These together with the economic and other practical implications make of the material here offered still another of those comparative studies by which psychopathological as well as social problems become more clearly understood.

Mignard-Serieux-Capgras, et-al. PSYCHIATRIE. Vol. I. A. Maloine et Fils. Paris, 1921.

A new Traité de Pathologie Médicale, under the editorship of Sergent, Ribadeau-Dumas & Babonnieaux in thirty volumes, is represented in its seventh volume by this Psychiatry, of which Vol. I has just reached us.

Ritti, who has just died, contributes the first chapter on Symptomatology. It is a very comprehensive one, of over one hundred pages, and is an excellent descriptive account of the accepted and current psychiatric terms.

Chapter II, on Acute Mania, and Chapter III, on Psychasthenia and Obsessions, are by P. Juquelier. His acute mania is a generalized fragment of a number of acute maniacal states, which may or may not be differentiated from other psychotic syndromes. His Psychasthenia and Obsessions is the old familiar Janet conception. M. Durand has written on Melancholia and Periodic Psychoses. Mignard on Confusion Syndromes and the Psychology of Delusional States.

Serieux and Capgras have given the best chapters in the book, although repetitions of their previous work on Chronic Systematized Delusional States. Logre has a chapter on Hysteria, chiefly à la Babinski. A short discussion of the Freudian principles is given. It cannot be said to be comprehensive nor really satisfactory, although the authors state that they find no particular discordance in the conceptions. They claim Janet as its real originator and make some inane remarks about the psychoanalytic procedure.

M. Brissot has a chapter on the Mental State of Epileptics and Mallot, a chapter on the Psychiatry of War.

Thus far the present system may be said to be a fair representation or rather reproduction of the psychiatric ideas of the close of the nineteenth century. There is almost no advance registered, but the chapters are very clear and straightforward and possess that ease of reading so characteristic of the best of French Psychiatry.

JELLIFFE.

Stratton, George Malcolm. THEOPHRASTUS AND THE GREEK PHYSIOLOGICAL PSYCHOLOGY BEFORE ARISTOTLE. London, George Allen and Unwin, Ltd.; New York, The Macmillan Company.

It is good to know Theophrastus. Stratton's introduction to him and then his words, which Stratton gives here both in the original and in translation, turn the reader face about toward the

past with a new interest. One almost involuntarily puts out a hand of comradeship to that vigorous critic of his fellow psychologists of old, that careful investigator and speculator who himself at once turns our psychological attention onward again toward today and tomorrow.

Stratton gives a brief evaluation of Theophrastus's work on the senses, both as a piece of criticism of the empirical psychology of his day and as a revelation of his own principles and results of observation in the field, which show through his critical discussion. Beside presenting these matters in the ancient psychologist's own words Stratton makes these first more intelligible to us in a number of short chapters in which he summarizes Theophrastus's teachings in regard to the senses individually and then he introduces us to his method of criticism while giving us at the same time the substance of it.

One feels that the hammer blow method by which the Greek writer attacks friend and foe alike is one with the alert spirit of his psychology. Time has brought us of course greater amplitude and exactness of knowledge in physics, in physiology and together with these in psychology. It is questionable whether it has very much quickened or sharpened the attention of the observer and the student of phenomena in these spheres. For Theophrastus measures up to the best of us in these respects.

There is a feeling of continuity and of similarity of interest with this student of many centuries ago. Here is a man who stands for simplicity of theory pressed into facts before him. He is contented with nothing less than exactness of proof from actually observed phenomena. His aim is that vital one which discovers the "mutual relation between sense-organ and sense-object" impatient with an isolated study of either. It also finds that relation a purposeful one giving thus to observed psychological factors a place in a functional unity. His psychology is a forerunner of a simply natural pragmatic view of things.

It is all this that gives to his thought that stimulus as of something dealing with living facts, a contact with them, partial and imperfect as it may be, that is a vital touch upon them in the days when scientific psychology is still young. This is continued today if we are still alive to the observation of facts, the simplicity of theory, the carefulness of proof, and withal the relation to actual purposeful living. Because of this never aging spirit of research and thought Theophrastus's writing brings much of fact and conviction that well stands the test of time. Sometimes his statements have to be somewhat denuded of a naïve form of definition and description but they contain many a kernel of truth more thoroughly and surely established as such today. The book under Professor Stratton's helpful presentation is a work of stimulus to the psychologist and of value to one with a more exclusive literary interest.

JELLIFFE

Obituary

ALLAN McLANE HAMILTON

Shortly after his death in November, 1919, current periodicals published the main facts in the life of Hamilton. A particularly sympathetic and human review of him as a man was the one that Charles L. Dana wrote for the Medical Record. All mentioned the books he had written, the discoveries he had made, and the societies to which he belonged or which he had founded.

To one who had the privilege of knowing Hamilton intimately for many years it seems that especial emphasis should be placed on the view which regards him as a man in advance of his times.

He was of the type which thinks of things first. His professional career has left proof of this in his inventions, new explanations, in the organizations he founded or planned, which had for their end the making practicable and available the results of investigation and knowledge.

But his accomplishments, considerable as they were, give little idea of his capacity for accomplishment. He was too versatile, too restless, too eager to start something new. He sowed rather than tilled, and it happened more than once that when the harvest arrived few remembered whose hand scattered the seed. It happens now and again that men pass through the world in a way that their very superior qualities do not win recognition far beyond the circle of their immediate acquaintances; the qualities were not associated together in a combination to make glittering achievement probable, or, and perhaps more frequently, their particular opportunity, their hour, never came.

Hamilton was primarily a man of ideas, but only a few of them found appropriate outlet.

He was the grandson of the man who many believe to have possessed the most original mind ever concerned in the direction of our national affairs. The mantle of Alexander did not fall upon Allan, but the psychological relationship between the two is unmistakable.

PEARCE BAILEY

HYMAN CLIMENKO

HYMAN CLIMENKO, M.D., 1873–1920

Hyman Climenko was born in Russia. He received his preliminary education in that country, having attended the Gymnasium, or secondary school, up to the time he emigrated to America in 1890. Economic necessity forced him to discontinue his studies for a time but he subsequently resumed them and finally entered Long Island Medical College in 1900, having been graduated from that institution in 1904. After a period of training at the Montefiore Home he went into general practice, but kept up his neurological studies by associating himself with Dr. Joseph Collins at the Post-Graduate Hospital and later at the Neurological Institute. Many years ago he was appointed adjunct visiting neurologist to the Montefiore Home and Hospital, later chief of clinic at the Mt. Sinai Dispensary, and, a short time before his death, was made adjunct neurologist to the Mt. Sinai Hospital and full visiting to the Montefiore. He was a member of numerous medical societies, among them the New York Academy of Medicine and the New York Neurological Society, and two days before his death, was elected chairman of the Section of Neurology and Psychiatry of the Academy of Medicine.

Dr. Climenko was an able clinician and a very capable neurologist. He was rapidly rising when his untimely death put an end to the fond hopes of his friends and to his own aspirations. Since 1908 and up to recently he contributed about forty papers on neurological subjects. A short list of titles includes Anterior Poliomyelitis, Familial Optic Neuritis, several papers on Tumors of the Brain and Cord, Dystonia Musculorum, Infantilism, Syringomyelia and Leprous Neuritis, Corpus Luteum in Neurological Practice, Lethargic Encephalitis, etc. His work combined scholarship with accuracy of observation. It is a tribute to his native ability and to his tenacity of purpose to have attained his position in the field of neurology despite numerous difficulties and the drawback of having had to master a new language.

As a man Hyman Climenko was extremely likable. He was a true and devoted friend, literally had no enemies, and was ever kind and considerate of the feelings of others. He was essentially modest, so that he never made a strong first impression, but closer acquaintance quickly revealed his sterling qualities. Besides his medical activities Hyman Climenko showed great interest and took active part in liberal social and literary movements. He is survived by his wife and five children.

I. S. Wechsler

ANTOINE RITTI

Dr. Antoine Ritti was one of the last of the famous alienists who towards the close of the nineteenth century placed mental medicine on its pinnacle. While he was still very young he was fortunate enough to be closely associated with some of the great minds of that period and brought down to our time the tradition of their work. It is probably because these traditions were so strongly impressed upon him that he in recent years was opposed to the psychiatric renovation attempted.

Ritti was born in Strasbourg in 1844 and at an early age cast in his lot with the students of mental diseases. He was an interne at the insane asylum at Fains [Meuse] for three years and then went to Paris to complete his studies. It was there that in 1874 he presented his thesis on the physiologic theory of hallucination. Baillarger, whose work had lain along these lines, sought his cooperation and Ritti became assistant at the Maison de Santé Esquirol of which Baillarger was the head. The next year he was admitted to the *Société Medico-psychologique* and shortly thereafter became secretary of the annual meetings.

In the years thereafter he mounted steadily from one important post to the other. From that of associate inspector of asylums he became after a few years time Baillarger's successor in the editorship of the *Annales medico-psychologiques*. His published work was of infinite variety, contributions to Dechambre's dictionary and notably his *Traité clinique de la folie à double forme*. As secretary of the society Ritti pronounced the final resolutions at the funeral services of many of his noted colleagues. On the fiftieth anniversary of the founding of the society these memoirs were published and serve as a vivid picture of the progress of psychiatry during the last half of the nineteenth century.

Through the initiative of Dr. Ritti, an annual congress of alienists of French speaking countries was created in 1889, and shortly after that date neurologists were admitted. These annual meetings continued without interruption until the war. Here Ritti communicated at the Bordeaux session an important work on the psychoses of old age, and as president at the Toulouse session, spoke in eulogy of the two founders of mental medicine, Pinel and Esquirol, both of whom began their studies at the medical school in that city.

SMITH ELY JELLIFFE

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Original Articles

THE MECHANISM OF REFERRED PAIN, HYPERALGESIA (CAUSALGIA) AND OF ALCOHOLIC INJECTIONS FOR THE RELIEF OF NEURALGIA

By Joseph Byrne, M.D., M.R.C.S., F.A.C.P.

PROFESSOR OF NEUROLOGY, FORDHAM UNIVERSITY SCHOOL OF MEDICINE, NEW YORK

This communication presents in condensed form some of the main arguments and conclusions derived from clinical and experimental studies covering a period of many years.

Definition

Functional or anatomical interruption of the afferent system of pathways and more especially of those in the peripheral nerves is frequently associated with more or less persistent pain and tenderness which are *referred* to the area of distribution of the injured pathways. The present communication concerns itself with this form of pain and tenderness as opposed to the *reflected* variety in which disturbances of the viscera are associated with pain and hyperalgesia in certain somatic areas whose sensory nerve supply is derived directly from the cerebro-spinal system.

Author's Theory of the Mechanism of Pain

In a previous contribution (1) the author has outlined his theory of the Mechanism of Pain. From periphery to brain two separate systems of afferent paths serve the purposes of sensation, viz., (1) the *affective* and (2) the *critical*. Under ordinary conditions of contact with our environment and in the methods commonly em-

ployed for testing sensibility, usually many different types of receptor mechanisms are simultaneously activated. Thus in testing with a pin-point it may be possible to differentiate introspectively between at least three distinct elements viz., *touch*, *hurt* and *sharpness* (pointedness). Similarly in testing for heat (45° C. and over) or cold (below 20° C.) it is possible to distinguish between the elements of *touch*, *hurt*, and *heat* (warmth) or *cold* as the case may be. In normal conditions, therefore, all forms of stimuli make appeal to both affective and critical elements but the forms clinically characterized as *affective stimuli* are pain and degrees and heat and cold somewhat removed from the neutral or skin temperature (about 34° C.) whilst the forms of stimuli characterized as *critical* are those which predominantly imply analysis and comparison such as touch and its localization, degrees of heat and cold ranging about the neutral point, e.g., 25° to 27° C. and 37° to 39° C., compass points simultaneously and consecutively applied, size, shape, weight, posture and passive movement, etc. The affective system mediates the hurt, pleasurable, or "change of state" elements in affective stimuli, whilst the critical system mediates the purely critical or intellectual elements in critical stimuli. For clinical purposes each of these systems is subdivided by the author into a superficial and a deep set of pathways depending on whether the stimulus used makes appeal to receptor mechanisms that are superficially or deeply situated. In testing sensory function there are therefore four sets of afferent pathways to be kept in mind, viz.:

(1) The *superficial critical* (light touch, compass points simultaneously applied, heat at 37°–39° C., cold at 25°–27° C., the specific element in hot and cold stimuli of all degrees upon momentary, superficial contact).

(2) The *superficial affective* (the hurt or pleasure elements of prick, of heat at 45° C. and above, and of cold below 20° C., etc.).

(3) The *deep critical* (pressure-touch and its localization, size, weight, shape, posture and passive movement, some elements of vibration, etc.).

(4) The *deep affective* (pressure-pain, extremes of heat (55°–60° C.) and of cold (ice) in massive, more or less prolonged application).

Notwithstanding an apparent community of function at the periphery, the affective and critical pathways are anatomically and functionally separate throughout their whole course until the optic thalamus is reached and here in the "essential organ" postulated by Head and Holmes (2) the affective elements for the most part

enter into consciousness, whereas the critical elements pass onward to the cerebral cortex. In the thalamus the critical system, by means of collaterals or main stems, impinges for the first time upon the affective system controlling this latter in the interests of cognitive or reasoned methods of protection, i.e., of methods based upon analysis, judgment, etc., as contrasted with the more primitive thalamic method of withdrawal or running away from consciously painful though poorly localized and obscurely appreciated stimuli; or the still more primitive method of the isolated (transected) spinal cord, viz., withdrawal by reflex shortening (flexion reflex) from *noxious* though *not consciously* perceived painful stimuli. The existence of each of these systems as separate entities is readily seen in thalamic lesions as well as in the regeneration period after nerve section and suture and has also been established by the author for the spinal cord and brain-stem as shown by the characteristic dissociation of sensibility encountered in lesions at these levels (1). The mechanism of this dissociation hinges upon the fact that the older affective system is more resistant to the effects of pressure, toxins, etc., than the newer critical system and continues to function, with certain peculiar characteristics, when injured or when the controlling critical system has ceased to function or functions imperfectly. After nerve section and suture, at a certain stage of recovery, affective stimuli such as pricking, heat or cold evoke mainly the pain, hurt or unpleasant element. The sensation experienced widely radiates from the point of application of the stimulus; is out of all proportion to the strength of the stimulus and the patient cannot well locate the point stimulated nor appreciate the nature of the stimulus. This is a typical illustration of *pure affective sensibility* ("protopathic" of Head) with its over-reaction, radiation, reference and impaired ability to name the stimulus. As recovery progresses and function becomes restored for the critical elements, the more or less pure type of affective sensibility loses, for moderate degrees of stimulation, the characteristics just mentioned; the point of stimulation can be once more located accurately, the sensation is confined to the area stimulated, the nature of the stimulus can be well recognized and, within certain degreees of stimulation, the reaction is in proportion to the strength of the stimulus and is under the control of the will of the subject. In the condition just described and indeed in all painful conditions of "physical" origin the dynamic factor immediately responsible for the pain and tenderness is *located in the neurone bodies of the dorsal root ganglia* since section of the peripheral nerves, e.g., in

trifacial neuralgia, does not necessarily afford relief whilst section of the pain paths at any level proximal to the dorsal root ganglia gives permanent relief. Injury of a nerve-trunk, e.g., by compression, does two things, viz., (1) it more or less completely interrupts functional or anatomical continuity in the critical system, thereby releasing the affective system from certain inhibiting influences exerted normally upon it by the critical system and (2) it partially interrupts functional or anatomical continuity in the affective system, thereby stimulating the latter to reactionary phenomena in the interests of repair and restoration of function. Each of these factors leads to metabolic hyperfunctioning on the part of the affective or pain bearing neurones which represents the natural biological response to (1) direct injury and to (2) removal of the control exerted normally by the critical system. At first the hyperfunctioning concerns itself with anatomical restoration of the parts damaged but later on, if the obstacles to restoration of the critical system prove insurmountable the hypermetabolism of the affective neurones persists and the excess of energy developed incidental to it, no longer concerning itself with the more primitive embryonic function of growth and repair, becomes diverted to the more highly specialized function of preparing the materials necessary for the elaboration and discharge of nerve impulses (kinetoplasm). In this way within the surviving portion of the damaged affective neurones neural energy is accumulated and stored to a degree that markedly facilitates spontaneous or readily elicited discharge, with a consequent rush brainward of impulses that are the immediate cause of pathological pain and tenderness.

The accompanying diagram sets forth the relations of the critical and affective systems from the periphery to the cerebral cortex and shows pictorially why it is that single lesions within the cord are most usually associated with critical dissociation: *A*, area at periphery supplied by both the affective (broken line) and the critical (unbroken line) systems; *B*, a dorsal root ganglion; *C*, region of the central canal; *D*, optic thalamus; *E*, mesial nucleus made to represent in the diagram the "essential organ" postulated by Head and Holmes; *F*, cerebral cortex; *G*, lateral nucleus; *H*, posterior nucleus. Lesions such as represented at I, II, VI and VIII can cause protopathic dissociation, i.e., suppression, partial or complete, of the critical elements, the affective element (hurt) being retained with over-reaction, radiation, etc. Single lesions within the cord such as represented at III, IV and XIII cannot readily cause protopathic dissociation because of the two pathways open at

these levels to critical impulses coming in from area *A*, viz., homolateral in the posterior funiculus, and contra-lateral in the mesial spinal lemniscus.

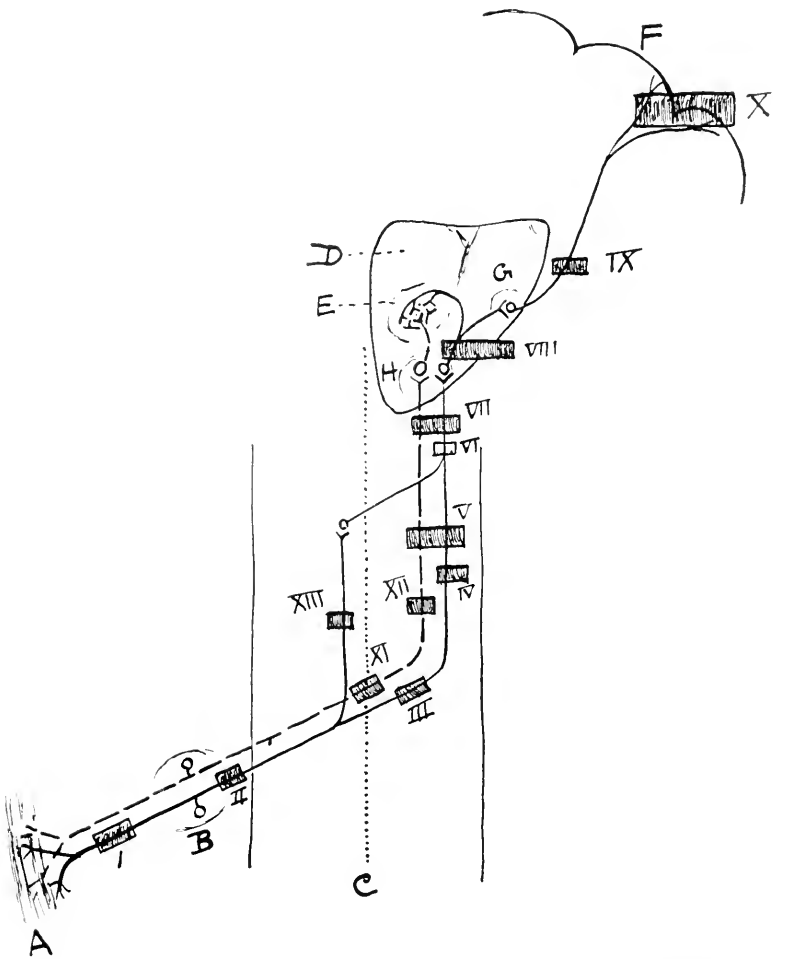

FIG. 1. Diagram showing the relations of the critical and affective systems of afferent pathways and the forms of dissociation which lesions at various levels may cause. For explanation see text.

Lesions within the cord such as represented at XI (in the central grey matter) and XII (in the lateral spinal lemniscus) can readily cause critical dissociation, i.e., suppression of the affective elements, the critical elements being slightly if at all affected. This is the type of dissociation normally found in syringo-myelia and in intra-medullary tumors where these latter are small and do not impinge upon

neighboring posterior nerve roots situated cephalad of the main block in the affective pathway. Lesions such as represented at IX (in the internal capsule) and X (in the cerebral cortex) can only cause impairment or loss of the critical elements without inducing true protopathic characteristics in the retained affective elements. Lesion VIII is the one usually associated with the sensory changes found in the thalamic syndrome. Lesions such as represented at VII abolish both the critical and affective elements.

Degenerative and Regenerative Changes in Injured Sensory Neurones

Since the introduction of Ranson's (3) pyridine modification of Cajal's silver stain it is now known that the unmyelinated far outnumber the myelinated fibres in the peripheral nerves. It is further more or less generally accepted that the unmyelinated fibres conduct the pain-bearing impulses (affective system) and that the axones of these fibres take origin from the small as opposed to the larger types of neurone bodies found in the dorsal root ganglia. The larger neurone bodies give origin to the axones of the myelinated fibres which are believed to mediate the critical elements (critical system). Injury of a nerve trunk, such as section, depending on the distance from the neurone body, may cause: (1) Complete degeneration and disappearance especially of the smaller neurone bodies or axonal reaction, i.e., impaired staining of the cytoplasm and chromatolysis with swelling distortion and lateral displacement of the nucleus; (2) In the proximal stump at the site of injury may be seen degenerative changes for a short distance from the cut end and regenerative changes consisting chiefly of an outgrowth of lateral branches from myelinated and unmyelinated axones. These branches divide and subdivide dichotomously until one branch gives rise to as many as fifty branchlets which run in all directions. Only some of these branches under the chemiotactic influence of the distal stump grow downward and penetrate the scar. Many of the branches are tipped with small, hollow bulbs containing a network of neurofibrils. These bulbs are regarded as indications of growth since similar bulbs are seen in the developing axones of embryos (Cajal) (4). The resistance offered by the scar prevents the downward growth of many branches which turn back and keep on dividing and subdividing (3). In the distal stump Wallerian degeneration takes place, the myelin coat and the axone undergoing disintegration and absorption. When the degenerative

process has reached its height the nuclei of the neurolemma sheath, in the myelinated and unmyelinated axones, begin to multiply and at the same time the protoplasm increases. This in time gives rise to the nucleated protoplasmic bands of Büngner (5) which replace the degenerated fibre and later become hollowed out to receive the axone branches which grow outward from the proximal stump. Many believe with Bethe (6) that new axones are developed *in situ* from these protoplasmic bands but the great weight of evidence seems to favor outgrowth from the proximal stump as the essential genetic source of the newly forming axones. In our own experiments section of the sciatic nerve as well as injections of alcohol into the nerve caused intense axonal reaction; phenomena which preponderately, though not exclusively, involved the smaller neurone bodies. Injections of 80 per cent. alcohol caused marked paralysis of the limb and intense axonal phenomena as well as interstitial

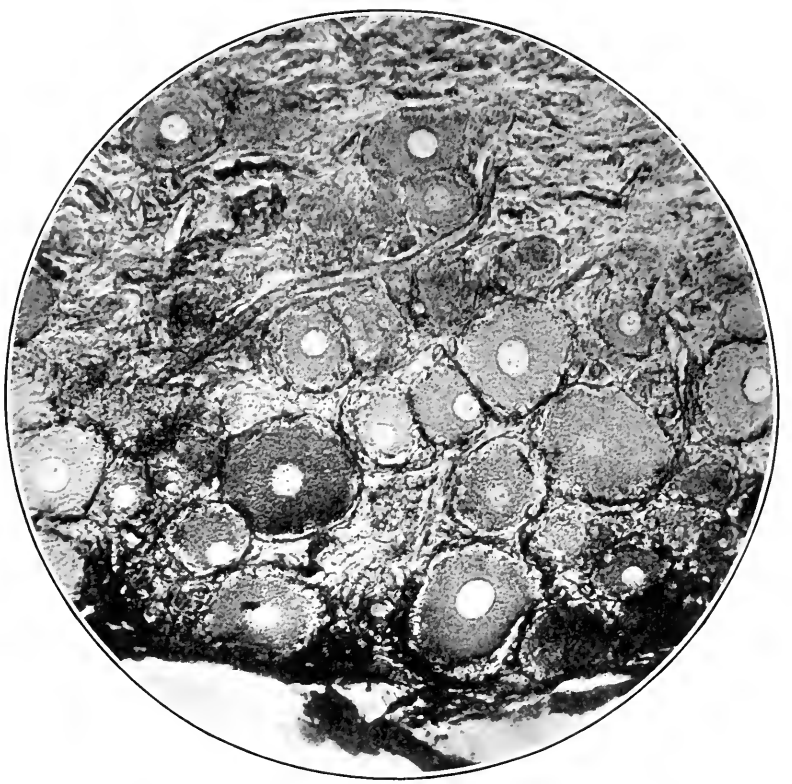

FIG. 2. Right posterior spinal ganglion S1, showing axonal reaction phenomena 12 days after ligature of the right sciatic nerve. Cajal's uranoformol silver method.

FIG. 3. Left posterior spinal ganglion S1, showing axonal reaction phenomena 12 days after injecting the left sciatic nerve with 60 per cent. alcohol. Cajal's urano-formol silver method.

changes within the related ganglia. Injections of 60 per cent. alcohol, especially when made just under the sheath and not too deeply into the nerve, only caused transitory and almost imperceptible disturbances of motor function, but at the same time caused marked axonal reaction phenomena. These facts have important clinical siginficance. After excision of half an inch or more of the sciatic nerve the outgrowing branches usually made little headway into the newly forming scar in contrast to the headway made presumably under the chemiotactic or other favoring influence exerted by the distal stump where the ends of the divided nerve had been united by suture. It was found that the neuroma of regeneration which forms usually just above the cut end of the proximal stump, and which for the most part is made up of tangled skeins of neurofibrillar plexu-es with recurrent axone branches, could be influenced

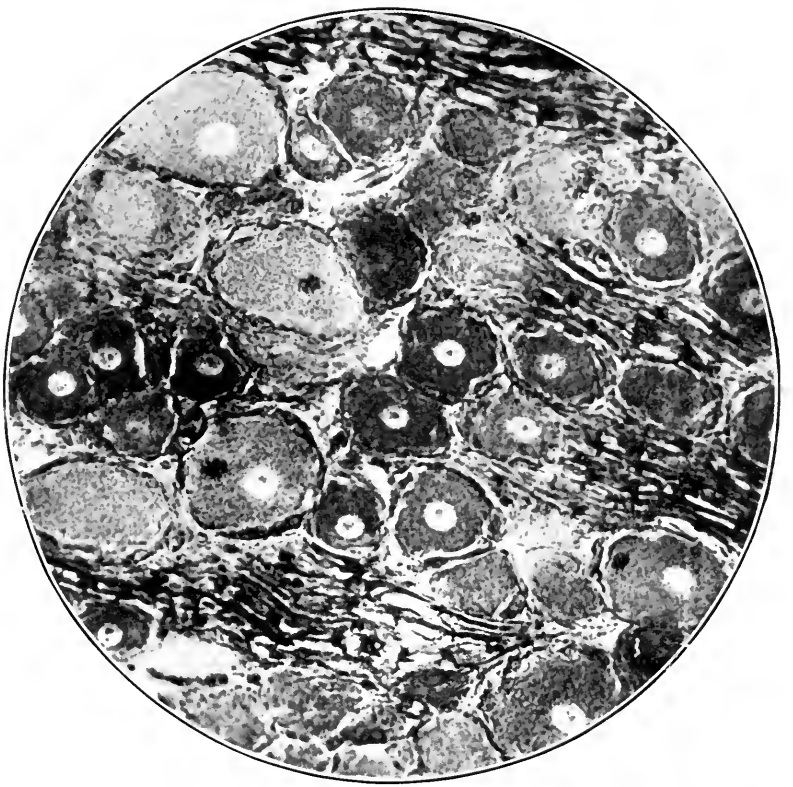

FIG. 4. Left posterior spinal ganglion LVII, showing well marked axonal reaction phenomena 46 days after injecting the right sciatic nerve with 60 per cent. acohol. Cajal's urano-formol silver method.

as regards the site of its formation. In one case where the nerve had been stretched and the sheath ligated the neuroma formed 1½ inches above the point of section. This fact is also of clinical significance.

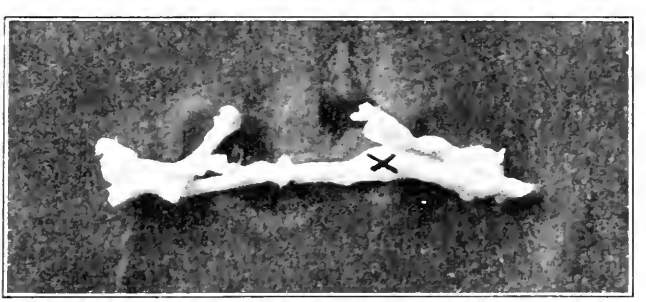

FIG. 5. Neuroma at *x*, on promixal stump of the divided sciatic nerve, some distance from the site of the lesion.

Mechanism of Referred Pains and Hyperalgesia (Causalgia)

As already stated every portion of the periphery is supplied by independent pathways derived from the critical as well as from the affective system. Lesions in any part of the superficial or deep set of critical pathways, from the periphery to and including the thalamus, may cause impairment of the control exerted upon the corresponding portion of the affective system, and may result in the neurones of this latter system taking on functional hyperactivity (hypermetabolism) with consequent excessive elaboration and storage of neural energy or of the materials from which specific neural energy (nerve impulses) is immediately derived (kinetoplasm). As a consequence of these altered metabolic conditions the affective neurones may discharge impulses brainward (*a*) spontaneously or (*b*) upon the slightest stimulation at the periphery. In the former event there results spontaneous pain, which is referred to the area of distribution of the particular neurones involved. In the latter event the parts supplied by the hyperfunctioning affective neurones become hyperalgesic. Where the lesion occurs in the peripheral nerves many pathways of both systems are usually involved. In such cases the involvement of the affective system stirs the damaged affective neurones to still greater hyperactivity. This is the mechanism in refractory cases of causalgia. Progressive lesions, e.g., compression in the caudal region of the thalamus or anywhere below the thalamus but proximal to the dorsal root ganglia tend, sooner or later, to block or interrupt the affective pathways. In such cases at certain stages of the compression typical dissociated sensibility with its concomitant pain and tenderness is always to be found. Thus in extra-medullary tumors of the cord, as the author has shown (1) typical referred pains and hyperalgesia as the result of *cord and not merely of root-pressure*, may be present in the early stages. These, as the compression increases, may disappear only to return, with marked intensity for a time, after successful removal of the tumor. Certain lesions in the ventro-lateral aspect of the thalamus are an exception to the rule just stated since such lesions may almost completely interrupt the critical pathways whilst interfering but little with the affective system. Such lesions, viz., in the ventro-lateral area of the thalamus, may cause typical dissociation phenomena with pain and tenderness (hyperalgesia) which may last for years. In syringo-myelia the dissociation phenomena are the reverse of those just mentioned. In this condition the affective system is primarily attacked the lesions in the vicinity

of the central canal interrupting at an early date the affective pathways as they cross in the central grey matter on their way to the thalamus whilst the critical pathways passing by different routes escape and continue to function more or less perfectly. Hence in syringo-myelia, although the lesion may cause hypermetabolism in

FIG. 6. Hyperalgesia of the sole following callus pressure upon the tibial nerve. The dotted line bounds the area of marked impairment for superficial critical sensibility, affective sensibility being retained with over-reaction, etc. The dotted circle bounds an area of extreme hyperalgesia. As the callus hardened and contracted the condition cleared up.

the affective neurone bodies of the dorsal root ganglia, pain and tenderness are usually not a feature because the affective pathways are interrupted in the cord. And the same is true of intra-medullary neoplasms where these do not compress or involve the posterior nerve roots. It is well to understand that the reference of a pain to the area of distribution of the affected pathways is a function of the critical system (localization) and as such is a matter of empirical knowledge or education from experience. As a matter of fact all pain no matter how caused is referred pain in the sense in which the term is used in this paper. The affective system when it

functions alone as in pure thalamic dissociation has little or no localizing power. It is only the critical system that confers localization and no matter what the site of injury or stimulation may be at the periphery, the *localization* or *reference* of the sensation experienced depends only in part upon the immediate inflow of afferent critical impulses and to a great extent upon the stored records of previous experiences acquired through impulses that had reached the cerebral cortex over the critical system. This was well shown in the case of a young officer the divisions of whose median nerve had been severed in the palm. At operation the surgeon by mistake sutured the proximal stump of the branch that supplies the palmar aspect of the thumb to the distal stump of the branch that runs to the middle finger with the result that now when the middle finger is pricked the pain is felt in the thumb.

Illustrative Cases

(1) Typical *causalgia* was caused in a boy by callus pressure upon the tibial nerve following fracture of the tibia in the upper third of the leg. Typical sensory dissociation was found over the sole where sensibility for superficial critical stimuli was markedly impaired whilst that for superficial affective stimuli showed variable threshold with marked over-reaction, wide radiation and inability, or markedly impaired ability, to name the stimulus. For many months owing to the extreme tenderness of the foot the patient could not endure the slightest touch on the sole although he got around fairly well with his shoes and stockings on. In this case the superficial critical and effective systems were both involved with consequent over functioning of some of the superficial affective neurones.

(2) Typical causalgia appeared in the area of distribution of the median nerve *seven days* after a strand of this nerve had been split off and cut transversely at the elbow and the proximal stump sutured to the distal stump of the ulnar, a stretch of this latter extending from the axilla to the elbow having been excised because of several large neuromata that dangled from the nerve. When the causalgia appeared, examination showed that sensibility for superficial critical stimuli over the hyperalgesic areas was markedly impaired whilst that for superficial affective stimuli showed the usual over-reaction, radiation, poor localization and impaired ability to name the stimulus. The hyperalgesia passed off spontaneously in the course of a few weeks. (Chart I.) In this case involvement of

both the affective and critical systems contributed to the hyperfunctioning of the affective neurones. The period of incubation, during which there was neither pain nor tenderness, was noteworthy and is to be attributed to the cessation of *specific functioning* on the

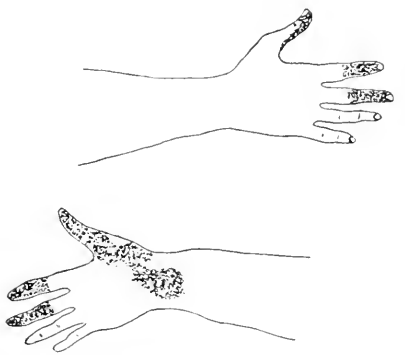

CHART 1. Hyperalgesia following operative trauma of the median nerve at the elbow. Shaded areas were hyperalgesic and at the same time dulled for superficial critical stimuli. Case 2.

part of the affective neurones. As specific functioning represents the most recent and highly specialized endowment of the affective neurones it is the first to sink into abeyance following severe injury of the axone processes and in such conditions shows a tendency to remain in abeyance whilst the neurone is taken up with the more primitive embryonic function serving growth and repair. It is well known that during the first day or so after section of a nerve-trunk abortive attempts at repair are made by the axones, myelinated and unmyelinated, in both the proximal and distal stumps. These attempts at repair cease after a day or so when the newly formed lateral branches undergo degeneration. It is only after all these things have happened occupying the space of some days that the neurone bodies begin to show the marked histological changes characteristic of the well known axonal reaction phenomena which are to be regarded as evidence of suspended functional activity of the neurone. In the light of these facts it may be safely concluded that the incubation period of pain and tenderness which immediately follows severe injuries such as rupture, division, etc., of nerve trunks is the result of suspension, on the part of the impaired affective neurones, of that specific *functional activity* which concerns itself chiefly with the elaboration and discharge of nerve impulses as opposed to the more primitive activities concerned in the growth and repair of the injured axone processes and their coverings. It is noteworthy

that in the case under discussion the large and *constantly growing neuromata* although they caused a fair degree of motor and sensory impairment in the ulnar nerve were nevertheless unattended by pain or tenderness either in the neuromata themselves or in the ulnar area of distribution. This is significant since it gives support to the view just expressed, viz.: that whilst the energy of the hyperfunctioning injured neurones is concentrated upon processes of growth and repair specific functioning (discharge of pain bearing impulses) may be in abeyance.

(4) Referred pains of excruciating character resulted from a stab wound which severed cleanly the ramus superficialis of the radial nerve in the forearm. Following the injury no pain was experienced for fourteen days, when pains referred to the area of distribution of the radial nerve in the hand set in and tortured the patient for over seven years. At operation Dr. A. S. Taylor found a small neuroma of the "size of a filbert" on the proximal stump 5 mm. from the cut end. The neuroma caused a fusiform enlargement of the whole substance of the nerve. In this case the period of incubation and the development of the referred pains were noteworthy. But perhaps the most interesting feature was the restricted growth of the tumor taken in connection with the early appearance of the severe pains. After nerve division, where the divided ends are kept apart, the out-budding bulb-tipped branches of the proximal stump usually make but little headway towards the scar and the majority of those that reach it turn backwards and continue to grow and divide, spreading laterally and backwards within their coverings. These branches after a time lose their bulbed endings which are the index of progressive growth and since many of them before ceasing to grow had made their way into the endoneurium it may be safely concluded that in this situation some of them took on specific function by developing newly formed receptor mechanisms or by effecting connections with already existing receptor mechanisms in the endo- and perineurium. In this way provision is made for the ready initiation of nerve impulses since, in the experience of physiologists, the axone processes themselves are notoriously inferior to the specialized receptor mechanisms in this respect. Another and further important provision is made, viz., for the closing of the neural circuit by "grounding" the nerve current in the connective tissues of the body. This may be regarded as mere supposition but in the event that conduction of the nerve impulse should ultimately prove to be a process similar to the con-

duction of ordinary electricity the closing of the circuit might be a *sine qua non* of nerve conduction. Compare the grounding of the wires in commercial electrical systems where the earth is used to close the circuit.

(5) In a case in which the ulnar nerve had been severely contused several months previously just below the elbow, a small, tender swelling was readily palpable at the site of injury. Ulnar nerve function, motor and sensory, was markedly impaired, although it was the pain that drove the patient to the surgeon. At operation Dr. A. S. Taylor found the swelling to consist mainly of thickened nerve coverings and more especially of thickened endo- and perineurium. The nerve distal to the swelling was in a marked state of Wallerian degeneration. By careful dissection the thickened connective tissue elements were removed with the minimum of injury and manipulation. Relief from pain was immediate and recovery of function in the injured nerve rapid and complete. The significant point in this case was the extreme growth of connective tissue between (endoneurium) and around (perineurium) the nerve bundles.

Effects of Nerve Traumatization.—Where a stretch of nerve trunk is crushed it must be remembered that not only are the coverings of the nerve trunk and the nerve bundles injured but also many small nerves in the tissues immediately surrounding the nerve trunk. Injury of these nerves sets up, among other things, marked chemiotactic attraction for the lateral branches growing downward from the axones of the nerve trunk above the site of injury. The net result of such an injury would be that, in its ultimate totality the attraction for the outgrowing axonal branches of the proximal portion of the nerve trunk would be greater in a lateral and backward direction than in the direction of the distal degenerated portion of the nerve trunk. Under these circumstances the number of outgrowing axone branches destined to reach the distal portion of the injured stretch of nerve would be few or none and the branches furnished with vitality enough to work their way down through the proximal portion of the scar would encounter great resistance only to find the distal portion of the scar, by the time they reached it, so well organized that it could be penetrated only by the most favorably endowed of the affective neurones and not at all, or only to a very slight extent, by the neurones of the critical system. Compare the difficulty with which the budding axone branches penetrate the scar in cases in which a portion of the sciatic has been excised and the cut ends left unsutured, and the ease with which the axone

branches pass into the distal stump where the nerve has been properly sutured. The author believes that the early outgrowth of axone branches into the newly forming scar modifies the connective tissue elements in such a way that they remain in a more or less embryonal state, i.e., pervious to the out-budding axones, and do not take on the characters of fully developed scar tissue. This view gives meaning and purpose to the phenomena of the abortive regeneration seen on the first day or so after nerve section. The lateral branches that penetrate the region of the newly forming scar notwithstanding their disappearance from the histological picture have, by the products of their degeneration, a marked biochemical influence upon the growing connective tissue elements. Compare the tubulization of the nucleated protoplasmic bands in the peripheral stump after nerve section and the relation this bears to the degenerating axonal processes. Compare further the development of typical miliary tubercles that follows local injections of emulsions of dead tubercle bacilli as demonstrated by T. Mitchell Prudden.

Injuries of nerve trunks as the result of extensive contusion or over-stretching, e.g., injuries of the brachial plexus incidental to dislocations of the shoulder, or lateral hyperextension of the neck, are among the most formidable from the point of view of causing intractable pain. Because of the extensive sclerosis that ensues, such injuries present much greater difficulties from the standpoint of surgical treatment than simple division or limited contusion of a nerve trunk.

Stump Neuromata.—Temporary referred pains occurring after amputations are often the result of previous infection, suppurative or non-suppurative, the toxins, etc., having directly affected the *neurone bodies* of the spinal ganglia after having travelled upward through the lymphatics of the nerve trunk as shown by Orr and Rows (7) or indirectly by acting injuriously upon the axone processes at the site of infection. Other sources of the referred pains are the familiar *stump neuromata* which are often actually the result of the surgeon's over anxiety to prevent them by injudicious clamping, overstretching or otherwise abusing the nerve in his attempts to cut it off short. *Every locus of injury in the course of a nerve that is to remain connected with the central nervous system becomes a possible source of initiation and perpetuation of that hyperactivity in the injured, affective neurones which is the immediate cause of pain and tenderness.* The lesson here is for the surgeon at all times to keep tissue-, and more especially nerve-

traumatization at the minimum and for the internist to insist on the early and complete removal of all possible foci of infection.

Injections of 80 per cent. alcohol into the sciatic nerve, as our own experimental studies show, cause marked and enduring paralysis and axonal reaction phenomena in the related sensory neurone bodies. When alcohol of 60 per cent. was used, although the motor disturbances were slight and transitory the neurone bodies in the spinal ganglia showed well-marked axonal reaction phenomena indicating, at the very least, cessation of specific functional activity. Such cessation of functional activity in the affective neurones represents the *modus operandi* of alcoholic and other injections practised for the relief of neuralgia and allied affections. It should be noted that if motor paralysis is to be avoided the solution of alcohol should not exceed 60 per cent. in strength and should be injected, where this is possible, by open operation just under the nerve sheath.

In *causalgia* due to nerve injury injections into the nerve distal to the site of the essential lesion are of no avail whereas injections, e.g., of 2 to 4 c.c. under the sheath of the sciatic nerve as suggested by the French surgeon Sicard, *proximal* to *the causative* lesion may give lasting relief. Stripping the arteries of their adventitia has been practised for the relief of causalgia. The temporary success that occasionally attends such a procedure is due to axonal reaction in the related neurone bodies in the spinal ganglia effected through fibres that left the nerve trunk *proximal* to the site of injury. In fifth nerve neuralgia associated with, e.g., an infected tooth, the causative agent is the *focus of infection* from which the toxins issue to damage the neurones at the site of infection or, by lymphatic conduction at higher levels, e.g., in the spinal ganglia. With removal of the offending tooth or other focus of infection the pain may disappear at once, althought it often remains for a time owing to persistence of the hyper-functioning of the affective neurones which, to the author, seems closely analogous in many respects to allergic or even anaphylactic phenomena.

Alcoholic Polyneuritis.—In polyneuritis, e.g., of alcoholic origin, the peripheral neurones in the totality of their extent are exposed to the deleterious influence of the alcohol circulating within the system the result being that the neurone bodies exhibit phenomena identical with axonal reaction phenomena and for a time lose all specific function. In typical polyneuritis occurring in a bartender, just after the onset and whilst the patient was still bibbling, the characteristic tenderness of the calves did not appear until the patient had completely stopped taking alcohol for some days, when the

tenderness appeared and the case, after a typical course, went on to recovery.

Here we have clinical evidence of a condition in the affective neurones that closely corresponds to the *incubation period* of pain and tenderness seen after nerve-trunk injury. This condition like the incubation period following nerve-injury is evidently due to suspension of functional activity as the result, or concomitant, of axonal reaction phenomena in the neurone bodies of the spinal ganglia. In a case of sciatica which the physician had attempted to relieve by injection of 80 per cent. alcohol into the nerve, paralysis of the flexors of the foot ensued. For seven days after the injection there was complete relief from pain but soon afterwards the sole of the foot became exquisitely tender. Examination showed that superficial critical sensibility was markedly impaired chiefly over the skin distribution of the tibial nerve whilst over the same area, and more particularly in certain small areas within the larger area, affective stimulation was attended by over-reaction, radiation and impaired ability to name the stimulus. (Chart 2.) Here again is

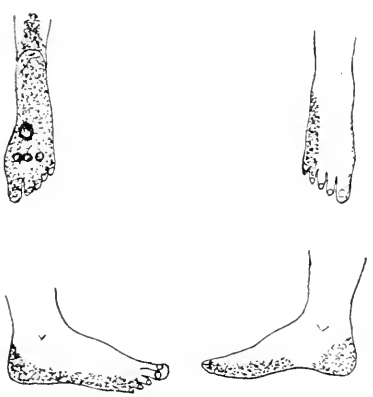

CHART 2. Hyperalgesia following injection of 80 per cent. alcohol into the sciatic nerve. Shaded area hyperalgesic and at the same time markedly dulled for superficial critical stimuli. Circles on sole indicate site of spontaneous pain and of maximal sensitiveness for superficial affective stimuli.

evidence of occurrences closely simulating those studied by us clinically and histologically after alcoholic injections into the sciatic nerve. This case shows that alcoholic injections into nerve trunks must not be undertaken too lightly for the relief of pain, especially where there is a possibility of motor involvement.

Postural Trauma and Fatigue as Factors in Neuritis.—The

effect of fatigue and functional over-strain upon the neurone bodies have been studied by Hodge (8), Vas (9), Mann (19) and others. The phenomena observed closely resemble what we have seen in our own experiments after injury of the sciatic nerve. In the light of these findings it is easily understood how fatigue and exhaustion of any particular set of neurones in the central and peripheral nervous system may be a controlling factor in determining toxic neuritis in the over-worked neurones. Thus in an ice-man, accustomed to handle heavy blocks of ice a typical alcoholic neuritis developed which was confined to both brachial plexuses. Similarly a munition worker who had to use his right hand in such a way that the muscles supplied by the radial nerve were constantly overworked, developed neuritis of the radial nerve from absorption, through the skin of his right hand, of metallic mercury. Occupation traumatization of the nerve trunks as well as trauma incidental to chilling exposure, etc., and to faulty posture in sitting, standing and even in lying in bed, are often determining factors of neuralgia and neuritis, the immediate exciting cause of which may be endogenous or exogenous toxins.

Conclusions

(1) All pain, whatever be the cause, is in reality *referred* pain.

(2) The great causative factors in referred pain are (1) *mechanical trauma* such as contusion, over-stretching, compression, and (2) *infection*, the mechanism essentially consisting of the resulting hyperfunctioning of the related affective neurones as set forth in the text.

(3) The incubation period, during which pain and tenderness are absent for some time following severe injuries of nerve trunks, is the result of axonal reaction in the related neurone bodies of the spinal ganglia with consequent cessation of specific function.

(4) Alcoholic and other injections into the nerve trunks for the relief of neuralgic pains act by inducing axonal reaction phenomena and suspension of specific function in the related affective neurone bodies in the spinal ganglia.

(5) In all operative procedures, crushing, stretching or otherwise injuring portions of nerves that are to remain connected with the spinal cord, should be scrupulously avoided as these are great factors in the causation of interstitial neuritis, neuromata and other conditions well known to be vital sources of referred pain.

(6) In assessing the value of etiological factors, with a view to therapy in neuralgia and neuritis, due weight must be attached to

occupational and postural trauma of the nerves, muscles, tendons and ligaments as well as to exposure and faulty function from whatever cause.

(7) In the investigation of painful conditions the afferent pathways from the periphery to the thalamus must be kept in mind and not merely the locus of the pain and tenderness. It is only in this way that the location and *modus operandi* of the causative factors can be appreciated and effectively attacked. Compare the rule laid down some sixty odd years ago by John Hilton of London, in his classical lectures on Rest and Pain.

The author tenders his thanks to Professor G. A. Caballero and Mr. Avery, as well as to Drs. John H. Larkin and Alfred S. Taylor for their valued assistance and kindly encouragement in the work.

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SOME OBSERVATIONS ON CISTERN PUNCTURES

By Henry McCusker, M.D.

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In the serological work at Butler Hospital, puncture of the cisterna magna as a therapeutic measure was begun in 1920. On April 13, 1920, I made the first puncture, and subsequently entered the cistern of nine patients a total of fifty-five times. It is yet too early to report our results of intracistern treatment in neurosyphilis, so I will confine myself in this paper to observations I made in doing these punctures.

Cases

Case I is that of a neurosyphilitic, manic-depressive in type, whose cistern was punctured fifteen times and every time the cistern fluid was replaced by salvarsanized serum. The first two punctures on this patient were done under a general anaesthesia.

Case II is a general paretic of the deteriorating type on whom cistern puncture was done ten times and salvarsanized serum injected every time.

Case III is that of an expansive type of general paresis whose cistern was tapped and salvarsanized serum injected five times.

Case IV, on whom a provisional diagnosis of general paresis was made, was punctured by the cistern route five times and injected with salvarsanized serum every time.

Case V was another general paretic of the expansive type. Cistern puncture was done five times and was followed every time by the injection of salvarsanized serum.

Case VI, a woman of 35, a dementing type of general paresis, was punctured three times and serum injected every time.

In addition to these six cases of neurosyphilis who received intracistern injections of salvarsanized serum, I have three other casec which presented points of interest.

Case VII is an undiagnosed case presenting an agitated-depressed syndrome who complained of a sense of fullness in his head and "funny feelings." Following the drainage of his cistern his head discomforts disappeared.

Case VIII is a neurosyphilitic, manic in type, in whom a lumbar puncture needle had been broken off previously. Following an unsuccessful attempt to locate the needle-end, sepsis resulted and a

lumbo-sacral meningitis followed, with much pus in the lumbar spinal fluid. The cistern fluid was found to be clear. Every other day for twenty-four days (in all twelve times) I irrigated his subarachnoid space by injecting Ringer's solution through a needle of entrance in his cistern and a needle of exit between his first and second lumbar vertebrae.

Case IX is that of a spinal cord tumor in a woman. By a combined cistern and lumbar puncture a subarachnoid block was demonstrated.

Technique

The technique used in these nine cases is the same as that described by Ayer of Boston and briefly is as follows: The head and neck of the patient are shaved from above the occipital proturberance to the sixth cervical vertebra, and the field is prepared as for any surgical operation. The patient is placed on the operating table so that he lies directly on his left side. His head is then flexed on his chest and is elevated by a pillow which brings the occipital protuberance on the same horizontal plane as the spines of the vertebral column. By palpating with the thumb of the left hand, the occipital protuberance is first located. Just below the protuberance and in the median line, a depression is felt. This depression lies between the lower margin of the base of the skull and the spine of the axis, which may also be palpated. The skin and soft tissues over this area are well cocainized. With the thumb of the left hand pressing firmly into the depression, the outer skin is pierced with a sharp lumbar-puncture needle held in the right hand. This needle is then discarded and another lumbar-puncture needle (of 18-gauge and graduated in centimeters) is introduced through the opening in the skin in the median line of the back of the neck, and into the space between the base of the skull and the spine of the axis. The direction of the needle is slightly forward and follows the line of a plane passing through the glabella and the upper edge of the external auditory meatus. The needle is carefully advanced until it is felt to have overcome the resistance of the dura and of the posterior occipito-atlantoid ligament, which extends between the posterior margin of the foramen magnum and the posterior arch of the atlas. The needle is now in the cisterna magna and cistern fluid can be withdrawn, pressure estimated, and serum or solution injected, as desired. The depth to which the needle must be inserted varies with the development of the patient; in Case VI, cistern fluid was obtained at a depth of 3¾ cm., while in Cases III and IV, the needle was inserted to 5 cm. before the cistern was entered. In all other cases the distance varied between 4 and 5 cm., but in no case was

the needle inserted beyond 5 cm. for fear of injuring the medulla. To complete the operation, the stilette is replaced in the needle, the skin held firmly by the thumb, and the needle withdrawn. Over the wound pressure is made for several minutes, and a sterile dressing is then applied. It is needless to say that the whole operation is performed under strict aseptic precautions.

Observations

These 55 punctures brought out some interesting observations. In this series there was no evidence of injury to the medulla, no deaths, and no blood in the spinal fluid, due to the fact that the technique was rigidly followed, and the needle was never introduced *beyond* 5 cm.

Although many of the patients were active, there was no sudden extension of the head, and hence the danger of breaking the needle was less than in lumbar puncture. The nuchal area was found less sensitive than the lumbar region, for it is clinical knowledge that in spinal syphilis zones of hyperaesthesia are not common in this cervical area.

In every case there was consistent absence of pain on piercing the dura, for which I can give no explanation, but I am sure it was not due to indifference on the part of the patients, because the patients were oriented, active, and had some insight—in fact, several were manic in type and unlikely to minimize pain.

In the 55 punctures there was not a puncture headache or a serum reaction—an important observation when the only after-care was rest from two to four hours. In general paresis puncture headaches and serum reactions are not common, but in the cases of neurosyphilis, not paretic in type, there were no headaches and no reactions; in fact, after the operation the patient would walk to his room for his rest. To illustrate: One day I tapped and injected salvarsanized serum into the cistern of a patient and sent him to his room. On the same day we were to entertain a medical society at the Hospital. Two hours after his treatment the patient directed the autos and acted as a guide to the visiting physicians, showing no signs of upset as a result of his puncture treatment.

Case VIII was another interesting case. Every other day for twelve times, he was cistern punctured and his subarachnoid space was washed out with Ringer's solution, yet he suffered no headaches, no root-pains, or other discomforts. In speaking of this case it may not be amiss to suggest how impracticable it would have been,

in a case like this, to have irrigated the subarachnoid space from below.

In no case was the patient's fear of discomfort sufficient to make him rebellious against this treatment. The only protest made by Case I, who was punctured fifteen times, was that it delayed his dinner.

The introduction of the needle into the cistern never caused a root-pain because there are no nerve trunks to hit at a depth of 4 to 5 cm. In doing lumbar punctures it is not uncommon to hit a nerve trunk, thereby causing root-pains in the leg.

There were no medullary signs, like slowing of the pulse or changes in respiration, on introducing the serum into the cistern. These signs we were accustomed to see in cases where the serum was introduced into the lumbar region and was followed by saline under pressure to drive the serum cervical-wise.

There were no nuchal aches following cistern puncture in contrast to the stiffness and pains in the back with which patients often suffered after lumbar puncture.

In lumbar punctures on a restless patient, an assistant must prevent the patient from straightening his spine: in these cistern punctures the operator controlled the patient's flexed head by holding it with his proximal hand during the operation.

Conclusions

In fifty-five punctures of the cisterna magna on nine patients, I had no deaths, no complications, and no accidents; in fact, the punctures were made without difficulty, and the discomforts to the patients were less than those usually found after lumbar puncture.

Society Proceedings

BOSTON SOCEITY OF PSYCHIATRY AND NEUROLOGY

Regular Monthly Meeting, February 17, 1921

Dr. Joseph W. Courtney in the Chair

ANATOMICAL FINDINGS OF GENERAL PARESIS AND MULTIPLE SCLEROSIS IN THE SAME CASE

Dr. Solomon C. Fuller

Dr. Fuller presented a paper in which he discussed the association of typical cerebral lesions of paresis with multiple sclerosis lesions, the question at issue being whether there was an actual combination of paresis and multiple sclerosis or whether the multiple sclerotic areas were to be regarded as manifestations of a disseminated non-paretic luetic process.

The patient was a woman of 47 who presented definite indications of paresis both on the mental and physical side and also certain signs strongly suggestive of multiple sclerosis. In spite of the fact that for a greater part of the time toward the end of her illness she was apparently obliged to use crutches, on occasions of excitement and euphoria she was able to discard her crutches and even run which had led to the supposition on the part of her friends that her disability was more imaginary than real. Histological examinations of the cortex showed alterations typically paretic although not quite so extensive as might have been expected. Various preparations of the chiasm, oblongata and cord showed disseminated sclerotic areas indistinguishable from the typical lesions of multiple sclerosis. A careful search failed to reveal spirochetes.

Discussion

Dr. H. I. Gosline asked if he considered the possibility that these changes in the spinal cord which show no sign of inflammatory process may not be later stages in the natural history of the syphilitic process.

Dr. S. C. Fuller replied that it might be possible. The late stages of a multiple sclerosis are indistinguishable from any chronic encephalitis with fibrous replacement. However, no fresh multiple sclerotic lesions were encountered in this case.

A CASE OF HENSCHEN'S NODES

Dr. Joseph W. Courtney

Dr. Courtney stated that in 1881 Henschen, the Norwegian pathologist, brought out a paper on migraine in which he noticed that 106 out of 140 cases showed nodes or nodules scattered about either in or under the skin of the arms, neck and scalp. Dr. Courtney stated that he had for a long time been looking for such nodules and had found them in but one case, which he exhibited. The patient, a woman, was a classical case of migraine of many years standing. A year or more ago she noticed nodules under the skin, in the arms and sternal region but none in the scalp or neck. They were more sensitive at times than at others.

Discussion

Dr. E. W. Taylor thought this interesting in connection with Auerbach's observation of what he called "nodular headaches." In many cases of headache, he had observed nodules in the muscles about the neck and shoulders, which were rather easily movable by massage. Such headaches he sharply distinguished from those of the migraine type.

PERIPHERAL NERVE INJURIES TREATED AT THE MASSACHUSETTS GENERAL HOSPITAL

Dr. W. E. Paul and Dr. C. A. Porter

Dr. Paul reviewed 188 cases from 1878 to 1918, involving fourteen nerves injured singly or in combinations and including brachial plexus injuries. Of these cases 95 had a record of end results. The pioneer operation was done in 1878 by the late Dr. C. B. Porter, a primary suture of the ulna and median above the elbow. The operative wound suppurated as did most of the nerve sutures in the pre-aseptic days. The injuries show 34 kinds of trauma or conditions and 20 cutting agents are specified, glass predominating. Nerve inclusions occurred in three forms. The nerves most frequently cut are ulna, 31 cases; median, 18 cases; ulnar and median, 12 cases; musculospiral, 8 cases; external popliteal, 4 cases. In operations various methods were used to approximate nerve ends and favor healing. Excision of portions of long bones was twice practiced. Frequently the sutured nerve was wrapped in Cargile membrane, or fascia, or fat or muscle. A vein was used to guide growth over a gap. Hetero and auto transplants were resorted to. Implantation of a neighboring nerve was done. Gaps were bridged with strands of silk, etc. Several cases were operated on more than once.

Statistics regarding the side injured and the location of injury were given. Males were found to preponderate in numbers

injured. There were 95 cases with record of condition one year or more after operation. In the 65 suture cases 41 per cent. failed to improve; 26 per cent. showed slight improvement; 30 per cent. showed considerable improvement; *one case* 1½ per cent. was stated to have completely recovered. In the 30 neurolysis cases 40 per cent. showed no improvement; 23 per cent. showed slight improvement; 20 per cent. showed considerable improvement; 16 per cent. showed complete recovery. Reference to the large amount of work recently done by many investigators was made; these studies though giving little help in treatment demonstrate how much repair is required for complete restoration of function following suture of a divided nerve. The ideal operation was outlined for nerve suture. Surgical and neurological opinion seems to be settling on three apparently sound factors essential to repair that shall restore function. (1) Accurate apposition by end-to-end suture of the central divided end to its former glial pathway peripherally. (2) A technique to avoid meddlesome handling of the nerve and eliminate post-operative fibrous tissue growth or clot at the nerve junction. (3) Methods of suture to minimize operative trauma.

Dr. C. A. Porter stated that in extenuation of the more or less unfavorable results of peripheral nerve surgery, up to the time of the war, there had been no one who had a large experience in such civil surgery as most of the cases came to the Hospital with a history of having been previously treated by some emergency surgeon who, not infrequently, sewed up the tendons omitting to suture the nerves, or sutured the nerves with chromic catgut, silk, or big needles. In such injuries as badly cut wrists, unless adequate experience and proper surroundings were available, it would be advisable to stop the hemorrhage, render the wound as clean as possible, dress with a sterile dressing and send the patient to the nearest competent surgeon to deal with the nerve injury. This applies particularly to injuries of the ulnar nerve which presides over the fine movements of the hand and fingers. It is doubtful whether a primary suture of the ulnar nerve ever results in perfect motor and sensory return, and it is almost sure that a secondary suture never so results. And where there has been a considerable long lapse of time between the injury and the suture, a varying degree of contraction, deformity and degeneration invariably precludes complete restoration of function. Even where cases have had perfect healing after primary suture and have had regularly the sort of after-care which they obtain in the Out-Patient Department, the result, when tested carefully, is never perfect.

The sciatic nerve, on the other hand, presides over rather gross movements, the comparatively unimportant sensations, so that when once the toe drop is corrected, it is surprising to see how well these patients can walk. When the sciatic nerve or its branches having been divided or a tumor excised, it is often difficult to bring about end-to-end union without undue tension. Much can be gained, however, by flexion of the knee on the thigh, adduc-

tion and extension of the thigh on the pelvis. This position should probably be maintained for three months or more, and then gradually relaxed during the next three months. The higher the suture and the larger the defect, the longer should the limb be immobilized.

A severe injury to the brachial plexus of all peripheral nerve lesions requires the most judgment as to what should be done. In a total of twenty-seven personal operations performed, only one has given satisfaction and this a comparatively poor result although treated as a private patient by one of our neurologists for over three years. As a five-year end result, she could flex her arm, wrist, fingers and thumb. The lesion was originally complete and the operation was a combination resection end-to-end suture and lateral anastomosis. In almost all of the other cases, in spite of endeavors to put sound nerve to sound nerve, the results have been lamentable and have almost always ended with shoulder amputation. In a small number of these, on account of persistent pain, posterior nerve-root division has been necessary. Of these only one was cured, and my feeling is that in the past we have done inadequate division. I should now advise resection of the roots from the third cerebral to the first or even second dorsal. If the roots of the brachial plexus proper only are divided, there is invariably a return of pain.

In regard to Volkmann's paralysis, among the cases operated upon, two or three clearly showed that in addition to marked apathy and fibrosis of the muscles, there was a definite lesion of the nerve as well, and in one case, above a point of constriction, a definite neuroma had formed. In excessive cases when the involved muscle has become functionless, no matter whether nerves could be freed by operation from scar tissue or united, the only hope of improvement is by transplanting normally innervated tendons.

In regard to the after-care it is vitally important that the paralyzed muscles be relaxed, as in general one finds that the normal muscles have, sooner or later, brought about contractions most difficult to overcome. Massage and galvanism should be employed to keep up the muscle tone and nutrition, and the finer the function of the nerve, the greater the importance of this after-care.

All are agreed that the musculo-spiral nerve with comparatively gross function is the one which recovers most quickly and most satisfactorily. In many cases neurolysis, after fracture in the middle of the humerus, has proved curative, and, if in doubt, should be tried without resorting to resection. Until recently it has been my custom after thorough freeing of the nerve which should always be commenced from above and below, approaching from these ends the site of the lesion, to stretch the nerve by grasping the proximal neuroma. It has been found that a nerve with moderate traction will stretch downwards from one-half to one inch, but that little or nothing can be gained by pulling upward

from the distal end. This fact is easily explained by the lateral branches which are given off in such a way that traction downward loosens them, whereas any pull from below up might tear the motor nerves from the muscles. If a proper relaxation cannot be obtained by free dissection upwards, there is no objection to stretching the nerve in order to obtain end-to-end suture without tension. As one's experience increases, however, and the dissection upward is more freely prosecuted, if the adjacent joints are properly relaxed, one can usually obtain an end-to-end suture in the average lesion.

Very little advance has probably been made since the time of Drs. C. B. Porter and M. H. Richardson, in 1885, in regard to the actual technique of suture, though probably today the majority of surgeons use an absorbable ligature. The increased experience since then, however, which of course the war has multiplied many times, has brought out the importance of delicate handling of the nerve, of the necessity for absolute hemostasis and the advantage of avoiding rotation in suture in order to maintain the original nerve tract pattern.

Our ordinary conception of a nerve is a round object more or less homogeneous and yet, before the nerve is freed, it is flat in the majority of cases rather than round, and composed sometimes of many nerve bundles rather than a single cable. Almost without exception there is a good sized bulb on the proximal end, while that on the distal is either much smaller or sometimes absent. Usually a little fibrous cord connects the bulbs. With the wish to remove as little as possible of these bulbs in order to be able to suture end to end, the human tendency is to inadequate excision of the proximal neuroma. I believe, owing to this error, that many nerve sutures are doomed from the start, and would strongly urge section after section with a fine, very sharp knife until motor nerve cables can be clearly demonstrated. Probably very little harm results from placing one catgut stitch through the center of the nerve to approximate the ends grossly, but upon this authorities differ. There is no question, however, that the rest of the suture should be done with very fine chromic catgut or very fine silk, the sutures being placed through the nerve sheath in such a way that the down-growing fibres are directed into the distal end and cannot mushroom out through the sutures. This very effect which we do not wish is sometimes produced by drawing the central single stitch too tightly. Inasmuch as primary union is complete, success is practically essential, and as past infection, if present, may allow germs to lie latent in the tissues for a long time, I believe that the introduction of any foreign body is contrarily indicated. Some have advocated surrounding the suture by fat or fasciolata. I believe the war experience has shown that burying the nerve suture in the muscle, particularly fat fiber when present, is much more preferable to a transplanting, and that probably burying the nerve in normal muscle is the best procedure of all when possible.

In spite of free dissection of nerves as previously mentioned and flexing of joints, end-to-end sutures sometimes can be obtained by transplanting the nerve to another shorter root; for example, the musculo-spiral can be brought in front of the humerus and the ulnar through the plexus of the forearm.

As in many other surgical problems, the main question involved is not the technique of the placing of a few sutures to approximate nerve ends, which a third-year student might learn very quickly, but a question of experience and judgment in selecting the best procedure in any given case. On the other hand, the surgeon must constantly bear in mind that the vital point of perhaps a two-hour tedious operation is the ultimate nerve suture which in itself may not require more than ten minutes.

Discussion

Dr. J. B. Ayer spoke of a case that Dr. Porter operated on about 1911 in which he had a chance to examine the tissues. The patient had been cut by a piece of glass and a neuroma about the size and shape of a pecan was excised. Histological examination showed that he did not get above to perfectly normal nerve, as there was a good deal of fibrous tissue at the proximal end. About one-half to one-third of the fibres ran through to the distal end. After resection he could not unite the ends and there was an inch gap filled in with several silk sutures and surrounded by Cargile membrane. About three years later the patient was able to use all of her ulnar muscles. Sensation had returned to a considerable extent although of a protopathic rather than epicritic type. Dr. Paul would agree that there was not complete regeneration, but it was a perfectly useful hand. This result was obtained under conditions which Dr. Porter has said are the worst: namely the nerve affected was the ulna, and the gap bridged was a very considerable one.

Dr. E. W. Taylor remarked that nothing has been said of the method of regeneration of divided peripheral nerves, whether solely from the proximal end or whether in part, at least, from the neurolemma sheaths of the peripheral end. This matter, long in dispute, is of practical importance in connection with the time of suture after the injury.

Dr. G. L. Walton remarked that in view of the "fumbling period," when various devices were tried for regenerating nerves at a distance it was a great satisfaction to have established the realization that such efforts may be discarded, and that there is little or no result to be expected unless there is absolute apposition to the cut ends.

Dr. Percival Bailey spoke of having seen recently Dr. Lewis's work in Chicago and of his general feeling that it was necessary to have an absolute end-to-end anastomosis without tension if any results were to be obtained.

Dr. Stanley Cobb, in connection with the question of central regeneration, spoke of his work under Dr. Frazier in General Hos-

pital No. 11. In six months about 175 cases of peripheral nerve wounds were treated and the rule was to wait until three months after the last sign of infection in the wound. That meant frequently waiting until six or nine months after the original injury. Upon making then an end-to-end anastomosis, it was found that regeneration would at once begin as though the operation had been done immediately after the injury which is evidence in favor of the theory of central regeneration only.

Dr. J. W. Courtney called attention to the fact that the electrical excitability of sutured nerves is an absolutely unreliable index of their functionability. He spoke briefly on a case in a young subject, a male, in which the left ulnar had been partially severed accidentally by a pen-knife blade. Dr. Porter had done a very careful and successful end-to-end anastomosis. In spite of the slow but steady regeneration of muscles and return of function which followed the nerve anastomosis, neuro-muscular electrical excitability remained practically at the zero point for considerably more than a year from the date of operation.

Dr. W. E. Paul, in answer to Dr. Taylor's question, stated that the authorities seemed to be in favor of the central regeneration theory. It is interesting to realize that the degenerative changes in the peripheral segment of a divided nerve include the disappearance of the parenchymatous tissue of the nerve.

Dr. C. A. Porter was unable to give an opinion in regard to central and peripheral regeneration of nerves, but offered the analogy of an unimpregnated egg (peripheral regeneration) and an impregnated egg (central regeneration), both might be very good eating, but the latter would not hatch successfully.

Current Literature

I. VISCERAL NEUROLOGY

1. VEGETATIVE NERVOUS SYSTEM.

Depisch, F. Contribution to the Pathology of the Vegetative Nervous System. [Case of Bulbar Disease with Hemiirritatio Vegetativa. Wiener Arch. f. klin. Med., Vol. 1, 1920.]

Anamnesis.—Forty-two year old woman patient with tuberculosis heredity. Had pleuritis fourteen years ago. A chronic polyarthritis set in nine years ago. The last few years the left cheek has been redder than the right. Since that time also there have been attacks of vertigo. Urinary trouble. Pronounced slowing of pulse as though in seizures.

Summary of the status after three quarters of a year of observation showed the following symptoms in addition to the chronic polyarthritis: 1. Reduction of skin temperatures of the trunk and left extremities (average reduction of 1° C.). 2. Increase in skin temperature on the left half of the face and dilatation of the left retinal blood vessels. 3. Increased sweat secretion on the left side. 4. Reversed Horner symptom complex on the left. 5. Increased secretion of saliva on left. 6. Increased tear secretion on left. 7. Signs of vagus irritation. 8. Signs of heart sympathetic irritation (vagus paralysis?). 9. Vertigo from left to right. 10. Headache in the left occiput. 11. Increased tonus of the sphincter vesicae? 12. Slight increase of the patellar reflex on the right and indication of Babinski on the right. 13. Mild ataxia of the left upper extremity. 14. Temporary weakening of the left abdominal reflex.

Epicrisis.—Signs 1, 3, 4, 5, and 6 are undoubtedly the expression of a semilateral irritation of vegetative nerves. In phenomena 2, 7, 8 and 11, this can only be suspected. The locus of the original disease must be in a central position on account of the marked hemilateral distribution of the phenomena and on account of the involvement of the entire left half of the body. The otological examination made by Fremel showed "an organic lesion in the region of the left Deiter's nucleus." All the patient's manifestations, with the exception of one and three, can to the best of our knowledge be explained by such a focus in the left half of the medulla. According to Babinski, Senator, et al., the vegetative disturbances are observed on the side of the focus in the head region in hemilateral medulla foci, they are contralaterally located on the trunk and extremities, or on the side of motor disturbances. Whether in our

case all the manifestations are to be explained by the one left sided focus, which must certainly be present, or whether possible a second focus must be assumed on the right side which only irritated the vegetative pathways for the trunk and extremities can certainly not be decided. We consider the first assumption to be the more probable. From literature pertaining to the writer's case, as well as to an unpublished case of Dr. Pappenheim's we come to the following conclusion in regard to the central fiber course of the vegetative pathways, especially in regard to their crossing.

1. In man the vegetative pathways from the cerebrum continue downwards through a crossing.

2. The crossing has been followed to the lowest sections of the cervical spinal cord.

3. The crossing for the path for the eye sympathetic and the vasomotor and sweat pathways of the face may be traced between the inner capsule and the pons.

4. The crossing of the vasomotor and sweat gland pathways of trunk and extremities seem to be situated in the upper sections of the medulla oblongata. [Author's abstract.]

Boeke, J., and Dusser de Barenne, J. G. THE SYMPATHETIC INNERVATION OF THE CROSS-STRIATED MUSCLE FIBERS OF VERTEBRATES. [Proc. Koninkl. Akad. v. Wetenschappen te Amsterdam, 1919, xxi, 1227 (2 figs.).]

Some years ago Boeke showed that on the cross-striated muscle fibers of reptiles, birds and mammals there existed, besides the usual motor end-plates, a second set of hypolemmal nervous end-organs, very fine and delicate, which are seen in Bielschowsky preparations as very small neurofibrillar end-rings and small end-nets, lying on the surface of the muscle fibers at the end of fine non-medullated nerve-filaments. These so-called "accessory" nerve-endings lie hypolemmally on the muscle fibers embedded in the granular sarcoplasm of the fiber, and in some cases are found in the same layer of granular protoplasm which surrounds also the terminal ramifications of the common motor end-organ; in other cases they are found as separate endings, lying embedded in a distinct layer of nucleated sarcoplasm independent of the motor sole, but, as far as could be made out, they always appear as hypodermal structures. The non-medullated nerves that have these end-organs attached to their terminal nerve-ramifications, are seen running in bundles between the muscle-fibers, remain amyelinic throughout their whole course, and seem to form a distinct system of nerve-fibers, independent of the motor and the sensory nerves. These facts suggested the sympathetic nature of these nerve-fibers, but it was concluded that the cross-striated muscle-fibers are innervated both by the spinal nerves and the sympathetic system. The end-organs just mentioned were found in

the muscles of the tongue, eye, iris, back, pectoral and intercostals, and the diaphragm. The sympathetic nature of these "accessory" fibers was shown by section of the trochlearis and oculomotorius directly after they have left the mid-brain: while the motor and the sensory fibers of these two nerves degenerated, the accessory non-medullated nerve-fibers and their end-organs on the muscle-fibers remained unaltered; they must therefore come from the carotid plexus by the sympathetic branch. Similar results have been now obtained in the cat's intercostal muscles a month after extirpation of the sixth to the ninth thoracic spinal ganglia together with simultaneous section of the sixth to the ninth thoracic ventral and dorsal roots. Bielschowsky preparations of the intercostal muscles of the seventh intercostal space showed complete degeneration of all the medullated fibers, both motor and sensory, with perfect preservation of the "accessory" non-medullated fibers with their peripheral terminations in the muscle. The writers conclude, therefore, that the accessory fibers and their end-organs, for the muscles of the trunk at any rate, belong to the sympathetic system, and transmit centrifugal, efferent nerve-impulses. [Leonard J. Kidd, London, England.]

Agduhr, E. The Sympathetic Innervation of the Cross-striated Muscle-fibers of the Extremities. [Proc. Koninkl. v. Wetenschappen te Amsterdam, 1919, xxi, 1231 (4 figs.).]

All the spinal nerves, whose ventral ramifications form the brachial plexus of cats, were divided between the spinal ganglion and the point of exit of the white ramus communicans; histological examination from five to ten days after operation. In sections of the interossei muscles—prepared by Agduhr's modification of Bielschowsky's method—from the anterior extremity of the operated side, he found that all the medullated nerve-fibers were degenerated, but that there were fairly numerous intact non-medullated nerve-fibers; these intact fibers are interpreted as postganglionic sympathetic fibers. Thus, the striped muscles of the cat's extremities are innervated by sympathetic fibers, as Boeke showed to be the case in the cat's superior oblique eye-muscle. These sympathetic nerves in the extremities terminate in comparatively simple loop-formations, partly on ordinary cross-striped muscle fibers and partly on muscle fibers in the muscle spindles. Agduhr has reason to believe that the large majority of these sympathetic terminal plates—both on ordinary muscle fibers and on those of the muscle spindles—are situated hypolemmally, just as Boeke described them in the cat's superior oblique muscle. But other preparations of Agduhr's show that there are also epilemmally situated sympathetic terminal plates in the extremity-musculature. Most of the sympathetic terminal plates on ordinary striped muscle fibers lie outside the region of extension of the motor plates, but many are situated within it. [Leonard J. Kidd, London, England.]

Dusser de Barenne, J. G. The Innervation and the Tonus of the Striped Muscles. [Proc. Koninkl. Akad. v. Wetenschappen te Amsterdam, 1919, xxi, 1238.]

The writer concludes, from a critical study of the subject, that there are at present no experimental facts pointing clearly to a direct connection between the mechanical tonus of the muscles, in the sense of Brondgeest, and the sympathetic nervous system. With regard to the question as to the nature of the non-medullated portganglionic fibers and the accessory end-plates of Boeke on the striped muscles of the eye, trunk and limbs, he holds that it is very improbable that they have anything to do with the mechanical muscle tonus of Brondgeest which is probably exclusively due to the simple motor nerve-fibers. But the chemical muscle tonus of Mansfeld and Lukács is here worthy of consideration: these authors communicated some experimental facts from which they derived the existence of a so-called chemical muscle tonus, by which term is expressed the view that striped muscles would have a certain amount of metabolism when at rest; this metabolism would be under the influence of the sympathetic system. The writer thinks that, though this is not absolutely proved, it is plausible. At the same time it has not much deepened our knowledge of the nature of the tonus of the striped muscles, and the real nature of the tonus is as obscure and mysterious as before. [Leonard J. Kidd, London, England.]

Epstein, B., and Neuland, W. Neurogenous Dermatoses in Children. [Jahrbuch f. Kinderheilkunde, 1920, 93, No. 1.]

These authors recognize neurogenic (psychogenic they should better write) dermatoses in childhood. They attempt to separate them from those of constitutional, exudative diathesis, origin, in which latter the American psychoanalytic school maintains a psychogenic component. The neurotic exudates are distinguished especially by their localization, the bend of elbow or knee, their symmetry, dryness, lack of discharge, chronic course, and itching. These call for tests for vegetative nervous system activity. Typical cases are described. A boy of eleven who since infancy has had a recurring skin affection on the cheeks, bend of the knees or elbows, or back of the neck, but never indication of the exudative diathesis. Occasional headaches, diarrhea and umbilical colic. At the age of seven suddenly lost for three weeks the ability to speak. The dermatosis flared up after an arithmetic examination. In some cases a removal from home influences cured the dermatosis which had resisted specialist treatment for years; in one case merely the change of governess. One child lived alternately with its parents, who were separated, and its dermatosis recurred regularly when it was with the mother and subsided when with the father who let him play with other children. Scabies and pediculosis may be complicated with a neurogenous "ec-

zema" in regions beyond. Cerebral reflexes from emotional stress are common; cases of herpes zoster, urticaria and Quincke's edema developing after a fright or excitement have been frequently published. They report some further cases where herpes of the lip or cheeks developed suddenly a few hours after a fright or sensation of disgust. Differentiation is most difficult in infants, and grows easier with the age, as the skin manifestations of the exudative diathesis improve under proper dieting, and decline as a rule with the first year. Changing the mode of life is the most effectual way—even in infants—to combat the neurotic dermatoses, guarding against causal factors such as vermin, woolen underclothing, too heavy bed clothing and too warm sleeping room. The needs for psychoanalysis are evident in these cases, although the author only says psychotherapy.

Cawadias, A. Continuous Fever of Sympathetic Origin. [Ann. de Méd., 1920, 7, No. 6.]

The new mode of approach to so-called hysterical fever opened up by studies of the vegetative neurology is seized upon by the author, who writes to explain slight prolonged fever as a phenomenon of overactivity of the sympathetic. The slight continuous fever, he maintains, is probably of endocrine origin. Adrenalin injection always causes a pronounced reaction in this type. A history is given in detail of a continuous fever ranging from 99°–100.4° F. This has persisted ten years with variations. There was also unstable pulse and vasomotor disturbances but negative to atropine. Nothing could be found to explain the fever otherwise, and its prolonged course excludes tuberculosis. The author's analysis unfortunately excludes the most important factors, *i.e.*, unconscious psychological ones.

Thomas, A. The Pilomotor Reflex. [La Médecine, February, 1920, B. M. J.]

According to Thomas the pilomotor centers in the upper limbs are situated in the fourth to seventh dorsal segments, and those in the lower limbs in the ninth to twelfth dorsal segments, the first lumbar segment and probably the second lumbar segment. In the first three dorsal segments there are centers for the face and neck and the upper part of the thorax, which is innervated by the fibers of the cervical plexus. Investigation of the pilomotor reflex enables one to judge of the condition of the centrifugal and centripetal tracts. The pilomotor reflex caused by cervical stimulation persists and may even be increased on the paralyzed side in cerebral hemiplegia when sensibility is not affected in the region stimulated. In unilateral or bilateral lesions of the cord the presence or absence of the reflex below a certain level indicates the severity and depth of the lesion. Lesions of the grey substance which destroy or irritate the sympathetic, such as syringomyelia, hematomyelia, or intra-

spinal tumor, cause considerable disturbance of the reflex. Lesions of the cauda equina within the spinal canal do not affect the reflex, but it is lost in the lower limb when the sympathetic is divided below the origin of the pilomotor nerves of the lower limbs. Any lesion of the roots, plexuses, or peripheral nerves modifies the reflex, either increasing it or abolishing it, according to the nature of the lesion. The reflex is modified in lesions of the sympathetic. Interruption of the sympathetic chain above the spinal origin of the pilomotor nerves of the brachial plexus abolishes the reflex in the upper limb, and if the section is at the level of the first dorsal ganglion and lower cervical ganglion, the reflex is abolished also in the neck and face. A loss of the reflex occurs in herpes zoster. When a divided nerve is regenerating, reappearance of the pilomotor reflex is an early phenomenon. Lastly, in some persons even a slight lesion of the limbs or trunk may cause an exaggeration of the pilomotor reflex in the corresponding half of the body with its maximum in the immediate neighborhood of the lesion.

Sicard, J. A., and Paref, J. The Oculo-pilomotor Reflex. [Bull. et Mém. Soc. Méd. des Hôp., May 20, 1920.]

A new reflex, the oculo-sympathetic or oculo-pilomotor reflex, is here described. It is induced by compression of the eyeballs, as in developing the Aschner reflex. Its centripetal tract is the trigeminus nerve. Its synapse is in the midbrain, and its centrifugal tract the sympathetic of the midbrain and spinal cord. If a subject in whom horripilation is readily produced has his eyeballs compressed, the cutaneous erection at once ceases, and does not reappear (in spite of energetic friction) as long as the ocular compression lasts, and even for some time afterwards. Unilateral ocular compression produces almost the same effect as bilateral ocular compression. Injection of adrenalin does not appear to have any effect on the cutis anserina or its inhibition. The occurrence of this inhibitory reflex shows, on the one hand, that there is a sympathetic tonus in the midbrain which influences the spinal tonus, and on the other hand, that ocular compression may have various effects, as it acts not only on the vagus, as in the oculo-cardiac reflex, but also on the sympathetic, inhibiting the pilomotor reflex.

Abadie, C. Pericarotid Sympathectomy. [Presse Médicale, September 1, 1920, J. A. M. A.]

Abadie explains that certain forms of atrophy of the optic nerve are probably the result of constriction of the arterioles which nourish the nerve trunk. This special atrophy is characterized by restriction of the visual field on the side toward the nose. The internal and lower visual field may have been long lost when the external and superior shows no signs of impairment. Instillation of atropin produces only a moderate effect, and the papilla is branched; the findings are like those in the eye

with severe quinin poisoning, the arteries filiform and empty of blood. This contraction of the arterioles is variable in degree and duration, but it entails in time this form of atrophy of the optic nerve. To arrest the permanent contraction of the arterioles in a severe case of the kind, he had a stretch, 1 cm. long, of the sheath of the carotid artery resected to interrupt the sympathetic innervation. The immediate effects were brilliant, the visual field rapidly enlarged until in two weeks it approximated normal, and vision improved to $\frac{2}{3}$. This favorable condition persisted for a month, but then, two months after the sympathectomy, the improvement retrogressed until conditions were the same as before the intervention. Ligation of the common carotid was also followed by marked improvement, but the benefit was transient. He has a record of four operations of the kind on the carotid, and although marked benefit followed, it was transient. But even this sustains the assumption of impairment of the circulation in the optic nerve and its sheath.

Ameline, M., and Quercy, P. Progressive Lipodystrophy in Pharaoh. [Rev. Neur., May, 1920. J. A. M. A.]

Ameline and Quercy remark that since Boisonnas' statement last October in regard to the rarity of progressive lipodystrophy in adult males, a second case has been discovered. This is in the Pharaoh Amenophis IV, as deduced from the mural tablets of ancient Egypt. The special features of the disease, the loss of subcutaneous fat in the upper part of the body and the pronounced increase of fat deposits in the regions below the crest of the ilium, are portrayed in the pictures of this ruler, and have been recognized and diagnosed thirty-five centuries later. Thirteen mural pictures are reproduced, and the question is raised whether the anomalies portrayed may not have been due to pulmonary tuberculosis. Necropsy of the mummy might give interesting results.

Zeak. Viscero-vasomotor Zones. [Wien. klin. Woch., June 17, 1920.]

This author calls attention to a crescent-shaped skin flushing situated about the middle of the clavicles and the convexity over the sternum. In pronounced cases the crescent has a dark-red color, while in less marked cases the whole of the area affected seems to be traversed by a network of fine anastomosing capillaries. The horns of the crescent often are fairly symmetrical, but sometimes one horn is more prolonged than the other and extends beyond the clavicle to the supraclavicular fossa. In some cases the right and left halves of the crescent assume the shape of a butterfly's wings, united to one another by a small central portion on the skin over the manubrium. The sign is not constant, for numerous cases of aortic disease, including aneurysm, do not show a trace of the crescent, and it seems as if only certain stages and varieties of aortic disease not yet determined give rise to it. In cases of aortic disease in which the crescentic area of redness does not appear spon-

taneously, the skin vessels of the upper part of the thorax, especially of the manubrium, are more sensitive to mechanical and even psychical stimuli than in health. This spontaneous or provoked erythema, which may be regarded as an objective Head's area, is due to an irritable condition of the vasomotor cells and fibers in the spinal cord.

Euzière, J., and Margarot, J. Visceral Innervation during Morbid Depression. [Encéphale, 1920, 15, Nos. 5 and 6.]

Euzière and Margarot refer to a morbid condition of apprehension and anxiety recurring at irregular intervals. These "états anxieux" are distinguished by extreme irritability of the sympathetic nervous system, and when they are associated with mental disease, this preponderance of the sympathetic system may be continuous. Their tests of sixty patients of the different types confirm, they say, that this hypertonia of the sympathetic system is unmistakably a constant physiologic substratum of the physical element of anxiety, namely, the anguish, and that the different degrees of the anguish (*angoisse*) parallel the intensity of the sympathicotonia. [J. A. M. A.]

Pal, J. Tonus of Smooth Muscle of Hollow Organs. [Deut. med. Woch., February 5, 1920.]

The author concludes that tonus must be regarded, not as a condition, but as a function which serves definite purposes. It is to a certain extent antithetical to the projicient apparatus. With others he finds that there are two distinct factors that characterize the condition of tension in the muscle: tonic and kinetic. The purpose of muscle tonus is to regulate kinetic processes. If necessary, this regulating function becomes a reparative function, as is seen in secondary hypertonia, but hypertonia may arise primarily as a disturbance of function from causes yet unknown.

Hunter, J. I. Abdominal Pain and its Associated Reflex Phenomena. [Med. Jl. of Australia, August 7 and 14, 1920. J. A. M. A.]

An attempt is made by Hunter to interpret abdominal pain by tracing afferent stimuli: (*a*) along the somatic sensory nerves and (*b*) along the splanchnic sensory nerves. It has been noted that: (1) the pain in peritonitis is due to stimulation of the somatic sensory fibers from the extraperitoneal fat. (2) Visceral pain is due to deep sensibility impulses from hypertonic involuntary musculature being transmitted to the same second relay cells as the somatic afferents. Internal pressure or tension is the result of this muscular contraction and not the exciting cause of the pain. (3) The skin and extraperitoneal fat sensory nerves are reflexly connected with the abdominal muscles. When stimulated in peritonitis by exudate or stretching of the parietal peritoneum, the extraperitoneal nerves cause reflex rigidity of these abdominal muscles, the

response of which may be localized and specific according to the site of stimulation. (4) The gut wall is connected by sympathetic afferents to efferent sympathetic cells, which excite inhibition of the gut wall. Contraction of the ureter is brought about by similar reflex. Pain occurs when the hypertonicity of the muscle is so great that the impulses can be transmitted by the pain path to the cortex. (5) These sympathetic arcs have a collateral connection with the abdominal muscles by way of the reflex through the anterior horn cells. This is the visceromotor reflex of MacKenzie and rigidity of the muscles results from its stimulation. (6) Rigidity stimulates fibers of deep sensibility and tenderness results. Pain is caused by the stimulation of cells in the pain column of the posterior horn of the cord by either somatic or splanchnic fibers.

Cheinisse. Eserine in Sympathico-Tonus. [Presse Méd., July 10, 1920.]

Vagotonics respond strongly to pilocarpine and atropine while sympathicotonics are susceptible to the action of adrenalin. As is well known there are mixed syndromes. Recently French observers have commented on solar crises, and their treatment by eserine. These crises are closely akin to sympathicotonia, a condition in which we encounter tachycardia, vasomotor instability with hot flashes, dilation and atony of the stomach, vascular hypertension, epigastric hyperesthesia, mydriasis, etc. In the solar crises emphasis is laid on the epigastric pulsation of the aorta. Since atropine is the remedy indicated in vagotonia, it occurred to him to test eserine in these sympathicotonic crises.

Padilla, T. Exploitation of Liver Functioning. [Semana Médica, March 4, 1920.]

In view of the increasing importance of visceral neurology, functional tests of organ capacity are becoming increasingly important. Thus in various midbrain syndromes, particularly striatal implications in some of its parts, liver disease is concomitantly present. The present review of the available liver tests is therefore of service, even though the author has not yet availed himself of the vagotonia-sympathicotonia concept to aid in functional variation differentiation.

Tashiro, K. Sympathetic Innervation of Intestines. [Tohoku Jl. of Experimental Med., Sendai, April 29, 1920. J. A. M. A.]

Tashiro describes experiments to demonstrate the action of epinephrin on the sympathetic innervation of the intestine. Its action seems to depend on the quantity, exciting or inhibiting according to the amount used.

2. ENDOCRINOPATHIES.

Christoffersen, N. R. METABOLISM AND INTERNAL SECRETION. [Ugeskrift for Laeger, July 8, 1920. J. A. M. A.]

Christoffersen tabulates the metabolic findings in three cases of extreme thyroid deficiency. They show that the elimination of sodium chlorid proceeds normally with thyroid deficiency, and even plus pituitary deficiency, if the suprarenals are intact. The elimination can be augmented by pituitary treatment but not by thyroid treatment. These and other data cited suggest that the suprarenals first, and next the pituitary, control the elimination of sodium chlorid (aside from heart and kidney disease). One of the patients studied was a dwarf, 45 years old. He had been of normal size at birth, but had at once developed gonococcus ophthalmia. The findings suggest deficient functioning of several of the endocrine glands, interfering with ossification and growth in general. The hip joints showed anomalies like those of the Calvé-Perthes disease, but the same findings were observed in other joints. Thyroid treatment was pushed, and the man of 45 showed marked improvement and grew 5 cm. taller, the röntgen rays demonstrating improvement in the structure and shape of the bones, hair and teeth, but the treatment had to be suspended on account of the great loss in weight. Biedl and Falta have also reported benefit from thyroid treatment in myxedema of twenty-five years' standing.

Brown, W. L. DIABETES IN RELATION TO DUCTLESS GLANDS. [Br. M. J., August 7, 1920.]

The sympathetic endocrine glands are accelerators, retardation is related to the parasympathetic. These constitute the two divisions of the oldest level of the nervous system—the visceral system, which, acting apart from consciousness and yet under its influence, subserves the functions of organic life. The author holds that the sympathetic is chiefly katabolic in its activity, and defensive while the parasympathetic is anabolic. The sympathetic is militant, the parasympathetic peaceful. The sympathetic mobilizes the sugar into the blood by means of the endocrine glands, for purposes of defense, while the parasympathetic stores it in the tissues of a reserve. Ordinary diabetes shows no other signs of endocrine disease, while endocrine glycosuria betrays other evidences of that origin. On the basis of these conditions the following classification of cases of glycosuria is made: (1) Organic origin, with structural changes in the endocrine glands leading to (*a*) overaction of suprarenal, thyroid, pituitary, or (*b*) underaction of the pancrease. (2) Sympathetic origin, with no evidence of structural changes in any endocrine gland, but producing a functional (*a*) overaction of suprarenal, thyroid, pituitary, and (*b*) underaction of pancreas. Diabetes is a sign of exaggerated metabolism, evoked through the sympathetic and the associated endocrines, which first asserts itself in relation to the most abundant

food material, the carbohydrates, but as it advances expresses itself in relation to all.

McArthur, A. N. The Ductless Glands. [Med. Jl. Austr., September 18, 1920.]

The author reviewed the present position of the therapeutic use of ductless glands and pointed out that knowledge was too imperfect to enable a definite opinion to be expressed. It was recognized that the ductless glands gave some secretions to the blood, which were essential to the general metabolism of the body. The glands worked together as a "confederacy" and when one weakened, the others might be said to carry on. Of all the endocrines, thyroid administered by the mouth was the only one that gave definite results. The suprarenal and pituitary extracts administered hypodermically also gave definite results. In menopause disorders and disturbances of menstruation, he had not found any striking results follow any combination of organo-therapy. In his observations he had been impressed by the fact that the menopause brought about by imperatively necessary surgical measures was free from many of the distressing symptoms of the natural menopause. He was inclined to think that in this "surgical" menopause the harmony of cooperative action of the endocrines helped to produce a more perfect metabolism than ordinarily occurred. A plea was made for most careful observation of symptoms and signs due to apparent faults in secretion of endocrine organs. In this way some further improvement in practical medicine might be obtained.

Pentagna. Etiopathogenesis of Endocrine Syndromes. [La Pediatria, May 15, 1920.]

This author here reports on the study of 115 cases of endocrine dysfunction. In 46 per cent. there was a positive Wassermann which was supported by other evidence of syphilis. In nearly 30 per cent. syphilis was probable although not demonstrable, while in only one quarter of the cases syphilis could be regarded as absent. In these cases alcoholism in the parents, endocrinic inheritance, and accidents in utero or during labor were the probable factors. Hence syphilis seems to be the most potent factor in endocrine pathology because of the action of its toxins during the developmental period upon the endocrine organs. The endocrine disorders present in the 115 children comprised the following: myxidiocy, 52; Mongolian idiocy, 41; pluriglandular syndromes, 13; myxedema, 8; hyperadrenalism, 1. The disastrous results to the thyroid are thus very strikingly portrayed.

Claude, H. Biologic Tests of Endocrine Imbalance. [Paris Médical, September 11, 1920.]

Claude, Barnard and Piédelièvre have been studying for several years the response in different persons to intramuscular injection of from 0.05 to 0.15 gm. of extract of the posterior lobe of the pituitary or of from 1 to 5 c.c. of the 1:1,000 solution of epinephrin. The pituitary injection may induce pallor and contractions of the bowel and uterus, and the epinephrin injection tremor or palpitations, but the reactions to be noted in the tests are (1) the cardiovascular response: the pulse, and maximal and minimal blood pressure, noted at five minute intervals, for an hour or hour and a half after the injection; (2) the sugar content of the urine when the injection had been immediately preceded by a test meal comprising 100 gm. of bread, 150 gm. of milk, 50 gm. of sugar or 150 gm. of glucose. The sugar output for six or nine hours thereafter is measured; (3) changes in the blood count. The corpuscles are counted anew one and three hours after the injection. The findings with these tests in different cases of endocrine upset are compared, and the possible differential value is emphasized as interpretation of the findings becoming more reliable. Their results with treatment based on what has been already learned are encouraging. With ovarian insufficiency, the pulse increased by ten or twenty beats under pituitary treatment but there was no glycosuria. The reactions to epinephrin were the same as in the normal, that is, no change in the pulse or merely a slight and tardy acceleration, a distinct rise in the systolic pressure, and a constant glycosuria. The normal response to the pituitary test is a drop in the systolic pressure with slight if any change in the pulse or sugar content of the urine. With hyperactivity of the thyroid, the reactions are the same as in the normal, except that they are all much exaggerated. Hence exaggerated normal responses point to the thyroid. They urge the accumulation of data in this line, especially in diabetes and epilepsy. [J. A. M. A.]

Graves, W. P. The Endocrines in Gynecology. [N. Y. Med. Jl., November 6, 1920.]

The more one studies the so-called nervousness of women, the more one is impressed with the possibility that the purely nervous mechanism of the body is of secondary importance. It is quite credible that the nerves are only the keys or instruments which are played upon by more dominant agents in the form of the endocrine glands. Whether women may be said to be peculiarly nervous or peculiarly endocrinous, the gynecologist undoubtedly accomplishes more accurate results if he estimates his nervous patients from an endocrinological rather than from a purely neurological viewpoint. Among other points with reference to the ovary as a gland of internal secretion the writer emphasized the following: Dysfunctions of the ovaries are usually attended with various

neuroses. Some of these may be due to the direct disharmonious action of other endocrines, especially those that have an affinity for the autonomic nervous system. In evaluating these neuroses one must also take into account those neurotic habits which are the result of a sense of physical inferiority, and characterized as a continued endocrinous emotional state. From an organotherapeutic viewpoint the ovary must be regarded as primarily a homogenous gland, the essential secreting structure being the interstitial cells. Variations in secretions of different parts of the gland are probably differences of degree rather than of kind. A selective action of the secretion from different parts of the gland is not yet proved and if it exists is probably quantitative. All ovarian preparations exert a specific influence on hot flushes. In this respect the residue to the most intensive, but the difference in efficacy of the various preparations depends to some extent on the idiosyncrasy of the patient. In the treatment of menstrual irregularities ovarian extracts exhibit an undoubted specific action, but this action is inconstant. In temporary functional amenorrhea, delayed menses, dribbling before and after catamenia, and small clotting, ovarian therapy is fairly reliable, and is at least the best asset the gynecologist at present possesses for these symptoms. For the permanent amenorrheas, especially those associated with pluriglandular disturbances, ovarian therapy has little or no effect on restoring the menstrual function, but is of undoubted value in improving the patient's general health. In certain types of dysmenorrhea ovarian feeding is efficacious, occasionally brilliantly so, but is unreliable and often disappointing after giving early promise. In severe types of dysmenorrhea it is of comparatively little help. For menorrhea and metrorhagia ovarian therapy is not indicated.

Downs, A. W. Influence of Internal Secretions on Blood Pressure and Formation of Bile. [Am. Jl. of Physiology, July 1, 1920.]

As a result of his experiments Downs feels inclined to believe that some at least of the endocrine organs exert a specific influence on the secretory activity of the hepatic cells leading to the production of bile. The output of bile in the dog is increased by the administration of secretin. The output of bile in the dog is decreased by the administration of epinephrin and by mammary, orchic, ovarian, pancreatic and thymic gland substances. The amount of bile secreted is not affected in a constant or definite manner by the substance of the spleen and thyroid gland. Blood pressure is raised by epinephrin. Blood pressure is lowered by pancreatic substance and the secretin preparation employed. A fall of blood pressure, ordinarily preceded by a slight rise, is caused by orchic and mammary gland substances. Oscillations of blood pressure are caused by ovarian and thyroid gland substances. Blood pressure is not usually affected by either splenic or thymic gland substances.

Jelliffe, S. E. Parathyroid and Convulsive States. [N. Y. Med. Jl., December 4, 1920.]

Jelliffe outlines the energic point of view that regards the human machine as one that through long evolution stages has learned to capture, transform and deliver energy. He points out the structural integrations that have made this possible and then discusses that part of the structure in the nervous pathways of energy distribution, the synapse, where certain types of disturbance may be found. Such are the tetany like synaptic resistance factors which he argues are under calcium regulation, which itself is under a general organized structure, the parathyroid. He therefore suggests the use of parathyroid in the treatment of certain types of epileptic phenomena. Just to feed parathyroid to every epileptic and expect him to get well is silly, he says, behind the type of cases of possible action there should be present the specific features of the "hair trigger" synaptic activity as seen in tetany. Careful study of the patient for all of the tetany reactions is needed. Interestingly enough, it has seemed that parathyroid given by rectum in its crude state is its most effective form. Given in other ways, by the gastro-intestinal canal, it undergoes destructive digestive changes; even hypodermic use seems to alter its composition; but taken by way of the rectum it would appear that no such deterioration takes place, and some very surprising and striking results have been obtained, not in the cure of an epileptic specially, but in the help of this one particular factor which Jelliffe emphasizes.

de Lange, Cornelid. Treatment of Tetany in the First Years of Life. [Neurotherapie (Supplement of Psychiat. en Neurolog. Bladen), 1920, Nos. 3–4, May–August, p. 30.]

The authoress describes the etiology of tetany as a disturbance of the correlations-equilibrium between alkalies and alkaline earths; this consists of an increase of the quotient $\frac{\text{alkalies}}{\text{alkaline earths}}$. It is probably founded on an endocrine dysfunction (parathyroids). Its manifest signs are convulsions and spasms, laryngeal, caropedal, sphincteric, of unstriped muscle, and of heart. Its latent signs are mechanical and galvanic hyperexcitability of the peripheral nerves (symptoms of Chvostek, Trousseau, Lust, and Erb). Prognosis generally good if treatment be early. Therapy usually effectual. The authoress treats tetany thus: In artificially fed infants, or in older children, the food must be prepared without kitchen-salt. If the child has been overfed, temporary fasting and a laxative are all that is needed; nothing but good comes from judicious temporary withholding of milk. In convulsions an enema of 0.5 gm. of chloral hydrate, with or without 50 m. grm.

of medinal, followed by another an hour later, if necessary; warm baths are usually unnecessary. As soon as possible, she gives phosphorized cod liver oil (phosphorus 10 m. grm., cod liver 100 grm., twice daily an eggspoonful). If the oil be doing good, she often uses Rosenstein's formula: phosphorus 1/10 m. grm., cod oil 250 grm., five times a day a teaspoonful; this may be continued for many months. After the strict diet limitation of the first week, a very gradual return to the usual milk feeding is made. To the phosphorized cod oil, calcium salts may be added, either 4 to 6 grm. of the chloride a day, or 1 to 2 of the bromide. Or one may use Schloss' prescription, calcii phosphorici tribasici puriss., 10, ol. jecoris aselli 100, twice daily 5 grm. In cases of broncho-tetany —which are difficult to differentiate from broncho-pneumonia during life—she advises hypodermic injections of magnesium sulphate, according to Berend's formula: an 8 per cent. solution is used; of this he gave 0.2 gr. of magnesium sulphate per kilogram of body weight; castor oil is given, and no food is given for six to twelve hours; afterwards phosphorized cod oil is given. [Leonard J. Kidd, London, England.]

Tiling. Two Cases of Tetany with Epilepsy. [Archiv f. Psychiat., u. Nervenk., 1920, Vol. 61, p. 776.]

Two cases of tetany with epilepsy were described. In the first, a woman 34 years of age, without tendency to convulsions, there appeared, two days after a thyroidectomy, a tetany, and a month later epileptic seizures. Implantation of parathyroid glands under the abdomen musculature was without result. The menses ceased; and two months later a trophic disturbance in the fingers made its appearance. When thyroidin tablets in dosages of three grains daily were administered all these symptoms vanished, and under this therapy the patient recovered. The menses became regular, the trophic disturbances receded. When after four months the thyroid dosage was reduced, the tetanic phenomena reappeared. The second case was that of a girl 27 years of ago, who from the second year of her life had been subject to tetanic convulsions with vomiting, and from the sixth or seventh year to epileptic seizures. Psychic disturbances in the sense of anxiety attacks, stuporous or dazed conditions were frequent and she was in a state of epileptic dementia. Somatically there was asymmetry of skull, goiter, puffy, dry skin which in the face was as brown as in Addison's disease, poorly developed mammae with almost male distribution of hair (although menses were regular); gluteal atrophy, waddling gait, degenerated toes, lamellar cataract (Chvostek, Erb, Trousseau, Schlesinger, etc.). There were frequent epileptic seizures, and attacks of tetany at intervals. Because of suspicion of hypothyroidism a therapy of thyroidin was undertaken but was wholly without effect, and the disturbances grew worse even when the thyroid treatment was discontinued. This fact, however, can-

not be regarded as evidence against Bolten's theory of the thyroid-parathyroid origin of epilepsy, as the disease in the author's case was doubtless accompanied by a pluriglandular disturbance. Besides, the chemically prepared tablets may not have the same effect as the organ extract used by Bolten. A series of cases without results after the use of thyroidin and parathyroidin tablets was cited to show that such instances are merely observations and cannot be adduced in disproof of Bolten's hypothesis.

Allen, B. M. The Parathyroid Gland of Thyroidless Bufo larvae. [Jl. Exper. Zoology, February 20, 1920.]

This series of experiments was planned to obviate the disadvantages of mammalian experimental work where both glands are enmeshed in each other. The two glands are quite widely separated in anuran larvae. Many of the earlier experiments upon the relationship between thyroid and parathyroid glands have been carried out upon mammals and in the removal of the thyroid the internal parathyroids have been simultaneously extirpated. The resulting enlargement of the lateral parathyroids might be attributed to the absence of the internal parathyroids, in part at least. In these experiments the tadpoles failed to metamorphosis as is usual. After living varying periods beyond the time of usual metamorphosis and having reached gigantic size, they were and the region of thyroid and parathyroid glands was examined. In anurans the parathyroids are four in number and quite distinct from the thyroid. It was found that there is a very marked hypertrophy of the parathyroids after removal of the thyroid gland, so that they grow to many times the normal volume. There is no deposition of colloid, nor any other evidence of the assumption of a vicarious relationship between the thyroid and parathyroid glands. There were, in fact, not noticeable histological peculiarities of the parathyroid glands resulting from removal of the thyroid gland.

Klose, E. Age Limits for Spasmophilia. [Arch. für Kinderheilkunde, October 11, 1919.]

In this interesting paper the author holds that spasmophilia never develops under the age of two months. Tetany is unknown under this age limit.

Cortier, Victor, and Gonnet, August. Unusual Localization of Tetany in the Adult. [Revue Neurologique, March, 1920.]

In this patient, who was 67 years old, the spasm was limited to the left leg. The patient had emphysema and dyspnea and gave a history of excessive use of alcohol and tobacco. The attacks of painful cramp had occurred for two years and each attack lasted from eight to eleven days. The spasm would last about ten seconds with a period of relaxation of from four to five seconds. During the spasm, the quadriceps femoris and anterior tibial muscles were most affected, with the great toe held in extreme extension. There was no evidence of a lesion in the pyramidal tract. The external popliteal nerve was hyperexcitable to electricity. The author points out that tetany assumes different locations according to the age of the patient. In nurslings it frequently takes the form of laryngospasm (Escherich) and other forms such as spasm of the lip (carp mouth), etc. In this patient the occupation, cabinet maker, may have had something to do with the localizing of the spasm.

Cottenot. Action of X Rays on Suprarenal Glands. [Thèse de Paris, 1913. Med. Rec.]

The x rays behave toward the suprarenal glands in the same fashion as they do in the case of other glands of the organism when given in sufficient doses—they diminish the functions. When given in cases of hypertension, the x rays will diminish the blood pressure, as the clinical experiments of Cottenot have amply proved. This fact brings up another argument in favor of the theory which considers hypernephria as a factor of hypertension, because a rational therapeutic measure is brought to bear on the very cause of this functional disturbance, and at the same time that the pressure drops, the symptoms due to hypertension improve. The value and duration of the lowering of the blood pressure, as well as the functional changes, are variable according to the subject. In some patients the improvement has been maintained for months, in others it has been necessary to renew the x ray applications from time to time. It is in the purely hypertensive cases without appreciable renal lesions that the best results have been obtained, and subjects with mild arteriosclerosis without albuminuria have also been benefited. In albuminuria with high blood pressure, the latter has been decreased, but no functional improvement naturally takes place. In cases of albuminuria with arteriosclerosis the treatment has been found of no avail, although the amount of albumin is not increased by the treatment. By massive repeated radiations, Cottenot has been able to produce lesions of the suprarenals in dogs. The lesions were found in both the medullary portion and the cortex of the kidney, the latter being less involved. The lesions consisted of destruction of the cells by cytolysis and chroma-

tolysis. In one animal a transformation *in situ* of the glomerular cells was found which in their shape, cytoplasm, nucleus, etc., had become identical with the normal cells of the fascicular portion. This can be interpreted in two ways: either the x rays hastened the normal evolution of the cells of the glomerulae or the process was a supplementary one destined to replace the destroyed cells. All these lesions have been found in dogs autopsied from eight to forty days after beginning the x ray radiations. The suprarenals of animals who had been x rayed for months were found absolutely intact, so that if in these cases if there were glandular lesions they must have been transient and the prolonged action of the rays did not prevent the regeneration of the gland. In only one dog was there any marked lowering of the systolic and diastolic blood pressures, and this was one of the animals whose suprarenals showed on post mortem examination important destructive lesions.

Weber, F. P. Suprarenal Sarcoma of Robert Hutchinson Type. [Br. Jl. Diseases of Children, July–September, 1920. J. A. M. A.]

The case cited by Weber is one of primary malignant disease of the medullary portion of the suprarenal gland in a child, aged 5 years, with secondary, multiple, diffuse, more or less symmetrical metastases in the cranium—of the type of which Robert Hutchison, in 1907, collected ten examples. A remarkable feature of the case was the enormous, nearly uniform, enlargement of the whole liver, which during life not only completely masked and concealed the presence of the suprarenal tumor, but also, when considered in association with the history of the medicinal use of brandy, gave rise at one time to the suspicion of alcoholic hypertrophic cirrhosis. It was suggested that the child's blindness might be due to the brandy having been adulterated with methyl alcohol. But this suggestion was found to be wrong, when the remainder of the brandy which had been used was produced.

Sand, K. Modern Research on Biology of Glands. [Ugesgrift for Laeger, August 12, 1920.]

This article is practically a critical review of Steinach's conclusions which, if accepted or not, will give impetus to intensive research. In women growing old seems a more difficult problem for research than in men, since access to the ovaries requires a laparotomy. The tissue producing the sexual hormone might be influenced by the röntgen ray or by autotransplantation or transplantation of young ovaries, however. The ever recurring wish of mankind to live forever has found another "elixir of youth."

De Langen, C. D. The Constitution of the Tropics. [Mededeel v. d. Burg. Geneesk. Dienst. Neth. Indies. 1920, 2. J. A. M. A.]

De Langen here brings down to date his theoretical considerations on the biochemical aspect of life in the tropics, and especially his assumption of the hypersensitivity of the sympathetic nervous system. He found that the cholesterin, other fats and calcium in the blood were below the normal level in European blood, but the sugar content was abnormally high. He ascribes the frequency of convulsions and spasmophilia to this deficiency in calcium. Experience has shown, in one hospital at least, that 3 gm. of calcium given daily to all the patients indiscriminately, seemed to hasten recovery and render it more complete. The uric acid content of the blood was found within normal range, identical with American values and perhaps a little higher than the European. He emphasizes that hypersensitivity of the sympathetic system does not necessarily imply a weakening of the antagonist system. The tonus of the latter may be normal, even although some of its effects may be normal, even although some of its effects may be dwarfed by the stronger sympathetic system. Klinkert's recent publications on eosinophilia are compared with these experiences in the tropics. There is some discordance between his views and the assumption of a tropical sympathicotonia which de Langen has found the rule.

Grant, S. B., and Goldman, A. Study of Forced Respiration. Production of Tetany. [Am. Jl. of Physiology, June, 1910.]

Forced respiration causes symptoms of tetany to occur in the human subject; these include carpopedal spasm. Chvostek's sign, Trousseau's sign, Erb's sign, and in one instance observed by Grant and Goldman a tetanic convulsion. As a result of the fall of alveolar carbon dioxid tension produced by overventilation, there is a reduction of the carbon dioxid capacity of plasma, a change in the reaction of the urine to the alkaline side, a decreased excretion of ammonia, and a slight increase in the calcium content of the serum. The authors believe that the underlying factor in the tetany of forced respiration is the alkalosis. [J. A. M. A.]

Heinekamp, W. J. R. Modification of the Action of Adrenalin by Chloroform. [Jl. of Pharmacology and Experimental Therapeutics, November, 1920.]

Experiments proving the fact that chloroform is toxic for heart muscle producing or tending to produce weakening of the organ, are here set forth under chloroform anesthesia, inhibition after administration of adrenalin, is due chiefly to the toxic or paralytic dilatation of the heart, ventricular fibrillation supervening. Adrenalin is contraindicated because of the action of chloroform on the heart wherever chloroform

is used and chloroform wherever adrenalin is used. The blood pressure has no definite reflex relation to the production of the paralytic dilatation. It has, however, a most important direct action by preventing the ventricle from emptying itself. The adrenalin action is peripheral, since it occurs after section of the vagi.

Fischer, A. W. Fatal Single Dose of Epinephrin. [Münch. Med. Woch., July 23, 1920.]

Fischer was called on to give a medicolegal opinion in a case in which, by mistake of a nurse, in place of the usual 1 per cent. procain-epinephrin solution, 10 c.c. of 1:1,000 solution of epinephrin were injected into the skin and muscle of the leg of a man of 35 in connection with an operation for bone fistula from a gunshot wound. The aim was to block the peroneal nerve at the head of the fibula and the tibial nerve above the ankle. Anguish followed the injection, with severe pain in the neck and back of the head, and palpitation of the heart. The pupils dilated and contracted, and in about six minutes death ensued, with manifestations of heart failure. During this six-minute interval the pulse was not perceptible to the finger. Necropsy several days later revealed status thymolymphaticus but no valvular lesions. There was no evidence that the epinephrin had been injected directly into the blood stream. Fischer was personally convinced that it was a case of epinephrin poisoning, but in view of the pathologic condition of the thymus he felt compelled in his decision to take a noncommittal attitude. The dilatation of the pupils, together with the pain in the head and the imperceptible pulse pointed to epinephrin poisoning, a general spasm of the vessels with consequent anemia of the brain. He therefore recommends caution as to the size of the single dose, but adds that, owing to the transient effect of epinephrin, the total daily dose need not be so carefully controlled. [J. A. M. A.]

Arnstein, A., and Schlesinger, H. Unusual Effects of the Adrenaline in the Older Age. [Wiener klin. Wochenschrift, 1919, Nr. 49.]

After subcutaneous injection of adrenaline (0.3 to 0.8 milligr.) in old people one sometimes observes hypotension after or without increasing of pressure or equal remaining pressure without any change of the pulse or with longer (also for hours) lasting tachycardia; the hypotension begins soon after injection and often persists for hours. The tachycardia and the settling of the pressure do not often go together. In several cases this event corresponds to a weakness of the heart; then there is tachycardia. In other cases—if there is a settling of pressure—we think of the effect of an irritation of the vasodilatators by the adrena-

lin. An impoverishment of lime of the organism may favor the irritation of the vasodilatators. Old people sometimes have tachycardia persisting for hours, also without accompanying settling of pressure, or there is missing an influence of the number of pulsation, perhaps on account of the changed form of reaction of the nervous apparatus. The development of the attacks of the stenocardia seems to be observed only in atheroma of the coronary arteries. The spasm of the coronary vessels seems to be the effect by a paradoxical reaction which is formed in stronger resistances for the heart-working. Perhaps the initial contraction of these vessels after injection of adrenalin is prolonged and deepened and favors the appearance of the attacks of stenocardia, when the heart-vessels are affected. [Author's abstract.]

Schulmann, E. Syphilis and the Endocrine Glands. [Paris Médical, May 29, 1920.]

Schulmann concludes from his review that some derangement of some endocrine gland is responsible for all forms and cases of malformation and abnormal growth. Whenever there is a possibility that syphilis is responsible for the endocrine derangement—and this is far more common than generally realized—prompt treatment may ward off further damage, attacking the spirochetes with swift and vigorous blows and combating the dystrophy with potassium iodid and organotherapy. The intensity of the treatment must be gaged for the patient and the glands involved; special caution is necessary with suprarenal insufficiency as any arsenic preparation by the vein might bring on acute disturbance from the superposed poison. [J. A. M. A.]

Cordier, V. Tetany from Hemorrhage in Parathyroids. [Ann. de Méd., 1920, 1920, 7, No. 5.]

A man 41 years of age, suffering from a chronic dysentery with paroxysmal pains in the neck, suddenly developed tetany of the arms and hands. A hematoma in the tracheothyroid space, destroying the right parathyroids, with hemorrhages in the left parathyroids, was found on autopsy. Hemorrhages in the parathyroids in adults are rare in comparison to children, Yanase's figures being as high as 37 per cent. for children.

Fryjii, I. Suprarenals in Experimental Diabetes. [Tohoku Jl. of Experimental Med., Sendai, April 29, 1920. J. A. M. A.]

Changes were found mainly in the chromaffin substance of the suprarenals during experimental diabetes of central origin. Among the other points brought out in the tabulated findings from the sugar puncture and drug tests on rabbits is that the splanchnic nerve on each side innervates the epinephrin secretion only on the same side.

Flörcken, H., and Fritzsche, G. Parathyroid Grafts in Postoperative Tetany. [Zentralblatt J. Chir., August 14, 1920. J. A. M. A.]

Flörcken and Fritzsche report a case of tetany following a bilateral goiter operation in a girl of 12. After suffering eleven years, especially during the months from January to May, from serious tetany symptoms, a goiter operation was performed on a patient of about the same age (23), and the right, superior parathyroid and a portion of the thyroid from the region of the right, inferior parathyroid were implanted in the right obliquus internus muscle of the tetany patient. Previous to the transplantation parathyroid tablets had been prescribed, but following the operation all medication was discontinued. While the patient cannot be said to be cured, she has been much benefited. The parathyroid tablets may have had some effect, but the good results can hardly be due entirely to their use, as severe cramps in the arms had occurred after the parathyroid tablets had been administered for several weeks, whereas after the transplantation the cramps ceased although the tablets had been discontinued.

Hammar, J. A. Plea for Systematic Research Work in Endocrinology. [Endocrinology, January–March 1920.]

The author here states that direct lesions of endocrine organs occur and frequently a certain clinical syndrome has more or less unanimously been considered to be connected with such lesions of one organ or another. To discern such direct lesions, at least when they are somewhat pronounced, our present knowledge has often proved sufficient. But in connection with exophthalmic goiter, Addison's disease, acromegaly and diabetes occur, formes frustes, in which the want of precision in our present anatomical knowledge is perceptible. The endocrine organs are closely connected with each other functionally, so that a disturbance in the function of one of these organs involves a disturbance in the function of a larger or smaller number of the others. Whether this state of things is characteristic only of the endocrine system or whether after more careful research anything of this sort will also be proved for other organs of the body is another question. It is sufficient to establish that in such cases we must reckon not only with direct but also with indirect disturbances of the endocrine organs.

Lereboullet. Diseases of the Endocrine Glands. [Gaz. des Hôp., October 9, 1920.]

According to this author the endocrine glands play a considerable rôle in pathology and by reason of excess, diminution or vitiation of their secretions cause many diseases. One gland only may be concerned at first, but the tendency is for several to be involved either simultaneously or in succession. The various syndromes should not be

attributed merely to altered chemistry of the blood for there is another component which involves the visceral nervous system. The benefit which accrues from the use of organ extracts in disease should not straightway be attributed to the making good of a deficiency, and the use of pluriglandular extracts is to be encouraged. Endocrine subjects can be improved by other forms of medication as seen in heredosyphilitics who present glandular syndromes and in which cases great benefits are obtained by opotherapy conjoined with antisyphilitic measures.

Savy and Langeron. Tetany and Chronic Diarrhea. [Lyon Méd., August 25, 1920.]

A man, aged 42, contracted malaria and amoebic dysentery, eight and three years previously, and had chronic diarrhea, polyuria, and cachexia. Emetine and astringents was successful on two occasions in stopping the diarrhea, but each time led to an attack of tetany of the upper limbs. Raw meat and calcium chloride therapy in conjunction with astringents it was found possible to diminish the diarrhea without inducing tetany, but the patient died during an acute malarial crisis. At the autopsy the thyroid was normal, the external parathyroids could not be found, and the internal parathyroids showed no hemorrhages, inflammatory changes, or sclerotic changes.

Mauclaire, P. Suprarenal Virilism. [Bull. de l'Académie de Méd., July 6, 1920.]

This by no means rare syndrome is discussed by the author in the findings of another case in which a tumor in the suprarenal cortex was present. Male characteristics were quite obvious in this woman of thirty-eight. In the course of six years the mammae had atrophied, the outlines of the body become less rounded, and a beard developed, compelling the woman to shave. He refers to similar cases on record and theorizes that the ovaries or the principal or accessory suprarenal glands in degenerating may acquire functions like that of the testicle hormone.

Kato, T., and Watanabe, M. Action of Epinephrin on Pupil. [Tohoku Jl. of Experimental Med., Sendai, April 24, 1920. J. A. M. A.]

Kato and Watanabe refer to the action of epinephrin on the pupil after repeated subcutaneous injections of the drug. Instead of the usual dilatation of the pupil, it contracts. This does not occur when the eyes are under the influence of atropin or when the epinephrin is injected for the first time. The contraction occurs probably from chemical changes in the muscles controlling the pupil.

Danielopolu. Tetany of the Vegetative Nervous System. [Bull. et Mém. de la Soc. des Hôp. de Paris, July 22, 1920.]

A boy 18 years of age who was recovering from cystitis with pyelonephritis in the course of three months had four typical attacks of tetany, lasting thirty-five to forty minutes. In addition, and as often as once or twice daily attacks of profuse perspiration, which almost invariably affected, for the first thirty to sixty minutes, the left side of the body only occurred. During the remainder of the attack (ten to forty minutes) both sides sweated equally. During these periods the systolic blood pressure was from 7 to 25 mm. higher in the right brachial artery than the left, and the axillary temperature was about 0.4° C. less on the left; the knee-jerk was exaggerated, and there was hypoesthesia to tactile, painful and thermal stimuli in the left leg.

Jacobowitz, S. Calcium Content of Blood in Tetany. [Jahrb. f. Kinderheilkunde, 1920, 92.]

The calcium content of the blood is here measured by a new micromethod. Twenty-one children free from tetany and a number of others with tetany were measured. The calcium was found to be decidedly lower in the tetany group. The calcium level in the blood was apparently unaltered on administration of calcium by the mouth, even when the therapeutic results following calcium therapy were excellent.

Laignel-Lavastine, and Duhen, P. Parathyroids in the Insane. [Ann. de Méd., 1920, 7, No. 6.]

Minute pathological analysis was made in sixty-four cases. Great variability was evident in the number, shape and structure in different subjects. There was one parathyroid present in seventeen, and in one case of myxedema the parathyroids were absent. No comprehensive deductions could be drawn. The observers did not direct their attention to anomalies of calcium metabolism, nor to hypermotility syndromes.

Lange, R. Parathyroid Implants in Tetany of Infants. [Monatsschrift f. Kinderheilkunde, July, 1920.]

The author reports chiefly negative results in four infants operated upon.

von Meysenburg. Spasmophilia and Vitamins. [Am. Jl. Dis. Children, September, 1920.]

The conclusions reached by this author negative the heypothesis that spasmophilia is related to water-soluble vitamins in anyway.

II. SENSORI-MOTOR NEUROLOGY

1. PERIPHERAL NERVES.

Richter, Eduard. The Biological Laws of Stimulation in Centrifugal and Centripetal Nerves. [Zeitschr. f. d. ges. Neurol. u. Psychiat., 1919, Vol. 48, p. 378.]

The laws of nerve stimulation as given by Pflueger and Du Bois-Raymond apply only to the motor nerves. Experiments undertaken by the author show a difference in the reaction of centrifugal and centripetal nerves to electric stimulation. When he placed the anode on the bulbus (or on the eyelid) and the cathode behind the eye at the roof of the pharnyx, the nervus opticus was kept in a state of stimulation with perception of light so long as the electric current streamed in from anode to cathode. If, on the other hand, the cathode was placed on the bulbus and the anode behind the eye the retina remained in darkness during the entire time of stimulation, there being only a momentary flash of light when the current was opened or closed, thus proving conclusively that the phenomena of light depends entirely on the direction of the current. The same law was found to hold of the other special senses. Not so the motor nerves. If the anode is placed on the anus and the kathode below the epicondylus medialus at the head of the flexor carpi muscle, this muscle is set in a state of contraction which continues as long as the current is applied. The current may be called the normal working stream. As the spinal column represents the central organ the action of the anode begins at the center and the continuous stimulation is produced by the out-flowing current. If the cathode is placed at the anus and the anode at the flexor ulnaris muscle stimulation is only shown when the contact is made and broken. The author sets forth a theory of a possible connection of the nerve currents with metabolism, in analogy with the electrolysis which takes place in a galvanic battery. The physiological process would proceed in accordance with Faraday's law which says that the quantity of substance appearing at one and the same electrolyte is proportional to the current. In the centripetal nerves the peripheral acid accumulation and the central alkali would establish a difference of tension having as result the stimulation of the nerves of special sense. Inversely the current determining acids at the center and alkalies at the periphery would produce the difference in tension resulting in motion. In the central organ associations and connections of acids and alkali bases could take place under conditions which would further the growth and preservation of central nerve cells. The author asserts that this concept of the connection between the centripetal and centrifugal systems conforms to the teleological needs of the organism and fits the physiological conditions better than any other. The colloid bodies are constantly washed by a blood system containing alkali bases

while acids of all sorts (uremic, phosphoric, etc.) are eliminated. The acids of the stomach, the carbonic acid of the lungs show that the secretory nerve X is under centripetal influences. A further application of this law in reference to the eye which responds to the current only in one direction, the inflowing, places us in a light system and, consequently, in a definite place in the cosmic order, so that our bodies through the sensory organs have determined spacial and temporal contact with the environment. The author also shows the significance of his views to problems of disease and therapy.

Pollock, L. J. The Clinical Signs of Nerve Injury and Regeneration. [Surgery, Gynecology and Obstetrics, May, 1920.]

Some of the signs of nerve injury and regeneration are studied relative to their interpretation. Attention is called to the widespread occurrence of supplementary movement which may be misinterpreted as signs of incomplete lesions. The significance of nerve overlap as related to the preservation of pain sensibility within the area of sensory supply of the severed nerve is described. It is emphasized that no method of clinical research permits differentiation of physiological interruption from anatomical section of a peripheral nerve. Of electrical reactions it is stated that the slowness of the muscular contraction is the only constant phenomenon which can be satisfactorily employed in determining the reaction of degeneration. Although electrical examination afforded no means whereby anatomical section could be differentiated from physiological interruption within a year following injury, after that period of time the cases of section showed complete loss of response to all forms of electrical stimuli. The longitudinal reaction did not prov to be of any value. Atrophy was of service in denoting the severity of a lesion only when seen soon after an injury. When observed a number of months following injury, many cases of complete section showed but slight loss of tissue, when measured by water displacement, whereas some cases of minor injury showed great loss. Absence of pain, when the trunk of the nerve is subjected to pressure below the seat of the lesion was not found to be a reliable sign, nor was absence of pain upon pressure of the paralyzed muscles. When tone was measured by a tonometer it was found that only for a short time after injury was the loss of tone any indication of its severity. Here the difference in millimeters of mercury was expressed in the ratio of 160 to 180 in normal muscle to 40 to 60 in the paralyzed ones. Relative to trophic disturbances, it was noted that where protopathic sensibility was lost ulcers were likely to occur. When an extremity was immobilized growth of nails ceased. When an extremity was protected by a dressing hypertrichosis was at times observed. In other words, the so called trophic changes were associated with some mechanical condition.

Some of the clinical phenomena associated with regeneration of nerves were analyzed. Many cases of complete physiological interruption of a nerve showed their first sign of regeneration at such a time as one would expect it to occur were the nerve divided at the time of injury and suture. Pain upon pinching of the skin very often was the first sign of nerve regeneration. Frequently spontaneous aching or "different feeling" preceded other signs. Only that return of sensibility to pain which occurred outside the area of possible nerve overlap could be interpreted as a sign of regeneration. Certain individual characteristics relative to the recovery of muscles were found in the various nerves, differing as to whether the recovery was spontaneous or followed primary or secondary suture.

The disappearance of the reaction of degeneration, the return of objective sensibility in the isolated supply of a peripheral nerve and the return of motion were the only certain signs of regeneration. The sensory and motor signs were the only constant ones. The other signs, widely described, were suggestive but never positive. [Author's abstract.]

Stopford, J. S. B. The Results of Secondary Suture of Peripheral Nerves. [Brain, May, 1920.]

All the results of secondary suture, followed for a period of not less than six months after operation, are here reported upon, a total of 271 examples of end-to-end suture being reviewed. Factors of importance influencing the progress and result are the interval which has elapsed between the reception of the injury and the date of suture, the surgical technique adopted, the condition of the nerve found on exposure at operation, and certain more frequent complications, such as prolonged sepsis in the neighborhood of the nerve, ligature of the main artery in the proximal part of the limb, and ununited fractures of the humerus. The longest delay encountered was three and a half years, in two patients with injury to the median at the elbow. The recovery was not good. A delay of twelve to eighteen months, unless caused by sepsis, appears to have no marked effect upon the date or extent of recovery. The technique adopted by Dr. Stopford was as follows: After free exposure, the extremities were excised until distinct nerve bundles could be seen, the ends were then brought into as perfect apposition as possible without distortion. Whenever practicable, only sheath sutures of catgut were employed, but in the larger proportion one tension suture through the substance of the nerve was found necessary. The effect of the through and through stitch is perceptible, in comparing progress and results with and without tension sutures. No protective material has been used to surround the line of suture, a procedure which has many advantages.

The prognosis is affected by sepsis, the site of suture, the prognosis being more favorable the nearer the suture is to the spinal cord. Bad shunting [efferent fibers passing down to afferent terminals or vice versa], which frequently occurs even with the most perfect surgical technique, is probably a common cause of imperfect recovery in such nerves as the ulnar. Incomplete recovery may also be caused by destruction of branches of the nerve, in addition to injury to the trunk. Ununited fractures especially of the humerus in injuries to the masculospiral are serious complications. Primary fixation of the bone seems advisable.

The intrinsic muscle of the hand and the muscles in the distal part of a limb recover less frequently than the larger muscles in the proximal part. Several factors in explanation of this are probably the distance which the young nerve fibrils have to travel away from their trophic center in the spinal cord to reach the muscle; the size of the nerve of supply; the phylogenetic history of the muscles.

The through and through suture should be avoided. The construction of a new bed for the nerve after suture is preferable to the use of any autogenous or heterogenous protective material. Displacement of the ulnar nerve in front of the internal condyle or widespread freeing to procure apposition of the ends does not appear to retard recovery. Liberal resection of the injured ends is essentially, especially if there is sepsis. No recovery after secondary suture could be regarded as perfect. The intraneural anatomy must necessarily be disturbed in resected cases. The nerve is making a second effort to regenerate, the first attempt being represented by a neuroma or outgrowths along fascial plants. [Stragnell.]

Souttar. Place of Electricity in Diagnosis and Treatment of Nerve Injuries. [Br. Med. Jl., September 11, 1920. J. A. M. A.]

In the case of an injury of a peripheral nerve Souttar says the use of electrical methods, merely to discover whether the nerve is divided or not, is of no great interest. It is when approaching the period of recovery that the importance of refined methods becomes pronounced; but even here the eye and hand of the expert rather than the actual method which which he employs counts. After all the work that has been done, and all that has been written on the subject, it still remains true that the subtle change from slow to pick response, with all that it means of recovered nerve and awakening muscle, is as evident to the trained eye, whether it be produced by a simple galvanic set or by some elaborate electrical device. This change in Souttar's opinion is by far the most important index of recovery. It precedes the return of voluntary power and of faradic response by a period which may vary from two or three weeks to several months; it invariably appears if recovery

of function is ultimately to occur, and is a sure indication that a certain degree of recovery has already taken place. The actual response may be observed either in the muscle itself or in its tendon. If the presence of a quickened response is an encouragement to be eagerly looked for, its absence should be a check to the undue optimism which has done so much to darken knowledge of the results of nerve suture. The primary object of the application of electricity to a paralyzed limb should be the production of contractions in the paralyzed muscles, and the surest direction of progress lies in the development of special forms of current for this purpose. The faradic current can be used to exercise the normal muscles, to free them from adhesions, and to restore them to their full vigor.

Walshe, F. M. R. Local Paralysis Following Superficial Injuries. [Brain, Vol. XLII, Part IV.]

This author here comments on a small group of cases of local paralysis after injury to a limb, in which no nerve trunk has been involved. The injury may be trivial and may produce marked paresis or paralysis, with wasting of muscles and diminution of their faradic excitability, impairment of the corresponding tendon jerk, subjective and objective sensory and vasomotor disturbances. These signs have a definite localization corresponding to a peripheral innervation. In every instance the injury was within the territory innervated by the affected nerve and cutaneous nerve endings were either directly injured or overlaid or in some way involved, while the trunk escaped. Sepsis was not an essential factor. They approximate the condition known as ascending neuritis. It is probable that a small proportion of Babinski's physiopathic disorders may have been of the same nature.

Thorburn, W. End Results of Injuries to Peripheral Nerves Treated by Operation. [Br. Med. Jl., September 25, 1920.]

The impression is conveyed to Thorburn by a review of reported cases that secondary nerve suture gives very good results in somewhere between one-third and two-thirds of all cases, but the most careful study of original articles, as well as personal experience, leads him to believe that a perfect neurologic recovery is rarely if ever obtained. Permanent disability may be masked in various ways, but is almost invariably to be detected if carefully searched for. Complete failures are by no means uncommon, and must be looked for in a very definite percentage of even the best operations. Such appear to be the general results in the case of secondary suture. In the case of grafting, much less is to be hoped for. Thorburn believes that it will be found that the greater the experience of end-to-end suture, the less often the need for grafting will be found to arise. So much can be done by bold operating, by extensive

exposures, by thorough stretching of nerve trunks, by alteration of their anatomic course into a shorter bed, and by the operation of stretching in two stages, that grafting will always be, and should always be a last resort. He has yet to see any cases in which it has been a success.

Sargent is somewhat skeptical as to how end-results following nerve surgery should be estimated as improvement continues to be noted three or more years after operation. Late results is the term he prefers. The method of determining these results are discussed. [J. A. M. A.]

Neel, A. V. Injury of Brachial Plexus from Vertebra. [Hospitalstidende, September 22, 1920.]

Five cases are here reported upon with slow progressing atrophy of the muscles of hand and forearm and neuralgic pains in the arm and a tender bony prominence in the supraclavicular fossa. In one of the cases the disturbances developed after a joint disease elsewhere. Instead of the expected cervical ribs, however, the röntgen ray revealed an abnormally large transverse process in the seventh cervical vertebra. This pressed on nerves and thus injured the brachial plexus. The patients were all women between 32 and 51, and operative treatment was advised for the younger woman. Some of the patients were under observation for a year or two, so that other causes for the disturbances could be excluded.

Nathan. Exostoses Following Nerve Wounds. [Ann. de Méd., No. 2, 1920. B. M. J.]

The case of a 24 year old soldier is here reported who, wounded by a revolver bullet in the left calf, subsequently developed neuritis of the left external popliteal nerve, and especially of its musculo-cutaneous branch. A sessile exostosis, the size of a small hazel nut on the antero-external surface of the head of the first metatarsal, and a similar exostosis on the antero-internal aspect of the head of the fifth metatarsal was revealed by an x ray examination. Trophic change similar to the hyperostosis met with in syringomyelia is the given interpretation.

Jalifier. Nerve Grafts. [Lyon Chirurgical, May–June, 1920.]

Nageotte's method of hetergrafts was applied and here reported upon by the author in seventeen cases of old injury of nerves. The best results were obtained with the ulnar nerve. Failures with the sciatic, median and in one the ulnar are reported. The interval since has been less than a year but regeneration is certain in three cases and probable in four others. The nerves grafted were from calf embryos.

Burke, N. H. M. Electrical Testing of Nerves at Operation. [Br. Med. Jl., September 11, 1920.]

Electrical conductivity, as well as excitability, are conclusive evidences of physiologic continuity of nerve fibers. An immediate improvement in electrical conductivity or excitability after neurolysis is suggestive of very slight compression, possibly chemical nerve block, and justifies a good prognosis. Absence of conductivity and excitability after neurolysis, indicates a severe nerve disturbance but is not conclusive proof of complete division of a nerve trunk.

Grabfield, G. P. Path of Faradic Sensibility. [Am. Arch. Neur. and Psych., July, 1920.]

The evidence collected by Grabfield has been largely gathered from a study of cases presenting certain neurologic lesions or psychiatric conditions, and suggests that faradic stimuli of liminal value probably follow the path of the thermal fibers, while markedly supraliminal stimuli may use other paths. The postrolandic cortex is in all likelihood the arrival platform for these impulses. [J. A. M. A.]

2. CRANIAL NERVES.

Schoenberg, M. J. Diagnosis and Treatment of Luetic Involvement of Optic Pathways. [Arch. of Ophthalmology, March, 1920.]

The author says that although our present means of establishing a diagnosis constitute a pretty good armamentarium to furnish more or less satisfactory information, early diagnosis of syphilis of the optic pathways is not made except in an infinitesimal percentage of cases. He asserts that examinations should be begun as soon as the primary lesion makes its appearance and repeated at regular intervals during the entire time the patient is under the observation of the physician. Diagnosis must be accurate, and one of the most difficult problems is the diagnosis of a nonsyphilitic condition in a patient with syphilis. There are many pitfalls, of which he considers the first and most dangerous to be the Wassermann blood test. It has almost became an established tradition that a patient with an optic neuritis or an optic atrophy, and a three or four plus Wassermann blood reaction, must have a syphilitic optic nerve lesion, yet nothing may be further from the truth. A single blood test can never be depended on for a final decision. The condition may be due to a cause other than syphilis, though the patient be syphilitic, or it may be due to syphilis plus one or several other causes. Conditions to be borne in mind while investigating such cases include, first, acute or

chronic sepsis from foci of infection in nasal sinuses, tonsils, teeth, gall-bladder, appendix, genitals, and intestines; second, acute or chronic toxemias, lead, arsenic, alcohol and disturbances of digestion, nutrition, elimination, and the endocrine system; third, acute or chronic trauma, emotional, physical, occupational, such as aneurysms, empyema of the nasal sinuses, periostitis of the optic foramen; and fourth, heredity and congenital conditions. One of the most valuable additions to our diagnostic armamentarium of late years is the examination of the spinal fluid. The information we obtain shows us whether we have to deal with a luetic involvement of the central nervous system; gives a clue as to about what pathological type of lesion of the optic path we are dealing with, and furnishes us a good deal of information about the prognosis. Concerning the disagreement of opinion regarding the indications and efficacy of intraspinal and intracranial medication, he thinks that the good results obtained are due not so much to the medication as to the meningeal reaction, the active hyperemia.

After a diagnosis has been made we must ascertain whether there is yet present an active process. End results of a condition which has come to a standstill need no treatment. A partial optic atrophy with no tendency to progress, with negative findings in the blood and spinal fluid, and no clinical evidence of an active neurological disease, should be watched but not treated. For patients with vision reduced to counting fingers at a few feet, poor fields and atrophic discs, there is not much hope. There remains the group of cases with 20/200 vision or more, with fairly good fields, and in good general condition, to be treated according to the type of neurolues and type of optic nerve lesion present. Therapeutically it is of the greatest importance to have a clear idea of whether we have to deal with taboparesis, cerebrospinal lues, or a vascular case; what type of optic pathway lesion the patient has, and in what stages of lues the optic pathway became involved. The indications, the dose, the frequency of treatment, and the method of administration are quite different, not only in each type of neurolues, but also in each type of optic path syphilis. It is therapeutically meaningless to say optic atrophy without mentioning the kind of atrophy we are dealing with.

Fortuyn, A. B. Droogleever. Two Nerves of Vertebrates Agreeing in Structure with the Nerves of Invertebrates. [Proc. Koninkl. Akad. van Wetenschappen te Amsterdam, 1919, XXI, H 1, 756.]

The olfactory cells in the vertebrate mucous membrane are "conducting sense cells," as the writer calls them; they are not surrounded by nerve fibers, but their cell body directly passes into a process with all the characteristics of a nerve fiber. These nerve fibers, the fila olfactoria, constitute the nervus olfactorius. So the olfactory nerve deviates in its structure from all the other nerves of vertebrates. In vertebrates conductive sense cells are found only in the rod and cone cells of the

retina, and perhaps in the pineal organ. But the majority of the nerves of invertebrates contain processes of conductive sense cells, which in these animals are always spread about the whole body in all kinds of sense organs. The writer concludes that the vertebrate olfactory nerve conforms to the invertebrate type of nerves. In invertebrates we find ganglion cells generally dispersed along the whole course of the nerve, either separately or in groups, ganglia. In this latter respect the nervus terminalis—which exists from Amphioxus to Man—is of the invertebrate type. The nervous system of Amphioxus has generally been compared with that of vertebrate animals, but in its sensory nerves it possesses the nerves of a true invertebrate; all, or most of them, contain processes of conducting sense cells, these cells being scattered about the whole body; moreover, most of the sensory nerves are accompanied by dispersed ganglion cells. Therefore, spinal ganglia are absent. [Leonard J. Kidd, London, England.]

Salomonson, J. K. A. Wertheim. A Case of Binasal Hemianopsia. [Nederlandsch Tŷdschr. voor Geneeskunde, 1919, LXIII, H 2, 1927 (1 fig.).]

Salomonson reports to the Amsterdam Neurological Society a case of binasal hemianopia in a man aged 59. In 1895 he fractured the base of his skull; eight months later he had defective right hearing and divergent strabismus with diplopia, speech disturbances, facial paresis, and masticatory difficulty; these then disappeared. Gradually the left hearing power diminished. He gradually recovered and did light work for thirteen years. For eight months he has had misty vision in both eyes in the central region; for some months pains in head. Gonorrhea when 17; no lues. Dropsy in legs for two years, which yielded to treatment. He has paralysis of all muscles supplied by the left third nerve, with loss of accommodation. Left facialis slightly paretic. Binasal hemianopsia; in the right eye the boundary is outside the fixation point; above, its boundary extends a little on the nasal upper quadrant; below, it is strictly limited to the middle line. In the left eye the boundary is inside the fixation point. Left eye has diminished vision; fundus normal. Left ear deaf to bone and aid conduction; right ear poor hearing. Loss of left vestibular caloric test; right, rotation and caloric tests show a trace of nystagmus. Loss of ankle jerks, diminution of knee jerks. Wassermann negative. In 1909 Bouman showed that pressure above and behind the chiasma could produce binasal hemianopia by squeezing the uncrossed optic bundles most severely. In Salomonson's case we have first a fractured base of skull in 1895, which gave rise directly to the lesions of the left 8th, 7th and 3d nerves. But as the binasal hemianopia came on only eighteen months ago, a direct connection with the trauma is excluded.

The röntgenogram shows a very wide sella, but no signs of a pituitary tumor and no thinning of bone. But a frontal röntgenogram shows a definite general shadow immediately to the left of the sella, but its cause is not clear. Salomonson thinks a tabetic neuritis is improbable; he supposes the loss of the ankle jerks is due to a senile neuritis. There is definite arterio-sclerosis, but there is no proof of the existence of an internal carotid aneurysm. Salomonson lays stress on the early trauma as a possible cause of a tumor or aneurysm; on the radiographic finding that points to either a tumor or a cranial deformity near the sella; and on the occurrence of binasal hemianopia without any limitation of the temporal fields. This accords best with bilateral pressure on the chiasma. [Leonard J. Kidd, London, England.]

Bakker, S. P. A Case of Hemichiasma Lesion. [Nederlandsch Tydschr. voor Geneeskunde, 1920, LXIV, September 4, 954.]

Bakker reports to the Amsterdam Neurological Society a case of a hemichiasma lesion in a bicycle-worker, aged 37, of good antecedents. In August, 1919, he had a carbuncle on neck, which broke and healed in ten days, without feeling ill himself. Early in September very bad vision in right eye, photophobia, and pain above eyes; great limitation of field, and a hemorrhagic retinitis appeared; in two weeks the right eye was quite blind, with exophthalmos, slight limitation of all ocular movements except that of superior oblique, papillitis with no great swelling but very tortuous vessels; the edema was chiefly on the nasal side. On October 29th sudden severe headache, vomiting and fever; he noticed some failure of vision in left eye. On November 3d very bad vision in left eye, with temporal hemianopia, the boundary between the seeing and the blind halves passing through the fixation point; the nasal half was slightly limited peripherally; a typical left hemianopic pupil reaction. Right eye had no light reaction, but reacted consensually from the left nasal field; convergent squint in right eye; loss of right corneal reflex; right hemianopic pupil reaction. Left Babinski reflex. No other signs. No sella enlargement to radiography. A chiasma lesion was diagnosed, probably a gumma or a tubercle. Sudden death from arrest of respiration five days after admission. Necropsy (only brain examined): basal meningitis about chiasma and bulb; the chiasma appeared swollen; a small opening was seen through which pus flowed on slight pressure. Nasal sinuses and ear normal. Histological examination shows the right optic nerve thinner than left; the whole of the right optic nerve is infiltrated with cells, the left also slightly at its periphery, but not at all in its center. An abscess cavity extends over the right half of the chiasma. The left uncrossed bundle alone is spared. The cerebral abscess localized in the right half of the chiasma had broken through and led to the fatal meningitis; the abscess contained staphylococci. In this

case probably staphylococci from the carbuncle entered the branch of the right ophthalmic artery which supplies the optic nerve, causing inflammation which travelled along the lymph sheaths and produced the cerebral abscess which extended over the right half of the chiasma. The left optic tract showed degeneration throughout its course, but this was much greater in its medioventral and mediodorsal parts. A definite conclusion on the question whether the crossed and the uncrossed bundles have a separate path in the optic tract or run together could not be reached from this case on account of the uncertainty as to the part played by the inflammation present. Degeneration was present throughout the whole of the external geniculate body, and it was greatest on the medial side where the radiation lies near the anterior corpus quadrigeminum. [Leonard J. Kidd, London, England.]

Terrien. Amblyopia Due to Carbon Disulphide. [Paris Médicale, April 17, 1920.]

The history of two patients, aged 45 and 48 years, who were employed for eight hours daily in a badly ventilated mustard plaster factory, is here reported. They had to spread indiarubber in solution on paper which was then covered with mustard. In both of these patients there was a very large central scotoma associated with narrowing of the visual fields. The prognosis of amblyopia due to carbon disulphide is usually favorable and the occurrence of atrophy is rare. Recovery takes place in 33 per cent. according to this author's statistical summary, improvement in 25 per cent., and in 20 per cent. treatment failed. Since the toxemia takes place through the respiratory tract it is important that factories should be well ventilated. As soon as signs of toxemia develop strychnine, small doses of iodides and diaphoretic measures should be employed; vapor baths and infusions of jaborandi leaves are suggested.

Terrien, F. Reaction of Optic Nerve in Meningitis. [Ann. de Méd., 1920, 7, No. 6.]

According to Terrien since the optic nerve is surrounded by meningeal structure, what affects the meninges elsewhere generally affects these surrounding the optic nerve. Lumbar puncture relieves the optic nerve, and antimeningococcus serum aids in combating a perineuritis. The grave ocular complications of former years since lumbar puncture have been made the routine practice are not so prevalent. Syphilitic retrobulbar neuritis and perineuritis also yield to treatment better. A single lumbar puncture in treatment of postmeningitic visual disturbance has improved vision from 1/6 to 2/3, and cured auditory postmeningitis lesions.

Zethelius, M. Lumbar Puncture for Relief of Ocular Symptoms Due to Methyl Alcohol Poisoning. [Hygiea, January 31, 1920. B. M. J.]

Methyl alcohol poisoning is increasing in frequency in Scandinavian countries, as well as in prohibiton areas, and hitherto no satisfactory treatment has been devised for the ocular symptoms provoked. In three cases he has had recourse to frequently repeated lumbar puncture, with strikingly good effects in one case, good effects in another, and comparatively good effects in the third case. As methyl alcohol or its decomposition products have been found in the cerebrospinal fluid in cases of poisoning, the author suggests that lumbar puncture may be beneficial not only by relieving pressure, but also by withdrawing poisons from direct contact with the central nervous system.

Cantonnet, A. Choked Disk. [Bull. Méd., August 21, 1920.]

The diagnostic importance of optic disk edema and its relations to intracranial pressure constitute the chief features of this short study. The functional importance of slight changes is dwelt upon and a blow dealt at those ultra scientific (?) attitudes that counsel waiting until advanced and irreparable damage is done before a "diagnosis" is reached.

Troland, L. T. Vision, General Phenomena. [Psychological Bulletin, Vol. 17, 1920, July, p. 201.]

An excellent general review of the entire literature of 1919 on the subject of the optic nerve functions. Invaluable for its intelligent grasp of the main factors involved.

Lipschutz, B. Doubling of Spinal Cord. [Am. Arch. Neur. and Psych., July, 1920.]

External examination showed no abnormalities in the case reported by Lipschutz. On opening the dural sac, however, the spinal cord was found divided in its caudal portion into two distinct symmetrical halves, the two entirely enclosed in a single dural sheath. Similarly, the arachnoid stretched across as a single membrane. The bifurcation began at the caudal border of the eleventh thoracic vertebra and extended to the caudal limit of the cord, forming two independent symmetrical halves. The caudal limit of each half was at the level of the cephalic border of the first sacral vertebra. The conus medullaris of each half was independent and at the level of the third sacral vertebra, the halves united into a single large filum terminale, the latter coursing caudally for a distance of 5 cm. to gain attachment to the dorsal surface of the first segment of the coccyx. The cervical and thoracic portions of the cord were normal in appearance. The peripheral nerves cephalic and caudal

to the bifurcation presented no variations in the formation of the different plexuses and in their normal peripheral distribution. The inner surface of the dura at the level of the caudal border of the twelfth thoracic vertebra likewise showed an interesting and rare anomaly. Where the division of the cord was total, a distinct band of dura was found projecting between the two halves of the cord. The band of dura was directed ventrodorsally and had a first attachment of 1 cm. on both the ventral and dorsal surfaces of the dura. It was of an hour glass shape and was placed in the sagittal plane. This band or fold was clearly a part of the dura, being of the same texture and consistency. In the unopened dura it seemingly caused no pressure on the halves of the cord. The division of the spinal cord began 0.5 cm. cephalic to the dural band noted above.

Book Reviews

Erben, S. Diagnose der Simulation nervöser Symptome. Zweite Auflage. Urban v. Schwarzenberg, Berlin v. Wien.

We have had occasion to review the first edition of this very carefully worked out volume. In its second edition it appears enlarged and rewritten largely on the basis of the new experiences made possible by the war. Here, as never previously within the ken of the modern neurologist, a host of simulation, malingering and exaggeration problems arose of perplexing character. To establish a fair and reasonable basis for adjudication of the numerous questions that arose therefrom has been a particularly intricate and practical necessity. This volume deals with many of them. The portions of the book of most interest are those descriptive of the cardiac neuroses. Sciatica and its complications, various types of tremor, disturbances in gait and numerous forms of dizziness, headaches and depressed states.

The author adopts a fair situation in the estimation of the conscious and unconscious suppressions of the hysterical reaction, although as yet he has not seen that a psychogenic disturbance has as definite a syndromy as an infectious disease—*i.e.*, if the unconscious factors are laid bare by the psychoanalytic technique. The book is an excellent addition to the many recently published.

Ewald, G. Die Abderhaldensche Reaktion mit besondere Berücksichtigung ihrer Ergebnisse in der Psychiatrie. S. Karger, Berlin.

This monograph of 200 pages constitutes vol. 10 of Bonhoeffer's Abhandlungen and comes from the psychiatric clinic of Erlangen. It is practically the first complete general statement of the numerous findings in the field of humoral pathology initiated by Abderhalden and Fischer's work on the defensive ferments of the body as applied to psychiatry.

The author, who has himself been an investigator of the phenomena, first discusses the general nature and specificity of the protective ferments. This he does in an impartial manner, arranging the positive and negative evidence, in so far as a work of this kind will permit. Especially interesting, although as yet quite unsettled, is his discussion of the humoral reactions connected with endocrine substances.

In the second part of his volume he brings together all of the evidence bearing on psychiatric problems. Here while the results put down are of interest they are far from convincing since the general factors surrounding the vexed problem of "diagnosis" are unsatisfactorily dealt with. While Ewald recognizes the enormous

flux of things from the serological view point—disease labels mean entirely too much. They are dealt with as static entities. Thus are built up such notions as "50 per cent. postitive brain-gonad reactions for 'dementia præcox'"; "40 per cent. triad reactions of brain-gonad-thyroid, for hysteria and psychopaths." If the author realized the fluidity of the disease symbol as well as the variability of the serological reaction we might have had something more valuable—even if interpretative of end results of disease processes rather than as causes, but in the present static state of word definitions which effectually conceal rather than reveal the behavior of things the effort is worth while and the alert observer may glean some useful notions. The dogmatist will swallow it hook, line and sinker. On the whole it is not a bad dose and can be recommended to the student of psychiatric problems, no matter what special mode of approaching may be uppermost for the moment.

Poppelreuter, Walther. Die psychischen Schädigungen des Kopfschuss im Kriege, 1914–1916. Band I. Sehleistungen durch Verletzungen des Okzipitalhirns. Band II. Die Herabsetzung der körperlichen Leistungen, u.s.w. Leopold Voss, Leipzig. Circa 200 Mks.

Although these two solid volumes appeared in 1917–1918 the reviewer has felt they were of sufficient importance to particularize among the numerous larger and smaller neuropsychiatric books of the Great War. They are two of four projected works which contain the field experience of some 700 cases of brain injuries. Others on speech, writing, reading, and on motility disturbances are projected in the author's introduction.

The first volume is a very full and careful record of a great many experiences of disturbances in the sight mechanism from the highest to the lowest of the functions of seeing. This is not only a sensorimotor neurological series of defects—but the patients' psychological mechanisms were very carefully gone into as well so that the work ranges itself with that of Willbrand, v. Monakow, Henschen and others who have gone beyond the merely anatomical situations. It is a very complete and valuable monograph.

The second volume is of an entirely different nature in that it deals with general functional capacity as modified by the injuries of war. Its aim is chiefly sociological and bears on many problems of reconstruction, insurance, problems of support and indigence and the countless aftermath socio-economic problems. The differentiation between actual somatic destruction of working machinery and psychogenic elements—even unconscious—of grafting, playing sympathy dodges, etc., are very broadly and widely considered. It is a sort of study for our reconstruction boards to read—and contains much good material for the handling of compensation problems in civil as well as in material life.

Watt, Henry J. THE FOUNDATIONS OF MUSIC. Cambridge University Press, New York and Cambridge.

We have had occasion in these pages to refer to this author's earlier volume on the Psychology of Sound. Speaking as he does as lecturer on psychology in the University of Glasgow he comes to his new task with a careful and elaborate foundation on fundamental psychological considerations. He here pushes forward into the musical arena and under the general title of a scientific aesthetic hopes to serve both psychologist and musician—and the general intelligent lay public—which we always have with us.

He therefore in a sense recapitulates much of his former work in the psychology of sound in the earlier chapters of this work. In fact the first eight chapters deal with the general psychological aspects—in which much more will be found by the neurologist than he can find in most texts on the physiological psychology of the hearing mechanism. After this he carries the psychological groundwork forward to synthesize the elements of music on the one hand and the sensory stuff and function of music as the musician would work with this sensory material.

The task has not been easy but notwithstanding the many discussable and debatable polemics the author has given us an essentially sound and human production. Historically he has exposed and dissected the various theories of harmonics and in most pleasing manner built up a true synthesis of the function of music as a "soul" function, by which is not meant any theological, metaphysical or spirtualistic category or part of the body embodied or disembodied but the common sense soul of aesthetic delight—the objectification of auditory beauty.

In one regard we find the book deficient. It is a little over systematic and over logical. Aesthetics has a tendency to become a prioristic—even absolutistic. The old Protagorean humanism—that man is the measure of all things—though not excluded from these psychological formulations—yet such an attitude towards aesthetics as a science is not over much stressed.

Oczeret, Herbert. DIE NERVOSITÄT ALS PROBLEM DES MODERNEN MENSCHEN. Art Institut Orell Füssli, Zurich.

In a pamphlet of 95 pages, the author, a practising physician of Zurich, discusses first the older ideas of the nature of nervousness as a somatic disorder; he then takes up the ideas of Freud, Adler and Jung, leading up to the idea of nervousness as largely determined by sociological factors. The chief features in this sociological view point are (1) child bearing and education, (2) the modernistic female and (3) the modern man—these three things are the pivotal points about which the modern question of nervousness revolves. To what solution? The author does not tell us. In this he is modest; and furthermore tells us that the great scarcity of paper cut his thesis off short. We are sorry as it was very interesting. We hope he can finish the story some time as his sketch of the rise of women and the downfall of men was beginning to be quite thrilling.

Becker, Rafael. Die Nervosität bei den Juden. Art Institut Orell Füssli, Zurich.

This short pamphlet of 32 pages intended as a "contribution to race psychology" was written by the author while active in a private sanitarium where he had occasion to observe patients and the literature of the subject was also partly available. There is little profound in the study which after quoting the generally utilized statistics goes on to develop the idea that the Jew is more disposed to neuroses and psychoses than other races and that a feeling of racial inferiority is one of the important factors in the production of this predisposition.

Deschamps, Albert. Les maladies de l'esprit et les Asthenics. F. Alcan, Paris. 740 pp.

This work stands out very auspiciously. His general formula is essentially dynamic. Man is an energy system and the formulation is well under way when the machinery just seems to go on moving but gets nowhere. • Janet's idea of insufficiency and inadequacy—not very far away from the old static idea, degenerée is as far as he gets. The neurotic, the psychotic, is asthenic. In order to make complete relation to reality he must finish his constructive psychical work. He does not, because he is asthenic. Psychoanalysis is treated in a sympathetic manner; regarded as not particularly new, and rather naïvely criticized relative to its supposed pansexualism. It is ardently dealt with purely on its formal, logical side; behind the author's acceptance and discussion there lies no real experience of application.

Deschamps does not in reality get far beyond Dubois' dialectic psychotherapy. Asthenia is a defect in the energy of the mechanism. The reasons for this asthenia are a closed book to the author. The transformer is defective. Hence although we had reason to suppose that we were getting a truly functional treatise, we fall back upon structure after all, not in the purely interactionism sense but in the limiting sense that structure determines function more than function determines structure.

There are many splendid thoughts in this volume—we could have desired fewer words to express them; less repetition and more coming to actual grip's with clinical pictures, all of which modern psychopathology demands.

v. Muralt, Alexander. Ein Pseudoprophet. Ernst Reinhardt, Munich. Mr. 3.75.

This short monograph of 70 pages is founded upon psychoanalytic study of a student of religion of much promise who following a neurotic breakdown came for observation in Bleuler's Clinic at Burghölzli. It originally appeared, in part, as a Zurich University Doctorate Thesis.

It is a fascinating clinical study of a fairly successful analysis of a very sick individual, who might readily have developed a complete religious paranoia on the basis of a psychopathic constitution. That

the severer dissociation and projection stages were hindered seems to have been due to the analysis.

Bousfield, Paul. The Elements of Practical Psychoanalysis. E. P. Dutton, N. Y. 1920.

The author tells us in his Preface, that the object of this work "is to give an account of the theory, technique, and scope of psychoanalysis, in such a form that its essentials may readily be understood by the student or practitioner without previous systematic reading in psychology and psychotherapy."

He then speaks of the necessity for reading many works and of the need for mastering a new nomenclature, which often "leaves him with vague and mistaken notions."

The author first offers a short glossary which is useful. He then discusses the Unconscious Mind, which to him is the seat of memory, habit and other functions not present at all in the conscious mind. He then gives a chapter on Desires and Psychic Energy. Psychic Energy to him is a different form of energy. Chapter III. deals with the Evolution of Erotic Desire, the next, with the Fate of Erotic Impulses. These are both excellent summaries of the general features of the Freudian hypothesis. Parental Complexes follows. Cloacal Eroticism is a new term he introduces, and would designate perineal eroticism as common and undescribed. He evidently has not read Federn's contributions on this subject. Chapter VI. deals with Narcissism quite inadequately in view of the important work done by many psychoanalytic investigators on Narcissistic fixation. In his chapter on Dreams, the author expresses his belief in telepathic dreams. Chapters on brief descriptions of the Neuroses and Psychoneuroses follow. Then a chapter on Technique, which first deals with Jung's Association Method. This is followed by a chapter with an abbreviated account of the findings in a Compulsion Neurosis. The author is under the impression that a compulsion neurosis can be analyzed in three months. Criticisms of, and the Scope of, Analysis are the terminal chapters. On the whole the book is well written, easy reading, and will be useful as an introduction. The absence of a bibliography, or other suggestions as to the great field which has been opened up by this new method of study stamp it somewhat more as a personal plea than a serious contribution to psychoanalytic literature.

Fernald, W. E., and Kline, G. M. Southard Memorial Number. Vol. IV, No. 1, of the Bulletin of the Massachusetts Department of Mental Diseases. February, 1920.

The reviewer wishes simply to call attention to this most valuable and worthily appreciative number of the "Bulletin" containing as it does a full account of the life work of E. E. Southard.

Barbé, André. Examen des Aliénés. Masson et Cie, Paris. 1921.

As Seglas says in an admirable preface to this small volume, "Who dares today, satisfy himself regarding a diagnosis of General Paresis on a mental examination alone?" The somatic syn-

dromy of mental disease is highly important and all progressive students, especially those most enthusiastic regarding psychogenic etiological factors, are united in the belief that structure and function go hand in hand and *all* facts are pertinent facts in so complex a situation as disturbances of psychical activities.

This little book is admirably planned to carry on this general tradition. It gathers together a host of practical examination methods throwing light on the somatic syndromy accompanying the various neurotic or psychotic groupings.

The chapter on the Cerebrospinal Fluid is excellent—also that of the blood; in fact the chapters on the somatic side are excellent—those dealing with neurology are less so, and those dealing with psychological examination methods are the least valuable. The author is evidently much more at home in the chemical laboratory than in clinical psychiatry. Microscopical and chemical symbols are readily handled—they should be—being relatively simple—but the function of intellectual symbols is not so well grasped by the author.

Carroll, Robert S. Old at Forty or Young at Sixty. The Macmillan Company, New York.

Dr. Carroll has interested and cheered us by a number of his writings, not the least engaging of which is this his latest, whose value stands in direct contradiction to this very small notice apportioned to it.

Head, Henry. Studies in Neurology. 2 vols. Oxford University Press, London and New York. $17.00.

The most important of the many researches carried out by Head and some of his confreres are here gathered in two stout volumes. They represent chiefly his researches on sensory neurology and comprise the following papers: The Afferent Nervous System from a New Aspect, by Head, Rivers and Sherren, 1905; Consequences of Injury to the Peripheral Nerves in Man, Head and Sherren, 1905; Human Experiment in Nerve Division, by Rivers and Head, 1908; Grouping of Afferent Impulses Within the Spinal Cord, Head and Thompson, 1906; Gross Injuries in the Spinal Cord, Head and Riddoch, 1917; Sensory Disturbances from Cerebral Lesions, Head and Holmes, 1911–1912; Sensation and the Cerebral Cortex, Head, 1918.

These studies have all appeared in Brain, and with one exception, the last, been abstracted in these pages. It will not therefore be deemed essential to here go over the chief findings which these extremely minute and painstaking researches have added to our neurological store. They are so many and so valuable they must be sought in their original forms, now so beautifully and bountifully provided. We would however call especial attention to the author's Epilogue and certain features of the Appendix, where are brought together some of the general philosophical conceptions reached through these studies, and wherein are discussed certain criticisms of the details of the investigations themselves.

Perhaps due to Dr. Head's general allegiance to the functional integration concept his studies are to be prized more than for the intrinsic nature of some of the findings. He has carried on the spirit of the work of Hughlings Jackson, the foundations of which have been and are constantly in danger of being buried beneath the cold formalisms of definitions, and over emphasis of morphological considerations.

In the Appendix the criticisms of the work of Head by Trotter and Davies, Boring, von Frey and others are dealt with and the new facts elicited by these critical studies integrated into the principles laid down by Head himself. On the whole Head is well able to manage the criticisms leveled against his findings.

This work should be part of the working library of every student of the problems of the physiology of the nervous system constituting as it does a solid and stimulating piece of research.

Van Gehuchten, A. Les Maladies Nerveuses. A. Nystopmyst, Louvain. 1920.

This work was to appear in 1915. The readers of this journal know what happened at the destruction of Louvain and the heavy hand laid upon Van Gehuchten's gentle spirit that in the destruction of his life's work also destroyed him. His son Paul Van Gehuchten has finished this volume from manuscript and photographs saved from the Louvain disaster and in this splendid volume of some 640 pages gives us a manual on diseases of the nervous system, a sort of companion volume to Van Gehuchten's "Anatomie."

Nervous diseases are grouped for didactic purposes here under Peripheral Nerve disorders, Muscle disorders (paralyses) and diseases of the central nervous system, systematized as maladies of the spinal cord, cerebral peduncles, cortex, cerebellum and meninges. Functional disorders also are included under that rather faulty and old fashioned name.

One is struck by the ease and charm of the presentation of the subject which follows the best French models. It is characterized by its fluidity and simplicity, rather than by its completeness, hence the value to students in their initial approach to neurology they are not overwhelmed by the multiplicity and contradictory nature of the vast variety of findings.

The chapters on functional troubles include chorea, paralysis agitans, epilepsy, hysteria, neurasthenia and traumatic neuroses. These are less carefully considered and only emphasize the loss neurology has sustained. The torso of this mutilated witness to Van Gehuchten's sacrifice will also have a value and interest to be found in the printed page in part only.

Gut, Walter. Vom seelischen Gleichgewicht und seinen Störungen. Art Institut Orell Füssli, Zurich.

In the small compass of a 168 page small octavo the author presents to a lay public his ideas on the minor forms of nervous disturbance. They were a series of lectures given to a group of women

interested in a "Fortbildungskurs." He opens his lectures with a discussion of physical illness and psychical reactions, continues on a consideration of character types, the complaining, the careless, the self pitying, the sensitive, the fault finders, and "nervous" and then goes into a description of the developmental conflicts in the home and the consequences. The fourth chapter deals with the evolution in conduct of the manner in which these conflicts go on to develop the "idealist," the "Bolshevist," the "Mystic," the "Religious" and other reaction types; and the final chapter points out some of the ways by which these minor and even major anomalies may be avoided. Altogether a very readable little treatise.

Schröder, Paul. Einführung in die Histologie und Histopathologie des Nervensystems. II. Auflage. Gustav Ficher, Jena.

In eight remarkably clear and simple lectures the author has covered the general histology and histopathology of the nervous system. The special histopathology is not dealt with. The book is illustrated with 53 pictures distributed into tables.

Rehm, Otto. Das Manisch-Melancholische Irresein. Julius Springer, Berlin.

One could write an extensive book review on this excellent monograph of Rehm's, now Oberarzt in the Bremen Staats irrenanstalt. As a student of Kraepelin's the author has received his inspiration from this viewpoint, yet his observations contain much original material and keen powers of observation. He has purposely omitted much comparative material as drawn from literature since Stransky's recently appearing monograph along similar lines contained this material. The author's charts are especially noteworthy. It is a very commendable piece of work, and we regret that the great mass of book review material which has crowded in since the close of the war requires us to be so brief.

Schröder, P. Geistesstörungen nach Kopfverletzungen. Ferdinand Enke, Stuttgart.

The war brought forth innumerable volumes on the results of head injuries from the monumental work of Duret, five inches thick and weighted with nine pounds of facts of every description and from every land to the tiny playlet that made a dramatic picture of a single amnesic patient who robs his own home and steals his own baby. From the serious to the comic the wealth of knowledge has been prodigal.

The present small volume, by the Director of the Greifswald Psychiatric Clinic, is a clear cut and succinct account of syndromes due to head injuries. Commotion psychosis (concussion syndrome) first described in its mild and severe forms. Traumatic Deterioration is rapidly sketched; traumatic epileptic deterioration discussed and trauma as a releasing mechanism in psychoneuroses briefly summarized. It is done in some fifty pages.

Obituary

JOHANN HOFFMANN

Johann Hoffmann died the first of November, 1919, leaving behind him a long and full record of service in the field of neurology. He was not only an investigator extending his researches into many pathways of neuropathology and of electrotherapy, in which his interest had always been active. He was a student also of internal medicine, a teacher distinguished by his accuracy and clearness of instruction, whether in the subjects of internal medicine or of neuropathology and he was also a consultant physician of wide repute both in Germany and in other parts of Europe.

He was born in Rhenish Hessia in 1857. He received his university education in Heidelberg, Strassburg and Berlin and in the end took his medical degree at Heidelberg. Later he succeeded to the professorship, then to the rank of honorary professor. He left his impress upon the Heidelberg school for neurologists not only by maintaining but by promoting its high character. He gave himself unsparingly to his work almost beyond the limits of his strength, for aside from his chief interest in the lines of research particularly his, he carried a full burden of clinical work with clinical instruction to his pupils. The war also brought him added burdens which together with his keen sensibility toward the catastrophe of his fatherland which marked its end, helped to precipitate the illness which brought his death. A few months before his death he had been made professor in ordinary of neuropathology, a goal which was the reward of his long activity.

His publications were many in number and were distinguished by the careful research which had preceded his conclusions and which characterized his clinical work and the clearness with which his reports were made. These articles were published in the Deutsche Zeitschrift für Nervenheilkunde and other neurological periodicals. Among his contributions were those upon progressive spinal muscular atrophy and progressive muscular dystrophy (Erb's). The closer defining of these disease forms and of the intermediate forms connected with them was largely due to his work. He gave the name of progressive neurotic or neural muscular atrophy to a form which he described in two important

papers. He described also a chronic spinal muscular atrophy in children of a familial type to which he was able to bring valuable clinical and anatomical material. He also published a brief resumé of the entire question of the different forms of progressive muscular atrophy, with special emphasis upon the typical hereditary and familial infantile spinal progressive muscular atrophy. He discussed also a third form of progressive muscular atrophy, progressive hypertrophic neuritis, a form of peripheral origin.

The subject of tetany received special attention from Hoffmann and he was able to prove that the sensory nerves as well as the motor showed increased response to mechanical or electric stimulation. He investigated also the relation of the disease to the thyroid and its association with myxedema and a typical myotonia. Myotonia congenita also received careful study at his hands.

He turned his attention also to a wide study of the affections of the peripheral nerves and to various forms of neuritis, among which he was able to observe an instructive case of syphilitic polyneuritis. His studies of the spinal cord are especially distinguished by his detailed work upon syringomyelia, in which his clinical observations were supplemented by a very full study in the pathological anatomy. He contributed also much to the study of tabes and of Friedrich's ataxia. He has also contributed to the study of multiple sclerosis, and to Huntington's chorea, and the traumatic neuroses, although to the diseases of the brain he had given less attention than to those already mentioned.

He not only published widely the results of his studies and practise but he presented his work freely before local medical conferences and occasionally at larger gatherings. He was a man of personal charm and of friendly character but of a modesty and a devotion to his work which kept him from a wide social activity. His indefatigable labors and his thoroughness of work have procurred him a lasting place in neurology.

JELLIFFE

G. RAUZIER

The death of Professor Rauzier still in the active years of his service and interest leaves a gap in French medicine and neurology. He was born in 1862 at Nimes and died in the spring of 1920, at the age of 58 years. He showed himself of brilliant intellect in his college days when he devoted himself to classical studies. At the University of Montpellier he entered with zeal into the study

of medicine and of law but it was to the former that he chiefly dedicated himself. He worked with Widal and Babinski at Paris for a time and then was nominated to the position of consultant at the general hospital at Montpellier. He became supplementary professor in 1892 and in 1907 was made professor of general pathology and therapeutics. Two years later he exchanged positions with Professor Grasset, becoming thereby professor of clinical medicine.

He had earlier been a pupil of Grasset and he continued to work in conjunction with him, assisting him in editing Grasset's last edition of "Traité des maladies du Système Nerveuse" and assisting also Robin and Brouardel and Gilbert in their publications. He himself made many communications upon nervous pathology to the medical sciences at Montpellier and a study of Malta fever. He did some experimental work in investigation of the cerebrospinal fluid and one of his last works was a report upon encephalitis lethargica. He published in 1909 "Maladies des vieillards." He was a man of profound learning and of keen clinical ability who entered into all his work with enthusiasm and energy. He devoted himself to military service during the war, maintaining at the same time his ordinary work. He was a member of the French neurological society from its beginning.

JELLIFFE

MORITZ BENEDIKT

The death of Moritz Benedikt in April, 1920, removed a familiar neurological figure from Vienna circles. He died at the age of eighty-five years, having been born in Hungary in 1835. He came to Vienna at the age of nine years and continued in that city until his death. He studied mathematics and physics before he turned his attention to medicine. After receiving his degree in medicine in 1859 he took up his studies in neurology and became docent in electrotherapy in 1861. He became professor extraordinary in 1868 and soon after was made professor of neuropathology. In 1899 he was honored with the title of professor in ordinary. For forty-five years he was also head of the department at the Polyclinic.

Benedikt was the author of a number of larger publications, the first of which were occupied with the subject of electrotherapy and with neuropathology and electrotherapy. Later the range of these publications shows the widening of his interest into

comparative anatomy, craniometry and criminology and psychology. He published also many shorter articles in various medical periodicals at home and abroad. Besides his interest in the more mechanical side of psychology he was interested in the psychic processes themselves as in hysteria, regarding which he was one of the earlier writers.

His name is attached to a symptom complex which expresses the field of his interest. It is the association of oculomotor paralysis with weakness and motor excitability of the extremities on the other side, a syndrome observed in certain diseases of the midbrain. Benedikt preceded Erb in pointing out the electric hyperexcitability of the nerves in tetany. He was keenly alive to new discoveries in the scientific field and manifested his interest from the first in radiology and its relation to internal medicine.

Benedikt showed from his early student days an interest in literature and drama, and his latest publication, shortly before his death, was an article on Raphael. He was a skilful writer, a brilliant speaker and powerful in debate. His readiness of speech was sometimes used acrimoniously and incurred for him a certain amount of hostility. This was particularly true in his declining years when he had become embittered through adverses in his private life and through illness. He was however capable of sincere friendship and he has always had a wide relationship in other lands than his own. He was honorary doctor in a number of universities, honorary member of various foreign societies and had a wide experience as consulting neurologist in Austria and abroad.

JELLIFFE

RAPHAEL LEPINE

Raphael Lepine died in April, 1920, at the age of 80 years, still working up to his death on the completion and publication of researches in his work upon blood sugar. He had retired in 1914 from active medical service but continued his interest and activity in research pathways. He was born at Lyon in 1840 and served as interne in the hospitals of his native city during the years from 1860 to 1864. He continued this service at Paris where he was fellow interne with Clemenceau. He was a pupil of Charcot and later studied in Germany under Virchow and Ludwig. He was associated with Brown-Séquard after his return from Germany and then served throughout the war of 1870. After this he became

a member of the faculty of the Paris University and remained in this city until 1898. He was also chief of clinic for Germain See. He left Paris in 1898 to take charge of the combined hospitals of Lyon and to become president of the Council of Hygiene in the Rhone department.

He was a man of marked clinical ability and of keen scientific interest. His name is associated with certain discoveries in nervous anatomy and histology as well as familiar through a number of publications. Among his discoveries were the perivascular spaces of the nervous centers, certain vasomotor fibers and centers and he devoted many years to investigation of diabetes and blood sugar He first described cerebral pseudobulbar paralysis and wrote many papers on drug addiction. These were indicative of his wide interest in clinical neurology, while other writings revealed his activity in the subjects of internal medicine, and therapeutics. His greatest work was his book on diabetes published in 1909 while his posthumous work is still to be known. He was one of the founders, along with Charcot and Vulpian of the *Revue de Médecine* and with Charcot of the *Archives de Médecine Experimentale*.

JELLIFFE

JOHN BATTY TUKE

Dr. John Batty Tuke died at a nursing home in London April 11, 1920, where he had been for some time seriously ill. As son of Sir John Tuke he was one of a family celebrated for many years for their philanthropic service particularly in their efforts to ameliorate the condition of the insane. Besides Daniel Hack Tuke is well known as the author of a "Dictionary of Psychological Medicine" and of other writings on the subject of insanity. Dr. John Batty Tuke was born in 1860 and was educated at the Edinburgh Academy, from which he received the titles of M.B., C.M.Edin. in 1881. He took the degree of M.D. in 1890 having been already elected a Fellow of the Royal College of Physicians of Edinburgh in 1889.

He served as assistant medical officer in the Royal Lunatic Asylum at Montrose and then as resident clinical assistant in the West Riding Asylum, Wakefield, before he joined his father to work with him. He was associated with him in the management of an asylum near Edinburgh. This was first at Saughton Hall

and afterward at New Saughton Hall in Midlothian. He himself became superintendent of the latter institution. He published various articles on mental diseases. He also maintained a consulting practice in Edinburgh. He had a large host of friends and was known and loved both within and without his profession.

JELLIFFE

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Figures with asterisk (*) indicate original articles and are accompanied with title. Figures unaccentuated, accompanied with title indicate abstracts.