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Original Articles

A KEY TO THE PRACTICAL GROUPING OF MENTAL DISEASES*

By E. E. Southard, M.D.

PATHOLOGIST, MASSACHUSETTS COMMISSION ON MENTAL DISEASES; DIRECTOR, PSYCHOPATHIC HOSPITAL, BOSTON; AND BULLARD PROFESSOR OF NEUROPATHOLOGY, HARVARD MEDICAL SCHOOL, BOSTON, MASS.

Abstract

Steps in the logical classification of disease.
The task of the psychiatrist contrasted with the alienist's.
Insanity not an entity; neither are all mental diseases *sui generis*.
Disease-group diagnosis in psychiatry, analogous to botanical classification of "orders."
Ten disease-groups or "orders" plus an eleventh for the residuum of cases.
-osis and *-aceæ; Rosa gallica* and *Neurosyphilis paretica*.
The key principle.
Special discussion of the eleven groups, syphilitic, feeble-minded, epileptic, alcohol, drug and poison, focal brain (incl. traumatic and arteriosclerotic), somatic, senescent-senile, dementia præcox, manic-depressive, psychoneurotic, and psychopathic.
Conclusions.

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* Being Contributions of the Massachusetts Commission on Mental Diseases, whole number 196 (1917.16). The previous contribution, 195 (1917.15) was by Curtis E. Smith and L. G. Lowrey, entitled "On the Use of the Emanuel-Cutting Mastiche Test in Examining Spinal Fluids," Boston Medical and Surgical Journal, October 18, 1917. Read at the forty-third annual meeting of the American Neurological Association, May 21, 22 and 23, 1917.

KEY TO THE PRACTICAL GROUPING OF MENTAL DISEASES

The layman makes out in the great majority of cases the gross fact of sickness. The layman works as it were with the naked eye of mere observation. The practitioner soon replaces the gross "*looks sick!*" with the more concrete "*looks surgical,*" "*contagious,*" "*obstetric,*" "*mental,*" "*nervous,*" etc. The general practitioner advances from the unarmed eye of mere observation to the lens-like power of trained comparison. He is termed "general" in that he deals with great groups, classes, or orders of diseases. But these great groups fall short of the true aim of diagnosis, the pragmatic aim of showing what is best to do. These group captions indicate general lines of treatment, corresponding with but the lowest power of the logical microscope. Resort must be had to the specialist, if such exists and is available (or the general practitioner must be his own specialist); in short a higher power of the logical microscope is invoked and "*surgical,*" "*contagious,*" etc., get resolved into "*abdominal,*" etc., "*exanthemata,*" etc. Finally still higher powers of the logical microscope, "oil-immersion systems," as it were, are applied, and the so-called entities, the latest constituents of the nosology of the day, roll into view. Thus, with the progress from mere observation to comparison and synthesis, "*looks sick*" turns, *e. g.*, into "*mental,*" and "*mental*" turns, *e. g.*, into "*syphilitic,*" and "*syphilitic*" turns, *e. g.*, into "*general paresis.*"

In the uneven progress of diagnostic science, as roughly marked out by medical-school departments and by the great specialized medical associations, the "mental" has not been the most favored of the great groups. Alienists, however, are slowly but surely being replaced with psychiatrists. Alienists are required by the exigencies of legal medicine to make the generic distinction "mental," *i. e.*, "insane," and the more canny of the alienists stop with this distinction. Psychiatrists are those whose duty requires them to go farther and identify groups of mental diseases and the entities themselves. The task of the psychiatrist is super-legal, special, concrete, not legal, general, and abstract like that of the alienist. When alienists and psychiatrists are brought into the same courtroom, as in the Thaw case of evil memory, havoc is apt to be played both with legal and with medical distinctions.

In presenting this key to the grouping of mental diseases, I want to make clear exactly what stage of classification I am referring to. (1) The layman is supposed to have made his gross observations. (2) The general practitioner is supposed to have placed the case in the great group of the mental. As yet no alienist is supposed to have approached the case, endeavoring to determine "insanity" for the benefit of some court and to satisfy the dictates of some code of lunacy laws. No! the next phase of inquiry is that of (3) the psychiatrist or of the general practitioner specializing as a psychiatrist.

The object of this psychiatric inquiry is, not to determine what would satisfy a court as to committability, but to determine from a physician's point of view what the disease in question is. The alienist may enter, if he likes or if it is necessary, to determine the medically irrelevant fact of insanity. We shall be even willing to supply the alienist with pertinent records and observations. It is even sometimes true that psychiatrists make reasonably good alienists, just as they may make good hospital superintendents or good laymen. But it must be insisted that the medical problem is distinct from the legal problem, that the problem of the psychiatrist is not that of the alienist.

The psychiatrist now confronts his "mental"—or more exactly his psychopathic—material, freed for the time being of medico-legal (*i. e.,* "committability" or "insanity") considerations. How shall the entity be reached, viz., something to correspond in mental diseases to scarlet fever among the contagious diseases?

The easiest way out perhaps is to deny the existence of entities in mental disease. There are two forms of this contention, first, that mental disease is nothing more or less than insanity, an entity itself, a genus with but one species, or secondly, that all victims of mental disease are individually to be provided with entities, that is, all examples of mental disease are *sui generis*. The development of psychiatry has killed the former contention stone-dead, but the latter contention still flourishes to an extent among those who overstress the "individual factor." And this latter contention is bolstered up by the existence of so many psychopathic patients of whom a diagnosis cannot be rendered for practical or theoretical reasons. However, there are no really consistent advocates of the *sui generis* plan of classification.

Following is my own plan for the analytical consideration of available data in a case of mental disease. I achieve thereby a provisional diagnosis or group-diagnosis which I regard as an important step towards final diagnosis, *i. e.,* diagnosis of the particular group-member or entity. It is hardly necessary to interpolate that, if I can achieve the entity by skipping the stage of provisional diagnosis, I shall do so cheerfully. This list is not a list merely, but a sequence, a key to be followed, when necessary, like a botanical key in the search for the classification of a plant.

I have stressed the key-principle in the method of grouping adopted and shall linger a little on the botanical analogues of the key and the ordered group-list. Omitting details (discussed *infra*), the sequence of mental disease groups I have provisionally arranged as follows:

Mental Disease Groups (Orders)

1. Syphilitic	Syphilopsychoses
2. Feeble-minded	Hypophrenoses
3. Epileptic	Epileptoses
4. Alcoholic, drug, poison	Pharmacopsychoses
5. Focal brain ("organic," arteriosclerotic)	Encephalopsychoses
6. Bodily disease ("symptomatic")	Somatopsychoses
7. Senescent, senile	Geriopsychoses
8. Dementia praecox, paraphrenic	Schizophrenoses
9. Manic depressive, cyclothymic	Cyclothymoses
10. Hysteric, psycho-, neurasthenic	Psychoneuroses
11. Psychopathic, paranoiac, et al.	Psychopathoses

Disregarding for the moment, both the order and the sufficiency of the list, let us consider the nature of the terms. The ending *-osis* was chosen for these groups to correspond exactly with the ending *-aceæ* for certain botanical groups, the so-called orders of plants (for simplicity's sake I pursue here only the botanical, not the zoological analogy). The parallel can be shown thus:

Rosaceæ	order	Syphilopsychoses
Rosa	genus	Neurosyphilis
gallica	species	paretica
R. gallica	name	N. paretica
red rose	common name	general paresis

or,

Cucurbitaceæ	order	Hypophrenoses
Cucurbita	genus	Hypophrenia
Pepo	species	idiotica
C. pepo	name	H. idiotica
pumpkin	common name	idiocy

or,

Rubiaceæ	order	Epileptoses
Coffea	genus	Epilepsia
Arabica	species	tarda
C. arabica	name	E. tarda
coffee	common name	late epilepsy

From this hint it may be seen that the use of the plan does not necessarily contemplate renaming diseases, although this may be often very desirable. It is not that a sufficient diagnosis of a given disease is, *e. g.*, "syphilopsychosis," any more than it would be proper to stop in plant diagnosis with *Ranunculaceæ* when the true goal was *Hydrastis canadensis.*

Whereas the ending *-osis* suitably expresses ordinal characters, the ending *-ia* (as in epilepsia, neurasthenia) suitably indicates generic characters of disease; indeed some dictionaries regard *-ia* as primarily suggesting disease. The ordinal ending here preferred is accordingly *-osis;* the generic ending *-ia.*

So much *re* nomenclature may suffice at this time (see below under the separate groups for further remarks). Aside from certain novelties in nomenclature, the plan has, I believe, merit as an application of a key-principle. Even if one were content with ordinary English group names ("syphilitic," "feeble-minded," etc.), still the order of consideration of group-data would remain of commanding importance. Should not a shred remain of the nomenclature just presented, the key-principle in the analysis of clinical psychiatric data would remain of use.

I commend the analysis of clinical psychiatric data upon a key-principle, much as by trial and error in the botanical process of classification. I do not, on the other hand, especially commend the gathering of the data in this order or in any special order. After the data are collected by some impartial process of observation and regular process of recording, I would then proceed to the analysis of the data in the order mentioned. I would give every hypothesis the completest opportunity to verify itself. I would even impress slight symptoms and minor indications into the service of each hypothesis in succession. This artificial bias is perfectly safe, since I am going down the line of possibilities giving the same bias in succession to each. For there is one striking difference between botanical classification and medical diagnosis. In botanical identification (as with Gray's botany) if I reach *Hydrastis canadensis* I hardly need to go farther, so rare are true plant hybrids. But in medicine a man may be victim of several diseases, and one must consider all pertinent possibilities (see below for remarks on "combined psychoses").

The whole matter of quasi botanical and zoological classifications in the psychiatric field would gain from a review on modern lines of the older classifications from de Sauvages and Linnæus: but this is not the place for an elaborate review.

Without further introduction I pass to remarks on the eleven groups themselves. I purposely omit consideration of the disease "genera" under these "orders," because there must obviously be so much controversial in most groups; for the data are not all gathered for a proper taxonomy! However, under the syphilitic and feeble-minded groups I have made suggestions for the "generic" subdivision of these "orders."

1. SYPHILOPSYCHOSES (the syphilitic group). The main representatives of this group are general paresis (otherwise general paralysis of the insane, paralytic dementia, "softening of the brain") and the so-called "cerebral syphilis" preferably termed cerebrospinal syphilis. I have recently tried to bring more order into the nomenclature by throwing together all diseases of the nervous system traceable to syphilis under the term neurosyphilis, the main forms of which are (*a*) paretic, (*b*) tabetic, (*c*) diffuse, (*d*) vascular, (*e*) juvenile, and (*f*) gummatous. The majority of these forms of neurosyphilis are at one or other period characterized by mental symptoms, so that the six-heading neuropathological classification works well enough for the psychoses more narrowly taken. However, the tabetic psychosis (a variety of *Neurosyphilis tabetica*) is exceedingly rare, so rare that I question my ever having seen an instance. On the other hand, mental disease supervening in tabetics is of course common enough and will ordinarily turn out to be part and parcel of general paresis (*Neurosyphilis paretica vel taboparetica*), though sometimes the symptoms will prove due to intercurrent syphilitic blood-vessel disease (*Neurosyphilis arteriosclerotica* plus *Neurosyphilis tabetica*). It is clear that examples will be found of *Neurosyphilis diffusa*, *i. e.*, of a mental disease depending on a widely diffused process, possibly involving meninges, parenchyma, and vessels as well, but having a prognosis far more favorable *quoad vitam* than *Neurosyphilis paretica*. Where possible, the diagnosis should certainly seek to pick out the meningeal, parenchymatous and vascular features, or their combinations, and distinguish these factors in the designations chosen. Something like this has been attempted by Head and Fearnsides, although the *syphilis centralis* of these authors seems not too happy a term, permitting the diagnostician to escape without a prognostic comment and without specifying what he really thinks is going on in the "central" substance.[1]

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[1] For full discussion see Southard and Solomon, Neurosyphilis: Modern Systematic Diagnosis and Treatment Presented in 137 Case Histories (Monograph Number Two of the Psychopathic Hospital, Boston), Boston, W. M. Leonard, 1917.

2. Hypophrenoses (the feeble-minded group). The main representatives of this group are the well-known graded forms of feeble-mindedness (as we use the term generically in America), viz., (*a*) idiocy, (*b*) imbecility, and (*c*) feeble-mindedness proper (the morons of Goddard, collected by Tredgold under the term *morosis,* in point of fact a term used by Linnæus). The excellent results of modern mental testing, however, have left us with a fourth group of (*a*) subnormals, lying between the morons below and the normals above; these may be known as dullards, simples, or stupids (Tredgold), among whom none should be included save those who actually *measure* low by modern scales and gradings. Thus, above (*a*) *Hypophrenia idiotica,* (*b*) *H. imbecilla,* and (*c*) *H. morotica,* we should find (*d*) *Hypophrenia subnormalis* (*sc. metrica*). But, as practical work abundantly shows, there are other hypophrenoses in which available measurements leave us at loose ends or at a loss. These Tredgold inclines to term *Amoralia* on account of their moral deficiencies and as a condensed term for Prichard's moral insanity (or a part thereof). Perhaps the reference to conventional standards implied in such terms as moral insanity or imbecility, or amoralia, is more or less justifiably resented by modern workers. Moreover, sometimes the deficiency is not in morals and yet exists. "Congenital psychopathic inferiority" is a term which covers many of these cases, being perhaps a rough translation of *Minderwerthigkeit.* "Below par" we sometimes say of these cases, being a figurative usage of the term "par" when no method exists of determining what is par (*Minderwerthigkeit* has the same air of greater exactitude than exists). On the whole perhaps we do less violence to existing terminology if we speak of (*e*) *Hypophrenia amoralis.* I often think of the group as one of non-metric or qualitative feeble-mindedness, though it cannot be denied that "qualitative weakness" is a contradiction in terms. This latter objection would be the stronger if we were trying to describe a scale of intensity in some one attribute. In many instances, it has seemed to me as a psychiatrist, these cases of qualitative inferiority are marked, not so much by a weakening of faculties as by a total absence of various faculties, faculties of course that are not indispensable in life. Without endeavoring to prove or expound the idea, what would happen could the instinct of disgust be conceivably left out of a subject's make-up? One could not then measure it: one could merely find it lacking. High evolutionary complications, *e. g.,* disgust, have simply not entered the subject's make-up. Accordingly I personally would prefer (*e*) *H. simplex* (*sc. non-metrica, qualitativa*) to *H. amoralis.*

The classification might go

2 HYPOPHRENOSES

(*a*) H. idiotica

(*b*) H. imbecilla

(*c*) H. morotica

(*d*) H. stupida vel subnormalis (sc. metrica)

(*e*) H.[2] simplex vel amoralis (sc. non-metrica, qualitativa)

I may be pardoned a word on behalf of the feeble-minded patients whom we now so often demonstrate in clinics; it has proved of value to use terms which do not possess unfortunate connotations for the minds of these patients. Of course, idiots are not harmed by hearing the term and the imbeciles not to any extent. It is all very well to call a spade a spade; but if the listener transforms a "spade" into a pile-driver in his own mind, Richard Cabot's warnings about belligerent truth-speaking fall into queer cross-lights. I find it of value to use in clinical demonstrations perfectly exact terms which the patients have no chance to misconstrue. *Hypophrenia morotica, H. subnormalis, H. simplex*, are such terms.

As to the term *Hypophrenosis* itself, it has been suggested to me that *Hypopsychosis* would be preferable. Perhaps so. I considered that "phren" had been used by Kræpelin in his proposal of *Oligophrenia* for feeble-mindedness. Oligophrenosis was then the natural group rendering for the "oligophrenias." I could not see that it was well to preserve the connotation "few" in the prefix "oligo-" which erroneously suggests "*few*-mindedness" where inferiority is really in question. But the other half of Kræpelin's suggestion seemed good, in view of the intellectual trend of the Greek term "phren" which closely imitates the intellectual trend of the term "mind." The "psyche" seems somehow broader than the "phren," just as "soul" seems broader than "mind," at least when both are used. Accordingly hypophrenosis seemed to be the nearest euphonious Greek equivalent of the term "feeble-mindedness," a term which, lying in the midst of the group, has succeeded in dominating the whole.

3 EPILEPTOSES (the epileptic group). Without here entering the vexed question of the classification of the epilepsies themselves, I will use the heading to call attention to a feature in the usage of the key to classification of which this group forms a part.

If a disease be syphilitic, *i. e.*, if syphilis played an essential part in its causation and is the practically most important factor in that causation, then feeble-mindedness, epilepsy, coarse brain disease, and the rest remain subordinate. Whether a disease be *Neurosyphilis hypophrenica* (as a rule, of course, *idiotica* or *imbecilla*) or on the other hand *Hypophrenia syphilitica* may be a matter of discussion: practically, however, it is my present contention that such cases be placed in the syphilitic group, really because of our bounden therapeutic duties to these cases.

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[2] Or should there be a new genus? *Amoralia Prichardi?*

The same holds for the epilepsies and so down the line. "Syphilitic epilepsy" is a term good from the epileptologist's point of view: from the point of view of the physician and therapeutist in general, it is better to classify the case as one of "epileptic syphilis," viz., in our nomenclature, *Neurosyphilis epileptica*.

4. PHARMACOPSYCHOSES (alcohol, drug and poison group). This designation (like hypophrenoses for the feeble-minded group) is a novel term, but one of such obvious fitness for a well-recognized group that I can conceive no reason against its adoption, if the group principle itself is deemed worthy.

Without entering the familiar field of the alcoholic psychoses (delirium tremens, alcoholic hallucinosis, jealousy-psychosis, dementia, etc.), and without discussing morphinism, etc., I will take occasion to point out how in the successive consideration of data pointing in a given case to (1) syphilis, (2) feeble-mindedness, (3) epilepsy, (4) alcohol and drugs, we are able to collect all the data that would be of commanding value in immediate treatment in special institutions. To be sure, special institutions for neurosyphilis have not so far been established in the world, though there is much to be said for the plan.[3] But, aside from neurosyphilis or "salvarsan" hospitals, advanced communities will always be found providing special institutions for the feeble-minded and the epileptic. It is an established principle of mental hygiene that the feeble-minded and the epileptic shall be treated separately. Placing a case amongst the hypophrenias or the epilepsias means as a rule something wholly practical: it means that special institutional treatment is indicated (*e. g.*, in Massachusetts, "this is a Waverley case" or "this is a Monson case"; in New York, "this is a case for Rome" or "for Sonyea"); or, if the actual state institution is contraindicated, then something equivalent or better along the same line is prescribed. As to the pharmacopsychoses, very few states have proceeded to the experiment of special institutions, though Massachusetts, for example, contains a successful one for moral and physical uplift cases. The "rounder" group and the delirium tremens problem are, so far as I am aware, not adequately dealt with on the planet. Not to launch into a homily on mental hygiene, let me merely insist that by considering, eliminating, or appreciating the data of these four groups, we have dealt with some of the largest social problems in psychiatry. How often in the elaborate discussion of doubtful mental cases do we find our younger officers indulging in long, not to say acrimonious, discussions of the relative merits of dementia præcox and manic-depressive psychosis, only to learn at the end that the case was essentially syphilitic, feeble-minded, epileptic, or alcoholic! And how often do we hear circular controversies about the respective parts played by epilepsy and alcohol, or by alcohol and dementia præcox in certain cases! The practical diagnosis is brought out at once as a rule by the simple inquiry, "Do you desire this case *treated* as an epileptic primarily or primarily as an alcoholic?" or "Do you fancy this case in a hospital for dipsomaniacs or do you want him placed in a hospital for the insane?" It is especially in this group of pharmacopsychoses that these pragmatic questions acquire their greatest significance.

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[3] The Massachusetts Commission on Mental Diseases and the Grafton State Hospital Board have coöperated in the establishment of a neurosyphilis ward, operated by special investigators.

5. ENCEPHALOPSYCHOSES (the focal brain group, including arteriosclerotic, tumor, traumatic cases, etc.). This is the "neurologist's group" of mental diseases. The classification is of course not as broad as that of nervous diseases as a whole, because there are still many nervous diseases without a characteristic psychotic side. Still, in general, the neurologist's technique in virtually its entirety is required in the elucidation of the encephalopsychoses. The neurologist is of value elsewhere, notably in the syphilitic group precisely because many of the syphilopsychoses are attended by coarse brain disease or by spinal cord disease deranging brain functions. Here then is the group in which the condition of the reflexes, the sensations, the motor and secretory powers, as determined by the neurologist, is of decisive worth in diagnosis.

The practical worker may be astonished at one feature of this group, seemingly so heterogeneous. It is the habit—a lax one, I believe—of many workers to unite in their minds too closely the arteriosclerotic and the senile psychoses. I place the arteriosclerotic cases in the encephalic (focal brain) group, because I believe that in the present phase of psychiatric science the diagnosis "arteriosclerotic psychosis" cannot be safely made except in the presence of some of the neurologist's signs or supported by shocks or other seizures in the anamnesis. I do not here speak of the mental sequelæ of somatic arteriosclerosis or of generalized arteriosclerosis: the arteriosclerotic subgroup of the encephalopsychoses is a group, according to this interpretation, of which "organic neurological" symptoms, signs, and history are characteristic. Some may miss the opportunity of ascribing "general deterioration" to arteriosclerosis: the present key requires investigation to learn whether the disease in question is assumed to be due to focal brain vascular lesions (encephalopsychoses) or to senility (see below, geriopsychoses) or to generalized arteriosclerosis (somatopsychoses, cardiovascular group) or, of course, to syphilis itself.

I would maintain a somewhat similar practical value for this key in the traumatic field. How many protracted, nay meaningless, medicolegal discussions could have been dispensed with, could the question, *whether the trauma was encephalic structural injury or not*, have been settled forthwith! A case for the present key is placed in the encephalopsychoses, traumatic subgroup, if there is good neurologist's evidence of some sort of focal brain disease; but it is placed far away in the group of the psychoneuroses if it has features predominant of the so-called traumatic neuroses. (It may be superfluous to say that this key does not infallibly place a case in the *right* major group.)

It is only fair to ask whether a line can be drawn between "focal" and "not-focal" brain disease. For instance, sometimes a case with multiple miliary aneurysms of the brain substance comes up for discussion. To be sure, such a case is commonly attended with multiple hemorrhages which would serve to place it forthwith in the focal brain disease-group. Nevertheless, many of the nervous and mental symptoms are doubtless due to lesions that could hardly be seen by the naked eye. The point is not so much what "coarse" lesions are demonstrable post mortem as it is, whether the neurologist with his special logical equipment can make the diagnosis. Or, again, take the brain lesions of certain cases of pernicious anemia. Shall these cases be placed among the encephalopsychoses? The brain lesions are microscopic. But on the criterion of the encephalopsychoses as the neurologist's group, I am inclined to say that these cases should be counted amongst the encephalopsychoses. I believe I should also desire to place the rare Alzheimer's disease here also, on the ground of its "organic," not senile, appearance.

The plot obviously thickens hereabouts. Miliary aneurysms and Alzheimer's focal lesions, however largely invisible to the naked eye, are nevertheless lesions which cut mechanisms apart precisely as larger lesions cut them apart. The lesions are, as it were, globar or molar lesions and not of the diffuse and intimate character of those in many diseases. With the pernicious-anemia brain, one is not so dogmatic. Perhaps, if we knew the somatic origin of pernicious anemia, we should prefer to classify this condition amongst the somatic psychoses. As for pellagra, I should prefer to place its psychosis in the next group.

6. Somatopsychoses (the bodily disease group, including infective and exhaustive cases, cardiac cases, etc.). This is the "internist's group" of mental cases.

The term "soma" is sometimes opposed to "psyche," sometimes to "head," sometimes to "brain." The hylozoist might oppose this term on the ground that all mental diseases are "somatic." An ardent dynamicist might query whether any mental disease is importantly "somatic." An interactionist might object on both grounds.

I am here innocently trying to oppose the term to the "brain" or "encephalon." After eliminating (1) syphilis, (2) feeble-mindedness, (3) epilepsy, (4) alcohol and drugs, (5) the "organic neurological" conditions, I then turn to (6) the organic non-nervous field. I apply the internist's technique. I perhaps find some "symptomatic psychoses" that appear to be intimately dependent upon cardiac or renal conditions. Or again upon infectious disease, such as typhoid fever or pneumonia. Or again upon non-nervous tumor, diabetes, metabolic disease, etc. As above mentioned, it would seem well to consider the possibility of pellagra at this point, perhaps also pernicious anemia (provisionally however placed among the encephalopsychoses so far as its mental side is concerned).

Here too may be placed the glandular affections, hyperthyroidism, myxedema, cretinism, and the like.

7. Geriopsychoses[1] (the senescent-senile group). Both the name and the key position of the senescent-senile group may perhaps be questioned. As to the key position, it might be queried whether it would not be better to exclude dementia præcox and manic-depressive psychosis before invoking involutional processes to explain a given mental disease. Still, in the use of this key, one is not supposed to stop with the first plausible group into which the clinical picture might fit. Accordingly, one would be assumed not to omit a study of the data from these other points of view.

I was moved to place the old-age group seventh partly to range it with more definitely organic psychoses, partly because I felt it better not to divide the succession that follows (see groups 8, 9, 10).

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[1] Better, *Presbyopsychoses?*

"Geriatrics" is a term that is very properly coming in to cover a definite but ill-developed specialty dealing with old-age disorders. I want to use "geriopsychoses" to cover, not merely the pronounced and ultimate disorders of old age, but the disorders of senescence, the presenium, and the involution period. It is at any rate practically important to consider all the data together that look in this direction, along the down gradient.

As above stated, I feel that it is practically important to separate the arteriosclerotic group from the senescent-senile. Not that arteriosclerosis is not a frequent phenomenon in old age (as it is assuredly also often not a marked factor!). One may truly be as old as one's arteries: but the arteries are not always as old as many other parts of the body. Aside from all discussion as to what constitutes old age, the prognosis of arteriosclerotic psychosis is often quite other than that of senile dementia with which it is so frequently confused. Accordingly, I believe that practical psychiatrists will agree that it is a practical advantage to consider the signs of arteriosclerotic psychoses separately from those of the senescent-senile group.

8. SCHIZOPHRENOSES (the dementia præcox or schizophrenic group). As "dementia præcox" forms no proper adjectives, the choice by Bleuler of the term schizophrenia for dementia præcox has been welcomed on all hands. Kraepelin himself, although he still speaks of the disease dementia præcox, often uses the adjective "schizophrenic" for the victims of the disease.

The idea of schizophrenia, viz., "dissociation" or "splitting" of mental processes, lies at the bottom of much, if not all, that is distinctive of the mental-symptomatic side of dementia præcox.

There is therefore a good deal to say for building a group-designation of schizophrenia, the symptom. Kraepelin, to be sure, in his last edition groups dementia præcox and paraphrenia (a renamed French disease, *délire chronique à evolution systematisée*) under the general term "endogenous deteriorations." But this term "endogenous deteriorations" seems far too general, besides which "endogenous" is a term which Germans (following Moebius) have specialized to mean "taking rise within the nervous system," a meaning possibly warranted but certainly not generally accepted.

Of course, practical workers are apt to use "dementia præcox" for disease which, though functional-looking, is regarded as fated to deterioration. Although everybody is theoretically aware that not all cases of dementia præcox deteriorate, yet the "lure of the 100 per cent." and the catchiness of the term "dementia" lead to a practical disregard of the actual guarded prognosis of dementia præcox and a virtual claim that all "real" cases of dementia præcox deteriorate. One is familiar with clinics in which the diagnosis of functional-looking diseases is from time to time revised in favor of dementia præcox if deterioration has set in, and in favor of manic-depressive psychosis if there has been no deterioration! The fact that Kraepelin observed that dementia præcox patients are apt to deteriorate *in particular and characteristic ways* is revised by practical men to the effect that dementia præcox deteriorates and, if not, the diagnosis is wrong!

In a clinic for doubtful cases, like that of the Psychopathic Hospital in Boston, I find that the diagnoses tend to vary somewhat with the natural pessimism or optimism of the workers. I find it practically of value to limit the diagnosis dementia præcox to cases in which something schizophrenic can be found. We may thus score too low a tally of correct diagnoses of dementia præcox, but I am sure we save some cases from an unjustifiably pessimistic diagnosis. For at best the prognosis of the schizophrenias is not a good one.

9. CYCLOTHYMOSES (manic-depressive group). Just as "dementia præcox" forms no proper adjective, so we find the same difficulty with "manic-depressive psychosis." No one has ever been satisfied with the term "manic-depressive psychosis," although the Kraepelinian conception of the disease which goes by that name has been pretty generally accepted.

The term cyclothymia has been used by some authors for all or part of the disease-group known as manic-depressive psychosis. The cyclic nature of the course of many if not the majority of instances of this psychosis is embodied in the first part, cyclo-, of the term cyclothymia. The most prominent feature, psychologically speaking, of manic depressive psychosis is the emotional disorder, which is demonstrated either in the morbid gaiety, fear, anger, or depression which characterizes different phases of the disease. Even those complex examples of the disease in which mania and depression occur mixed (cases as one might say of "mixed emotions") are still fundamentally examples of emotional rather than intellectual disorder.

Some authors have applied the term "affective" to the group which may be known as the group of the affective psychoses.

The second theme, thym, of the term cyclothymia refers to this predominantly emotional or affective nucleus of the disease or diseases known as manic depressive psychosis. Kraepelin himself occasionally uses the term cyclothymic. Accordingly, I have felt that if we desire to place in a single great group the varieties of manic-depressive psychosis and allied diseases, we could do no better than to speak of them as the cyclothymias, or, adopting the common Greek ending for these groups, the cyclothymoses.

It will be noted that the schizophrenias have been placed in this key prior to the cyclothymias. Practical workers will all recognize how easy it is to find "cyclothymic" (that is, "manic-depressive") phenomena in all sorts of mental diseases and conditions which are not genuinely manic-depressive. These cyclothymic symptoms are even not infrequently found in schizophrenic cases. In diagnostic discussions where numerous physicians are consulting, not infrequently one physician is found triumphantly proclaiming dementia præcox on the basis of schizophrenic symptoms, whereas his colleague with equal triumph claims manic-depressive psychosis on the basis of cyclothymic symptoms.

The point of the group arrangement in this key is perhaps nowhere more clearly shown than in the priority that the schizophrenias take as against the cyclothymias. In practice it seems that schizophrenic phenomena blanket cyclothymic phenomena. A victim of dementia præcox may in several parts of his mental life exhibit perfectly good and clear-cut cyclothymic phenomena; yet it is the schizophrenic or dissociation phenomena which, according to this point of view, must command the diagnosis. This situation can the more readily be understood when it is remembered that after all the majority of the manic-depressive or cyclothymic phenomena are merely exaggerations or diminutions of normal functions. After all there is nothing "queer" or dissociative, nothing that definitely proves mental disease in the supernormal gaiety or exaggerated depression of a manic-depressive subject. Perfectly normal subjects may at times show these features, though perhaps not to the extreme extent nor in the rich display that characterizes the manic-depressive patient.

The victim of dementia præcox, according to our point of view as above expressed, must have something in his status or history to show schizophrenia; but elsewhere in his status or history he may very well show those variations above and below the normal in emotions which normal people, as well as manic-depressives and other psychopaths, show. In short, the cyclothymic patient shows variations of emotion which are decidedly within the frame of the normal and can rather readily be understood by the layman.

The manic-depressive is either supernormal or subnormal in his emotional display at a given time, and so far as the layman can tell is often doing only what a normal person might do under the circumstances. The concept of schizophrenia on the other hand is not one which the layman readily grasps: it is in fact fundamentally hard to define.

10. PSYCHONEUROSES (the group of neurasthenia, psychasthenia and hysteria). It may seem that the psychoneuroses should not be grouped among mental diseases. One suspects, however, that the authority who takes this line is under the influence of older notions as to the supposed identity of mental disease with certifiable insanity.

From the standpoint of general practice or of clinic which lies nearest to general practice, namely the psychopathic hospital clinic, the psychoneuroses are precisely as much within the frame of psychiatry as the schizophrenias and cyclothymias.

As far as the gravity of these conditions is concerned, there is not much doubt that many of the psychoneuroses are just as grave in prognosis as many of the cyclothymias. It may be suspected that some of the cyclothymias are in practice termed psychoneuroses precisely because the diagnostician fears that the patient and his friends will resent the diagnosis manic-depressive psychosis, when the diagnosis neurasthenia or psychasthenia will not be resented or feared.

It cannot be denied, however, that the demarcation of the psychoneuroses is an extremely important one from the practical standpoint of prognosis. Whereas the schizophrenic group takes its own way and whereas the cyclothymic diseases seem in a sense self-limited or at all events beyond the reach of special therapeutics. on the other hand the psychoneurotic group is the psychotherapeutic group par excellence. We practically mean when we call a case psychoneurotic that we feel that the case has a good chance under methods of direct or indirect psychotherapy.

It might be inquired whether the psychoneuroses should not be placed nearer the head of our key. Errors in diagnosis are undoubtedly found in which some other form of mental disease is asserted to exist when psychoneurosis is the fact. However, we have come upon so many instances in which syphilis, alcoholism, arteriosclerotic brain disease, somatic disease and manic-depressive psychosis have been erroneously regarded as psychoneurotic that I feel confident that these conditions should be considered and eliminated prior to making the diagnosis of neurasthenia, psychasthenia or hysteria. Of course, if a wrong diagnosis of some other form of mental disease is rendered, then it is conceivable that the psychoneurotic patient will fail to get what he so importantly needs, namely, psychotherapy. However, the will to psychotherapy is so deeply implanted in every physician that I feel few cases have genuinely suffered from the lack of an attempt to carry out psychotherapy. Of course, no one would claim that every psychoneurotic gets the proper kind of psychotherapy or enough of it; but that is another story.

11. PSYCHOPATHOSES (the group of the psychopathias and of a variety of doubtful entities). I shall not here discuss at length this doubtful group. I place therein a variety of ill-defined conditions. Some of these, as the psychopathic personalities, verge very closely upon the normal; others, like the so-called prison-psychoses, are considered by some authorities not to exist at all, at least as entities.

The true nature of the so-called "psychosis of the deaf" is not well enough understood to permit its characterization; at all events, it does not appear to fall amongst the ten well-defined groups listed above.

Those rare cases of true paranoia I personally prefer to place in this ill-defined group of psychopathoses. At any rate, I see no special advantage in making these pure paranoias without signs of mental dissociation or tendency to deterioration tag along behind the schizophrenias.

I would also place in this ill-defined group those rare cases of mental disease which are regarded as certifiable and deserving of institutional regime, but which cannot be practically classified in any one of the above-mentioned ten groups.

Of course, in practice these "undiagnosticated insanities" are really the fruit as a rule of poor observation or of poor opportunity for observation.

At this point it may be inquired whether such entities as combined psychoses need be assumed. For my part, I am wholly willing to agree that a patient might properly enough be theoretically placed in any one of several of the groups above mentioned, thus a patient might well be an old man with coarse brain disease and disease elsewhere in his soma who had acquired syphilis, was extremely alcoholic and had been a feeble-minded subject to start with; and this subject might, of course, have shown a variety of psychoneurotic and cyclothymic symptoms. It is even possible that such a patient might exhibit some phenomena that looked like those of a dementia præcox. Practically, however, such a case would be placed in one of the above-mentioned ten groups precisely because the diagnostician would want to have the case treated primarily either as a syphilitic or as a feeble-minded subject or as an epileptic, etc. Accordingly, we may provide full scope for the so-called combination of psychoses in theory without damaging the practical validity of the abovementioned classification.

Summary and Conclusions

I have here presented not so much a classification as a key to the grouping of mental diseases. The key has been worked out to the extent of ten well-defined groups and an eleventh residual group. These groups correspond to the groups of, *e. g.*, the *Rosaceæ* or *Leguminosæ* of botany, and do not correspond to the genera and species of those orders. Some hint is given of the generic and specific distinctions of mental disease that might correspond to the genera and species of botany, provided that there were any practical need for a quasi-botanical or zoölogical genus-species distinction in mental diseases.

The incentive to this grouping has been practical. No endeavor was made on the library table to construct a *hortus siccus* of mental diseases. On the contrary, this key is the product of several years of work in the Psychopathic Hospital in Boston where the task of reasonably accurate diagnosis by an ever-changing staff of psychiatrists-in-training was the desideratum. I do not accordingly suggest this key as something to replace the methods of the expert in arriving at a conclusion concerning psychiatric diagnosis. I do offer it, however, as a guide for the tyro and the psychiatrist-in-training. It is not an outline giving an order of examination. It is a scheme for summarizing and evaluating results after the physical, mental and historical data are collected. The plan is eliminative but is subject to this reservation: if one arrives in the chosen sequence of analysis at a plausible or even a correct group diagnosis, one is not thereby absolved from continuing the process of analysis. All data bearing on any of the groups must be considered. Diseases may be "hybrid," though practically one is almost never in doubt as to the group under which to subsume a case. Theoretically, one may be for example both epileptic and alcoholic; practically one is either an epileptic alcoholic or an alcoholic epileptic. The guide to the grouping here is a pragmatic one and depends upon the institution or the special treatment to which the supposed victim of epilepsy and alcoholism must gravitate. I must especially emphasize that the groups and the group names do not correspond to nosological entities and entity names. The placing of a case in one of these eleven groups is not psychiatric diagnosis in the entitative sense. Accordingly, this grouping does not run into collision with any previous endeavor to classify the genera and species of mental disease, such, for example, as the genera and species in the majority of classifications quoted in Hosack.[5]

I would insist further that the group headings given are not special enough to constitute sufficient diagnosis for a classification of use in the statistics of institutions for the insane. The plan is not so much an excursion in nosology as an essay in the technique of psychiatric diagnosis for the tyro. The plan gives hints for a method of arriving at an eventual diagnosis: it does not prescribe the names of diseases. Again, the plan is not an etiological plan, although recent advances in psychiatric etiology have been such that many of the practical groups are actually etiological groups.

It is possible that the sequence has been unduly telescoped. It is possible that there should be a traumatic and an arteriosclerotic group. I have placed both of these groups in the encephalopathic or coarse brain, or "neurologist's" group, feeling that I do the diagnostic tyro a service by pulling the encephalo-traumatic psychoses far apart from the traumatic psychoneuroses on the one hand, and the arteriosclerotic psychoses far apart from the senile psychoses on the other hand.

Lastly, I would insist once more that the plan is one born of Psychopathic Hospital experience and bred in the first place for the inexpert. It is a key to study and not an analytical classification with any pretense to finality. Elements in the sequence can be destroyed and new elements inserted. Indeed such processes of extrapolation and interpolation must needs occur in the progress of practical diagnosis. Whatever novelty the plan may have lodges in the sequential character of the analysis of data already collected and not in the completeness or ultimacy of the groups. The sequential plan of analysis is of course as old as the diagnostic hills. It is superior, however, to the type-matching method of diagnosis in vogue with many tyros, who very often come to their superiors with the plaint that the data in a given case fit the book descriptions of half a dozen diseases. A set sequential analysis of collected data must be superior to a hit-or-miss type-matching of entities.

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[5] Hosack, David, A System of Practical Nosology: to which is prefixed A Synopsis of the Systems of Sauvages, Linnæus, Vogel, Sagar, Macbride, Cullen, Darwin, Crichton, Pinel, Parr, Swediaur, Young, and Good, with References to the Best Authors on each Disease, 1st edition, 1819, 2d edition, 1821, New York.

PROGNOSIS IN MANIC-DEPRESSIVE INSANITY*

By J. B. Macdonald, M.D.

ASSISTANT SUPERINTENDENT DANVERS STATE HOSPITAL

Upon the basis of outcome largely rests the classification of the two great psychiatric entities, the manic-depressive and dementia præcox groups, when, not seldom, other differentiating means fail us. Of the notable advances in modern psychiatry, perhaps the most important was initiated when a survey of experiences led to a division of cases into classes founded upon prognosis, as favorable or unfavorable; or perhaps better to say, groups with a tendency to a chronic course and deterioration as an outstanding characteristic, and groups with a tendency to recovery and recurrence without special liability to deterioration. In a general way, the latter characteristic distinguishes the manic-depressive insanities from all others.

The fundamental and distinctive feature of the manic-depressive insanities, affect-disturbance, is so common in experience, physiologically and pathologically, that it would seem to offer no insuperable difficulties to recognition. Trial and practice furnish proof to the contrary oftentimes. It cannot be supposed, therefore, that the lines dividing this from other forms of insanity are as yet definitely drawn, or that the issue in a given case may not be at variance with the expectations that apply to the general. Affect-disorder touches upon, and forms an important element in, the symptom-complex of other insanities distinct from the manic-depressives. Hence arises conflict and uncertainty of diagnosis in the earlier stages of this and other forms of mental disturbance allied by symptom manifestations. In the final outcome of attacks, however, recovery and recurrence without special tendency to marked early deterioration are so commonly identified with the manic-depressives that instances to the contrary raise a question as to the diagnosis.

The problem of determining in advance the outcome of any case of manic-depressive insanity is anything but simple. Oftentimes what may appear as the chief causative agency is so overlaid by additions, physical, constitutional or environmental, that precision in prognosis is seriously handicapped. And yet one cannot be satisfied with the general conclusion that the outlook for recovery from the individual attack is good, but with tendency to recurrence. The practical questions of the duration of attack, probable length of free interval, and recurrence confront us daily in our relations with patients and public. The majority of us have to make particular and fragmentary experiences the basis of such opinion as we may hazard in our answers; nor can we discern beyond the lines of empiricism a guide to a better or a more scientific judgment.

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A statistical study of cases in this connection possesses more than mere academic interest. Properly considered, it furnishes a measure wherewith to subject empiricism to the conditions of experience. It is proverbially open to fallacy. Nothing in the world, the remark goes, is so fallacious as figures, except facts. Making due allowance for various possibilities of error in statistical analysis, it still remains true that our conjectures as regards prognosis shall draw near to probability the more extensive the means of comparison, and the more closely they conform to deductions gathered from experience with numbers of related cases.

To determine whether any constancy, relative or absolute, exists in the sequence of phenomena of this disease, seems a fitting object of a review of cases. Is it possible to discover by retrospective analysis something of the nature of a common denominator rendering more exact judgment of cases possible, and to what degree are we encouraged by past experiences to predictions regarding course and outcome? Or are our opinions in the matter at best but expressions of belief qualified by conditions to which diverse solutions might attach according to times, places and circumstances?

With these questions in mind, this analysis of 451 cases diagnosed manic-depressive at the Danvers State Hospital was undertaken. The cases were taken consecutively according to first admissions and determined diagnoses, rather than selected for special features. Grouped according to the age-periods at which the first attack occurred, they stand as follows:

Age-Period at First Attack	Males	Females	Total
Pubescent-adolescent (up to 25 years)	36	80	116 or 25.7%
Mature (25–40 years)	44	132	176 or 39.1%
Climacteric (40–60 years)	47	100	147 or 32.5%
Post-climacteric (60 years upward)	4	8	12 or 2.6%

Classified according to the type of the first attack, the cases may be arranged in the following order:

Number of cases in which first attack was of the depressed type	245
Number of cases in which first attack was of the manic type	152
Number of cases in which first attack was mixed in type, or with involutional modifications	54

TYPES OF ATTACKS AND TENDENCY TO RECURRENCE

Our analysis confines itself mainly to first and second attacks, partly because these, with their attendant conditions and circumstances, are of the most importance in relation to outcome, others with modifications of duration, phase and interval claiming interest chiefly as periodic reflections of tendencies already established; partly because a more comprehensive study would end in a bewildering array of results, and consequent confusion.

In 205 of the 451 cases, histories of recurrent attacks were obtained. The number of such in individual cases ranged between 1 and 20. In 100 cases all the attacks were of the depressed type. In 128, all were manic, but in most of these transitory phenomena of slight depression ushered in or terminated the attacks. Attacks of circular or alternating type occurred in 20 cases, and in 149 the type of attack was irregular.

An adequate idea of the tendency of cases towards establishment of the complete manic-depressive cycle does not follow from this tabulation. In a considerable number of all our cases, the life history subsequent to discharge from the hospital was incomplete or unobtainable. Of a group of 100 cases in which results of analysis could not be vitiated by this deficiency, 78 showed in one or more attacks variation of type, that is to say, a completion of cycle; 22 presented attacks of one general type throughout, but differing in order of occurrence, duration and intensity, and of these almost two thirds were recurrences in the form of depression.

The tendency to recurrence seemed slightly greater in men than in women of all ages (66 per cent. of male cases recurring to 65 per cent. of women). It was greater in cases originating with excitement (manic and mixed).

INTERVALS BETWEEN ATTACKS

Where the first attack was a depression, the average interval between first and second occurrence was 10.6 years for men and 10.9 years for women, as against an average of 6.1 and 6.5 years respectively when the first attack consisted of excitement.

Of females, 67 per cent. of the cases beginning with depressions showed an average free interval of 10 or more years; 23 per cent. an average interval of 5–10 years, and 10 per cent. less than 5 years.

Of males, of the corresponding depressed group, 55 per cent. had average free intervals of 10 or more years; 33 per cent. intervals of 5–10 years, and 12 per cent. less than 5 years between first and the following attack.

In this respect, the outlook for cases beginning with excitement (manic and mixed) appears by contrast less favorable. Female cases of this group, with initial excitement, averaged in numbers 60 per cent. with free intervals of less than 5 years, 21 per cent. with intervals of 5 to 10 years, and 19 per cent. with intervals of 10 or more years. The corresponding average percentages for males were 43 per cent., 33 per cent., and 24 per cent.

Intervals varied widely in individual cases. The longest free interval for females of the depressed group was 44 years (first attack at 15); the shortest 2 years. For males, the extremes were 28 years and 1 year. Following first attacks of excitement, the longest interval was 28, the shortest 2 years for females; for males, 39 years and 1 year or less. Between these extremes individual cases presented a bewildering variety of interval durations, many without any apparent order or regularity of succession and duration.

Age in Relation to First Attacks

Grouping all our cases according to age at first occurrence, the period of maturity stands out prominently as the one most fruitful in originating attacks. An even higher incidence than that represented by our tabulation is obtained, if allowance be made for the variation between the periods of maturity in the sexes. Basing our calculation upon physiological epochs according to sex, the ratio of first occurrences, for both sexes, would be approximately 40 per cent. (for the mature period) to 33 per cent. (climacteric), 25 per cent. (pubescent-adolescent), and 2 to 3 per cent. (post-climacteric).

Reckoning thus, the incidence of first occurrences in males becomes approximately 39 per cent. (for period of maturity), 33 per cent. (climacteric), 25 per cent. (pubescent-adolescent), and 3 per cent. (post-climacteric); for females, 41 per cent. (maturity), 31 per cent. (climacteric), 25 per cent. (pubescent-adolescent), and 2 per cent. (post-climacteric).

Tendencies of Cases Originating in Period of Maturity

Besides the special tendency in our cases towards origination of the disease in the period of maturity, the tendency to recurrence within the same period was remarkable. Relatively the number of these recurrents exceeded the total number recurring within the pubescent-adolescent, or climacteric periods of origin. Seventy of the 176 cases which had safely passed through the storm-periods of puberty and adolescence recurred here at intervals varying between 7 and 1 years. Exceptional cases were found with intervals of from 10 to 14 years—one as long as 28 years—but the number of such was relatively so small that the average length of the first interval in both men and women did not rise above 8.8 years.

In general, it was found that first attacks of excitement between the ages of 25 and 40 were followed by a longer interval in men than in women, the ratio being 6.6 + years in men, as against 5.3 years in women. In cases of depression arising in this period, the average free intervals between first and second attacks were about equal in men and women, and slightly exceeding in length the average first intervals for depressions in men and women of all ages.

This group also contributed 76 cases with 145 attacks to the total number of cases with recurrences in the climacteric period, and 15 with 26 attacks recurring in the post-climacteric period. The increment thus bestowed upon succeeding periods constituted 50.3 per cent. and 30.6 per cent. of the total number of recurring cases of the climacteric and post-climacteric epochs respectively, representing 61.1 per cent. and 29 per cent. of the total recurring attacks of these periods.

All our evidence, therefore, indicates a striking tendency towards the development of this form of insanity at this stage of life. Whatever may be the influence that determines occurrence at this period, the outlook as regards freedom from recurrence is not wholly promising. Contrasted with the pubescent-adolescent group, recurrent cases constituting 73 per cent. of the total originating between 25 and 40 averaged 3.3 attacks, as against 2.3 attacks for 71 per cent. total recurrents of the former period.

Tendencies of Cases Originating between 40 and 60

After the age of 40, recurrences occurred at shorter intervals. This was specially marked in manic cases, the average intervals being 3.8 years for men, and 1.5 years for women. Notable exceptions, however, were not lacking. From this age onward, the intervals became shorter for the depressions. After 45 years of age, the average intervals between attacks of first depressions fell to approximately the same length as that following excitements. The number of cases recurring averaged 63 per cent. of those first occurring after this age. Recurrences, which in many instances might perhaps be more properly termed relapses from remissions with return of leading symptoms, averaged 4.4 attacks per case. A considerable proportion of these cases terminated in chronic states or death during the first or second attacks, while others were discharged as improved where the distinction implied simply a certain quietness of mind coincident with improvement in general health.

Comparing first occurrences in men and women during the involutional or climacteric periods, the attention is arrested by results almost equal for the sexes, with the balance of greater liability on the side of the males. Certain contributing factors, aside from age influence, as alcohol, possibly helped to swell the number of male cases at this period. The fact could not be overlooked, however, that, where such influences obtained, the same factors existed during the period of maturity but failed to effect in respect to exciting a manic-depressive attack. Leaving out of consideration extraneous features common in greater or lesser degree to all periods, the evidence warrants the conclusion that a special vulnerability of the nervous system appears during this period, and that the susceptibility to mental disturbances of the manic-depressive order in this epoch is at least as great in males as in females. The number of cases under review is too small to justify dogmatic inferences, but the findings attain greater significance in their correspondence with the results of analysis of 3,000 cases of melancholia by S. Weir Mitchell, which seemed to dispose of the idea that women were more liable to melancholia at or about this critical period.

Final Outcome

Cases Originating During Puberty and Adolescence

The cases originating in the periods of puberty and adolescence resolved themselves into two divisions in respect to final outcome. In about one third of the number in whom it would appear the external circumstances and relations of life determined the attack, the outlook for complete recovery was good. It was not unusual for second attacks to occur in this group before the end of the thirtieth year, under the dreary persistence of vicious environmental conditions, but the end-results were favorable, the duration of the attacks short, varying from 1 to 4 months.

Where the attacks occurred in quick succession, as a rule the outlook was exceptionally unfavorable. Three or four attacks occurring up to the age of 25 generally presaged a chronic termination, or a mental reduction of varying gradation short of down-right dementia. In many respects such cases bore singular resemblances to the milder types of dementia præcox, suggesting a composite picture with the manic-depressive coloring more conspicuously in the foreground.

Another group of generally unfavorable outcome embraced a number of cases where excitements or depressions appeared as exaggerations of habitual constitutional tendencies. Here frequent recurrence, brief free interval, and irregular duration of attack, was the rule. While in general the duration of life did not seem shortened, the attacks occurred in such rapid succession that a large part of it had to be passed in hospital confinement.

Cases Originating After Age of 25

From this age onward till the age of 45, short duration of attack offered prospect of a long free interval, or occasionally no recurrence. The number discharged recovered within 6 months of the onset of first attack amounted to 65 per cent.; after 12 months of illness, 21 per cent.; after 24 months, 10 per cent.; and after attacks of longer duration, 4 per cent. of the total recovery discharges of the whole period after the age of 25.

The recovery curve for men reached its height between the fifth and sixth month; for women between the fourth and fifth month following onset; from which points the declination was rapid. Individual exceptions of seemingly good recoveries occurred following attacks of over three years' duration.

Beyond the age of 40, permanent recoveries from first attacks were rare. Temporary recoveries were more often recorded, but in the majority of cases, the restoration of mental health did not progress beyond an improvement, ranging in degree from a return more or less complete, of former tastes, habits and interests, to the disappearance of leading symptoms, but with the persistence of abnormal features, instability, irritability and intellectual dulling, not serious enough, perhaps, to prevent the taking up in part of habitual or simple occupations. Depressions, especially in the case of women, seemed to offer the least hope of favorable outcome at this age.

Contributory Factors

Among the factors of pathogenic importance, general opinion assigns a prominent place to hereditary influences. Forty-three per cent. of our cases furnished evidence of insanity or neuroses in the ascendants or near relatives. The indefinite information available in many cases regarding ancestry, or the lack of any information ofttimes, renders it probable that this percentage represents somewhat more nearly the minimum rather than the maximum of members with psychopathic or psychoneurotic antecedents. Quite as frequently as insanity, a neurotic, unstable make-up in the direct ascendants seemingly contributed a share to the sum-total of pathogenetic forces. Where the hereditary patrimony included evident innate defect, the prognosis was decidedly gloomy; in others the existence of apparent familial tendencies to mental disturbance did not seem to becloud the issue specially. A case in point was that of an attack of depression with an attempt at suicide in a girl of 18. Attack lasted three months, when a gradual improvement began, ending in recovery four or five weeks later; married at 24; first childbirth at 26, no symptoms of mental disturbance during or following pregnant state. Two more children born between 26 and 35. Health good and mental condition normal up to 40, when further record of case ceased. Heredity included an insane mother who committed suicide, a maternal uncle one-time patient in an insane hospital, and a father alcoholic. In many of the cases where heredity figured as a possible predisposition, the outcome compared favorably with that in others not burdened, so far as record shows, with the incubus of destiny identified, in popular opinion, with such descent.

Alcohol figured next in importance to psychical factors in the tables of assigned causes. In very many of these cases, the basis for assuming an alcoholic etiologic influence appeared insufficient. A large proportion of cases of depression in men over 40 yielded to scrutiny a history of alcoholic habits, light or excessive, at some period in early or late maturity. A very small portion of these had ever suffered an alcoholic psychosis proper, and a relatively insignificant proportion an affective psychosis during that space of time when the habit existed. Doubt arises as to the accuracy or value of hospital statistics in this respect, the data being insufficient, and the grounds upon which they are based often questionable. Where alcoholic habits occurred with the psychosis, in later life, the proportion of recoveries and improvement was decidedly lessened. Intervals, when such occurred, were short, in both manic and depressed conditions.

In 22 cases, pregnancy, childbirth, or lactation was assigned as a cause. In four cases, no history of later attacks occurred. In eight other cases, later histories were lacking by reason of changes of residence to other states or foreign countries. Recurrences were recorded in 10 cases. Of these, four had their first attacks at from 3 to 6 years prior to the first pregnancy. Later attacks occurred in 3 cases without a pregnancy, and in 3 cases later attacks followed later pregnancies. Fifteen, or approximately 73 per cent. of the cases, made good recoveries from attacks following the first pregnancies. The prognosis did not seem to be especially darkened where pregnancy seemed to occasion later attacks. Duration of such attacks did not differ materially from that in recoverable cases assigned to other causes.

By far the greatest number of cases were assigned to psychical causes: domestic infelicities, worry and disappointments, deaths of friends or relatives, love affairs, emotional shocks, etc., either singly or in combination with physical causes. In 7 cases where it appeared the psychic factor was the direct and only causative agent, the attacks were of brief duration, averaging 3 months, with permanent recoveries so far as the record goes. Where psychic disturbances precipitated an attack in a person without conspicuous innate psychopathic traits, the outlook on the whole was most favorable. While in numbers these cases are pitifully few, the fact is worth recording on account of its bearing upon measures of treatment and prophylaxis. Against the general gloom of pessimism prevailing in regard to permanent cure or abridgment of course in this disease, even so feeble a beam of hope suggesting possibilities of restorative influences and prophylactic assurance, may serve to cheer and encourage the earnest worker in this field of medicine.

No compiling of figures, however extensive, will enable one to attain to a clearer vision of the manic-depressive field, if the unseen elements in cases, which often nullify our wisest calculations, the factors of environmental and social influences, are not considered. Equally important must be the anatomical and physiological conditions, the organic processes, which we are persuaded underlie some at least of these cases of seeming biological disturbance; and here the path from symptoms to primary cause ends in a wilderness of doubt and obscurity. The subtlest analysis based solely upon arithmetical considerations must miss the essential point of the matter, since the values of contributory affect factors are not susceptible of exact estimate in quantitative terms, while the existence and influence of organic causes, and what they may be, in any or all cases, remains and for a long time will remain, a speculative question.

CONCLUSIONS

Statistical analysis is not of value in establishing rules or laws regarding the affective psychoses. It serves to confirm opinion concerning tendencies which may have already become a matter of not uncommon experience. Many important elements escape detection, or are impossible of arithmetical consideration, which have a profound influence upon course and outcome in this form of disease.

The tendency as to outcome is generally more favorable in the depressions than in excitements, intervals being in general longer, and the possibilities of non-recurrence greater.

Manic attacks or excitements first occurring at 40 or later are of unfavorable outlook, the duration of attacks being generally longer, the intervals shorter. Such cases show greater tendency to chronicity after this or later attacks.

In attacks of depression first occurring after 40, the tendency of a lengthening of attack duration, and shortening of intervals, begins.

After 50, in both males and females, manic and depressive attacks approximate more closely in duration of attack and length of interval. The tendency to chronicity of depressive conditions sooner or later in the course seems greater in cases first occurring at about this period, or somewhat later in life than is the same tendency in manic conditions.

The majority of cases show a tendency to first occurrence between the age of 25–40. Attacks first occurring in this period seem more prone to recur.

The influence of the climacteric in originating attacks does not appear greater in women than in men. Other things equal, the outlook for attacks in women at this period is not more serious than in men.

Recoveries, or marked improvements, are more common in cases of attacks of one to six months' duration. Following eight or more months' attack-duration, the probabilities of recovery or marked improvement diminish in proportion as the duration of the attack lengthens. After a twelve months' duration of attack, changes for the better assume more of the nature of remissions.

Innate constitutional defects are usually associated with tendencies to irregular forms of attack, frequency of occurrence, and a degree of deterioration more or less marked in the later periods of life. Attacks excited by emotional causes solely, in the absence of constitutional abnormalities, tend occasionally to permanency of recovery on the removal of causes which occasioned them, and a readjustment of environmental and social conditions. Psychic factors apparently predominate in the determination of attacks, and mental prophylaxis directed with sympathetic understanding and insight into the patient's life and personal characteristics, would seem to offer hope of brighter prospects in some cases than has heretofore obtained under the influence of the doctrine of recurrence and predestined incurability.

ON THE METHOD OF RECORDING BRAIN WEIGHTS; THE ERROR DUE TO INCLUSION OF CEREBRAL FLUID*

By Lawson G. Lowrey, A.M., M.D.

ASSISTANT IN NEUROPATHOLOGY, HARVARD MEDICAL SCHOOL; PATHOLOGIST TO DANVERS STATE HOSPITAL

When one speaks of brain weights there at once arises the question of what is included in the weight. It is very easy to demonstrate differences depending upon the interval between removal and weighing, due to loss of superficial fluid from the arachnoid meshes. Some weigh with the brain a rather variable flap of the dura mater. Again, some weigh the brain from which the pia has been stripped. This last weight is undoubtedly the more correct one, but the almost universal custom is to weigh the brain with the pia-arachnoid containing a variable amount of fluid.

If the interval between the removal and weighing and the amount of cerebral fluid were always constant, there could be no particular objection to this method. But we never succeed in weighing all of the cerebral fluid, as much basal and other fluid is lost, and the amount weighed with an absolutely uniform procedure is extremely variable, as will be shown.

For the purpose of securing a standard method of procedure, giving more directly comparable brain weights than the usual practice, we began in February, 1915, the following procedure, and present herewith the data from 50 cases so handled.

Immediately upon removal the brain was weighed, with whatever fluid remained in the arachnoid. It was then allowed to drain for 10 minutes. The pons and cerebellum, always removed by a transverse cut at the upper border of the pons, were weighed; then the hemispheres together.

The difference between the first weight and the sum of the two latter gives the amount of the superficial fluid; and the sum of the two latter is the "first net weight." In order to weigh the ventricular fluid, either (1) the hemispheres may be cut apart, and each drained of fluid by manipulation and weighed separately, or

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* A contribution to the William Leonard Worcester Series of Danvers State Hospital Papers, presented November 19, 1915.

(2) an incision may be made into the base of each temporal lobe at the lower end of the lateral ventricle, the fluid drained off, and the hemispheres weighed together or singly.

Either of these methods will drain the ventricles with a minimum of destruction, and this is desirable, especially where any topographical work is being done. The ventricular fluid seems not so variable in amount as the superficial, and was not estimated in all cases of the series.

The data were obtained from 50 brains, 28 from male and 22 from female bodies. The cases were unselected, being a consecutive autopsy series. The age at death varied from 38 to 91.

The data are presented in Table I, which gives for each observation the number of cases, and the average, minimum and maximum values obtained. This table shows that not all observations were made on every case. Thus the ventricular fluid alone was weighed in only 18 cases, although determined together with the superficial fluid in 13 additional cases. Similarly, the superficial fluid was determined alone in only 37 cases, but together with the ventricular fluid, it was measured in 13 more.

These variations are explainable on the basis of variations in the method of procedure due to circumstances entirely aside from the problem at hand. Any apparent discrepancies in the figures are attributable to these variations.

Brain Weights with and without Fluid

Table I

	No. Cases	Average, G.	Min., G.	Max., G.
1. Brain wt.	50	1,271	950	1,565
2. Superficial fluid	37	35	10	85
3. Pons and Oblg. (Cerebell.)	50	157	125	205
4. Hem. ā superficial fluid	37	1,091	860	1,355
5. Est. net weight	37	1,248	985	1,530
6. Ventricular fluid	18	23	10	35
7. Total fluid	31	50	25	110
8. R. H. ā fluid	33	535	390	625
9. L. H. ā fluid	33	535	405	625
10. Total net weight	31	1,216	935	1,430

Notes

In 37 cases superficial fluid estimated.
In 18 cases ventricular fluid also estimated.
In 31 cases both estimated (*i. e.*, 18 above plus 13 in which no intermediate weighings done).

However, the table makes obvious the fact that it is not entirely a matter of indifference how the brain is weighed. Thus the case with a first brain weight of 1,350 grams requires a new viewpoint when we subtract 110 g. for fluid and find a weight of 1,240 g.

To be sure, we always speak of the amount of fluid in an impressionistic manner, noting an excess or absence, but these notations do not help us to a more correct analysis. Thus I find notes "excess" and "fair amount," the amount apparently greater in the first instance, applied to cases showing the same amounts by weight.

Since it appeared from our observations that the ventricular fluid was present in small and not greatly variable amounts, we now use the first part of the method, registering for each brain the following weights: gross, pons and cerebellum drained, cerebrum drained, superficial fluid and first net. This at least gives us a fairly accurate standard for comparison.

The most commonly used formula for calculating the expected brain weight in the individual is Tigge's. This formula allows 8 grams of brain for each centimeter of body length. On comparing the calculated weight of the brain for these cases with the observed gross and final net weights, at once is revealed both the defect in weights as commonly recorded and in accepting the formula as representing the actual normal

TABLE II

	No. Cases	Av., G.	Min., G.	Max.
Gross weight greater than formula.......	15	78	13	169
Net " " " "	9	60	6	134
Gross " less " "	13	86	16	210
Net " " " "	19	91	1	250

The formula, though perhaps applicable in general, is dangerous in the individual case. It is much better to use Quain's tables.

SUMMARY

Some more uniform scheme other than the usual one of weighing the brain plus a greater or less quantity of fluid is highly desirable, at least in order to have a uniform, comparable set of figures.

A table is presented showing the great variation in the amount of superficial fluid present in the cerebral meninges. Observations on the difficulty of estimating this amount and on the wrong idea of the brain weight obtained by the ordinary methods are given. The ideal method would be to strip the brain before weighing.

A simple scheme is given whereby one may obtain the gross.

first net and final net weights very easily. Of these, the first net is now determined in all cases in this laboratory, and is used in all calculations. Apparently the ventricular fluid is much less variable than is the superficial.

Finally, Tigge's formula should be applied with caution, since variations in the amount of cerebral fluid retained make a considerable difference in the interpretation.

Society Proceedings

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The President, Dr. E. W. Taylor, in the Chair

(*Continued from volume 46, page 452*)

AN UNUSUAL CASE OF HYDROMYELIA

By Edwin G. Zabriskie, M.D.

A young woman of twenty-five years; initial symptom was pain in right groin and flank, occurring in paroxysms during March, 1915; a few weeks later, girdle sensation across lower abdomen. Two months afterward, sharp stabbing pains from knees down to ankles. Pain in right groin whenever she walked or twisted her shoulders. August, 1915, severe gastro-intestinal disturbance; was treated for gastric ulcer. August, 1916, cyst over right sacro-iliac joint was opened, and relief from all symptoms was experienced, until the wound closed, six weeks later. Development of double foot drop in January, 1917. Examination showed abolition of all tendon jerks in the lower extremities, atrophy of left anterior tibial group, double foot drop, no electrical response, and only slight hyperesthesia over the dorsum of the feet. Exploratory laminectomy revealed extensive hydromyelia extending from the conus upward.

THE ATAXIC TYPE OF CEREBRAL BIRTH PALSY (CEREBRAL DIATAXIA)

By J. Ramsay Hunt, M.D.

The clinical picture presented by the cerebral birth palsies is large and varied, and notwithstanding the differentiation of a number of clinical types, it is but rarely that these are encountered in an absolutely pure form. More commonly the clinical picture is mixed, representing a combination of one or more types in which, however, the predominance of one special group of symptoms is usually distinguishable. The recognized clinical types of the cerebral birth palsies are as follows: (1) the spastic type of Little, (2) the flaccid or atonic type of Förster, (3) the cerebellar type of Batten.

In addition to these well defined and distinct types there are various subgroups, complications and associated symptoms which add considerably to the variety of the clinical picture; *e. g.,* choreiform and athetoid movements, tremors of the intention type, myoclonic movements, epilepsy, involvement of the special senses and mental defect, and which when combined with spastic diplegia are usually classified under the general term of Little's disease.

To these recognized clinical forms Dr. Hunt would add another which is best described as *the ataxic type of cerebral birth palsy.* This type is characterized by a pure ataxia without paralysis or spasticity. There is a history of prolonged or difficult labor, faulty presentation or instrumental delivery producing injury during birth. This is followed by retardation and abnormality in the development of motor coördination, which causes a slowness and awkwardness in the development of such acts as sitting, walking, talking, and in the use of the arms and legs. All of these various movements show evidences of incoordination and ataxia, with a tendency, however, toward gradual improvement. There is dysarthria, static and locomotor ataxia, and an incoördination of the upper and lower extremities which persists in the recumbent posture. There may be a moderate degree of hypotonicity, and the tendon reflexes are sometimes diminished and may be difficult to elicit. The superficial sensations are apparently normal, and the special senses are not affected. Speech is dysarthric and participates in the ataxic disturbances. There is a moderate degree of mental retardation but no gross intellectual defect and no epilepsy in the cases observed.

The symptomatology is bilateral and fairly symmetrical, although the symptoms may predominate on one side. The legs are more affected than the arms. There is a tendency to gradual improvement. The gross motor power is well preserved and there is no tendency to spasticity or exaggeration of the tendon or periosteal reflexes. There is rather a tendency to hypotonicity and diminution of reflex action. The plantar reflex is of the physiological type. There is no *nystagmus.*

The clinical picture is therefore characterized purely by motor incoördination which affects in greater or lesser degree all voluntary movements.

This clinical picture Dr. Hunt ascribes to a vascular lesion received during the birth, causing meningeal hemorrhage, thrombosis of the cerebral veins, softening, etc., limited to the parietal area, in the sensory sphere of the cerebral cortex. He believes that during birth the parietal veins of the cerebral cortex are thrombosed or ruptured. These veins course in the parietal fissures and drain the blood from the parietal lobes. Such a vascular lesion would lie posterior to the motor area, in the sensory fields and as a result there would be a destruction or retardation in the development (dysgenesis) of the cortical centers and commissural systems by which muscle memories are received and transmitted to other cortical areas. This form of the cerebral birth palsy is the sensory equivalent of Little's disease and is characterized by bilateral cortical ataxia; it is a *cerebral diataxia,* in contradistinction to Little's disease, which is a *cerebral diplegia.* This type may be readily confused with cases of congenital cerebellar ataxia, the more so as bilateral ataxia of cortical origin is rarely if ever encountered in a pure form excepting in this group of cases.

Among the important diagnostic criteria may be mentioned the history of injury at birth, the absence of nystagmus, incoördination of the extremities in performing the usual tests for ataxia, which persists and is not decreased in the recumbent posture. The disturbance of motility is not in the nature of a dysmetria, nor has it any of the characteristics of an intention tremor. It is a true ataxia which is more marked when the eyes are closed.

CONGENITAL CEREBRO-CEREBELLAR DIPLEGICS AND THEIR TRAINING TREATMENT

By L. Pierce Clark, M.D.

The diagnostic syndrome of the affection. Spastic and flaccid types. School, occupational and general training. Special principles of treatment for the segmental ataxia (asynergia). Speech training. Training for the mental retardation. Prognostic value of the educational training. Relative values of various special school systems. Outcome of personal experience in handling a series of cases.

The papers by Drs. Hunt and Clark were discussed together.

Dr. Starr asked Dr. Hunt whether there was any athetosis in his cases.

Dr. Ramsay Hunt, in reply to Dr. Starr, said that athetosis had not been observed in his cases. At times a certain tendency to spontaneous incoördinate movements was observed which was in the nature of an ataxic manifestation and did not resemble chorea or athetoid movements.

Dr. Fisher, of New York, thought the cases referred to by Dr. Hunt and Dr. Clark very similar in their type. It was, as stated by Dr. Hunt, a question of distribution of the lesion. Many observations of autopsies made some years ago, which the speaker had reported as birth palsies, either diplegic or hemiplegic, showed there were invariably involvements of the cerebellum, with marked decrease of the fibers passing from the cerebellum to the cerebrum. He thought, therefore, that no distinct condition was portrayed as in the two papers, but that it was the same thing that had been previously found in birth palsy: that it was simply a difference in localization axis. The mental condition, as Dr. Clark had stated, corresponds to many of these cases of Little's disease. The degree of improvement that Dr. Clark had referred to depends entirely on the integrity of the cerebral structure. We know that the question of reëducation in tabes consists in the cerebral function controlling the spinal function and it is the same in these cases. He thought it simply a condition in which the original etiological factor is the same, the symptoms differing only according to the site of the lesion.

Dr. Starr said he recognized the cases Dr. Hunt had described, but in his own experience they were rare, and in the cases he recalled as presenting hemiataxia there had uniformly been a condition of athetosis. That had been the origin of his question; because he had in mind four cases wherein there had been no paralysis, but which were accompanied by hemiataxia and athetosis. Dr. Hunt's objection to Dr. Clark's supposition of a bilateral symmetrical lesion of the cerebellum he considered very well taken; because he could not, in all his etiological experience, recall seeing any absolutely bilateral symmetrical cerebellar lesions. He doubted if they exist. That would throw a great deal of doubt on any classification of these cases as cerebellar cases if they were bilaterally symmetrical in the distribution of their symptoms.

With regard to the pathology suggested by Dr. Hunt, the speaker thought it must have been twenty years ago when Lannelarge first published his cases which excited so much interest and Dr. Keen wrote that popular article in Harper's Monthly Magazine which led to the operation of opening the skull in these cases. Dr. McBurney and the speaker operated on twenty-two such hemiplegic, ataxic individuals, and, much to their surprise and disgust, in none of the cases did they find evidence of surface clots upon the brain. That had been the speaker's pathological diagnosis, and each case disappointed him greatly, because each time they would operate there was not any evidence of anything but a perfectly smooth normal dura and a perfectly smooth cortex, and there was not any clot there. In contradistinction they had found peculiar honeycombed connective tissue defects in the brain; so that the clots on the surface he thought must be a pretty rare thing.

Dr. Hunt's pathological suggestion, namely, of a clot running down between the hemispheres and affecting the corpus callosum, greatly interested him, because it does imply a bilaterally symmetrical effect that would endure; but, on the other hand, he had had occasion to study very carefully a case of corpus callosum tumor some years ago in connection with Dr. Francis, of Montclair, and they had at that time got together some eighteen or nineteen cases of tumors of the corpus callosum, with careful analysis of the symptoms and pathology, with, of course, autopsies; and the speaker in his paper describing these had also referred to a collection that had been made by an English author, Bristow; and in all those cases it had been interesting to know that while the result of the destruction of the corpus callosum was the development of symptoms of mental deterioration which one might term dementia, and while in some of the cases there was a definite condition of blindness resulting that indicated a connection between the optic commissure between the occipital lobes, yet in none of the cases was there any paralysis or ataxia; so that there again there is a doubt as to whether this ataxia could be produced by the division of the fibers of the corpus callosum.

Dr. Starr had not seen any recent evidence that the theoretical pathology of Dr. Hammond, who ascribed these cases to lesions of the optic thalamus, had been confirmed, but it seemed to him a great pity that in these cases of birth palsy, especially of the ataxic type, we cannot get a pathology to explain the symptoms. He regretted that in the cases he had observed he had not secured any improvement such as Dr. Clark suggested.

Dr. Knapp said thirty years ago the entire profession was a great deal more interested than now in cerebral palsies of children, it having then been a comparatively new subject, and Greidenberg, in a very exhaustive paper in the Archiv fur Psychiatrie, made what Dr. Collins would call a most meticulous specification of all the different forms of posthemiplegic disturbances which might occur in the central paralysis of children; and a little more elaborate study would probably have found many more. Thirty years ago the speaker himself presented to this Association a brief contribution on the subject, making a slight addition to the classification as presented by Greidenberg. These disturbances occur not only in the birth palsies, but in the later central palsies of childhood, and he thought that Dr. Hunt's cases might fairly come under that general heading, even if there had been no ordinary paralysis with them. Of course, it is a comparatively common thing to find some disturbance in motion, rather than a real paralysis.

As regards Dr. Starr's remarks concerning tumors of the corpus callosum, the speaker had seen one which was attended with a shifting hemiplegia, first upon the one side, then upon the other, with gradually progressive dementia.

Dr. Camp said he had had an opportunity to autopsy several cases of trauma to the brain at birth, and it had not been his experience to find that the hemorrhage in these cases was bilaterally symmetrical. As he understood it, Dr. Hunt had characterized his syndrome as due to a bilaterally symmetrical lesion, but the speaker would be of the opinion that if the symptoms indicated a bilaterally symmetrical condition, it probably would not be due to trauma.

Dr. Ramsay Hunt, in closing, said that the clinical picture presented by the group of cases which he described was bilateral, although a preponderance of the symptoms on one side had been noted. He remarked that he had had many opportunities to study the brains of infants injured at birth and quite agreed with those who spoke of the variegated nature of the lesion, viz., hemorrhages, meningeal, intracerebral or ventricular, and sometimes associated with laceration of the brain substance. That meningeal hemorrhage, however, is a frequent occurrence and an important factor in the symptomatology has been shown by many observers, and notably by Dr. Sarah McNutt. The cerebral veins pass from the surface of the convexity to the superior longitudinal sinus, there are from four to six frontal veins, two or three parietal veins and two occipital veins which pass in the median line across the meningeal space to enter the sinus, so that any unusual overlapping of bones of the fetal head which normally takes place during parturition might in a violent or prolonged labor tear the veins from their connections with the sinus. Furthermore, the sinus might be compressed and in this way a thrombosis induced which could then extend into the tributary cerebral veins. Such a lesion would necessarily interfere with the circulation in a limited area of the cortex, corresponding to a given venous distribution. Furthermore, it would be of a superficial character; that is, causing hemorrhage softening and edema in the superficial layers of the cortical structure. The larger cerebral veins course in the cerebral fissures and it is interesting to note that the parietal fissures usually contain one or more of the large parietal veins, and it is quite possible that a thrombosis or hemorrhage in this distribution might produce the clinical picture described. That such a lesion is frequently the cause of spastic diplegia as described by Dr. Little has been proven beyond all doubt.

Dr. Hunt's contention is that a lesion of similar character and limitation may occur in the sensory sphere of the cortex posterior to the fissure of Rolando. A lesion in this region would injure the centers for the perception and transmission of the proprioceptive impulses from the joints and muscles. As the result of such a pathological condition not only would the centers themselves be injured, but the short commissural systems which unite these centers with the Rolandic area would suffer as well. And as many of the cells and fiber systems of the cortex are imperfectly developed at birth, such an injury would also retard or prevent the possibility of normal development. He also emphasized the fact that he was speaking only of birth palsy in the strict sense of the term and not of the whole group of the cerebral palsies of childhood, with its variegated pathology, both pre- and post-natal.

Most authorities on cerebral localizations ascribe to the parietal area centers for the reception and elaboration of muscle memories. These are localized in the parietal convolutions P^1 and P^2 as well as in portions of the supramarginal and angular gyri. The mesial surface of the parietal lobe is also supposed to participate to some extent in this function, so that there is nothing forced in the theory that a localized lesion in the parietal area would produce the clinical picture of a pure ataxia. If we recognize the possibility of pure spastic diplegia from a vascular lesion in front of the fissure of Rolando, we cannot deny the possibility of a pure ataxic type of diplegia from a vascular lesion in the sensory sphere posterior to the fissure of Rolando. He thought that Dr. Starr had misunderstood him in one particular; in speaking of association fibers Dr. Hunt did not refer to the corpus callosum but to the association fibers uniting the sensory and motor areas of the cerebral cortex. Among these is the fasciculus centro-parietalis which von Monakow suggests might play a rôle in coördinating certain sensory and motor centers of the cortex.

Dr. Clark, in closing, said that he would claim practically the same fundamental argument in delimiting cerebro-cerebellar diplegia from the ordinary or irregular types of cerebral diplegia or Little's disease as Dr. Hunt had put forward for an ataxic type of diplegia, although he was disinclined to agree with Dr. Hunt that the latter had established a separate clinical cerebral entity apart from some irregular types of cerebro-cerebellar diplegias. As has been urged a brain injury to produce so severe and extensive a lesion as to embrace the well protected cerebellum must be great indeed, this is also shown in that the cerebro-cerebellar diplegias are very infrequent. Their percentage of coincidence with a simple diplegia is quite small,—not more than a fraction of 1 per cent. at most. He regarded Dr. Hunt's so-called ataxic cerebral type as really closely allied to Batten's cases, which, after all, were but slighter grades of Dr. Clark's larger and more inclusive class of cerebro-cerebellar diplegia.

EPILEPSY IN THE ADULT

By Edward D. Fisher, M.D.

1. Epilepsy occurring after severe mental shock.
2. In its relations to arteriosclerosis.
3. In alcoholism.
4. In syphilis.

Differential diagnosis between essential and acquired epilepsy, the former occurring during childhood, the latter after the cerebral structures have been fully developed.

Dr. L. Pierce Clark, of New York, said that while the majority of epileptics show gross defects of the intestinal tract and vascular nervous system, yet there are many others who do not show these constitutional defects. He was interested to hear Dr. Fisher draw attention to the inability of these epileptic persons to meet different life stresses. The types of stress these individuals are called upon to meet are not dissimilar to those the average individual is able to cope with successfully. For some reason, a situation which is not particularly difficult is not handled in the proper way by the epileptic, and the stress thus engendered might provoke a whole series of epileptiform symptoms. We must go back to an understanding of the essential physiological and psychological makeup to understand how these stresses really play a rôle.

Recently the speaker had taken a group of traumatic cases, and examined in detail a dozen cases of epilepsies following in the wake of infantile cerebral hemiplegia, to find the particular mental makeup of these individuals prior to their palsy and before the onset of their epilepsy. He found that the personality makeup of these children was not very dissimilar to that seen in the idiopathic epilepsies, or those without obvious pathological or structural conditions in the brain. In a paper presented four years ago before this Association, in collaboration with Dr. Sharp, based on a study of 443 cases of hemiplegic epilepsy at the Craig Colony, the speaker had maintained the heredity factor in hemiplegic epilepsy was only a little less in evidence than that present in genuine epilepsy, and that the prognosis as to a sequential following in the wake of a given case of infantile cerebral palsy should be based upon the presence and degree of spasmophilia or neurotic history in any given case; and that this latter fact should be given as much or even more weight than the site, nature and degree of the initial cerebral injury expressed in the palsy.

Dr. Schaller, of San Francisco, said that in 1906, while working in the pathological laboratory of Dr. William Oppuls, he had undertaken some experiments to produce arteriosclerosis by repeated injections of adrenalin intravenously into the rabbit following the experiments of Josué. By this method striking specimens of arteriosclerosis were obtained. He had used maximum doses of adrenalin within the lethal dose in order to produce maximum effects; and he had by this means frequently produced typical epileptic attacks in these rabbits. The attacks were manifested by periods of unconsciousness, by falling, tonic and clonic convulsions, dilatation of the pupils, loss of sphincter control; in short, by typical epileptic attacks. He had not at the time been particularly interested in epilepsy. These experiments were interrupted by the fire and earthquake and not subsequently published, but in the light of what Dr. Fisher had to say about the vascular origin of epilepsy and the relationship of arteriosclerosis, Dr. Schaller thought it well to speak of them here.

AN ANATOMICAL SEARCH FOR NON-TUBERCULOUS DEMENTIA PRÆCOX

By E. E. Southard, M.D., and M. M. Canavan, M.D.

Several autopsy collections in Massachusetts institutions have been searched for dementia præcox, and the percentages of open and closed tuberculosis determined. General figures for the whole series; dementia præcox patients are more apt to die of tuberculosis than are non-dementia præcox patients. The dementia præcox group itself, defined by various more or less rigorous criteria, has been studied more narrowly with respect to tuberculous lesions, disease-type and the like.

Dr. Jelliffe, of New York, said that, although he had not heard the presidential address, sufficient indications of it had been given from time to time to justify the speaker in indulging in some free speculations. Following the example of Balzac, let us say, who, in his later years, attempted to summarize his philosophical ideas of life, but fearing the philistine mind of his orthodox and conservative surroundings, chose to present them as coming from a crazy man, Louis Lambert, Dr. Jelliffe said he might presume to utilize a similar psychological device, by assuming what he had to say as touched with a fine frenzy before he would utter them. Antithesis is the very foundation of life. Dr. Southard was always stimulating, he said, and following this law of opposites, Dr. Jelliffe would suggest the problem, not that which Dr. Southard offered as to the relationship the tubercle bacillus bears to dementia præcox, but what relationship dementia præcox bears to tuberculosis.

In other words, if he might say it didactically, the phthisiologists of the future must go to the insane asylum to find the ultimate cause of tuberculosis. Tuberculosis might ultimately be defined as a *failure in the sublimation of respiratory libido.* Here may be found the answer to the question why the tubercle bacillus finds such a convenient hospital in the lungs. Why it grows there; what is the failure in resistance; what are the physico-chemical, sensorimotor and vegetative neurological factors accompanying the serum, cellular and anaphylactic reactions, etc. These questions may ultimately find their answer when the unconscious of the patient will reveal the secret why he fails to utilize his respiratory libido as a progressive instrument for social sublimation.

Dr. Southard had given his hearers some very good points of the situation to work with. His type of approach as providing material was extremely fascinating, especially the stimulating statistics relative to the catatonic forms. To understand the mannerisms, how some make their psychotic flights, etc., all these are symptomatic conditions, so far as the psychiatrist sees them, in the patient's more or less ineffectual attempt to handle unconscious situations which are unbearable. In catatonia the fixation of the chest wall is one of the minor vegetative neurological signs behind which a rebellious, even anarchistic psyche was revealing itself. Here is found the individual who, wishing to live his own private life apart, differing from all others, yet failing in any productive artistic capacity to forge new weapons for sublimation, retreats behind a stolid barrier of chest fixation—self-immolated and narcissistic in the extreme. He has no life, no joy, no progressive libido in the lung activity. Resistance, hate, rebellion and spite alone dwell there, and the tubercle bacillus grows in this kind of a medium better than in any prepared by conscious bacteriological finesse. Dr. Jelliffe suggested these Louis Lambertian ideas to the consideration of neurologists and phthisiologists alike.

Dr. Southard, in closing, said that Dr. Jelliffe's ideas were probably not as absurd as they sounded. We are all aware that bacteria tend to settle in flail joints; accordingly, we might feel with Dr. Jelliffe that the brain and parts of the body at large in dementia præcox was a locus minoris resistentiæ. There are other aspects of Dr. Jelliffe's remarks that had best be settled.

NEW YORK NEUROLOGICAL SOCIETY

October 2, 1917

The President, Dr. Frederick Tilney, in the Chair

I. CINEMATOGRAPHIC RECORDS OF WAR NEUROSES

By Frankwood E. Williams, M.D.

Dr. Williams, associate medical director of the national committee for mental hygiene, gave a brief account of what the government of the United States was trying to do effectually to handle the problems of war neuroses.

Shortly after the declaration of war, the Surgeon-General, who realized the importance of war neuroses in the casualties in the European and Canadian armies, decided to create in his department a division of psychiatry whose duty it would be to organize a neuro-psychiatric service in the army to meet the problem of war neuroses as it developed in the American forces. Dr Pearce Bailey, chairman of the Mental Hygiene War Work Committee of the National Committee for Mental Hygiene, was given a commission as major and went to Washington to take charge of the new division. The creation of this division of psychiatry represented the first attempt in any army to take into consideration the mental and nervous qualifications of recruits for military service.

Upon the formation of the division of psychiatry, the National Committee for Mental Hygiene undertook to interest the neurologists and psychiatrists throughout the country in this work. The result was that whereas there were few medical officers in the army at the time of the declaration of war who could be called psychiatrists or neurologists, there were now approximately three hundred of these specialists commissioned in the Medical Reserve Corps.

There had been, of course, many new problems before the division, but the work had divided itself largely into three parts: (1) The examination of recruits, (2) provision for the care of war neuroses in the expeditionary force, (3) provision for the care of invalided soldiers returned to this country. Psychiatrists and neurologists were now detailed to each of the American camps where they were examining the troops in a systematic way in order that those recruits might be eliminated who were found unfit for military service because of neuropathic or psychopathic conditions. No statistics were available at the present time, but it was estimated that from one to two per cent were being eliminated. The question, what neuropathic or psychopathic conditions should disqualify a man for service and what the minimum findings should be in each case, had been carefully considered and instructions prepared for the examiner.

In order that the cooperation of line officers might be obtained, a special report was prepared indicating those personality traits that would frequently come to the attention of such officers and which were considered of possible psychiatric significance, and they were requested to refer those men under them who exhibited such traits to the specialists for examination. The line officers also found the psychiatrists to be of great assistance to them in helping them to a better understanding of their men, and in consequence the cooperation had been cordial. In one camp the men were being referred to the psychiatrists by the line officers at the rate of from seven to fifteen a day, and from fifty to seventy-five per cent. of these were found to be unfit for service. Disciplinary cases were likewise being referred to the specialist.

Neuro-psychopathic wards were being planned for the base hospitals at each of the sixteen cantonment camps. Three or more psychiatrists and a corps of specially trained attendants were to be detailed to each of these hospitals which would be provided with adequate hydrotherapeutic and electrotherapeutic equipment. The plans for the expeditionary force called for thirty-bed neuro-psychiatric units with each base hospital and for a five hundred-bed special hospital for war neuroses. The latter would be staffed by nineteen medical officers, a corps of one hundred and fifty nurses and male attendants, and a corps of specially trained reëducational workers.

Dr. Kennedy and Dr. Casamajor and others had pointed out the importance of having specialists in nervous and mental disease at the casualty clearing stations, and it was probable that eventually specialists from the base hospitals would be on duty at the casualty clearing stations, so that a patient could be handled from these stations through the base hospital unit and, if necessary, through the special hospital for war neuroses. If after a reasonable time a patient did not recover in the special hospital, special provision would be made for his care and treatment.

(The cinematographic pictures followed. They represented men suffering from various forms of war neuroses. Each was accompanied by a short history of the case presented and an account of the success of the treatment instituted. The diagnoses varied, among them being platysma tic; hysterical paraplegia, stammering and tics; dancing gait; hysterical gait following wound; fits in a malingerer; hysterical gait following shell shock; hysterical paraplegia and mutism; hysterical monoplegia; hyperthyroidism and hyperadrenalism.)

II. WAR SHOCK, ITS OCCURRENCE AND SYMPTOMS

By T. H. Ames, M.D.

The speaker who considered these war neuroses more aptly termed war shock than, as they were generally known, shell shock, had been for a long time endeavoring to classify these conditions and to differentiate them from the neuroses occurring in times of peace. For this purpose, he spent some time in Canada, studying these cases returned from the front, and his description of some of them was most graphic.

Differential Diagnosis.—From observation of chronic cases of war neuroses in convalescent hospitals in different parts of eastern Canada, classification for the differential diagnosis of every case of nervousness developing at the front might be made in the following way:

1. Constitutional inferiority group, including the high-grade morons and epileptics.
2. Psychoses, such as general paresis, dementia præcox and manic-depressive states.
3. Concussion, that is, organic injury to the brain or spinal cord, so that on physical examination disturbances in reflexes and in the spinal fluid were demonstrable.
4. War shock, or the functional cases which had no organic signs, either wounds from bullets or shrapnel, and showed no abnormal changes in reflexes.
5. Malingering, or deliberately feigned symptoms.

The frequency of the occurrence of war shock could not at the present time be estimated. The statistics of the returned casualties were being compiled in Ottawa and, though they were not complete, a rough estimate of cases of nervousness in all forms was about three per cent. of all the casualties, perhaps one half being cases of war shock. This meant that probably one half of one per cent. of the casualties returning to Canada were war shock cases.

It was interesting to study the types of men who suffered from these conditions. Throughout the war it had been a matter of continuous comment that prisoners of war did not have war shock. Similarly it had been stated that wounded men did not have war shock, all nervousness that they might have had ceasing instantly on being wounded. It was also claimed that war shock never developed in a man who was asleep when a shell burst near him. Crack regiments had fewer men coming down with war shock, so did old regiments with long traditions of pride. It was also stated that among officers there was relatively a smaller percentage than among privates. One of the most striking features was the relatively small number of cases among woman nurses and civilians who were often exposed to shell fire.

The immediate exciting incident provoking the attack might be either a physical or an emotional shock. The physical shocks were frequently tremendous. Being gassed constituted another inciting cause, as did aëroplane raids and mine explosions, or anticipated mine explosions. The emotional causes were apt to produce less sudden onset of symptoms; the factors were most frequently fear or suspense. The large percentage of cases, however, had their onset some time after the shock, some of the men coming out of unconsciousness and being for several days without any symptoms at all, then developing mutism, blindness, tremors, etc. The period between the trauma or inciting shock and the onset of the symptoms of neurosis was called the period of mediation by some writers, the latent period by others and the free interval by others; the speaker considered "the period of incubation" the better phrase, for it resembled that period in infectious diseases between the time of exposure and the breaking out of symptoms.

Once the symptoms started, they were likely to assume their maximum severity within twenty-four hours, so that all of the different symptoms appeared at the end of that time. As a rule, from the time the man was taken care of the symptoms began to abate, subsiding, in the majority of cases, one by one at irregular intervals. Some of the symptoms that disappeared did so in a few moments' time; the use of the voice came back all at once, blindness disappeared almost instantaneously, as did paralysis, though the use of limbs that had been paralyzed might be slow and gradual. The cessation of tremors, however, had never been rapid.

The course of the disease might be continuous or interrupted, exacerbations being quite common. The severity of the symptoms varied in many respects. Some were extremely severe and others very mild. Those cases which were monosymtomatic were likely to be more severe than those with more than one symptom. It might be stated that the intensity of any symptom was in inverse proportion to its duration.

The symptoms might be classified as psychical or physical; the first involved ideation or emotional features or both; the second was characterized chiefly by motor symptoms, symptoms involving the special senses. There was a third group involving the autonomic system, gastrointestinal, cardiac, respiratory, secretory or excretory systems.

Dr. John T. MacCurdy regarded as the most important feature of these war neuroses, the human element. It was so large a factor that one could not treat these troubles properly without familiarity with the environment in which they were produced. It was for this reason that Dr. Ames had done good service in making his account so graphic.

The war neuroses were extremely important. The situation was urgent medically in that there were new clinical problems of frequent occurrence demanding speedy solution. There were no novel symptoms, but the occurrence of stereotyped neurotic reactions with a constant war content justified a separate nosological grouping. The prevalence of "shell shock" was not well known, because no statistics had been published. Dr. Ames spoke of three per cent. in Canada, but that was a very conservative figure, inasmuch as the figures given officially to Major Bailey in May showed that twelve per cent. of those invalided home to Canada suffered from neuroses and mental diseases, fifty-eight per cent. of which had a diagnosis of "shell shock." The War Council of Great Britain gave Major Salmon statistics of all discharges from the British Army; one seventh of these were for mental and nervous troubles, of which the largest proportion were war neuroses.

The importance of this subject did not end with a consideration of its frequency, for war neuroses had become a military as well as a medical problem. This was because they were intimately connected with the psychology of fear and the morale of the army. Dr. Ames had done well by beginning his study with a classification; the chaos of literature was due to the fact that most writers were talking about something other writers had labelled in a different way. There had been little consistent effort made to separate into discrete groups the different types of nervous disorders, to gather the pure war cases and set them apart from those of civilian type occurring in the army. It was a description of the peace types that furnished so many of the bizarre pictures set forth in the literature.

War neuroses seemed to be constant and simple in their type. In England, the speaker visited seven or eight special hospitals for nervous cases and found that the physicians who did most for their patients and returned the most men to active duty classified their material into two groups, anxiety neuroses and the conversion hysterias.

In the anxiety neuroses the symptoms were almost purely psychic, in contrast to the hysterias, where the symptoms were somatic. A further difference was found in that the anxiety cases occurred mostly among officers. In Scotland in a three hundred-bed hospital for officers they had only one example of anxiety neurosis with gait disturbance; the other 299 were cases which showed no somatic symptoms beyond occasional tremors, which were of brief duration. The paraplegias, the blindness, the mutism, tics, etc., constituted the hysterias and these occurred preponderantly among the private soldiers. Privates, as a rule, were comparatively ignorant men; they were not surprised to find a scratch on the shoulder resulting in paralysis of the arm, a sequence which an educated man would view with astonishment. This was one reason for the rarity of hysterias among officers and corresponded to the experience of civilian practice, where functional palsies, etc., were rarely met with outside of dispensary practice. The onset of the anxiety condition was gradual and usually marked by fatigue. The hysterias, on the other hand, developed quickly. It was the anxiety neuroses that had the greater military significance. The officer who later developed an anxiety state passed through a latent period during which he felt more and more fear and struggled against it. It was impossible for a man putting forth ninety per cent. of his energy in smothering fear to encourage his men with the necessary abandon; consequently their neuroses led to the breaking up of the morale of their companies.

The treatment for the two groups was different. Hysterical symptoms were amenable to suggestion, hypnotism and reëducation, all of which efforts were successful with anxiety neuroses only to a limited degree.

In regard to etiology, the first point was the universality of fatigue. This was a factor which in civil practice might be almost always disregarded in the consideration of fundamental causes, but in war one could not do that. Such fatigue as occurred in the trenches was unknown in times of peace; in civil life some respite was usually available, but the soldier must go on four, five days, perhaps even for a week without sleep, with inadequate rations, with little or no shelter from the weather and always exposed to a frightful bombardment. This produced such extreme fatigue that it broke down inadequate resistance and resulted eventually in a neurosis. The symptoms of this neuro-psychic fatigue were a feeling of tenseness and restlessness; starting, without fear, and slight tremors. Intellectually the tension and the power of concentration were poor and memory was poor and exercised only with great effort. There was great difficulty in falling asleep and during the period immediately preceding real sleep the soldier was troubled with hypnagogic hallucinations; these were universally present with normal people but lasted only for a few moments, consisting of a visualization of the train of thought with insight, but in fatigue they might persist for hours, perhaps during the entire night, during which time the soldier knew the visions were not real but could not dispel them. He might have dreams of the occupational type. At any rate, he awoke in the morning feeling as tired as when he went to bed. After this went on for some time his adaptability to warfare broke down; he was overcome with horror of the sights around him; he became fearful. Any man when exposed to shell fire was fearful, but as soon as he learned to distinguish in which direction the projectile was traveling and where it was likely to fall, his fear ceased. But when sufficiently fatigued, when his compensation began to go, he lost this ability and felt as though every shell were coming directly at him. After suffering in this way for some time he wished to be released from the situation, toward which he developed a feeling of antagonism.

At this point emerged a further difference between the officer and the private. The common soldier hoped to receive some wound, a "blighty" one, and when his neurosis appeared the symptoms assumed corresponding physical form; his sight went or the tics, paraplegias, etc., developed. The officer had higher ideals; he would not harbor the thought of being disabled; he did not want to get out of the war by any subterfuge, and so it came about that he developed a fear of death and fearful dreams of being killed began. When this occurred his sleep was disturbed by nightmares and this aggravated his condition until it was only a question of time before he broke down. All these premonitory symptoms went on for some time and just how fast they developed to the point of incapacitation depended on circumstances. The soldier was waiting for some final precipitating factor which might be a purely psychic trauma or a physical accident, such as concussion.

When did the disease begin? A good deal of the confusion in the literature came from the fact that in taking the histories of these men the obvious incapacitating symptoms rather than those suggestive of prodromal difficulties had been noted. The important thing to remember was that when asked what caused the trouble the patient always mentioned the final accident. Concussion might be more important than Dr. Ames suggested. It was not always possible to examine the cerebrospinal fluid, but there were mental features in the history which were pathognomonic of real concussion. Following the accident the soldier lost consciousness, recovered, as a rule, in a hospital and drifted off again. These lapses of consciousness might last for weeks and during this period there was an occupational delirium. Occasionally one might find traces of small retinal hemorrhages weeks after the concussion.

The results of mild concussion lasted for only a few moments in a normal individual not suffering from fatigue. Considerable stress was laid by some authorities on the make-up of the patient and on the claim that so many neurotics broke down. This was true. The adaptability of a neurotic was not up to par and he could not stand fatigue or exposure very well. On the other hand, it was astonishing to find how many previously neurotic men improved with military training. There were, however, some tendencies which interfered specifically with military efficiency. Those who had been afraid of thunder were affected by shell fire because of the similarity of the sound. Men who had had difficulties suggestive of claustrophobia were fearful of dugouts; most important of all were the type who had sensitiveness to cruelty or bloodshed, for they could not stand more than a few months in the trenches.

Dr. Ames said he believed the officers were not so frequently affected by war neuroses. Out of the ten of thousands of cases in the British hospitals, the statistics showed relative percentages of six officers to one private with " shell shock." This was natural, considering the greater responsibility and mental strain which the officer endured.

Dr. Ames also referred to the cardiac symptoms. Some writers had tried to classify D.A.H. (disordered action of the heart) with " shell shock." In the Hampstead Heart Hospital in London careful histories were taken of a number of cases picked out as most likely to be neurotic; in ten consecutive cases only one or two were found who showed the emotional stigmata of a neurosis. They had apparently developed their symptoms as a result of the purely physical stress of the campaign. On the other hand, work done at that hospital by Fraser and Wilson showed that these individuals were apparently suffering from trouble in the nervous or glandular mechanism which controlled the heart action. They were exquisitely sensitive to adrenalin and insensitive even to large doses of atropin. They might have neuroses, if Graves' disease was a neurosis, but not a neurosis in the ordinary sense of the term.

The subject of war neuroses was too big to be treated adequately in a few moments; only generalities could be discussed. No two cases were identical in detail and the possibilities for variation were so great that what might be true as a whole of a group might be inapplicable to any one individual patient. In touching on these few salient points the speaker hoped he had not given the impression that it was a simple matter that was being dealt with. The study of war neuroses had just begun.

Dr. Charles L. Dana did not think that the disorders and symptoms described under the term " war shock " were any of them new; the grouping of the cases and classification corresponded to the groups of neuroses and psychoneuroses seen in civil life as the result of trauma and shock. The frequency, however, of different types and the combination of symptoms were different in war shock and civil shock cases. Thus in civil life there were very few cases of hysterical mutism, deafness, or blindness, but plenty of tremor, paralysis and skin anesthesia. The group which the term neurasthenia covered better than " anxiety neurosis " seemed to have much the same characters as the traumatic neurasthenias of civil life, where there were often types of mild depressions brought out by shock; neither war nor civilian shocks were often the real cause of the obsessive psychosis.

The main measures to pursue in trying to prevent or to prepare individuals against shock were the avoidance of excessive fatigue and education against fear, measures which were rather councils of perfection. The ear and the body could, however, be educated to withstand the noise and concussion of cannon-firing and shell explosion, as had been shown in the artillery branch of the army service where soldiers, ignoring ear protectors, slept peacefully in the gun pits of even the heavy artillery.

BOSTON SOCIETY OF PSYCHIATRY AND NEUROLOGY

October 18, 1917

The President, Dr. Joseph W. Courtney, in the Chair

VARIATIONS IN TESTS ON SPINAL FLUID IN SYPHILIS OF THE CENTRAL NERVOUS SYSTEM UNDER TREATMENT

By Harry C. Solomon, M.D.

Cases of syphilis of the nervous system receiving treatment frequently show diminution in the spinal fluid findings approaching more nearly the normal, even though the patient shows no clinical improvement. At times they may even become entirely negative while the patient has not recovered. On the other hand, patients may have a remission apparently as a result of treatment, while their tests show no improvement, so that the clinical symptoms are the more important.

In some cases where the tests become milder, it may be the gold sol that first becomes negative; in other cases the gold sol remains positive, while all other tests become negative. The same is true of the Wassermann reaction in the fluid and the globulin content. The Wassermann reactions of blood and the spinal fluid do not parallel each other in many cases. At times the blood will early become negative, while the spinal fluid is not changed. Again, the spinal fluid becomes negative, the blood remaining positive. We still have to depend to a large degree upon our clinical observations.

Dr. Courtney presented to the Society a number of prints of old masters.

THE DIFFERENTIATION OF PSYCHOTIC FROM NEUROTIC CONDITIONS

By Donald Gregg, M.D.

The dividing line between psychotic and neurotic conditions as usually drawn is vague and theoretical. This situation is partly due to the confused relationship between psychoses and insanity. The matter of insanity, however, must be considered apart from that of the existence of a psychosis, for insanity is a social condition—a question of conduct in a given environment and a question primarily of legal rather than medical definition.

The differentiation of a psychosis from a neurosis, however, is a matter of importance. Laymen attach more importance to the distinction between the two conditions. Clinical standards help to clarify this situation.

The law recognizes the distinction between delirium tremens and alcoholic hallucinoses and provides for the exclusion of the former and the admission of the latter to the Boston Psychopathic Hospital. Clinically, in delirium tremens there is evidence of a toxic interference with the receipt of stimuli and an increased reaction through the vegetative nervous system to emotional stimuli, whereas in alcoholic hallucinoses the evidence of interference with the receipt of stimuli is seemingly lacking and there is a striking lack of reaction through the vegetative nervous system to such stimuli.

Similarly, in syphilitic neurasthenia there is an increased reaction through the vegetative nervous system to emotional stimuli, whereas in general paresis there is a lack of such reaction.

In shell shock also there is a physical agent present which produces in man symptoms varying from mild neuroses to severe psychoses.

In distinguishing between psychotic and neurotic conditions the thesis is advanced that in the former there is a hypo-reactivity through the vegetative nervous system to emotional stimuli, whereas in the latter there is a hyper-reactivity through this system to such stimuli.

The following observations are given to illustrate this thesis.

In the syphilis-psychoses are to be recognized four types—syphilitic neurasthenics, the pre-paretics, the cases of paresis sine paresi, and the paretics. In the first two groups we get increased reaction through the vegetative nervous system to emotional stimuli, while in general paresis the changed reactivity is recognized as an early symptom almost always present.

Among the hypo-phrenoses—the feebleminded—keenness of reaction to emotional stimulation is not expected.

Among the epileptoses, a change in affectivity is noted that may gradually develop and remain present, or may proceed or follow individual seizures.

Among the pharmaco-psychoses—the alcoholic and drug cases—the distinction between delirium tremens and alcoholic hallucinoses has already been considered.

Among the encephalo-psychoses—the coarse brain cases—are cases which in their early stages are classed as neurasthenics and that later show marked changes in affectivity.

Somato-psychoses are seldom seen by psychiatrists in their initial stages. In typhoids, cardiac, pneumonic and puerperal cases, a change in affectivity, as keen alertness, a disregard of normal physical weakness and disabling symptoms may be recognized.

Among the gerio-psychoses are again to be found cases varying in symptoms from neurasthenics to frank psychoses.

Among the schizo-phrenoses—the dementia præcox cases—change in affectivity is an early and almost constant symptom. In these the connection between emotional stimuli and normal reaction through the vegetative nervous system is irregular and labile, predisposed to rupture under environmental or physical strain.

The cyclo-thymoses—the manic-depressive cases—also show types varying in symptoms from mild neurasthenic-like depressions to frank psychoses. These cases imperatively call for an early diagnosis, for from among these cases come the sudden suicides and maniacal murders.

Among the psychoneuroses there is recognized a relationship between emotional disturbances and the physical symptoms that to a greater or less degree incapacitate them for effective life and happiness. In the neurasthenias these symptoms represent excessive reactions through the vegetative nervous system in the field innervated thereby—the digestive system, the urinary organs, the genital organs, the respiratory apparatus, the cardio-vascular system, etc., while in hysterics and shell shock cases there is seemingly an overflow of reflex stimulation that in addition inhibits various muscular activities usually controlled through the cerebrospinal system. Emotions play an important part in these conditions and react physiologically through the vegetative nervous system.

Among the psycho-pathoses—the psychopathic individuals—there is a lability of connection between emotional activity and the vegetative nervous system which in the genius enables him to surmount difficulties with exceptional success and disregard the distractions and environmental inhibitions of more common individuals, conditions which in another member of the same family, with failure, predispose to mental disease.

Conclusion.—No attempt to define insanity or consider the etiology of various types of psychoses. Diagnosis is helped by clear line of demarcation between psychoses and neuroses—cases may be considered neuroses so long as they show hyperactivity of reaction through the vegetative nervous system to emotional stimuli, but may be considered psychoses when there is found evidence of hypo-activity of reaction through the vegetative nervous system to adequate emotional stimuli.

CHICAGO NEUROLOGICAL SOCIETY

IN CONJUNCTION WITH THE WEST SIDE BRANCH OF THE CHICAGO MEDICAL SOCIETY

October 18, 1917

The President, Dr. Arthur W. Rogers, in the Chair

Dr. Samuel N. Clark presented a case of spinal bifida occulta in the cervical region. This case will be published in full at a later date.

BRAIN FROM A PATIENT WITH WEBER'S SYNDROME

By G. B. Hassin, M.D.

The specimen was from a girl who died about a year ago. She was about nine years old and was taken sick in July, 1916, with severe headache, vomiting, dizziness. Two weeks later marked drooping of the left upper eyelid occurred, which was followed in six weeks by a right-sided hemiplegia, which was the condition when she entered the Cook County Hospital and the surgical service of Dr. Morf. On examination was found normal sensibility all over the body, normal genito-urinary functions, and a total paralysis of the left upper eyelid. There was an external left strabismus, the left pupil was dilated and rigid. In addition there was a right-sided hemiplegia with exaggerated reflexes, Babinski, etc. Both discs showed a marked papilledema. A tumor was diagnosed in the left cerebral peduncle and it was believed that the tumor was a tubercle. On account of threatening loss of eyesight a decompression operation was done and the child died two weeks later. The post-mortem examination showed a tumor that involved the left peduncle and the left hippocampal gyrus, which were both entirely destroyed, the tumor having also involved part of the optic thalamus and the medulla. The chiasm, the corpus callosum and the hemispheres were normal, the ventricles, particularly the third, were greatly compressed, but the anterior cornua of the lateral ventricles were markedly dilated. The microscopic examination showed the tumor to be a glioma which is very unusual in the peduncular region especially in children where the tumors are mostly tubercles.

A CASE OF BRAIN TUMOR

By George B. Hassin, M.D.

The patient was a man twenty-four years old who entered Cook County Hospital in the service of Dr. E. V. L. Brown about two months ago. He was taken sick suddenly about ten months ago with dizziness, vomiting, severe headache and convulsions. At the same time his eyesight rapidly failed and the patient soon became totally blind, about two months after the onset of the disease. Eight months after the onset he entered the hospital, where he had a single convulsion.

The examination did not reveal any paralysis, any sensory, urinary, or mental disturbances, but a marked lesion of the fundi which showed a secondary optic atrophy. There was also a slight nystagmus, especially on lateral movements. The pupils did not react to light or in accommodation. The entire clinical picture was confined to a bilateral iridoplegia and disc changes which suggested the possibility of a tumor with an indefinite localization. The X-ray examination showed some indefinite slight changes in the sella turcica. The serological findings, including Wassermann reaction on the blood and spinal fluid, were negative. On account of the acute onset and course, the convulsions, the severe headache and the early development of the optic atrophy, the possibility of a serous meningitis, probably of syphilitic origin, must also be considered. Repeated lumbar punctures were advised, combined with mercury and potassium iodide treatment. Only the medicinal treatment was carried out and at the present time the patient feels fairly well. He has no headaches, no dizziness, no convulsions, but he is totally blind. The pupils show somewhat variable changes—sometimes there is a slight reaction to convergence, but none to light; sometimes there is no reaction of any kind. A definite diagnosis could not be made. The onset, the course, the early occurrence of blindness suggest the possibility of a serous meningitis, similar cases having been reported by Quincke, Oppenheim and others.

Dr. Peter Bassoe said that perhaps some of the members of the Neurological Society would remember a patient he showed at a meeting some three or four years ago as a case of serous meningitis. The patient was a woman who had had tonsilitis and very soon afterward developed severe headache and rapidly failing vision. When he saw her she could not count fingers, but could see the outline of the moving fingers. There was marked papillitis. The lumbar puncture gave a fluid which was under increased pressure. She began to improve immediately after the lumbar punctures, the vision came back very rapidly, the swelling in the discs went down and when shown at the Society the eyegrounds, which were examined by ophthalmologists who were present, showed no traces of any neuritis. There has been described as following whooping cough an acute condition resembling for the moment a brain tumor syndrome with marked ocular symptoms, sometimes blindness. This has turned out to be, not serous meningitis, but actual encephalitis. There may be difficulty in deciding in Dr. Hassin's case whether there has been actual involvement of the brain in the vicinity of the third ventricle.

A CASE OF ANESTHETIC LEPROSY

By Julius Grinker, M.D.

The patient, a young man, aged 26, dry-goods clerk, a native of South America, of Portuguese descent, first came under observation on July 20, 1917. Family and personal history negative, excepting that patient acquired a case of gonorrhea six years previously and chancroids one year ago. He is an occasional user of alcoholics, but not of tobacco. After an insignificant trauma to the right leg eighteen months ago the patient experienced some pain, subsequently a painless ulcer developed in the vicinity of the second right toe-nail, which left a scar. At about the same period a weakness appeared in the last two fingers of the left hand, leaving the parts in a paretic flaccid state. In addition atrophy and weakness were noticed in the muscles of the left thenar eminence, and somewhat later of the right. Soon afterwards the entire left hand became weak with adduction completely abolished. In the areas affected by this motor disability there appeared peculiar sensory disturbances, not so much of pain, but rather the absence of pain, and the presence of numbness and paresthesia of various description. Shortly thereafter there appeared a peculiar discoloration of the skin, first noticed in the face, beginning as whitish spots, but becoming more brownish as they grew older. All of the skin eruptions with the exception of a small area under the left eye were of the macular variety. A small area extending from the left lower lid downward onto the face was the only papular eruption noticed. The right side of the face showed the same peculiar brownish discoloration as well as the chest and lower and upper extremities in diffuse spots and also in large blotches. These areas of discoloration were not symmetrical in distribution and had the ham-colored look of syphilids. Atrophies and paralyses were evidenced by the grip in both hands, which showed marked diminution of power with total loss of the same in the last two ulnar fingers of each hand. In spite of his partial disabilities he is still at work as dry-goods clerk and enjoys good health, but is greatly displeased with his cosmetic appearance.

An examination of his reflexes reveals practically normal findings, though the tendency is for a slight reduction of the deep reflexes and there are not found any pathologic reflexes. The most interesting feature in the case is the sensory examination. Without going into unnecessary detail, the sensory findings are those of syringomyelia with the peculiar sensory dissociation syndrome, in which there is complete loss of the temprature and pain senses and relative preservation of the tactile sense in the areas affected by the atrophies as well as in the patches of discoloration. Though the nerve trunks are not enlarged, they are sensitive to deep pressure. Wassermann negative. Pupils are equal and react normally to light and in accommodation. Central paralysis or palsies are absent, as well as kyphosis. There is no involvement of the bulbar group of nerves.

The diagnosis rests practically between syringomyelia and leprous neuritis. The peculiar discoloration of the skin, the absence of spasticity in the lower extremities, the complete preservation of sphincter functions, combined with an absence of bulbar phenomena, and the presence of flaccid paralysis and reduced deep reflexes with no pathological reflexes anywhere, make the diagnosis of anesthetic leprosy or leprous neuritis almost a certainty even without the demonstration of lepra bacilli in the affected parts. The patient, a Portuguese born in South America, when asked as to exposure to leprosy, denied such a possibility, but after much pressure admitted that his birthplace was only twenty-six miles distant from a well-known colony for lepers.

A CASE OF CAUDA EQUINA LESION

By Julius Grinker, M.D.

The patient, a butcher, complained of a foot drop on the right side, combined with swelling and discoloration of the joint structures of the big toe and the one adjoining. The joint condition might well be designated as dystrophic and has the appearance of a Charcot joint, for which it has been mistaken. The redness and swelling of the right toe were first noticed four years ago, at which time there was a discharge of pus and sequestra from the wound, which subsequently healed. According to the patient's story all of the symptoms occurred as the result of a fall from a roof six years ago, which disabled him from walking for a period of eight weeks. At the end of that period he could barely get about with the aid of a cane, but he lost all sensation in the lower extremities during a period of six months. Improvement was very gradual and incomplete. Sphincters were also involved for a time but had practically recovered

An examination revealed the presence of knee and Achilles jerks on both sides, although the right Achilles jerk appeared somewhat reduced when compared with that of the opposite side. The sensory examination revealed a loss of sensation in the last lumbar and the first sacral of the left side and of the first and second sacral, as well as of the fifth and a small portion of the fourth lumbar on the right side. Trophic disturbances were seen in the first and second phalanges of the left side. Neurologically it is possible to diagnose a lesion of the lower lumbar and upper sacral roots, and indeed an X-ray examination revealed an old injury of the lower lumbar spine. Even without such radiographic picture it was possible to diagnose the case from its symptomatology. The patient said he suffered extreme pains at first, which had a tendency to radiate down the legs, the very region which was partially anesthetic at the time of examination and still the seat of occasional darting pains. This finding is not characteristic for a lesion of the cord; rather does it favor the cauda equina as the seat of the trouble. Surgically this might have been a good case for interference at the time of the trauma, for of all lesions at the lower part of the spine the cauda gave the best results surgically. It is doubtful whether anything could have been gained at that time from any sort of surgical interference.

A CASE OF MULTIPLE SCLEROSIS

By Julius Grinker, M.D.

The patient had difficulty in locomotion and her symptoms were mostly of left-sided unilateral involvement. The paralysis is said to have developed about six months ago, at which time there appeared some numbness on the left side, which disappeared after a short while. For a period of two months there was speech difficulty of the aphasic variety, complete at first, but with gradual improvement to complete recovery. In addition there was a short period following the aphasia during which she suffered from diplopia. Peculiar attacks of numbness and tingling were also noticed at different times, but these never remained very long. Even at present there is occasionally numbness over the left side.

Examination revealed a left-sided involvement of the arm and leg, though the face and tongue were perfectly symmetrical and showed no signs of weakness. Tests for motility revealed a marked weakness of the left half of the body, but no distinct paralysis. Deep reflexes were about normal, with the exception of the knee jerks on both sides, which responded by an insignificant contraction of the adductor group of muscles. The left-sided Achilles reflex was also much reduced. Babinski was present on both sides, as well as Oppenheim and Chaddock signs. The patient complained mostly of the left-sided weakness and was surprised to learn that the right side was also affected. In this case also a loss of the abdominal reflexes was found, indicating that there was involvement of both pyramidal tracts, especially shown by the presence of double Babinski sign. The pupils responded well to light and accommodation, but there was slight nystagmoid jerking in both eye-balls, especially when patient looked in extreme lateral directions. Speech at the time of examination presented many of the characteristics of scanning and was very monotonous.

Regarding the diagnosis of the case, the multiplicity of symptoms suggested two diseases, cerebrospinal syphilis and multiple sclerosis. Against the first diagnosis was the absence of the characteristic signs for that disease and the absence of serologic findings. There remains only multiple sclerosis. The case was interesting because upon a first superficial examination it was mistakenly diagnosed as a hemiplegia. The second point of interest was in the possibility of cerebrospinal syphilis yielding identical symptoms, from which this case could not possibly be differentiated except for the serological findings which were negative, throwing the case at once into the group of insular or multiple sclerosis.

A CASE OF BRAIN TUMOR

By George W. Hall, M.D.

This case has been on two or three services in the hospital and as the patient does not understand English the history has been obtained by piecemeal. First he came into the eye service September 24, 1917, and six months previous to that he was treated for various things. He first complained of severe headache six months ago, which had lasted up to the present time. The patient stated that the trouble with his vision began two weeks before entering, when he noticed a twitching of the left eye. Following that he began to see double and can only see clearly when the left eye is covered. The headache was severe and located on the left side. The patient was treated here for gastric ulcer in 1915, was operated upon and had pneumonia at that time. He denies venereal disease. He drinks two bottles of beer a day, coffee and tea in moderation, no tobacco.

The patient drools on the left side of his mouth, he complains of very severe headache, is drowsy part of the time, but does not complain much. The headache is all over the head but more marked on the left side. He can turn his eyes to the right without any trouble but the left eye does not turn to the left at all. The right eye is apparently normal. The pupils show no irregularity, no inequality, and respond very well to light and accommodation. In closing the eyes the left closes much less firmly than the right. There is also better wrinkling of the forehead on the right than on the left side. Palpebral fissure is wider on the left than on the right. There is evidence of a third nerve paralysis on the left, evidence of a facial paralysis, which is shown by the fact that the eye is wider open and less wrinkling of forehead than on the right. In addition to that, on the right side of the face the sensation is normal, whereas it is absent on the left, which conforms to the outline of the fifth nerve. On opening his mouth the jaw tends to deviate toward the left. In testing further there is a marked traction of the masseter upon the right and none on the left. In testing the hearing he is apparently completely deaf in the left ear. He cannot hear a watch on the left side. On putting out the tongue it deviates decidedly to the left and it is wrinkled upon the left side and not on the right, showing a decided involvement of the twelfth nerve together with atrophy of the tongue. There is difficulty in swallowing, so there is no question but that there is involvement of the ninth and tenth as well.

Apparently there is great cranial nerve involvement, which is completely localized to the left side, so the lesion is in the region of the cerebello-pontine angle on the left side.

The only difference of opinion regarding the case is as to what is the cause. There is no history as to how long he has been deaf. Is it a tumor springing from the eighth nerve or is it a specific involvement? The blood tests showed a negative Wassermann and the spinal fluid was also negative. The cell count showed no increase, there was a slightly positive Noguchi and Nonne, which is of no account unless it is extremely decided without an increased cell count. The skull shows no lesion in the region of the cerebello-pontine angle. He had some bad teeth. His temperature had been 99.6°, 99.8°. He has had active specific treatment and yet the headache had not been relieved. He had taken mercury to the point of salivation. Dr. Hassin thought the facial nerve had improved somewhat. The negative Wassermann both on the blood and spinal fluid seem to exclude a syphilitic lesion. The eyegrounds were normal, there was no evidence of optic neuritis, so the question in this case is what is the nature of the trouble that is causing this man's disturbance. Is it a basal syphilitic meningitis, is it a gummatous growth, is it a fibro-neuromatous process from the eighth nerve or other tumor growth that is causing the condition? As it is so well localized and remains on the left side, it seems more likely that it is a possible tumor growth, even with no objective findings in the optic nerve. In the lower extremities there has been no evidence of involvement. In some cases of cerebello-pontine disturbance there is also a disturbance in the lower extremities but in this case nothing has been found up to the present time.

Dr. G. B. Hassin said that he saw the patient when he entered the eye service of Dr. E. V. L. Brown. At that time there was marked paralysis of the left seventh and sixth nerves. The eighth was not involved. A combined cerebral nerve lesion is usually due to a basal meningitis, but, of course, may also be caused by a ponto-cerebellar tumor. The eyeground findings were and are absolutely negative, and a tumor large enough to involve the fifth, sixth, up to the twelfth nerve ought to give some signs of intracranial pressure, especially on the part of the discs, which the patient never showed. On the other hand, he greatly improved on mercury, as the headache, or rather pain in the face, almost disappeared. A tumor in the ponto-cerebellar region is usually a fibroma and can subside only from an operation. For these reasons he believed the lesion to be a basal affair, probably of syphilitic nature, near the region suggested by Dr. Hall.

Dr. Grinker said it was quite possible that a neuro-fibromatosis of the several posterior cranial nerves might produce the symptoms without choked discs as a necessary accompaniment.

Dr. Hall, in closing, said he had never seen a syphilitic meningitis, which must necessarily be more or less extended in this case, which would not melt away like snow under treatment, but he had seen other kinds of tumors that had improved temporarily under specific treatment, only to return after a time. He did not see how, if the patient had a meningeal involvement, he could have escaped some involvement of the spinal fluid. He had been on specific treatment to the point of salivation.

Periscope

Review of Neurology and Psychiatry

Abstracted by Dr. C. E. Atwood, New York

(Vol. XIII, No. 9)

Factors which Determine the Caliber of Nerve Cells and Fibers. **Leonard J. Kidd.**

The writer claims that certain points have been missed and certain errors have been made, because most observers of the past, who have worked on mammals, have neglected the study of lower vertebrate forms, and *vice versa.* His conclusions are as follows:

1. The caliber of a nerve cell or a nerve fiber does not depend on the size of an animal, nor on the size of the muscle which it innervates, nor on the length of the course which the nerve fiber has to traverse, nor on the number of muscle fibers which the nerve fiber innervates, nor on the morphological position of the tissue which the nerve fiber innervates.

2. There are three factors, and apparently only three, which combine to determine the caliber of nerve cells and fibers, viz., (*a*) the phylogenetic age of nerve cells and fibers, (*b*) the number and complexity of the dendritic connections of nerve cells, and (*c*) the large size of the nerve cell or fiber in relation to the size of the muscle which it innervates, and to the quickness of its motor response to afferent stimuli.

3. Although age is an important factor in determining the size of nerve cells and fibers, yet relatively juvenile cells are sometimes large, *e. g.,* the giant cells of the mammalian cortex cerebri: in these instances the large size of the cell is due to its rich and very numerous dendritic connections with other neurones.

4. All nerves, both somatic and visceral, contain nerve fibers of varying sizes: the smallest are the youngest, the larger ones are older, and the largest are the oldest.

5. The relatively small size of the nerve fibers of viscera, of the branchial apparatus, and of the phrenic nerve of mammals, is probably due to the relative simplicity and unprogressive nature of the functions of the alimentary and respiratory systems. The large size of somatic motor and somatic afferent nerve cells and fibers is due partly to the greater complexity and the more variable nature of the work which they have to perform.

6. Probably all nerve cells and nerve fibers undergo a steady, gradual increase in caliber throughout embryonic and fetal life, and certainly during post-natal life up to the period of fully mature growth of the body. But the rate of increase varies at various periods.

7. It appears to be the rule in most vertebrates that large nerve fibers rise in large cells, and small fibers in small cells. But in the brook lamprey the nerve cells are very much smaller in relation to the size of their nerve fibers than holds good for other vertebrates. This peculiarity of the lamprey's nerve cells is attributed by the writer to the simplicity, sluggishness, and slowness of that animal's muscular movements.

(Vol. XIII, No. 10)

An Anatomical Search for Idiopathic Epilepsy. D. A. THOM and E. E. SOUTHARD.
A Voice Sign in Tabes. W. B. SWIFT.

1. *Anatomical Search for Idiopathic Epilepsy.*—This is a contribution from the laboratory of the Monson State Hospital, Monson, Mass. The method of study was borrowed from similar studies in the field of insanity. The summary and conclusions reached are thus stated:

1. Seventy-six of 205 brains of institutional, but otherwise unselected, epileptic subjects, *i. e.*, 37 per cent., yielded brains without substantial lesions visible to the naked eye upon superficial examination or dissection.

2. This percentage of "normal-looking" brains is rather higher than has hitherto been found in institutional, psychopathic, *non*-epileptic subjects, although the dissections in the epileptic group have probably not been so extensive as in the psychopathic group.

3. A study has been made of 76 epileptics with normal-looking brains, with the hope of securing a number of "idiopathic" cases for special examination.

4. In order to secure a group of pure epilepsy, 68 cases had to be excluded as being complicated with feeble-mindedness, acquired dementia, or other psychotic symptoms, leaving 8 apparently non-psychotic epileptics for study. Of these 8, 1 had facial palsy, 1 had organic-looking symptoms, and 2 had chronic leptomeningitis. Dismissing the 2 cases of chronic leptomeningitis, we have 6 cases from which a truly idiopathic brain, from a histological point of view, may be isolated, and it is upon these 6 brains that further study must be made.

5. The whole series affords an opportunity for general conclusions on certain classical questions of epileptology, *e. g.*:

Age at Onset, Table II.—(*a*) Seventy-two cases out of a total of 76 with normal-looking brains where the age at the time of first convulsions was known. *Eighteen (25 per cent.) began between eleven and fifteen years,* a period quite significant for the disturbance of the nervous system, already predisposed to psychochemical changes. *Of the 118 cases with abnormal brains, only 9.3 per cent. had their onset during this same period.* (*b*) The abnormal series show that the percentage of cases (11 per cent.) where the age at onset was under one year was twice as high (5.5 per cent.) as the normal series (suggesting birth injuries and congenital defects). All those cases where the epilepsy began after the fortieth year were about equally divided between the normal and abnormal group.

Duration of Epilepsy, Table III.—The cases where the duration was of thirty-five years or more were divided as follows: 18.4 per cent. abnormal group; 5.3 per cent. normal group. Those with shorter durations were about equally divided between the two groups.

Age at Death, Table IV.—Average age of patient at time of death, in normal group, 38.9 years; abnormal group, 41.44 years.

Heredity, Table V.—Heredity present in 24 per cent. normal cases; 20 per cent. abnormal cases, being about equally divided in either group into the same and allied types of heredity.

Mental Status, Table VI.—Only 10 per cent. of the cases in either group that did not present mental symptoms, dementia being more frequent in the normal group (46 per cent.), while feeble-mindedness predominated in abnormal group (53 per cent.).

Number of Convulsions, Table VII.—*Cases with minimum number of convulsions,* one or less a month, *belonged largely to abnormal series,* while

The cases where the convulsions occurred once a day or more *frequently* were *usually found in the normal series.*

Assigned Causes of Epilepsy. Table VIII.—The assigned causes varied so widely, and in so many instances were unknown, that the data were of little significance, excepting that head injuries were given as the cause in 9.1 per cent. in the normal series and in 10 per cent. in the abnormal series. Alcohol, normal series, 5.2 per cent.; abnormal series, 1 per cent. The causes of death were also so numerous that the data are of little importance, excepting that tuberculosis was the cause of death in about 10 per cent. of all cases in either group

Alcohol and Syphilis in Patients, Table IX.—Alcohol, 12.5 per cent. normal group; 10 per cent. abnormal group. Syphilis, 1.5 per cent. normal group; 2.3 per cent. abnormal group.

We feel that, contrary to the expression of the numerous authors already quoted, there still remains some doubt that all epilepsies are organic in nature, and it has been the purpose of this note to introduce a more logical method of anatomical search for idiopathic epilepsy than has hitherto been applied to the problem.

2. *A Voice Sign in Tabes.*—The author states that "in final form the test of the voice sign in tabes resolves itself into this formula: Let the physician request the patient to utter the following sounds—'e' (as in eel), 't,' 'journals,' and 'time and tide wait for no man.'" In vocal ataxia the pronunciation of vowels is affected a little, of consonants somewhat more, and of difficult combinations of consonants very much more.

(Vol. XIII, No. 11)

The Thoracic Innervation of the Diaphragm. Leonard J. Kidd.

A thoracic innervation of the diaphragm has been proved to exist in man, dog, rabbit, guinea pig, and fetal cat.

In man this innervation comes from the six or seven lower intercostal nerves. It supplies the costal area of the diaphragm, which is also supplied by the phrenic nerve. The intercostal innervation of the diaphragm is a much smaller one than the phrenic innervation.

The intercostal innervation of the diaphragm is almost certainly both motor and afferent (sensory). The motor innervation comes from the ventral horns of the sixth or seventh to the twelfth thoracic segments of the spinal cord; the afferent innervation from the corresponding root ganglia. Both innervations are direct (uncrossed).

Though this innervation is a relatively small one, yet it is of much physiological importance. It comes into use during deep and during forced respiration; it thus reinforces the inspiratory action of the intercostal muscles.

But it cannot, even in the dog or man, effectually replace physiologically the damaged or destroyed phrenic innervation for more than a few days or weeks (dogs); and even that is possible only if a quiet life be ensured.

This intercostal innervation of the diaphragm is injured, or destroyed, by many lesions involving the mid- and lower thoracic region of the spinal cord, roots, ganglia, membranes, and bones; this damage may be unilateral or bilateral; there is commonly present a simultaneous paresis or paralysis of intercostal muscles. In order to detect this damage, we must make the patient attempt to inspire deeply. Probably the damage done to this intercostal innervation of the diaphragm in cases of spinal lesions is one of the reasons why these patients are so prone to die from intercurrent infective broncho-pulmonary conditions

It is doubtful whether the alleged automatic action of the diaphragm has any existence; and also whether there is a true anastomosis between the terminal ramifications of the lower intercostal nerves with those of the phrenic nerve in the substance of the diaphragm.

(Vol. XIII, No. 12)

Pellagra—Report of a Case. D. K. HENDERSON.

The patient was a native of Glasgow, Scotland, and an inmate of the Glasgow Royal Mental Hospital. Her age was 50 and she had the characteristic syndrome of the disease. The points emphasized in the report were the almost entire absence of meat and the lack of variety in the dietary, and the improvement which was effected by an ordinary full mixed diet, and arsenic medication. She had resided in India, but ate sparingly of maize and had good health while there. Bread and butter and tea were her main articles of diet for two years prior to the development of the disease.

Monatsschrift für Psychiatrie und Neurologie

ABSTRACTED BY J. W. MOORE, M.D., BEACON, N. Y.

(Vol. 37, No. 5, May, 1915)

1. The Study of the Relationship between Pathological Conceptions and Hallucinations. A. PICK.
2. An Effort to Revise the Psychophysiological Study of the Elementary Associations and Reproductions. W. POPPELREUTER.
3. Association Tests in Alcoholics. J. B. JÖRGER.

1. *Pathological Conceptions.*—In studying hallucinations not enough attention has been paid to the difference between perception and conception. An autobiography written by a patient regarding his hallucinatory experiences is given and several other instances are mentioned in which the mind simply brings up a vivid conception of some sensory experience which is so real as to almost deceive the person affected. Often an hallucination of one sense will be contradicted by the perceptions of another sense which is intact, as a person who felt himself thrown into the water and could see and hear the element but because he did not feel himself wet he knew the experience was not real. No deductions are made by the author.

2. *Association and Reproduction.*—A rather academic discussion of the psychology of association. The burden of the article is an endeavor to show that the so-called psychopathological disorders should not be studied as disturbances of certain functions. Nothing is to be gained by applying the methods of study which obtain in other pathological departments.

3. *Association in Alcoholics.*—The disturbances of association in alcoholics may be divided into two groups: first, a lengthening of the reaction time, a tendency to repetition of the words given, an increased number of internal associations and a corresponding decrease in number of motor-speech associations; second, an increase in senseless reactions and perseveration, lessened ability to reproduce, tendency to give sentences in reactions and an increase in sound associations. The first group of symptoms tended to become more pronounced during recuperation under abstinence from alcohol while the second group became less marked.

(Vol. 37. No. 6, June, 1915)

1. The Question of Operative Treatment of Bullet-wounds of Peripheral Nerves. E. Redlich.
2. Contribution to Our Knowledge of the Anatomy and Clinical Picture of Meningitis Serosa Spinalis Circumscripta. P. Schuster.
3. Psychiatry, Neurology and Neuro-Surgery. L. J. J. Muskens.
4. Neurological and Psychiatrical Experiences in the War. M. Löwy.

1. *Bullet-wounds of Nerves.*—The present war has furnished a large amount of material for study of surgery of the peripheral nerves. The author himself has had experience with over four hundred cases. As always the chief question is whether an early or a late operation shall be chosen. Surgeons of large experience still differ on this point. It is well known that very serious nerve injuries with paralysis often clear up almost miraculously without operative interference, but one does not know which cases will have this favorable outcome. Sometimes if operation is delayed the patient becomes used to the paralysis or other symptoms and refuses surgical treatment. Of course, where the continuity of the nerve is hopelessly destroyed the indication for immediate operation exists because besides an actual loss of part of the nerve the free ends are apt to form knob-like bunches which cause further trouble if neglected and add difficulty to attempted anastomosis. The author has even seen bone-structure (microscopically) in these excrescences, due probably to a fragment of periosteum being implanted at the time of the injury. On the whole the author is inclined to the opinion that unless continuity is known to be destroyed it is better to wait three or four months before operating. Incidentally, the reduction of the galvanic response is no safe indication of severity of injury, as many cases show this and still recover completely.

2. *Meningitis Serosa.*—The author first draws attention to the relative scarcity of the literature on the anatomy of this disease. It has apparently received much more attention from clinicians. A case is described which showed pain and subsequent atrophy in the shoulder region. As the symptoms became more aggravated operation was performed in expectation of finding a tumor (extra-dural). Over the lower cervical segments a subdural cyst containing about fifty cubic centimeters of cerebrospinal fluid was found which was evacuated. The cord itself appeared rough on the surface and there were cloudy plaques. After operation the legs were paralyzed as were also the bowels and bladder and the arms were very weak. There was also great hyperesthesia and pain on the slightest motion of the arms. Death occurred a few days later. Section showed marked flattening especially of the right half of the cord between C6 and D1. In several cervical and dorsal segments there were areas of acute softening as well as dropping out of anterior-horn cells in several places; in the posterior columns were areas of degeneration, probably old. A very thorough discussion and correlation of the clinical and anatomical findings are given which form a valuable contribution to the subject and indicate much careful work. The article is not improved by an apparent desire to show that the English writer Horsley (Chronic Spinal Meningitis, Brit. Med. Journ., 1909) was wrong in practically every observation he made and every diagnostic point he put forward in his description of this affection.

3. *Psychiatry, Neurology and Surgery.*—A discussion of the question of the separation of neurology and psychiatry in practice. The author believes the time has arrived when such separation should occur. He is also in favor

of the adoption of surgery by neurologists and gives examples of brain-surgery done by general surgeons under advice of neurologists, in which better results would have been obtained if the operations had been done by neurologists.

4. *Observations from the War-front.*—The author was attached to an Austrian landstrum regiment of men from thirty-two to thirty-eight years of age from the rural districts. Although they were largely excessive beer-drinkers they did not develop abstinence delirium—probably because of the constant muscular activity and out-door life. After several days under severe artillery fire there developed a peculiar half-anxious, half-cynical expression of face which the author calls "cannon face" and which he observed constantly in troops coming from active duty in the trenches. Diarrhea and even dysentery was common under fire, even in those who were apparently calm and very courageous. It was probably a purely nervous symptom. Another common symptom developing under fire was a weakness in the legs with tremor which often lasted for days after going to the rear. The ears became hyper-sensitive to the noise of explosions. Naturally, pathological excitements and depressions occurred and some few cases of manic-depressive psychosis and dementia præcox, but they were rare. The article does not present any valuable observations but is an interesting contribution from one who personally experienced the horrors of being exposed to modern artillery fire.

Revue Neurologique

Abstracted by Dr. Carl D. Camp, Ann Arbor, Mich.

(An. XXIII, No. 7, July, 1916)

1. Infantile Hemiplegia and Hereditary Syphilis. L. Babonneix.
2. The Cerebral Lesions in Polyneuritis due to Deprivation of Vitamins (Experimental Beri-beri). J. Lhermitte.
3. Research on the Labyrinthine Disturbances in Concussion and Injuries to the Head. François Moutier.
4. Thomsen's Disease. L. Lortat-Jacob and A. Sézary.
5. Some Cases of Cerebellar Hemiplegia. Demeter-Em.
6. Cases of Pathologic Fugue before the Enemy. B. Logre.
7. Mental Examination of African Battalions and Special Groups in Time of War. Porot.

1. *Infantile Hemiplegia.*—A review of the arguments in favor of the relation of hereditary syphilis to infantile hemiplegia. The large number of cases in the literature in which the parents of infantile hemiplegia are known to have had syphilis, together with the frequent association of stigmata of hereditary syphilis, the clinical resemblance to syphilitic hemiplegia in adults, the finding of treponemas in the brain in a case of infantile hemiplegia with lesions of acute encephalitis and the good results obtained by many authors by the mercury and iodid treatment of infantile hemiplegia; all these facts suggest a careful study of all cases of infantile hemiplegia for evidence of syphilis.

2. *Cerebral Lesions.*—Hens fed exclusively on hulled rice developed diarrhea, became emaciated and paralyzed. They were decapitated. The nerve trunks showed severe degeneration. The spinal cord was normal. Nerve cells in the brain showed severe perinuclear chromatolysis and there was marked proliferation of neuroglia.

3. *Labyrinthine Disturbances.*—Eighteen cases of concussion and twenty-eight cases of injury to the head were examined both by the galvanic method (Babinski) and the caloric method (Bárány). Forty out of the total of forty-six showed some disturbance in function by these tests. The author prefers the electrical method, as it is easier to apply and more exact. The test has a practical value in testing the sincerity of the subjective complaints of the injured.

4. *Thomsen's Disease.*—Report of a typical case in a soldier, aged twenty-two years, who had been affected since infancy.

5. *Cerebellar Hemiplegia.*—Four cases, all syphilitics, their ages ranging from forty-one to eighty-five years. The symptoms came on suddenly and consisted of unilateral cerebellar incoordination, nystagmus, combined flexion of head and thigh, dysmetria, adiadochokinesis, cerebellar titubation and a tendency to fall to the affected side.

6. *Fugues.*—Fugues before the enemy are looked upon by military authorities as desertion in time of war and the result is likely to be serious for the individual. Four cases are reported—a case of alcoholic delirium; a melancholic; an epileptic, who did it repeatedly; and a case of phobia, who did it only once.

7. *African Battalions.*—Battalions from Africa contain a large number of mentally affected. Cases of general paralysis, confusional states, chronic delirium and manic-depressive insanity are considered incompatible with the service.

(An. XXIII, No. 8–9, August–September, 1916)

1. The Syncinesias in Hemiplegia, their Physiology, their Pathology and their Theoretical and Practical Interest. PIERRE MARIE and CH. FOIX.
2. The Association of Reflexes. A. AUSTREGESILO and R. TEIXEIRA-MENDES.
3. Action on the Reflexes of Experimental Anemia Produced by an Esmarch Bandage. M. O. DE ALMEIDA and F. ESPOSEL.
4. The Sign of Plantar Flexion of the Foot with the Leg in Flexion. EGAS MONIZ
5. Tubercle of the Pons. A. D'ESPINE and V. DEMOLE.

1. *Syncinesia.*—These movement are divided into three varieties which differ in pathogenesis. The global variety is a phenomenon of spasticity always associated with contracture and is due to lesion of the pyramidal tract. The syncinesia of coordination is a phenomenon of spinal automatism. The syncinesia of imitation represents an exaggeration of the natural tendency to symmetrical activity. Practically the syncinesias present a double interest: they are a cause of difficulty and, more rarely, of amelioration in the motility of hemiplegics; they constitute an important point in the diagnosis of organic affections, especially the slight hemiplegias.

2. *Associated Reflexes.*—The term is used to denote the simultaneous occurrence of two reflex movements as a result of one stimulus. As illustration, a case in which tapping the right knee caused not only an exaggerated knee jerk, but a right bicep jerk. The reflexes may be homolateral or crossed.

3. *Experimental Anemia and Reflexes.*—A review of the literature on this subject. The alteration in the reflexes produced by the Esmarch bandage are not due to any effect on the sensory organs but on the motor.

4. *Sign of Plantar Flexion.*—The case was a sarcoma of the ascending frontal convolution. When the foot was flexed, with the knee also flexed, or when the flexed foot was pushed along the bed by the straightening of the knee, the great toe extended. All other signs of extension of the toe—Babinski, Oppenheim, Gordon, Shaffer, Rossolimo, Mendel, Bechterew, Foix, Marie, Fromner, etc., were negative.

5. *Tubercle of the Pons.*—A patient, age seven years, complained of vertex headache, and on examination was found to have paralysis of conjugate movement of the eyes to the right, also paralysis of the right side of the face and the right sixth nerve. The cutaneous reaction was positive. A diagnosis of tubercle of the pons in the region of the eminentia teres. He apparently recovered from his sickness and the paralysis also lessened. About six months later he developed symptoms of tuberculous meningitis and died. Autopsy showed acute tuberculous meningitis, also numerous tubercles in the brain and cerebellum. There was one in the right eminentia teres destroying the nucleus of the right abducens.

(An. XXIII, No. 10, October, 1916)

1. Contribution to the Study of Hypertrophic Pachymeningitis. G. MARINESCO.
2. Voluminous Extradural Hematoma exclusively Frontal without Neurologic Localizing Symptoms. ROCHER and LOGRE.
3. Contractures in Spastic Paraplegia. NOÏCA.

1. *Hypertrophic Pachymeningitis.*—Two cases reported with necropsy. In the first case there was a sudden onset, with pain, followed by a spastic paraplegia. The Wassermann reaction was negative. Necropsy showed syringomyelic cavities as well as the meningitis. The second case had a positive Wassermann. The first symptom in this case was a unilateral facial neuralgia. There were no cavities in the cord in this case.

2. *Subdural Hematoma.*—The patient received a blow on the head and was brought to the hospital two days later with no other information. On admission he was stupid and incoherent. There was bilateral ecchymosis about the orbits. The pupils were equal, temperature and pulse normal, no paralysis, but a bilateral Babinski. He gradually became comatose and died six days later. Autopsy showed a large subdural hematoma due to rupture of a branch of the middle meningeal. No operation was done because of the absence of localizing signs and a mistaken diagnosis of concussion.

3. *Spastic Paraplegia.*—The contracture in spastic paraplegia is an exaggeration of muscular tonicity caused, on the one hand, by a diffusion of voluntary excitations and, on the other hand, by reflex irritations, arising from the periphery, the surface of the skin and also deeper parts.

(An. XXIII, No. 11–12, November–December, 1916)

1. Observations on Concussion Syndromes Simulating Organic Affections of the Central Nervous System (Meningitis, General Paralysis, Cerebellar Lesions, Multiple Sclerosis, Tabes). A. PITRES and L. MARCHAND.
2. Alterations in Speech in the Psychoses and Psychoneuroses Due to Concussion. N. WYROUBOW.
3. Mental Childishness in the Course of Psychosis Following Concussion. R. CHARRON and G. HALBERSTADT.
4. Pensions for Nervous and Mental Patients. R. BENON.

1. *Concussion Syndromes Simulating Organic Affections.*—In the first patient a meningitic syndrome developed soon after shell concussion; severe headache, retraction of the head, Kernig's sign and unilateral ptosis. The spinal fluid had a yellow color. He afterward developed a mental condition resembling catatonic dementia præcox. Fourteen months after the injury he was reëxamined and all symptoms were absent except slight weakness of the legs. In the second case there was a period of unconsciousness following the concussion, mental confusion, memory disturbance. The knee and Achilles jerks were lost. Speech was tremulous and hesitant. Except for the per-

sistence of some ideas of persecution, the patient recovered in sixteen months. The third patient presented a cerebellar syndrome with the addition of some mental disturbance. The case simulating multiple sclerosis had lost knee and Achilles jerks. The case simulating tabes had no lightning pains, but in other respects was typical (the Wassermann reaction was positive). The author draws two conclusions: The diagnosis in these cases is difficult. These cases have as a basis an organic lesion. They are not hysterical or simulation.

2. *Alterations in Speech.*—They are divided into three classes: mutism, a stammering speech, and a high-pitched voice in which the patient speaks rapidly and irregularly.

3. *Mental Childishness.*—The patient, 21 years old, developed the condition following shell shock. He talked and acted like a child, occupied his time sailing boats, etc., and frequently cried in a childish way. There was no disorientation, no hallucinations and the neurologic examination was negative.

4. *Pensions.*—The fundamental question in the determination of the pension allowance in nervous or mental cases is whether or not the condition present is due to service in the war. The fatigue and emotions of war may act as a determining cause and the value attaching to the predisposing cause, whether hereditary or acquired, is the same as in civil life.

MISCELLANY

Further Contributions on Neurobiotaxis—IX. An Attempt to Compare the Phenomena of Neurobiotaxis with Other Phenomena of Taxis and Tropism. The Dynamic Polarization of the Neurone.

C. U. Ariëns Kappers. (The Journal of Comparative Neurology, April, 1917.)

Kappers in this study seeks to understand further the phenomenon of taxis or tropism in the nervous system, to which he has earlier given the name of neurobiotaxis. It is a phenomenon which can be discovered in phylogenetic or in ontogenetic growth and development and refers to the shifting of groups of nervous cells through the dendrites and cell-bodies in the direction of the point whence the majority of stimuli proceed to the cell. The shifting of the abducens nucleus from the ventral position it occupies in the bony fish to its dorsal position in the shark is chosen as a striking illustration of this phenomenon.

Further study was needed, however, to explain why only certain cells approach this center and to account for the growth of the axis cylinder away from the center in the direction of the stimulus irradiation. The observation of the first phenomenon led to the recognition of the same law of association in the anatomical relation of the dendrites and cells in the nervous system which is operable in psychology. This leads to a new formulation, that the growth of the chief dendrite and the cell displacement take place only under a correlation of stimulation depending on simultaneity of function, which also has a part in the growth of the axis cylinder. It is briefly stated as a neurobiotactic law that neurobiotactic processes occur between correlated systems, the tropism of the dendrites and cell-body being stimulo-petal or toward the center of stimulation and the course of the axon stimulo-concurrent or in the direction of the current.

Bok's studies, resulting in his theory of "stimulogenous fibrillation," has shown that the axon is a product also of stimulation and must first be thus functionally formed before it is capable of transmitting stimuli. Bok proved that when an axis cylinder or a bundle of amyelinated fibers grows out and passes nerve cells on its way, these nerve cells can be stimulated to send out axis cylinders themselves in a direction perpendicular to the activating axon or fiber bundle.

There still remains to be explained the opposite polar difference by which part of the neuronic protoplasm approaches the center of stimulation while the other proceeds in the opposite direction. For this the author turns to galvano-tropisms and other tropisms which take place in living organisms. It is proved that a living being or part of it, placed in a constant electric current of certain strength, turns almost or quite without exception towards the electro-negative pole, the kathode. Increase of the strength of the fluid medium, solution of chlorid of sodium or potassium reverses the tropism to the opposite pole, the anode. Albumen and lecithin shift ordinarily to this opposite pole. The addition of acids, however, turns the albuminoids towards the negative pole.

The part of the nervous system which is stimulated, whether by sensory contact at the periphery or whether it is a primary growing axis cylinder, forms, as is well known, a negative pole, while its surroundings offer the anodic field for the stimulation. At first the anodotropic character of the protoplasm of the nerve cells will be manifest in the production of an anodic offshoot. To this will be added chemical and tropic characteristics of the potassium and chlorids of the medium. According to the experiments with other living cells the increased potassium chlorid in the growing axon further enhances this anodic character and moreover increases its conductivity. The dendrites do not appear until later, and their kathodic tropism together with that of the protoplasm of the cell-body is not interfered with by the presence in any considerable amount of potassium and chlorids. It is, as has been shown, in accordance with the phenomena of kathodic stimulation and is probably moreover favored by a kathodic kataphoresis, since the Nissl bodies or nuclear acid derivatives appear at the same time with it.

Polydendritism occurs because the perinuclear and dendritic protoplasm is everywhere sensitive to the kathodic influence and thus offers a response at several different places, while monoaxonism results as the effect of different forces on the same point and line of application. The neuron receives a compound impression from different perceptions, which it conducts along the axis cylinder to form higher, more complicated compounds in the cerebral direction or leads to a somatic effector center in the aboral direction.

Kappers does not claim for this study that it explains nervous life or its psychic realization but that these facts do give some idea of the physico-chemical processes that accompany its evolution and determine its form of expression. "Taken all in all, we can say that the stimuli which arrive in the nervous system, especially the relation between those stimuli, mold the material substratum of the mind; this correlation is the primary force, and expresses itself in the material arrangements of our nervous system."

JELLIFFE.

PREGNANCY AND TABES. E. M. Allen. (Journal A. M. A., Sept. 22, 1917.)

Pregnancy rarely occurs in tabes, partly because of the predominance of men thus suffering and partly for other reasons. Allen has found a very scanty literature to refer to in the case he reports The patient was a woman, aged 27, who had had two miscarriages since her first child; each of these was spontaneous and painless. She first began to be troubled with shooting pains of tabes about January, 1917, and they have continued to date. The labor in this case was indolent, but was expedited by the use of pituitary solution. It continued seventy-two hours or more. Both mother and child had a feverless, uneventful puerperium. There was no pain in the labor until the head was on the perineum and then less than usual.

Reversal of a Portion of the Spinal Cord at the Stage of Closed Neural Folds on the Healing of the Cord Wounds, on the Polarity of the Elements of the Cord and on the Behavior of Frog Embryos. D. Hooker. (Jour. Comp. Neur., 27, 1917, No. 4.)

A piece of the cervical spinal cord 1 mm. long from 2.5 to 3.5 mm. frog embryos was grafted in reversed position. Complete healing with a return to normal functioning resulted in a number of cases.

The reversed piece as a whole retains its original polarity. The nerve processes arising from the cord ends are the same in kind as those which would have arisen if the piece had remained in its original position. At the cephalic wound surface there arises a series of nerve fibers growing in opposite directions into the wound which all have the anatomical characteristics of descending nerve processes, and at the caudal wound a number growing in both directions which have the characteristics of ascending processes.

The physiological results demonstrate that the descending processes of the reversed piece of spinal cord function as ascending processes and the ascending as descending. In this sense there is a reversal in the polarity of the elements contained within the reversed piece of the spinal cord.

The region of the body containing the reversed segment of cord is the region which determines the locomotion of the whole animal and in this region the characteristic succession of responses to tactile stimulation is best observed.

The reactions in the middle region of the body containing the reversed segment cannot be localized in any portion of it, either as regards the sensivity of the receptors or the functioning powers of the effectors. This region of the frog embryo, about 1 mm. in length, must be considered a unit in its reaction to stimuli. (Author's abstract.)

Multiple Sclerosis. L. M. Crafts (Journal A. M. A., Oct. 6, 1917.)

Crafts says that while this disorder is regarded as common in Europe, in this country it has been considered rare, and he thinks this points to a lack of correct diagnosis by American physicians. The real cause and causes seem to be unknown, and the only apparent manner in which the causes can operate is by the turning into the blood of some agent, probably autotoxic, to destroy here and there patches of white or gray matter, and must be by establishing some vice of secretion in the glandular system, thus distributing metabolism, and at intervals pouring the toxin into the circulation. The only alternative would be some microbic agent acting directly or through its toxins. In his series of thirteen cases no possible causative factors, even remote, could be found in six. The cases are reported and commented on, with the difficulties in their identification, and form the bulk of the paper. While the uncertainty as to the initial etiology is a fact, the clear and striking influence of trauma and the puerperium in causing recrudescence is most striking. The discussion of symptoms, as shown in the illustrative cases, is suggestive, but the elaborate details cannot be briefly abstracted.

The Motor Nuclei of the Cerebral Nerves in Phylogeny. D. Black. (Jour. Comp. Neur., 27, 1917, No. 4.)

In the introduction the author explains the purpose and scope of the paper and gives a list of the material serving as a basis for his study. The term "neurobiotaxis" was first employed by Kappers as a name for certain molecular rather than molar forces which bring about both ontogenetic and phylogenetic nuclear displacements and thus determine the formation of reflex pattern. The motor nuclei of the cranial nerves offer especially favorable material for the study of neurobiotactic phenomena.

The arrangement of the motor nuclei in *Bdellostoma dombeyi* resembles closely that obtaining in *Myxine glutinosa*. Both these animals present a more highly specialized motor nuclear pattern than does *Petromyzon*. The arrangement of the motor nuclei in *Bdellostoma dombeyi* is apparently primarily determined by the position and development of the general somatic afferent area.

The caudal viscero-motor column (motor VII-IX-X nuclei) in *Selache maxima*, in its essential arrangement is typical for all selachians and its position is determined by that of the visceral sensory column. The isolation of the motor V nucleus upon the level of its root exit and apart from the caudal viscero-motor column is intimately related caudally with the type of respiratory reflex characteristic of selachians. The serial arrangement of the motor cerebral nerves on the periphery of the brain stem (III, IV, V, VII, VI, IX and X) is a primitive one. A prostadium of the accessory nucleus can be recognized, but neither the nucleus nor its emergent roots are isolated in any way from the vagus motor complex.

The visceral motor nuclear pattern in ganoids is in many respects similar to that obtaining in selachians, and such differences as obtain are to be correlated with the altered respiratory reflex needs apparent among ganoids. The oculomotor and abducens nuclei present certain specialized characters elsewhere seen among fishes only in teleosts. The arrangement of the motor nuclei in *Polyodon spathula* closely resembles that obtaining in other ganoids. This pattern is apparently not an ancestral one and evidences of regressive modifications are not lacking.

In contrast to ganoids and selachians, among teleosts, even in comparatively closely related forms the position and relations of the motor nuclei are subject to striking variations. These variations are intimately associated causally with two most characteristic teleostean features, viz.: (1) ability to specialize and amplify receptor organs and their centers (visual, lateral line, tactile or gustatory), and (2) specialization of certain effectors in the branchial region (respiratory mechanism and pharyngeal tooth-bearing apparatus).

Thus within the teleost group it is difficult to construct a generalized scheme of motor nuclear arrangement, owing to the characteristic ability of the elements of the primary nuclei to react to neurobiotactic influences and to develop a pattern based chiefly upon specific requirements. (Author's abstract.)

ANTIMENINGOCOCCIC SERUM. H. L. Amoss. (Jour. A. M. A., Oct. 6, 1917.)

Noticing first the defects that have been found in commercial antimeningococcic serums, showing that the producer cannot be left to determine his own methods and standards, and the doubts and prejudices that have arisen in consequence, the author says that the essential obstacle to the standardization of the antimeningococcic and the antipneumococcic serum arises from the fact that neither is a consistent uniform species, both being separable into different types possessing different qualities. While the case is comparatively simple with the pneumococcus, since serum Type 1 alone is therapeutically effective, the case is not quite so simple as regards the meningococcus, but not so complex as to defy solution. In some respects the therapeutic possibilities of the antimeningococcic serum are far wider than for the other, since it can be made effective against all forms of epidemic meningitis. Fortunately, 80 per cent. or more of epidemic meningitis cases are due to two type strains, regular or normal, and parameningococcus, and nearly all the remaining 20 per cent. by two more strains, not quite so definitely marked off biologically. The recent invaluable English experience has shown us that a potent serum may be prepared with say the four type cultures, which, if of sufficient titer, may be accepted as standard. There is nothing to prevent a commercial manufacturer improving his product by following the methods already demonstrated, and he should be encouraged, but this should not permit any clouding of the essential issue, which is to produce a highly potent standard serum. Amoss has impartially tested a number of samples purchased in the open market, and put them in comparison with three other samples derived from health departments and the Rockefeller Institute. His intent is to define what will be a readily realizable and adequate standard of potency. Several immunity reactions have been employed. "When applied to the antimeningococcic serum, they arrange themselves in the following order of specificity: (1) agglutination at 55 C.; (2) opsonization; (3) complement fixation; (4) anti-infectious power, and (5) anti-toxic power. Gradually agglutination of the type cultures of the meningococcus is displacing other and less indicative methods of standardization. Accurate clinical experience also is confirming this decision." Five specimens of serum by prominent makers were purchased in the open market and treated together with two from boards of health and one from the Rockefeller Institute. All the commercial products were unsatisfactory for therapeutic purposes, either from too low agglutination titer, or other reasons, and one at least might produce severe reactions. The two board of health products were more or less satisfactory, and that from the Rockefeller Institute represented adequately all the type cultures and was a balance serum that should meet all expectations. Amoss says that a still more perfect product can be turned out by paying constant attention to the rarer variants and introducing them into the scheme of immunization, controlling their effects also by agglutination tests, but this refinement seems unnecessary in the plan of standardization. A practical standard for the serum should include two requirements. "The first should define the physical qualities of the product which are acceptable. This definition should include absence of more than a trace of hemoglobin, color of straw yellow to amber, perfect clearness, or if slightly turbid, clearing on standing for twelve hours. As regards the preservation, tricresol is to be preferred, and the strength should not exceed 0.35 per cent., and may safely be reduced to 0.2 per cent., provided due care is exercised in collecting and bottling the serum. Next, the employment of dark glass containers should be prohibited. The container, whether bottle or syringe, should be clear white glass, and the labels arranged so as to permit of inspection of the contents from without. The containers should be wrapped in blue paper or otherwise enclosed so as to exclude the actinic rays of light. Finally, the agglutination titer for each of the four type cultures should be from 1:400 to 1:1,000, as determined by the macroscopic method after incubation at 55 C. for sixteen hours (over night)." In view of the possibilities of meningitis epidemics in camps, the serum production should be rigorously controlled. Amoss calls attention to certain points in the administration of the serum clinically. While the temperature is high and the meningococci still present in the cerebrospinal fluid, injection every twelve hours should be resorted to unless contraindicated. The next interval between injections should be twenty-four hours; then forty-eight hours; as improvement continues in the condition of the patient the energy of treatment may be modified. To distribute the serum better through the brain after the intraspinal injection, the foot of the bed should be raised from eight to twelve inches and kept so for six hours, if possible. After six hours the foot should be lowered and the other end raised until the time for the next lumbar puncture. During this time the pus or turbid fluid is collected in the lower part of the spinal cord to be drawn off at the next puncture. In addition to treating all cases by intraspinal injection, it is advisable to administer one or more doses intravenously in fulminant or very severe cases, or cases in which there are numerous skin hemorrhages. The quantity thus injected should be from 50 to 100 c.c., according to the age of the patient and the severity of the case. Supplementary intravenous injections have been employed also in less severe cases, but it cannot be stated positively that this is a real advantage; sometimes it has seemed beneficial.

PRIMARY AND SECONDARY FINDINGS IN A SERIES OF ATTEMPTS TO TRANSPLANT CEREBRAL CORTEX IN THE ALBINO RAT. E. H. Dunn. (Journ. Comp. Neurol., 27, 1917, No. 4.)

This study was undertaken to ascertain whether such transplantation as had been possible for spinal ganglia could be obtained for cerebral cortex. By the use of immature nervous tissue from the brain of the albino rat the life of the constituent neurons in the cerebral cortex has been maintained after transplantation. In a series of forty-six rats, after many unsuccessful attempts this result was obtained by utilizing a thin covering blood clot to retain the graft in position. The best nourished grafts were those which lay near the plexus choroideus of the lateral ventricle. In the neurons of the transplanted cortex certain differences from those of normal tissue were detected. These differences were in the staining intensity and morphology of the perikarya and medullated fibers. The blood supply was less ample. A massing of tangentially placed medullated nerve fibers was found about the open spaces produced by accidental ablations of cortex. These tangential fibers probably connect different parts of the cerebral cortex. This aberrance of nerve fibers shows that a new path may be routed when the usual path has been permanently blocked. The increased number of medullated fibers is satisfactorily explained by Greenman's work on the regeneration of peripheral nerves. Similar bands of vertical fibers were noted along the margins of incised wounds. Corroborative evidence was noted for Ranson's finding regarding the growth of medullated nerve fibers across cicatricial tissue in the nervous system. (Author's abstract.)

TRAUMATIC NEUROSES. Edward E. Mayer. (Journal A. M. A., Sept. 22, 1917.)

The author discusses the traumatic neuroses with special reference to their medical legal relations. They have become of special interest at the present and Oppenheim reaffirms and amplifies his former views from his experience with the war neuroses. He believes more firmly than ever that we are dealing in some of them with an overstimulation and exhaustion of the nervous system. Other authorities of more or less note have attacked his view and Mayer says that the shock hypothesis of Monakow seems to him a valuable conception. It is well recognized that any catastrophic event may stop the brain from receiving any information and we start, therefore, with the premise that the stoppage of cerebral activity may result after a trauma. This need not be structural any more than syncope is, but it must be of such a degree that the individual cannot adjust himself to it. Emotional reaction and its motor responses follow. The result is similar to the overactivity of cells which in diaschisis causes a physiologic stoppage of function. Once established, harmful emotions keep up their influence in many ways. Unconscious wish factors often determine them. Mayer goes over the attempts of classification which have been made. Each case must be judged by itself. He says we need hardly call attention to the fact that were pension and compensation not involved physicians would not trouble to comment on the traumatic origin of the neuroses, and he agrees with Dercum as to the pernicious influence of litigation. Our method of jury trials is unfair and how to mend it is difficult to say. It tends to multiply so-called medical experts and it is difficult to see how to mend matters. If it were possible to make the compensation of medical experts by making it a part of the expenses of the trial some improvement would be obtained. The jury system seems to put a premium on exaggeration and he would suggest that testimony of all court physicians be placed on file by the county societies. Publicity would tend to stop a certain class of medical testimony that is produced under our present systems. A physician finds a great difficulty in securing an opportunity properly to examine a claimant for damages if he is not retained by the claimant's side, and medical legal opinion should not be based on subjective symptoms and only objective opinions should be used or permitted in stating a diagnosis in court. Hypothetic questions will be continued to be used but distorted medical facts, exclusion of important symptoms make them generally of no value. If the physician has made an examination of the claimant he should refuse to answer any hypothetic questions unless they included his objective findings and his answer should be predicated on them. While the expert is required to accept as true the evidence included in the hypothetic question, he is permitted to qualify his answer to make it plain that he can have no expert opinion on evidence not agreeing with his objective findings and he should never be satisfied with categoric answers. Most statistics regarding prognosis should not carry much weight in court, because of the personal equation of the accident and the social status of the patient and in the different groupings found in statistics and variations in the laws of different countries. In general the physician is not truthful who gives his opinion that a traumatic neurosis of any kind cannot recover. Interested corporations should work to secure a law giving them the privilege of reëxamination at any future time; the results of such reëxamination, showing that the compensation was based on false claim, would give the court power to reopen the case. The need of a more elastic system governing accident compensation is plain and he commends the physicians and surgeons in Leeds, England, who consult before the trial and make it an organization matter, that a member should give full and impartial testimony. They have thus solved much of the problem and Mayer says, "Let us hope that our medical societies may at no distant time establish similar standards of honor and professional conduct."

Structure and Development of the Sense Organs of the Lateral Canal System of Selachians (*Mustelus canis* and *Squalus acanthias*). S. Johnson. (Jour. Comp. Neur., Vol. 28, 1917, No. 1.)

The sensory canal system of *Squalus* and *Mustelus* comprises two sets of organs, known as canal organs and surface or pit organs respectively. The two sets are genetically equivalent, but development in the former is carried to a further advanced stage, the organs of this type forming in the adult an essentially continuous column of sensory epithelium along one side of an epithelial canal. The sensory canals thus formed lie within the dermis or deeper. The sensory epithelium of the lateral canal consists of small groups of secondary sensory cells, surrounded by columnar, basal, and spindle-shaped supporting cells. Nerve fibers from the ramuli of the *N. lateralis* branch extensively and terminate freely between and around the bases of the sensory cells. The sensory canals arise by linear extensions from preauditory and suprabranchial ectodermal thickenings. The sensory bands of ectoderm thus formed infold to form grooves which later close to form the complete sensory canals. The N. *lateralis* arises from a central ganglion in close association with the ganglia of the vagus. (Author's abstract.)

Psychoneuroses. Theodore Diller. (Journal A. M. A., Sept. 22, 1917.)

The author says that twenty-five years ago practically nearly all the neuroses or psychoneuroses were classified as hysteria or neurasthenia, but for many years now, there has been a disposition to scrutinize these diagnoses so that they are made now much less frequently. This has been his own experience as regards neurasthenia but not as regards hysteria. He gives a table showing his diagnoses during the period beginning in 1894 and also one of the same number, one thousand, running back from December, 1916. In the second table the term psychasthenia has been introduced and covers a large proportion, while the diagnosis of neurasthenia has greatly diminished in numbers. He also includes in this second table dementia præcox, for the reason that a certain number of cases of this type are and have been called neurasthenia, hysteria, etc. Diller does not accept the view held by some that it is useless to attempt to differentiate between the psychoneuroses. There are certain clinical and practical differences between psychasthenia, neurasthenia and hysteria, but he admits all sorts of borderland and overlapping cases. To answer why there is such a great difference in neurasthenia between the two tables, 127 in the earlier table against 36 in the more recent one, he finds that comparison shows that the great majority have been classified in the later records as psychasthenia, there being such a distinct emotional or intellectual change as to make that definition more appropriate, but not all cases have been put in the psychasthenia group. The diagnosis of dementia præcox, which did not appear at all in the first table, is made sixty-eight times in the second, among which were a considerable number of cases called predementia præcox. Many of them covered in the earlier period would have been classed as hysteria and some of them as neurasthenia and still later, in his experience, some of them would have been called psychasthenia. Probably half or some two thirds would have been designated as some form of insanity. He often finds in his earlier records the diagnosis of adolescent insanity, which is not far removed from our present conceptions of dementia præcox. He wishes especially to call attention to the sixteen cases tabulated in the latter group called constitutional inferiority. The view has grown on him more and more that mental weakness underlies many cases of grave psychasthenia and hysteria. We have all seen cases suggesting dementia præcox, but have hardly felt justified in classing them as such and those which some call predementia præcox and other states allied to dementia præcox. Constitutional inferiority is deficient emotional tone, but there are no definite boundaries to this classification. It is important to recognize the defect, which cannot be cured any more than imbecility can, though the hysterical and other symptoms may be cured, but still leave the underlying condition. Allied to constitutional inferiority or defect is what is nowadays called temperament. The differential diagnosis between hysteria and dementia præcox has interested Diller for many years and sometimes he has thought it could be made and even be of real value; at other times it has had to be revised. He thinks it is the experience of all of us who have had opportunity for extensive observation to note that hysterical symptoms are really common in dementia præcox, but there are some cases in which a differentiation is of practical importance because a purely hysterical case is more apt to be curable. Diller believes that cases that appear superficially as neurasthenia, hysteria, etc., should be more closely studied for underlying organic conditions, examining and reëxamining if necessary. The main point is that after having eliminated organic disease to try to determine as far as possible the original constitutional defect and temperament, realizing that some of the cases will have to be classed as constitutionally inferior.

LAMINECTOMY. F. J. Gaenslen. (Journal A. M. A., Oct. 6, 1917.)

A simplified technic in laminectomy with a description of combined laminectomy and spine fixation by bone transplant is published by Gaenslen. The essential feature is in the fact that instead of stripping the soft parts and periosteum from the posterior vertical spines on either side and then cutting them off at their bases, the spines are split longitudinally into right and left halves just as in the Albee operation for an insertion of a bone transplant in Pott's disease, but instead of deflecting the halves to one side only, the split halves are deflected on both sides. It is then a very simple matter to separate the periosteum with the attached soft parts from the lamina as far laterally as the articular processes. The posterior spines should be split well down to their bases and only a small remnant of the process is then left to be cut away with the bone cutting forceps by any one of the numerous methods advised. The technic is described in more detail but the foregoing are the main features. Gaenslen claims the following advantages: (1) rapidity; (2) diminished trauma; (3) diminished hemorrhage, and (4) more accurate and firmer closure by virtue of the union of the bone components. If in some cases of more urgent cord pressure symptoms, it is desired to fix the spine by means of a tibial transplant immediately after decompression of the cord, the method of approach indicated paves the way for a successful combination of laminectomy and spine fixation by means of the bone graft. This plan was carried out in two cases and in both primary union was obtained. Of course, this would only be a rare necessity, as traction and recumbency will do in the vast majority of cases. "After decompression of the cord by laminectomy, performed according to the plan just outlined, several healthy spines above and below were split after the usual manner. The left halves were deflected while the right halves remained standing. A graft of sufficient length was then cut and put in place, bridging over the laminectomized area and finding anchorage above and below on the standing halves."

NEURASTHENIC THRESHOLD. F. R. Fry. (Journal A. M. A., Sept. 22, 1917.)

Noticing the various and often deprecatory views regarding the neurasthenic by the profession, as well as by the public, the author says that the language of some writers would imply that we go far enough in explaining neurasthenia by calling it a fatigue neurosis. Others undertake to support a psychogenic theory and are willing to define it as primarily a mental disorder. A majority of writers hold that the causation is not to be found in tangible or probable structural changes, but that the syndrome is the result of a structurally normal organism reacting (organically) abnormally, and that the ultimate explanation is to be found only in a constitutional defect, a direct hereditary predisposition. For the moment, he says, we must remember, in considering the subject, that the fundamental plot of the nervous system is one of defense and that the instincts and their related emotions have had the leading part. Secondarily we must visualize, as it were, the whole general scheme of reflex performances by which the various species of defense are maintained and coordinated. In our clinical studies we find the neurasthenic absorbed in his sensations and disturbed by his abnormal consciousness of them. This means, he never possesses an emotional equilibrium and in this his psychic condition is abnormal. "As neurologists we all have more or less familiarity with the time-honored contest between psychology and physiology over the causal relations between emotions and visceral reactions and the mental states connected therewith, and from the phases of this argument we may try to derive some coloring for the formation of a lucid theory. Or, again, we notice the fatigue reactions of our neurasthenic patient and are impressed with the fact that to a certain extent they may be paralleled with physiologic fatigue, but we are apt to overlook the limits to which these analogies may here be legitimately extended. In short, one of us, affirming a psychic view, fails to sustain his position for lack of a thoroughgoing argument. Another, impressed with the etiologic importance of the physical side of the problem, fails to assemble in proper sequence the data to which he should appeal for defense of his position." It so happens now that the modern neurologist is a better psychologist than the physiologist, at least in a speculative way. The physical side of physiology, so to speak, is his greater stumbling block. For example, we cannot grasp the conception of the threshold and the problems involved unless we know in the physiologic sense something of the relation of stimuli and condition of reflexes, rules of conduction, etc. We have reached the place, he thinks, where we cannot proceed profitably without dwelling carefully on the question of threshold. Our attention has been particularly stimulated by physiologic and clinical studies of the glands of internal secretion and the physiologic side of this work has led to more definite conceptions in that the specific substances may determine stimulus thresholds and definite neurons on which their direct stimulus influence falls. Neurasthenia has received much attention from older writers who wrote on its close relation to arthritism, obesity and other syndromes, and the modern writers are reviewing them in the light of the newer data. Considering the work undertaken and its promising results, etc., it is not too much to hope that the neurasthenic and his neurotic associates will receive a more fair consideration. The therapeutic promise is good. The abuses of the well-conceived rest method began long ago to show us its proper limitations and the same has happened in regard to psychanalysis. The superenthusiasm in its attempted application has been replaced by a better recognition of its proper value. In our present efforts of hormone therapy we are overreaching again and neglecting our former lessons but our view is broadened and we are obtaining wider conceptions of the neurasthenic reactions.

Book Reviews

JESUS, THE CHRIST, IN THE LIGHT OF PSYCHOLOGY. By G. Stanley Hall, Ph.D., LL.D. Doubleday, Page and Company, Garden City, New York, 1917.

The world grows weary only when it tarries too long with an accepted doctrine, assembly of facts or way of belief or life. These need be in no sense false or inessential except in one respect: they cease to grow with the race. Too often those who hold to them forget or have never been aware of the fundamental principle which works in the human psyche, that of unceasing growth, not accretion but progressive evolution. The appearance of these volumes therefore marks a wide advance into a practical Christianity which promises new life in place of a faith growing cold, and vital, energizing meaning where old beliefs have lost their power.

Hall's point of departure is just where theology, speculative philosophy and historico-critical study have left the problems of the life and teachings of Christ. These have all accomplished what they can and might seem to some to have left most of the problems unsolved or divested of practical interest for human life in the present and the future. Hall says of higher criticism, it "only informs, but does not edify." The next step which he takes boldly, but with a modesty befitting the greatness of his theme, is that of psychological interpretation of the Christ. This is no mere descriptive explanation in current psychological terms of the story of Jesus, the articles of the Christian faith and the hold which these have upon human history. Nor is it a mere psychological history of the gradual growth of Christianity and its unfolding through the last twenty centuries of history. It is vastly more than this, for it presents a psychological evaluation of a dynamic faith in the heart of the race, both discovering and conditioning such an unfolding, and promising moreover a far greater future of psychic or spiritual realization than the older forms of theology or historicity or higher criticism, self-limited as they are, have been able to conceive or to realize.

Hall brings a special equipment to this task of discovering and presenting the "psychological Jesus Christ" as "the true and living Christ of the present and the future." He is personally well-grounded in theology, acquainted with the long range of criticism in regard to the facts of the life of Jesus and the faith of his followers, from critics who have worked constructively and those who have manifested a negative destructiveness; and he has searched literature and art to discover the enormous place which Jesus has held there. Much of this study is incorporated in these volumes, and with such material he combines a long pedagogical experience in the classroom and through the questionnaire in which he has come into close contact with the human mind of the present day and its demand and possibility for receiving the psychological Christ and appropriating him and his faith for a new religious development of the human soul. He has also the psychoanalytic insight into the racial soul and its dynamogenesis, which discovers the creative will in this racial soul, which is both the source and the greater goal, man's need and his salvation from that need through the greatest and deepest of all religions which the race has known, the fuller promise of which lies as yet only in its future.

The historicity, the actual physical life of Jesus upon earth, fades into insignificance before this greater Jesus who has still scarcely begun to come to his own in the psychical history of man's development. His physical appearance, the various conceptions of him, historical or present, which literature and art have sought to portray, live but as they show the effort of the human spirit through the centuries and in the present day to conceive and represent the power of his faith in the life of these years. All this effort, criticism, denial, conflict of opinions, fettering dogma, timidity of belief has been looking without rather than within, whence religion, with all that it contains, really comes.

Such a realization of the inner need of the racial soul and of the answer to its call is found in the Jesus of the gospels and of the Christian faith which succeeds them. In this Christ is embodied first, in his nativity, the return of the race to its deepest elemental forces, a lost state of solidarity in the racial soul, so that " Jesus coming down to earth is only the ambivalent way of saying that man was exalted to divine sonship." The conception of his Messianity, of his sonship and of the kingdom which he represented and which he was to establish are revelations also of the exalted self-consciousness by which Jesus recognized this inner need of the racial soul to thus seize and grasp its greater unconscious self. The final purpose to which his life tended, the doctrine of the consummation of his teachings and of the Christian faith, are traced by the author as Jesus felt his way through his changing conceptions and altering experiences in his life on earth and its culmination in apparent defeat and failure.

The perplexing inconsistencies of the gospel story and of Jesus' psychological attitude, which Hall outlines, are dissolved if it is remembered that the gospels "are not static, as has commonly been thought, but dynamic." Whether they, with the other Christian writings, represent an actual historical figure or merely the projection of this highest conception and embodiment of the racial soul, they disclose an ideal of self-consciousness that seeks to find and express itself in a genetic upreaching of this wish of man.

The parables, prayer and ethics of Jesus and the miracles are all likewise submitted to this touchstone of psychological development and psychical expression, where they too are found more true in the spiritual realization which they teach, and in the higher grasp of the racial soul through them upon the larger meaning of human desire and effort after attainment, than any literalness could ever grant them. Hall severely arraigns the narrow literalism which must prove a stumbling block to many and thus obscure the larger faith by which men may believe and live again. Yet this is no denial of the value of orthodoxy and of the various restricted conceptions of the past. Because this is a dynamically psychological concept of Jesus, each of these partial stages is given its evaluation and finds its place in the development of the belief of " Mansoul."

The psychological Christ rings out triumphantly through his resurrection no less than did the historic Christ in the literal belief in his resurrection and ascension after the apparent defeat in death and the grave. This in it's literalness at one time was necessary to transform the early faith into an active creative ecstasy, to enable believers to lift their faith over failure and death into a truly sublimated reality. In the newer fuller Christianity the resurrection serves the same great purpose but in a more complete manner, through those elements of psychical self-realization, conflict and victory which are discovered by psychoanalysis largely in the unconscious life of the race and the individual. " Pristine sense of guilt," sin against the God-father, the primal sin, must be projected into a Saviour who would thus externalize it, atone for it and moreover by his resurrection and ascension insert himself into the place of the Father-god whom he has displaced. The soul of the race and of the individual is delivered, through such means, from a psychotic obsession of sin and, through the highest sublimation of which religion has been capable, returns in its resurrection and through its atonement to the highest aspiration of man. Thus in raising Jesus from the dead Mansoul raised both God and itself, and entered a new world as a new creature.

Such is a suggestion of the depth and extent of this initial study of the psychology of Jesus Christ. It enters the racial soul to find there the meaning of this life and the faith grown out of it in the greater unconscious wish and striving of the Mansoul, and it studies the Christ in the light of his intuitive recognition of this his mission, and his psychical unfolding in the accomplishment of it. The book is full of psychical insight and opens many a theme of great promise all united in a genetic concept, which gives a meaning and power to Christianity for which the world is waiting.

L. Brink.

Elements of Folk Psychology. Outlines of a Psychological History of the Development of Mankind. By Wilhelm Wundt. Authorized Translation by Edward Leroy Schaub, Ph.D. London, George Allen and Unwin, Ltd., New York, the Macmillan Company.

The translation into English of another work of this eminent psychologist renders a peculiar service to psychological study in our own language. The difficulties of translation have been so well met that the author's thought finds here clearest representation. This book forms a supplement in the author's writings to his fuller work upon folk psychology, which considers rather successively than synchronously and synthetically the changing forms of expression of the human mind, as the author himself expresses it. Just so Wundt's works, particularly as expressed in this developmental study, form a transition in psychological thought between the older limited history of events or the study of the outward expression of human mental activity and the more recent psychological thought, which finds beneath the surface of events and deeper than the superficial appearance of emotions a causation which lies in the duration of creative energy. This it is which gives to the expressions of human development and to the otherwise undefinable and inexplicable emotions a genetic unification and a far profounder meaning as but so many changing expressions of a continuously unfolding and creating energy.

Wundt thus partially recognizes the unconscious depth which rolls beneath the separate elements of life which are the objects of the usual narrow viewpoint of conscious thought. He calls it " the reality of collective minds " and though he has not given to it the same definite expression which has become familiar in explanation of it, his work is itself a synthetic history of the formation of that collective mind through the gradual dropping into it of these earlier experiences of the human psyche, which advancing culture crowds into this accumulating depth. The book therefore fulfills a twofold purpose, in that it adds in its carefully collected detail abundant material to our knowledge of that inner psychological history, which after all is the true history of man, and in that it stimulates intellectual activity along such psychological and philosophical lines of evolutionary interpretation of human history.

The author begins by defining the place which folk psychology occupies among the other sciences which concern themselves with the study of human life, such as ethnology or linguistics. These also occupy themselves with the outward development of that inner life which folk psychology seeks to discover, though the study of the latter is in no wise independent of these other branches of investigation. Psychology, on the other hand, takes, as Wundt expresses it, transverse sections of the main stages of development each in its "sequence, and each in the total interconnection of its phenomena." His first section for study is therefore primitive man. He differs here with some other investigators in his acceptance of certain peoples and rejection of others as representatives of the most primitive human life which can be discovered. However, his study is as far as possible a review of facts as they are to be found instead of a consideration of artificialities based upon the imagination of the cultured student who attempts merely to build up his ideal of primitive man. Interpretation, therefore, though it follows necessarily a certain amount of personal bias due to individual point of view, is sufficiently tentative and experiential to offer the stimulus of difference of opinion and at the same time provide fresh material for future investigation and psychological interpretative thought.

Thus, although he bases his discussion of the growth of marrriage customs, with the laws of exogamy arising out of earlier sexual relationships, upon the debatable hypothesis of an original monogamous society, he presents an extended and instructive discussion of all these earlier forms of society. Similarly, the beginnings of language, of belief in powers beyond man, which merges into religion, together with the first attempts at artistic expression, whether in movement, sound or formative art, all pass under review and are examined in their mutual relationship in the synthesis of a progressive development.

The forms and customs which appear only in their fragmentary beginnings in the so-called primitive period pass through a much more elaborate development in the totemic period, to which the author gives ample space. Totemism he believes to have originated in the earlier animism which conceived of the human soul as divided into a corporeal soul and a shadow or breath soul. This latter at death passed over into an animal form. Totem and taboo, two words which are most closely associated in the beliefs and customs of these early stages of human history, form the main theme of this chapter, followed through their relation to marriage customs, ancestral worship, growth of cult, and the progress of art. This period passes in turn, in the development of these, over into that of the age of heroes and gods.

The hero represents the individual personality around which events which mark the progress of society come to center themselves. Out of these individual heroes in turn arise the individual gods. Both hero and god represent the continuous human effort to idealize human personality into the superhuman. The hero, however, does not really transcend humanity, while the god comes to possess qualities and characteristics which raise him above human personality. At the same time he inherits certain characteristics from the earlier impersonal demon, which preceded the intermediate hero form.

This period of heroes and of a personal religious life, based upon the conception of a personal god, witnessed its own broad unfolding and deepening of cultural life and an organization which extended itself through political society, building of cities, growth of classes, firmer establishment of religious cults, building and establishing of society upon that surer basis which has prepared the way for the humanistic period into which society is now entering. The four steps through which finally we enter into this age of humanity are those of world empires, world culture, world religions, and world history. It is to a clear definition of humanity that the author thus strives, in his pursuance of the course of human history psychologically considered, throughout the course of investigation which he has thus mapped out and followed.

This book was out among the students of human history before the war began. These last great factors in the unfolding of the evolution of human society remind one of Freud's reference to the world citizen aghast at the disruption of cultural harmony and fellowship which this war launched upon civilization. [Freud: Zeitgemässes über Krieg und Tod, Imago, Vol. III, No. 1.] The course of evolution is, however, unremitting, the spirit which initiated progress before the age of primitive man, and has conditioned its unfolding down the ages, can even through such an upheaval never lose its world culture nor fail to find and establish the humanism which has indeed been coming to its own opportunity through its grasp of world empire, world history, world religion and world culture. The meaning of these terms may have been mistaken, but the new goal of world peace will reveal to the new humanity wherein these forms of civilization have their real meaning and their place.

L. Brink.

Delusion and Dream. An Interpretation in the Light of Psychoanalysis of Gravida. A Novel. By Wilhelm Jensen, which is here translated by Dr. Sigmund Freud. Translated by Helen M. Downey, M.A. Moffat, Yard and Company, New York.

The literary and artistic charm of this very unusual and captivating "Pompeiian fancy" arouses appreciation and interest no more than does the equally delicate application to it of the principles of scientific interpretation. These find in it something still more as a guide to understanding and help in mental difficulties and aberrations. Freud's keen critique and interpretative insight into such revelations of the illusive efforts toward psychical adjustment and the difficulties into which such effort falls make of this study another of those helpful excursions into the skill in the artistic mind to reveal hidden and obscure truths.

Any attempted review of the first part of this volume could only mar its perfection and disturb the adequately skillful presentation and analysis of it which Freud has set forth. It is enough to follow in brief outline the story as he has presented it in tracing the line of delusion formation and dream production and the method of therapy which the author himself has more or less unconsciously introduced.

The story concerns a young archeologist whose natural love for womankind, driven out of consciousness by repression and substituted by an interest in archeological forms, stirs nevertheless unconsciously toward an original object of interest. This, however, is unable to come into consciousness because of the nature of the unconscious wishes involved and the repression which has shut them away. A delusion is then formed as a compromise between the conscious interest and the unconscious longing after a living woman, consciously forgotten.

The mechanism which makes use of the material within this young man's life upon which the delusion is built is that which has become familiar to Freud through his psychiatrical work. The element of truth, which lies partly in consciousness and partly in the unconscious, forms the basis not only of the delusion but constitutes the convincing factor which gives it a hold upon him. The living woman herself, by her clear intellectual control of the situation and an ability to enter with some insight into both sides of the conflict compromise, cleverly utilizes the delusion itself to lead the unconscious lover out to reality, health and a true love ending. Several dreams occur to attest the delusion content and the unconscious content upon which it is based. They also exercise a definite control in directing the hero upon the path, which, even while it follows the delusion, leads likewise to its explanation and dissolution.

Freud's handling of the story and of the author's own careful employment step by step of truly therapeutic measures, although these are artistically rather than scientifically chosen, is another of his clear and incisive presentations of the unconscious mechanisms of the psychic conflict and its compromise adjustments. He finds in the story the psychoanalytic method of pursuing again the same path in a somewhat reversed order back to the affective meaning and core of the apparent symptomatic difficulties. Dream interpretation receives here the chief attention, as from the nature of the dream and its important place in these psychic processes, it has been exalted in all Freud's writings and practice.

The book presents a delightful picture of these intricate workings of the human psyche and particularly an insight into the real meaning and value of the dream and its place in a human life with its conflicts and attempts at adjustment. It does this first artistically through the author's presentation, of which the reader is only perhaps unconsciously aware and appreciative. Freud has added to this a conscious understanding and awareness, which assists in a more distinct way to the comprehension and therefore control of the psychical waywardness of delusional activity of all degrees. There is very definite and pointed application in his discussion to the actual work of dream interpretation, which will be helpful to all concerned with this subject.

The translator is to be commended for the sympathetic understanding and the ability with which she has carried over into another language the twofold value of the entire book.

Jelliffe.

The Origin and Evolution of life on the Theory of Action, Reaction and Interaction of Energy. By Henry Fairfield Osborn. New York, Charles Scribner's Sons.

Those who have followed Professor Osborn's previous works need no introduction to his range of thought nor his method of treatment. A clear and simple directness of expression lends its aid in the winning and sustaining of interest in the matter he presents. His is the skill to strike certain chords which awaken the harmony that sweeps along the whole course of life from the indistinct notes beyond millions of years to the complex symphony of to-day. In this book, instead of attempting to discover the beginnings of life and the course of evolution from its present existing forms, he attempts to arrive at some knowledge of it and open the way for a more effectual pursuit of these problems in the future by entering from the other end into the first movement of energy which was life, and tracing it as it unfolds through a swelling complexity of movements and forms.

Life, as he thus follows it, appears to him due to a new relation of cosmic energy already existing brought into connection with existing chemical elements, and that the evolution of life follows thus a new constructive process. This construction is, however, still evolutionary, due to new combinations of preëxisting matter, energy merely following new directions. Living processes come then to be interpreted in terms of action, reaction and interaction, unknown principles of which may yet be discovered, or chemical analysis may yet discover some essential element wrapped up with living matter to which life is due, or an unknown source of energy may lie concealed. These are matters for further study and revelation. At the same time this energy concept eliminates the necessity for explanation of adaptation through chance, but brings adaptation into the causal orderliness of cosmic continuity.

The complexes in which energy is manifest in action, reaction and interaction are those of inorganic environment, the living organism, the heredity germ and the life environment or sum of individual organisms.

The first of these Osborn presents from the records of geology and paleontology and in terms of physiochemical laws and modes of activity. This is the discussion of the lifeless earth and ocean and the primordial atmosphere and their preparation for life, and embraces also the presence of the necessary life elements contributed by the sun. From this follows the assembly of such elements as are found in these environmental sources into the first living forms, that is, into combinations which present the properties which are known as the functions of living matter. These functions may be summed up in the capture, storage, release and reproduction of energy, and, we should like to add, upon which the author does not lay sufficient stress, in the shifting and transformation of energy from one form of manifestation and activity to another. He speaks instead of forms of energy, when in the discussion his own meaning seems to be rather the life forms in which energy manifests itself, not the "forms" of that which can have no form.

The movement of life upward from the earliest bacterial form of energy capture and utilization to the complex mammalian organism is viewed in the light of these principles, through this conception of a dynamic movement producing, altering, maintaining and reproducing the forms of life. Attention is paid chiefly to animal forms and these for the most part as they precede mammalian life. Comparatively little consideration is given the latter in this discussion. In fact, the author's desire is to open promising fields by the introduction of this concept, which shall prove of stimulating interest for future research in this pursuit of energy movement and its evolutionary results. He confesses particularly the darkness of our understanding of the working of energy in and through the germ plasm, suggesting this as one of the fields most needing some illuminating interpretation.

Fascinating and invigorating, however, as this study proves itself, the most significant and far-reaching factor seems to have been left out of account. It is not sufficient to believe that this belongs only in the discussion of the highest mammals, where conscious intellect is at work. Psychic energy carriers, the movement of energy in the psychic realm of sensory reception and psychic affective reaction, must have been present in dimly definable, rudimentary form, when life began from the first to consist of action, reaction and interaction in the most primitive organisms and in their relation to inorganic and other organic environment. Psychic values already were doubtless beginning to be crystallized out and bear their influence just as surely and with greater flexibility and variability than the chemical messengers, which are frequently mentioned among the energy carriers affecting action, reaction and interaction.

This work is a valuable contribution, turning thought and investigation along a vital, progressing pathway because utilizing such a dynamic, vital concept with which to trace the history of evolution and peer into its future. For the sake, however, of the psychic movement of energy, in which perhaps is the most fruitful field of investigation for the control and guidance which have produced the forms of evolution as well as for its future direction, it is to be hoped that future discussion will not leave this out of account. This has also a practical bearing upon understanding the effort, struggle and direction of each individual activity, and therefore pertains to questions of health, success and moral and intellectual advance. Hence the need of appreciation of this realm of energy manifestation and movement. To this in fact the work of the book points, even though it has left this branch of the subject unexplored.

Jelliffe.

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Original Articles

TABES DORSALIS

Statistical Study of 240 Cases; Incidence of Syphilis and Tabes; Age of Infection; Age of Onset of Tabes; Influence of Treatment of the Primary Infection on Tabes; Pretabetic Stage; Preataxic Stage; Ataxic Stage; Chair and Bedridden Stage; Death in Tabes

By Morris Grossman, M.D.

ADJUNCT VISITING NEUROLOGIST, CENTRAL AND NEUROLOGICAL HOSPITAL; CHIEF OF NEUROLOGICAL CLINIC, LEBANON HOSPITAL, O. P. D.; ASSISTANT NEUROLOGIST, MOUNT SINAI HOSPITAL, O. P. D.; VOL. ASSISTANT NEUROLOGIST, MONTEFIORE HOME AND HOSPITAL

There is such divergence of opinion regarding the age of onset of tabes and the age of incidence of syphilis and tabes that it seemed to me advisable to study as large a group of cases as I could gather in order to obtain, if possible, authoritative data on these questions. This paper is based on the study of 240 cases of undoubted tabes, gathered from my private practice and the services of Dr. B. Sachs, neurologist to the Mount Sinai Hospital; Dr. S. Wachsman, director of the Montefiore Home and Hospital; and Dr. W. J. M. A. Maloney, neurologist to the Central and Neurological Hospital; to all of whom I am greatly indebted for the privilege of using their material at those institutions.

Age of Onset.—As there is no agreement as to the minimum essential to constitute a diagnosis of tabes, and as it is well not to include any doubtful cases, the age of onset of tabes derived from this study will slightly exceed that given by others who have included not only probable but also even possible cases of tabes.

In fixing the age of onset of tabes in this group, I arranged the cases in order from the youngest to the oldest. I then found the percentage of cases occurring in different age periods and excluded those at both extremes of the column, so that rare cases of precocious youthfulness and equally rare cases of onset in extreme age should not unduly influence the result. In this process, the 7 youngest and the 7 oldest cases were eliminated; of 2 others the age could not be ascertained. The average age of onset of tabes in the remaining 224 cases was 39.1 years.

There has been considerable discussion as to the effect of antisyphilitic treatment upon the duration of the pretabetic period. I divided my cases into two groups. Those in whom there was a definite history of primary chancre, and those in whom there was no such history. In the first group there were 102 or 44.35 per cent. of the cases, and in the second group there were 128 or 55.65 per cent. of the cases. There were 10 cases that could not be estimated. The age of onset of tabes, in the cases in which there was a history of a primary chancre, was 39.1 years. The age of onset of tabes in those cases in which there was no history of chancre was 39.0 years. It is fair to presume that those patients, in whom a primary chancre was recognized, received more antisyphilitic treatment than those in whom no infection was detected; indeed, many of the latter were unconscious of the fact that they had ever contracted syphilis. Comparison of the figures derived from the above study shows no appreciable difference in the age of onset of tabes, in the two groups.

Age Period (Years)	Number of Cases	Age Coefficient	Average Pretabetic Period
10–15	2	0.935	13 years
15–20	27	0.86	16.37 "
20–25	35	0.671	15.17 "
25–30	21	0.448	11.85 "
30–35	10	0.423	14.0 "
35–40	5	0.327	9.05 "
40–45	1	0.268	11.5 "
45–50	1	0.291	14.0 "

The incidence of syphilis and tabes is alleged to vary at different age periods. The average age at which infection was contracted in my group of 102 cases was 24 years. The average age of onset of tabes was 39 years. The average pretabetic period was therefore 14.6 years. What I may call the age coefficient of tabes, the ratio of the duration of the pretabetic period to the age at which infection occurred, was $\left(\frac{14.6}{24.4}=0.559\right)$ 0.559 years. I have calculated this ratio for five-year age periods, ranging from 10 to 50 years.

The lowest individual coefficient was 0.1; the highest was 1.55. The average or group coefficient was 0.587, after eliminating six cases at the two extremes. The coefficients here given are not absolute values. Most of the groups with which I deal are too small to eliminate with certainty the variations which may be due to possible virulence of the infecting organisms, and to the difference in resistance in different individuals in the same group. Indeed, in the group of cases whose ages ranged at the time of infection from 15 to 20 years, the coefficient varied from 1.39, the highest, to 0.36, the lowest. However, in groups of 10 or more cases, I think the group coefficient approximates sufficiently close to the average for that age to permit us to make certain tentative deductions.

Thus there is no evidence to support Erb's contention that the younger the age at which infection is acquired, the earlier tabes follows. Mingazzini and Salvadori, and Schaffer have all supported Erb's contention. These four observers have among them offered in evidence only 4 cases, the oldest of which was 22.5 and the youngest was 19.5 years of age. In my series there were 27 cases in the age group between 15 and 20 years, and they yielded a coefficient of 0.86, which is a figure higher than that given by any of the other age groups that contained more than 10 cases.

Pitres asserts that syphilis occurring in the aged is rapidly followed by tabes. In my group there were no cases of syphilis occurring in extreme old age. The oldest patient, in my series, contracted his infection at the age of 48 years. But the tendency to shortening of the pretabetic period as years advance, which is evident in my table, seems to confirm Pitres's observation.

Exceeding the average pretabetic period of all the cases, 14.6 years was that only of two groups: the group from 15 to 20 years inclusive, which was 16.37, and the group from 20 to 25 years, which was 15.17 years. From 20 years onward, the average pretabetic period seemed to decline. This decline by the age of 40 years equaled 7.12 years; but the gain between the 15 and 20, and the 20 to 25 year groups was 2.15 years. The significance of these variations, if further researches confirm them, is obvious. The resistance of the central nervous system deteriorates with age, as Maloney contends.

Preataxic Period.—The preataxic period is that period which occurs between the onset of the first symptom of tabes and the appearance of ataxia. There is no agreement as to the minimum essential to constitute a diagnosis of tabes; the development of ataxia in tabes is usually insidious, and many of the patients do not consider themselves ataxic until they must use a stick to enable them to walk. The preataxic period is extremely difficult to determine precisely.

In a group of 65 cases analyzed and reported by Fournier, the preataxic period in 19 cases was 2 years or less; in 23 cases, more than 2, but less than 5 years; and in 23 cases, from 5 to 14 years. In 54 per cent. of Fournier's cases the preataxic period was 3 years or less.

In my group of 240 cases there were 42 cases which had no determinable preataxic period. In these cases ataxia came, so far as is recorded, synchronously with, or was itself the first symptom of tabes. The oldest patient in this group was 73 years; the youngest was 36 years; the average age of the group was 39 years. The average age of onset of tabes in this group of 42 cases was 44.5 years.

There were 46 cases that were still preataxic, in whom no ataxia had appeared up to the time they came under observation. The oldest patient in this group was 68 years of age; the youngest was 29 years; the average age of these 46 patients was 42.5 years. One was still preataxic after 15 years of the onset of tabes. The average duration of tabes, without ataxia, in these 46 cases was 4.39 years. No conclusions regarding the length of the preataxic period should be based on any cases which are not yet ataxic.

Of the remaining 152 cases, 7 could not be estimated, leaving 145 which could be determined. In 63 (43.4 per cent.) of these 145 cases, the preataxic period was 2 years or less; in 38 (26.2 per cent.) it was more than 2 but less than 5 years; and in 44 (30.3 per cent.) of the cases, it varied between 5 and 27 years. In 78 (53.8 per cent.) of the cases, the preataxic period was 3 years or less. The arithmetical average duration of the preataxic period in these 145 cases was 4.14 years.

The following table shows the duration of the preataxic period in the different age groups at which the first symptom of tabes made its appearance.

Age Group of Onset of Tabes	No. of Cases in the Group	Average Preataxic Period
Under 20 years	2	17.5 years
21 to 30 years	26	4.75 years
31 to 40 years	57	3.81 years
41 to 50 years	48	3.90 years
51 to 60 years	12	3.75 years

In studying the figures in the above table, one sees that the length of the preataxic period diminishes as the age of onset of tabes advances to 40 years, and that thereafter it remains fairly constant. The average decrease of the duration of the preataxic period from the thirtieth to the sixtieth year was 1 year. More data are obviously needed to establish the influence of the age on the preataxic period.

The age of the host does not influence the virulence of the spirochete. Therefore the shortness of the preataxic period must be determined either by the resistance of the host, varying with age or other factors. It is evident that the resistance of the nervous system of the host is measured by the pretabetic period, and that this is a factor which may be influenced by age.

Taking these 145 cases, I arranged them in sequence, from the shortest preataxic period to the longest. The 73 case gives the probable average preataxic period of this group (the wahrscheinliche Mittel); this was 3 years. The arithmetical mean of this group was 4.14 years. In dealing with figures so variable, I believe the wahrscheinliche Mittel gives a more accurate approximation to the true average.

To determine the influence of sex on the preataxic period was difficult, because there were so few female cases in any one group. In 22 ataxic cases among the females, where the preataxic period was determinable, the average preataxic period, determined by the wahrscheinliche Mittel, was 2.6 years. The arithmetical mean of the preataxic period in these 22 cases was 3.24 years. In the age group from 41 to 45 years there were 21 males and 5 females; the average preataxic period for the males was 2.0 years, by the wahrscheinliche Mittel method; and 3.73 years by the arithmetical method. The average preataxic period for the 5 females was 2.8 years by the wahrscheinliche Mittel; and 3.44 years by the arithmetical mean method. Hence these cases indicate, although their number is not sufficient to prove, that women have a shorter preataxic period than men.

The marked variation in the duration of the preataxic periods in the same groups, the difference in the preataxic periods in males and females, suggests that the determining factor may be a psychic one, a mental deterioration that varies with each individual.

Ataxic Period.—Some tabetics long remain ataxic; others have little or no ataxia yet soon become bedridden; and others again perpetuate the ataxic stage. Only in tabetics who have become bed- or chair-ridden, on account of ataxia alone, may a completed ataxic stage be distinguished. Death, joint changes, and injuries must be looked upon as accidental terminations of ataxia.

In this series of 240 cases there were 36 (15 per cent.) who became bed- or chair-ridden; of these, 6 cases have been immobile for one year or less; 6 cases, for more than one year but less than three years; 12 cases, for from three to four years; 4 cases, for more than four but less than eight years; 4 cases, from eight to twelve years. Yet two to four years is commonly alleged to be the life expectancy of the bedridden tabetic. Twenty of these 36 cases have been immobile from 3 to 12 years. The remaining 4 of these immobilized patients died: 1 at the age of 39 years, after three months of immobilization; 1 at the age of 30, after being bedridden 4 years; another, who had been bedridden 12 years, died at the age of 50 years, and the fourth died at the age of 49 years, after being immobilized 7 months. Maloney points out that the duration of the bedridden period is determined, not by the disease, but by the nurse.

Among these immobilized tabetics there are three main groups. The first group comprises 16 cases immobilized by ataxia complicated by injury, resulting in fractures or Charcot joints. The second group consists of 5 cases of optic atrophy, resulting in almost complete blindness, with or without injury. The third group includes 15 cases immobilized by ataxia alone.

Among the 16 cases forming the first group, immobilization followed in 5 cases the occurrence of blindness and ataxia; in 5 others the appearance of Charcot joints; immobilization was twice attributed to fracture and Charcot joints; once to fracture without joint trouble; once to intra-spinal medication; once to perforating ulcer of the foot; and once to muscular atrophy complicating ataxia. Only in the case which was bedridden because of muscular atrophy could a real paralytic stage be distinguished.

Of the 5 cases in the second group, none have had ataxia. Three took to bed and have remained there after injury to their lower extremities; and two after the onset of blindness.

Of the 15 cases immobilized because of ataxia alone, one retired to bed immediately the ataxia appeared; 7 became bedridden within 4 years after the onset of ataxia (2 within 6 months, 1 within 12 months, 1 within 18 months, 1 within 24 months, and 2 within 42 months after the appearance of uncomplicated ataxia). In the remaining 7 cases, the duration of the ataxic period varied between 5 and 15 years, before immobilization occurred.

The average age of these immobilized patients was 53 years.

It is useless to discuss the duration of the ataxic periods in those who from Charcot joints, injury, blindness or other accidents became bedridden. One might as well discuss the average duration of active life from a series of cases immobilized by street accidents. The only cases upon which any conclusions may be based are those 15 which became immobilized on account of uncomplicated ataxia.

The following is a table of the 15 cases, immobilized by uncomplicated ataxia, showing the duration of the preataxic period, the ataxic period, the bedridden period and the age of onset of tabes in these patients.

Age of Onset of Tabes	Duration of the Preataxic Period	Ataxic Period Before Immobilization	Bedridden Period
41 years	None	77 months	7 months
52 "	"	180 "	60 "
29 "	"	84 "	48 "
39 "	"	117 "	3 "
52 "	3 months	6 "	18 "
24 "	6 "	18 "	48 "
33 "	12 "	None	72 "
48 "	30 "	6 months	12 "
33 "	30 "	24 "	18 "
45 "	48 "	42 "	30 "
36 "	48 "	72 "	1 "
40 "	60 "	132 "	36 "
30 "	60 "	144 "	132 "
49 "	72 "	66 "	66 "
30 "	84 "	12 "	144 "

From this table it is obvious that in these cases there is a conspicuous tendency to a short preataxic period; 7 of the 15 cases became ataxic within 1 year after the onset of tabes. The probable average preataxic period determined above was three years; therefore 46.6 per cent. (7 out of 15 patients) had one third the normal average preataxic period, or less, and 60 per cent. (9 out of 15) had less than the probable average normal. 5 of the 15 patients became bedridden within 18 months of the onset of ataxia; indeed, 1 patient retired to bed immediately the ataxia appeared. The average duration of the ataxic period in this group of 15 cases was 4.11 years.

The usual conception of a bedridden stage, habitually occurring 10 to 20 years after ataxia has appeared, is therefore erroneous. Only 3 (20 per cent.) of the 15 bedridden cases, on account of ataxia alone, became immobilized later than 10 years after ataxia appeared.

Maloney has divided the ataxic period into four stages: the biped stage, when locomotion is still unaided; the triped stage, where only one stick is necessary; the quadruped stage, where two sticks are needed for walking; and the chair and bedridden stage, which is the final stage of deterioration of attitude. This subdivision represents deterioration of attitude without regard to the extent or severity of the tabetic lesions.

The average duration of the preataxic period in these 15 cases was 2.53 years. It is remarkable that of 6 patients who became bedridden within 2 years of the onset of ataxia, the preataxic period in 5 of them was 1.5 years, half of the probable average determined above. In only 1 of these 6 patients did the preataxic period exceed the probable normal average of 3 years.

Maloney contends that the deterioration of attitude is mainly a mental and not a structural deterioration. The short ataxic period in these bedridden cases, according to Maloney, is due to the same mental inferiority which was conducive to the short preataxic stage. Further support for this contention is obtained by the examination of individual patients in this group. Thus case 177, an ambulant ataxic tabetic, through the shock received from the death of her daughter, took to bed and has never walked since, a period of 6 years. Case 108 had been ataxic for 18 years, 7 years ago he had a perforating ulcer of the foot; he took to his chair and, although the ulcer has been healed almost 7 years, he has never again attempted to walk. Case 88 had a sudden giving at the knees 6 years ago and has never walked since. I could cite other analogous cases from this group, but I think these three adequately illustrate the mental influence in the deterioration of attitude among tabetics.

The exclusively ataxic patients seldom became bedridden, but tended to perpetuate their ataxia. If added to ataxia, there was trauma, either simple or resulting in fracture, joint trouble, shock or despair, deterioration of attitude was likely to occur. The psychic influence of blindness was also a prominent factor in reducing these patients to hopelessness and helplessness; indeed, in 5 of the cases, blindness in itself was sufficient to cause immobilization, when there was no existing ataxia.

Death in Tabes.—In my 240 cases there were 28 (11.66 per cent.)

that died. Of these 28 cases 10 were examined post mortem. Postmortem examinations so frequently rectify clinical opinion that it is rash to base conclusions upon causes of death, which have not been subjected to their corroboration. But I would like to emphasize that post-mortem deductions are also unreliable in certain particulars. One pathologist may stress the occurrence of a vascular degeneration which another would ignore; thus the pathological examination of one of my cases is reported to have revealed nothing except tabes. There is no fixed standard by which the lethality of any but the grossest morbid changes can be judged. Some observers are prejudiced in favor of renal, some prefer vascular, others lean to cardiac incrimination, and so forth. And if, as in my cases, the post-mortem examinations have been made by several observers, such a personal factor probably separates the point of view of each of them, that I hesitate to generalize from their reports. Moreover the number of my cases is not enough to warrant the attempt to generalize.

The causes of death in these 28 cases fall into three main groups: in the first group are those that died of cardiac, vascular or renal disease, or a combination of these; the second group comprises those in whom septic or other infections hastened or even determined the fatal issue; and in the third group are those tabetics in whom death occurred without the immediate cause being ascertained. Of these 28 deaths, 10 (35.7 per cent.) belonged to the first group; 7 (25 per cent.) belonged to the second; and 5 (17.85 per cent.) belonged to the third group. There were 3 deaths due to a combination of causes, cardio-renal and septic; and 3 of other origin.

The 10 deaths in the first group were recorded as follows: 5 died of arterial disease; 2 of cardiac insufficiency; and 3 of kidney inadequacy. Of the 7 deaths in the second group, 2 were attributed to cystitis; 3 to cystitis with pyelonephrosis; and 2 to pneumonia. The 5 cases in the third group were reported as deaths from tabes, without further information being offered. Of the 3 cases attributed to composite causes, 1 was recorded as due to cerebral thrombosis and pneumonia; 1 to uremia and cystitis; and 1 to cystitis, nephritis and bulbar palsy. Of the remaining 3 cases, 1 death was attributed to diabetes; 1 to angioma of the liver; and 1 to edema of the glottis.

The average age at which death occurred in these 28 patients was 53 years, the arithmetical mean; and 52.5 years, the probable mean (wahrscheinliche Mittel). The average mean duration of the disease was 12.4 years.

Lucke,[1] in a study of 250 cases of tabes, records 56 deaths. Among these 56 patients, the cardio-vascular, renal group contained 24 (42.88 per cent.); 16 deaths were attributed to nephritis; 5 to myocardial disease; and 3 to arterial disease resulting in apoplexy. The septic group contained 19 (33.93 per cent.) of the 56 cases; there were 9 recorded as having died of pneumonia; 7 of these were of the lobar and 2 were of the broncho-pneumonic type; pulmonary tuberculosis was given as the cause of death in 5 cases; in 4 general sepsis, and in 1 infection of the genito-urinary tract. The third group contained 7 cases in which no lesions were mentioned other than tabes. Of the remaining 6 cases, 2 were stated to have died of edema of the lungs; 1 of gastro-enteritis; 1 of tuberculous enteritis; 1 of intestinal paralysis; and 1 of carcinoma of the esophagus.

The average age at the time of death was 54.96 years. The average duration (probably the arithmetical mean) of tabes in these fatal cases was said to be 8.01 years.

Burr reported a series of 34 cases of death in tabes.[2] Of these 34 cases there were 19 patients who died of cardio-vascular, renal disease; 7 of these 19 deaths were attributed to myocardial disease; 3 to endocardial disease; 3 to arterial disease; 5 to renal inadequacy; and 1 to combined cardiac, vascular and renal lesions. The septic group contained 13 cases; 6 of these died of pulmonary tuberculosis; 4 died of pneumonia; 2 of general sepsis; and 1 of infection of the genito-urinary tract. The remaining 2 cases in his series died of edema of the lungs; but both of these patients showed myocardial and arterial disease on post-mortem examination; the edema of the lungs was probably an agonic phenomenon.

The average age at which death occurred in 33 of Burr's 34 cases was 53.4 years; the age of one patient was not given. The average duration (probably the arithmetical mean) of tabes in 33 of his 34 cases was stated to be 8.2 years; one case not being mentioned.

The average age at death in Lucke's cases was 54.96 years; in Burr's 33 cases it was 53.4 years; in my 28 cases it was 53.0 years. In these 117 cases, the average age at which death occurred was 53.06 years. The average ages at which death occurred in all these groups of cases approximate each other very closely.

Mortality.—The arithmetical mean age at death in my 28 cases was 53 years; the probable mean was 52.5 years; of these 28 deaths there were 15 patients who lived to be 53 years or more. Among my

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[1] Journal of Nervous and Mental Disease, May, 1916.

[2] Journal of Nervous and Mental Disease, Vol. 39, 1912.

240 tabetics there were 63 cases of 53 years or more; of these 15 died. This gives a mortality of 238 per 1,000 tabetics of 53 years or over. To enable me to compare this death rate with the death rate from syphilis, chronic cardiac and chronic renal disease, Mr. Louis I. Dublin, statistician of the Metropolitan Life Insurance Company, kindly gave me the following statistics: "Among Metropolitan premium-paying industrial policyholders between the ages of 50 and 54 years inclusive, during the quinquennium 1911 and 1915, there were 109 deaths from locomotor ataxia, corresponding to a death rate of 6.3 per 100,000 exposed; there were 367 deaths from syphilis with a death rate of 21.1 per 100,000 exposed; from organic disease of the heart there were 5,346 deaths corresponding to a death rate of 308 per 100,000 exposed; these deaths from organic disease of the heart include those due to affection of the myocardium as well as those due to affection of the valves of the heart, no separate tabulation being made of these; from chronic nephritis there were 4,435 deaths, with a death rate of 255.5 per 100,000 exposed."

The duration of the disease cannot be accurately estimated because while 238 per 1,000 tabetics die at the age of 53 years, we do not know at what age the rest die. We cannot even state when the average tabetic dies. However, this age, 53 years, is a critical age of tabes.

Excepting the case of edema of the glottis (which may have been a laryngeal crisis) there is no evidence of death from tabes. The paralysis of the intestine quoted by Lucke cannot be discussed without further data. There is no death reported among these cases from gastric crises; yet Foerster confesses a mortality from his operation (nerve-root section for gastric crises) in his own hands of 12 per cent.

In my group of 28 cases there were 6 cases that reached the age of 65 years or more; one of them lived to the age of 73 years. In Burr's series there were 4 cases that lived to be 65 years or more; one reached the age of 71 years. Lucke does not give the individual ages in his series. The lethality from tabes is that from syphilis only. Except for the doubtful case of laryngeal spasm, and other occurrences so rare that no example of them was found in 118 deaths, tabes has merely the menace of syphilis plus whatever menace there may be in sensory losses such as blindness, and in the weakened resistance to organismal invasion, which the prolonged presence of syphilis creates.

Conclusions

1. The average age of syphilitic infection, dated from the primary chancre, was 24.4 years.

2. The average age of onset of tabes in 238 cases was 39 years.

3. No detectable difference exists in the age of onset of tabes in those patients treated with antisyphilitic remedies and in the age of onset in those untreated or presumably less treated.

4. The average pretabetic interval is not greater than 14.6 years.

5. The pretabetic interval in the young may, but seldom does, last for a shorter period than in the more mature.

6. The resistance of the central nervous system seems to deteriorate with age.

7. The duration of the preataxic period may be influenced by age.

8. The probable average preataxic period is three years.

9. Women seem to have a shorter preataxic period than men.

10. The average life expectancy of the bedridden tabetic is very much longer than that usually taught.

11. The average age of the immobilized tabetic is 53 years.

12. Most tabetics usually perpetuate the ataxic stage; in the small percentage of cases which become bedridden, owing to uncomplicated ataxia, the average duration of the ataxic period is 4.11 years.

13. Among those tabetics who become bedridden, a short ataxic period usually follows a short preataxic period. This substantiates Maloney's contention that the deterioration of attitude is mainly a mental and not a structural deterioration. The short ataxic period in these bedridden cases is due to the same mental inferiority as is conducive to the short preataxic stage.

14. The cause of death in tabes is syphilis.

15. Syphilis and tabes lead to death through cardio-vascular and renal degeneration, and through weakened resistance to nonsyphilitic infections.

16. The average age at which death occurs is 53 years.

17. The mortality among tabetics over 53 years of age is 238 per 1,000.

18. Tabes is as nonlethal as any form of syphilis.

THE TREATMENT OF DELIRIUM TREMENS BY SPINAL PUNCTURE, STIMULATION AND THE USE OF ALKALI AGENTS*

By Herman H. Hoppe, A.M., M.D.

CINCINNATI, OHIO

The routine treatment of delirium tremens for many years has been catharsis, restraint and sedatives. In many places and in private practice this treatment is the rule to-day. Many years ago digitalis was for a time advocated as a specific remedy, but its use was abandoned up to a few years ago, when it was advocated once more.

Two years ago, R. Steinbach, rather accidentally, in withdrawing the cerebro-spinal fluid in a case of delirium with fixed pupils, for the purpose of making a Wassermann test, found that the patient's condition improved very remarkably, and continued to treat eighteen other cases by spinal puncture, with rather good results. After the opening of the Cincinnati General Hospital in 1915 the delirium tremens cases were sent to the psychopathic wards instead of the strong ward and transferred from the medical to the nervous and mental department. An attempt was made to treat these cases on a basis of their pathology and I wish to put on record the results obtained by this treatment during the year 1916.

Delirium tremens is an acute exhaustion psychosis developed upon the basis of chronic alcoholism. Considered from the standpoint of pathological anatomy we have, first, the changes in the brain, the heart and the blood-vessels and intestinal tract which are characteristic of chronic alcoholism, and secondly an acute condition of the meninges which is occasioned by the presence perhaps of an intermediate poison which has found its way into the cerebral circulation. The simultaneous occurrences of cellular changes in the cortex of the brain, together with changes in the pia, are the underlying anatomical factors which produce delirium tremens.

The cellular changes are perhaps of prime importance in the production of the delirium. These changes are more manifest in the cells of the cortex and are rather uniform.

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* Read at the meeting of the American Neurological Association, May 21, 22 and 23, 1917.

They are: i. In the early stages of chronic alcoholic degeneration, the dendrites of the ganglionic cells lose their granular appearance and become smooth and bare.

ii. If these changes continue to progress, the dendrites break up and disintegrate.

iii. The cell body at first is swollen, then becomes vacuolated, degenerates and becomes atrophic.

If these cell changes have not progressed very far it is presumed that the cells can return to a normal condition.

In a macroscopic way the most noticeable change in delirium tremens is the so-called wet brain. We have been told, as we shall see later, that this is a misnomer. The brain itself is rather deficient in fluid, but the pia mater is edematous and we really have a serous meningitis. The meshes of the pia are full of serum; there is some increase in the number of leucocytes and old cases show a tendency to increased connective tissue formation, more especially along the course of the larger vessels. There may be perhaps an increased secretion of the cerebro-spinal fluid, but the greatly increased quantity of fluid is probably caused by a serous meningitis. The cerebro-spinal fluid itself is found increased in nearly all the cases which have been under treatment. Steinbach found an absence of this increased pressure in 25 per cent. of cases. I believe that in our cases the percentage is much lower. Our experience has been the same as that of other observers, viz., that this increase of cerebro-spinal fluid continues during the whole course of the disease; for in all of the cases of repeated punctures, the cerebro-spinal fluid has always been found under increased pressure. The fluid itself is apparently normal, no largely increased number of cells are to be found. In this respect delirium tremens differs from ordinary chronic alcoholism or alcoholic psychoses. The cerebro-spinal fluid in the few cases of chronic alcoholic dementia in which spinal puncture has been made is never under pressure, whereas the cell count is slightly increased.

Slight quantities of alcohol are at times found in the cerebro-spinal fluid (Steinbach), but this has no relation to the development of delirium tremens.

Nuzum and Count publish the result of a series of experiments on the ability of the brain tissue to take up water after death. They come to the conclusion that in delirium tremens the brain colloids take up a very much larger percentage of water than normal brains of individuals who have died from accidents. They conclude that this ability to take up water is due to a cell asphyxia.

Cell asphyxia in delirium tremens is due perhaps to three factors:

i. Impaired circulation caused partly by the direct effect of the alcohol on the vessels, and partly by the pressure of the increased cerebro-spinal fluid. Cardiac weakness caused by alcoholism plays an important rôle, a deficient quantity of blood being brought to the brain.

ii. The impaired vitality of the cells of the cortex due to either the direct action of the alcohol or to the toxine which is developed in the intestinal tract in alcoholism.

iii. Alcohol is a narcotic and as such produces cell asphyxia.

The cortical cells are therefore narcotized by the alcohol, poisoned by a toxin and underfed by a deficient circulation. According to Prof. Martin Fisher the result of cell asphyxia is the development of an acidosis.

This abnormal state of the ganglionic cells of the cerebral cortex is caused by a similar degeneration of practically all the cells of the body, more especially, however, of those of the heart, the kidneys and the intestinal tract. In the circulatory apparatus this cellular degeneration results in a weakness of the heart muscle, as well as the muscle of the arterial walls, causing a passive hyperemia. In the kidneys the combination of cellular degeneration and passive congestion leads to a deficiency of elimination. Similar changes in the intestinal tract lead ultimately to the formation of the intermediate toxin, which is supposed to be the direct cause of delirium tremens (Bonhoeffer).

As long as this toxin can be eliminated by the kidneys with the help of the circulatory apparatus conditions are fairly normal. As soon however as elimination fails we have cerebral edema, an increase of cerebro-spinal fluid, cortical ganglionic cell asphyxia, acidosis and then delirium tremens.

The underlying causal factors are therefore the development of a toxin, a weakened heart and circulation, a deficiency of elimination by way of the kidneys, then edema of the meninges and increased pressure of the cerebro-spinal fluid.

These factors call for a treatment by elimination, stimulation of the circulatory apparatus and in at least one half of the cases, the removal of the pressure on the brain and cerebral circulation. Following is the routine treatment:

i. Catharsis is used as a routine measure, calomel, followed by a rather large dose of Epsom salts. The latter is especially indicated because of the well-known effect of sulphate of magnesium in dehydrating the tissues of the body.

ii. Tr. digitalis and Tr. nuc. vomica gtt. x are given by the mouth every three hours. In the active state of delirium strychnine and digitaline are given hypodermatically. We believe that this stimulation is perhaps the most essential part of the treatment, for whereas many if not most cases show an increase of blood pressure on admittance, the pressure drops very rapidly during the course of the delirium and dangerous weakness of the heart develops frequently, as a result of the excessive muscular activity.

iii. In mild cases the indication for alkalies is met by the use of the imperial drink with lemon juice.

Prolonged hot baths and hot packs are given twice a day, chloral and bromides are given only at night, and then not more than 2–3 doses during the twelve hours.

In the ordinary mild cases of delirium tremens, uncomplicated with kidney trouble, the above treatment is sufficient and the disease runs a very mild course.

In the more severe cases, and at present as a routine treatment, spinal puncture is resorted to as soon as the patient begins to have hallucinations. The cerebro-spinal fluid is always under pressure and from 30 to 60 c.c. is usually withdrawn. The withdrawing of the fluid is followed by a rapid reduction of the delirium, especially in cases which have had preliminary stimulation and alkalinization. If the delirium returns spinal puncture is repeated and the fluid is usually found to be again under pressure. In this respect our findings agree with those of Steinbach, who says that the increased pressure of cerebro-spinal fluid continues during the whole course of the disease. If the delirium still continues notwithstanding the spinal puncture, or if the patient is pale and covered with perspiration with a low muttering delirium, an intervenous injection of normal saline solution is given, or what we have found to be of more use, especially in cases with frequent convulsions and deficient kidney function, Fisher's solution.

We have had much experience with Hogan's method of treatment. We believe it to be of much value, and use it when the above method fails.

The prolonged warm baths and packs not only have a sedative action, but remove large quantities of fluid from the system and help to eliminate the intermediate toxin. They also help to remove the pressure from both brain and kidney.

The treatment may be said ultimately to be based upon the effort to remove the cell asphyxia and the acidosis of all the tissues, especially that of the brain cells, by improving the circulation, introducing dehydrating alkalies into the blood current and enabling the latter to reach the brain cells, by removing the pressure through spinal puncture. Chloral and bromides should be used as little as possible, and only in bad cases of extreme delirium, because like all sedatives they increase cell asphyxia and acidosis.

Cases have been treated according to this method during a part of the year 1915, the entire year 1916 and during the present year. I will confine myself to an analysis of the results obtained during 1916 because of the fact that it is only fair to take a whole year, rather than a part of a year.

During 1916 129 cases, either in the actual state of delirium tremens or so-called borderland cases with beginning delirium, were admitted to the psychopathic ward. This number comprises all, diagnosed clinically as complicated and uncomplicated. None of these complications were surgical complications. Of this number, 14 cases died, and I hereby show a table of the pathological causes of death. The mortality therefore from all causes was 10.8 per cent.

Clinical Diagnosis	Autopsy Diagnosis
Acute alcoholism	Fracture base skull; congestion brain and lungs; fatty liver.
Acute alcoholism	Congestion lungs; chronic nephritis.
Acute alcoholism; lobar pneumonia	Lobar pneumonia; fatty liver; acute nephritis.
Chronic alcoholism	Cellulitis leg; dilatation heart; chronic interstitial nephritis; congestion lungs; sepsis.
Chronic alcoholism; multiple neuritis	Edema brain; acute nephritis.
Chronic alcoholism; lobar pneumonia; chronic nephritis	Lobar pneumonia; pleuritis; chronic nephritis; dilatation heart.
Delirium tremens	Edema brain and lungs; chronic nephritis; fatty liver.
Delirium tremens	Chronic tuberculosis; tuberculous enteritis; pseudo-œsophagitis.
Delirium tremens	Edema brain and lungs; endocarditis; fatty liver; chronic nephritis.
Delirium tremens	Leptomeningitis; acute nephritis; fatty liver; edema lungs.
Delirium tremens; serous meningitis	Edema brain; dilatation heart; edema lungs; chronic nephritis.
Delirium tremens; omental hernia	Chronic interstitial nephritis; edema lungs; omental hernia; fatty heart.
Delirium tremens; lobar pneumonia	Lobar pneumonia; dilatation heart; fatty liver; chronic nephritis.

Of the 129 cases, 24 had clinical complications, usually chronic Bright's disease in some form. Of the other 105 cases, which seemed clinically uncomplicated, 8 cases died, a mortality of 7.6 per cent.

I would like to compare these figures with those of the 10 years, preceding 1915, when the routine treatment was catharsis and sedatives. During these ten years 903 cases of delirium tremens, not counting those complicated with surgical conditions, were treated. Of these 903 cases, 234 died, a death rate of 25.9 per cent. compared to a death rate of 10.8 per cent. under the treatment outlined in this article. 89 deaths in the 234 were clinically assigned to complications. 783 cases, however, during these 10 years were considered clinically as uncomplicated and of these 114 died, a mortality of 18.5 per cent. as compared to 7.6 per cent. in the clinically uncomplicated cases treated according to the above method.

If we consider the figures, however, from another point of view, we will have a clearer value of the treatment. Ordinary cases of drunkenness or even doubtful cases are not sent to the psychopathic ward. Only when there is good reason to believe that delirium tremens is impending, or that it is actually present, are the patients sent from the receiving wards to the psychopathic service. Of 375 cases admitted, 27 cases died, with a mortality of 7 per cent. Of these 375 cases, only 114 cases actually developed delirium tremens. 264 cases being aborted, 59 cases developed only mild delirium tremens, of which only 2 cases died. Sixty-seven cases were looked upon as severe cases and were treated by spinal puncture. Of these 25 cases were aborted and did not develop typical delirium tremens. All severe cases complicated with chronic Bright's or pneumonia were subjected to spinal puncture as well as to the intravenous treatment with normal saline solution or Fisher's solution; often as a last resort.

The pathological table will show the hopelessness of most of the cases that died during 1916, and that death was due to such advanced stages of degeneration of the heart and kidneys as to render any treatment unavailing.

Beginning with January, 1917, spinal puncture has been used in every case of delirium tremens admitted to the service, the rule being to apply the treatment as soon as any hallucination becomes manifest.

Hogan's method of treatment has been used only in the exceptionally severe cases and with very much success, apparently hopeless cases recovering quite frequently. I am favorably impressed with the method, but it is far more complicated and requires very much more time than the comparatively simple treatment outlined above.

I believe that the cases treated are sufficiently large in number to allow us to draw conclusions as to the value of the treatment. When we consider that the cases treated in a large general hospital are usually the worst of the class, cases which cannot be kept at home or in private hospitals, we can readily see that we are dealing with the most acute cases, as well as those most likely to have complications on part of the heart and kidneys.

We may summarize as follows:

i. The treatment is a rational treatment, based upon the pathology of the disease.

ii. It renders the course of the disease shorter and milder.

iii. Only thirty per cent. of the cases developed manifest delirium tremens.

iv. The cases are easier to nurse, the ward being in charge of female nurses with one male orderly, and the cases are less noisy and not so objectionable to other mental cases in the psychopathic ward.

v. The treatment by spinal puncture is devoid of danger and can be carried out by the average interne of a hospital.

vi. Many complications such as myocardial collapse and uremia are forestalled by the routine treatment.

vii. The death rate is greatly reduced.

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MENINGITIS DUE TO A SHELL WOUND

Recovery by Drainage. Attempt to Estimate the Daily Secretion of Spinal Fluid

By C. Burns Craig, M.D.

ASSOCIATE PHYSICIAN, NEUROLOGICAL INSTITUTE, N. Y.; NEUROLOGIST TO AMERICAN AMBULANCE, FRANCE

Infectious meningitis, not due to syphilis, is an incurable disease. Some cases due to the diplococcus intracellularis are favorably influenced by Flexner's serum. However, the percentage mortality of meningitis is high; therefore, any rational therapeutic suggestion deserves a hearing. The accidental therapy in the following case suggests that the same procedure designedly performed would be of value in purulent meningitis.

The patient, a rather muscular man, 30 years of age, received a shell wound October 20, 1914. The shell burst near the ground behind him, blowing him off his feet, so that he fell upon his face, in which position he lay for several hours unable to rise or move his legs. He finally dragged himself, by using his arms, to a place of slight shelter, from whence he was removed the same day to a first-aid hospital; later he was sent to the American Ambulance at Neuilly on October 28, 1914.

Examination showed a slit-like infected wound in the right flank about six centimeters long and three centimeters broad. X-ray examination showed an irregular piece of metal about three by six centimeters close to the right side of the first lumbar vertebra. The following day Dr. Du Bouchet removed the shell fragment through its own track. It was found to be attached to and partially embedded in the top of the first lumbar vertebra. The tip of the twelfth rib, which was shattered, was also removed. Motor power in the legs was beginning to return and there was a tingling sensation in the legs, which lasted six weeks.

The wound continued to produce a purulent watery discharge in great quantity. Motion and sensation were improving, when, on the first of December, he began to complain of headache. On the third of December his temperature, which had been 99°–100°, ran up to 105°, his pulse became rapid and moderate delirium set in. By the eleventh of the month the headache was extremely severe and the patient was having marked delirium at night, although during the day he was quite rational and gave an exact history of his case.

Examination showed dilated pupils, rigidity of the neck, Kernig's sign and Brudzinski's sign. There was no tache cerebrale, both ankle and knee jerks were absent, the cremasteric reflexes and the right abdominal reflex were absent, the epigastric and left abdominal reflex were present. There was no paralysis, but weakness of the legs.

Lumbar puncture revealed 2,120 leucocytes per cubic millimeter, chiefly polymorphonuclear in type with numerous myelocytes. A pure culture of streptococci grew out. Blood count revealed 18,400 leucocytes with an increase of the polymorphonuclear percentage.

Because of irritability and photophobia he was isolated in a darkened room. Sedatives were given and the wound was kept freely draining. The quantity of fluid which escaped from the wound and the watery character of it raised the probability of damage to the ureter. The discharge was tested for urinary constituents, but no urea or other characteristic urine content was found. The watery character of the escaping fluid, the absence of urinary constituents and the infection in the spinal fluid drawn off by lumbar puncture warranted the belief that the discharging fluid came from the subarachnoid space and that a fistula existed, connecting the spinal canal with the surface of the body. An attempt was made to estimate the daily quantity of fluid discharged from the wound. The fistulous track was lined by a very smooth granulated surface and the admixture of pus from this surface was extremely small, the fluid being almost clear. An effort was made to drain the wound into a small receiving bottle by the introduction of a sterile catheter without success. It was found necessary to rely upon weighing the dressing pads before and after application to the wound. They were changed three to five times a day and half as often at night to avoid loss by evaporation as far as possible.

The following table will indicate the success of this undertaking:

Date, 1914	Fluid Intake in Gm.[1]	Urine in Gm.	Fluid Discharge from Wound in Gm.	Stool
December 19	2,100	1,100	375	2
" 20	2,100	1,300	440	1
" 21	2,000	900	360	1
" 22	2,200	850	1,055	Enema
" 23	2,350	1,800	0	"
" 24	2,400	1,250	0	1
" 25	2,200	1,750	370	0
" 26	2,400	1,375	0	1
" 27	2,000	1,600	0	0
" 28	1,900	1,240	0	0
" 29	2,500	1,610	505	4

[1] Water, milk, eggs and coffee.

It will be seen that on certain days there was no discharge, then again for a period of days the discharge into the dressings was copious. The healing wound was evidently having a valve-like action. The average for the five first days was 557.2 gm., whereas for the total eleven days of observation the average was 282.2 gm. The average daily secretion of spinal fluid during the acute stage of the meningitis was at least 282 gm.

On December 14, a second lumbar puncture revealed 2,080 leucocytes, 1,850 polymorphonuclear and 230 mononuclear cells.

The fluid was of a canary-yellow color, very slightly cloudy and coagulated upon cooling. There was a heavy globulin excess and an absence of reduction of Fehling's solution. The patient at this time lay quite rigidly, occasionally muttering, picking at the bedclothes, moving his extremities about slowly and aimlessly. The eyes were wide open, but he was unresponsive unless thoroughly aroused. For two weeks he continued in this precarious state, requiring morphine to control the nocturnal delirium; then the delirium began to mitigate. On the days when the outflow of spinal fluid was less, the headache and delirium were more severe, so that drainage was persistently encouraged.

By December 24 an auto streptococcus vaccine was prepared, but by this time it was apparent that the crisis was past and improvement took place rapidly. The temperature fell to normal on the 26th and the pulse ran from 88–100.

The nerve trunks in the lower extremities were found to be extremely tender on pressure.

On December 27 lumbar puncture revealed 140 leucocytes, chiefly polymorphonuclear, with a few endothelial and mononuclear cells. The fluid was pale yellow and coagulated upon cooling. Globulin excess was less and there was a slight reduction of Fehling's solution. On December 3 the flow of the fluid from the wound ceased, the rigidity of the neck disappeared as well as the headache and the patient passed into a state of extreme exhaustion.

At this time memory was clear and orientation perfect; he even manifested a sense of humor.

With the aid of increasing quantities of nourishment and good nursing he made a rapid recovery, so that by February 1 he was able to get about in a wheel chair and by March 1 could walk alone. He began walking by holding to articles of furniture and threw his feet out in front of him much like a tabetic patient. Kernig's sign persisted to the middle of February and up to June, 1915, there was no return of the absent tendon reflexes in the legs, although the motor power was quite good. He was troubled during convalescence with a burning sensation on the outer side of the leg most noticeable when in bed, which kept him awake at night. There was excessive perspiration upon the soles of the feet and to a lesser degree upon the legs. There was no atrophy.

When last seen on June 6, 1915, although he was quite active on his feet and felt quite well, there were no tendon reflexes in the legs; there was a slight contraction of the left hamstring tendon on extension and lack of rapid reciprocal inhibition in flexing and extending the left leg. There was no sensory disturbance and the paresthesia of burning appeared only in the left foot on damp days.

The extraordinary recovery of this case of virulent meningitis emphasizes the value of the establishment of drainage of the spinal canal as a valuable procedure in cases of meningitis produced by organisms against which there is no effective serum therapy. Drainage might be established by trocar or laminectomy where advisable. Continuous drainage of the spinal fluid is not attended by serious consequences, as it occurs not infrequently for several days following ordinary laminectomy.

DYSTONIA MUSCULORUM DEFORMANS

Report of a Case and a Review of the Literature

By Moses Keschner, M.D.

ADJUNCT ATTENDING NEUROLOGIST TO THE MONTEFIORE HOME AND HOSPITAL;
ASSISTANT NEUROLOGIST TO THE CENTRAL NEUROLOGICAL HOSPITAL;
VISITING PHYSICIAN, CITY PRISON, BROOKLYN, NEW YORK

The study of abnormal muscle movements, the so-called dyskinesiæ, has always been a fascinating problem for the neurologist, both from a clinical, as well as from a pathological point of view. The clinician finds great difficulty in establishing definite clinical groups, because at the outset he is confronted with the question as to whether a particular bizarre movement is a symptom of a distinct clinical entity, or whether such a movement is a disease "sui generis."

In December, 1910, Ziehen (27) aroused great interest among neurologists, by reporting five cases of what he called "progressive torsion spasm," at a meeting of the "Psychiatrischer Verein" of Berlin. Three of these cases had been previously published by von Schwalbe (24) (Berlin) in the Neurologisches Centralblatt, XXX Jahr, Seite 109, in 1908, and in October, 1911, Oppenheim (21), of Berlin, published in the same periodical the clinical histories of four cases which gave him great difficulty in interpretation and classification. He then stated that he had seen within the last five years similar cases, but had been unable to decide whether they were cases of hysteria, special hysterical scoliosis, lordosis or idiopathic bilateral athetosis. Further observation, however, led him to believe that these cases, while very similar to hysteria, athetosis and Huntington's chorea, nevertheless had none of the classical characteristics, etiologically or symptomatologically, of these, and so he established a separate clinical group, which he called "dystonia musculorum deformans."

Since then numerous observers, both abroad and in this country, reported cases belonging to this group. Their number, however, has been quite small, and the object of this report is to put one other such case on record.

Our case presents some unusual clinical features, and will therefore be reported in great detail.

A. C. Single, Jewess, 22 years old, born in United States, was admitted to the Central Neurological Hospital to the service of Dr. Isadore Abrahamson, on August 30, 1915.

Her father is a tailor 54 years old; her mother is 48. They were both born in Russia. There is no history of alcoholism, syphilis, gonorrhea, tuberculosis, cancer, diabetes, epilepsy, insanity or similar disease in the family. The father never smoked, and their ancestors, as far as is known, were healthy and long-lived. The mother gave normal birth to 8 normal children, six of whom are living and two died in infancy of causes unknown.

The patient's birth was normal. She was breast-fed. It is not known at what age she began to teeth, walk or talk, nor is it known whether these events were accompanied by disease. She is said never to have had any convulsions or twitchings. She had measles at 7, erysipelas at 8, and diphtheria (age unknown). She made an uneventful recovery from each of these.

In 1903, when she was 9 years old, she was frightened by a Chinaman, who ran after her. She fell, picked herself up and went home. She had apparently sustained no physical injury.

While going to school, she had a habit of walking backward, because, she says, she could walk much faster. She never fell and never collided with any object.

Two and a half years after she had been frightened by the Chinaman, she noticed that her left foot began to drag, and her right hand to tremble. Soon after this, her left hand began to tremble and her right foot began to drag. With this complaint she was admitted to the Kings County Hospital, where she stayed for seven months, and was discharged, with "no improvement." In 1907 she went to the Hospital for Ruptured and Crippled and in 1908 she was transferred to the Hospital on Randall's Island, where her condition was diagnosed as "spastic chorea." During her stay in Randall's Island there were periods of alternating improvements and relapses. The duration and extent of these is unknown. Her speech was good until two years ago. She began to have movements of the head about one and one half years ago.

Her menstrual history is of no significance.

Physical examination reveals a girl with dark hair, typical Semitic features, poorly developed and poorly nourished. Heart, lungs, abdomen and genitalia negative. The thyroid cannot be felt. Cranial nerves apparently normal. Fundi normal.

The reflexes of the upper and lower extremities appear to be present and not exaggerated. Owing to the continuous muscular twitchings, it requires great patience to elicit them. Abdominals present and equal. No clonus and no Babinski. It is impossible to ascertain the presence or absence of Romberg's sign. On testing joint mobility, it is found that the shoulders and elbows are normal, but that of the wrists, fingers, hips, knees and ankles is somewhat impaired, probably on account of the contractures of the tendons.

In both wrists and ankles, the phenomenon designated by Hunt (18) the "paradoxical" or "reverse" phenomenon of dystonia, is present. This sign is elicited in the following manner: The wrist joint being held in flexion by the patient, when she is requested to extend the hand on the forearm, she makes an attempt to do so, but instead of extension there are several involuntary flexions to a greater angle than there was originally, and after a perceptible lapse of time, the desired extension is first carried out. The same result may be obtained in any other joint.

The sense of position and vibration is normal. There is no astereognosis and no dysdiadochokinesis. Although all movements are executed in a clumsy fashion, there is no ataxia, dysmetria or asynergia.

There are no sensory disturbances, and no symptoms referable to bladder or rectum.

The muscles of the forearms, hands, legs and feet are in a state of hypertonia alternating with hypotonia. There seems to be a slight atrophy of the muscles of the forearm, but the muscles of the lower extremities are markedly atrophied and unequal.

Right thigh 6 in. above patella measures 13¾ in.
Left thigh 6 in. above patella measures 15 in.
Right leg 6 in. below patella measures 8¾ in.
Left leg 6 in. below patella measures 9½ in.

There is no *R.D.* X-ray examination, owing to the spasms, could not be carried out.

Laboratory Findings.—Blood and spinal fluid Wassermann negative. Luetin reaction negative. Blood normal. Urine, except for a high specific gravity (1.030), is negative.

There is no tenderness anywhere.

The patient appears most comfortable in the following attitudes —"postures of election."

Sitting.—In a chair with the head turned to the left, showing the right sterno-cleido-mastoid rigid and very prominent, with her chin tilted toward the left shoulder, and the left sterno-cleido-mastoid flaccid. In this position, the right side of the face appears fuller than the left, and although the facial innervation is equal on both sides, there is a tendency for the left side of the mouth to droop. The anterior border of the left trapezius is in contact with the relaxed posterior border of the left sterno-cleido-mastoid, the anterior border of which is perfectly round, particularly in its lower third. She leans with the left shoulder, left trunk and dorsal part of the vertebral column in marked scoliosis, against the back of the chair, so that there is a space of about 8 inches between the back of the chair and the right upper trunk. In order to be most comfortable in this position she must allow her *left* arm to hang down with her elbow slightly flexed, protruding outwards, and the hand flexed on the forearm with the palm of the hand pointing outward. All the fingers are completely flexed at the second and third phalangeal joints, with continuous alternate twitchings of the different fingers. These twitchings, however, are irregular and have no definite rhythm. At the same time her *right* arm is in a position of flexion at the elbow, making an angle of about 90 degrees with the forearm, which is held in supination, with the palm pointing towards the anterior plane of the body; the fist is fully clenched, and all the fingers are in complete flexion, the middle finger digging deeply into the flesh of the palm. The thumb, however, is only partially flexed, and is superimposed over the first phalanx of the index finger. There is a continuous spasm at the wrist, with marked prominence of the tendons of the flexors of the fingers above the annular ligament. An attempt to open the *right* hand aggravates the spasm in the fingers of the *left* hand and the fingers of the *right* hand assume clonic contractions. When the same hand is opened completely and with force, there ensues a general spasm involving the muscles of the face, neck and trunk, as well as those of the *right* leg and for a period of about one half of a minute, the fingers of the right hand are hyperextended, the spasms increase, and the whole body appears as if in a general clonic convulsion, the thighs are adducted, and involuntarily she "grabs" her dress in front of her genitals. She persists in this attitude, until the hand is relaxed by the examiner. During this procedure she complains of no pain whatever; she simply appears to be uncomfortable, and seems to be undergoing a great physical strain.

She prefers to sit on the edge of the chair resting only the left buttock on it, the *left* leg making an angle of 90 degrees with the thigh, the foot flexed on the leg at an angle of about 70 degrees, the inner aspect of the foot in contact with the floor, and the thigh in continuous rhythmic motion, in adduction. In this position, the *right* leg is held at an angle of 110 degrees with the thigh, which is abducted, and the foot at an angle of about 100 degrees with the leg in extension, but the heel does not come in contact with the floor. This foot is everted, all the toes are constantly twitching. The sartorius muscle and hamstring tendons appear very tense. When the *left* leg is adducted, the *right* one seems to abduct, *i. e.*, to get away from its fellow. When both legs and feet are put in active or passive motion, she makes with the ball of the *right* foot an arc of about 80 degrees on the floor.

While standing, the following appears to be the most comfortable attitude for her: She uses the *left* leg as her main support, with the foot on the floor, in eversion. In this position, the *right* foot is held in inversion in a position of equino-varus, the foot making an angle of about 100 degrees with the leg, which is in extension, the distance of the heel from the floor being about 6 inches, while the tips of the toes just about touch the floor; the nates, particularly on that same side, become very prominent, the kypho-scoliosis is very marked, and the head, neck, trunk and upper extremities remain in the same position, as when sitting down. In this attitude, when her attention is distracted by engaging her in conversation, the spasmodic movements of the head, face and fingers become very marked.

Gait.—While walking, she holds her limbs in about the same position as when standing. She can begin locomotion by putting out either leg first, although she favors the right one. It is then that the characteristic "dromedary" or "monkey" gait becomes very evident. Without support, she can walk a distance of only 9 feet, she tires very easily, her face becomes flushed, her pulse accelerated from 120–130, she perspires profusely, and complains of pains in the lumbar region. She has no difficulty in walking a straight line, and can walk backwards as well as forwards.

On lying, all contractures and deformities, except those of the spine, pelvic girdle and hamstring tendons disappear, as do all the spasmodic movements, provided she is kept perfectly quiet.

Her speech is thick and drooling, and at times unintelligible. On opening her mouth, the tonsils, uvula and palate appear to be normal. Her teeth are very bad. Several attempts have been made by a dentist to put her mouth in a sanitary condition, but owing to the constant twitchings of the head and body, it was impossible to accomplish anything in this direction. Her tongue is constantly rolling on the floor of the mouth; the rolling waves begin at the root of it and extend to its tip. This rolling of the tongue becomes more marked when she attempts to speak, and profuse frothy saliva begins to trickle down her chin.

Her appetite is good; her bowels regular. She urinates 2–3 times a day, and has no nycturia. She sleeps well, but it takes her a long time to adjust her body so that her spasms will be at a minimum. During profound sleep, all movements cease and her limbs are found to be perfectly straight.

She has no vertigo, numbness or itching. Occasionally she complains of frontal headache and sensations of heat and cold in her right hip. Her skin is warm, and always clammy; there is a simple acne of the face. Her mammæ are unusually well developed, and her scalp, axillæ and pubes have a normal supply of curly black hair.

Psychically she is perfectly normal. She is intelligent, and keeps abreast with the affairs of the day. She spends her time reading the newspapers and popular stories. She is inclined to be rather sensitive and bashful. When not reading she spends her time crocheting, and it is remarkable to see how, in spite of her clumsiness and spasms, she threads a needle.

She feeds herself and prefers to drink liquids and to eat solids, rather than to use a spoon.

COMMENT

The disease, as originally described by Oppenheim (21), is a chronic progressive one, affecting mostly children of Jewish-Russian parentage, between the ages of eight and fourteen years. It is characterized by a deformity around the pelvic girdle, with tonic and clonic spasms, involving chiefly the muscles of the thigh, pelvis and lumbar region. Other muscles might be involved, but the chief involvement is in the muscles concerned in locomotion. The involved muscles are alternately in a state of hypertonia and hypotonia. The deformities and myospasms disappear while the patient is asleep. On standing and walking the characteristic deformities and the so-called "dromedary" or "monkey" gait present a striking picture. There is no evidence of mental deterioration; there is no motor-tract involvement, and there are no sensory disturbances.

The disease has been described by different observers under different names, such as "dysbasis lordotica progressiva," "dystonia musculorum deformans" (Oppenheim) (21), "tonic torsion spasm" (Ziehen) (27), "progressive torsion spasm of children" (Flatau-Sterling) (14), "Ziehen-Oppenheim disease" (Van Bernstein) (3), and "tortipelvis" (Fraenkel) (15).

Cases have been reported presenting the characteristic features of the disease, in the form of a monoplegia, diplegia and hemiplegia. The five original cases of Ziehen and Van Schwalbe were discarded by Oppenheim, because they were lacking the clonic spasms, the hypotonia and the increase of the spasm on standing and walking.

Our case is one of very extensive involvement, in which all four extremities, including the muscles of the face, neck and tongue, seem to participate. While Oppenheim's original cases presented no muscular atrophies, our case resembles that of Biach (4) in the fact that the muscles of the right thigh and leg are markedly atrophied. It also resembles Bregman's (7) case in its involvement of the muscles of the face, and Van Bernstein's (3) case in the fact that speech is partly affected. The difficulty of her speech is undoubtedly not central in origin, but is probably due to the spasm of the tongue and partially to the poor condition of her teeth.

In this disease all voluntary movements are performed as if there were a conflict in action of the different muscle groups, a reversal of muscle tonus. Hunt (18) has studied this inability to dissociate harmoniously the essential muscle-tonus elements of a simple movement, namely contraction of the agonists and antagonists. This phenomenon he designates the "paradoxical" or "reverse" phenomenon of dystonia, and he considers it diagnostic in the differentiation of the disease from spastic, hysterical and other forms of spasmodic contractures. Our case illustrates the correctness of his observation, particularly in the execution of the movements of flexion and extension in the wrist and ankle joints.

The clinical picture of the disease is well known and cannot be mistaken, after one bears in mind the classical description of it by Oppenheim. Nothing definite, however, is known of its etiology or pathology. Oppenheim believes the disease to be due to fine pathological changes in the cells of the cortex, which control muscle tone.

Fraenkel (15) says "it would be difficult to identify such a widespread constitutional disturbance with a uniform causative lesion. The lesion—structural—if found will have to be interpreted as sequential. It would seem more reasonable to look for the cause of such disorders in the epithelial bodies and parathyroid glands, in changes of their products and their influence upon the mineral metabolism, particularly the calcium metabolism."

Dr. Nelson W. Janney (19), physiological chemist to the Montefiore Home and Hospital, subjected one of the patients, in that institution, afflicted with a severe type of this disease to a careful study of the calcium metabolism. He could find absolutely no abnormality in the elimination of this mineral. (Unpublished personal communication).

Jelliffe (20) thinks that the lesion is in some portion of the cerebello-thalamo-cortical arc, probably cortical to the red nucleus and possibly in the region of H′ and H″ of Forel's field.

Other observers, amongst them Dana (10), are doubting the organic nature of the disease, and are inclined to include it among the neuroses considering it a variety of hysterical spasm or generalized tic. Bing (5) in his Lehrbuch der Nervenkrankheiten, 1913, considers the condition to be similar to double athetosis.

A case of this kind was shown by Seelert (23) before the German Society for Psychiatry and Neurology, and reported in the Berliner Klinische Wochenschrift (October 6, 1914). The patient was a boy seven years old. In the discussion of the case Oppenheim emphasized the psychic indolence of these patients. Bonnhoeffer (6, 23) was satisfied that the affection was not psychogenic. Although at first sight it appeared preëminently hysterical, prolonged observation of the evolution of the disease led him to class it among the choreatic processes as an organic disease.

J. Ramsay Hunt (18), after an exhaustive study of six cases of the disease and a thorough review of the literature, says that he is convinced that "the lower type of mechanism is at fault, one which is closely associated with the corpus striatum, but which is engaged in the regulation of tonus, especially in its relation to the reciprocal activities of the agonistic and antagonistic muscles, for this constitutes one of the essential factors in the motor disturbances of torsion spasm; but the preservation of facial expression and articulation is against a localization in the corpus striatum, for we know from many pathological studies that the face and articulation are both involved in this localization."

Theodore Diller (12) and George Wright (12), of Pittsburgh, report the case of a man thirty-two years old afflicted with this disease, in whom the first symptom of the affection made its first appearance at the age of fourteen. The most noticeable involvement in their case is in the muscles of the upper extremities and shoulders. The muscles of the legs, pelvis and lumbar muscles are not affected at all, and the gait is perfectly normal. The back, however, shows a moderate but distinct scoliosis to the right in the upper dorsal region.

The cases described by Spiller (25), Abrahamson (1), Beling (2), Bregman (7), Hegier (17), Climenko (9) and Bonnhoeffer (6) presented no unusual features.

Patrick (22), of Chicago, presented a case before the Chicago Neurological Society in December, 1915, which began in young adult life as a facial tic, to which was soon added a spasmodic torticollis. Six or seven years later an operation was performed on both sides of the neck, without benefit. The shoulder and trunk became involved. He presented at different times torticollis, tortitorso, occasionally tortipelvis, violent movements of the shoulders and some facial movements. The movements are slower than those of tic and are of a writhing, twisting character. The trunk and shoulder muscles are much more involved than one sees in tic, and the movements are less under the control of the will, and they disappear entirely during rest and sleep. The patient presented was not a Jew. He was twenty-seven years old, and the disease began at the age of nineteen. During the discussion of this case Patrick remarked that he had previously seen two similar cases, one in a man of twenty and one in a middle-aged man, but he could not say definitely whether they were cases of tic or dystonia.

Weisenberg (26), of Philadelphia, showed before the Neurological Society of Philadelphia in November, 1916, a case presenting a rather unusual type of the disease. There is no history of Jewish blood in the family. The disease began at the age of six. The spasms began in the right arm, and extended to the muscles of the right and left shoulders, and there developed a tendency of the whole trunk to twist to the left and now at the age of twenty-six he has all the well-marked symptoms of a torsion spasm, this consisting of a torsion of the whole trunk from right to left. The head is mainly twisted from the right to the left, there being constant jerking spasms of all the muscles of the upper chest, shoulders and neck and the muscles of the jaw. The twitchings of the muscles of the jaw are so severe that the patient is unable to talk loudly, he being forced to whisper, and there is also constant grinding of the teeth which are very much worn. He also has difficulty in chewing and swallowing. There are very few if any torsion movements in the hips and legs. Physical examination shows no atrophy but an overdevelopment of the muscles on account of the constant spasm. The tendon reflexes are increased. Mentally he is normal. Wassermann and Abderhalden tests are negative. In the discussion of the case Cadwalader (8) stated that he was impressed with the similarity of this case to one of progressive lenticular degeneration. He thought that all these cases represented mere clinical types that are referable to disturbances of the lenticular nucleus. Eshner (13) believed that the case resembled one of those that he had seen at Blockley, presenting athetoid movements of the hand and face, disorders of speech and in some instances contractures. At one time these were looked upon as due to deficient development of the lateral tracts. Later they were considered as due to some cerebral lesion, traumatic, herorrhagic or otherwise.

F. X. Dercum (11) reports a case which he calls "anomalous torsion spasm." At the outset of his report he admits that the case differs markedly from the cases described by Ziehen, Oppenheim, Flatau and others. In his patient, who is not of Jewish descent, the first symptom began at the age of nineteen. The torsion is most pronounced in the cervical region, and is complicated by epileptic seizures. He concludes that the case is possibly an unusual and bizarre outcome of a rotary tic.

F. M. Hallock (16) and H. W. Frink (16) presented a case of dystonia before the New York Neurological Society in January, 1917. The patient was a girl fifteen years old, of Russian-Jewish parentage, who at the age of five, after having fallen from a chair, began to experience difficulty in walking. Her left leg became weak and stiff, later all the other limbs were gradually involved, the left leg and arm being the most affected. There also developed some difficulty of speech. There were periods of exacerbations and remissions, but for the last five years her symptoms remained stationary. The muscles of all extremities are spastic, all movements are much disturbed and clumsy during active movement, but passive movement is perfectly normal. There are no spontaneous or rhythmic movements, when the patient is at rest, such as occur in athetosis. No hypotonia can be demonstrated. All tendon reflexes are exaggerated. Abdominals present; plantar reflex is of the Babinski type. There are no sensory changes, and no electrical changes. No difficulty in swallowing or chewing. Although there is a dysarthria present, which is apparently due to a spasm of the tongue, and of the muscles about the mouth and larynx, there seems to be no difficulty in phonation. There are no eye changes. Urine and Wassermann negative.

We had an opportunity to see this case, and owing to the absence of hypotonia, and torsion spasm of the muscles of the pelvic girdle, and the presence of signs of pyramidal tract involvement, we are inclined to doubt the diagnosis of dystonia. Dr. J. Ramsay Hunt, who also saw the case, was of the opinion that it most probably belonged to a group of incomplete double hemiplegia.

In our present state of knowledge, and with the lack of pathological material, the localization of this most baffling condition must remain purely a matter of conjecture. Up to the present time there is only one authenticated record of an autopsy, and that was in one of Ziehen's cases. The findings, however, both in the brain and spinal cord were absolutely negative.

The disease "per se" does not seem to be fatal. The patients as a rule die of some intercurrent disease. As to its duration, all that we can say now is that in one case of twenty-five years' duration the patient is still alive.

Therapy has had little or no effect. Psychotherapy, electricity, hydrotherapy and metallotherapy have been employed, but only with temporary benefit. In one of Fraenkel's (15) cases, reëducation seemed to help for a time, as did the intraspinal injection of magnesium sulphate. There is no case of permanent cure on record. Some of the cases have at time attacks of violent spasms, particularly those with involvement of the muscles of the neck. The spasms may be so severe that to the observer it may appear that the patient will die of asphyxiation at any moment. We have seen one such case, and after having resorted to various sedatives, including luminol, in large doses, we could not control the spasms until we had given enormous doses of hyoscine hypodermatically. On several occasions general anesthesia with chloroform was tried; relaxation of the spasms occurred only after the patient had been completely anesthetized. The patient stood the anesthesia very well, but upon its withdrawal, and before full consciousness had been reëstablished the spasms recurred as before. In all cases it seems that mental and physical excitement have a tendency to bring on an exacerbation of the disease.

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A CONSIDERATION OF THE PATHOGENESIS OF EPILEPSY

By Lewis J. Pollock, M.D.

INSTRUCTOR IN NERVOUS AND MENTAL DISEASES, NORTHWESTERN UNIVERSITY MEDICAL SCHOOL, CHICAGO

Following the experiments of Fritsch and Hitzig, Unverricht, Francois Frank, etc., who have shown that convulsions can be produced by electrical irritation of the motor cortex, the view supported by Kussmaul, Nothnagel, etc., that the medulla and pons were the seat of the disease in epilepsy was practically abandoned. Subsequent experiments and certain clinical facts have confirmed the opinion that the convulsive site or starting point of epileptic convulsions is in the cerebral cortex.

It has been shown that when a part of the motor area has been removed, the movements of the convulsion represented by this area are absent. In hemiplegia the paralyzed side has been found to become exempt from the convulsive movements of an epilepsy.

The unconsciousness attending an epileptic convulsion, the frequent complication of psychical disturbances and psychical equivalents, have all indicated that the cortex is the seat of disease.

Experiments conducted in an attempt to localize the seat of convulsions have been of two types: The one tended to produce convulsions by direct irritation of various parts of the central nervous system. The other endeavored to prevent the occurrence of artificially produced convulsions, or to cause their disappearance or change their character by means of ablation of various parts of the brain.

The first method has accurately localized the motor area of the brain and has proved the pathogenesis of cortical or Jacksonian fits.

Irritation experiments of the subcortical areas of the brain have only demonstrated various types of hypertonia and dystonia which are no longer remarkable in the light of our knowledge of the proprioceptive nervous system and the clinical pictures of extrapyramidal diseases. These experiments include among their number the investigation of the function of the quadrigeminal bodies[1] and the corpus striatum.[2]

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[1] Flourens, Lorget, Schieff, Magendie, Weber.

[2] Nothnagel, Hitzig, Fournie, Albertoni and Michieli, Lussana, Lemoigne, Glicky and Eckhard, Braun and Soltmann, Ferrier, Baginsky and Lehmann, Johannsen, Zichen and others.

Excepting those which deal with electrical cortical fits, experiments employing ablation of various parts of the brain may be divided into two groups: First, those producing fits in decerebrated animals by means of certain toxins (picrotoxin, coriamyrtin, cinchonidine, absinthe); second, those allowing the observation of spontaneously occurring convulsions in decerebrated animals (Rothmann).[3]

Convulsions produced by toxic substances in decerebrated animals have been described by Roeber, Perrier, Grünwald, and others, who worked with picrotoxin, Albertoni with cinchonidine, Ossipow with absinthe, Shimizu with senso, and others with various substances. It has been insisted that when such a convulsion occurs in a decerebrated animal it lacks the clonic phase of a fit, and the movements are of tonic, stretching, bending and running type (Bechterew, Luciani and Landois, etc.).

The fact remains, however, that whether it is clonic or not it is a convulsion.

Particularly convincing of the occurrence of subcortical fits are the observations of Rothmann upon spontaneous convulsions in decerebrated animals. These convulsions occurred from three months to three years following the operation. They were tonic in nature, except for the clonic movements of the facial muscles.

Ziehen and Ossipow both attribute the clonic convulsions to the cortex and the tonic to the subcortical centers.

An epileptic convulsion consists not only of the tonic and clonic movements, but also a series of events and changes including the aura, the vascular, respiratory, vasomotor and secretory changes, contraction of the involuntary muscles—as of the bladder—and loss of consciousness. As in idiopathic epilepsy, so in picrotoxin convulsions, whether occurring in normal or decerebrated animals, there are marked symptoms referable to the irritation of the central autonomic nervous system, and pupillary, vascular changes, the sialorrhea and involuntary urination may easily be attributed to irritation of this center in the medulla and pons in the former condition, and have been proven to be so located in the latter (Grünwald).

The vascular and respiratory symptoms precede the aura in some, and the convulsive movements in some and probably all epileptic convulsions (Pollock and Treadway).[4]

Although the circulatory and respiratory changes associated with the picrotoxin convulsion are not exactly similar to those found in idiopathic epileptic convulsions, yet the independent presence of blood pressure change associated with picrotoxin convulsions tends to show that these changes are part of the convulsion alike in picrotoxin and idiopathic epileptic convulsions (Pollock and Holmes).[5] We have seen that, although differing in type, convulsions can occur from irritation of the subcortical centers—as the medulla and pons. However, the integrity of the entire central nervous system is necessary for the production of all the symptoms of a convulsion.

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[3] Rothmann. Neur. Cent., 1912, Vol. 31, p. 1286.

[4] Pollock and Treadway. Archives of Internal Medicine, 1913, Vol. 12, p. 445.

The symptoms of the convulsion vary as to the state of preservation of the brain. If it be intact, besides the aura and autonomic nervous system symptoms, tonic and clonic components are present. If the animal be decerebrated, tonic, stretching and running movements alone exist. If the cerebellum be the point of irritation, in the absence of the cerebral cortex, bending, tonic movements occur. If a cerebellar lobe be removed the intensity of the convulsive movements becomes greater upon that side (Risien Russell, Luciani).

If it is granted that symptoms referable to the central autonomic nervous system are a part of idiopathic epileptic convulsions and can be produced by stimulation of the medulla (picrotoxin), then it is reasonable to assume that the nuclei of the pons and medulla are as essential to the complete picture of a convulsion as is the cortex.

We may attribute the clonic convulsions to the cerebral cortex, the tonic to the subcortical centers and the symptoms of the central autonomic nervous system to the medulla and pons. Convulsions occur in normal and decerebrated animals alike, differing only in the absence of the clonic component of the convulsion in the latter. Both are associated with and preceded by symptoms referable to the central autonomic nervous system which is represented by the lowest of the three levels mentioned above.

The site of discharge cannot be located in the cerebral cortex only, because convulsions occur in decerebrated animals. The pons and medulla are the only parts of the brain whose integrity has been found to be essential for the production of experimental convulsions.

The presence of medullary symptoms in the convulsions of normal and decerebrated animals and the fact that they precede the convulsion in case of *petit mal* and some experimental convulsions in decerebrated animals point to the medulla and pons as the starting point of convulsions.

Convulsions can be caused through irritation of the motor and other parts of the cerebral cortex, wherever the site of discharge may be. The occurrence of convulsions in anencephalus and the spontaneously occurring convulsions in decerebrated animals, the production of convulsions by medullary convulsants in such animals, and the persistence of epileptic convulsions following decorticization, all speak for the possibility of the production of convulsions by irritation of other parts of the brain.

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[5] Pollock and Holmes. Archives of Internal Medicine, 1915, Vol. 16, p. 213

Clinically we find that, dependent upon the area irritated, is the type of aura, as is seen in cases which are due to lesions of sensory areas, to wit, olfactory and gustatory aura in uncinate gyrus fits, etc. Just as cortical sensory aura may point to irritation of the sensory cortex, so vagal aura may point to irritation of the vagus.

Only epileptic attacks which begin either with a sensory aura or a localized spasm can definitely be said to be caused by irritation of the cortex.

Loss of consciousness has been accepted as a proof of the cortical origin of epilepsy. The term consciousness has no definite meaning. The state which it designates includes a number of functions, some of which cannot be said to be mediated by the cerebrum alone. Suspension of some of the functions attributed to consciousness, as in sleep, may be observed in decerebrated animals. Such animals may likewise show a suspension of certain functions usually attributed to consciousness from toxins, anesthetics, etc.

Jacksonian epilepsy consists of a focal spasm or fit usually not attended by unconsciousness and frequently followed by a generalized convulsion with loss of consciousness. Consciousness is affected earlier and by less intense discharges from the site of discharge or convulsive site than are the convulsive movements in idiopathic epilepsy, yet in Jacksonian epilepsy the movements are early and frequently solely present. The focal fit or spasm and the after-generalized convulsion are distinct and separate phenomena and are probably caused by different factors. The loss of consciousness is not due to the initial cortical irritation, but to some factor occurring afterwards and with which we are unfamiliar.

By all of the above observations it is suggested that whatever the site of the irritation, and whatever the variation in the clinical pictures because of the different parts irritated or absent, the site of the discharge of the convulsion itself lies in the subcortical regions, probably in the medulla and pons.

It is further suggested that the production of the after-generalized convulsion following a cortical or Jacksonian spasm or fit is dependent upon involvement of the pons and medulla in the irritation.

SOME EXPERIMENTS BEARING ON THE FLOW OF LYMPH IN NERVES*

By L. B. Alford, M.D., and S. I. Schwab, M.D.

ST. LOUIS, MO.

In the attempt to explain certain cases of neuritis in which the disease process seemed to advance upward along the nerves, the theory has been brought forward that there is a flow of lymph in nerve trunks that proceeds from the peripheral endings to and into the central nervous system. Since its formulation this conception has been applied in the explanation of a number of other affections of the nervous system, the pathogenesis of which has long been obscure. It explains, for instance, the fact now apparently well established, that the toxin of tetanus and the virus of rabies reach the central nervous system by travelling or being carried along nerves. Marie and Guillain[1] have pointed out that the location of the degeneration in tabes dorsalis is that to be expected if it is assumed that the degeneration is caused by a syphilitic toxin in this hypothetical stream. It will be recalled that according to the best evidence the earliest degenerations in tabes occur at or near the point where the posterior roots enter the spinal cord, which happens to be the point where the neurilemma sheath ceases. According to the view of these authors, it is reasonable to suppose that a toxin in this lymph stream, although too mild to affect nerve fibers covered by the neurilemma, could bring about their disintegration after it is lost. Orr and Rows[2] have suggested that paresis may be caused by the presence of this toxin in the lymph of the cranial nerves. Strümpell[3] perhaps first advanced the hypothesis that the virus of infantile paralysis may reach the central nervous system by travelling along the olfactory nerves. Further it has been pointed out by various writers[3] that should such a stream exist it might have an important bearing in explaining the pathogenesis of syringomyelia, Landry's paralysis, herpes zoster, and progressive muscular atrophy.

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* From the laboratories of the Department of Internal Medicine, Washington University Medical School, Dr. George Dock, Director. Read at the forty-third annual meeting of the American Neurological Association, May 21, 22 and 23, 1917.

[1] Marie and Guillain, Rev. neur., 1903.

[2] Orr and Rows, Brain, 36, 1913–14, 271.

[3] See Cornil et Ranvier, Manuel d'histologie pathol., 1907, T. 3, 718.

In addition it would account for a large part of the lymph that bathes the central nervous system, for the amount of lymph that would flow in from all the cranial and peripheral nerves would be considerable.

Certain workers have attempted to obtain experimental evidence of the existence of this stream. Orr and Rows[2] placed celloidin capsules containing living cultures of bacteria (*Staphylococcus, B. coli,* and *B. botulinus*) against the sciatic nerve in the gluteal region and near the spinal column, and upon sacrificing the animals some days later, found inflammatory changes in higher parts of the nerve in the one case and in the spinal roots, cord, and meninges in the other. In Marchi preparations of the cord they found evidence of degeneration of the entering fibers of the posterior roots at a point corresponding to that where the early degenerations are found in tabes, and elsewhere. Homen and Laitinen[4] in the course of extensive experiments on the properties of the streptococcus injected cultures of a very virulent strain into the sciatic nerves of rabbits. Later they were able to demonstrate in microscopical preparations bacteria in the subdural and subarachnoid spaces, in the pia, and in the connective tissue composing the septa or lying around the blood vessels of the cord. Pironne,[3] Zalla,[6] Quillot,[3] Laitinen[5] and others have obtained similar results following the injection of bacteria or their toxins into or about nerve trunks. Other experimenters[6] have used inert substances and chemicals, injecting them into or applying them to nerves and later have found evidence that they had penetrated the nerve for some distance above and in some instances had entered the spinal roots. Among these substances may be mentioned ferric chloride, turpentine, India ink, Richardson's blue, jequirity, and ether. Thus it is clearly shown by evidence from many sources that under certain conditions bacteria, toxins, irritants, and granules when injected into or applied directly to nerves may advance upward for considerable distances and even enter the spinal roots; and it is not unreasonable to conclude that an ascending lymph stream may play a part in the ascension.

In view of the practical importance of the question, we decided to repeat and to try to amplify some of the work of the above-mentioned experimenters. Although our results may prove little so far as the pathway of lymph is concerned, still some facts came to light that we believe are worthy of record.

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[4] Homen u. Laitinen Ziegler's Beiträge, 25, 1899, 44 (see also Homen, Arbeit a. d. path. Inst. Wien, Bd. 19, H3, 1912).

[5] Laitinen, Centralbl. f. allg. Path. u. path. Anat., No. 7, 1896, 358.

[6] See D'Abundo, Annali di Neurologia, Fasc. 3. 4, 1896 (abstracted by Orr, Rev. neur, and psy., 1, 1903, 639); Guillain, Rev. neur., 1899, 855; Feinberg, Zeit. f. klin. Med., 25, 1894; Spitzer, Arbeit a. d. neur. Inst. Wien., 19, 1912; Zalla, La nevrite ascendente, Firenze 1913.

For reasons of brevity the experiments will not be described in full nor in the chronological order in which they were done. At first several weeks were consumed in determining the limitations of various injection solutions or suspensions, in deciding on the most suitable animal to employ and in developing technic of operation. Rabbits were found to be the most satisfactory animal, although dogs and cats have been used in some experiments. The operation consists merely in exposing the sciatic nerve in the thigh and in injecting the substance just under the sheath from a Record hypodermic syringe, with as little trauma as possible. The needle should be fine and sharp and the injection should be done slowly. The most common accident is a ballooning of the nerve just above the point where the needle is introduced and it is rare that as much as 0.1 c.c. of most fluids can be introduced without this accident occurring. In some experiments an attempt was made to use hydrostatic pressure in the hope that the process of injection could be extended over several hours' time, but the force thus obtainable was not sufficient for the purpose. For the injections extensive use has been made of a solution of one half per cent. each of iron and ammonium citrate and potassium ferrocyanide (as recommended by Cushing and Weed[7]). This solution is non-irritating, is practically isotonic and mixes readily with tissue fluids. If after section the tissues are fixed in a formaldehyd solution containing hydrochloric acid (1 per cent. to 5 per cent.) a precipitate is formed that is not soluble in dehydrating agents. Within four hours after the operation it generally will have disappeared from the nerve for the most part. A strong solution of fuchsin, India ink, turpentine, and ether (the last two being colored with soudan) have also been employed in a number of experiments.

In the first few experiments some successful injections were obtained, it being demonstrated at autopsy that the solution had ascended along the nerve for various distances (4 to 10 cm.). In the light of the conclusions of other workers it was assumed that the solution had been carried up in an ascending lymph stream. Then came two experiments in which it was found that the solution had passed in the opposite direction and followed the nerve trunks into the smallest branches as far as their terminations in muscle. This result was so unexpected that it was completely baffling for a time, and it naturally led to further speculation as to the factors concerned in the spread of the solution. When in some experiments on animals long dead, practically identical results were obtained, it became evident that the lymph circulation played little or no part. Indeed it was demonstrated that the chief factor was the pressure of the solution, for when the nerve had been exposed over some distance, the rapid ascent of the fluid under the sheath of the nerve could be seen during the process of injection. It was most surprising to find that amounts of 0.02 and 0.04 c.c. would spread for 8 or 10 cm. along the nerve. Owing probably to the effects of autolysis on the finer tissues, larger amounts could be injected into the nerves of dead animals; and it was comparatively easy to force the solution along the nerve until it escaped into the subdural and subarachnoid spaces. It was not possible to obtain this result in living animals with iron or fuchsin solutions, but by choosing a point nearer the cord for the injection in two or three instances India ink was forced into these spaces. Oil of turpentine, and ether, however, were found to flow into the nerve with the greatest ease and amounts as small as 0.02 c.c. were sufficient to extend from the point of the injection in the middle of the thigh to the meninges. When these animals were sacrificed immediately the path of these substances could be followed by the color imparted by the soudan and when the animals were allowed to live for some hours, the course of turpentine was made evident in microscopical sections by the rich exudate it had induced. There was no difficulty in injecting 0.2 or 0.3 c.c. or even larger amounts of turpentine and ether.

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[7] Cushing and Weed, Jour. Med. Research, 36, 1914-15, 21.

When the animals were allowed to survive, an interesting train of symptoms developed after the use of turpentine. In one animal that had received about 0.3 c.c., for instance, it was noted on the morning following that both hind legs were paralyzed, except for slight movement on the side opposite the injection. During the day it became evident that incontinence of urine and feces was present and that the abdominal muscles were weak. On the second morning both fore legs were weak and the animal was stuporous and cold. It was sacrificed and at autopsy there was found an intense congestion of both cranial and spinal meninges. By regulating the amount injected the paralysis can be limited to both hind legs or almost to one, that on the side operated.

It may here be noted that from studies of the gross specimens from India-ink animals and of sections in the case of the turpentine animals, it was possible to determine the course of the fluid through the meninges. It seems that the solution always followed the anterior roots and that it entered the spaces after breaking through the delicate sheath investing the roots. In no instance did it flow around the posterior root ganglion into the posterior roots and never in sciatic injections did it reach the cord, as happened in the experiments of Aschoff and Robertson.[8] When the injection was made into the nerves of the fore legs, the roots of which are shorter, the fluid remained in the roots until they joined the cord but it did not enter the cord. These last experiments, however, were not controlled by microscopical studies.

To summarize the results of these experiments, it has been shown that when injected into nerve trunks certain fluids readily flow along under the sheath and finally escape into the subdural and subarachnoid spaces, independent of the circulation of lymph.

The experiments with bacteria have not been extensive enough to justify any conclusions. A number of experiments in which bacteria were injected into nerves were done with indefinite results. In some it was found at autopsy that above the site of injection there was a marked inflammatory reaction that extended well into the spinal roots; and in others the reaction was pretty well confined to the neighborhood of the point of injection, cultures taken from higher parts of the nerve being negative. It was not determined whether in the former group the bacteria had travelled along the nerve or had been forced up at the time of operation. Indeed the only possible deduction from these experiments is that here is a problem worthy of a long series of experiments in which it will be necessary to take into account time factors, the species of bacteria and the virulence and adaptability of the strain.

A rather complete series of experiments was conducted in an attempt to obtain some evidence of a lymph stream, and although the results were not conclusive, it is perhaps worth while to describe them. It was felt that the iron solution should readily mix with tissue fluids without disturbing their normal circulation and that if lymph flows upward in nerves, properly conducted experiments with this solution should give some evidence of it. The experiments were therefore varied both as to the amount of solution injected and as to the period before the animal was sacrificed. Animals were killed after intervals varying from a few minutes to four days. Blocks of tissue for microscopical examination were taken from the nerve at points above the site of injection and from the cord at and above the entrance of the corresponding roots and cut into serial sections. Of the many sections examined, in not one were found granules the presence of which was not evidently due to the force of the injection, and in no case did the arrangement of the granules strongly suggest that they were lying in a lymph vessel. Often they did lie in groups but there was not the sharp delimitation to the groups one would expect if the granules were lying in a vessel. No granules were found in the cord even when the animal had survived for hours or days; in fact with the longer periods granules were found only at the site of operation. In such cases it was not definitely determined how the solution had disappeared; but apparently it tended to diffuse through the sheath of the nerve into the surrounding tissues. Granules not infrequently were found lying in the sheath and occasionally were seen in surrounding tissues. There is the possibility, however, that as a result of the small amounts of the solution injected the granules were so scattered that they were missed in the examination of the sections.

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[8] Aschoff u. Roberston, Med. Klinik, 11, 1915, 715.

With India ink, also, no more positive evidence of an ascending lymph flow has been obtained, although it was not anticipated *a priori* that the granules would find their way into the lymph vessels in large numbers. There is the advantage when ink is used that the granules remain in the nerve for weeks and that there is, therefore, ample time for them to be taken up by the lymph and carried along the vessel. It seemed from a study of the sections, however, that the tendency is for the granules either to become encapsulated with connective tissue or to be taken up by leukocytes, and not for them to be carried upward. This observation agrees with a later one of Guillain.[9]

An effort to demonstrate this stream was made in still another way. Fuchsin in powdered form was teased into the sciatic nerve (not without considerable trauma it must be admitted) with the hope that it would be dissolved in the lymph and stain the nerve higher up. In one experiment there was a staining of the tissues for about an inch above the point of operation, but in the others the staining was evident equidistant in all directions.

Thus it will be seen that in these experiments no evidence of an ascending lymph stream in nerves has been obtained.

The tendency of liquids injected into nerve trunks to spread along under the sheath would seem to be important in considering the results of others, for it is not easy to dismiss the impression that hitherto workers have wrongly neglected this fact in interpreting their results. In several instances it might well have been that a lymph stream had no part in determining the spread of the fluids injected into nerves. It is true that suspensions of bacteria are not easily injected and that, therefore, it is difficult to believe that the presence of bacteria in the spinal cord in the experiments of Homen and Laitinen[4] was due to force alone; but it is conceivable that certain species of bacteria can grow along the nerve not because of the presence of a lymph stream but because there lies the path of least resistance. The observations on rabies and tetanus really give little aid in deciding the question. Meyer and Ranson[10] and Permin[11] believe that tetanus toxin ascends along the axis cylinder—a view that Aschoff and Robertson[8] discard for that of an ascending lymph flow, but apparently on insufficient grounds. In the absence of an ascending lymph stream it is easy enough to explain the inflammatory reaction found by Orr and Rows[2] but it is not possible to account for the degenerations they encountered.

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[9] Guillain, Rev. neur., 1903, 110.

Interesting in this connection are some results obtained by Key and Retzius.[12] After injections into the subdural and subarachnoid spaces these authors were able to show that the solution passed out under the sheaths of nerves for long distances. Evidently fluids can be made to follow the roots through the meninges in either direction.

Two experiments on dogs have suggested a possible practical application of our results. In one experiment it was shown that ether injected into branches of the infraorbital nerve reached the Gasserian ganglion. In the other the animal was sacrificed four days after 0.06 c.c. of ether had been injected into one and 0.04 c.c. into another branch of the infraorbital nerve. After the operation it was perfectly evident that there was a corneal anesthesia on the side of the operation and a keratitis soon developed. Upon examination of the ganglion microscopically hemorrhages and a degeneration of nerve cells were found. It would seem to be feasible to use this method in treating neuralgia of the fifth nerve in man. The operation is quite simple and, if it is found that ether does not readily pass through the sheath of the nerve, should be without untoward complications. Further experiments of this sort are contemplated.

The contents of this paper may be summarized as follows:

1. The hypothesis that there is a flow of lymph along nerve trunks in a central direction has been advanced and has been used in explaining the situation of the lesion in paresis, tabes dorsalis, herpes zoster and other affections of the nervous system, and in accounting for some of the facts of tetanus, rabies, and poliomyelitis. It is supported by the results of a number of experiments.

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[10] Meyer u. Ranson, Archiv. f. exp. Path. u. Pharm., 49, 1902-3, 369.
[11] Permin, Mitt. a. d. Grenz de Med. u Chir., 27, 1914, 1.
[12] Key u. Retzius, Archiv. f. mik. Anat., 9, 1873, 308.

2. In attempting to repeat and amplify some of these experiments, we have injected a solution of certain iron salts, and of fuchsin, India ink, turpentine, and ether into nerve trunks of animals, but have found no evidence of the existence of an ascending lymph stream.

3. It has been found, however, that when certain substances particularly turpentine and ether, are injected into nerve trunks, they flow along under the sheath for long distances and may enter the subarachnoid and subdural spaces. This fact, and not the presence of an ascending lymph stream, may account for some results of other observers.

4. It has been found, finally, that ether injected into infraorbital branches in the cheek passes into and causes a degeneration of the Gasserian ganglion. It would seem that this method might be used in the treatment of trifacial neuralgia.

Society Proceedings

BOSTON SOCIETY OF PSYCHIATRY AND NEUROLOGY

November 15, 1917

The President, Dr. Joseph W. Courtney, in the Chair

TWO CASES OF CEREBELLO-PONTINE ANGLE TUMOR WITH DEMONSTRATION OF PATHOLOGICAL MATERIAL

By James B. Ayer, M.D.

Dr. Ayer showed a brain and the photographs in a second case and discussed briefly the clinical manifestations in these two cases, in which the correct diagnosis had not been made previous to death. Postmortem examinations showed in both cases a large cerebello-pontine tumor. The appearances of the brain in the one case and the photographic reproduction in the other were almost identical.

The first case presented herself for deafness, which examination showed to be a nerve deafness. This deafness had come on suddenly three years previously. There had been no history of other cranial nerve involvement and at the time of examination there was no evidence of any other cranial nerve lesion; there were no abnormal reflexes. There was found to be a moderate blurring of the optic discs and the patient had been suffering from defective vision. A subtemporal decompression was done, with the idea of relieving intracranial pressure on the assumption that there was a brain tumor. The patient had died in about ten days from a hemorrhage into the area of operation.

The pathological finding was a large cerebello-pontine tumor which had distorted the pons and medulla and had pushed the cerebellum down. There was distinct atrophy of the last named. Microscopic examination of the tumor showed it to be made up of fibrous tissue, young neuroglia and myelin sheath fibers. The fifth nerve was markedly elongated and stretched to paper thinness. But despite the distortion of this nerve, there had been no sensory disturbances referred to the nerve abnormality.

The second case was that of a man who had been deaf for about twenty years, which deafness proved on examination to be a nerve deafness. He showed no other cranial nerve involvement save a choked disc. There had been some dizziness and headache ten months previous but those symptoms had not been noticed for about nine months. Again, a subtemporal decompression was done and with striking relief. This patient also died from a hemorrhage into the area of operation.

The pathological finding was almost identical with the preceding case, a large cerebello-pontine tumor. Since the brain had been removed but two days before, the microscopic study of the tumor had not been done.

A FEW AUTOGRAPH LETTERS OF FAMOUS NEUROLOGISTS AND PSYCHIATRISTS

By Henry R. Stedman, M.D.

Dr. Stedman read a number of autographed letters of prominent medical men, including Paul Broca, Phillippe Pinel, Claude Bernard, Jenna and others. He also read one from Florence Nightingale.

Doctor J. Alder Blumer, of Providence, added two more similar letters.

SYMPOSIUM ON THE SUBJECT OF MENTAL EXAMINATION OF RECRUITS

Dr. D. A. Thom, of Camp Devens, opened the symposium by discussing the various features of such an examination as they have worked out in the cantonment at Camp Devens. He spoke of the size of the cantonment and the likelihood of finding in such a large group of men a considerable number of men showing manifestations of nervous and mental disease. The camp at Ayer covers 12,000 acres and accommodates 30,000 men and 1,300 officers, for which has been provided a base hospital of thirty-seven wards, each ward of which contains thirty-two beds, with provisions for materially enlarging this number.

In the first draft army sent to Camp Devens, 12.5 per cent. of the men were rejected. The largest number were rejected by the orthopedists. Doctor Thom spoke of the work of Doctor Salmon, of New York, in organizing the neuro-psychiatric work in the American army, after a careful and searching inquiry into the work of a similar character which has been done by the belligerents abroad. He said that of the 300,000 men sent over from Canada previous to January, 1917, of whom 175,000 had seen active service, 4,300 had been sent back to Canada for nervous and mental diseases, a percentage of about 15. He said that the American army would probably average about that same figure.

He spoke of the number of hospitals which had been established abroad for the care of only nervous cases: there are four in Great Britain, and, in addition, Australia has established three and Canada two of their own in England.

The function of the neuro-psychiatric unit is two-fold. The first function is to eliminate as far as possible from the ranks of the army all cases of feeblemindedness, neuroses, psychopathic personalities, epileptics and similar nervous and mental cases which promise to be a detriment to the fighting forces. The second function is the care of cases of nervous and mental disease which have developed in the course of duty. To date, the unit at Camp Devens had done no routine work, all of the cases which have been examined have been referred to the unit by one of the four following groups:

1. The regimental surgeons.
2. The regimental commanders (cases of petty offenders, the "goat" of the regiment and those men who do not get along well in drill, etc.).
3. The disciplinary boards (cases of misconduct, disobedience and the like).
4. The psychologists.

The whole number of cases encountered in the work of the unit can be divided into six groups:

1. The feebleminded.
2. The epileptic.
3. The insane.
4. The psychoneurotic.
5. The psychopathic personalities.
6. The objectors.

In making recommendation as to the disposal of these cases, only one of two alternatives is allowed, either the men are accepted for military service or they are rejected. Doctor Thom emphasized the desirability of adding another alternative, a designation that a given case, though unfit for active military work as a fighting man, should be assigned to do menial tasks about the cantonments, road repair work and the like, thus relieving from such work an equal number of men who are in every way fit to take part in the more purely military activities. The feebleminded, for example, are not incompatible with the military forces when they are assigned to selected occupations. But the more strenuous work of the marches and bayonet drills, for instance, gives rise in these men to much distress and confusion. In selected work, however, the same men do very well.

During September and October 372 cases of nervous and mental disease had been rejected by the unit. The diagnoses in this group were as follows:

Feebleminded	164
Epilepsy	92
Chronic alcoholism	27
Dementia præcox	12
Constitutional psychopathic state	13
Psychoneurosis	9
Manic-depressive insanity	7
Hysteria	4
Drug	7
Syphilis of the nervous system	7

Only 50 per cent. of the cases of epilepsy had shown convulsions during their stay at the camp. The psychopathic personalities were referred to the unit in nearly every case from the disciplinary boards. The hardest groups to deal with proved to be the psychoneuroses and hysterias.

The objectors formed a group which were studied by the unit. They could be divided into four groups:

1. The conscientious. These men will not fight or take life but are perfectly willing to do any kind of work about the camps, or do any kind of hazardous tasks during the war activities. But they will not bear arms.
2. The religious. These men will have nothing to do in any way with things military, they refuse to help a dying soldier or to have anything to do with camp or other activities.
3. The insane and psychopathic. The objection in these cases is a part of the mental disease.
4. The malingerer. These men use the term "objector" or "conscientious objector" as a means to escape service. They can usually be recognized at once, for the reasons which they advance for their objections are not consistent.

Doctor Thom spoke lastly of the work of the psychologists at the camp. These men, assigned to the sanitary corps, have no power of rejection. They examine large groups of men, and from these groups make individual examinations in any cases which have in the more general examination shown any suggestion of mental deficiency. Of the 2,380 men of the Boston regiment, for example, 109 men received individual examinations and of these 28 of the men had been referred to the neuro-psychiatric unit. Of the group referred to the unit by the psychologists, one in three are rejected. There are at the camp ten psychologists and a staff of sixty clerks. Doctor Thom was of the opinion that a better working plan could be evolved in which the men were seen first by the psychiatrist and neurologist and then men found with a suggestion of mental deficiency could be referred to the psychologists for examination. Probably cases of mental disease frequently escape under the present system.

Dr. Courtney presented the following skeleton of questions asked and the examination carried out by him in his duty as contract surgeon in connection with the National Guard.

The questionnaire embraces the following points:

1. Name.
2. Age.
3. Civil state.
4. Birthplace (if of alien birth, length of time in States).
5. Character and extent of education.
6. (*a*) Nature of former occupations and length of service in each.
   (*b*) Reasons for abandoning any given occupation.
7. Reasons for entering service.
8. Date of mustering-in.
9. Attitude toward duties.
10. Attitude toward fellows.
11. Penalization for misdemeanors.
12. Consumption of alcohol.
13. Venereal infection.
14. Sleep (dreams).
15. Appetite.
16. Digestion.
17. Emotional tone.

The above questionnaire gives us, among other things, a good line on the vital matter of the quality and developmental status of the examinee's cerebral gray matter, his reaction to both previous and present vocational environment, the depth of his sense of responsibility and the scope of his perspective.

The method of physical examination is as follows: Motor coördination is determined by having the examinee walk rapidly up and down the room once or twice, turning quickly at either end of the room. For the determination of static coördination, the ordinary Romberg test is used.

By means of a flashlight and magnifying lens the size, shape and light reaction of the pupils are carefully observed. With the flashlight also the mouth and pharynx are looked at. The muscles of the eyes, face and jaw are likewise examined.

For the determination of the coördinating capabilities of the upper extremities, we employ the finger-to-nose and finger-to-finger test. We then require the examinee to hold his hands outstretched before him, with palms down and fingers widespread, and then, slowly, to revolve hands until palms come uppermost. At the same time we palpate the muscles of hands, forearms, arms, and shoulders. The arm reflexes we do not bother with. We next have the candidate stand on either foot and attempt to draw a circle with the toes of the other foot. Finally, with the examinee seated, we palpate the leg musculature, concluding with the taking of the knee and ankle jerks.

During the whole of this examination we note attentively the examinee's promptness of grasp of our commands and the celerity with which he executes them. The actual physical examination requires about four minutes and covers the ground of muscular trophism, coördination and reflectivity in so practical a manner that it would be well nigh impossible for even an incipient case of organic disease of brain or cord to escape detection.

Dr. E. W. Taylor referred to the contract work which he had done during the summer on the men assigned to the Wentworth Institute, a body of engineers. He remarked about the lack of standardization of the methods of examination and the methods of rejection. He had followed the plan of explaining to the men in a fair-sized group (10–30 men) the objects of the examinations and the necessity of learning of mental and nervous abnormalities as a military feature because of the large numbers of men disabled abroad from such conditions. The coöperation of the men was very good. Then each man was questioned and a simple neurological examination done. This method worked well and quickly. He said that he had not encountered such high numbers of nervous cases as the other men had reported.

Dr. A. Myerson spoke of the work which he had done at Framingham. At that camp another plan was followed. The list of men in the regiment was gone over with the regimental officers and any men about whom there was any suspicion of nervous trouble or who had committed offenses and the like were called up and examined. In about 2,000 troops, thirty cases of nervous and mental disease were found. There were nine cases of epilepsy, and Doctor Myerson was of the same opinion as Doctor Thom, that epilepsy is much more common than usually thought. Another point which Doctor Myerson brought out was that a number of cases of dementia præcox were found, in which the original "lead" was found in their over-religious attitude. On further study, a number of these men proved to have hallucinations and delusions. He also emphasized the point which Doctor Thom had made about the feebleminded and reiterated the need of permitting these men to remain in the army to do the more menial tasks and thus allow normal men to be free to carry on the military activities.

Dr. Walter E. Fernald, of Waverley, spoke briefly of the work of standardization which had been recently submitted to the Surgeon-General by a committee appointed by the National Committee of Mental Hygiene and which has been reported in the journals. He remarked about the fact that twenty-seven of his former patients at the Waverley institution had been taken into the military service.

Dr. E. E. Southard defended the work of the psychologists and said that he felt that they were doing a good piece of work in the examinations of the men. He was inclined to congratulate them on the manner in which they had secured such concessions and such a large working force at Camp Devens, and suggested that the psychiatrists and neurologists would have secured the same amount of help had they but gone to Washington, as the psychologists had, and asked for the necessary help. He remarked also that the plan as carried out at Camp Devens was merely an experiment to see if that manner of examining the men would prove the most efficient.

Dr. P. C. Knapp also spoke of the great advisability of keeping in the service some of the men who, under the present system, are rejected because of low mental development, such men to do the menial work about the camps, etc., as mentioned earlier. He spoke also of the relatively large number of epileptics which he has encountered in practice, many of whom, as mentioned by the other men, hold important positions and are prominent in other activities as well. He said that too much value was being given to the various psychological tests on the men, tests which he felt had as yet received no real evaluation. The value of the Binet-Simon test, for example, was questioned: He had seen a very bright woman, capable of a calm and logical discussion of intricate matters, who was reported to have been classed as equivalent to an age of 11½ years by such tests. The tests as applied at Ayer, besides being futile, had done a certain amount of harm by leading intelligent men, college graduates, to be considerably distorted by their fear that these tests would show that they were mentally defective or were becoming insane.

Dr. Thom closed the discussion by saying that the standardized plan of examination as proposed by the National Committee was rather complex to be used in examination of large numbers of men. A simplification of that plan was the more desirable.

He said that all of the data which is being collected by the unit at Camp Devens will be handed over to the state mental hygiene organization for their records and for subsequent follow-up work if that is desired.

In closing, he invited the Society to Camp Devens to see the psychiatric wards and other points of interest in the cantonment.

Translations

THE INTERNAL SECRETIONS AND THE NERVOUS SYSTEM[1]

By M. Laignel-Lavastine

Authorized Translation by Fielding T. Robeson, M.D.

Translator's Preface

In the original French "The Internal Secretions and the Nervous System," by Prof. Laignel-Lavastine, is a classic. The translation is crude and without literary merit, and its only virtue is that a sincere attempt has been made to preserve its scientific value.

As proper innervation of the internal organs is necessary for health, and considering that there is an intimate relationship between the ductless glands and the nervous system, the proper understanding of the subject is not only of interest to the neurologist but to the general practitioner as well.

Organotherapy dates back to remote ages, as Dr. Diner has stated in his introduction. The Chinese treated obesity with preparations made from canine orchitic extracts and heart disease and epilepsy with dried and powdered frogs and newts. It has been shown by Abel's investigations that the skins of these animals contain an appreciable amount of adrenalin owing to the presence of cutaneous adrenals. To-day suprarenal extract is used in certain forms of heart disease and epilepsy with excellent results. Moreover we have no other adequate treatment for eunuchoid obesity than the administration of orchitic extracts. It would seem that modern medical knowledge is not the only healing art that was ever practiced. Empirics they were perhaps, but be that as it may "There were Kings before Agamemnon."

If the renewed interest in endocrinology has done nothing else for the art of medicine it has shown the utter futility of regarding physiology and pathology en masse. It is the individual and the study of the individual that is of supreme importance. Everyone has his own proper physiology and his own proper pathology as well. Following along their lines his life takes its course. That there are a broad common physiology and pathology none can deny, but that each individual has his own physiological and pathological variant is also not to be questioned. There is no truer saying than that " what is one man's meat is another man's poison," and it is the disregard of this fact that has hampered the advance of medical diagnosis and therapeusis for years. Whether it comes under the heading of mechanistic physiology or vitalistic physiology it is the individual physiology that has to be carefully analyzed and considered before a proper appreciation of health and disease can be arrived at. Endocrinology has taught, and is still teaching us to analyze our cases by close clinical observation and research. In many ways Nature is a kind mistress after all, and even her misfits are frequently granted a modus vivendi which can only be appreciated by the right kind of clinical study. In the analysis of endocrinal disease a slipshod method is worse than useless. The family history, the previous history, the present history, the personal idiosyncrasies, likes and dislikes, physical make-up and appearance, in fact all that concerns the individual must be elicited, weighed and balanced even to the most minute detail. In this way alone can success be arrived at.

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[1] Article written in July, 1914, for the Congress at Berne, which did not take place on account of the War. I here publish the entire text, just as it was given to the Revue de Medecine in July, 1914.

It would be presumptuous in me to enter into detailed descriptions of methods of endocrinological research which has been furthered by American observers. When the time is ripe for the publication of well-authenticated facts on the subject they will appear in proper form. I may be pardoned, however, in stating here certain conclusions which have been arrived at, and which have been confirmed time and time again.

A. Briefly stated the life of every individual is dominated largely if not wholly by his ductless gland chain.

B. Certain of these glands assume a preponderating influence on the morphology, physiology and pathology of the individual.

C. Certain tropisms are existent, so that we have the pituitary, thyroidal, adrenal, etc., type of individual.

D. Certain diseases, both of an acute and constitutional character, are welded, as it were, with the glandular tropisms, and belong to them, and are part of their distinctive pathology, either functional or organic. This is not only true of acromegaly, Basedow's disease or Addison's disease, but of many other diseases as well.

E. The glandular influence having so much to do with morphology, the physical make-up of the individual gives marked evidence of the glandular constellation under which he lives and has his being.

F. Within certain limits if the previous history of the individual be accurately known, his physical appearance can be approximately described, and his physiological and future pathological states can be predicted.

Some of these conclusions need no defense, and will be acceded to by all who have given the subject even a moment's consideration, while others will not be admitted by all endocrinologists.

The results obtained in the experimental feeding of tadpoles are very significant. The small amphibia that were fed on thyroid gland developed into tiny frogs described as "petit vieux," and those that were fed on thymus grew into enormous tadpoles or "grand enfants." This experiment proves to some extent at least why taking two individuals of the same age, one may look like a premature old man, and the other have the appearance of unwarranted juvenility.

The physiology, psychology and pathology of the two will follow the thyroidal and thymic influences that have had such a marked bearing on their morphology.

Take for example the dominion of the pituitary gland on certain types of body structure. Giantism in youth, acromegaly in adult life and shrinking in old age. There are small pituitary types as well. The dominating influence of the pituitary makes for feminism in the male, just as the dominating influence of the adrenals makes for masculinity in the female. The thyroidal individual has his marked personal characteristics—his bright intelligent eye, his good clean teeth, his temperamental attitude toward life, his freedom from infectious disease except measles and typhoid and his tendency towards intestinal, certain forms of cardio-vascular and neurotic disturbances. The pituitary individual, easily recognized by his structural make-up, has his own peculiarities. He is musical, has an abnormally acute sense of rhythm and is prone to diseases attended by periodicity and to syphilis (Charcot joint—a local acromegaly). The adrenal individual has his strong masculinity, his tendency to hypertrichosis and pigmentosis, his liability to diphtheria, to hyperchlorhydria, to hypertension, to certain forms of pulmonary disease, to hernia and varicocele. These master types have their variants depending upon the influences of the other glands, especially marked in the gonads. The endocrine system has been well described as the ductless gland chain, and it is imperative to realize that every link counts. The clinical picture is never a simple one.

It will be through endocrinological study and investigation that we will come to a better understanding of humanity. We will see how within certain broad lines the life of the individual takes its course. We will understand perhaps what the world calls Fate.

F. T. Robeson

Introduction

"Every man, from the highest to the lowest station, ought to warm his heart and animate his endeavors with the hope of being useful to the world, by advancing the art which is his lot to exercise; and for that end he must necessarily consider the whole extent of its application, and the whole weight of its importance."—Johnson.

In making the writings of Laignet-Lavastine accessible to those not familiar with the French language, the translator has certainly hearkened to the admonition quoted above.

The importance of the internal secretions, both as etiological factors and as remedial agents, is being recognized more and more and anything which adds to our understanding of this highly complex subject should be welcomed with open arms by the medical profession.

Organotherapy or the use of animal matter in the treatment of disease is not by any means a new addition to the medical armamentarium. It is the intelligent interpretation of the symptom-complexes arising from dysfunction of the endocrine glands and the rational application of the secretions of these glands which anew engages the attention of the medical research worker and clinician alike.

The indirect application of animal tissues and organs to the treatment of disease finds its first expression at the sacrificial altar.

In gray antiquity, medicine and religion went hand in hand. God only could cure diseases and those of his representatives who were close to him in his service, the high priests, were empowered to execute his will in this direction as well as in religious matters. History records that as far back as 2000–3000 B.C. the treatment of disease was in the hands of the priests in Egypt. In Greece the Asclepiades, the priests of the temple of Asclepias, were entrusted with this important function. And Moses transferred to the priests the knowledge of medicine which he accumulated in Egypt.

The Hebrew literature, while replete with medical information, gives but scant evidence of animal therapy. No doubt the term "unclean" which is so frequently employed as a prohibitive injunction with reference to food, hygiene and other matters, comes into play here and accounts for the scant use of animal matter for medicinal purposes. In Joma, VIII, 6, we find that "One bitten by a mad dog was given the liver of the dog as an antidote" and the use of small doses of urine is passingly mentioned in another section, but whether to be taken internally or applied externally is not clearly stated.

However, if we cast our eye on the medical literature of other nations and peoples, we find no lack of evidences of animal therapy. Without making any attempt at chronological arrangement, I will merely cite a few instances.

The Papyrus Eberus recommends: human brain, half with honey and half dried, as a remedy against inflammation of the eyes. Dioscorides, first century of present era (II, 21), recommends the fried brain of the hare as a good remedy for the cure of "Tremor, Convulsions, etc." Sextus Platonicus (330 A.D.) recommends the fried brain of the hare given internally to aid dentition in children. Celsus (II, 31, 34) as well as Plinius (XXVIII, 60) suggest the use of brain of the hare for urinary incontinence. And Plinius, Dioscorides and others advise the use of brain of different animals for the treatment and cure of epilepsy.

The liver also plays an important part in the materia medica of antiquity. Besides the quotation previously mentioned, we find that Hippocrates speaks of the benefit to be derived from the use of sheep's liver and of goat's liver in the treatment of diseases of the uterus. Plinius considers human liver as indicated to combat epilepsy; and Scribonius Largus uses "a piece of liver from a suffocated gladiator" for the same purpose (epilepsy).

Herophilus (300 B.C.) employs liver in cases of dysmenorrhea and metrorrhagia, as does Plinius, who also finds it useful against cough, tachycardia and ascites.

Bile is employed by Hippocrates in gynecological practice in the form of suppositories to combat sterility, prevent abortions and to ameliorate dysmenorrhea and amenorrhea. Plinius uses bile as a cathartic internally and applies it externally in treating diseases of the eye and to remove warts. Sextus Platonicus treats dizziness, epilepsy and asthma by internal medication with bile. Orchitic substance is mentioned by Sushruta (400–600 B.C.) for the treatment of obesity.

Particularly rich in information on the subject of organotherapy are the writing of Dioscorides. Thus we find that the blood of doves and wild hens is a valuable remedy against recent injuries of the eyes, against hemorrhages and in many other pathological conditions. The blood of doves is especially valuable in hemorrhages of the brain, while the blood from other animals, such as goat, sheep, rabbit, etc., fried in a pan and taken internally, cures or stops dysentery. Blood from land-turtles is a sure cure for epilepsy. Menstrual blood prevents conception when painted in a circle around the body (abdomen?) or if one steps over it (blood). When rubbed in as a liniment it removes podagra and roseola. Feces of different animals also finds manifold uses. So for instances it is indicated to reduce inflammations, remove scrophula and gland-enlargements, correct prolapsus uteri, chase away mosquitoes, aid menstruation and to promote abortion.

Frogs prepared with oil and salt are a sure antidote for serpent's bite. Incidentally they cure painful tendons and stop bleeding when applied externally after burning and powdering them.

Testicle, dried and finely powdered, taken in wine is also used as antidote for serpents' bites but the beaver's testicle is especially valuable to help in bringing on the menstrual flow, aid abortion and promote expulsion of retained placenta. Incidentally it also finds its use in relieving cramps, convulsions and nervousness. Crabs, especially river-crabs, when boiled with honey are recommended for the removal of carcinomatous growths, and when boiled with meat-soup are indicated in the treatment of phthisis pulmonalis. Sea-crabs may be used for the same purposes but are less efficient. Lungs, especially fox's lungs, dried and taken internally cure asthma. And finally Dioscorides recommends urine for a number of diseases. So for instance is one's own urine good against serpents' bites; that from a mad dog against the bite of the dog, while the urine of an innocent boy, taken internally, cures orthopnea. Urine is also employed in various forms against eruptions, dysmenorrhea, pains in uterus, earache and urinary calculus.

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Yellin, David, and Abrahams, Israel. Marmonides.

The relations of the internal secretions and the nervous system constitute an immense subject, which requires to be classified and condensed in as short a report as this to escape the penalty of remaining under vague generalities.

The most recent and important work issued on this question is the second edition of the remarkable production of Professor Arthur Biedl, "Innere Sekretion, ihre physiologischen Grundlagen und ihre Bedeutung für die Pathologie." It contains, perfectly classified, all that has appeared of interest on the internal secretions up to the year 1913.[2] The physiological researches and experiments are herein particularly well set forth.

As I have the honor and the pleasure of having Professor Biedl himself as co-reporter, I would show poor taste in not leaving it to him to demonstrate the physiological part of the question.

I shall limit myself then to the pathological part. From a pathological standpoint the relations of the internal secretions and the nervous system are far from being completely cleared up, as one may gather from the recent reports of N. Pende,[3] G. Ghedini[4] and Parhon[5] at the congress of 1912 and 1913, and I have no hesitancy in stating with the Philalèthe of the Philosophical Dialogues of Renan: "For my part I am accustomed to classify my ideas on the subject in three categories. The first, unfortunately very limited, is that of the certainties; the second is that of the probabilities; the third is that of dreams. We will refrain from mentioning the last if you please, Euthyphron, as in all probability it exists for each one of us as the dearest part of all."

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[2] I refer here for the bibliography, also to the recent volume of Pr. Gley, Les Secretions internes, Baillière, 1914.

[3] N. Pende, Les sécrét. int. en rapport avec la clinique, XXII Cong. de la Soc. italienne de med. int., Rome, oct., 1912.

[4] G. Ghedini, idem.

[5] Parhon, Les gl. à sécrét. int. dans leurs rapp. avec la psychol. et la pahtol. mentale, rapport, Congrès internat. de Neurol., Gaud, 1913.—Voire aussi: Parhon et Golstein, Les sécrét. int., Maloine, 1909; W. Falta, die Erkrankungen der Blutdriesen, Berlin, 1913; Lucien et Parisot, Gl. surr. et org. chromaffines, Gutler, 1913; Lewandowsky, Handbuch der Neurologie, Bd. IV, Innere Sekretion und Nervensystem, Berlin, 1913.

In fact, since my report of 1908 at the Congress of Dijon, on psychic troubles caused by disorders of the glands of internal secretion, where I insisted on the importance of these glands in neurology and psychiatry, the glands of internal secretion, heretofore ignored, have now become the special study of medical men, so that all or nearly all of them, clinicians, anatomico-pathologists, experimenters and therapeutists started investigating and consequently to-day one invokes with too much facility their disturbances as a causative factor each time one is puzzled. Next to the sympathetic, the abnormalities of which were more dwelt upon than was warranted, the endocrine glands have become the maids of all work of physiopathology.

It seems wise to me to expostulate against this excess. It has a tendency in effect to prejudice against endocrinology such critical minds which are more impressed by the lack of strict truth and the foundation of vagrant theories than by the biological interest of precise facts, verified over and over again.

In this question of the relationship of the internal secretions and the nervous system one should be assured above all of the reality of the facts under consideration, then these should be analyzed as to their details in order to grasp their divers elements, and to unravel their component parts, finally one should not extend their reach beyond the conditions that determine them, extrapolation not being generalization.

From the standpoint of pathology as from the standpoint of physiology the relations of the internal secretions and the nervous system interest us in so much as they are relations of causality.

My first aim then is to show that in pathology there exist, on the one hand, nervous disorders due to disturbance of the internal secretions, and on the other hand, disturbance of the internal secretions due to nervous disorders.

Before establishing this double relationship it is necessary to define exactly the terminology. Nervous troubles mean to me all the disturbances of the nervous system, the motor symptoms, sensory symptoms, trophic and psychic symptoms with their anatomical, physical and chemical correlations. These disorders are divided into three groups according as to whether they pertain to the sensory-motor, vegetative or psychic functions.

The sensory-motor disturbances are above all the expression of the neuraxis, the vegetative of the vago-sympathetic, and the psychic of the cerebral cortex.

One knows that Langley has differentiated in the vegetative system that which he calls the autonomic from the sympathetic system. This consists of the cephalic portion which proceeds from the mid-brain and the bulb—the oculomotor nerve, the pneumogastric and the chorda tympani—and of the sacral portion running from the cord—the pelvic nerves. This system, of which the ruling element is the pneumogastric, presents a functional antagonism to the sympathetic.

Thus, for example, the sympathetic dilates the pupil, causes the eyeball to protrude, accelerates the heart action, inhibits the movements of the intestine, dilates the sphincter ani, produces glycosuria and polyuria. Inversely the autonomic system contracts the pupil, relaxes the zonule of Zinn, slows the heart action, contracts the muscles of the intestine, increases the gastric and pancreatic secretions.

Eppinger and Hess[6] have striven to demonstrate this in man by the aid of pharmacodynamic tests, injections of adrenalin, of pilocarpine and of atropine. They have given the name of vagotonics to individuals in whom the activities of the autonomic predominate and of sympathicotonics to individuals in whom the sympathetic excels.

Adrenalin dilates the pupil, contracts the blood vessels, accelerates the heart action, increases arterial tension, produces polyuria, glycosuria and reflex excitability.

Pilocarpine incites salivation, sweating, blushing, increase of intestinal peristalsis, hypersecretion of digestive fluids and intestinal juice.

Atropine dilates the pupil, stops secretion, and sometimes accelerates the heart.

Eserine, introduced by Mougeot,[7] vago-excitant, slows the pulse, raises pressure, and contracts the intestine.

One speaks of adrenalin as exciting the sympathetic, of pilocarpine and eserine as exciting the autonomic, and of atropine as paralyzing the latter.

When a subcutaneous injection of one milligram of adrenalin produces a glycosuria in excess of 5 grams, when the quantity of urine is doubled and the pulse has a rhythm one third above normal, one speaks of sympathicotonia.

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[6] H. Eppinger et L. Hess, Zur Pathologie des vegetativen Nervensystems, Deutsch. Arch. f. klin. Med, 1909, LXVIII, 3–4, p. 231.

[7] Mougeot, A., Le réflexe oculo-cardiaque, Soc. de Med. de Paris, 28 mars, 1914 pp. 277–287.

When a subcutaneous injection of one centigram of nitrate of pilocarpine produces a salivation and sweating more abundant than normal one speaks of vagotonia.

When a subcutaneous injection of one milligram of the neutral sulphate of atropine produces a rapid and prolonged dilatation of the pupil with considerable increase of the pulse rate one speaks again of vagotonia.

When finally a subcutaneous injection of a quarter of a milligram of hydrobromate of eserine does not produce an appreciable slowing of the heart nor contractions of the intestines one speaks either of hypovagotonia or sympathicotonia.

The oculo-cardiac reflex, discovered by Aschner, allows one also to take notice of the respective activities of the sympathetic and pneumogastric

In the normal state and in the recumbent position, pressure on the eyeballs with the pulp of the fingers softly for 30 seconds without pain, determines after the lapse of a few seconds a slowing of the pulse, lowering of arterial tension, slowing of the respiration and sometimes a feeling of nausea.

The reflex is positive when the slowing of the pulse is in excess of 12 beats per minute.

It is normal when the slowing is at least 4 and less than 12 beats per minute.

It is negative when there is no reaction or one of less than 4 beats per minute.

It is inverted when, without excitement or pain, the slowing of the pulse is replaced by acceleration.

When the reflex is positive, one speaks of vagotonia; when it is negative or inverted, of sympathicotonia.

Thus, thanks to these researches, two clinical types among the vegetative neurotics are clearly determined.

(To be continued)

Periscope

Review of Neurology and Psychiatry

(Vol. XIV, No. 1)

A Case of Disseminated Sclerosis following Exposure, with Long Period of Remission. A. VIVIAN BRUCE.

A brief description of a case of disseminated sclerosis in a soldier. He had received a severe wetting during a long route march, and had slept in his wet clothes. The symptoms developed suddenly next morning, and consisted of weakness in both legs, volitional tremor, and nystagmus. With the exception of the nystagmus, these had all vanished in three weeks. A history of a similar attack twelve years previously was given by the patient.

(Vol. XIV, No. 2)

Extreme Calcification in the Brain of a Subject with Mental Symptoms. A. E. TAFT.

The specimen described was received from the Danvers (Mass.) State Hospital.

The case was one considered clinically as dementia præcox, or manic-depressive insanity without definite diagnostic symptoms. There were active visual and auditory hallucinations. Headache. Motor excitability. Tendon reflexes increased. Duration of symptoms, one year.

The brain presented no anomaly on inspection and palpation.

Frontal sections showed gross areas of calcification nearly symmetrically placed in both hemispheres.

The calcareous areas extend antero-posteriorly, and are in the white substance at the upper and outer angle of the lateral ventricle on either side; in the lenticular nucleus, and in a less degree in the optic thalamus. In the cerebellum there are concretions in both dentate nuclei.

Microscopically the calcareous areas, both in the cerebrum and cerebellum, appear intricately branching plaques with nodular processes having no apparent vascular relation. Small granules are diffusely scattered about in the white substance. There is an associated glia-fiber increase in these areas.

The blood vessels of the cerebral basal ganglia are surrounded by colloid droplets. These invade the vessel walls in varying degrees. In the white substance some of the vessel walls are much thickened, with no infiltration.

The cerebral cortex is not involved in the calcareous process.

(Vol. XIV, No. 3)

The Possibility of Voice Inheritance. W. B. SWIFT.

Author's Summary.—(1) Literature on eugenics and cacogenics shows that bone shapes are probably inherited. (2) The noses of the Indians, and the Greeks, and the Jews, prove this pretty conclusively. (3) The lower animals afford data that put this thesis beyound doubt. Thus it is proved that bone forms are inherited. Then what is contained in them is also inherited, and therefore the functions that those cavity shapes subserve, such as vocal quality and utterance, are likewise inherited.

In brief, I claim abundant evidence to show the possibility of voice inheritance.

(Vol. XIV, No. 4)

1. Transient Hemiplegia in Diphtheria. J. D. Rolleston.
2. Studies in Speech Disorder, No. 5.—The Speech in Athetosis. W. B. Swift.

1. *Transient Hemiplegia in Diphtheria.*—Hemiplegia is uncommon in diphtheria. Of 11,313 cases only 8 developed this complication in the experience of the Grove Fern Hospital in sixteen years' observation. The two cases of transient hemiplegia reported are the only examples of the kind seen by the writer in diphtheria. The first case was of faucial diphtheria in a girl of 6. On the twenty-ninth day of the disease after two attacks of vomiting, she developed violent convulsive movements of the right arm and leg followed by flaccid hemiplegia and loss of speech. The paralysis disappeared the following day but the patient died two days later after generalized convulsions. There was no autopsy. Uremic signs had been present. The second case was one of severe faucial diphtheria in a boy of 5. On the thirty-first day of the disease, after general convulsions, paralysis of the right arm, leg and face set in, with aphasia. These symptoms disappeared the following day. The patient, later, recovered. There had been an early involvement of the heart, giving rise to small cerebral emboli, and lesion easily reparable, is the theory advanced by the writer.

2. *Studies in Speech Disorder.*—We have here an extreme case of athetosis that shows in the vocal mechanism as a constant intertwining change of mouth positions so that all sounds are immediately varied into other forms of vowels; and other sounds, if consonants; their interrelations are extremely varied. Speech is clear only when movements happen to take correct position. and the letter then sounded. In brief, athetoid speech is a constant variation in vowel form and consonant sound, clear only when correctly struck during the constantly changing contractions, or when, during rare moments of relaxation. the sounds are hit before contractions occur.

American Journal of Insanity

(Vol. LXXIII, 1917, No. 3)

Abstracted by Dr. C. L. Allen, Los Angeles

1. Psychiatric Family Studies. A. Myerson.
2. Consanguinity. M. P. Kemp.
3. State Charity Laws. S. Wilgus.
4. Brain Atrophy. A. E. Taft.
5. Korsakow Syndrome in Pregnancy. C. E. Riggs.
6. Dementia Præcox and Sodium Chloride. N. Ishida.

1. *Psychiatric Family Studies.*—It was originally intended to study particularly the fate of the descendants of such persons as had been committed as insane to the Taunton State Hospital, what becomes of them, how many themselves were committed and how many not, what is the record of the latter in the community, etc., but since it was found impossible to secure the financial aid necessary for the prosecution of this work, the inquiry had to take another direction, so that this paper presents (1) a review of the literature on the transmutation of the psychoses and of the family studies done by others; (2) a rearrangement and criticism of Koller and Diem's work on the heredity of the insane and the non-insane; (3) the marriage rate of four

groups of the insane, as shown by the Taunton Hospital statistics; (4) "anticipating or antedating," as shown by the work of Mott and others and by Taunton figures; (5) analysis of individual families (Taunton State Hospital). Reviewing the literature the author finds that the doctrine of the heredity of insanity, especially the idea that it is a unit biologically, so that the degeneracy inherited may manifest itself in any form of insanity, has probably been accepted too implicitly, and has done this much harm, that in most hospitals if insane heredity is admitted there has seldom been much attempt to get at details as to the form, etc., and the question as to the polymorphism of psychoses is attracting considerable more attention than formerly. While he cannot regard the attempt to use the Mendelian laws as an absurdity, he feels that there are grave difficulties in the way of their acceptance, since (1) There is no evidence that the neuropathic differs from the normal person by the lack of some normal determiner. (2) The laws of Mendel have not been shown to apply to any single normal human character, except perhaps eye color, so to assume that the vast range of psychoses is related to a unit determiner is at least premature. Normality in fact is an abstraction rather than an entity. Even Rosanoff's moderate scale of dominance is ahead of the facts, for the classification of psychiatric diseases is more clinical than biological. (3) The dominant characters as made out by Mendel were determined by close inbreeding, such as practically never occurs in human relationship, so that a comparison between them and what is observed in human beings is hardly fair.

2. Considering the work of Koller and Diem, it appears that if all degrees of taint in all relatives are considered, the insane are slightly more tainted than the sane. They are far more tainted by insanity and more especially by insanity in the parents and through direct inheritance by character anomalies, and somewhat more heavily through direct inheritance by alcohol. On the other hand the sane have more nervous diseases, senile dementia, apoplexy in their heredity and through their collateral ancestors, and are more heavily tainted by alcohol and character anomalies. In general they are more heavily tainted through grandparents and collateral ancestors than are the insane.

3. An important matter in the discussion of heredity and hereditary diseases in the insane is the marriage rate of the individuals concerned. Do the psychoses, or the conditions underlying them interfere with marriage? Do male and female insane marry in equal ratio? The author has taken several hundred cases from each of the following groups: alcohol psychoses, general paresis, dementia præcox, and senile psychoses.

Summarizing his results, he finds, first, that the males in the alcoholic, paretic, and dementia-præcox groups marry less than do the females. In paresis this difference is slight, in alcoholics decided, and in dementia præcox the lead of the females is still further increased. Hence it would appear that in transmitting a psychotic taint to the next generation, "the female of the species is more deadly than the male." Whatever is back of dementia præcox seems to operate against self-perpetuation, and there is something of the same internal mechanism in alcoholism, very little, if at all, in paresis and senile psychoses. If there is an inborn defect, it would seem greatest in dementia præcox, next in alcohol psychoses, least of all in syphilis and senile psychoses.

4. Considering the question of "antedating" or "anticipation," which in the view of Mott is an effort of nature to get rid of the disease by "crystallizing" it in a few descendants, making them more vulnerable and unfitted to propagate by being brought early to asylums, the author finds that the method of getting such statistics contains so many sources of error as to seriously vitiate their value. Nevertheless he considers it probable that the

descendants of the insane, who themselves become insane, do so at an earlier age than their ancestors.

5. Considering the question as to whether successive generations show a change in the psychotic type toward progressively more severe disease, the methods which have had to be used attack only part of the problem since they have utilized exclusively asylum material, whereby the nervous, the criminal, the crank and many of the feeble-minded and epileptic have been ruled out.

To answer this question the author adduces all the cases in which three or more generations are represented and part of the cases in which two generations are represented, in all 98 family groups. He confesses that the data are too incomplete to justify a statistical analysis of the cases, at best certain trends may possibly be discovered. The problem he would state as follows: Given a certain type of mental disease in an ancestor, what form of mental disease is to be expected in his direct descendant?

1. Paranoid condition in the ancestors breeds dementia præcox in the descendants. The author's statistics on this subject agree in general with this dictum of a number of authors.

2. Manic-depressive insanity, if clean-cut, is usually followed by manic-depressive insanity, but it may be followed by dementia præcox.

3. Involutional psychoses are usually followed by dementia præcox. (Many of these cases are only late dementia præcox.)

4. Organic brain disease followed by insanity in the descendant has probably some other factor coöperating with it.

5. With regard to alcohol psychoses, the data are inconclusive.

6. The senile cases, if paranoid, tend to paranoid diseases and dementia præcox, if manic tend to be followed by manic-depressive.

All roads seem to lead to dementia præcox and from thence to imbecility.

This gives but the barest outline of this important and comprehensive article, which should be read in the original by anyone specially interested.

2. *Consanguinity Among the Patients at the Newberry State Hospital.*—The authoress, noticing that quite a number of the patients at this hospital had had relatives also under treatment there, was led to make a study of these relationships, with the following results: Of the 50 women considered there were mother and daughter 8 times, mother and son 3 times, father and daughter 7 times, brother and sister 9 times, sisters 4 times, aunt and niece (or nephew) 6 times, cousins, nieces, etc., 13 times. More than half of these patients were foreign-born. Over two thirds of the cases were of manic-depressive or dementia præcox. Looking over the authoress's tables there appears a decided tendency for manic-depressive and dementia præcox in the parent to be followed by a similar psychosis in the child, though this is not absolute.

3. *Remarks on the State Charities Laws.*—Not suitable for abstraction.

4. *Observations on Brain Atrophy with and without Widening of Sulci.*—From a group of 582 brains the author chose 6 for this study, without regard to clinical or post-mortem findings. Three of these cases showed much thinning of the corpus callosum without widening of the sulci. The other three cases showed considerable widening of the sulci without notable thinning of the corpus callosum. All these cases were clinically those of dementia. Two of the cases with widening of the sulci were subject to convulsions at some time. All of them showed a considerable degree of atheromatous degeneration of the basal cerebral vessels. In two there were cysts of softening at the base of the brain. The group without widening of the sulci but with thinning of the corpus callosum with moderate enlargement of the lateral ventricles has an average brain weight lower than the group with the widened sulci. This group with the lower brain weight averages a greater age also.

The atrophy characterized by widening of the sulci involves loss of short association fibers which connect adjacent convolutions, that showing no widening of the sulci shows some flattening of the gyri with notable thinning of the corpus callosum. Presumably, there may be atrophy without either of these changes, due to degeneration of the long association fibers. There may be combination of any two of these forms and some degree of dementia may accompany any of them.

5. *The Korsakow Syndrome in Pregnancy.*—History of a case of this sort with remarks. Toxemia developed during the course of many diverse pathological states may give rise to the Korsakow syndrome. When this appears along with peripheral neuritis during gestation or the puerperium, the pregnancy must be regarded as an important etiological factor.

6. *Results Produced in Dementia Præcox by the Infusion of Sodium Chloride Solution.*—Kraepelin found that salt infusion produced increased feeling of hunger and thirst with improvement of the general health. The author has tried introducing intravenously a 0.9 per cent. sodium chloride solution in nine cases of dementia præcox, with improvement in 50 per cent. of the cases. The patients became quieter and to some extent certain filthy habits were corrected. Are these results attributable to the salt infusion? According to the author Horinchi has found a certain deficiency in Cl content of the blood in precocious dementia.

MISCELLANY

Shell-Shock. Henry Viets. (Journal A. M. A., Nov. 24, 1917.)

The author reviews the English medical literature of shell-shock, making frequent quotations from the authorities to whom he refers. The first report of cases appeared in 1915 under the term of "shell-shock." The symptoms are varied, covering nearly all the functional and hysterical phenomena described by authors. The importance of the problem cannot be overemphasized and if it is possible, those subject to the disease should be eliminated from among the recruits before they are exposed to the perils of trench warfare. The neuropathology of the condition has been best studied by Mott. In the fatal cases, the symptoms of shell-shock resemble those of the gas poisoning, which most neurologists hold cannot alone produce shell-shock. The treatment is largely moral as well as physical and seems to have been well worked up in the British hospitals. The writer asks in conclusion: "What can the Medical Corps of the United States Army do toward the prevention of shell-shock? Obviously it must be checked at the recruiting station or in the cantonment camps before the men leave for France. There ought to be no question in the minds of the medical officers as to the advisability of checking this condition at the source, for no one who has seen the results of modern warfare on the unstable mind can do otherwise than urge such measures with utmost vigor. It becomes the duty of each medical examiner to weed out from the recruits such men as are liable to shell-shock. By so doing an enormously important advance will be made in our army, as judged by the experiences of the other armies of the Allies. We have been strongly advised by Osler to check the enlistment of the neurasthenic. It is obviously difficult to pick him from the crowd, as he may come up in good form, and be eager to go overseas. But it is not so difficult with the mentally deficient, the 'queer stick,' the 'boob,' and the butt of the practical jokers. He is soon observed by both officers and men, and if one singles him out and talks with him for five or ten minutes, one ought to have no difficulty in deciding his fitness for active trench warfare. One ought also to look with especial care into the past history of the depressed, the man who worries unnecessarily, the self-conscious, the shy, the high-strung, excitable man, the violent-tempered, the nervous, the timorous, the easily frightened, or the neurotic individual. Any or all of them may make poor first-line-trench soldiers. The task is difficult, but that in itself should not prevent us from trying. What an advantage it would be to our army officers, and what a saving of life it would mean to our men, if the shell-shock patients could be eliminated from our forces that will fight overseas! Such a utopia is probably impossible, but I feel confident that careful weeding out of the mentally unstable will certainly greatly reduce the numbers of shell-shock cases that are bound to appear in our casualty lists."

The Advanced Psychiatric Centers. Crinon. (Presse Medicale, 1917, no. 18.)

Psychic changes should be recorded as scrupulously as the organic, writes Crinon. It is now officially ordered that the concussion syndrome has to be specified on the card. The "psychically disabled" should have their record as complete from the first as is the rule for the physically maimed. This would permit also suitable measures from the very first, when they are much more likely to prove effectual. The influence on the brain of physiologic disturbances from shell-shock or toxic infections should be arrested as early as possible. To neglect this allows the psychic changes to deepen and crystallize into delirium or confusional states. All this requires advanced psychiatric stations. Their existence is still further justified by the important task of sifting out the men to be sent to the nerve centers and the psychiatry centers farther back from the front. Many men only lightly affected could do well in them and be promptly restored to full duty. Sent back into the interior, their psychic disturbances become more and more confirmed and durable. At the best, the men are returned after months of convalescence when, if they had been given specialist treatment close to the front, they would have been in the ranks again in much less than a month. Toxic delirium of alcoholic origin is often mistaken for a more permanent trouble. It requires only a special course of internment and treatment which is as available in a well-equipped advanced psychiatric station as elsewhere. Men subject to convulsions can also be kept under observation here, and the nature and number of their attacks determined. Crinon thinks it is as absurd to exempt men from service on account of a single epileptic seizure—which is now the regulation—as to exempt those who have not good teeth.

German Psychology under Aërial Bombardment. A. Hoche. (Mediz. Klinik.)

Hoche has recently confided to the *Medizinische Klinik* of Berlin the effects of aëroplane attacks on Freiburg in Baden observed by himself and other physicians. Freiburg is a town of 80,000 inhabitants and the first attacks, made with comparatively small bombs, left no strong impressions; but when, from April onwards, larger bombs were used, the nerves of Freiberg suffered more, partly because the safety sought in cellars proved to a certain extent illusory. Hoche states that the effect of a bombardment on the minds of the inhabitants of Freiburg was directly proportional to the loudness of the explosions, and in this connection remarks that some persons dread thunder more than lightning. The calculation that the chances of being wounded were infinitely smaller for the individual at Freiburg than for the soldier at the front did not prevent an artillery officer who had lived through the battles of the Somme from finding the explosions in Freiburg far more terrifying. This, Hoche thinks, must be due in part to the enforced passivity of the bombarded; in the case of a man who could take an active part in defence the mental strain was relieved. Hence, the greatest sufferers were the most helpless, the bedridden, and patients recently operated on; patients with fever were indifferent. Bombs released at a height of 3,000 to 4,000 meters travel, Hoche calculates, at an average velocity of only 150 meters a second, but the whistling sound their passage made travelled at the rate of 333 meters, so that the explosion was preceded by a period of tension lasting several seconds. This anticipatory tension had a most injurious effect on the nerves, the most common expressions of fear being chattering of the teeth, pallor, more or less mechanical praying, hysterical laughter, diarrhea, rapid excretion of urine, and great thirst. The April bombardments did not provide the lunatic asylums with a single new case, a fact which Hoche, who is professor of psychiatry in the University of Freiburg, considers emphasizes the view that the development of insanity is remarkably independent of external factors. The inmates of the Freiburg asylum were little disturbed, and some of them even regarded a bombardment as an agreeable entertainment. Among the sane, insomnia was a common phenomenon, and in some cases, we are told, necessitated change of residence. Cardiac symptoms were often prominent, not in the subjects of organic disease, but in cases of nervous origin, notably in the "thyreo-toxic" group. Increased excretion of sugar, amenorrhea, vomiting, and attacks of asthma, giddiness, and general weakness were also observed. Persons buried for seconds or hours in the ruins of houses might completely lose count of the lapse of time. They could recall visual but not auditory impressions; they could remember, for instance, seeing the walls falling, but not the sound of the explosion.

(B. M. J.)

PSYCHONEUROSES AND HYSTERIA. Bernheim. (Presse Med., 1917, no. 18.)

The author defines neuroses, psychoneuroses and hysteria, and shows the connection between them. Every organ, every function tributary to the nervous system, is subject to neuroses. Even the brain is not exempt; hallucinations, amnesia, strange ideas and dreams are manifestations of psychic neuroses. All the symptoms soon subside, perhaps instantaneously, like the disturbances induced by suggestion; the latter are only experimental neuroses. The neurosis may be brought on by emotional stress or it may accompany some traumatic affection or it may be of mental origin—the idea of coughing starts one to coughing. Psychic neuroses are those manifested by mental symptoms, while a psychoneurosis is a nervous affection maintained by the mind. The two may be associated.

SHELL SHOCK AND THE AMERICAN ARMY. (Editorial, Boston Medical and Surgical Journal, Jan. 10, 1918.)

No medico-military problems of the war are more striking than those growing out of the extraordinary incidence of mental and functional nervous diseases ("shell-shock"). Together, these disorders are responsible for not less than one seventh of all discharges for disability from the British Army, or one third, if discharges for wounds are excluded. A medical service newly confronted, like ours, with the task of caring for the sick and wounded of a large army, cannot ignore such important cause of invalidism. By their very nature, moreover, these diseases endanger the morale and discipline of troops in a special way, and require attention for purely military reasons. In order that as many men as possible may be returned to the colors or sent into civil life free from disabilities which will incapacitate them for work and self-support, it is highly desirable to make use of all available information as to the nature of these diseases among soldiers in the armies of our allies, and as to their treatment at the front, at the bases, and at the centers established in home territory for their "reconstruction."

England has had three years' experience in dealing with the medical problems of the war. During that time, opinion has matured as to the nature, causes and treatment of the psychoses and neuroses which prevail so extensively among troops. A sufficient number of different methods of military management have been tried to make it possible to judge of their relative merits.

Although an excessive incidence of mental diseases has been noted in all recent wars, it is only in the present one that functional nervous diseases have constituted a major medico-military problem. As every nation and race engaged is suffering severely from these disorders, it is apparent that new conditions of warfare are chiefly responsible for their prevalence. None of these new conditions is more terrible than the sustained shell fire with high explosives which has characterized most of the fighting. It is not surprising, therefore that the term "shell-shock" should have come into general use to designate this group of disorders. The vivid, terse name quickly became popular, and now it is applied to practically any nervous symptoms in soldiers exposed to shell fire that cannot be explained by some obvious physical injury. It is used so very loosely that it is applied not only to all functional nervous diseases, but to well-known forms of mental disease, even general paresis. If all neuroses among soldiers were included in these groups the use of the term "shell-shock" might be defended. But many hundreds of soldiers who have not been exposed to battle conditions at all develop symptoms almost identical with those in men whose nervous disorders are attributed to shell fire. The non-expeditionary forces supply a considerable proportion of these cases.

The medical statistics of the war are as yet untabulated. Even if the records contained the information desired it would be very difficult to state the prevalence of the neuroses on account of the defective nomenclature employed. It is doubtful if there is another group of diseases in which more confusion of terms exists. Nervous or mental symptoms coming to attention after the soldier has been exposed to severe shell fire are almost certain to be diagnosed as "shell-shock," and yet when such patients are received in England, well-defined cases of general paresis, epilepsy, or dementia præcox are often found among them. This source of confusion tends to swell the number of cases reported under the term "shell-shock," but there are many other sources of error which tend to diminish the apparent prevalence of the war neuroses. It is the belief of those who have made an effort to ascertain the prevalance of the war neuroses that the rate among the expeditionary forces is not less than ten per thousand annually, and among the home forces not less than three per thousand.

The experience of the British "shell-shock" hospitals emphasizes the fact that the treatment of war neuroses is essentially a problem in psychological medicine. While patients with severe symptoms of long duration recover in the hands of physicians who see but dimly the mechanism of their disease, and are unaware of the means by which recovery actually takes place, no credit belongs to the physician in such cases and but little to the type of environment provided. In the great majority of instances the completeness, promptness and durability of recovery depend upon the insight shown by the medical officers under whose charge the soldiers come, and their resourcefulness and skill in applying treatment.

The resources at the disposal of the physician in treating the war neuroses are varied. The patient must be reëducated in will, thought, feeling, and function. Persuasion, a powerful resource, may be employed, directly backed by knowledge on the part of the patient as well as the physician of the mechanism of the particular disorder present. Indirectly, it must pervade the atmosphere of the special ward or hospital for "shell-shock." Hypnotism is valuable as an adjunct to persuasion, and as a means of convincing the patient that no organic disease or injury is responsible for his loss of function. Thus, in mutism, the patient speaks under hypnosis or through hypnotic suggestion, and thereafter must admit the integrity of his organs of speech. The striking effects of hypnotism in the removal of symptoms are somewhat offset by the fact that the most suggestible who yield to it most readily are particularly likely to be the constitutionally neurotic. A mental mechanism similar to that which produced the disorder is being used in such cases to bring about a cure.

The experience in English hospitals has demonstrated the great danger of aimless lounging, too many entertainments and relaxing recreations, such as frequent motor rides, etc. It must be remembered that shell-shock cases suffer from a disorder of will as well as function, and it is impossible to effect a cure if attention is directed to one at the expense of the other. As Dr. H. Crichton Miller has put it, "Shell-shock produces a condition which is essentially childish and infantile in its nature. Rest in bed and simple encouragement is not enough to educate a child. Progressive daily achievement is the only way whereby manhood and self-respect can be regained."

It is evident that the outcome in the war neuroses is good from a medical point of view and poor from a military point of view. It is the opinion of all those consulted that, with the end of the war, most cases, even the most severe, will speedily recover, those who do not being the constitutionally neurotic and patients who have been so badly managed that very unfavorable habit-reactions have developed. This cheering fact, however, brings little consolation to those who are chiefly concerned with the wastage of fighting men. The lesson to be learned from the British results seems clear—that treatment by medical officers with special training in psychiatry should be made available just as near the front as military exigency will permit, and that patients who cannot be reached at this point should be treated in special hospitals in France, until it is apparent that they cannot be returned to the firing-lines. As soon as this fact is established, military needs and humanitarian ends coincide. Patients should then be sent home as soon as possible. The military commander may have the satisfaction of knowing that food need not be brought across to feed a soldier who can render no useful military service, and the medical officer may feel that his patient will have what he most needs for his recovery—home and safety and an environment in which he can readjust.

Although it might be considered more appropriately under the heading of prevention than under that of treatment, the most important recommendation to be made is that of rigidly excluding insane, feeble-minded, psychopathic and neuropathic individuals from the forces which are to be sent to France and exposed to the terrific stress of modern war. Not only the medical officers but the line officers interviewed in England emphasized, over and over again, the importance of not accepting mentally unstable recruits for military service at the front. If the period of training at the concentration camps is used for observation and examination, it is within our power to reduce very materially the difficult problem of caring for mental and nervous cases in France, increase the military efficiency of the expeditionary forces, and save the country millions of dollars in pensions. Sir William Osler, who has had a large experience in the selection of recruits for the British Army and has seen the disastrous results of carelessness in this respect, feels so strongly on the subject that he has recently made his views known in a letter to the *Journal of the American Medical Association*, in which he mentions neuropathic make-up as one of the three great causes for the invariable rejection of recruits. In personal conversation he gave numerous illustrations of the burden which the acceptance of neurotic recruits had unnecessarily thrown upon an army struggling to surmount the difficult medical problems inseparable from the war.

Neuroses are very common among soldiers who have never been exposed to shell fire, and will undoubtedly be seen frequently among non-expeditionary troops in this country. In England nearly thirty per cent. of all men from the home forces admitted to one general hospital were suffering from various neuroses. Most of these men were of very neurotic make-up. Many had had previous nervous breakdowns. Fear, even in the comparatively harmless camp exercises, was a common cause of neurotic symptoms. Heart symptoms were exceedingly common. The same experience in our own training camps can be confidently predicted.

PSYCHOTHERAPY IN CHRONIC INTERNAL DISEASES. A. I. Yarotzky. [Russky Wratch, 1917, No. 16.]

The author maintains that the treatment of a chronic internal disease should not be restricted to giving the patient directions as to drugs, food, exercise, etc., to enable him to keep up under his chronic disease and postpone the fatal outcome as long as possible. Yarotzky pleads that the physician should step in and aid the patient to acquire an entirely new view of life and attitude of mind, live for others, cultivate a love of art and of science, interest himself in his environment, in short, instil idealism, altruism, as a physiologic factor. In his practice he has noticed that persons who develop pneumonia or diabetes have almost invariably passed recently through some severe emotional stress or financial worry. The fear of death which acts like a whip in acute disease grows dulled in the chronic, and the patient debates whether mere living is worth all the trouble. Here is the field for psychotherapy, as an adjunct to all that medical skill can suggest in the special case. It is indispensable to enable the patient to profit by the physician's skill otherwise. Yarotzky claims that the physician can train the patient's feelings, ideas and ideals, just as he can train an organ to strengthen it. The lack of this sustaining psychotherapy is what drives so many to Eddyism and other empirical types of psychotherapy which make their appeal to the mind. Altruism, idealism, public questions and service, photography and other hobbies—interests of this kind are a potent factor in keeping well and in aiding in the struggle against disease. Yarotzky takes up in turn chronic disease of the various internal organs, showing the influence of the mind in their course and even on their inception, especially excessive secretion of hydrochloric acid with its evil train. He emphasizes that the physician with his examinations and directions focuses the patient's attention on some organ and thus by suggestion plus autosuggestion may induce exacerbation of existing derangement. He urges the physician to trust more to his intuitions, explaining how these are the crystallization of a lifetime of subconscious impressions from the environment. The wearing out of organs is merely a subordinate factor in old age. The richness or the poverty of the individual's mental life is the predominant factor. In conclusion, Yarotzky reiterates that the physician is too apt to pay scant attention to the patient's psychic life, and yet this is the key to success for his other measures in some cases.

PSYCHIATRY IN THE ARMY. Damaye. (Presse Medicale, 1917, no. 18.)

Damaye analyzes 638 cases of mental or nervous affections that passed through his service last year. The mental disturbances were usually transient when the men were kept back from the front. The proportion of the persisting and incurable cases is surprisingly small in comparison to the more or less prompt recovery of the others. The mixed cases are especially numerous, namely, those in an intermediate stage between mental debility and dementia præcox, with and without delirium, or between hebephrenia and actual loss of mental balance. Hystero-epilepsy and hysteroneurasthenia were particularly frequent. The various types of mental anomalies are listed; the largest group was 71 cases of melancholia with notions of persecution; 39 cases of melancholia with a neurastheniform state; 51 of acute brief attacks of delirious excitement with hallucinations, and 37 of simple mental debility. In 24 cases there was desire to commit suicide; in 19 malaria was commencing, and in 399 there was slight albuminuria, with more or less perfect compensation of some heart defect. The albuminuria disappeared in most of them after a week of rest, but in others it persisted unmodified. The etiology of these nervous and mental disturbances is complex: predisposition, emotions, intoxications and fatigue all coöperating. The attacks of convulsions nearly always coincided with exhausting fatigue. Syphilis is a predisposing factor in the mental disturbances, and a combination of malaria and alcoholism, but all the mental and neuropathic troubles and even the syndrome of general paralysis can be started by some concussion mishap. This "presses the button" as it were. Treatment in all cases was to give at once a bath at 37° C. for one half hour if the man is tranquil, and for an hour at 40° C. if he is excited. A calomel purge was then given and the man was put to bed. The baths are repeated daily and no food but milk is allowed for two or three days. If the urine findings are negative, he is then given the restricted and then the full milk-vegetable diet. By this means the effects of the digestive disturbances, etc., are overcome. No wine is ever allowed; milk or "glyzin" are the only beverages given. The patients are all given, besides, a solution of 40 drops of tincture of iodin in 100 gm. gum mixture, fractioned, during the day. This is kept up for five to ten days. It serves to sterilize the digestive tract, promote leukocytosis, and acts as a general tonic. Cold baths are not advisable, but, if conditions call for it, a daily injection of 5 cg. of sodium cacodylate is given. When there is much mental distress, morphin is the resource and the much excited patients are given, beside the baths, 4 gm. of chloral in 120 gm. of gum mixture at night and possibly a very cautious injection of hyoscin hydrobromate. The most practical arrangement for the psychiatric service is to have an advanced station, moving with the front lines, and, farther back, where all is quiet, a psychiatric center and a neurologic center to which the men can be evacuated from the advanced station. The evacuation should always be in charge of specialist attendants.

THE ENERGY CONCEPT IN PSYCHIC THERAPY. (Editorial, New York Medical Journal, Jan., 1918.)

"As if a wheel had been within a wheel," said an ancient Hebrew prophet of the vision that he saw. Wheels within the head is the modern vernacular expressively stating dire mental confusion and irresponsibility. Driving energy forces at odds with one another seeking to usurp the final common pathway for self-expression is the explanation with which the clinical psychiatrist endeavors to read the cross purposes of the psychic life which makes the patient "nervous," restless, unhappy, ineffectual, and suffering a psychalgia as distressing as it is difficult for the patient to define and explain. Some such concept of a constantly shifting energy, available now for this form of activity, now for that, is necessary for a sufficient explanation of this confusion and disorder, as well as for a working basis whereby there can be a restoration of order in a redirection of energy. Such a vital dynamic conception throws light and hope where old static definitions and descriptions of mental disturbance set barriers in the way of understanding and concealed the true nature of psychic disorders offering no means of thorough readjustment. Now physicians of psychic diseases are discovering in psychic activities, whether rightly or wrongly directed, evidence of the energy moving through all forms of life and only manifesting itself here through a different form of energy carrier, by which the striving to live is expressed on a different plane and in a special manner.

Wheels within wheels of a marvelous energy utilization and expression is the impression to be gained from the study of the beginning and slow yet sweeping development of life in terms of the "capture, storage, release, and reproduction of energy" as this is presented in The Origin and Evolution of Life, by Henry Fairfield Osborn. In this study, however, energy movement is viewed only from its physiochemical aspects. These lead a long way and the theme is a fruitful one, first, as it is pursued through the gradual gathering together of elements under favorable conditions of moisture, temperature, and then sunlight, to form the first living protoplasm and in the evolution of this to increasingly higher, more complex forms. There is also a deeper following of the life process to discover the ways it has pursued, what this development of life has brought about and what is being wrought for individual and race. It is fascinating and stimulating to follow with the author, somewhat in speculation, far more from the records written in geology and paleontology, supplemented by embryology and existing forms of plant and animal life, the shiftings and transformations of energy in the "actions, reactions, and interactions" which have made up the history of living forms and their relation to one another and to the varied environments in which life has been lived. Hormone or chemical messenger activity, with the more mechanical bodily activity, have not been neglected as energy carriers. Yet all the way along the form of carrier that has been most extensive and contains the greatest possibilities for energy potentiality is barely hinted at. In the face of the ignorance and obscurity which still enshroud this age-long movement of energy and the mystery that still obscures the nature of life itself and its possible purpose, this higher, greater factor presses for recognition and consideration. Most of all it demands acknowledgment before these mental difficulties and here it claims service from this discussion of energy transposition and transmutation on these lower levels. Close beside this and constituting a response to environment which contains all the source and structure of emotional life from the first sensitive result of action, reaction, and interaction to the highest affective life of man, energy found for itself through feeling and finally through ideas added to it, the avenues to reach by means of symbols new adjustments, wider forms of expression, new paths for creation. This is the secret, if secret there be, of Freudian therapy. It finds the struggle of the higher life, the mental, psychic, in just such terms of "capture, storage, release, and reproduction" of energy as those manifest in the physicochemical and sensorimotor processes of life. In its wider scope it utilizes even these, so that thus the somatic life processes stand at the service of this higher distribution of energy. This throws light upon the endeavors and strivings in the psychic plane, its frustrations and failures, the effort for symbolic values of one kind or of one grade of psychic cultural value to supplant another. Then confusion, inefficiency, and distress, mental or psychic sickness, ensue. Thus also a way is opened through recognition of this energy and its work on this plane to recapture it for the higher, more useful psychic adjustments and adaptations, and control and health once more result.

Wonderfully simple seems the unfolding of so profound and far-reaching a history of life as that found in these pages, in the light of such an energy concept. Marvelous in simplicity and ability to touch the secret springs of success or health, and maladjustment or disease, is this same energy concept in the psychic realm, even in the face of the complexity and the depth of the mental life of man.

The Treatment of Neurasthenia and Psychasthenia Following Shell-Shock. R. T. Williamson. (Br. Med. Jl., Dec. 1, 1917.)

The author says that a very large number of cases of persistent neurasthenia, psychasthenia, and allied conditions, following shell-shock are now under treatment in England. Similar affections are also caused by the shock or continued anxiety of Zeppelin raids, and also the continued anxiety from other risks of injury. The symptoms may commence suddenly after one severe shock, or gradually after repeated shocks. In many of the severer cases the patient is unable to carry out either military or civil duties for a long period and so keeps up an extended pension. It is thus important both for the patient and the country that a cure be effected as soon as possible, and the cure should be psychological as well as medical. Williamson offers a method of treatment which briefly outlined is as follows: (1) All *anxiety* and fear of further exposure to similar risks to life, and anxiety from other causes, should be removed if possible, and the patient should be definitely told that he will certainly recover. (2) The *sleep treatment* is very useful. At first hypnotic drugs may be given both at night and during the day for a short time; so that the patient may sleep all night and, for a few days, also during part of the daytime. (3) He should *cease thinking* of the war and his experiences. This may be brought about (*a*) at first by the sleep during part of the daytime as well as during the night as just described, and by occupation whenever he is awake; (*b*) afterwards he should be kept asleep all night (by drugs); but during the day the drugs should be discontinued and he should be kept fully *occupied* in a suitable way. (4) As regards the kind of occupation: (*a*) A *new* subject or one not associated with his war experience is desirable. (*b*) *Very close application* to the work in hand is important. (*c*) The occupation should be one requiring thought, and if the patient finds, after continuing it for some time, that it can be done mechanically, the occupation should be changed or altered so that thought is required. (*d*) It should be one very *interesting* to the patient, and one which will become more interesting.

Absorption of Mercury. J. F. Schamberg, J. A. Kolmer, G. W. Raiziss, and J. L. Gavron. (Journal A. M. A., Jan. 19, 1918.)

These authors have experimentally investigated the absorption of mercury when rubbed into the skin in the form of inunction. Rabbits were used, and the detailed results are given. Their conclusions are as follows: "(1) Animal experiments demonstrate that the chief avenue of absorption of mercury, when applied by inunction, is the skin. (2) Rabbits may be fatally poisoned with mercury by inunction, even when no opportunity of absorption through the lungs exists. (3) Rabbits breathing a mercury-laden atmosphere may absorb considerable quantities of mercury through the lungs, but, as a result of our experiments, we believe the respiratory absorption to be far less important than the cutaneous absorption. (4) Metallic mercury in the form of the official mercurial ointment is more volatile and is much more apt to be absorbed by the lungs than calomel ointments of equal strength. (5) Calomel ointments are fully as well absorbed through the skin as the ordinary blue ointment; indeed, we have the impression that calomel is absorbed with greater facility. (6) There appears to be no reason why calomel inunctions should not supplant the unclean blue ointment rubbings which have been so long in use."

Organic Lesions in Shell-Shock. (Editorial, Bost. Med. and Surg. Jl., Jan., 1918.)

Recent observations on the various fronts tend to show that shell-shock is the expression of a cell-exhaustion of the central nervous system. It is generally accepted by neurologists that this exhaustion is accompanied by pathological lesions of the cytoplasm. It is, perhaps, doubtful whether this change is invariable, and the laws governing it are still very imperfectly known, but, as a broad fact, it is certainly true. Such lesions may be divided into two main groups. First, those which are visible after proper staining of some particular cells or substance of the brain. These have been observed recently, and they seem to lie at the root of fatal cases of shell-shock. Secondly, those which connote a diminished potentiality for the development of nerve force of such a nature as to impair the value of the cell. These are types of degeneracy which appear in spite of a satisfactory military training and environment. It is this latter class that alienists like Sir George Savage and Sir Robert Jones have described in the Journal of Mental Science. These authors seem to understand by the disposition to shell-shock a marked falling away, mentally, morally, and physically, from the average condition of the soldier or race. Thus, among British soldiers, the habitual criminal and the morally perverse, the mentally unstable and insane, the physically weak and ill-developed are often spoken of as predisposed to shell-shock. But there are also cases in which it occurs, in spite of hygienic surroundings, the best heredity, and the most careful education. It follows that shock or fear or the dread of the " unknown," of sufficient severity to overwhelm the will, may cause in healthy men the whole syndrome of the affection —the unconsciousness, aphasia, abasia, and pseudo-paraplegia. It is shown by Nissl and by Nonne that the power to resist the highest degree of fear, as in drumfire, explosion of mine craters, etc., necessitates the presence of the maximum nervous potentiality plus an optimum constitution. This is the meaning of Dr. Mott's phrase that many cases of shell-shock are the neuro-potentially unfit.

There are three chief views as to the causation, which have been fully discussed by Wollenberg (Archiv für Psychiatrie, 1916, p. 335), and more recently by two Italian neurologists, Lattes and Goria (Archivio di Antropologia Criminale, April, 1917). The first is, that shell-shock is not the expression of a pathological cell change, but the sign of a defect which exists in certain strains or stocks, and which most writers describe as psychoneurosis, hysteria, suggestibility, and degeneracy. On this view it is presumed that the innate nerve potentiality has been impaired by congenital or acquired hysteria and neurasthenia; it includes, besides, the types of degeneracy as seen in idiots, epileptics, and paranoiacs. In modern armies these groups are found, which obviously shows the importance of a minute family and individual history in the examination of soldiers. The second view is that the syndrome of shell-shock is not the result of defects or atavistic causes, but arises of itself; in other words, it is psychogenic. Most writers agree that these cases —the functional, emotional, the hysterical in the usual sense—are the most numerous. As Wollenberg says: " In the bulk of the cases of shell-shock (Granatkontusion) the emotional factor far outweighs the commotional." Dr. Mott and other British authorities take this view, but they have considerably narrowed the definition of hysteria.

The third classification is that the causes of shell-shock—whether they have existed *ab initio* in the soldier's nervous system or whether they are psychogenic in origin—are physical processes, organic lesions, produced by the effects of long exposure to the gases, and other results of the bursting of powerful shells. In this place reference may be made to a recent work by Homburger (Die körperlichen Erscheinungen der Kriegshysterie). This author looks upon the question in a twofold way: either the idea of pure hysteria must be abandoned, or this form of hysteria must be sharply differentiated from hysteria with organic lesions. Most neurologists at the front find it exceedingly difficult to believe in traumatic hysteria (Oppenheim's) or molecular shock (Charcot's). Actual observers found that of 74 men examined after an artillery attack, 67 showed unmistakable signs of localized organic lesions of the central nervous system.

' These lesions have now been studied post mortem by Dr. Mott and Captain Hurst. They, as well as French, Italian and Russian neurologists, have observed: (*a*) Early generalized chromatolytic changes in the cells of the central nervous system, (*b*) disappearance of the basophile substances, (*c*) extravasation of blood into the substance of the brain, (*d*) punctate hemorrhages with congestion of the meninges, (*e*) minute hemorrhages and changes due to the effects of compression and decompression, that is to say, as in caisson disease, with cerebrospinal fluid under high pressure, albumin, blood, and excess of lymphocytes. It has been noticed by several observers that the clinical signs are those of organic changes; and Homburger, Mörcher, and Nissl believe that the war has altered our conceptions of hysteria though it has produced no new type. Nissl, in particular, appears to question the existence of the "hysterical personality." Shell-shock is that condition of nervousness which results from the exhaustion of the inherent vitality of the cells. They are unable to function because they have come to the end of their physiological banking account. In fact, to Nissl most cases are due to a completely human and normal weakness, and the organic lesions, it might be added, are equally likely to be due to the action of inorganic poisons, as gas, and physical agents, concussion and commotion.

Sciatica. Israel Strauss. (Journal A. M. A., Dec. 15, 1917.)

Strauss notices the various views as to the pathology and etiology of sciatica and consequently of its treatment. He says that his experience has led him to believe that there exists a large group of cases in which the lesion, functional or organic, exists in the nerve itself. He has carefully examined ninety-one cases that have come under his observation in recent years and gives an analysis of his findings. In all the cases, organic abnormalities outside the sciatic nerve itself were excluded and the patient recovered without any treatment other than that directed to the relief of the nerve itself. The treatment of sciatica is discussed in the light of these observations. The greater frequency of the disorder during the summer months is probably due to the exposure of the body to drafts in order that the patient may sleep during hot nights. As a prophylactic measure, persons subject to coryza from drafts should be particularly careful not to subject the legs to such exposure. The same holds true regarding the use of the cold plunges or shower baths by such persons. In early stages, rest in bed and application of warmth along the nerve, especially in the gluteal region, and large doses of the salicylates are indicated. Massage is absolutely contraindicated as well as counterirritants. As the pain is severe, cocaine should be freely given. If the attack does not then yield there are two methods that have given good results. One is the injection of the physiologic sodium chlorid solution into the neighborhood of the nerve according to the technic of Lange and the other is the epidural injection according to the method described by Cathelin. These two methods are thus described: "In making perineural injections, the patient lies on the abdomen with a pillow underneath its lower part, and the feet projecting beyond the edge of the table or couch. A line is then drawn from the sacrococcygeal articulation to the lowest point of the postero-external border of the great trochanter. The point of puncture is one inch to the outer side of the junction of the inner one third and outer two thirds of the foregoing lines. A trocar and cannula about 20 cm. in length and 2 mm. in caliber is used in the injection. The point of the trocar ought not to project very far beyond the cannula. The needle is inserted directly downward through the gluteal muscles until the nerve is reached. Physiologic sodium chlorid solution is then injected in amounts varying from 100 to 150 c.c. Considerable pressure is sometimes necessary in order to force the fluid into the tissues, and in such cases, care must be taken that the needle is not forced into the nerve. Considerable pain may follow the injection, which, as a rule, subsides after an hour. It may be necessary to repeat the injection every other day until at least five are given, but as a rule three injections suffice. Alcohol should never be used for these injections. The epidural space in an adult begins at the lower edge of the first sacral vertebra, where the dura ends. It extends down to the sacrococcygeal articulation. At this level the injections are made. There are certain landmarks by which this opening, the foramen sacrale superius, may be identified. It lies at the end of the crest made by the spines of the sacrum. It has the shape of an inverted V or U, and is about 1 cm. wide and from 1.5 to 2 cm. in length. It is bordered laterally by two prominences, the cristæ sacrales laterales, which are usually easily felt by the finger. The opening is covered by a dense fibrous ligament, the ligamentum sacrococcygeum. The opening lies generally 2 cm. above the end of the gluteal fold. The needle used for the injection should be about 8 cm. in length, and 1 mm. in caliber. I have used an ordinary steel needle previously tested as to its flexibility. If greater flexibility is desired, a needle made of platinum iridium may be used; but a broken needle need cause no alarm: it will do no harm if allowed to remain in the epidural space. The needle is to be inserted to a depth of 6 cm. to reach the second sacral vertebra. There is no danger of entering the subarachnoid space, because the dura ends at about the level of the first sacral vertebra; however, to be certain that this space has not been entered, it is well to wait for a few minutes before injecting to see whether there is an escape of cerebrospinal fluid." It has been the writer's custom to use novocain to anesthetize the skin and tissues. Injections are given at 48-hour intervals and there has been no untoward result from the epideural injection. The treatment by sodium chlorid solution injections, whether epidurally or perineurally, offers some means of shortening the painful affection from weeks or months to days.

Recurrent Laryngeal Nerve Paralysis. G. E. Brown and B. E. Hempstead. (Journal A. M. A., Jan. 5, 1918.)

The authors report a case of recurrent laryngeal nerve paralysis associated with mitral stenosis. The usual association of this paralysis is with aneurysm and aortic arch dilatation, and it is only since Ortner's original report in 1897 that we have learned that recurrent paralysis may be associated with and apparently caused by cardiac enlargement. In a series of 360 cases studied by Thomson, in St. Clair, only ten were reported as being due to an enlargement of the heart in mitral stenosis. Up to 1916 only eleven cases had been reported with necropsy confirmation, but a number of clinically reported cases with a recurrent paralysis have been reported in which the cardiac condition could be proved the causative agent. The proof has become more exact since the advent and general use of the Roentgen ray in chest diagnosis. It was used in the writers' patient, and they comment on it as follows: "This was a case of mitral stenosis, associated with temporary paralysis of the left recurrent nerve during a period of mild decompensation, in which, under appropriate treatment, the left auricle increased in size. This reduction in the size of the auricular chamber evidently released a pressure on the left recurrent nerve with restoration of its function. The case is the only one of this particular type that we have been able to find in which a diagnosis could be made early enough to allow the nerve function to return. The case illustrates the importance of a rigid investigation of every case of left laryngeal paralysis to rule out its more common causes, as no other etiology offers a better chance of relief than this particular type."

Book Reviews

THE CRIMINAL IMBECILE. AN ANALYSIS OF THREE REMARKABLE MURDER CASES. By Henry Herbert Goddard. New York, The Macmillan Company.

The admonitions to society, embodied in this presentation of three murder cases and the comments upon them which follow, bear the authoritative stamp of the author's experience and knowledge of the mentally defective. He understands the types of mentality which lie behind these murders committed and has looked carefully into society's responsibility and tested the possibility of both constructive and preventive work with such subjects.

His reason for presenting the details of these murders is to help society to recognize the character and the prevalence of such a menace to its safety as lies in the presence of members of these types in its midst. The trial of each one brought out evidence of various kinds showing that these persons were below the normal standard in mental equipment and therefore in their appreciation of their acts and responsibility for them. In the first case the subject was acquitted on the ground of criminal imbecility, with commission to an institution where he could be properly confined and cared for. In the second instance the verdict was that of murder in the first degree, the defense of imbecility and irresponsibility not being accepted by the jury. The third case, in which the mental defect was more evident than in the others, was convicted of murder in the second degree, with life imprisonment, the utmost penalty in the state in which this murder occurred.

The particular interest which lies in these cases for society, is pointed out by the writer in his discussion. In the first place these were the first court cases in which the report of the Binet-Simon tests for mental ability were admitted as evidence. They confirmed with scientific accuracy that to which the character of the evidence and especially the depositions of the prisoners themselves pointed. The differences in decision upon the cases illustrate the ignorance and lack of comprehension on the part of society of what constitutes an imbecile, and of the measures with which such mental conditions may be met. In self-defense they condemned the last two, while merely committing the first to life incarceration in a corrective institution. In the first case it had been carefully explained that this alternative would be adopted. This was not emphasized in the second instance, but the third was, even under the extreme penalty, actually committed to such institutional care.

Goddard insists in all this on several points significant for the safety of society and the welfare of the imbecile. Not the least is the danger of such a large class so little recognized, as were the first two at any rate, as a menace to life and order. This emphasizes the need of their detection and of following this by methods of education and training combined with proper custody in many cases, and also the prophylactic duty of preventing as far as possible the propagation and multiplication of this class. This latter is supported by the existence of hereditary mental defect in evidence in two of these three cases.

The direct presentation of this material together with the result of the author's study of them forms a small volume of practical usefulness for society in its consideration of the problem of this less easily detectable grade of mental defect, and also of its significant bearing upon legal procedure.

THE BRAIN IN HEALTH AND DISEASE. By Joseph Shaw Bolton, M.D., D.Sc., F.R.C.P. Longmans, Green and Company, New York, London.

The author presents in this book a histological study of certain areas of the cortex in order to supplement clinical knowledge of brain development and its relation to brain disease. The areas upon which he has directed his intensive study are the sensory projection sphere of the cortex, to which he gives the name of the visuo-sensory area, the region of lower cerebral association, the visuo-psychic zone, and the region of higher cerebral association, or the prefrontal area. These he considers as forming the post-Rolandic portion of the cerebrum, and constituting the zones of projection areas with their corresponding zones of association. The pre-Rolandic part is the psychomotor area, which serves to give external expression to these processes of association, one portion of it being concerned with the control, selection and coördination of the results of the post-Rolandic cerebral association, which permits their transformation into activity or inhibits them.

His study is based upon the consideration of the cell laminæ present in the structure of the cortex, the function of each of these laminæ and its place in evolution of the cortex. The highest layer functionally, subserving the associative, psychic or educative functions, is the pyramidal or outer layer. That which has to do with the receptive functions is the middle cell lamina, while the inner cell lamina takes care of the organic and instinctive functions of the cerebrum.

Bolton divides both the clinical results and the pathological and histological into two groups. He uses the term amentia "to connote the mental condition of patients suffering from deficient neuronic development," and the term dementia "to signify the mental condition of patients who suffer from a permanent psychic disability due to neuronic degeneration following insufficient durability." Sub-evolution of the cerebrum is the term he uses for the morphological description of the former group, and dissolution for the latter. On this basis his study proceeds to verify this classification in the development or in the disease manifested in each of the cell laminæ in the respective areas examined. Beginning with a general topographical survey of the cortex and technical details of his procedure, he presents in the first half of the book this histological material.

The latter half is devoted to a clinical consideration of the same cases from which his material was taken, following still his twofold classification. Statements made in this section lack a certain decisive clearness which belongs to present-day psychiatry. The presentation of the mass of clinical material, actual content of psychic confusion and aberration, which he brings forward, tends to this where, as here, interpretation of the content is lacking. It proves again how helpless psychiatry is in adequately understanding and as far as possible reaching these conditions to render aid, without some such insight into the meaning both of this psychic content in its typical confusion, and without some pragmatic grouping according to the underlying dynamic force seeking for expression in ways which are psychical, but not consciously directed.

The retention of the mystically obscure terms insanity, epileptic insanity, recurrent insanity, reveals this lack of definiteness and progress into newer more workable conceptions. However this section, like the former, offers a large body both of histological fact as basis for an also valuable amount of clinical material. Into both this investigator and writer has injected a spirit of research which tends toward recognition of a dynamic unity of morphology and function by which the former is developed according to the demand for the latter. Disturbance in the one results therefore because of imperfect development or deterioration in the other. The work has made a valuable contribution toward the understanding of the organic basis of mental activity and of the disorders which manifest themselves there.

The History and Practice of Psychoanalysis. By Paul Bjerre, M.D. Authorized translation by Elizabeth N. Barrow. Boston, Richard G. Badger; Toronto, The Copp Clark Co., Ltd.

Bjerre's presentation of psychoanalysis is distinguished by an originality of approach which contains an appreciation of work and thought which preceded psychoanalysis, discussion of this in its various phases, and above all a deep spiritual appreciation, if so it may be called, of the therapeutic value of its principles in the reëducation and reëstablishment of a healthy psychical life.

The redirection of attention so that relief and health comes through the mind itself, he finds in Kant's experience and his testimony to his efforts in this direction with his own pain. Feuchtersleben embodied the same conception in his practice and in his poetic expression of it. Wetterstrand in his own private work with his patients effected the same sort of psychotherapy through hypnotism and foreshadowed the work of the later schools which established hypnotism, suggestion and other forms of psychotherapy upon a more scientifically recognized basis.

Then follows a brief history of the psychoanalytic development from this earlier work, with a brief description of its fundamental elements upon which it bases its work, the mechanism of the dream, of the repression and the construction of the neurosis out of the repressed psychic material. The separation which may occur in a life between conscious and unconscious thought processes, and the difficulties occasioned, with the service which psychoanalysis then renders toward readjustment is presented through the illustration of a case from the author's own clinical practice. There is also given a most instructive and helpful outline of the analysis of a subject suffering under paranoid projection of persecution, all of whose delusions were broken down through the analysis.

One chapter is devoted to the discussion of Adler's development along independent lines, in which Bjerre himself reveals some resistance against Freud's fundamental emphasis upon the sexual factor and inclines toward Adler's symbolic treatment of the incest problem. He finds that exclusive insistence upon the viewpoint of either, that of Freud upon fundamental causality and of Adler upon the essential drive of a final purpose, will not produce a complete therapy.

In his discussion of hypnosis, to which another chapter is devoted, he views it as a withdrawal to a primary, fetal state of rest and perhaps overemphasizes the value of inducing and continuing this state in order to help the patient. For he fails, as he shows in his discussion of the unconscious, to evaluate the transference phenomenon and therefore the advantage of the patient's conscious cooperation in the investigation and control of the unconscious, rather than by hypnosis to increase and encourage reliance and dependence upon the transference object.

The book is a collection of these separate discussions yet united in its one interest and in the author's expression of his point of view. Where this differs from that of the more strict followers of Freud, it is of interest as a stimulus to thought and inquiry and it is so imbued with the mission of psychoanalysis as a sublimative agency in the high goal of its therapy that it must carry conviction and inspiration to the worker in psychoanalysis or to the popular reader. Thanks are due the translator for a very happy transference of the charm of the book into English.

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Original Articles

AN ESTIMATION OF THE PROPORTIONS OF GRAY AND WHITE MATTER IN THE HUMAN BRAIN, MADE THROUGH THE PLANE OF THE OPTIC CHIASM BY MEANS OF THE PLANIMETER*

By A. E. Taft, M.D.

CURATOR, DEPARTMENT OF NEUROPATHOLOGY, THE HARVARD MEDICAL SCHOOL

The variation in the proportion of gray and white matter in the human brain is apparent, without definite measurement, if a large number of frontal sections through the same plane are examined; a degree of variation is seen also in the depth of the sulci.

Embryology

If the ontogeny of the cerebral hemispheres is considered, it becomes evident that there is opportunity for a disparity in the development of the cellular gray and white nerve-fiber elements. The first differentiation of the cerebrum is in the form of a thin-walled vesicle. Up to the end of the second month the hemisphere wall remains thin and undifferentiated. The thickening which begins then is not uniform in all regions at the same time, but is always more advanced at the basal portions adjoining the corpus striatum, from which point there is gradual extension over the whole pallium. This is the period of cell migration from the cytogenetic layer surrounding the inner cavity of the central nervous system, which gives rise both to the ganglion and the neuroglia cells. Donaldson concludes from histological evidence that the production of cells ceases at the end of the third month of fetal life. From the fourth fetal month onward, the wall thickens rapidly owing to the ingrowth of fibers, the first of which are entirely exogenous, being those which have grown in from the thalamus and corpus striatum. Subsequently the axones developed from the cortical neuroblasts are added.

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Grateful acknowledgment is made of the assistance of Prof. F. T. Kurt, the Chauncy Hall School, Boston, for his assistance in the use of the planimeter. The photographic work is by Mr. H. W. Taylor, Cambridge.

SUBSEQUENT GROWTH

It may be assumed, then, that the growth after birth is mainly if not entirely due to the increase of its non-nervous constituents and by the enlargement of its nerve elements. These latter changes, as Donaldson says, are dependent on the increase in the mass of the cell-body and the cell outgrowths, especially the neurone, and by the development of the myelin sheath by the neurone. The medullary substance is shown to be the chief source of increase in weight at this period, and very probably also in volume. Vulpius makes the statement that the newborn brain contains no myelinated fibers either in cortex or medullary substance, with exception of the precentral gyrus.

The process of myelinization in the human nervous system has been divided by Flechsig into three general periods: primary, intermediate and terminal. The first represents that part completed at the time of birth; the second that taking place during the first month after normal birth, and the third or terminal portion includes all myelin formation taking place later than one month after birth. The last represents that part which differentiates the human brain cortex from the anthropoid type.

Meckel found definite differentiation between gray and white matter about the eighth to the tenth week after birth, and about the sixth month after birth usually the same relation between gray and white which exists throughout later life.

Meynert says: "Not until several months after birth does the white substance appear in the frontal lobes, and not until the end of the fourth month do these parts become as white as they appear in the adult."

The work of Kaes demonstrated that in the brain of an idiot infant of three months, the bundles were in the most varied stages of development, and were only partially myelinated, while that of a microcephalic of ten months showed a numerical reduction in the fibers of the radiations of Meynert, but complete myelinization of those present. Further, concerning numerical values, Nissl considers that the lower organization contains more cells than the higher, while Kaes holds the opposite to be true; he says also that the cortex containing the fewest fibers, both as a whole and in relation to the different layers, is the broadest. He offers nothing in explanation, except the later statement that the breadth of the entire cortex, as well as of the individual layers, also the breadth of the projection fibers and the fiber content of the individual association layers, undergoes a continual change from childhood throughout life.

Material

The brain specimens used in this study are from eight diagnostic groups, namely: (1) Those showing no mental abnormality. (2) A small group of infants and microcephalics. (3) Feeble-minded (4) Epileptic. (5) Criminal. (6) Manic-depressive. (7) Dementia præcox. (8) Senile dementia. (9) Hemiplegics. (10) Unclassified.

Method Employed

A single section through the optic chiasm, in the frontal plane, was chosen from each specimen for measurement. This was fixed upon as a point at which the anatomical relations are the most constant. Some variation was found, but within narrow limits.

Tracings were made from photographs, or whole brain sections stained with the Weigert myelin sheath stain. The outer margin was outlined, and also the junction of white with the gray substance both of cortex and basal nuclei. The ordinary thin, transparent tracing-paper was employed.

Measurements were made by means of the compensating planimenter (Keuffel & Esser), an instrument of precision for measuring mechanically the area of a plane figure. It is particularly useful in finding the value of a surface of irregular outline. The instrument consists of two metal arms connected in such a manner as to form an easily movable elbow-joint. The free end of one arm is provided with a sharp needle point which is fixed in the surface of the table when the instrument is in use. On the distal extremity of the other arm is the somewhat rounded point which serves to trace the outline of the figure which is to be measured. Near the junction of these two arms is a disc which records the revolutions of the drum on which is read the further value of the measurement, including the first decimal place, and the vernier which indicates the figure of the second decimal place.

By following the outline of the brain section with the tracing point carefully, the area of the entire figure is obtained expressed in terms of square inches. The direction of the tracing arm should always be clockwise. If the line representing the junction of cortex and white substance be traced, the area of the surface within this line is found, and in the same manner the value of the basal gray matter can be measured. With these three sets of figures, the exact area of each portion of the section can be determined. Having found, in this manner, the value of the cortical gray, and the medullary white substance, their proportions were worked out by means of the slide-rule, which provides the means for accurate calculation to the third decimal place.

Discussion

Estimations of brain surfaces by means of the planimeter have been made by Ladame, working with von Monakow, in which not only the relation of white and gray was studied, but further division of the white substance was made; this report includes measurements on a series of frontal sections made on a single hemisphere of one brain. Further work with the planimeter has been reported from the same laboratory by Tramer, confined to the measurements of pyramidal bundles, following cell counts in the corresponding areas.

The section through the optic chiasm cuts the frontal cortex on the convexity of the brain, and thus provides a field representing, in some degree, that portion which is credited with psychic function. The measurements of the basal gray matter were disregarded as not pertaining directly to the chief interest of the study.

Nissl says that the development of the white substance of the hemispheres in animals is in proportion to the development of the cortex (its cell content) and he finds it also true of man, particularly so in the brain proper. He does not include the basal gray matter nor the olfactory area, which have not kept pace in this development, but on the other hand have fallen behind. Flechsig, with others of the earlier investigators, expressed the idea, now generally recognized, that the fibers which develop latest are those connected with the higher cerebral centers. This is generally accepted as both phylogenetically and ontogenetically true.

Measurements were made altogether on 157 frontal sections, representing a like number of specimens.

Group I. No Psychosis

In this group of nine individuals, only one is known to have had more than ordinary ability, suggested by the occupations recorded, such as housework, laborer, etc. With one exception, also, death was due more or less directly to malignant new growth. (Cases autopsied at the Huntington Memorial Hospital.) It was noted that there was no apparent change in brain weight due to the disease. The average age of the group is 40.7 years, with extremes of 27–60. The sexes are very evenly divided. The measurements averaged, cortex 47.70, white 53.29, or an excess of 6.59 parts of white matter. As the table shows there is a moderate range of variation. The frequence with which the cortex predominates considerably in one hemisphere, and the white substance in the other, without uniformity in choice of hemispheres, is notable. Gross examination offers no explanation of this phenomenon.

Group II. Infants. Microcephalics

This group of six specimens includes a wide range of ages, with extremes of 7 weeks and 45 years. The average measurements are: Cortex 55.375, and white, 44.625, or an excess of 10.75 parts of cortex. This is the direct opposite of the proportion in the preceding group I, but not a surprising finding if one recalls that the cortex is laid down before the development of the white substance. The table shows lack of uniformity between the two hemispheres. In all but two cases (presumably the youngest from the viewpoint of exact age), one hemisphere possesses more cortex than white substance, and other hemisphere the opposite relation.

Group III. Feeble-minded

A group of 18, with an average age of 27 years, with extremes of 3¼–62 years. Measurements average, cortex, 48.6; white, 51.4, an excess of 2.8 parts of white matter. If this result be compared with the two preceding, it might suggest that the feeble-minded represent a lack of development of fiber systems compared with those of the self-supporting laborer. But the individual measurements shown in the table indicate that five of the number are distinctly different from the remainder of the group, in that the amount of cortex in both hemispheres considerably exceeds the amount of white. If the group be re-averaged without this subgroup, the amount is found to be quite a different one: cortex, 45.8; white, 54.17, or 8.37 parts of white in excess of gray. On the other hand, the small subgroup of five averages, cortex, 55.87; white, 44.13, or 11.74 parts of cortex in excess of white. This average accords very closely with that of Group II, made up of infants and microcephalics. The records show that this small group of five includes 3 mongolian idiots (the entire number in the Waverley Research Series[1]), one nearly smooth brain (Waverley), (a case of agyria of the greater part of the convexity), and one moron, considered clinically as a case of dementia præcox.[2] The average weights for this small series is somewhat less than that of the remainder of the group, or 1,067 as compared with 1,231. The difference would be much greater, if the weight of the moron brain, 1,435 grams, were not included. This weight in a moron of 16 suggests macrocephaly with low mentality, when compared with the normal weight of the adult male brain, 1,350 grams.

Group IV. Epileptic

A group of 10 with an average age of 35.5 years; the extremes are 20–73 years. The measurements average, cortex, 44.40; white, 55.56, or an excess of 11.16 parts of white over gray. A similar lack of uniformity between the hemispheres of individual specimens is seen in a few of this group. Here is a greater difference in proportion than has been found in the preceding averages.

Group V. Criminal

A series of 7, all males, classified as "judicial homicides." The average age is 28.8 years, with individual variation from 19–36. The measurements average, cortex, 44.05; white, 55.95, or 11.9 parts white in excess of gray. This compares closely with the average in Group V, the epileptic series. Lack of uniformity between the hemispheres of the same brain exists in two cases of this group.

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[1] Fuller descriptions of the cases in the Waverley Research Series will be found in a forthcoming publication.

[2] Described by Dr. E. E. Southard in an earlier publication, On the Topographical Distribution of Cortex Lesions and Anomalies in Dementia Præcox, with some Account of their Functional Significance, American Journal of Insanity, October, 1914–January, 1915.

TABLE I

GROUP I. NON-MENTAL

Case No.	Sex	Age	Gray : White	Case No.	Sex	Age	Gray : White
13–73			L. 51.2 : 48.8	74	F.	56	L. 46.4 : 53.6
			R. 49.0 : 51.0				R. 46.8 : 53.2
11–12	M.	37	44.5 : 55.5	79	F.	38	41.0 : 59.0
			43.6 : 56.4				43.8 : 56.2
64	F.	46	41.3 : 58.7	84	F.	60	48.0 : 52.0
			41.0 : 59.0				54.8 : 45.2
66	M.	37	55.0 : 45.0	85	M.	25	44.6 : 55.4
			43.0 : 57.0				44.5 : 55.5
67	M.	27	57.4 : 42.6				
			44.8 : 55.2				

Average: Cortex, 46.70; white, 53.29.

GROUP II. INFANTS. MICROCEPHALICS

Case No.	Sex	Age	Gray : White	Case No.	Sex	Age	Gray : White
12–60	F.	7 wk.	L. 66.8 : 33.2	14– 6	M.	20	L. 53.3 : 46.7
			R. 74.2 : 25.8				R. 48.3 : 51.7
12–55	F.	4 mo.	54.7 : 45.3	14– 5	M.	5	46.2 : 53.8
			46.0 : 54.0				55.0 : 45.0
12–20	M.	45	52.6 : 47.4	15–12			58.0 : 42.0
			49.0 : 51.0				60.4 : 39.6

Average: Cortex, 55.375; white, 44.625.

GROUP III. FEEBLE-MINDED

Case No.	Sex	Age	Gray : White	Case No.	Sex	Age	Gray : White
12–20	M.	45	L. 52.6 : 47.4	15–25	M.	32	L. 45.2 : 54.8
			R. 49.0 : 51.0				R. 42.4 : 57.6
15–31	M.	14	61.2 : 38.8	15–26	M.	43	45.8 : 54.2
			64.2 : 35.8				40.7 : 59.3
14–73	M.	3¼	52.5 : 47.5	15–41	F.	31	42.8 : 57.2
			48.4 : 51.6				40.7 : 59.3
12–21	F.	62	48.0 : 52.0	15–48	M.	10	42.4 : 57.6
			55.8 : 44.2				42.3 : 57.7
13–13	M.	16	50.8 : 49.2	15–64	M.	23	54.5 : 45.5
			54.2 : 45.8				50.3 : 49.7
14–13	F.	25	48.2 : 51.8	16– 3	M.	38	48.0 : 52.0
			57.4 : 42.6				49.4 : 50.6
13–47	M.	26	42.0 : 58.0	16– 8	F.	5	52.2 : 47.8
			43.2 : 56.8				55.3 : 44.7
15– 2	M.	37	39.5 : 60.5	17– 2	F.	30	41.7 : 58.3
			45.8 : 54.2				48.9 : 51.1
15–24	F.	18	59.4 : 40.6	17– 3	M.	41	38.4 : 61.6
			56.6 : 43.4				40.4 : 59.6

Average: Cortex, 48.8; white, 51.4.

GROUP IV. EPILEPTIC

Case No.	Sex	Age	Gray : White	Case No.	Sex	Age	Gray : White
10–22	M.	22	L. 43.5 : 56.5	11–21	M.	40	L. 40.7 : 59.3
			R. 40.6 : 59.4				R. 46.1 : 53.9
11–32	M.	28	40.6 : 59.4	09–16	M.	29	48.9 : 51.1
			41.5 : 58.5				35.7 : 64.3
11–33	F.	50	48.5 : 51.5	10– 3	F.	20	39.9 : 60.1
			53.6 : 46.4				50.2 : 49.8
11–19	M.	25	37.5 : 62.5	11–25	M.	31	47.7 : 52.3
			43.8 : 56.2				40.5 : 59.5
11–15	F.	37	41.7 : 58.3	11–34	M.	73	50.8 : 49.2
			53.5 : 46.5				43.5 : 56.5

Average: Cortex, 44.40; white, 55.56.

Group VI. Manic-Depressive Insanity

Nineteen specimens; the average age 58 years, with the extremes 24–84 years. The average measurements, cortex, 46.10; white, 53.80, the white exceeding the cortex by 7.79 parts. This places the series between the non-mental and the feeble-minded groups. The individual counts show excess of gray over white in two cases. There is lack of uniformity between hemispheres in a much smaller proportion of cases than in the preceding groups.

Group VII. Dementia Præcox

A group of 20 cases with an average age of 49.5 years, varying from 23–71 years. The measurements average in the proportion of cortex, 43.36; white, 56.64, or an excess of white over gray of 13.28 parts. In no case does the gray exceed the white in both hemispheres, but in three instances this relation exists in the left hemisphere only, while in one the table shows a very slight excess of gray in the right, though the proportions are very nearly equal in both hemispheres. This series shows the highest average of excess of white substance yet found, and suggests that the condition may involve a degree of atrophy of cortex alone, possibly due in a measure to the degeneration of intra-cortical fiber systems. As a means of control of this possibility, the following group is included.

Group VIII. Senile Dementia

The average age of the 12 cases chosen is 74.58 years, ranging from 59 to 83 years. The measurements average, cortex, 41.47; white, 58.52, making an excess of 17.05 parts of white over gray, which is much the greatest average difference. This would seem to bear out the suggestion, that the greater variation in the proportions of gray and white in the dementia præcox series may be due to intra-cortical atrophy, and one might presume that the condition in the epileptic and criminal groups is a similar one, but of developmental rather than degenerative origin.

Group IX. Hemiplegics

In addition to the above 8 groups, a small series is added which includes 5 cases, all of which show some gross lesion or anomaly.[3] All were epileptic, and clinically either hemiplegic or hemiparetic.

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[3] Further described in an article which appeared in the Review of Neurology and Psychiatry, June, 1916, entitled Focal and General Unilateral Brain Atrophy: Effects upon the Corpus Callosum, by A. E. Taft.

GROUP V. CRIMINAL

Case No.	Sex	Age	Gray : White	Case No.	Sex	Age	Gray : White
12–22 . . .	M.	36	L. 46.2 : 53.8	12–49 . . .	M.	25	L. 42.6 : 57.4
			R. 53.6 : 46.4				R. 42.8 : 57.2
12 . . .	M.	22	. . . .	51 . . .	M.	36	43.2 : 56.8
			40.3 : 59.7				46.1 : 53.9
13 . . .	M.	19	. . . .	56 . . .	M.	33	38.4 : 61.6
			42.4 : 57.6				42.6 : 57.4
37 . . .	M.	31	40.4 : 59.6				
			50.0 : 50.0				

Average: Cortex, 44.05; white, 55.95.

GROUP VI. MANIC-DEPRESSIVE INSANITY

12– 9 . . .	F.	64	L. 50.2 : 49.8	13–65 . . .	F.	65	L. 44.1 : 55.9
			R. 53.0 : 47.0				R. 45.9 : 54.1
13–20 . . .	M.	67	43.2 : 56.8	13–67 . . .	F.	74	46.1 : 53.9
			48.1 : 51.9				48.1 : 51.9
11– 5 . . .	F.	70	45.0 : 55.0	14– 7 . . .	F.	64	47.6 : 52.4
			41.2 : 58.8				45.1 : 54.9
12– 8 . . .	F.	53	46.0 : 54.0	14–26 . . .	F.	50	51.4 : 48.6
			43.4 : 56.6				47.6 : 52.4
12–11 . . .	M.	84	38.8 : 61.2	1420	M.	46	40.4 : 59.6
			42.6 : 57.4				42.0 : 58.0
12–19 . . .	M.	53	43.0 : 57.0	1426	F.	53	49.7 : 50.3
			43.3 : 56.7				45.1 : 54.9
13– 7 . . .	F.	64	45.0 : 55.0	1584	M.	50	49.3 : 50.7
			45.2 : 54.8				46.8 : 53.2
13–51 . . .	F.	72	43.3 : 56.8	1597	F.	75	40.3 : 59.7
			42.8 : 57.2				47.4 : 52.6
13–55 . . .	F.	51	48.7 : 51.3	1495	F.	24	48.3 : 51.7
			49.2 : 50.8				50.8 : 49.2
13–63 . . .	F.	63	52.7 : 47.3				
			51.3 : 48.7				

Average: Cortex, 46.10; white, 53.89.

GROUP VII. DEMENTIA PRÆCOX

1615	F.	58	L. 50.9 : 49.1	1507	F.	60	L. 44.7 : 55.3
			R. 49.3 : 50.7				R. 42.2 : 57.8
1602	F.	62	38.4 : 61.6	1491	F.	53	45.3 : 54.7
			43.8 : 56.2				40.4 : 59.6
1593	F.	71	45.3 : 54.7	1487	F.	34	46.2 : 53.8
			46.3 : 53.7				46.2 : 53.8
1583	F.	23	49.3 : 50.7	1472	F.	55	41.6 : 58.4
			48.4 : 51.6				43.7 : 56.3
1575	F.	64	48.8 : 51.2	1407	F.	65	50.4 : 49.6
			40.7 : 59.3				44.2 : 55.8
1574	F.	59	43.8 : 56.2	1405	M.	46	44.6 : 55.4
			43.6 : 56.4				44.7 : 55.3
1571	M.	54	40.4 : 59.6	1335	M.	32	47.5 : 52.5
			41.3 : 58.7				40.0 : 60.0
1540	F.	29	44.8 : 55.2	1319	F.	31	30.1 : 69.9
			50.3 : 49.7				32.5 : 67.5
1518	F.	45	45.5 : 54.5	1317	F.	44	52.2 : 47.8
			40.8 : 59.2				46.4 : 53.6
1509	M.	58	21.5 : 78.5	1297	F.	47	42.8 : 57.2
			34.5 : 65.5				40.2 : 59.8

Average: Cortex, 43.36; white, 56.64.

The average age is 21.4 years, varying between 18 and 30. The measurements average, cortex, 53.99; white, 46.01, or an excess of 7.88 parts of gray over white, which brings the series in the class with the infants, microcephalics and mongolians. The table shows that in numbers 10 and 7, the gray exceeds the white in the left hemisphere, while the reverse proportion is present in the right side. In these two specimens the left hemispheres are much smaller than the right (Figs. 1 and 2), which suggests that the smaller hemisphere in each case had been retarded in development at a point before the fiber systems were normally formed. In contrast to these two is number 26, in which the proportion is more or less uniform with those in which the white is proportionally greater than the gray. Fig. 3 shows that there is a considerable difference in the size of the hemispheres, due to a destructive lesion involving the entire central convolutions on the right side. The measurements

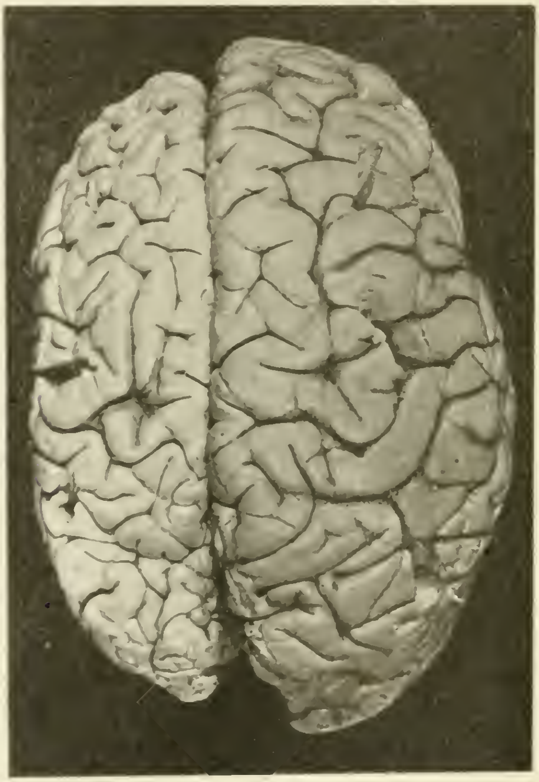

Fig. 1.

show that, in spite of this difference, the proportion of gray to white is very nearly the same as that found in the opposite, unaffected hemisphere. This suggests that a degenerative process affects both elements of the central nervous system equally, in contrast to the developmental defect, apparently due to arrest at a period when the gray matter is present in greater proportion than the white, though both specimens present marked lack of uniformity in the size of the hemispheres. Number 90 is another example of a similar condition, in which there is little difference between the proportions found in the two hemispheres, following a degenerative lesion involving the entire frontal and parietal opercula, the Island of Reil, and the first temporal convolution.

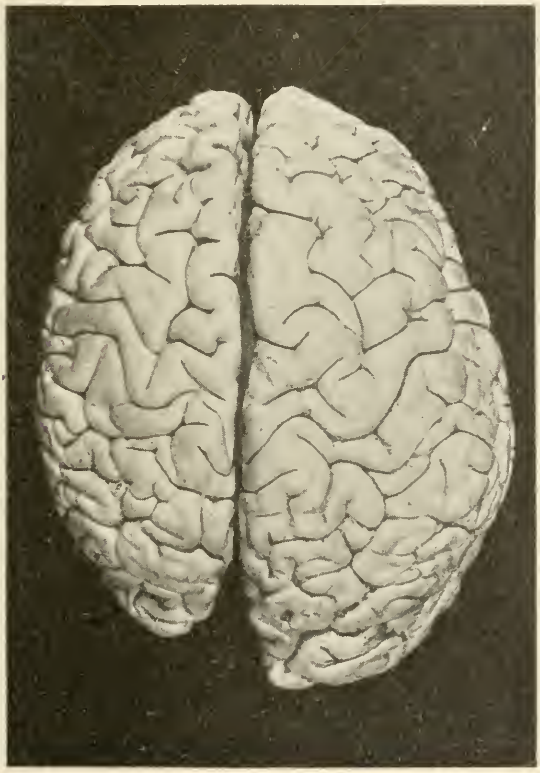

FIG. 2.

Group X. Unclassified

One single case is added which does not seem to fall in any of the classifications included here. The measurements are: Cortex, 46.1;

white, 53.9, making the excess of white substances 7.8 parts. This brings one to the point of considering the relation existing between this case, the nearest normal, the feeble-minded, and the manic-depressive groups, which fall in very nearly the same average proportions from the standpoint of these measurements. All gross measurements, whether by volumetric methods, which have been frequently employed, or differentiation by weight, such as has been done by Cruickshank recently, or by planimetric calculations, such as are used here, are the first step in exact determination of brain values. For final evaluation, the most painstaking microscopical examinations, both qualitative and quantitative, must necessarily be added. Such methods are exemplified in the work of Bolton and others.

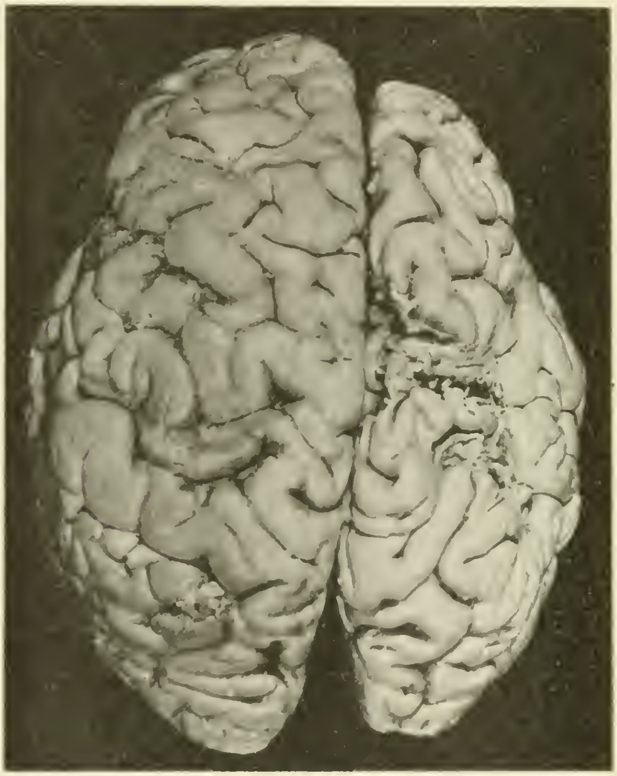

Fig. 3.

GROUP VIII. SENILE DEMENTIA

Case No.	Sex	Age	Gray : White	Case No.	Sex	Age	Gray : White
16–27 . . .	F.	64	L. 45.6 : 54.4 R. 45.4 : 54.6	12–45 . . .	F.	72	L. 39.7 : 60.3 R. 50.6 : 49.4
13–11 . . .	F.	71	47.0 : 53.0 48.2 : 51.8	13–21 . . .	F.	83	47.6 : 52.4 48.6 : 51.4
12–33 . . .	F.	80	47.3 : 52.7 51.6 : 48.4	13– 4 . . .	F.	83	45.8 : 54.2 52.2 : 45.8
13–17 . . .	F.	83	48.3 : 51.6 44.5 : 55.5	13– 3 . . .	F.	80	45.5 : 54.5 48.6 : 51.4
13–18 . . .	F.	72	39.7 : 60.3 38.5 : 61.5	12–52 . . .	F.	59	43.4 : 56.6 44.4 : 55.6
13–27 . . .	F.	69	39.0 : 61.0 39.5 : 50 5	15– 7 . . .	M.	79	43.4 : 56.6 38.9 : 61.1

Average: Cortex, 41.47; white, 58.52.

GROUP IX. HEMIPLEGICS

14– 7 . . .	F.	22	L. 63.0 : 37.0 R. 65.6 : 34.4	11–26 . . .	F.	19	L. 48.0 : 52.0 R. 48.5 : 51.5
11–10 . . .	F.	18	65.5 : 34.5 39.7 : 60.3	11– 7 . . .	M.	30	53.7 : 46.3 49.2 : 50.8
10–90 . . .	M.	18	55 5 : 44.5 51.2 : 48.8				

Average: Cortex, 53.99; white, 46.01.

GROUP X. UNCLASSIFIED

Case No.	Sex	Age	Gray : White
12–2	M.	54	L. 45.5 : 54.5 R. 46.7 : 53.3

Average: Cortex, 46.1; white, 53.9.

SUMMARY

Planimetric measurements were made on a single frontal section through the plane of the optic chiasm, to determine the proportions of white and cortical gray.

Measurements were made on 157 specimens, by means of photographs and whole brain sections stained by the Weigert myelin sheath method.

The following groups were included:

I. Showing no psychosis.
II. Infants. Microcephalics.
III. Feeble-minded.
IV. Epileptic.
V. Criminal.
VI. Manic-depressive insanity.
VII. Dementia præcox.

VIII. Senile dementia.
IX. Hemiplegics.
X. Unclassified.

The average of the proportions found in non-mental, feeble-minded, manic-depressive, and unclassified, indicates only a small margin of difference between these groups. Epileptic and criminal are very closely allied, as are the dementia præcox and senile dementia groups. The averages in these 8 series indicate that the white substance is present in the plane measured, in greater proportion than the cortical gray. Opposed to this finding is the proportion in the infants and microcephalics, including the mongolian group, in which the average proportion of cortical gray exceeds that of the white substance.

The greater average proportion of white than gray in the dementia præcox group suggests that a degree of cortical atrophy exists in this plane, and this is further indicated by increase in the average proportion of white to cortical gray in the senile dementia group, in which cortical atrophy is easily expected.

In the group including infants and microcephalics, the excess proportion of cortical gray to medullary white in microcephalics is apparently due to lack of normal development of fiber systems.

Difference in size of the hemispheres of a brain may be due to arrest of development of one and not the other, or may be due to a destructive degenerative process in one hemisphere only. In case of the former condition, the relation of cortical gray to white substance may represent the normal period of development at which the arrest occurred, thus conforming with the proportion found in the infant and microcephalic groups, or representing what might be characterized as a hemi-microcephalic. In the second instance, with gross destructive lesion, the proportion between cortical gray and white on the affected side appears to be the same as on the more nearly normal side, suggesting that the white and gray disappear quantitatively in the same proportion.

Conclusion

Planimetric measurements made on frontal sections through the optic chiasm from a group of human brains yield the following proportions:

Infants, microcephalics and mongolian idiots, proportion of gray greater than white, 55.0:44.6.

Non-mental (taken as normal), greater proportion of white (in contradistinction to the preceding), 46.7 : 53.0.

Manic-depressive insanity, nearly identical with normal, 46.1 : 53.8.

Feeble-minded, proportions nearly equal, 48.6 : 51.4.

Epileptic and criminal, proportions almost exactly alike, 44.4 : 55.5 and 44.0 : 55.9 respectively. Proportion of white relatively greater than in non-mental and manic-depressive groups.

Dementia præcox, proportion of white slightly greater than in the preceding groups, 43.3 : 56.6. This proportion suggests some degree of cortical atrophy.

Senile dementia, proportion of white still greater than that in the dementia præcox group, 41.4 : 58.5.

In the hemiplegic group, the proportion suggests that found in the infant-microcephalics with the figures, 53.9 : 46.0.

Sex, age and brain weight do not appear to have any constant relation to the proportions existing between white substance and cortical gray, although in some cases the proportion of white varies directly with the brain weight.

Brains of mongolian idiots manifest the infant-microcephalic relation between gray and white substance.

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JACKSONIAN FITS IN MULTIPLE SCLEROSIS*

By Hugh T. Patrick, M.D.

CHICAGO

The symptoms of multiple sclerosis are almost uniformly those of defect, symptoms of irritation being quite exceptional. Pain is very rare, even marked paresthesia is exceptional. Subjective sensations of smell and taste are almost unknown, tinnitus is seldom observed. Although the optic nerves are so often involved, scintillating scotoma is a great rarity; little flashes of light have been more often observed. The same rule applies in the motor sphere. The symptoms are those of defect. The customary spasticity aside (which is a symptom of defect) any sort of muscular spasm is most unusual. Even slight muscular twitching is rarely seen. While apoplectoid attacks belong to the banal symptomatology of the disease, epileptic or epileptoid seizures seldom have been recorded and mention of Jacksonian fits is scarcely to be found. A rather extensive examination of the literature has disclosed only one detailed case, though Mueller[1] mentions having seen two cases. The one fully reported case is the frequently cited one of Gussenbauer.[2]

The patient was a man of thirty-one years whose trouble began with scintillating scotoma followed by an apoplectiform attack, paralysis of the right arm and leg and aphasia. The aphasia disappeared in three days, the paralysis in fourteen. Five months later there was a similar attack and five months after this one a third with delirium and right-sided convulsions. After this attack the hemiplegia improved very slowly and within a month he had another seizure. A month after this it was noted that the right arm and leg were paretic and ataxic with exaggeration of the deep reflexes, that there was some speech defect (sic) and mild aphasia. Six months from this time, a diagnosis of brain tumor having been made, he was operated upon. The cortex appeared normal but to palpation there was apparent a diffuse induration which extended from the third frontal convolution back over the central convolutions. The borders of the induration were not well defined. The brain was not incised and condition after operation was much as before. The right-sided spasms continued off and on, the other symptoms gradually increased, the patient slowly deteriorated and died eight years after the onset. During the last year the fits grew worse, lasting from two minutes to two hours. The autopsy report (by an assistant in the psychiatric clinic) said "multiple sclerosis." Report of the microscopic findings was promised, but I have been unable to find it. It is worthy of note that the posterior central convolution was greatly thinned, to a narrow strand (Leiste) 3 millimeters in diameter. Such a degree of atrophy or sclerotic shrinking is hardly compatible with multiple sclerosis. So, although lesions were found in brain and cord, in the absence of microscopic examination, some slight doubt must rest upon the diagnosis. Certainly the clinical course was far from typical.

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* Read at the forty-third annual meeting of the American Neurological Association, May *21*, *22* and *23*, 1917.

[1] Die Multiple Sklerose des Gehirns und Ruckenmarks, 1904.

[2] Wien. Klin Wochens., 1902, No. 38. Two articles, one page 175, the other page 964, both including this case.

My own patient, a lad of 18, first seen Dec. 22, 1916,[3] was perfectly well until some time in July, 1915, when one morning on rising he noticed that the *right* hand felt numb and was somewhat clumsy. This first day the leg was not at all or but little affected but the trouble rather rapidly increased so that at the end of a week he could scarcely feed himself, could not write and use of the right leg was distinctly impaired. For about two months the leg continued to grow worse though he could always walk without assistance. The hand was almost useless. About two weeks after the onset, the mother noticed that the left palpebral fissure was smaller. Otherwise there seems to have been no facial difference. There was no pain, no headache, no vomiting, no dizziness, though he seems to have reeled somewhat in walking. There was no aphasia, no dysphagia. No eye symptoms were noticed. At times the voice changed "as if he were hoarse." Mentally he seems to have been normal. About four months after the onset he began to improve and in six months was quite well again. Both the patient and his family considered that he had entirely recovered. One may note that he had no antiluetic treatment. He remained to all intents and purposes well until July, 1916, when he contracted something like "a cold in the head." Soon he began to feel dizzy and "couldn't walk straight." Then the *left* arm and leg began to be weak. September first he was put to bed in the Alexian Brothers Hospital, but continued to grow worse. In four weeks he could not walk at all and the left arm was practically useless. The right side, formerly paralyzed, seems to have been all right. While in the hospital, where he remained only four weeks and where the blood

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[3] Through the courtesy of Dr. Carl H. Christoph.

Wassermann was negative (Dr. Heym), he vomited once and once had a severe epistaxis. At this time he was receiving intramuscular injections of cacodylate of soda. After leaving the hospital his condition remained about stationary but during the next six weeks he had three attacks of repeated vomiting, each lasting three or four days. These were attended with dizziness but no headache. About the middle of November the left hand improved and was better for three weeks, then returned to *status quo*. For a short time before my examination he had been able to walk alone. Once in October for a few seconds the right hand felt numb and cramped. December 4, 1916, he had for a few seconds a "buzzing" sensation in the left lower jaw and this recurred three or four times on subsequent days. Since August there is said to have been occasional diplopia and the patient says that while in the hospital vision of the left eye was impaired. On September 6, 1916, Dr. Heym found optic neuritis on the left side. Two weeks later it had disappeared.

On December 19, three days before I saw him, he suddenly began to have convulsions limited to the right side and without loss of consciousness. From 12:20 p.m. to 10 p.m. he had 14 seizures, each lasting probably less than a minute. The next day he had six and the third day only one. I saw him at about 8 p.m. the following day. He had had none that day but had two in my presence which are said to have been just like the preceding ones. The patient thought lying on the right side tended to bring them on. Previously, lying on the right side would bring on dizziness. In the attack the (supine) patient raised the right arm to an angle of about 45 degrees from the bed and about the same angle from the body, the elbow was semiflexed, the fingers spread and slightly flexed. The mouth was opened, the right facial muscles and right arm in tonic-clonic spasm. Contractions seemed to begin simultaneously in face and arm. The patient was covered so that the leg could not be well observed but I think it also was convulsed, though to less extent than arm and face. During the seizure the pupils did not dilate and I believe they did respond to light, though facilities for observation were poor. There was no unusual flow of saliva and consciousness apparently was unimpaired. During the seizure the patient did or tried to do things I asked him to do and afterward could repeat all I had said to him. After neither seizure was there any paresis of arm or face. He was put on full doses of sodium bromide but had an attack on December 23 and 25, none since. Examination showed considerable disability of the left arm and leg, practically none of the right, exaggeration of all deep reflexes, very faint abdominal reflexes, double Babinski (not very marked), slight nystagmus, no speech trouble, equal and normal pupils and normal eye grounds. Mentally the patient seemed to be quite normal. Neither in the history nor in the examination was there any evidence of emotional instability, increase of suggestibility or of other symptoms indicating hysteria. No anesthesia or analgesia was found and hearing was normal. Vision was good.

On January 28, 1917, his condition was about the same. He could just walk a few steps alone. The right hand showed practically no impairment, the left was very clumsy. About a month later I noted that the gait was spastic-ataxic, jerky, no reeling. Gross strength of hands and arms was good but there was irregular intention tremor of the left. There was distinct though not marked nystagmus when looking to the left. Babinski sign both sides, more marked on the right, slight ankle clonus either side, knee jerks exaggerated, all deep reflexes of arms exaggerated except right triceps, which was diminished. Jaw jerk not increased. Cremaster reflex faint and weaker on the left; lower abdominal absent, upper left diminished, right weaker still. Patient stated that for a few days, about a week before, he had been unable to move the toes of the right foot. From this time gradual though steady improvement was noticed and in less than three months he was able to walk about outside. He busied himself with the care of chickens and chores about the house and continued to grow better for several months, when the trouble came to a standstill. On December 20, 1917, the following were noted. He walks with a quick, fairly free step, but is somewhat spastic and occasionally the right toe catches the floor a little. Can hop on either foot but not well and less well on the right. Has no material trouble in mounting stairs, but descends less easily. The right hand is very nearly normal, he writes fluently and well, though not quite so well as before the present illness. As an amateur he does cobbling well but says that occasionally the right wrist feels weak and tired. The left hand is distinctly clumsy and shows typical though not exaggerated intention tremor. Vision and pupils are normal, the left palpebral fissure is still smaller than the right and there is nystagmus on looking strongly to the right or left or upward. There is double Babinski and double ankle clonus, more sustained on the right. The knee jerks are about equal and but little exaggerated. Cremaster present; lower abdominal absent, upper present on both sides. Wrist jerks and biceps jerks brisk and right greater than left. The left triceps jerk greater than right. Jaw jerk absent. No sensory blunting discovered. With proper diet the bowels are regular and sphincters normal. Ordinarily the patient is very amiable, helpful and willing, but rather easily excited and occasionally transiently irritable. Speech is normal and memory good.

In the absence of necropsy one may not be absolutely certain of the diagnosis but the clinical course and physical findings are quite characteristic of multiple sclerosis. That the seizures were typical Jacksonian fits could not be doubted by any witness familiar with such fits. In view of the manifold manifestations of multiple sclerosis and of the fact that the plaques not rarely invade the cerebral cortex, the only wonder is that such hyperkinesias are not more frequent. This case seems to be worthy of record because the rarity of focal fits in multiple sclerosis might be a factor in leading one to an erroneous diagnosis of brain tumor or other operable lesion.

LEUKEMIC INFILTRATION IN THE SPINAL CANAL AS A CAUSE OF PARAPLEGIA*

By Peter Bassoe, M.D.

ASSOCIATE PROFESSOR OF MEDICINE (NERVOUS AND MENTAL DISEASES) IN RUSH MEDICAL COLLEGE, CHICAGO

Involvement of the central nervous system is comparatively uncommon in all forms of leukemia. The lesions most frequently described are: hemorrhages, often multiple, more frequently met with in the brain than in the cord; degenerations of the spinal cord, similar to those seen in pernicious anemia; small foci of leukemic infiltration of the cord or brain substance associated with hemorrhage and necrosis; finally, macroscopic epidural or dural infiltration of sufficient size to cause compression symptoms. In twenty-six cases collected by Baudouin and Parturier, the dominating lesion in eight was hemorrhage, in seven leukemic infiltration, and in eleven cord degenerations.

Leukemic Infiltration of Spinal Dura with Paraplegia.—Only two cases so designated, with necropsy, seem to have been reported so far. In 1898 Eichhorst reported the case of a boy of seventeen years in whom enlargement of the axillary lymph nodes had appeared two years previously. On his admittance to the hospital the leucocyte count was 41,650. The differential count given as polymorphonuclears 79 per cent., mononuclears 16 per cent. and eosinophiles 5 per cent. has led a subsequent writer, Stursberg, to question the leukemic nature of the case. Nine weeks before death the patient complained of heavy feeling in the legs. Ankle clonus and increased knee jerks were present, but there was no sensory disturbance until three weeks later. Four days after the onset of heavy feeling the patient became unable to walk, and three days later the bladder became paralyzed. Soon the complete picture of a transverse lesion of the thoracic cord was present: total paraplegia, loss of sensation below the lower level of the thorax, urinary retention, and bedsores.

Necropsy: At fifth to seventh thoracic segments a grayish mass 3 cm. long was found, which was loosely adherent to the posterior

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* Read before the Chicago Society of Internal Medicine, May 28, 1917.

surface of the dura and to the bone. The latter was not invaded. The pia was hyperemic and the cord at the fifth thoracic segment was distinctly softened. There were no changes in the skull or brain. On histologic examination the epidural mass was found to be mainly made up of small mononuclear cells, but there were also large cells with from two to six nuclei. The softened portion of the cord showed marked degenerations with looseness of texture of the white matter, while the gray matter was well preserved. The rest of the cord showed only the ascending and descending degeneration to be expected.

The second and unchallenged case is that of Stursberg. A man, thirty years old, suffering from typical spleno-myelogenous leukemia as evidenced by very large spleen and leukocyte count of 480,000, mostly myelocytes, was suddenly taken with severe pain in the back radiating to the legs. The next morning the legs were totally paralyzed, knee and ankle jerks absent. There was urinary retention, also loss of sensation in the legs. Bedsores developed. The paralysis and sensory disturbance remained stationary until death eleven days after the onset of paralysis. Necropsy by Ribbert showed that the dura of the lower thoracic and lumbar cord was surrounded by a reddish-brown mass of a maximum thickness of 1 cm. in which the roots were embedded. Histologically the epidural mass consisted of myeloid tissue. The cord above the lesion was normal except for ascending degeneration while the compressed portion showed a few myeloid cells in the pia and some small hemorrhages.

An earlier case than either of these, with "tonic flexor contractions" in the arms and "leukemic growth along the vertebræ" at necropsy, is reported from ophthalmologic standpoint by A. Osterwald (1881), the principal feature being bilateral exophthalmos due to orbital tumors. Nothing is said about the spinal cord. The proportion between red and white blood cells was as three or four to one. The blood findings and absence of green color of the tumors evidently led the author to the correct diagnosis of leukemia, otherwise one would have found the case reported as "chloroma" or sarcoma.

"Chloroma" and Its Relation to Leukemia.—The scarcity of cases of leukemic epidural and dural infiltrations compressing the cord is only apparent as most of them are recorded in the literature as cases of "chloroma," a condition admittedly having all the features of leukemic infiltrations and in addition a grass-green color

of the tissue which persists only some ten minutes after the tissues have been exposed to the air, and the cause of which no one has been able to determine. Earlier writers dwelt on the greater tendency to indiscriminate invasion of adjacent tissues, "heterotopies," in chloroma, the late appearance of leukemic blood changes, and the fact that the only leukemic blood picture observed was that of the acute lymphatic variety. Now, however, the consensus of opinion is that "chloroma" and leukemia are not separate diseases, because: (1) Green tumors have been found in all forms of leukemia, acute and chronic, myelogenous as well as lymphatic. (2) "Heterotopies," or invasion of various organs and tissues, occurs in the cases of the ordinary leukemic as well as the green infiltrating growths. As products of efforts at subdividing the leukemic diseases according to the blood picture, the tendency to tumor-like tissue invasion and the production of green pigment we meet with such terms as "leukosarcoma" and "chloroleukosarcoma" for lymphoid infiltrations, without and with green color respectively, and "myelosarcoma" and "chloromyelosarcoma" for the corresponding myeloid infiltrations.

Cases of Cord Compression Recorded in the Literature in Connection with Chloroma.—Full reviews of all cases reported up to time of publication are found in the exhaustive articles by Dock (1893), Dock and Warthin (1904) and Lehndorff (1911). Dock in his first article was fully aware of the leukemic nature of chloroma, seventeen cases of which had been reported up to that time. In five of these, infiltrations of the vertebræ and ribs were mentioned. Dock and Warthin in 1904 collected twenty-two additional cases, in nine of which the vertebræ were affected, "usually in the periosteum of the bodies, sometimes in the dura, sometimes in the processes, or in the fat of the vertebral canal." The following cases, in chronological order, are the principal ones in which vertebral involvement had caused cord symptoms. (It is beyond the scope of this paper to discuss the much larger number of cases of "chloroma" of the skull causing exophthalmos and various cranial nerve paralyses.) A. Burns in 1823 described the case of a young man with orbital tumors, exophthalmos, blindness, later paraplegia and paralysis of the bladder. Greenish-yellow tumors of the bones were found at the necropsy. Dittrich (1846) in a woman who died with symptoms of scorbutus found "dirty green" tumors on the periosteum of the vertebræ, ribs and cranium. In Dock's case (1893) there was pain over the sternum but there is no mention of any paralysis. There was a layer of greenish tissue all along the spine. The periosteum of the spinal canal was invaded and the loose fat in the canal converted into soft-greenish masses. W. Rosenblath (1902) describes a boy, fifteen years old (case 1), taken with pain in the region of the right hip having the characteristics of sciatica. Then followed bilateral exophthalmos, optic neuritis, severe headache, blindness in the right eye, left facial paralysis, great weakness in the arms and legs, atrophy of the muscles of the right thigh. The blood became leukemic during the illness, with white count of 300,000. There was retention of urine for a few days before death which took place four months after the onset. Necropsy: Large greenish tumor along the anterior surface of the thoracic and lumbar vertebræ, also greenish tumor mass inside the lumbar spine. It seemed to have grown through the intervertebral foramina. There were no gross changes in the brain and cord but microscopically there was degeneration in the posterior columns in the lumbar and thoracic regions. Rosenblath's second patient, a boy eight years old, also had bilateral exophthalmos caused by orbital tumors. There is no mention of neurologic symptoms, but there was a flat, greenish tumor mass along the thoracic and lumbar spine. Harris and Moore (1902) also describe a case, that of a boy fourteen years old beginning with symptoms of left sciatica, followed in two months by partial paralysis of the upper and lower extremities, great pain in the left hip, marked right exophthalmos, almost complete deafness, and bilateral facial paralysis. Death three months after the onset. Necropsy: "Numerous nodular masses of new growth of a grass-green color were found in connection with the inner aspect of the dura mater, with the periosteum of the orbits, of the vertebræ, the sacrum, the iliac bones, and in the kidneys." Gümbel, in 1903, in a paper on chloroma and its relation to leukemia, described a boy nineteen years old who first was taken with tinnitus and deafness in the right ear, two weeks later with paralysis of both legs. Nothing is said about pain, other sensory disturbances, and reflexes. Death two months after the onset of tinnitus. Necropsy: Large decubitus. In the spinal canal the circumdural fat was greenish, firm, and adherent to the dura. On the left side of the cauda a thin, green pseudomembrane, 10 cm. long, could be peeled off. There were white patches on the posterior surface of the lumbar and thoracic cord, with nodules at the exits of the roots. The cord was here and there soft and red. There were large tumors along the anterior surface of the spine. In 1904 Dock and Warthin in addition to reviewing fully the subject of chloroma and its relations to leukemia reported a new case with the blood findings of acute leukemia, general weakness, headache, tinnitus and deafness. The characteristic findings in connection with the spine were present, namely, a flattened greenish mass along the anterior part of the spine and softening of the vertebral bodies so they could be cut with a knife. The cord and meninges were not altered. In the same year Klein and Steinhaus described the case of a man, thirty-eight years old, in whom, as in the cases of Harris and Moore and Rosenblath, the first symptom was sciatica. This was followed by pain in the sternum and along several ribs. Duration three months. During the last six weeks of the illness the leukocyte count increased from 20,000 to 41,000; lymphocytes 66 per cent.; myelocytes varied from 16 to 32 per cent. Post mortem: There were greenish tumors in the skull, sternum, etc., but nothing is said about the spinal canal or cord.

Weinberger (1907) reported three cases of chloroma, one of them, case three, with pronounced cord and brain symptoms. A boy, fifteen years old, first complained of stiffness in the back, then pain in the lumbar region, pain in the left thigh, loss of flesh, pallor, urinary incontinence, right facial paralysis, right-sided deafness. There were retinal hemorrhages, Bence-Jones albumose in the urine, increased knee and ankle jerks, but no total paralysis. The leukocyte count rose from 13,000 to 72,000 in the last three weeks of the illness, and the lymphocytes reached 94 per cent. Necropsy: Numerous "chloromas" of dura, pericardium, stomach and bladder. There were numerous nodules on the front and sides of the spinal column, and an infiltration 1 cm. thick along the posterior wall of the spinal canal, compressing the thoracic region of the cord. There were also hemorrhages in the dura, pia and the cerebellum. In 1909 Saltykow related the case of a paraplegic woman, thirty-seven years old, with clinical diagnosis of tuberculosis of the spine, no blood examinations having been made during life. The patient had complained of vague symptoms for ten months, and two months before death a swelling appeared on the left side of the neck, and the left arm became paralyzed. Two weeks before death there was sudden paralysis of the legs, bladder and rectum. Necropsy: Greenish tumor mass ("myeloid chloroma") along the left side of the spine and in front of the sacrum. Tumor mass 1 cm. thick in the spinal canal, between the vertebral bodies and the dura from the fifth to the tenth thoracic vertebræ, and for this entire distance the cord was compressed and soft, without markings on cross section.

Recently, an excellent clinical description of a case of acute leukemia with paraplegia was given by Schwab, Sale and Schmidt, that of a man fifty years old, taken with pain in the back, followed by paraplegia, loss of sphincter control, abolition of tendon reflexes, and anesthesia from the nipple level down. There was fever at the onset but the blood examination then showed only 11,500 leukocytes, 73 per cent. of which were polymorphonuclears. Gradually the picture of acute leukemia developed, the leukocyte count reaching 137,200, practically all cells being mononuclear but of a peculiar type, fully described in the paper. Death occurred two months after the onset. Necropsy was refused. The authors do not especially correlate this case with those we are here discussing, but the resemblance is so striking that we may assume this to be a case of leukemic infiltration in the spinal canal with compression of the cord.

Writer's Case.—The following case is an example of tumor-like myeloid infiltration of the vertebræ, outside and inside the spinal canal, without green color, in a case of spleno-medullary leukemia of many years' standing.

The patient, a married woman, twenty-eight years old, was first admitted to the service of Dr. Frank Billings in the Presbyterian Hospital on April 29, 1914. Six months previously she had given birth to her third child and during pregnancy she became pale and complained much of shooting pains along the left side of the trunk and in the left leg and of headache. Two days after delivery the nurse noticed a swelling in the abdomen which was recognized by the physician as an enlarged spleen. On admittance to the hospital the hemoglobin was 40 per cent., erythrocytes 3,410,000, leucocytes 476,500. Of the latter 40 per cent. were neutrophilic myelocytes and 3.5 per cent. eosinophilic myelocytes. The spleen was very large, its length as determined by percussion being 40 cm. The liver was palpable 9 cm. below the costal margin and the thyroid was considerably enlarged. The urine contained albumen but no casts. During a stay of seven months in the hospital she had a gradually decreasing fever and under treatment which included the use of the X-ray, benzol by rectum, and extraction of several bad teeth, the blood and the general condition gradually improved. When she left the hospital in November, 1914, the leucocyte count was 13,000 and the hemoglobin 94 per cent. In March, 1916, a therapeutic abortion was performed. At that time the blood showed 60 per cent. hemoglobin, 3,300,000 erythrocytes and 24,400 leucocytes. After leaving the hospital she continued having X-ray treatments until August, 1916, and was feeling very well until about December 15, 1916, when she contracted a severe cold attended by such severe pain in the thorax that pleurisy was suspected and the chest strapped. No fluid was found on puncture. A feeling of fulness and dull pains in the chest remained. On February 1, 1917, she felt chilly, and on the next day the legs were numb and so weak that she could not stand. The paralysis in the legs became complete in a day, and two days later she thinks fever set in. On February 6 urination became difficult, and on the next day, when readmitted to the hospital, she had to be catheterized. Both legs were paralyzed and flaccid. Spleen still very large. Hemoglobin 60 per cent. Erythrocytes 2,900,000, leukocytes 286,000. Differential count: Small lymphocytes 5 per cent., large lymphocytes 6 per cent., neutrophiles 36 per cent., eosinophiles 2 per cent., myelocytes 51 per cent.

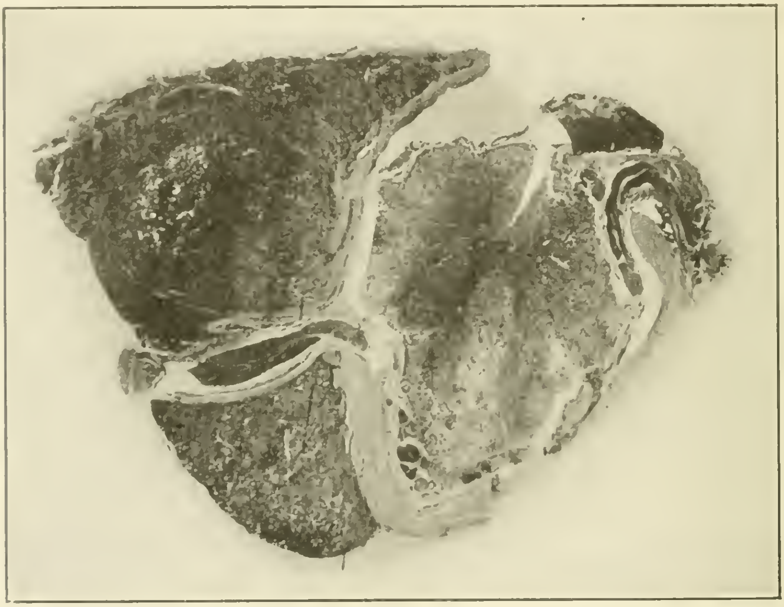

FIG 1. Thoracic cord and epidural leukemic infiltration. Necrosis of posterior portion of cord. There is some distortion as the dura had been cut open before hardening.

Examination by the writer on February 9. No voluntary movement in lower extremities. Good strength in upper extremities. Bilateral Babinski sign. Ankle reflexes: Right absent, left present. Knee, abdominal and wrist reflexes absent, elbow reflexes present. Loss of all cutaneous sensation below level of fifth rib. Pain on pressure on the fourth, fifth and sixth thoracic spines.

Lumbar puncture on February 9 yielded a clear fluid containing no cells except a few erythrocytes. Nonne-Apelt globulin test positive. The Lange gold test gave a weak reaction in the higher dilutions (0001221000). Pain in the back and chest, especially on moving or handling, was severe at first, but gradually subsided. The paralysis and sensory disturbances remained stationary. Severe bedsores developed. X-ray treatment both of spleen and thoracic region of spine was given. On February 23 the leucocyte count was 48,900, on March 1 26,600, and on March 5 15,000. The temperature on admittance, February 7, was 103.4° and then most of the time ranged between 99° and 101° until February 25, when it became higher, maximum being 105° on March 7. When reëxamined by the writer on the latter date considerable dyspnea

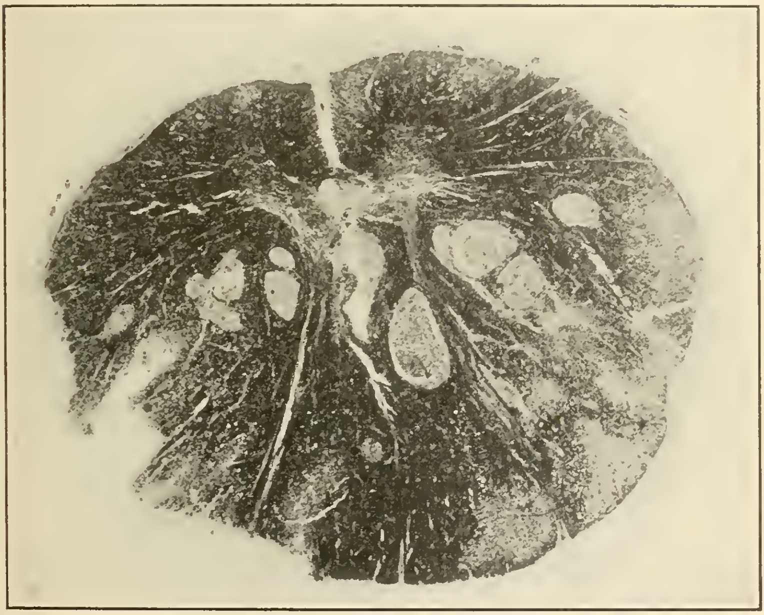

Fig. 2. Degeneration of compressed portion of cord. Pal-Weigert method.

and gaseous distention of the abdomen were present. A Babinski sign was still present on both sides, the knee and ankle reflexes were absent. The patient died on March 9, 1917.

The necropsy was held on the day of death by Dr. B. O. Raulston, resident pathologist to the hospital.

Anatomic diagnosis: Large suppurating necrotic area over sacrum; marked anemia and emaciation; leukemic infiltration of dura mater, vertebræ, and perivertebral tissues in region of fourth, fifth and sixth thoracic vertebræ; large chronic splenic tumor; localized fibrous perisplenitis; myeloid degeneration of bone marrow; moderate edema of the lungs; moderate fatty changes in liver and kidneys; old surgical scar of anterior abdominal wall; absence of vermiform appendix; mobile cecum; redundant sigmoid; carious teeth.

The weight of the spleen was 1,500 grams. The brain could not be examined. The description of the spine and cord is as follows:

"When the organs are removed from the body in the usual manner the parietal pleura is seen to be elevated on each side of the spinal column in the region of the fourth and fifth thoracic vertebræ. This is most marked on the left side where the mass measures six by three cm., while on the right side it measures four by two cm. These masses consist of a pale, soft tissue. The vertebræ in this region are found to be decidedly softened and cut with a knife with but little difficulty. When the spinal cord is removed the dura mater in the region of the fourth, fifth and sixth thoracic vertebræ is found to be markedly thickened and firmly adherent to the bodies of the vertebræ. When the nerve roots in this region are cut the spinal cord cannot be removed until the meninges are dissected loose from the bone. The narrowing of the lumen of the spinal canal is produced by the thickening of the meninges and not by the condition of the vertebræ."

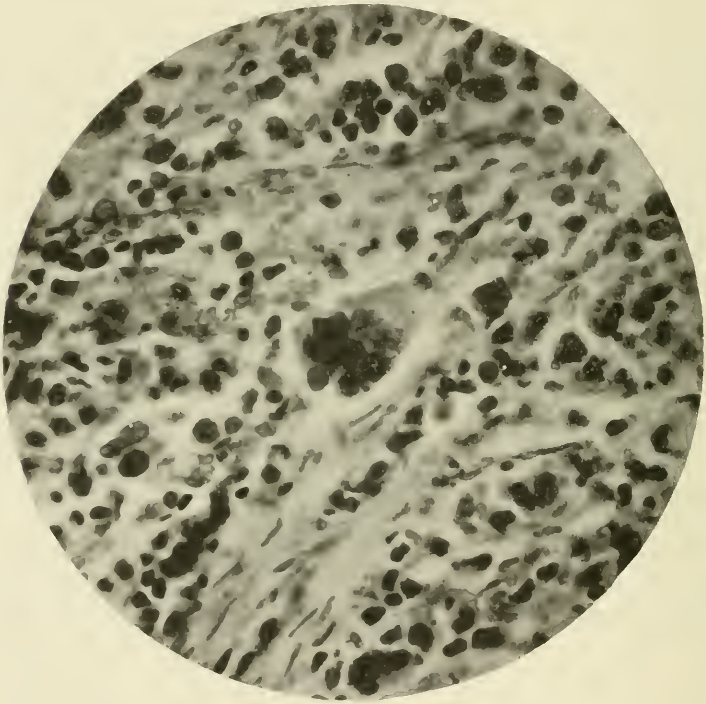

FIG. 3. Tumor in front of spinal column showing large myeloid cell. Hematoxylin and eosin.

After formaldehyde hardening the cord was further examined by the writer. The dura at the thoracic level mentioned is covered by a firmly adherent layer of grayish tissue for a distance of 12 cm. It is thickest (6 mm.) and extends the full distance mentioned only on the left side, where both anterior and posterior roots pass through it. The entire cord is surrounded for a distance of but 2 cm., the right and posterior surface escaping elsewhere. The inner surface of the dura is smooth, and the pia appears normal.

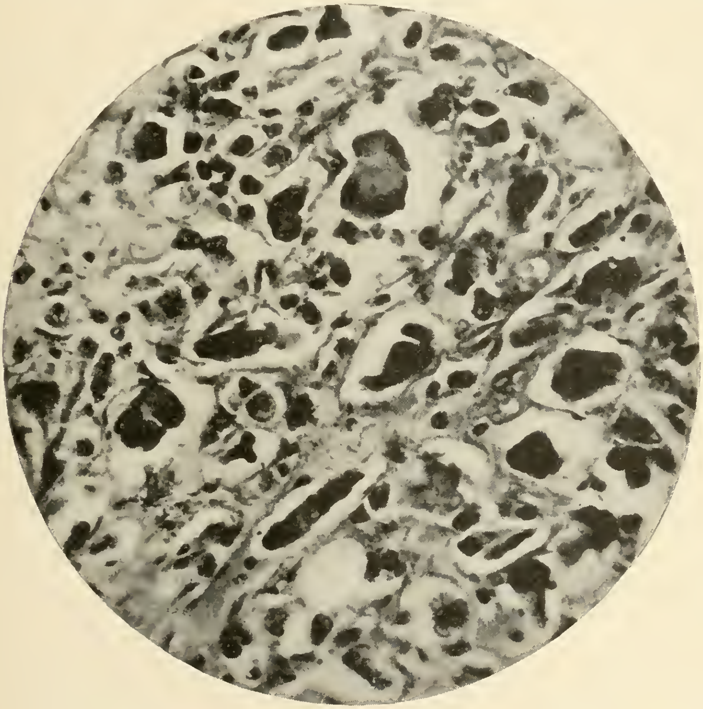

FIG. 4. Intraspinal tumor, showing loose reticulum enclosing numerous multinuclear cells. Hematoxylin and eosin.

On cross section of the cord in the cervical region there is no distinct macroscopic change. All along the thickened dura in the thoracic region, however, the cord appears almost necrotic in its posterior half and the normal markings are lost in most cut surfaces. At the level of greatest dural thickening the cord is distinctly flattened laterally. In the lower thoracic and lumbar regions the cut surfaces appear normal.

Histologic Examination.—The tumor mass in front of the spine and that within the canal show identical structure, namely that of a fibrous reticulum enclosing cells of various kind, from small mononuclear ones to large, multinuclear, "myeloid" cells (Figs. 3 and 4). The spinal cord in the region compressed by the epidural mass shows marked degeneration and partial necrosis in its posterior portions (Figs. 1 and 2). The rest of the cord only shows moderate secondary degeneration. There is no leukemic infiltration of the cord at any level.

The case here reported is an exquisite example of paraplegia caused by purely mechanical compression of the cord by a leukemic tumor growing into the spinal canal. There is no evidence of leukemic infiltration or old "toxic" degeneration of the cord. The onset of severe pain followed by paralysis evidently occurred at the time when the canal had become too small for the growing leukemic mass. If at that time laminectomy had been performed and the dura merely slit posteriorly, serious injury to the cord might have been avoided. However, at the time it was impossible to ascertain that no cord infiltration or hemorrhage existed and that the symptoms were of purely mechanical origin. The existence of leukemia in any form makes the patient a poor subject for a major operation, but under similar conditions, with sudden onset of signs of cord compression in a leukemic patient previously free from cord symptoms, the writer hereafter will at least seriously consider the advisability of an operation.

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THE CHARCOT-MARIE TYPE OF PROGRESSIVE MUSCULAR ATROPHY*

Peroneal Type of Tooth; Neurotic Form of Progressive Musculer Atrophy of Hoffmann

By George Wilson, M.D.

INSTRUCTOR OF NEUROLOGY IN THE UNIVERSITY OF PENNSYLVANIA

In 1886 Charcot and Marie (1) described a form of muscular atrophy to which they gave the following characteristics:

An onset in early life with a distinct history of heredity or at least more than one case in the same family.

The atrophy beginning in the feet and legs and not affecting the hands and forearms for some years.

Preservation of the proximal segments of the extremities notwithstanding the intense atrophy of the peripheral portions.

Fibrillary contractions and muscles cramps occurring in the muscles which are wasting.

The electrical excitations showing reactions of degeneration.

Non-involvement of the sphincters and mentality.

Tooth (2) later in the same year described the disease under the title "The Peroneal Type of Progressive Muscular Atrophy."

Hoffmann proposed that the condition be called "the neurotic form of progressive muscular atrophy."

As a rule there is no impairment of sensation, although at times slight diminution in extremely atrophied parts may occur.

In one of Charcot and Marie's original cases there was a marked loss of sensation; this loss resembled that seen in the hypertrophic interstitial neuritis of Dejerine and Sottas.

One of the most striking features of the Charcot-Marie type of muscular atrophy is the presence of more than one case in the same family.

Souques says it is an hereditary disease par excellence. Like many other hereditary diseases, it picks out the male sex more frequently. Sainton (3) gives the proportion of five males for one female. The women often remain immune while transmitting the disease to their offspring.

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* From the Department of Neurology of the University of Pennsylvania and from the Philadelphia General Hospital.

The onset is usually in childhood, sometimes after the age of 20, very rarely after 40. In Sainton's statistics the age of onset varied from two to forty-nine years.

The atrophy often begins in the lower extremities but not always, as the hands may be affected first. When the upper extremities are first involved the lower extremities are quickly attacked, whereas, when the atrophy commences in the feet it may be some years before the muscles of the hands and forearms waste. The atrophy is symmetrical.

The progress of the disease is an extremely slow one; it is usually years before the patient is seriously inconvenienced; in one of my cases it was forty years after the onset of his trouble before the man had to give up his occupation of hostler.

The muscles of the trunk, neck and face and, to a large extent, those of the thighs and arms are not involved. Hoffmann (4) believes that all these parts may be attacked in the Charcot-Marie form of progressive muscular atrophy. This I believe to be incorrect and to account for some cases of muscular dystrophy being diagnosed as instances of Charcot-Marie atrophy. Thus in a case reported by Oppenheim and Cassirer (5) the clinical picture was similar in many respects to the type under discussion with the exception that the orbicularis palpebrarum was involved on both sides. Their diagnosis rested between multiple neuritis and neurotic muscular atrophy. The necropsy revealed a normal nervous system and marked degeneration of the muscles. Similar cases have been described with necropsy by Dejerine and Thomas (6) and Spiller (7), clinical cases by Gowers, Spiller, Cotton and Naville and others.

Cotton and Naville (8) believe that primary myopathy beginning in the distal segments of the limbs comes on late in life. Gowers' case began at 12 and Spiller's at 26. They also believed that this form of myopathy affected relatively more women. Neither one of their contentions has proved absolutely correct.

Cassirer and Maas (9) have reported a case with necropsy which they believe connects the so-called primary myopathies and other forms of muscular atrophy. Their patient, a man 39 years old, had muscular atrophy of the feet and legs and, to a less degree, of the thighs.

The muscular development of the hands and forearms was poor but the strength fairly good. There was no tenderness of the nerves or muscles. Sensation was practically normal. The right pupil was of the Argyll-Robertson type.

The study of the tissue showed a normal spinal cord with degeneration of the peripheral nerves. The muscle showed fatty degeneration of the fibers with overgrowth in some places and marked proliferation of the muscle nuclei.

There was no evidence of syphilis. Nothing could be found to account for the Argyll-Robertson pupil.

Dejerine and Sottas (10), in 1893, described a condition to which they gave the name "Progressive Interstitial Hypertrophic Neuritis of Childhood." This disease has been studied chiefly in France. It is regarded by some, Marinesco and Raymond particularly, to be an atypical form of Charcot-Marie atrophy. Strümpell thinks it is a combination of Friedreich's ataxia and the hereditary peroneal form of progressive muscular atrophy.

The characteristics of the disease are: An onset in early life with sharp pains in the extremities, ataxia, Romberg's sign, kyphoscoliosis, marked loss of sensation in the extremities diminishing as the trunk is approached. The pupils are small and do not react to light.

The extremities are wasted and the disease may be familial. The most prominent physical findings are the enlargement and the hardening of the peripheral nerves which features may be present from the start.

Thus it will be seen that the clinical picture has very little in common with Charcot-Marie atrophy and the latter condition lacks the peripheral nerve changes.

I can see no reason for considering the affection an unusual manifestation of Charcot-Marie atrophy and believe it to be a separate and distinct entity.

It resembles much more juvenile tabes and indeed the first case reported (Gombault and Mallet) (11) was so considered. In a case reported by Schaller (12), the Wassermann was negative, but hereditary syphilis may well be the etiological factor.

Cases of Charcot-Marie atrophy with autopsy are rare; only five have been reported to date. The case from which I was fortunate enough to obtain pathological material was reported clinically by Spiller (7) in 1906. I am greatly indebted to Dr. Spiller for aid in the preparation of this paper.

N. H. White, male, 54 years of age at the time of his admission to the Philadelphia General Hospital in 1901, died in 1916 at the age of 69. He was unmarried, his occupation that of a hostler.

At the age of 15, the patient began to have pains in his legs, which were dull in character. These pains would last a week or two and would incapacitate him for work. The pains came on in the spring of the year and would then disappear until the following year.

He had no weakness of the feet and legs for some years and was able to work. At the age of 35 the pains appeared in the hands and forearms and he noticed that he was becoming weak in the legs. Soon after this the feet and legs wasted and the feet became deformed. From that time until the age of 60 the progress of the disease was slow but constant, though the pains were not so severe and were present only in the feet.

He had to stop work at the age of 55, forty years after the onset.

The atrophy in the feet and legs preceded that in the upper limbs by ten years.

He had no difficulty in controlling the sphincters. His eyesight and hearing were good and there was no difficulty in chewing and swallowing until four months before his death. At this time marked difficulty in deglutition and mastication came on and his speech became weak and thick.

His personal habits were good, he did not use alcohol and denied venereal disease. He was never exposed to lead or metallic poisons.

His mother and father died many years ago from causes unknown. He was one of eleven children, three of whom are dead. One, an unmarried brother, is dead and had the same disease. Of the seven living, one sister, whom I have examined, has Charcot-Marie atrophy. She is married and has two male children, both of whom are healthy and show no wasting of the extremities.

So far as can be determined there are no other cases in the family. Both of the males suffering from this disease were unmarried.

Physical Examination.—The patient is well nourished except for the atrophic parts. The skin is florid, conjunctivæ clear.

The pupils are equal, regular and react well to light and in convergence. There is no hemianopsia, exophthalmos or nystagmus; no weakness of the ocular muscles. The muscles of the face are not paretic. The cranial nerves are normal. The tongue is clean, well developed and is not tremulous.

The chest and the abdomen are well formed, breathing is regular and abdominal in type.

The lungs are resonant throughout; the breath sounds are vesicular and no adventitious sounds are heard.

The heart is not enlarged. The sounds are poor and distant but no murmurs are present. The peripheral vessels are sclerotic.

The muscles of the hands are extremely atrophic; the thenar and hypothenar eminences, the lumbricales and the interossei are practically absent, giving a typical claw hand. The muscles of the forearms are wasted but not so much as those of the hands. The muscles of the arms are intact. Fibrillary tremors are seen in the atrophic parts.

The muscles of the feet and the legs are wasted, the thighs are well preserved. The peroneal group of muscles is especially involved. An acquired talipes equinovarus is present. The ankle joint is very flail-like. The muscles of the trunk and head are well developed.

The gait is peculiar. The patient walks with the feet wide apart and shifts the weight from foot to foot by exaggerated movements of the thigh and trunk. The gait is somewhat steppage in character.

The station is poor, as it is practically impossible for the patient to bring the feet together and stand without support.

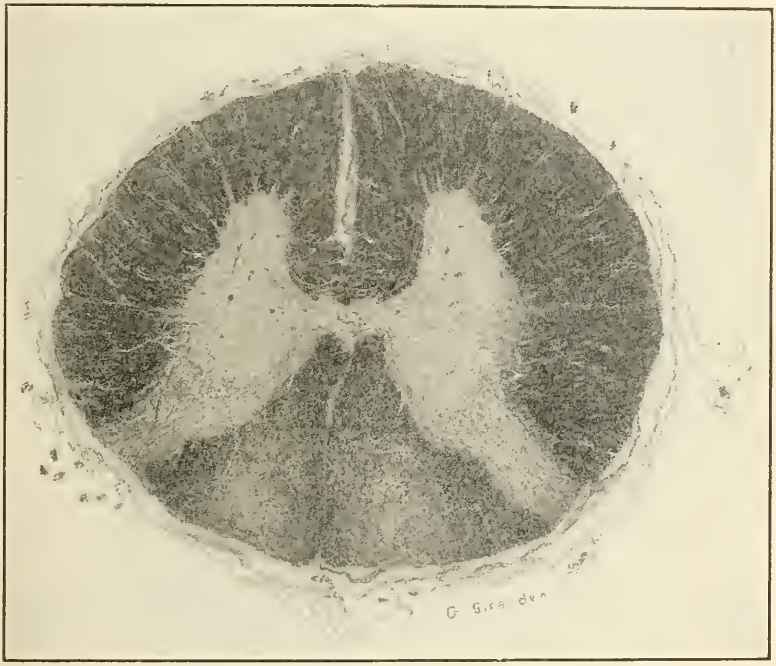

FIG. 1. Section of spinal cord from lower thoracic region.

The patellar, Achilles, biceps, triceps and radial reflexes are absent. Plantar stimulation gives no response. The abdominal and cremasteric reflexes are present.

Sensation, pain, touch, heat and cold and the sense of position are normal. There is no tenderness over the nerve trunk or muscle. The nerves are not enlarged.

Eye Examination by Dr. Shumway.—Veins of the retina full and show pressure signs, the result of arterio-sclerosis, otherwise the findings are negative. Vision, O.D. $^5/_8$; O.S. $^5/_{10}$. Fields are normal.

In November, 1913, the left lower extremity became gangrenous and was amputated at the middle of the thigh. It was a dry gangrene, the result of an obliterating endarteritis.

In 1914 the patient's condition had not changed materially. All the peripheral vessels were extremely sclerosed. The right foot and leg were blue and cold and the pulse of the dorsalis pedis very feeble.

In 1914, two years before his death, the patient was carefully tested for sensation. Touch and pain were very slightly diminished on the sole and dorsum of the foot. Heat and cold, deep pressure and the sense of position were all preserved.

On April 11, 1916, he developed erysipelas of the face. He died on April 23, 1916.

The autopsy was performed forty-eight hours after death. I have Dr. F. C. Narr to thank for his kindness in this work.

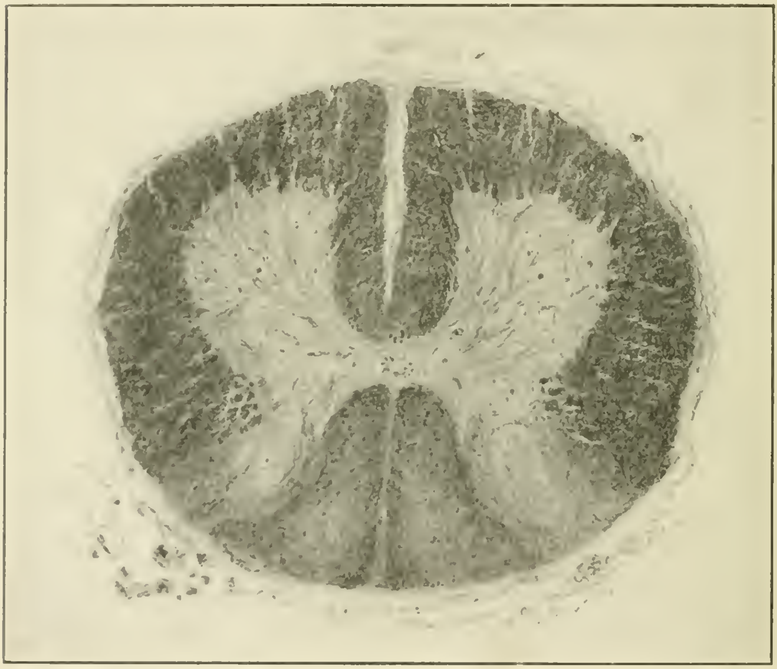

FIG. 2. Section of spinal cord from lumbar region.

A limited amount of material was obtained. The spinal cord from below as far as the fifth dorsal segment, the radial, median and plantar nerves and pieces of muscle were all that were allowed me.

The peripheral nerves on gross examination showed nothing. The muscles were pale and flabby and infiltrated with fat. The arteries were sclerosed and calcareous.

The spinal cord was greatly reduced in size. The roots, both anterior and posterior, were extremely thin and presented a shriveled appearance.

The specimens were stained by Weigart, Pal, Marchi, eosin and thionin methods.

Microscopic studies revealed the following:

Mid-thoracic region: The columns of Goll and Burdach are moderately degenerated. The degeneration is very similar to that seen in tabes. Lissauer's zone is not sclerotic. The posterior and anterior roots are normal. The pyramidal tracts are intact.

The cells of Clarke's columns are normal.

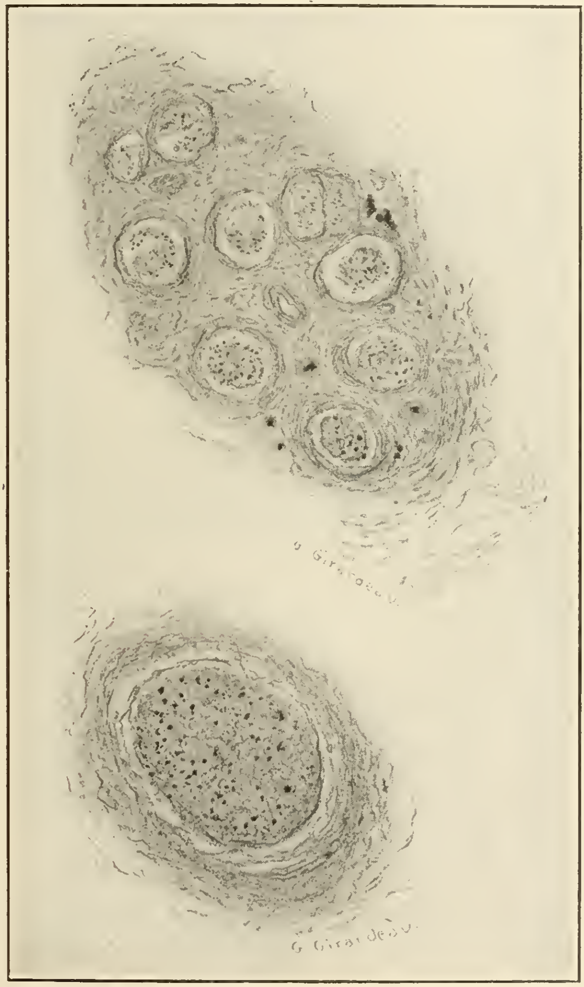

FIG. 3. Section of plantar nerve, low and high power.

Lower thoracic and upper lumbar regions: The degeneration in the posterior columns is more intense than in the mid-thoracic region.

Lissauer's zone is intact. The cells of the anterior horns are numerous and stain well, their nuclei are centrally placed. The posterior roots are slightly degenerated. The pyramidal and direct cerebellar tracts are normal.

Lower lumbar and sacral regions: There is a diffuse degeneration in the posterior columns. The posterior roots are slightly degenerated. The pyramidal tracts are normal.

The cells of the anterior horns are numerous and stain well.

Plantar nerve: This nerve is intensely degenerated, very few healthy fibers remaining. Those which do remain are small. The epineurium and perineurium are thickened. There is no change in the endoneurium.

Median nerves: These nerves taken at the wrist show moderate degeneration, not as marked as in the plantar nerve. The epineurium and perineurium are slightly thickened. The nerve fibers which remain are both large and small.

Ulnar nerves taken at the same level as the median nerves show more degeneration. The epineurium and perineurium are slightly thickened.

Hypothenar eminence: The muscle has been entirely displaced by fat and connective tissue.

The cases of Charcot-Marie atrophy with necropsies are rare. I have been able to find records of five undoubted cases with pathological reports. A brief summary of these reports follows:

Sainton (13) found the posterior columns intensely degenerated, more especially in the columns of Burdach. The ganglion cells of the anterior horns were atrophied to a high degree in the lumbo-sacral cord.

The fiber network of the posterior horns was rarefied.

The cells of Clarke's columns were normal.

The pyramidal tracts were degenerated, more marked in one direct and one crossed tract.

There were cerebral lesions in this case, a fact which probably accounted for most of the alterations in the motor pathways.

The peripheral nerves were very slightly altered, the peroneals alone showing distinct degeneration.

Marinesco (14) found very extensive degeneration in the posterior columns. The gray substance of the posterior horns was almost devoid of fibers. The cells of Clarke's columns were preserved, but the fiber network was atrophied. The posterior roots were the seat of a pronounced degeneration.

The cells of the anterior horns were decreased in number in the lumbo-sacral and cervical swellings but the remaining ones were normal.

The pyramidal tracts were normal.

The peripheral nerves showed marked degeneration with an increase of the interstitial substance.

Dejerine and Armand-Delille (15) found degeneration in the posterior columns from the lumbar to the cervical region. A few of the cells in the anterior horns were altered without a diminution in their number. The cells of Clarke's columns were normal.

The pyramidal tracts were normal.

The large nerve trunks, the posterior and anterior roots were normal.

The intra-muscular filaments of the nerves presented very marked alteration.

Gierlich (16) found degeneration in the posterior columns, decreasing as higher levels were reached.

The cells of Clarke's columns were slightly altered. Lissauer's zone was intact. The posterior and anterior roots were normal.

There was slight degeneration in the crossed pyramidal tracts.

The peripheral nerves were much degenerated.

Aoyama (17) found degeneration in the posterior columns most marked in the lumbar region.

The cells of Clarke's columns were normal.

The cells of the anterior horns were diminished in number and some were without processes.

The posterior and anterior roots were degenerated.

The pyramidal tracts were normal.

The peripheral nerves were thinned and presented marked degeneration of the fibers without an increase in the interstitial substance.

The medulla was smaller than normal and showed alterations in the nuclei of the seventh, ninth and tenth cranial nerves.

There are other cases with necropsy in which the diagnoses have not been clear. I refer to those of Dubreuilh, Siemerling, Friedreich and others.

From this brief summary of the pathological findings it is quite clear that the lesions in Charcot-Marie atrophy are not constant.

In six cases the posterior columns were degenerated in all. The anterior horn cells were intensely degenerated in one case, the others showed slight or no change. Clarke's columns were slightly altered in one case.

The pyramidal tracts were slightly degenerated in two cases. The nerve trunks were degenerated in four of the six cases, in one very slight degeneration was found only in the peroneal; in one case the nerves were normal but the intra-muscular filaments were altered.

The absence of the sensory changes in the disease is puzzling. In the cases where there have been slight changes in sensation the changes have not been at all in proportion to the amount of structural loss in the nerves and cord. The sensory pathways in the cord are not involved with the exception of the posterior columns. Despite this almost constant pathological change the sense of position and vibration are not affected.

How different this is from the sensory loss seen in anemia!

In a case of this kind which I have recently studied both clinically and pathologically the symptoms were present but a few months. The sense of position was lost in the toes and disturbed in the ankles and knees. The sense of vibration was greatly affected over the tibias. The spinal cord shows moderate degree of sclerosis in the columns of Goll, certainly no more than in my case of Charcot-Marie atrophy. Yet one showed marked loss of deep sensation, the other none at all.

Dejerine and Thomas (18) have said that the columns of Goll are not necessary for sensation. A case of Friedreich's ataxia which they studied had extreme ataxia and no disturbance of the sense of position, yet the columns of Goll in the cervical region were entirely degenerated.

It may be that in the slowly progressing degeneration of the posterior columns in hereditary disease such as Charcot-Marie atrophy and Friedreich's ataxia other sensory pathways take on the functions of the posterior columns.

By the use of the Bielschowsky stain Spiller was able to demonstate many naked axis cylinders in Goll's columns in a case of Friedreich's ataxia. With the Weigert's stain these columns appeared entirely degenerated. It is possible, as Spiller says, that the posterior columns are capable of more function than the Weigert stain leads us to believe.

Clinically Charcot-Marie atrophy presents unusual features at times. The following case presents signs of pyramidal tract involvement.

Mrs. G. N., 58, female, a sister of N. H. reported above. She is married and has two children, both of whom are well.

She has had her present trouble since early life, the exact year of its onset being unknown; she places it at about 20 years ago. Her first symptom was dull aching pains in the feet and legs. The next was a disturbance in walking and at the same time the muscles of the feet began to waste.

A number of years later the hands commenced to atrophy and with this state of affairs more or less loss of power supervened.

She has never had any difficulty in chewing, talking or swallowing.

She has retained complete control of the sphincters.

Her habits are good, and despite her disease she has succeeded in doing her own housework.

Physical Examination.—The patient is well nourished and in good health. Her station is normal.

The gait is very striking. She walks with her feet widely separated and with the trunk swinging from side to side. The knees are raised high and the feet flop down.

The pupils are equal, regular and react well to light and in convergence. No exophthalmos, hemianopsia or nystagmus. Extra-ocular muscles are normal. The eyesight and hearing are acute.

The tongue is protruded in the mid-line, is not atrophied and possesses no tremor.

The muscles of the face are normal.

The interossei, lumbricales, thenar and hypothenar eminences are wasted on both sides, giving typical claw hands.

The muscles of the forearms are moderately wasted, but the power is good. The muscles of the arms, shoulder girdles and neck are well developed.

The biceps and triceps, coraco-brachialis and Bechterew's reflexes are present and about normal.

The muscles of the feet are decidedly atrophic, the muscles of the legs slightly so, the muscles of the thigh, pelvic girdle and trunk are normal. The feet are in a position of talipes equino-varus and the arches are greatly exaggerated.

The great toe on the right is in the position which it occasionally assumes in Friedreich's ataxia.

There is bilateral foot drop.

The Achilles reflexes are lost. The patellar reflexes are present and exaggerated. Plantar stimulation on the left gives prompt flexion, on the right gives extension of the great toe, a typical Babinski.

Sensation is everywhere normal; pain, touch, deep pressure, heat, cold, sense of position and tactile discrimination were tested for. Vibratory sense was not determined.

The nerve trunks are not enlarged nor tender.

The second member of the family which I have reported above showed unusual features, viz., exaggerated reflexes and on one side a plantar response of the extensor variety. With Sainton's case in mind a careful inquiry was made as to the possibility of a cerebral complication. The patient has never had an apoplectic attack and there was nothing in her physical condition to warrant a diagnosis of an intra-cerebral lesion. The Babinski response, therefore, must be interpreted as nearing degeneration in the pyramidal tract. Degeneration of the pyramidal tract was found in two of the cases which were studied microscopically.

Increased patellar reflexes have occasionally been seen in the Charcot-Marie atrophy. Dercum reported such a finding in 1903.

Dejerine and Long have reported cases with spasticity, exaggerated reflexes and Babinski sign.

Such cases as those of Dejerine and Long strongly suggest the occurrence of family spastic paralysis in combination with Charcot-Marie atrophy.

Optic atrophy has occurred in neurotic muscular atrophy. Cases with this phenomenon have been reported by Ballet and Rose, Gordon, Viziola, Krauss and Bertolotti.

Bertolotti's (19) cases are extremely interesting. They were sisters who showed typical Charcot-Marie atrophy before the age of 15. In addition to the muscular atrophy there was in each case optic atrophy, ocular nerve paralysis, disturbance in deglutition and speech and a distinct lowering of mentality.

Bulbar symptoms occasionally occur in Charcot-Marie atrophy. They were present in Aoyama's case and degeneration was found in the nuclei of some of the cranial nerves.

In my case with necropsy reported above bulbar symptoms were present, but did not come on until the patient was near 70.

At times Friedreich's ataxia and Charcot-Marie atrophy may present almost identical clinical and pathological pictures. This is especially so when muscular atrophy occurs in hereditary ataxia and pyramidal tract symptoms in neurotic muscular atrophy.

Spiller (20) in a paper on Friedreich's ataxia compares his findings in such a case with those of Gierlich in his case of neurotic muscular atrophy.

Microscopically the two cases were very similar, the only difference being that in Spiller's case of Freidreich's ataxia the cells of Clarke's columns were absent and the posterior roots were much degenerated, while in Gierlich's case of Charcot-Marie atrophy Clarke's columns were slightly degenerated and the posterior roots were normal. Marinesco, however, has shown that the posterior roots may be degenerated in Charcot-Marie atrophy, and my case presented this feature in a mild degree.

The absence of ataxia in neurotic muscular atrophy can be explained by the fact that Clarke's columns are intact. The absence of certain other symptoms of Friedreich's disease in neurotic muscular atrophy, viz., nystagmus, scanning speech, etc., can be explained by the infrequency with which bulbar lesions are found in the latter condition.

Jendrassik (21) in two articles on hereditary disease says that no sharp distinction can be drawn between the various forms in which these diseases manifest themselves.

He says that the clinical manifestations of these diseases blend into one another and make classification impossible.

Jendrassik also states that hereditary nervous diseases have a corresponding course in the same family but vary in different families.

Clinically and pathologically there is much to support the views of Jendrassik.

Muscular dystrophy has occurred in combination with family spastic paralysis and has been found in patients who have Friedreich's ataxia.

Dejerine and Long's cases of neurotic muscular atrophy with spasticity and other manifestations of pyramidal-tract involvement would make it appear that this particular disease may be also complicated by hereditary spastic paralysis.

Newmark (22), Strümpell and others have shown that sclerosis of the posterior columns may occur in family spastic paralysis in addition to the degeneration in the pyramidal tract. Indeed, in Newmark's cases the sclerosis in the columns of Goll and Burdach exceeded that found in the pyramidal tracts. Newmark also found the cells of Clarke's columns to be few in number.

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A GRAPHIC REPRESENTATION OF PUPILS*

By Frank R. Fry, A.M., M.D.

For a number of years past I have been noting the appearances and reactions of pupils by the use of certain characters. These I first employed solely for the sake of brevity in notations, but from time to time, in a more or less desultory manner, I have elaborated the method until now I find it a great convenience. I believe it affords me a means of making more thorough and accurate observations and of recording the same in an intelligible and reliable manner. I am venturing, therefore, to present it to others. This may readily be done because of its simplicity.

A pair of normal pupils is represented by two small circles drawn side by side as nearly equal and regular and as near the actual size of the observed pupils as may be. In as much as we are observing the pupils as they appear before us, the circle on our left represents the right pupil and the circle on our right the left pupil. There will be no confusion between R. and L., especially after one has been using these formulæ a short time.

In hastily jotting down these characters it is impossible, at least for the average pen-man, to make them very regular. Therefore if the pupils are equal this is represented by the equal sign between and just below them. If the pupils are not equal this is indicated by using the sign of inequality to indicate which is the larger. If a pupil is irregular this is indicated by writing R. irreg. or L. irreg., as the case may be. Or the irregularity may be indicated by a figure drawn to represent it. The latter is a good practice for the reason that the character of the irregularity sometimes varies in a pupil. The size of the pupil I attempt to indicate as it appears to me by drawing the figure to correspond thereto. A pupilometer with a convenient scale might be brought into requisition in some few special cases, but for ordinary cases it is not needed, as the characters as above employed indicate the size of pupils very well.

In studying pupils carefully one makes notations of their behavior in varying kinds and degrees of light, *e. g.*, before the bright and the shaded window, in the dark room with various degrees of artificial illumination (80-candle-power ceiling light, 20-candle-power light, small flashlight, etc.). These observations are readily indicated by suitable abbreviations, as suggested below.

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* Read before the St. Louis Neurological Association, January 29, 1917.

The modal features of pupillary reactions are designated by certain terms which have become familiar by general usage, *e. g.,* slow, sluggish, prompt, spastic, hippus, paradoxical, etc.

For convenience of description I have employed in this connection two terms not in general use. My use of the term *rebounding pupil* I explained several years ago, viz., a pupil that readily contracts to light and then quickly opens or rebounds in the presence of the same illumination which caused its contraction.

For some time past I have been using in my private records the term *indolent.* An indolent pupil we find well dilated in the dark or in moderate illumination, yet accomplishing very little movement when stimulated by considerable light. The same pupil before a bright window is small and opens only slightly when considerably shaded, *e. g.,* by the hand. In other words the movements of this pupil in both contracting and dilating are slight or indolent as distinct from sluggish, or slow. For a sluggish pupil, although not responding quickly to light or shade, may, once started, make a good excursion as compared with the indolent one. Some observers have described this pupil without confusing it with spastic miosis and spastic mydriasis. Others possibly have not escaped making this mistake. For I believe that a performance of the kind just described may be distinguished from that of spastic mydriasis and spastic miosis, and also from the myotonic pupillary reaction as these are usually described and understood. I shall not try to state here my reasons for this conclusion, as this would carry us into a discussion of the physiology and pathology of pupillary reactions which is beyond my purpose in this brief paper. I have only digressed sufficiently to explain why I have used this term, whether properly or improperly may remain to be determined. I would venture to suggest, however, that in careful observation it may be found important to keep in mind that a distinction may be made between pupils that are sluggish or slow and those that are indolent.

At this juncture I may be pardoned the farther general suggestion that our work in this field cannot be too thoroughly done. The intent of my paper is a plea, in a modest way, for facilities to make this work as thorough as possible. For many years eminent clinicians have attempted well-planned methods for these observations. Notwithstanding, it is quite evident that imperfections therein are accountable for some of the discrepancies to be found in the reported results in pupil examination in various pathological conditions. In support of this assertion, if it were necessary, we may cite the single instance of the Argyll-Robertson pupil. A canvass of opinions and statistics concerning this familiar phenomenon impresses one that more uniform methods in making examinations and in recording results would greatly assist in the eliminations of errors which have been confusing and difficult to adjust.

I subjoin the characters used and a list of the abbreviated terms which I have most frequently used in connection with them. I think it will be seen how conveniently records may be kept and compiled from notations made in this manner.

ABBREVIATIONS

o o	indicates	the two pupils.
=	"	equal pupils.
>	"	R. is larger.
<	"	L. is larger.
?	"	questionable.
re.	"	reaction.
l.	"	light.
a.	"	accommodation.
sta.	"	stationary.
dir.	"	direct.
con.	"	consensual.
p't.	"	prompt.
slugg.	"	sluggish.
reb'd.	"	rebound.
ind.	"	indolent.
hand.	"	shading with hand.
mod.	"	moderate illumination.
dark.	"	dark room.
flash.	"	flash of incandescent light.
wind. or (day)	"	before light window.

The following examples show how much may be expressed in a short formula where the characters and abbreviations are employed as I have suggested. The abbreviations here used are simply such as I found convenient and have been using for some time. They might readily be improved upon.

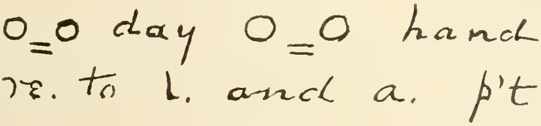

FIG. 1.

Figure 1 indicates the size of the pupils, and that they are equal in daylight, and that they dilate very well when shaded by the hand and are still equal, and all reactions are prompt. Normal pupils.

Figure 2 indicates that the L pupil is considerably larger than the R in daylight. When shaded by the hand the difference in size is less. The R reacts to light and to accommodation. The R reacts to light possibly sluggishly. The L seems to be stationary.

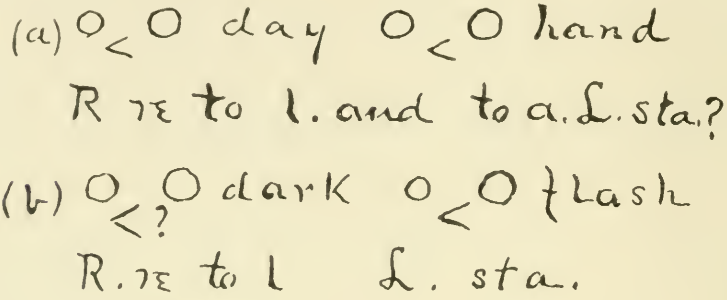

FIG. 2.

(b) Indicates that in a dark place the R dilates well. The L does not. They are so nearly equal in the dark that there is a question of inequality between them. With a flash-light the R contracts and the L does not. This shows the advantage of using a darkened room and flash-light at times to better determine the reactions of pupils.

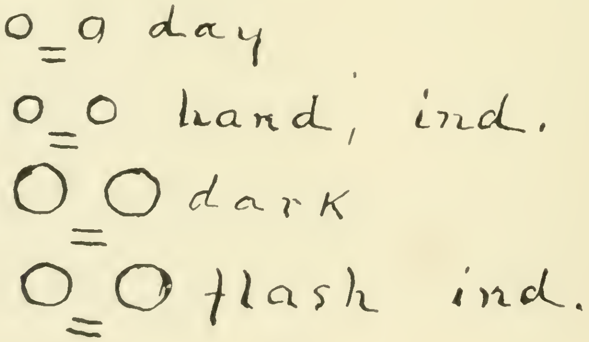

FIG. 3.

Figure 3 indicates the size of the pupils in daylight. Next the size of the same pupils when shaded by the hand, there being very little dilatation, which is indicated by the abbreviation *ind*. Next the size of the pupils in a darkened room, being large. Next their size when stimulated by a flash-light, the reaction being slight (ind.). The so-called indolent pupil.

Figure 4 indicates that the pupils are irregular in daylight and about equal. Shaded by the hand they dilate considerably, but seem less equal, as indicated by question mark. They are still irregular, but there is a question as to the mode of their reaction. In the dark room they are still irregular and with a flash-light we determine that they are both sluggish, although accomplishing a good excursion. Thus tested they are evidently unequal.

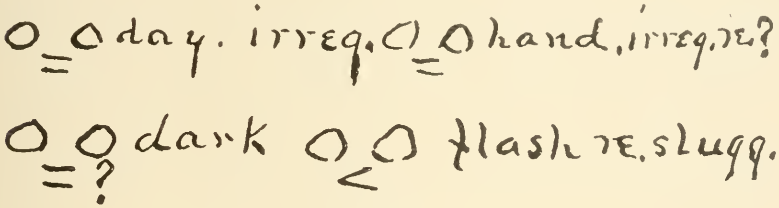

Fig. 4.

Note.—In the discussion of this paper before the St. Louis Neurological Association the propriety of the term indolent as here used was questioned quite generally. The correctness of the criticism is in a measure admitted. The especial reason, I explained, for using the word indolent was to avoid the word spastic in describing a reaction which probably is not spastic in a true sense. I also contended that the two words sluggish and indolent are not exactly synonymous, at least not in all their uses or applications. I further explained that I had casually fallen into the use of the word indolent as conveniently designating a movement much like the so-called sluggish one, that we more often see, yet enough different to require special characterization.

The terms used to describe the modal features of pupil reactions are all more or less fanciful, but they subserve two purposes; they eliminate the necessity of repeating lengthy descriptions of certain phenomena and they emphasize the interest that has been taken therein. These terms are not important in the sense that they have always an immediate clinical application, yet in studying the aberrant behavior of the pupil it has been the habit of the observers from time immemorial almost to note the phenomena which they more frequently encountered. For evident reasons this is a good habit to follow. With a handy method of making notations the task of doing this may be much simplified.

Society Proceedings

NEW YORK NEUROLOGICAL SOCIETY, IN CONJUNCTION WITH SECTION OF NEUROLOGY, ACADEMY OF MEDICINE

November 13, 1917

The President of the New York Neurological Society, Dr. Frederick Tilney, in the Chair

EXHAUSTION PSEUDO-PARESIS: A FATIGUE SYNDROME SIMULATING EARLY PARESIS DEVELOPING UNDER INTENSIVE MILITARY TRAINING

By J. Ramsay Hunt, M.D.

The speaker presented a résumé of the results of special neuropsychiatric examinations in one of the large training camps for officers, composed of 1,500 men, and out of this number 11 cases were found presenting slight but definite symptoms of incipient paresis, preparesis, or early cerebral syphilis. In all of these the diagnosis was confirmed by examinations of the blood and cerebrospinal fluid.

Generally speaking, the clinical symptoms were not very marked, consisting of pupillary changes, tremors of the face and hands, and slight disturbances of articulation on repeating test phrases. General cerebral symptoms or evidence of mental deterioration were so slight as to be practically negligible from the diagnostic standpoint, and for the detection of this very important group of cases the examiner was almost wholly dependent upon those silent but well-established somatic symptoms of early paresis which are so characteristic to the trained observer, *e. g.*, tremors, absent or feeble reactions to light and disorders of articulation of the paretic type.

As directly bearing on this subject, emphasis was laid on the occurrence of another group of cases which had come under observation, the formal recognition of which was of importance because of the close similarity of the somatic symptoms to those of early paresis. This condition was apparently dependent upon an exhaustion of the cerebrospinal centers, the result of the unusual strain, both mental and physical, to which men undergoing the intensive course of military training were subjected. Four cases were reported in detail, presenting slight mental and cerebral disturbances, inequality of the pupils, with extremely feeble and sluggish reactions to light, coarse tremors of the hands, face and tongue and a dysarthric disturbance of speech on repeating test phrases very similar to that observed in the early stage of paresis. The pupils in all of the cases were unequal and showed a very feeble and sluggish reaction to light. In some of the cases there was so little response as to suggest a true loss of the light reaction. The reaction of accommodation was preserved and the sympathetic response was also elicitable. The impression of an Argyll-Robertson pupil was, therefore, produced. The tremors of the face and tongue were coarse and there were associated movements of the facial muscles on speaking. In addition, there were fairly coarse tremors of the hands and fingers and the handwriting was tremulous. Syllable stuttering and the dysarthric speech of paresis were closely simulated.

Clinically, the diagnosis of incipient paresis seemed assured, but the serological examinations of the blood and spinal fluid were entirely negative. There was no increase of globulin or cells and the colloidal gold reaction was negative. Furthermore, all the symptoms cleared up after a week or ten days' rest. In the absence, therefore, of positive findings in the blood and spinal fluid and the rapid improvement under rest, it seemed clear that the condition had been produced by an acute exhaustion of the central nervous system, with somatic symptoms strongly suggestive of early paresis.

As there was association between fatigue and the production of certain toxins which act upon the central nervous system as well as upon the muscles, in addition to the theory of nerve exhaustion, a low-grade intoxication of the nerve centers had to be considered as a possible explanation for these symptoms. Among these toxic products of fatigue might be mentioned such substances as carbon dioxide, paralectic acid and mono-potassium phosphate. Some observers, notably Weichardt, had also long maintained that a specific fatigue intoxication existed, and was the essential etiological factor in the production of its characteristic manifestations.

Among the recognized mental symptoms of fatigue were a diminished power of attention, a lack of the ability to concentrate, a slow reaction to mental stimuli, slowness in reasoning, as well as errors and slowness in mathematical calculation. If these symptoms were present in any marked degree and associated with the somatic symptoms mentioned above, they might well lead to error.

It was well known that fatigue was a frequent cause of tremor, and a tremor after prolonged muscular activity was well recognized. The unusual degree, wide distribution and persistence of the tremor in these fatigue cases were probably dependent upon the prolonged mental and physical strain and a special predisposition to exhaustibility of the nerve centers.

As the mechanism of speech required a delicate coördination of the higher cortical centers and muscular activity, it was perhaps not surprising that the disturbance of articulation noted in this group of cases should have occurred, as a manifestation of extreme fatigue.

More difficult of explanation were the pupillary phenomena. It was well known that during the convulsive crises of epilepsy, and even hysteria, the pupils dilated and were rigid to light. Also, in simple exhaustion states the pupils were dilated and might be sluggish to light, with preservation of the reaction on accommodation. Perhaps the suspicious pupillary phenomena observed in these exhaustion cases were of a somewhat similar nature, possibly dependent upon a disturbance of the sympathetic innervation of the pupil by fatigue or the toxins of fatigue. The pupils, while definitely unequal, with sluggish or absent reaction to light, presented no irregularities of contour and this might constitute an important point of difference from the true syphilitic pupil which not infrequently displayed marginal irregularities.

Dr. Hunt stated that he had not observed a similar condition in civil practice, which he ascribed to the unusual etiological conditions furnished by life in a training camp, and thought that the formal recognition of a *fatigue syndrome simulating early paresis* was worthy of earnest consideration. Furthermore, it was not unlikely that under still greater conditions of stress and strain this group of cases might be the forerunner of more severe types of the exhaustion neuroses and neuropsychoses.

NEUROLOGY AND PSYCHIATRY IN THE ARMY

By Major Thomas W. Salmon, M.D., M.R.C.U.S.A.

The speaker gave an account of the work which had been done in neurology and psychiatry in the army and that which was being planned. He gave illustrations to show the great importance of mental diseases in military life and the formidable new medico-military problems created by the extraordinary prevalence of the psychoneuroses in the present war.

The lessons to be learned from the prevalence of these diseases among armies had not been wasted, as Surgeon-General Gorgas had made appropriations even before the participation of the United States in the war to organize neurological and psychiatric work in the army upon a scale which had not been previously attempted. Greatly helped by the coöperation of the National Committee for Mental Hygiene, the American Medico-Psychological Association and the American Neurological Society, all of which had appointed war-work committees, no less than 222 specialists in nervous and mental diseases had been commissioned by the Medical Reserve Corps.

The first duty of these specialists in the army was with candidates for commissions and with recruits. Medical officers in this special work were stationed at all officers' training camps and conducted complete examinations of all candidates with the result that many cases of organic nervous disease and some of psychoses and psychoneuroses had been rejected for disability. Each of the National Army cantonment camps now had a neuro-psychiatric board of three medical officers who examined cases referred to them by line and medical officers and were now commencing to make a systematic examination of all civilians under training. This would result in a great decrease in the number of cases to be returned from the Expeditionary Forces. Already several thousand men had been rejected for mental and nervous diseases, among these being nearly all the psychoses, mental deficiency, even cases of imbecility, and a striking number of epileptics. The presence of these medical officers in the camps tended to prevent the assimilation of mental diseases.

Seven American specialists were in England gaining experience in the most approved methods of treating "shell shock"; several others were in France with the Expeditionary Forces and one was attached to each base hospital sent abroad; one was also attached to each military prison and when delinquency battalions were formed one specialist would be attached to each.

A number of medical officers entering the Service had acquired some special training. Neurologists had desired to get some psychiatric work and psychiatrists had felt that they should brush up in organic neurology. This need had been met by detailing a number to intensive courses in neurology and psychiatry.

Major Salmon described briefly the arrangements to be made for the care of cases of functional nervous diseases in the Expeditionary Forces and those who would be likely to be returned for those causes. With the permission of the Surgeon-General he announced that the first military psychiatric hospital in the United States was about to be opened at Fort Porter, Buffalo, and that others would be provided as the need arose. A special neuropsychiatric base hospital had been established for Expeditionary Forces and would probably leave the country in a short time. In this hospital the entire personnel of 216 individuals consisted of trained physicians, nurses and other workers who had had actual experience in the care of mental and nervous diseases.

In closing Major Salmon directed attention to the influence which this work in the army would have upon the extension of psychiatry and neurology in civil life after the war.

NEUROLOGICAL AND MENTAL EXAMINATION OF STATE TROOPS OF THE NATIONAL GUARD

By Major Graeme M. Hammond, M.D., M.R.C.U.S.A.

Major Hammond gave a general review of the work he had been doing in the examination of the troops of the National Guard in this city and at the camps. When he received orders in August from the Surgeon-General to examine all the militia in the vicinity of New York City, he was at first unprepared to act, for he realized his own efforts would be a minor part in such a tremendous task. So he enlisted the interest and assistance of twelve able neurologists and psychiatrists who agreed to help him in the work and they formed themselves into an examining board.

The troops were scattered throughout the armories here and in camps in the Bronx and Van Cortlandt Park, but the work was started, beginning with one regiment. The army surgeons with the troops could give little information as to the mental soundness of the men, though they knew all about their physical condition, but it was soon discovered that the non-commissioned officers could give a certain amount of such information, so these men, usually sergeants, were asked to make lists of the men whom they believed would not make good soldiers. That helped a great deal. Soon experience showed that many of the cadidates could be passed at a glance on the appearance they presented, but others were given a more careful examination. The intention was to dispose of those who would not make good soldiers, who would not obey orders, or who could not understand them, those with no idea of discipline, those with organic disease of the nervous system and the mentally unstable cases. Certain regiments were found to have higher types of men than others; very few were rejected from some regiments, but in one regiment, from a distant part of the country, of those examined sixty-three per cent. were rejected. After the Rainbow Division left nearly 40,000 men had been through this examination.

At the camps the work was not easy, for large numbers had to be examined in a day, though some of these men were of an exceedingly high class and one had no difficulty in deciding that they were all right. But some were delinquents, though not mental defectives; others were manic depressives; there were cases of dementia præcox, epilepsy and migraine, a few spinal cases, some of progressive muscular atrophy, though only one of cerebrospinal syphilis. No cases of tabes were seen. In some regiments many cases of goiter were seen, a few exophthalmic. Unless they presented constitutional symptoms they had not been rejected; only when they showed evidence of tremor or of physical weakness, so that they could not keep up with their work, were they considered unfit for duty.

One could hardly realize the amount of work this meant. The large number of men that had to be rejected had proven a revelation. The army was full of incompetents who should have been stopped before they entered if the men on the exemption boards had done their duty, and it was deeply to be regretted that such a state of affairs should exist in this age and at this crisis. In the officers' training camp there were many whom it was found necessary to reject, men of the highest type, college men and those who had held important positions, men of affairs. Those from the West compared very favorably with those from New York State, but in one regiment of men from a large city a number of the men had been in jail or a reformatory. The cases of migraine were of interest, mostly all giving a significant family history, usually the mother having suffered from it. Those who had slight attacks were passed, but those in whom the attacks lasted two or three days accompanied by severe pain and prostration were rejected.

Epileptics were not rejected unless they were seen during a seizure by a member of the board or by someone on whose testimony the board could rely. A proportion of those would probably be heard from later. There was no doubt that a certain number of cases of all kinds that should have been rejected got through. They were careful in going over the neurasthenics and those with hysteria, in recognition of the Surgeon-General's opinion that such men were not desirable.

As far as the militia, the volunteer regiments, were concerned, they would undoubtedly prove a high type of soldier; but in regard to the National Army as a whole one could not be so enthusiastic. In one day seventeen men were dismissed from the Service who had been under observation in the Psychiatric Hospital at one camp for a number of days. This was where the heroin cases were seen, some of them coming in voluntarily because they could not obtain the drug and others sent in by the commander. It was a matter of astonishment how frequently these men were secretly supplied with this substance by visiting friends and relatives. Of the seventeen rejected men referred to, four were cases of dementia præcox, four epileptics, eight heroin habitués and one was undiagnosticated.

With persistent and self-sacrificing work, however, on the part of all the medical officers, under the present plans of the government, the United States would in time have an army that had never been equalled in the world, and the world would be the better for it.

Dr. Bernard Sachs, referring to the number of uniformed commissioned officers present in the audience, expressed the hope that a civilian's opinion was still of value, particularly as some of the civilians, like himself, remained such, not from choice, but because of age limitations. It was a source of satisfaction to hear from Major Salmon that there was work for all neurologists and psychiatrists to do; he himself believed there would be a good deal of work for them to do in New York alone and he knew they were all anxious to do what they could for the government.

So far as the neurological and psychiatric program was concerned, the one part that needed discussion was the manner in which those selected for the work were to be prepared to meet the huge preponderance of war neuroses. From all the accounts of the various armies in Europe, these conditions presented a large number of peculiar and interesting problems. The opportunity to study them was better than any which Charcot's clinic presented thirty-five years ago; yet, though more intense to-day, they would probably present many of the same characteristics that were elicited in those far-off days.

The speaker's own point of view regarding the attempt to educate some of the members of the Medical Reserve Corps in neurology and psychiatry was that in order to appreciate the importance and peculiarities of the neuroses, it was necessary that they have proper training in organic nervous diseases or they would regard every manifestation of nervous involvement as a neurosis and perhaps many serious organic troubles would not be recognized. It would be deplorable for the neurologist not to recognize the early onset of tabes or general paresis, particularly in those cases returned from the battle line after injury, and to diagnosticate, for instance, purely functional paralysis instead of a myelitis. It was very important that those men have excellent training in organic nervous diseases.

Dr. Hunt's presentation had brought up that very point. He spoke of his cases as exhaustion pseudo-paresis, which diagnosis might be accepted for the time being. But nevertheless these cases showed the extreme importance of being able to exclude the presence of cerebrospinal involvement which later on would develop into true paresis or pseudo-paresis luetica. They showed so many of the symptoms of early onset that in spite of the fact that they did not present the physical characteristics of increase of cells and positive Wassermann, one might well hesitate to say they were not marked for paresis. After all, nothing more had happened in those cases than had happened in dozens in civil life when under emotional strain the symptoms of general paresis first appeared. Under camp conditions, the mental and nervous strain had been unusual, the physical strain great, and so the lack of resistance was first made evident. Such men should not be returned at once to military life even though the symptoms disappeared after a week. They should be exempted from the army for seven or eight months, or even a year, and kept under observation; if they then showed no return of the symptoms they could be returned to the army.

As regarded the aftercare of the cases of neuroses arriving here, that would be a matter in which all took an interest. One of the points of interest that had been observed abroad was the great improvement that appeared when treatment was undertaken as early as possible and as nearly as possible to the battle line, which showed that the greater stimulus of the desire to return to the fight was a helpful factor.

Of all the points covered by the papers of the evening, the one which the speaker wished to emphasize was this: Every possible opportunity should be taken and every use made of every opportunity to train the men who were going to see these neuroses in as thorough a knowledge as possible of organic nervous diseases. Once the men were able to discriminate between organic and functional disease they would advance their studies of the neuroses still further and would acquire an insight into war neuroses and "shell shock" that would lead to a better knowledge of what was to-day a very important and puzzling condition.

Dr. M. Allen Starr felt he represented the sentiment of the audience in expressing indebtedness to Major Salmon and Major Hammond for the information they had given of what the army was actually doing in the work of examining the soldiers. It seemed appalling in its extent; the examination of one or two million men, as would have to be done, was a feat that was tremendous, and it was probable that every physician sooner or later would be called upon to share in the work.

From the beginning, the speaker had been of the opinion that it was a mistake on the part of the medical authorities of the army to reject the services of men who were competent to make examinations, but who were unwilling or unable to give their whole time to it; but it was probable that a part-time service was destined to come to everyone, and there was no doubt that everyone would be ready to give that part-time service when the occasion arrived. The occasion would probably arrive as soon as the soldiers came back wounded and invalided from the front. The situation at present in New York was an evidence. At one of the base hospitals in America recently the speaker met one of his former students in charge there who said they had seven or eight cases they did not know what to do with because of the difficulty of deciding if the diagnosis was organic or functional. None of the physicians in charge was really qualified to pass a psychiatric opinion and they were anxious for advice. Giving advice in such instances was the kind of part-time service many could readily render; they had been doing it all their professional lives in hospitals and why should it not be done for the army?

It was a difficult matter to eliminate the neurasthenics from the army. The speaker had in mind three individuals who had slipped through into the training camps; they had been privately recommended to leave, but had refused to do so because they were patriotic; they were in active service but actually incompetent to be soldiers, all three being cases of dementia præcox, one the son of a dementia præcox and a replica of his father, yet he had slipped through three different examinations, deceiving one of the best examiners on the Board of Mental Hygiene. He was incompetent and would show it in any emergency or under excitement. Yet many like him had passed through; they were in the opposite class to malingerers, yet it was equally important to detect them. The army examiners should be on the lookout for that type of individual. The percentage of these was interesting. Statistics of the first eighteen months of the war in Germany showed there were three and a half per cent. in one division alone near Hamburg which had been rejected, which showed the Germans were as badly off as the English in the numbers they had to release from the service. The average in the American Army would probably be higher. The average class in the College of Physicians and Surgeons numbered about 120 and in each class there were usually three men suffering from neurasthenia or dementia præcox. This was nearly three per cent. That was a good example of what existed in the community. A large number of these men would be found to be incompetent in the army and it was the business of someone to weed them out and as fast as possible.

The point Dr. Sachs made seemed to be valid, that it was important to educate the medical personnel and impress on these young men the great incidence of functional nervous disease and the importance of differentiating it from organic nervous disease.

When the time came for the establishment in this country of the new hospitals Dr. Salmon spoke of, it was to be hoped the men would be made use of who had kept abreast of what had been learned up to the present time about "shell shock." In connection with the study of war neuroses, to be conducted by the new committee for this purpose that Dr. Tilney had just appointed, a mass of accurate information would be gathered together in available form which would be of infinite service in dealing with these cases when they returned from the front.

Dr. Edward D. Fisher thought that possibly too much weight was put on neurasthenia; when the men were in active service this would largely disappear. He agreed with Dr. Sachs that the distinction between organic and functional diseases must be carefully made. It was very important, therefore, that the examining physicians be thoroughly trained for such work.

Dr. L. Pierce Clark wished to stress only one point and that was this: To exclude these neuroses from the organic group was not a sufficient training for the men entering into this work; in addition to having an organic understanding they should have psychiatric training and a modern conception of the functional neuroses. He was glad to know that the men weak in either qualification were being sent to appropriate places so this lack could be made good before they actually engaged in the work.

Dr. John T. MacCurdy was particularly interested in Dr. Hunt's paper and the mental symptoms he described. It was safe to exclude these cases from the group of true paretics. It was not impossible that the war would furnish groups of cases from the mental standpoint very like paresis. In London the speaker had occasion to examine a case following concussion; the most striking thing was not only his intellectual defect, but he was without insight into his true condition and showed the type of carelessness one saw in paretics. If there had been no history of concussion and without the negative serological findings, the institutional examination would have resulted in a diagnosis of paresis.

Dr. J. Ramsay Hunt felt he must reply to Dr. Sachs. He could understand that a critical attitude might be assumed toward the possible paretic features of these exhaustion cases. It had not seemed possible, however, that any clinician of experience could possibly regard them as true cases of paresis, in view of the normal serology and subsequent course.

The point that he had wished to emphasize was the existence of a group of cases developing under intensive military training, with pathological pupillary response to light, coarse tremors of the face, tongue and hands and a slight dysarthria closely simulating that of early paresis. He had tried to make clear that the mental and general cerebral symptoms were not characteristic of paresis, but in conjunction with the somatic symptoms were suggestive and corroborative. Furthermore, the disappearance of all symptoms, general cerebral, mental and somatic, after a period of rest, and the normal serological findings, left no other interpretation than that of fatigue or exhaustion of the central nervous system.

Dr. Hunt again stated what he had previously emphasized, that he had never encountered the condition reported in civil life, and any importance or significance which attached to this fatigue syndrome was, he thought, limited to the exigencies of military life. He thought it not unlikely that cases of this description which showed thus early a tendency to exhaustibility of the sensory nervous system might be the type of case which later, under greater provocation of stress and strain, might pass into the more severe neuroses or neuropsychoses of war.

These men were not recommended for discharge for the reason that they were quite willing to resign voluntarily from the camp, realizing from their experience that they were unfitted for the mental and physical strain of the life. Under conditions where the candidate was unwilling to resign and yet presented such a striking picture of fatigue, the question of the recommendation for discharge would have to be settled on the individual merits of each case.

CHICAGO NEUROLOGICAL SOCIETY

November 15, 1917

The President, Dr. Arthur W. Rogers, in the Chair

A CASE OF "QUADRANTIC BLINDNESS"

By Brown Pusey, M.D.

The man consulted Dr. Pusey complaining of defective vision. He was able to read ordinary print slowly. Examination of the fields of vision showed blindness of each eye in the lower right quadrant. The fields otherwise were normal. The refracting media and fundi were normal. The case was shown because of the very great rarity of the condition. Dr. Pollock described the case further.

History.—(October 29, 1917.) The patient stated that he was apparently well until a week ago, when he complained of severe pain in the head. He went to work, but returned at four o'clock, his headache having been worse. He rode a block past his house and then walked back. From then on he was unable to see distinctly. He vomited once that afternoon and was unable to work the next day because of severe frontal headache. His memory was so affected that he had forgotten where he lived.

Previous history negative. Denied lues; Wassermann reaction negative. Did not drink, smoked moderately.

Physical Examination.—A well-nourished male, aged fifty years, 5½ feet tall. Chest negative; abdomen and contents negative; extremities and genitalia negative. No gross loss of power in any of the extremities; no tremor. Motor and cranial nerves all normal. Heat and cold, touch and pain sense normal; no ataxia, no dizziness. Deep reflexes equal and normal; knee jerks variable, wrist jerks equal, triceps equal, normal. Jaw jerk normal. Plantar on the right frank, left less so. Cremasteric slightly sluggish on left, as was the abdominal. Pupils equal and reacted to light and in accommodation. Ocular movements normal except that perhaps convergence was a little bit poor. Sensory and cranial nerves normal, aside from the optic nerves. In speaking there was a slight tendency to misunderstand spoken words. He complained of forgetting numbers; could not remember the name of his first wife or of his present wife. He could not tell where Marshall Field's was located; said the City Hall was where the LaSalle Hotel is. He could not remember 2468 after two other numbers had been given him. Although he stated that he was a school teacher and was accustomed to doing rapid calculation, he could not do simple problems. The patient's blood pressure systolic was 140. He complained of headache, which he said was severe, but he was up and about and when his attention was distracted from his head he apparently had no pain.

He was sent to the dispensary clinic, where he had to go down an incline from the hospital; when he came out of the clinic he thought he had to go down stairs and lost his way in that manner on a number of occasions. At first he could not recognize any writing, but on a number of other occasions following Dr. Pusey's examination he could read his own name and on other occasions could read rather small type. He was given a deck of cards and told to deal himself a full house; he looked through the deck several times, passing three queens, muttered to himself "eight" and finally with great difficulty was able to pick out three eights. There was some defect in writing; he could write to dictation those things with which he was familiar —his name, address, Chicago, but when asked to write President Wilson, started with p-r-e-s-, and had great difficulty in getting further. There was an agraphia which was present not only on dictation but also on volitional writing. Relative to the agraphia, it might be interesting to recall the fact that a similar case was described by Casamajor in 1907 in the JOURNAL OF NERVOUS AND MENTAL DISEASE, except that that was a case of homonymous hemianopia with agraphia in which the question arose as to the localization of the lesion in the cases with an agraphia. Attention was called to Dejerine's dictum, that those lesions which were in the angular gyrus were associated with agraphia, whereas those which were subcortical were not affected with agraphia and in these a pure alexia was present.

Dr. Hugh T. Patrick said he had seen several of these cases of quadrantal blindness, but a clean-cut quadrant was very rare and very interesting in relation to the structure of the occipital cortex. Most of the peculiar fields were due to occipital lesions. Just at present these were even more interesting than they had been because a great many had been observed since the war began. Marie and Foix had reported a number of cases of gunshot or projectile wounds of the occipital lobes and had found some most extraordinary fields. The thing was of interest because of the question of cortical representation for color aside from form and a most interesting feature was the association of other symptoms with the peculiar visual defects. These related first to those symptoms connected with the various aphasias, alexias, agraphias and so on. In his experience the cases if seen early were associated with some form or degree of aphasia, and he believed the difficulty which the patient presented had in reading was due to the man's failure to recognize what he really saw. When Dr. Patrick was told that the patient had poor central vision, he said he must have something else besides an occipital lesion and it turned out, as in so many of the cases, that the trouble lay not in lack of visual acuity, but in lack of recognition, just as in ordinary word blindness.

The gentleman with quadrantic blindness for color only also had difficulty with his speech as well as with vision, which Dr. Patrick believed was due to a difficulty of recognizing the significance of what he saw. This applied not only to written characters but also to objects, which brought up another symptom which he thought was nearly related, and that was the point Dr. Pollock spoke of—failure to recognize surroundings. The patient did not orient himself properly, his recognition of places was defective.

Dr. Patrick cited a case seen several years ago in which the patient had an irregular, incomplete horizontal homonymous hemianopia. That man would get lost in his own house where he had lived for many years and could not go many yards beyond the front gate without losing himself. That would seem to have no relation at all to aphasia, but he believed it was closely related to visual aphasia in that it was an object blindness—a failure to recognize and appreciate what was seen, just as a person with word blindness sees perfectly but fails to recognize the printed characters he sees.

In another case seen recently there was an indication of the same sort of thing, which had been misinterpreted as mental confusion. A woman with a homonymous hemianopia was supposed to be mentally off because she acted so peculiarly. The trouble was that she did not see things on the right-hand side and at the table she would put out her hand without turning her head to look and fail to get what she reached for; second, she did not recognize all that was said to her; third, she did not recognize what she read and, fourth, she did not express herself fluently. All these collateral symptoms were due to the fact that the lesion was neither strictly cortical nor strictly occipital but extended forward into the speech centers or the fibers from them.

PSEUDOSCLEROSIS

By Lewis J. Pollock, M.D.

Dr. Pollock read a paper on this subject and presented a patient with this disease.

After reviewing the literature on the subject the speaker stated that in many respects pseudosclerosis was closely related to Parkinson's disease, and particularly to the so-called juvenile form. Many of the cases reported as juvenile paralysis agitans had really been examples of other diseases and the pure clinical cases had been very few in number. Many of the so-called juvenile paralysis agitans were certainly cases which would fit in the description of pseudosclerosis.

In the case shown, which had been diagnosed as juvenile paralysis agitans on several occasions, it was the tremor and rigidity which led to the diagnosis. The marked asymmetry of the involvement, and lack of conformation to type of the muscle rigidity, the extent of the tremor all spoke against paralysis agitans, as the chronic course, absence of emaciation and dysphagia, spoke against the inclusion of the case with a categorically defined Wilson's disease.

If juvenile paralysis agitans was to be considered as a clinical entity, conforming in its symptomatology to the adult type, it had better be sharply differentiated from the cases which differed in any respect from the recognized type. These cases, as the one shown, must be included in a group of diseases of the lenticular nucleus either complicated by diffuse changes elsewhere or affecting one or another area of the lenticular nucleus. Some of the cases might further be grouped, from the similarity of the cause or general pathology, as in the cases of pseudosclerosis and Wilson's disease showing the concomitance, the lenticular nucleus degeneration and liver disease.

The case shown was a female, age 33 years, single. Probably at the age of 15, but definitely being present at 17, the patient noticed a slight rigidity of the left side of the body, with dragging of the left foot in walking, and the assumption of a constrained, tense attitude of the left upper extremity in which the forearm and wrist were peculiarly flexed, the fingers flexed and thumb adducted. There was gradual increase in rigidity and tension and at the same time there was noted a tremor gradually increasing in intensity. The tremor was involuntary and as a result of it she frequently spilled things. About five or six years ago the condition began to be apparent in the right side of the body with a tremor of the arm and hand and some rigidity. At the same time there was noticed some difficulty in speaking, considerable shakiness and difficulty in enunciating words. At times difficulty in swallowing was present. Throughout the illness there had been a tendency toward crying easily and in later years to considerable depression. The condition progressed so that eight or nine years ago she gave up her work as dressmaker. For the last two or three years she had not gone anywhere because of the difficulty in walking and tension in her body. At times she complained of hot flushes throughout the body.

Upon examination, passive movements elicited marked spasticity of the left upper extremity with cog-wheel resistance, the spasticity being more marked in movements about the wrist and elbow than about the shoulder. Some resistance was present in the right upper extremity and a moderate amount in the lower.

When lying on her back the left leg was rotated internally, the big toe dorsally flexed. The right hand was slightly flexed at the wrist, the fingers slightly flexed, the forearm flexed. The left arm was abducted, the forearm was flexed, the wrist was flexed and deflected to the ulnar side, the thumb was adducted, flexed and the index finger flexed above the thumb in the position assumed by a small boy in shooting marbles. The other fingers were flexed. The head was held slightly toward the left. The face was somewhat washed out, although she was still able to smile without any forced movements. Ordinarily the face was devoid of much expression. There was present a tremor in the left hand, forearm, arm, head, slightly in the right arm, more in the forearm and hand, in the left thigh, leg, ankle and foot. The tremor was slow, four to five per second, coarse, consisted of to and fro movements of moderate amplitude, increasing to considerable amplitude and consisting of alternating contractions of opposing groups of muscles, flexion, extension of the forearm, pronation and supination more, flexion and extension of the wrist. This tremor was stopped momentarily on slapping the member affected, increased on associated movements, ceased at the beginning of an intended movement and upon sustained effort was increased. An attempt was made by the patient to control it by pressing the flexed hand firmly against the side or abdomen, or holding it with the opposite hand. Upon the right side the tremor was more easily seen in the individual fingers where flexion and extension were the chief motions. Alternate contraction in the muscles themselves without movement of a joint might be seen. The tremor apparently began at the root of the limb. The gait was decidedly stiff, hemiplegic, with propulsive characteristics. Considerable difficulty was seen in the performance of such acts as required the finer movements of the hand, although the beginning of the intended movement was associated with a cessation of the tremor. There was some difficulty in arising from a sitting position due to the tendency to fall backwards. In walking the left arm was held in the position described in the lying position, with arm abducted, the forearm flexed and pronated and the fingers in the above-described position. The right arm hung extended rigidly, with the fingers slightly flexed. There was no sensory disturbance, no bladder or rectal disturbance and the eye grounds were negative. The cranial nerves were negative except for lateral nystagmus when looking to the extreme lateral positions in either direction. Considerable difficulty was experienced in movements requiring diadochokinesis with the left and slightly with the right hand. There was no diminution in volume of the liver that could be made out even with a Roentgen examination. The pyramidal tract was intact.

THE UNMYELINATED FIBERS OF THE CEREBROSPINAL NERVES AS CONDUCTORS OF PAIN AND VISCERAL SENSIBILITY

By Prof. S. W. Ransom (by invitation)

With the aid of a differential axone stain it had been possible to show the spinal nerves contained great numbers of afferent unmyelinated fibers, whose cells of origin were located in the spinal ganglia. Many of these fibers go to the skin, smaller numbers to the muscles. When traced in the dorsal roots toward the spinal cord these fibers were seen to separate out from among those which were myelinated and turn lateralward into the tract of Lissauer in which they run for a very short distance and then terminate in the substantia gelatinosa Rolandi.

Since these fibers pass into the gray matter and terminate near the level at which they enter the cord, their intraspinal course corresponded to that of the pain and temperature fibers. They had been able to show by a series of experiments on the dorsal roots of the seventh lumbar and first sacral nerves of the cat that those afferent impulses which give rise to struggling and a reflex rise in blood pressure travel by way of the unmyelinated fibers. They were not transmitted by the myelinated fibers. These were the reactions which accompany painful stimulation and were the best objective criteria for pain. So far as it could be settled by animal experiments this showed that painful afferent impulses travel by way of the unmyelinated fibers.

Visceral Afferent Fibers.—Molhaut had shown that about one fourth of the cells in the nodose ganglion give rise to afferent fibers running to the stomach. Only a small part of this enormous number of cells could be accounted for by the few myelinated axons which are present in the vagus below the diaphragm, which is composed almost exclusively of unmyelinated fibers. It was therefore clear that afferent impulses from the stomach, passing by way of the vagus, travel along these unmyelinated fibers.

Work now in progress showed that the splanchnic nerves contain great numbers of unmyelinated afferent fibers with their cells of origin in the spinal ganglia. In addition the splanchnics contained a much smaller number of myelinated afferent fibers which were associated with the Pacinian corpuscles of the viscera and peritoneum. There was reason for supposing that these endings were sensitive to pressure and traction and that this type of sensation was carried from the viscera by the relatively small number of myelinated fibers. This would leave the enormous number of unmyelinated afferent fibers of the vagus and splanchnic nerves to transmit the vagus visceral sensations of pain and temperature and those visceral afferent impulses which never rise into consciousness but initiate unconscious visceral reflexes.

In conclusion he called attention to the remarkable parallelism between Head's protopathic fibers and the unmyelinated fibers. It would be remembered that Head maintained that each of his two groups of sensations, epicritic and protopathic, were mediated by a separate, anatomically distinct set of nerve fibers. His protopathic fibers were assumed to be primitive in character and the first to appear in the phylogenetic series. This was also true of the unmyelinated fibers. According to Head, pain was transmitted by protopathic fibers and he had just presented strong evidence to show that the pain fibers were unmyelinated. Like the fibers of protopathic sensibility, the unmyelinated fibers pass into the gray matter near the level at which they enter the cord. The viscera were endowed with protopathic and deep but not with epicritic sensibility. For the deep sensibility we had the Pacinian corpuscles and a scanty supply of myelinated fibers; for protopathic sensibility a great number of unmyelinated fibers. Also in the rate of regeneration the parallel held good. Head had shown that after division and suture of a nerve protopathic sensation returned more quickly than epicritic. It was a significant fact that protopathic sensation returned at exactly the same time as innervation to the sweat glands and blood vessels. These vasomotor and secretory fibers were postganglionic autonomic axons and were known to be unmyelinated. On the assumption that the protopathic fibers were also unmyelinated the fact that these two groups of axons complete their regeneration at the same time would be easily understood.

He was aware that Head's work had not been very well received. Trotter and Davis in England and Boring in this country had repeated his work and came to very different conclusions. But if Head's work should prove to be correct there would be no escape from the conclusion that his protopathic and the unmyelinated fibers were identical. If Head's work should be proven to be incorrect we should still have the unmyelinated fibers to account for and he had presented what seemed to him strong evidence that they carry most of the afferent impulses from the viscera as well as pain and possibly temperature sensation from the rest of the body.

ABSTRACT OF AUTOPSY REPORT OF CASE SHOWN BY DR. GEO. W. HALL AT THE OCTOBER MEETING

In the tissues of the soft palate and in the posterior pharyngeal wall and more on the left than on the right side there was an ulcerating, spongy, grayish-white tumor mass, which measured 5 cm. by 2 cm. in its opposite dimensions. Upon removing the brain in the usual manner and after reflecting the dura from the base of the skull, a soft, vascular tumor mass was seen to occupy the basilar portion of the occipital bone from the sella turcica posteriorly to the foramen magnum. The petrous portion of the left temporal bone was largely replaced by spongy red, friable tumor tissue. There was no involvement of the hypophysis or of the sella turcica. At no point had the tumor tissue eroded through the dura.

Serial paraffine sections of the tumor tissue proved it to be a lymphosarcoma apparently primary in the nasal sinuses and eroding upward into the middle fossa of the base of the skull and pointing downward into the tissues of the posterior pharyngeal wall and soft palate. The brain stem was compressed by the tumor.

BOSTON SOCIETY OF PSYCHIATRY AND NEUROLOGY

December 20, 1917

The President, Dr. Joseph W. Courtney, in the Chair

PSYCHOLOGICAL TESTS IN THE NATIONAL ARMY

By Lieutenant John E. Anderson

As Lieutenant William S. Foster, of Camp Devens, was unable to present a communication on the above topic Lieutenant John E. Anderson discussed the examinations of the men at that camp. He said that a psychological examination had been made on practically every man in camp. The object of the examination is two-fold: to classify the mental ability of the men as an aid to their superiors in the selection of men for appointment as non-commissioned officers and for special duties and secondly to weed out the unfit.

The men appear for the examination in groups of from one hundred to two hundred. First a very brief literacy examination is given which separates the illiterate from the literate. The latter then take a forty-five minute test covering quite varied abilities. The illiterates are given a " skill examination " consisting of the putting together of disassembled implements, such as locks, wrenches, electric bells, and so on. Those doing poorly in either examination are recalled and examined individually. If their performance is poor enough to warrant it they are sent to the psychiatrist who examines them with a view to rejection.

On the basis of these examinations the men are grouped in five classes: the very superior, superior, average, inferior, and very inferior. The company commander receives a report on each man, to be used in any way he sees fit. He is advised that these tests get at the " intelligence factor " only, and that the final selection of a man depends also upon such qualities as resourcefulness, leadership, and courage, which cannot be measured by tests. But the tests do bring a number of the men to the fore who otherwise would pass unnoticed and so serve to give the officer the material from which to select. This has been particularly noticeable in the cases of quiet but efficient men. Each company commander submits a return report to the psychologists in which he comments on the usefulness of the test ratings and any irregularities he has noticed. These reports have been very encouraging.

Although the personnel work (*i. e.*, the ratings submitted to the officers) is of primary importance, the elimination of the mentally unfit plays a large part. The psychologists and the psychiatrists coöperate in this work.

Asked about the details of the examinations, Lieutenant Anderson said that about 150 men could be examined an hour in the groups. The examination including the seating and arrangement of the men takes an hour. The individual examination, given to the culls from the entire system of examination, takes between forty minutes and an hour. The scoring of the group examinations which is done by clerks with stencils upon which the correct answers are designated takes very little time. The tests include such things as the carrying out of simple commands, memory for digits, the rearrangement of sentences, arithmetic problems, etc., all aimed to give ratings on general intelligence.

Asked about the cost of the examinations, Lieutenant Anderson said that it was very small as compared with that of other examinations in the army. He said that a considerable number of the illiterates had been found.

Many of these are foreigners who have difficulty with the English language. Asked about the possibility of coaching before the examinations, he said that five different forms are in use, and that the examination is such that even a repetition of it gives only a slightly higher rating.

A CASE OF CEREBROSPINAL MENINGITIS SUCCESSFULLY TREATED BY INTRA-SPINAL AND INTRA-VENTRICULAR ADMINISTRATION OF ANTI-MENINGITIS SERUM

By Theodore A. Hoch, M.D.

The paper was a report in full of a case of cerebrospinal meningitis treated as indicated and presented by Dr. Theodore A. Hoch. The case was a marine officer who had come home on leave. The family history and previous history bore no relation to the present illness. In January last he had had an attack of ptomaine poisoning and, though critically ill for a few days, he had fully recovered in a short time.

Early in May, the patient came home on leave. He was sick on arrival and fainted before reaching home in a taxicab. He had a chill, was dazed, complained of a severe headache, later became disturbed, excited and wildly delirious. There was no fever when he was seen by a physician, who gave him morphine. Two days later he was taken to the McLean Hospital in much the same condition. There was a questionable rigidity of the neck, the temperature was subnormal, the pupils not remarkable, the reflexes were hyperactive, there were questionable Kernig and Babinski responses. The patient complained much of severe pain in the back, neck and head. He was dull and very restless. Two days after arrival he showed a left facial palsy and a few scattering punctate blotches. The next day he was distinctly worse and had gone into stupor. A lumbar puncture on the fourth day after arrival showed a turbid fluid in which the organism of epidemic cerebrospinal meningitis was demonstrated. The anti-meningitis serum was at once administered into the spinal canal and repeated four times, 15 to 30 c.c. being given at a time. There was marked improvement in the symptoms and the spinal fluid soon became sterile. But the temperature again rose, the pulse became elevated, there developed headache, confusion and restlessness.

On the twelfth day after admission, an intra-ventricular puncture was made on the left side by Dr. Mixter. Many meningococci were found in the fluid, though the spinal fluid had been sterile. The serum was injected and the treatment repeated several times until a sterile fluid was obtained from the left ventricle. Still the symptoms persisted and a similar treatment was instituted on the right ventricle. Living meningococci were recovered in large numbers from the right ventricle, though both the spinal fluid and the fluid of the left ventricle were sterile. The serum treatment was begun and after several injections the fluid became negative. The symptoms gradually cleared up. An orchitis had developed, but that soon disappeared. An arthritis of the knees and wrists developed after the serum therapy was begun and that gave little trouble. A partial deafness which had been noticed soon after entrance soon disappeared, the facial palsy cleared up and the evidences of renal irritation likewise were soon lost. The mental symptoms were quickly lost. In July the patient was discharged well and has joined his ship in the fleet, entirely recovered.

Dr. Hoch emphasized the necessity of giving the serum early if the intraventricular method was to give the best results. It is a method to be recommended in cases where the outlet of the ventricles is closed by the inflammatory process and the infection has become walled off in the ventricles.

Prompt treatment tends to prevent the formation of an internal hydrocephalus. Cushing, Flexner, Chiray and others have suggested the early use of the serum in cases similar to the one just cited. No untoward symptoms have followed the intra-ventricular therapy, but on the other hand, as here, great improvement can be brought about by such a method.

In conclusion, Dr. Hoch mentioned that the mother of the patient had developed cerebrospinal meningitis three days after the arrival of the son and that she had died in a few days. Her contact with the son had not been for more than a few hours at home.

Dr. E. W. Taylor emphasized the importance of a careful detailed report of such a case. He had seen the case and had recommended transfer to the McLean Hospital. He had been unable to make a diagnosis at the time, for the patient was then under the influence of morphine, and in a highly disordered mental state.

Dr. Taylor had also seen the mother, a rather feeble woman of 64, who had undoubtedly contracted meningitis from her son. Her symptoms and behavior were much like those of the son; she showed delirium, restlessness, confusion, etc., pointing to a disturbance primarily cerebral. Repeated lumbar punctures showed cell counts ranging from 3,000 to 8,000 per cubic mm. The serum was administered in large doses but the patient died, having been in coma most of the time.

Dr. Knapp congratulated Dr. Hoch on the success of the treatment in this case and spoke of the importance of applying the anti-meningitis serum to the seat of the trouble in so far as that could be done. He said that he felt sure that very little material introduced into the spinal canal reached the cranial cavity. He spoke of the insignificant disturbance attendant upon the operation of trephining as practised in the intra-ventricular treatment of neuro-syphilis, and he saw no reason why the method was not indicated in such cases as Dr. Hoch had just discussed.

Dr. Frank C. Richardson commented on three cases of cerebrospinal meningitis which had recently come under his care, all of them treated by intra-spinal therapy. In one of the cases, several treatments with the serum supplied by the state gave no results and the case cleared up promptly when the Flexner serum was used. In a second case, the exact reverse was true, a fact that raises the question as to whether there are several strains of organism or whether these results were merely coincidents. He said he would like to give a word of caution about the too frequent procedure of lumbar puncture, especially after the fluid becomes negative. Time should be allowed between punctures for the process to clear up.

Translations

THE INTERNAL SECRETIONS AND THE NERVOUS SYSTEM

By M. Laignel-Lavastine

Authorized Translation by Fielding T. Robeson, M.D.

(*Continued from page 141*)

Chapter I

The young girl, who complains of palpitations and precordial pains with slight tachycardia, burning pains in the stomach, diarrheas and sweating attacks, in spite of being chilly and having cold feet; who has profuse lachrymation, who is often nauseated, and who has tendencies to be sick especially before her periods, who is easily seasick, who dislikes to ride backwards in a carriage or railroad car; who with a large palpebral fissure has a slight exophthalmos; who has a clear von Graefe's sign without the sign of Möbius; who has an abnormally low arterial tension, with perhaps an eosinophilia; whose overcontracted pupils are not dilated by adrenalin, and which contract with expiration (Samogyi's sign); who has an alimentary glycosuria with adrenalin; who has secretory crises with pilocarpine; and finally who is benefited marvellously by atropine as regards dyspeptic troubles, and whose constipation disappears at once—she is a vagotonic.

The woman with a well-marked tachycardia and few subjective symptoms; with exophthalmos and no von Graefe's sign, but with a clear sign of Möbius; with a large pupil and scanty lachrymal secretion; who has no sweats or diarrheas; with very marked loss of hair, with a tendency towards fever; who is always too warm; whose pupil dilates with adrenalin, who also has an alimentary adrenalin glycosuria; who does not react to pilocarpine, and stands atropine badly—she is a sympathicotonic.

This differentiation, true in general, has aroused many criticisms from the very first, especially from Fleischmann,[8] Potzl, Eppinger and Hess themselves,[9] Falta, Newburgh and Nobel,[10] Falta and Kahn, [11] Petren and Thorling,[12] Burstein[13] and Bauer,[14] etc., the justice of which has been admitted by myself and my interne Mlle. Romme at Beaujon Hospital.

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[8] Fleischmann, Med. Klinik, 4 fev., 1910.

It is thus that we have seen intense reactions to pilocarpine at the same time that adrenalin shows an exaggerated excitability of the vegetative system, the same individual presenting at intervals of some days different reactions, and adrenalin glycosuria has no value until the hepatic element is eliminated.

Finally I wish to state that the term tonic or tone does not seem to me well chosen, because it deals more with an exaggeration of the excitability of the nerve rather than an increase of its tonicity, and these two states are far from being always parallel.

Be that as it may, I differentiate in nervous disorders in addition to sensory-motor troubles and psychoses, the disorders of the vegetative system, and these sympathetic and autonomic abnormalities. We shall see later on that these disorders do not separate themselves into parallel series as simply as the theory would have them do. Then again many trophic disorders observed in endocrine syndromes are not actually trophoneuroses. It seems quite often that endocrine commotions reëcho on the morphology through a humoral intermediary and not through a nervous one. Nevertheless, as I can not dissociate in the actual enumeration of the trophic disorders those that have a nervous intermediary from those that have none, I will discuss them all, later on indicating how they may be distinguished.

Commotions of the internal secretions should include the disturbances of all the internal secretions, that is to say, all humoral pathology not to say all the pathology, because every cell from a cytological standpoint is a gland of internal secretion, and following Renault, who showed the secretory value of the cells of the conjunctivæ, Nageotte, just recently by mitochondrial methods, has demonstrated the secretion of the neuroglia, which was thought formerly to be a simple tissue of support.

In order to be brief, and admitting the three distinctive conditions, histological, chemical and physiological, of the glands of internal secretion, claimed by Gley[15] at the recent Congress of London, I will only picture among the internal secretions those that depend upon definite glands, in the front ranks of which I will place the classical hemato-vascular glands: thyroid, parathyroids, pituitary, suprarenals, ovaries and testicles.

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[9] O. Pötzl, H. Eppinger et L. Hess, Wien. klin. Woch., 22 dec., 1910.

[10] W. Falta, L.-H. Newburgh et E. Nobel, Zeitschr. f. klin. Med., 1914, LXXII, 1–2.

[11] W. Falta et F. Kahn, Zeitschr. f. klin. Med., 1912, LXXIV.

[12] K. Petren et I. Thorilng, Zeitschr. f. klin. Med., 1912, LXXIII, 1–2.

[13] M. Burstein, Med. Obozr., 1912, LXXII, 10.

[14] J. Bauer, Deutsch. Arch. f. klin. Med., 1912, CVII, 1.

I will add to this group the pineal, which in the infant, histologically as well as physiologically, is an endocrine gland; the choroid plexus, of which the secretion diffused in the cerebro-spinal fluid has been demonstrated by Pettit and Girard; the prostate, whose elective action on the genital organs has been brought in evidence by Hallion, Papin and Morel[16] and the paraganglia of the sympathetic, which are chromaffin organs apart from the suprarenals.

In addition among the glands of external secretion, certain ones have at the same time an internal secretion of such importance that I must at least mention them; such are the liver, the kidney, the pancreas, the salivary glands, the mammary glands and the intestinal glands of which the endocrine action has been grasped histologically by P. Masson.[17] Among these I will retain only the pancreas on account of its participation in the mechanism of glycosurias.

Finally among the lymphoid glands, ganglia, thymus and spleen, the thymus at least plays a secretory rôle.

I will consider then the nervous disorders linked with disturbances of the thyroid and parathyroids, the thymus, the suprarenals and paraganglia of the sympathetic, the pancreas, the pituitary, the pineal and the choroid plexus, the ovary, the testicles and the prostate.

In this clinical analysis I shall recapitulate at first in a critical review as briefly as possible the nervous disorders existing in the syndromes, that one as a rule places among the disturbances of the endocrine glands, that I have just mentioned, and reciprocally the endocrine disorders observed in the nervous syndromes.

In this critical review I will bring out the elements of an endocrino-neurological scheme, in which by the choice of certain nervous symptoms, certain endocrino-vegetative syndromes, certain traditional nervous syndromes, certain temperaments, certain characters, I will attempt to show by the method of double weighing, that some among them are determined by an endocrine commotion in certain cases, and that in others they are the expression of a nervous upheaval of different origin reacting secondarily on the internal secretions.

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[15] E. Gley, Relat. entre les organes à sécrétion int. et les troubles de ces sécrét., Rapport, sect. de Physiol., Congrès internat., Londres, 1913.

[16] Hallion, Morel et Papin, Act. vaso-dilatatrice péniesme de l'extr. prostateq., Soc. de biol., 28 fev., 1913. p. 401.

[17] Masson, P., La gl. endocrine de l'intestin chez l'homme, Acad. des Sc., 5 janv., 1914.

And I will gather from this rather suggestive study of a subject so complex and so obscure some conclusions which I will advance for your discussion.

A. Critical Review

The endocrino-neurological clinical relationships form, a priori, two big groups:

1. Nervous disorders in the endocrine syndromes.
2. Endocrine disorders in the nervous syndromes.

Before discussing these I must explain the value of the methods of investigation which are permissible for proof. I will be very brief as regards the neurological methods and a little more explicit as regards the endocrinological procedures.

(*a*) *Methods of Neurological Investigation*

I skim over the current clinical methods employed for unravelling the motor, sensory, lisso-motor, secretory, trophic and psychic disorders of the nervous system to pause at the more complex experimental tests in clinical use to establish the so-called states of vago- and sympathicotonia. These tests are at the starting point chemical or mechanical. The first are the injections of adrenalin, of atropine, of pilocarpine, of eserine; the second are the ocular, auricular or solar ganglion tests permitting the consideration of the oculo-cardiac,[18] auriculo-cardiac and cœliac hypotensory reflexes.[19]

Now each of these tests determines a series of reactions already quoted.

In order to judge of their diagnostic bearing on the neurological status one makes three hypotheses.

The first, that the antagonism between the sympathetic and the autonomic is complete.

The second, that just one of the results of each of the tests, which one regards as characteristic, is representative of the general orientation of all the results of that test.

The third, that the orientation of the test so determined is of use for deciding not only the state of the function thus investigated, but the state of the whole sympathetic or autonomic nervous system.

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[18] For the recent French bibliography, see: Vernet et Petzetakis, Le réflexe oculo-cardiaque, Gaz. des hôp., 2 mai, 1914.

[19] André, Thomas, et J., Ch. Roux. Soc. de biol., 23 mai, 1914, p. 857.

Now as regards the first hypothesis one can reply that if pharmacodynamics bring the innervation of the sweat glands under the control of the autonomic, there is nothing in anatomy or physiology to permit it to be separated from the sympathetic.

To the second one can answer that the results so often dissociated of adrenalin or atropine, raised blood pressure without glycosuria or vice versa, dilatation of the pupil without acceleration of the heart or vice versa, show clearly that one can not draw conclusions from the character of the physiological reaction, considering from the same standpoint the character of all the other possible reactions that one has neglected.

In a stronger way one should respond to the third hypothesis that the frequent confirmation of reactions in an inverse sense, of the vagotonic and sympathicotonic classification shows that one can not judge of such states from one single reaction, but further that the frequent confirmation of reactions in an inverse sense, sympathicotonic or vagotonic, that I have often observed as a result of different tests and even of the same test, shows at least the association or the succession of these two states of the vegetative system, and in consequence diminishes, if not the importance of the doctrine, at least the practical interest of this classification, of which the clear-cut outlines and the antagonism seem to have been exaggerated.

(b) *Methods of Endocrinological Investigation*

These methods are clinical, anatomical, organotherapeutic, physiological and chemical. In my report of 1908 I have shown the inherent causes of error in the first three.

Clinically one must not in an endocrino-neurological complex, of which the groupings may be more or less defaced, pick out as an element of causality that which perhaps is nothing more than a co-result of the same cause or which has nothing but a contingent relationship with the nervous or endocrine disorder.

In anatomo-morphological pathology one gathers facts of incontestable value, and that is why I have continued[20] to examine systematically the endocrine glands of my nervous and mental cases, but as I said in 1908 one must always know how to read, and how to interpret these data; to read them, that is to say, observe the physiological, ethnic or geographical[21] variations, the errors of technique, the post-mortem lesions, in order to distinguish the normal from the pathological; to interpret, that is to say, to distinguish in the pathological lesions those which are contingent, and are recent alterations due to terminal accidents, or which are but a co-effect resulting from the same cause as the nervous disorders, or results of a previous infection or intoxication, in order to be able with these lesions to establish beyond criticism a causal relationship between endocrine disorders and nervous symptoms.

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[20] Laignel-Lavastine, Hyperplasies glandulaires de l'hypophyse. Congrès de Neurol, Amiens, 1911.

Laignel-Lavastine et Duchm, Les parathyroïdes chez les aliénés, Soc. de biol, 20 janv., 1912; 30 mars, 1912; Annales de Méd. (sous presse); Les parathyroides chez les déments séniles, Soc. de psychiatrie, avril, 1912; M.

Besides a last difficulty which is considerable renders these researches sufficiently rare under ideal conditions. The glandular disorders, which for the sake of argument one supposes to have reacted on the mental condition, are seldom severe enough to result in death.

A long time elapses between the onset of the trouble and the autopsy. Thus on the one hand additional lesions due to the pathological overcharge can render old glandular lesions unrecognizable, and on the other hand nervous and psychic symptoms born of a glandular disorder, which is often transitory, may outlast this disorder indefinitely.

These examples of nervous and above all mental sequelæ of a functional upset, which has ceased for a long time, are relatively very frequent illustrations of the great law of habit.

In organotherapy[22] when it is a question of establishing a relationship of causality between a nervous disturbance and an endocrine disorder, because the administration of the extract of an incriminated gland has been followed by the disappearance or at least the attenuation of the nervous syndrome under consideration, it behooves one to be even more careful than in any other therapeutic induction, being aware already of the many fallacies of such

Labbé, Laignel-Lavastine et Vitry, Diabète et lésions du pancréas, Soc. anatomique, 8 mars, 1912.

Laignel-Lavastine et V. Jonnesco, L'hypophyse des psychopathes, Soc. anatomique, 30 nov., 1912; Encéphale, janv., 1913, pp. 25–45. Trois planches couleurs.

Laignel-Lavastine, Anat. pathol. de la pinéale, Mém. couronné par l'Acad. de Méd., 1913, Arch. de Méd. exp. (sous presse).

[21] Il en est ausi pour la thyroïde. V. Parhon, Mlle. Mateesco, Tupa, Nouv. recherches sur la thyr. des aliénés, Encéph., août-sept., 1913, pp. 139 et 235–55.

[22] Hallion, L., La pratique de l'opothérapie, 1911.

because here the causes of error are particularly numerous: coincidence; general action on the organism and its metabolism by simple pharmaco-dynamic effect; suggestion; variability of the organotherapeutic extracts according to the method of acquisition, of preparation, of conservation, their age, the mutation of effect according to dosage, the avenue of introduction, the frequency of dosage, the difference between their action and that of the normal gland, the uncertainty indeed of the nervous syndrome being in line with the endocrine disorder, which in other respects may not have induced the nervous syndrome except through the agency of glandular commotions in one or many other of the endocrines, observing as well other intermediaries such as mechanical, physical, chemical, humoral, nervous or psychic causes.

In his report of 1913, Gley reiterated the causes of error in insisting upon the general toxicity of organic extracts and their variations, depending upon the method of preparation, autolysis, the production, the manner in which they are used, the heating and the quickness of injection. In addition he has drawn attention to a new cause of error: tachyphylaxis,[23] rapid immunization characterized by the fact that successive injections of organic extracts in small doses gives rise to an immunization that is produced in a few minutes. This phenomenon of tachyphylaxis for one organic extract can be aroused by the extract of another organ and vice versa. This crossed tachyphylaxis of Gley and Champy should be taken into consideration in the interpretation of such complex results as the effects of treatments by simultaneous or successive associations of glandular extracts. From this standpoint the theory of treatment by hormones[24] is guarded from such causes of error because the hormones entail neither anaphylaxis nor tolerance. In the above we have an instance of one of the differences between the action of adrenalin and that of extracts of the suprarenal gland.

Finally the new physiological methods, methods of Abderhalden, methods followed by Gley and Claude, etc., are themselves no longer shielded from causes of error.

The Abderhalden method has already been applied by numerous authors, Urechia,[25] Pesker,[26] Parhon,[27] Obregia and Pilulesco,[28]

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[23] Gley et Champy, Soc. de biologie, 1911, 22 juillet, p. 159; Gley, Livere jubilaire du Pr. Richet, 1912, pp. 111–29.

[24] Hallion, L., Sur la part attribuable aux hormones dans les effets de l'opothérapie, Soc. de thérapeutique, 26 nov., 1913, pp. 472–77.

[25] Urechia et Popeia, Soc. de biol., Bucarest, 20 dec., 1913, p. 591.

[26] Pesker, Ass. scientif. des med. de l'Ass. psychiatrique Saint Nicholas a Saint Petersbourg, 10 janv., 1914

[27] Parhon, et Parhon, M., Soc. de biol., 25 avril, 1914.

[28] Obregia et Pitulesco, Soc. de biol., Bucarest, 31 janv., 1914, p. 316.

Marinesco and Papazolu,[29] Mutermilch,[30] etc., to induce from their results an endocrinological origin for numerous nervous and mental syndromes.

Only recently, following his researches on the relations of the internal secretions and the psychoses, Parhon, with Odobesco,[31] started to trace a psycho-endocrine syndrome characterized from the psychic viewpoint by great irascibility and ideas of persecution poorly systematized, and from a somatic viewpoint by ovarian disturbances, irregular menstruation or amenorrhea and especially thyroidal disturbances, congestion of the face, hot flashes, mononucleosis and a positive Abderhalden reaction for the thyroid.

Now Plaut has shown that in Abderhalden's reaction, kaolin talc, sulphate of barium produce dialyzable sustances which react with ninhydrin just as the protein does which has served in the preparation of the animal,[32] and H. de Waele concluded after a series of experiments that this ferment is unique: it is antithrombin. It is not the fragments of organs or proteins that undergo proteolysis but really the globulins of the serum. The specificity will simply arise from the preparatory injection which has created conditions favorable to the action of the protein on the globulins of the serum, and it appears probable that this bears a close relationship to the phenomena of agglutination and precipitation.

Even more recently Flatow[33] happened to show that it consists of simple variations of the proteolytic ferments of the serum. This study of antiferments for the diagnosis of endocrino-nervous relationships is, therefore, to my mind, extremely dangerous. In effect the recent criticisms of the Abderhalden reaction, in spite of the recognition of the gross chemical interest, put one justly on guard against its pretended specificity towards the extracts of organs employed.

I will then consider that the new investigations are not entirely conclusive relative to the existence of an endocrine factor, based solely on the Abderhalden reaction.

The physiological method advocated by Gley in his report for judging of the functional capacity of the affected organ consists of injecting into animals the altered tissue in order to see if it still manifests the physiological properties of normal tissue.

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[29] Marinesco et Papazolu, Soc. de biol., Bucarest, 29 mai, 1914, p. 1419.

[30] Mutermilch, S., L'applicat. de la récat. d'Abderhalden au diagnostic et à l'état des mal. nerv. et mentales, Arch. de Neurol., avril, 1914, pp. 205–219. Bibliographie.

[31] C. J. Parhon et Gr. Odobesco, Encéphale, 10 juin, 1914, pp. 489–582.

[32] H. de Waele, Soc. de biol., 25 avril, 1914, p. 627, et Zeitschr. f. Immunitätsf.

[33] Flatow, A propos de la spécificité des soi-desant ferments protecteurs, XXXI Cong., allemand de med. int., Wiesbaden, mai, 1914.

A priori, this method seems of value, and, as Gley says, "this type of study seems to recommend itself in a general way to pathologists. The anatomo-pathological research which allows certain lesions to be authenticated should be amplified." And as an example he has cited his experiences with the cardio-vascular action of adrenal extract from thyroidectomized dogs compared with that obtained from normal canine glands. He did not note any difference. Porak, who has followed this route, has arrived at unexpected results. Suprarenal extracts obtained under conditions of activity clearly greater than normal have given cardio-vascular reactions of less intensity than those that were obtained under normal conditions. As the cardio-vascular effect is proportionate to the richness in adrenalin one must conclude that not only is the richness in adrenalin of the suprarenals not in proportion to their activity, but that taken at a given moment they are less charged with adrenalin than are less active suprarenal glands.

Thus because function wears itself out with persistence, and by fault of having overlooked the time factor, one has been exposed to erroneous deductions, in conclusions drawn from the physiological method, which a priori is valuable in itself.

It is good because, contrary to precedent, it is capable of furnishing answers during the life of the individual. Better yet because it seems to be the method followed by Claude and his pupils.

It consists of injecting divers glandular extracts into patients, and observing their reactions systematically, and deducing from these reactions the probable endocrine disorders. Thus it permits the acquisition of individual indicators of physiological endocrine reactions, which, counting on the complexity of the cases, by the comparison of a large number of facts, may allow the formation of hypotheses if not of conclusions. Claude with his pupils, Baudouin and Porak, has already used this method with success in the study of acromegalics, Addisonians and just recently of Basedowians.[34]

The many criticisms summed up by Biedl and Falta and Porak[35] have done full justice to the serological methods, such as that of Meltzer-Ehrmann, based upon the supposed fact that dilatation of the enucleated eye of the frog, in the presence of any serum indicates the existence of adrenalin in that serum. Mydriasis can be brought about by other causes than the presence of adrenalin. It is useless to argue further.

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[34] Claude, H. Baudouin, R. Porak, L'épreuve des extr. hypophysaires chez les basedowiens, Soc. méd. des hôp., 19 juin, 1914, 1112.

[35] Porak, L'épreuve de l'hypophyse dans les maladies des glandes à sécrétion interne., Thèse, 1914.

There remains the need of knowing how to interpret the results of the clinical, organotherapeutic, anatomo-pathological and physiological methods (Claude type).

I will now sum up the nervous disturbances in the endocrine syndromes and the endocrine disturbances in the nervous syndromes as rapidly as possible, because one finds them to-day explained at length everywhere.

1. Nervous Disturbances in the Endocrine Syndromes

Endocrine syndromes are increasing every day, perhaps because one finds definite endocrinal lesions in a syndrome till now confounded with an analogue, perhaps because one now erects at pleasure endocrine theories for divers affections of unknown origin. The first way is legitimate, although of a rather delicate interpretation—in fact we are all familiar with the frequency of lesions in the endocrine glands in all sorts of autopsies. The second is singularly fallacious when it depends only on experimental or clinical analogies or on debatable anatomical, humoral or therapeutic authentications. The syndrome of dystrophia adiposo-genitalis due to a pituitary lesion and precocious macrogenito-somatosis due to a pineal lesion are examples of the first. The endocrine theories as to the origin of seasickness, hysteria, Paget's disease, cholera are, in their turn, examples of the second.

In the beginning, in the period which might be called the uniendocrine, each syndrome was connected with a lesion of one single gland, Basedow's with the thyroid, Addison's with the suprarenals, acromegaly with the pituitary, and in each gland only disorders of increase or decrease of secretion were seen (quantitative period).

In the meantime, after many others, I had shown with Thaon in 1905 a case of Basedow's disease in a woman with myxedema, which the simple quantitative theory could not explain.

(To be continued)

Periscope

MISCELLANY

Exhaustion Pseudoparesis. J. Ramsay Hunt. (Journal A. M. A., Jan. 5, 1918.)

Hunt reports some of his experience in the examination for fitness for military service of the candidates in officers' training camps. He was assigned to one of these camps in order to make neuropsychiatric examinations of the candidates. Out of 1.500, twenty-one were recommended for discharge as suffering from disease of the nervous system sufficiently grave to incapacitate them for military service. Nine of these were examples of functional nervous disorders, such as neurasthenia, vasomotor neuroses and the psychoneuroses. Only one presented symptoms of a definite psychosis, probably belonging to the paranoid type of dementia præcox. Another very important group of cases, numbering eleven altogether, showed evidences of syphilis of the central nervous system in the form of incipient paresis, preparesis or early cerebral syphilis. Six of these were regarded as incipient paresis. The others are examples of preparesis, or early cerebral syphilis. Generally speaking, the clinical symptoms were not marked, consisting merely of pupillary changes, tremors of the face and hands, and slight disturbances of articulation. General evidences of mental deterioration were practically negligible, from the diagnostic standpoint. For their detection, one had to depend on the slight but well-established somatic symptoms which appear characteristic to the trained observer. The men examined were able to perform their duties and made no complaints of physical illness, but the syphilitic nature of their trouble was confirmed by laboratory examinations of the blood and spinal fluid before the final recommendation for their discharge was made. The importance of eliminating such men from military service is self-evident. The writer emphasizes another group of cases directly bearing on this question, which came under his observation, the formal recognition of which is of some importance on account of the close resemblance to those of early paresis. In his opinion, this condition was due to an exhaustion of the cerebrospinal centers, causing a clinical picture simulating that of early paresis. Only serologic determinations could have eliminated these from the syphilitic class. The writer calls attention to these fatigue symptoms, the more to avoid diagnosic mistakes and their consequences. He would emphasize, as a cause of these symptoms in these individuals, the unusual strain, both physical and mental, to which men in an officers' training camp are subjected. He has not encountered a similar condition in civil life. Four case histories are given. The mental and general cerebral symptoms were not marked and alone would not have indicated paresis, but associated with pupillary sluggish response, slight disorders of articulation, and facial tremors, they would have suggested the early symptoms. It is not so generally known that a pupil sluggish to light and a generally dilated one may be the results of exhaustion. In the cases reported every possible precaution was observed. The writer declares that the responses appeared pathologic, a view reinforced by a definite inequality. But the laboratory tests invariably failed.

Thymic Dwarfism. K. H. Krabbe. (Ugeskrift for Laeger, August 9, 1917.)

The insight recently acquired into the significance of the ductless glands in relation to growth has given a new impetus to the study of dwarfism. K. H. Krabbe has recently published a case of dwarfism, which he traces to some disorder of the thymus. The patient was a girl born in 1899. When she was admitted to hospital in 1914 myxedema was diagnosed; then she was demonstrated as a case of pluriglandular insufficiency manifested as progeria. Later this diagnosis was questioned, as the progeria of Hastings Gilford—only a few cases of which have been described—is characterized by senility and a debility not noticeable in this case. There was no family history of interest. She weighed 3.75 kilos at birth, and was breast-fed for the first year. The first tooth appeared in the ninth month, and she began to walk at the age of eighteen months. At this age she was bow-legged, but in spite of this she walked well at the age of two. Mentally she was, if anything, forward; she attended school at the age of six. At the age of fifteen her height was only 111 cm., and menstruation had not begun. Relatively to the legs, the trunk was long, but as a whole the body looked small and stunted. Her expression was lively and intelligent, and there was no sign of myxedema in the face, which resembled that of a woman of forty. The hair of the scalp was very scanty, and consisted of fine, silky tufts of a light yellow color. There was no hair in the axillæ or on the pubes. The skin of the hands and arms was somewhat dry and desquamating, whereas there was excessive perspiration from the axillæ. Pigmented patches the size of a lentil were scattered over the scalp. The thyroid gland was not enlarged, and the *x*-ray examination of the cranium and teeth showed no abnormality. The reproductive organs were infantile in September, 1914, but by February, 1916, they had grown appreciably, ovarian extract having been given in the interval for nearly three months. She was also treated with suprarenin and thyreoidin for a short time without any noteworthy effects. Wassermann's reaction was negative, and there was no sign of tetany. After stating that dwarfism and rickets are a constant sequel to thymectomy in various animals, the author points out other features common to these animals and his patient. Deficient growth of hair is, he says, one such feature. His diagnosis of thymic dwarfism is further strengthened by a careful investigation and elimination of the other known causes of dwarfism.

Exophthalmic Goiter. Charles Scott Miller. (New York Medical Journal, December 29, 1917.)

The author states that, statistically considered, diseases of the thyroid body are classified as exophthalmic goiter, No. 51 of the International Classification of the Causes of Death; tuberculosis, No. 34, classified as tuberculosis of other organs; cancer, No. 45, as cancer of other organs; and No. 88, or diseases of the thyroid body. Some conception of the relation of exophthalmic goiter to the other classifications may be gained by comparing the mortality registered for Philadelphia, 1906 to 1915, inclusive. Of all diseases of the thyroid gland from 1906 to 1915, inclusive, the proportion of exophthalmic goiter to other diseases of the thyroid is three to one. Inasmuch as the first class occupies a ratio of three to one to the other classifications, we may take it as an index of the relative mortality due to affections of this gland. Diseases of the thyroid are on the increase, as evidenced by a study of statistical tables. Miller submits a study of 5,230 deaths from exophthalmic goiter. The data cover three groups of statistics and vary somewhat in period of time because of lack of facilities for making a more extensive summary. As a result of this investigation Miller has found that diseases of the thyroid are on the increase for all areas considered. The age period of forty to forty-nine years gives the greatest mortality. The female sex is predisposed. Colored persons are not as susceptible as white persons. The rate for residents of cities is almost uniformly higher than for rural districts. Geographical location has no bearing in goiter prevalence. The water-borne theory of infection has not been satisfactorily demonstrated experimentally or statistically. The same applies to foodstuffs. Judging from the mortality rates, the density of population has little or no effect on the prevalence of goiter. Geological formation does not affect the prevalence. Miller's conclusions are that the present indications show that goiter is noninfectious and is not caused by a foreign toxin introduced into the body either by food, drink, or other means. Inasmuch as it develops in persons subject to nervous strain, possibly due to their environmental influences and at a period of life when this strain is most acute, and from the indications of overactivity of this gland as presented normally in certain states of health, as pregnancy and menstruation, it is reasonable to infer that all causes point to the development of some poison within the body, due to faulty metabolism. In turn, this faulty metabolism of the body chemistry is influenced by the habits and life of the individual. Therefore the theory of nervous innervation or nervous control, as being directly responsible for the development of goiter in its various forms, and the nervous symptoms manifested in a well-developed case are in turn secondary to the reflex effect of the goiter which constitutes a vicious circle.

GOITER AND DEPRESSIVE CONDITIONS. Kappenburg. (Med. Tidsc. f. Geneve, Sept. 20, 1916, II, 14, p. 1173.)

The author states that 20 per cent. of the fifty-six persons with goiter at the Utrecht Hospital presented more or less pronounced mental impairment, while only 4.4 per cent. among 437 other inmates showed anything of the kind. Among the 20 per cent. nearly all were of the manic-depressive or melancholia types of psychosis, while this was true of only 1.1 per cent. among the others. The thyroid gland seems to be affected more than others by emotional influences. It is the *glande de l'émotion* as it has been called. He compares the various theories as to the pathogenic influence of the thyroid and its connection with psychic depression. One thing is certain, he declares, namely, that such an influence exists, and the figures he presents sustain this assumption.

THYROID DISEASE. B. R. Shurly. (Journal A. M. A., Dec. 9, 1916.)

Shurly says that his particular interest in thyroid disease arises from the fact that Michigan is in a well-defined geographic belt where thyroid disease is relatively common. He mentions the common failure of ophthalmologists and laryngologists to recognize the incipient forms when called on for their opinion. The simple goiter of girls at puberty, with disturbed emotional states attending an insufficient iodin feeding, is an example of the transitory disturbance of the thyroid. The exacerbation at the menstrual period with hysterical or neurotic throat symptoms is frequently called to the attention of the laryngologist. There is also a fascinating field of research in the interrelation of the tonsils with the suprarenals, thymus and ductless gland system in general. Shurly quotes rather fully from Beebe and Rogers as to the differential signs of hypothyroidism and hyperthyroidism. He notices also the family tendency to the disturbance of this organ. Some of the cases may be identified as thyro-parathyroid insufficiency. Marked cases of cretinism, infantilism, and exophthalmic goiter are readily recognized, but the large number of atypical forms of disease of the ductless glands with perverted secretions and attending pathologic changes and discomfort in the nose and throat frequently pass unobserved and unstudied. Attending enlargement of the thyroid, the rhinologist is often called on to recognize or suspect tumor of the hypophysis or change in its anterior or posterior lobes. It is not alone in acromegaly that typical signs of impaired function of the posterior pituitary appear. The effects of thyroid toxemia and insufficiency on the nervous, muscular and cardiovascular systems are so serious that we may find special and early symptoms in the upper respiratory tract, and with routine examination, including the cervical and postcervical glands, thyroid and thymus, it may be possible to abort an incipient case of Graves' disease or pulmonary tuberculosis. Shurly gives details of what should be done, and reports the findings of others on the special senses in these conditions, such as perversions of taste, smell and hearing. In severe deficiency of thyroid secretion, hemorrhage from the nose, throat or gums is common, and dyspnea that may simulate cardiac or lung trouble. The dry and husky throat of Graves' disease may be attended by cough, fever, unilateral bruit, loss of weight, precordial pain, etc., and the hyperfunction of the thyroid gland may increase its density and cause tracheal cough. The psychic symptoms are also to be considered and serious hypochondriac symptoms may appear. In the treatment the majority of drugs are useless. Rest and often a change of scene are essential, and psychic control and sedative therapeutic suggestion very useful. In myxedema the careful administration of thyroid extract and iodin gives great relief. Proper use of the galvanic cautery is often attended with improvement. Operative interference, either ligation or enucleation, should not be postponed when medical treatment does not show improvement after a reasonable time. Many cases of the myxedematous type improve greatly under the administration of pure iodin. The study of the individual cases alone can determine the question of treatment. Shurly hopes that the laryngologist and otologist will learn to take up this subject, and the neurologists and general surgeons and internists generally appreciate the fact that an examination of nose, throat, ears, etc., is worth the effort.

SUPRARENAL FUNCTIONING. H. Roger. (Presse Médicale, Nov. 22, 1917, 25, No. 65.)

The author reviews the multiple functions of the suprarenals, as he has determined them in large part by his own research, showing how they participate continuously in the workings of the economy, and the rapidity with which they respond to different nervous excitations. They restore almost instantaneously the balance in the blood pressure, or at least counterbalance the morbid influences which tend to depress it. They intervene as well in psychic disturbance as with material lesions of the nerve centers; they combat the exhaustion of the heart induced by fatigue, and modify the action of the pneumogastric on the heart. They also regulate nutritional metabolism and influence the consumption of sugar. They also serve in the elaboration of pigments, of cholesterol and of lipoids, and seem to act also on different poisons formed or introduced in the organism. This multiplicity of functions explains the multiplicity of disturbances for which they may be responsible. Among the numerous experiments related are some on rabbits with pulmonary edema induced by injecting into the veins a large amount of some isotonic and isoviscous fluid; by injecting methyl salicylate or similar substance which irritates the lung capillaries; or by intravenous injection of epinephrin. The hypersecretion in the lungs looks alike in all, but injecting each into a separate rabbit causes a very different response. The fluid from the first rabbit does not modify the blood; from the salicylate rabbit the pressure is reduced, while from the epinephrin rabbit, it sends the blood pressure very high. The rôle of the suprarenals in the development of arteriosclerosis has also been confirmed in Roger's laboratory. Repeated intravenous injections of epinephrin induced pronounced lesions in the arteries, but subcutaneously it induced glycosuria. This shows that it is by their action on the suprarenals that nervous impressions induce glycosuria, and that it is by the intermediation of these glands that puncture of the fourth ventricle produces this effect. The action of the pancreas hormone counterbalances the action of epinephrin. In thyroidectomized animals the epinephrin injections never induced glycosuria.

SEROTHERAPY IN MENINGITIS. Syk. (Svensk. Läk. Hand., Sept., 1917.)

The author's experiences in fifty cases are given with ample detail in the seventy-two pages of this work. About ten pages are devoted to personally analyzed bibliography, and nearly five to a summary in German. The variability of meningococci at different seasons, etc., is emphasized, as also the advisability of testing the potency of the antiserum. The most reliable means for this seems to be by titrating out the smallest amount of antimeningococcus serum which induces specific phagocytosis in vitro. This seems to be a safe and uniform guide; it can be supplemented with the fixation of complement test. The antiserums of different makes differ in strength. The single dose must be not less than 20 c.c. and the doses must be repeated daily. In case the diagnosis is dubious, do not hesitate to inject the serum. He regards the intraspinal as the only effectual route. Analysis of 241 cases on record of deaths, notwithstanding antiserum treatment, shows inadequate dosage as responsible or else the physician yielded to the patient's demand to be let alone, or the physician took a hopeless attitude from the start. Five died soon after the injection; five died apparently from anaphylaxis; fifty-five were moribund when the first injection was made. In Syk's own experience, one of the four who died soon after the injection was found to have acute miliary tuberculosis with the acute meningitis. Epinephrin before puncture is a useful precaution if the blood pressure is low. He adds that sudden and unexpected deaths occur in epidemic meningitis even when no antiserum has been given, and hence the antiserum should not be incriminated for every fatality.

ADDISON'S DISEASE AND THE WAR. F. Ramond and R. François. (Bull. et mém. Soc. Méd. des Hôp. de Paris, 1917, 3^e sér., xli, 1001–1003.)

The strain of war on the ductless glands has attracted much attention, and hyperthyroidism and later overactivity of all the endocrine glands have been described. As a late result of extreme hypertrophy atrophy is recognized, and clinically Graves's disease may be succeeded by myxedema; possibly by an analogous process, or perhaps, as F. Ramond and R. François suggest, as the result of overfatigue or of various infective or toxic influences the adrenals falling an easier prey to tuberculosis, Addison's disease is becoming commoner. These authors state that since May, 1917, no fewer than 26 cases of this rare disease have been under their observation. The patients were about thirty years of age, and had been a long time at the front, and therefore much exposed to stress and emotions exciting the adrenals to overactivity. Among the 26 cases 12 were regarded as fully developed cases and 14 as *fruste* or incomplete cases, four of the latter showed hyperthyroidism, and, though the authors would not agree to the view that this diagnosis is sufficient, it therefore appears advisable to exclude them. But even so, 22 cases of Addison's disease in six months is an unheard-of experience. A remarkable feature about Addison's disease in war is stated to be that the arterial blood pressure is well maintained until near the fatal termination. All the cases except the four it is proposed to exclude went downhill.

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Original Articles

SOME OBSERVATIONS ON THE INFLUENCE OF ANGLE OF SECTION ON MEASUREMENTS OF CORTEX DEPTH AND ON THE CYTOARCHITECTONIC PICTURE*

By Samuel T. Orton, A.M., M.D.

WORCESTER STATE HOSPITAL, WORCESTER, MASS., AND PENNSYLVANIA HOSPITAL FOR THE INSANE, PHILADELPHIA, PA.

The observations here recorded were planned as a preliminary to a more ambitious group of studies of cell size, development, spacing and lamination in certain areas of the cortex in the normal and in the defective and demented classes.

A thorough estimate of the structural integrity or stage of development of the cortex should take cognizance of the number, size and development of the nerve cells, the number and size of afferent and efferent myelinated fibers, the richness of the dendritic ramifications of the cells, the wealth of terminal arborizations of afferent fibers, propriocortical axons and recurrent collaterals, the neuroglia cells and fibers and the glial framework which forms the support of the non-medullated fibers in the cortex and finally the vascular apparatus with its accompanying mesodermal tissues. It is obvious that such a review is scarcely possible with our present technical methods except over relatively small areas of the brain. Attempts have been made to evaluate the cortex on the basis of intricacy of its sulcation, its depth and its cell content.

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* A contribution to the William Leonard Worcester Memorial Series of Danvers State Hospital Papers, presented November 19, 1915.

Hammarberg studied the number, size and development of the cells in nine cases of idiocy and imbecility. His cases were all of a rather pronounced type of clinical defect and his estimates of cell numbers were based on counts in carefully measured cubes of cortex with sides of 0.1 mm. and do not bring out clearly the relationship of cell numbers to the amount of the intercellular space in which lie structures of importance equal to that of the cells.

In the course of a somewhat intensive study of the cyto- and architectonic map of an hydrocephalic imbecile at the laboratory of the Danvers State Hospital in 1907, the writer encountered many areas where the attenuation of the cortex was marked but in which the cells had apparently been relatively well preserved, yielding a picture of great cell richness in an extremely thin cortex which would obviously have given an abnormally high count if the number in a given cubic volume had been used as a basis, while it is equally obvious that measurements of the cortex depth would have failed to express the situation clearly. It seems probable that the attenuation here was in part at least due to lack of development (or possibly destruction) of the intercellular structures. Some of the loss may perhaps be attributed to the loss in diameter of the myelin sheaths, a suggestion supported by the greater relative loss in white matter. Another factor which may have played a part is that of the size reached by the nerve cells. Donaldson has shown that there exists a difference both relative and absolute in the weights of the central nervous system of the gray and white rat and that this is correlative to a difference in size of the individual cell and fiber elements and not to their number or apparent stage of development. This points to the tentative conclusion that a small brain whose size is dependent not on a reduction in number of essential structures, but rather on the size of the constituent elements may yet from the functional standpoint be relatively normal and offers a possible explanation for the cases of average or even more than average mental attainment in individuals whose head measurements (or brain weights) are below the normal averages or even within the limits accepted for microcephalia.

The structures which fill the spaces between the cells may be divided for consideration into the essential nervous elements and the supportive and nutritive tissues. The first group includes the exogenous and endogenous myelinated fibers with their non-medullated terminal arborizations and collaterals and the dendritic expansions of the cells. The myelinated fibers form no small part of the whole mass in certain areas especially in the lower levels and in some cortices in certain higher laminæ as well. In other levels. however, their number is much less marked and the lamina granularis externa and lamina pyramidalis show a very limited absolute number in all cortices and here it seems probable that the chief intercellular nervous structures are the non-medullated fibrillar elements. The part played by the medullated fibers can generally be readily controlled by appropriate preparations, but the methods for the selective staining of the non-medullated elements are more difficult and less constant and the tremendous wealth of these fibers in an adult brain would make their accurate estimation a very difficult task.

It proves relatively easy as a rule to estimate the spatial importance of the vascular system because of the ease with which it may be stained and the neuroglia cells and differentiated neuroglia fibrils can likewise, as a rule, be readily demonstrated by selective staining methods. The neuroglia fibrils are, however, relatively sparse in the upper cortex layers except when proliferation occurs in response to inflammation or as replacement and here another type of supportive framework must be considered. The indistinct diffuse staining of these levels by many methods—notably Mallory's phosphotungstic acid hematoxylin and Alzheimer's modification of Mann's eosin-methyl blue—points to material here which is probably not essential nervous tissue and does not take the characteristic stain of the glia fibrils. Cajal's ammonium bromide-gold chloride method in successful preparations shows a wealth of material here which gives the impression of a very delicate network of fibers or possibly of a plasmatic substance. Unfortunately this stain like the majority of the metallic impregnations is somewhat uncertain and requires, at least in the writer's experience, freshly fixed material for good results. It must be granted, however, that if the results shown in successful preparations by this method reveal the real situation we are here dealing with a material which might go far toward filling the intercellular spaces in a cortex, which was far below normal in its contest of dendrites and termini, and hence distort badly any interpretation based on the relation of cell number to thickness of laminæ.

In the earliest embryonic stages of the nervous system the syncitial supportive tissue, *i. e.*, the spongioblasts of His, tend to develop in advance of the neuroblasts. Streeter states that in some sections a fairly complete spongioblastic framework is encountered in which are found no differentiated nerve cells or fibers. This tendency of the supportive framework to precede the development of the nervous structures is apparent also in the embryonic stages of the cortex, where the well-marked spongioblastic mantle zone and the stratum cribrosum are first developed, into the former of which the nerve cells later push their way by migration from the nuclear layer. Whether or not this order obtains later in the course of the development of the cortex is apparently an unanswered question as yet.

Disturbances of the blood supply in the adult brain especially in cases where the alteration is that of marked reduction in volume of blood but not a complete stoppage, as for example, the endarteritic form of syphilis, apparently give rise to a differential destruction of the brain substance in which the nerve elements go first, while the neuroglia is preserved and often reacts more or less to fill the loss. More complete obliteration of a vessel gives rise to loss of neuroglia tissue, also, while the mesoblastic elements of the vascular framework often remain. In other words, it seems that the nutritive and supportive structures of the cortex are more resistant to at least this type of destructive influence than are the essential nervous tissues. If this order also applies to the effect of an inhibitory moment acting during development, it is easy to conceive of a condition in which the full nerve cell development was hindered, while the proliferation of the supportive tissues went on with relatively little interference. Such a selective inhibition would give either relatively few or poorly developed nerve cells in a disproportionately large amount of supporting matrix. That this may be the actual state of affairs at least in some cases is suggested strongly by a comparison of some of Hammarberg's drawings of imbeciles cortices with his normals (Plate I, Fig. 2 with Plate V, Fig. 2). The imbecile cortex in this case contains 213 cells in a depth of 2.5 mm., the normal 333 cells in 2.97 mm. or to express the relation in simpler form, if the imbecile cortex were of the thickness of the normal it would contain about 255 cells as compared to the 333 in the normal, and when one considers that the development of the individual cells of the imbecile cortex is far below that in the normal, and that they therefore probably add a very much smaller complement of dendrites, collaterals, etc., to the intercellular spaces, the conclusion seems unavoidable that the proportion of supportive tissue here must be very much greater. Unfortunately Hammarberg's drawings do not lend themselves readily to such comparison as they are not for the most part sufficiently accurately localized to permit of direct contrast. Hammarberg himself reports in his microscopic examination in a number of cases (especially those of the first group) that the supportive substance is somewhat thicker than normal. With the methods he employed, however, it seems doubtful if this could have been the result of direct observation.

With these various factors in view it at first sight seems like a difficult task to form any estimate of the structural conditions of the cortex in a given case without an almost prohibitive series of comparisons between the results obtained by various selective stains. If, however, we accept as a working hypothesis the probability that the number and complexity of interconnections is correlative to the development of the individual cells, then a threefold coefficient of correlation (or possibly a percentual expression of the relation) between cortex depth, cell volume (expressed in terms of area) and cell numbers may give a result of value in the defective group. Whether this might also apply to the cases of dementia without cortical devastation remains to be seen.

For such a review sections must be available which are comparable both as to fixation, embedding, thickness and site selected for the counts and measurements. The writer has for his cases adopted the following technique. Fixation: the brain is suspended by means of a string passed under the basilar artery in a solution of 4 per cent. formaldehyde (10 per cent. formalin) at least one month. After this period pieces are removed and run through three changes of twenty-four hours each in 95 per cent. alcohol, absolute alcohol, chloroform, chloroform saturated with paraffin and then left at 55 degrees in 52° C. M. P. paraffin for twenty-four hours. Sections are cut at 10 μ and stained in thionin or toluidin blue.

The choice of area for measurements is of importance. Bolton has laid emphasis on this point and considers that for estimates as to cortex depth it is necessary to measure the crest, sides and sulcal regions of a convolution and take an average. This factor would be greater in narrow convolutions than in those of greater width, and hence in brains of greater complexity than in those of more simple pattern.

Another factor is that of the angle made by the section to the surface of the convolution. Thus theoretically a section cut diagonally through a cortex 3 mm. deep in a block 2 mm. thick would yield an error of about .6 mm. (20 per cent.) and while it is highly improbable that such obliquity would occur in a carefully cut and embedded block it seemed advisable to control it by direct measurements. For this purpose a special block holder was devised, which rotates about its horizontal axis and which is equipped with a scale graduated in millimeters so that from a wedge-shaped block of cortex cut so that its central plane is as nearly as possible perpendicular to the surface, seven or eight planes of section can be made cutting the cortex at as many different angles. All measurements have been made at the apex of convolutions through the strip where the axes of the majority of nerve cells pass vertically into the white matter. Some of the measurements were made with a micrometer eyepiece, but the majority have been made by means of a 45° mirror on the microscope of a convertible balopticon with lenses and table height adjusted to give a magnification of 500 diameters. A specially constructed mechanical stage makes it possible to follow the selected axis and each field is measured either by means of a millimeter scale or millimeter cross section paper, their sum forming the cortex depth. Section groups of this type have been cut from ten blocks, five of which representing five major cortical fields are given here in tabular form.

Cortex Section No.	PCL		PoCL		F.		T.		Occ.	
	Mm.	%	Mm.	%	Mm.	%	Mm.	%	Mm.	%
1	4.38	45.5	......	......	4.	47.3	4.20	56.2	......	......
2	3.23	7.3	3.70	30.1	3.97	46.3	3.26	21.5	......	......
3	3.09	2.6	2.96	4.2	2.93	7.8	2.77	3.3	4.41	119.4
4	3.01	0.0	2.85	0.4	2.72	0.0	2.68	0.0	2.10	4.4
5	3.11	3.3	2.97	4.6	2.84	4.4	2.96	10.4	2.01	0.0
6	3.28	8.9	2.84	0.0	3.21	18.1	3.37	25.5	2.40	19.4
7	4.06	34.8	3.20	12.6	3.65	34.4	3.82	42.2	2.60	29.3
8	......	......	4.02	41.3	......	......	......	......	3.11	59.7

The PCL. block was from the precentral convolution immediately below the point of incidence of the great annectant buttress. The PoCL. block from the postcentral convolution opposite the PCL. block. The F. block was from the posterior end of the first frontal gyrus and represented a part of the agranular frontal type of cortex. The T. block was from the mid portion of the Sylvian border of the superior temporal gyrus about opposite the Rolandic operculum. The Occ. block is calcarine cortex from beneath the sulcus calcarinus proprius near its point of bifurcation.

The percentages have been based in each instance on the shortest measurement to show the variation from this brought about by the change of angle.

The wedge-shaped pieces of cortex were from eight to twelve mm. long on their superior surface and of the width of the gyrus from which they were taken, so that the steps of the series are from 1 to 1½ mm. apart on the surface and roughly coincident at the apices, so that the first step on either side of the vertical would probably represent the maximum error which would occur in a carefully cut and mounted block of from two to three mm. thickness. With the exception of the postcentral the steps, while varying markedly in value, yet show a regularity of direction on each side of the section of least depth. The postcentral shows a condition which was encountered in one other block of the series, which bespeaks apparently an irregularity of depth.

One disturbing element in the measurement is that of determining exactly the point at which cortex ends and medulla begins. In practically every case the spindle cells of the lowest cortical layer disappear rather gradually as the white matter is reached and individual cells of this type may frequently be seen singly or in pairs well below their neighbors, so that the establishment of a lower border is more or less of an arbitrary one. A part of the variation between pairs of measurements on either side of the zero may result from this and in order to estimate its value five determinations were made at widely separated intervals of the depth of Section 4, of the PCL. block, with the result that the readings varied from 1.4 per cent. above to 1.5 per cent. below that recorded, a total error of 2.9 per cent., which is greater than the smallest error referable to obliquity shown in the table and approximates two others. As these cells in common, with all the cortical elements, find their adult position by migration from below it is highly probable that this error may prove a very variable one in brains from various sources, and especially in those which have been influenced by some factor inhibiting full development.

The greatest variation between a section of least depth and its nearest neighbor is that shown in the Occ. block, *i. e.,* 19.4 per cent. The average variation in the whole series of ten blocks was 5.98 per cent., while in those included in the table it is 6.14 per cent.

The cyto-architectonic picture is not much altered except when the obliquity is marked. The individual laminæ according to a few careful measurements seem to be increased in width proportionately to the change in total cortex depth. In only one observed instance, however, does this tend to modify the picture. This is in the level occupied in other fields by the stellate cells in the precentral and agranular frontal cortices where the widening of this zone increases the prominence of the scattered stellate elements, though it is hardly probable that they would be mistaken for a true lamina granularis interna. A further influence of obliquity is seen in the pyramidal cells. In the vertical section by far the larger proportion of these are cut so that they show long apical processes and as the plane deviates from the vertical those showing long processes become less in number and the short truncated forms more numerous. There is, however, an apparently fairly wide variation in the vertical orientation of these cells, so that their shape will not serve as an accurate control over the obliquity. A few observations of the accuracy of this control have been made by determining the proportion of truncated cells to those with long processes and it seems probable that degrees of obliquity giving rise to 10 per cent. or more of error could be recognized in this way. This same factor of variation in form will probably act to reduce an estimate of cell volume based on measurement of cells areas and hence might play a part in the use of such data for determining the correlation suggested above. Further observations on this point are intended.

In general the results show that sections for comparison must be cut and mounted with extreme care to avoid undue obliquity and that with such care one may expect an error of something under 6 per cent. of which almost one half is due to difficulty in determining the line of demarcation between cortex and medulla.

UNILATERAL OPHTHALMOPLEGIA*

Report of Case Due to Carotid Aneurysm

By Henry Viets, M.D.

Unilateral complete ophthalmoplegia is a rare disease, especially when the condition is due to lesions other than those of the nuclei. I have been unable to find in the literature a report of this condition due to an aneurysm or tumor which was verified by operation or autopsy. Therefore I report the following case, which is of interest not only to the neurological surgeon, but to the neurologist and ophthalmologist.

Miss A. S. entered the Peter Bent Brigham Hospital on March 15, 1917, on the neurological-surgical service of Dr. Harvey Cushing, to whom I am indebted for permission to publish this case.

Complaint.—Headache, numbness over right eye, dropping of right eyelid.

Family History.—Entirely negative.

Past History.—Her general health has always been good. There is no history of trauma. The past history is not remarkable in any way.

Present Illness.—The present illness began seven weeks before admission with headache for two days. This was throbbing in character, continuous on the right side of the head only, in the frontal and occipital regions. This headache has continued up to the time of admission but has been worse for the last two days. A few days after onset the right eye closed. At the same time numbness and pain were noted around the right eye, the right side of the nose, and part of the right cheek. The numbness was also noted over right forehead. Three days after her illness began she went to a Providence (R. I.) hospital, where she remained seven weeks prior to coming here.

Physical Examination

Well-developed Irish girl of 26. Single. Examination not remarkable except for blood pressure, systolic 176, diastolic 110. Vessels and heart negative.

Urine.—Negative on 3 examinations.

Blood.—Wassermann negative.

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* From the clinic of Dr. Harvey Cushing, Peter Bent Brigham Hospital, Boston.

Spinal Fluid.—Clear, colorless, cell 0, globulin 0. Wassermann, negative.

NEUROLOGICAL EXAMINATION

General condition good.

Head.—Not remarkable in size or shape. Held in normal position. No prominences or tenderness. Percussion note not remarkable. No dilated veins.

Cranial Nerves—I. *Olfactory.*—No subjective disturbances. Objective—cannot name vanilla, camphor or ammonia, but knows difference.

II. *Optic—Fundi and Fields* (Dr. C. B. Walker).—Fundi normal in appearance in both eyes. Optic cups rather shallow and laminæ cribrosæ not sharp. Fields normal throughout to form and color except for slight general contraction on right to smallest discs. Vision O.S. 20/15; O.D. 20/20.

III, IV and VI. No diplopia or nystagmus. *O.D.* Pupil round, small and regular. Does not react to light, accommodation or consensually. Pupil in mid-axis of orbit. Paralysis of all external ocular muscles. Ptosis of lid. Slight enophthalmos and photophobia. *O.S.* All extra-ocular movements perfectly performed. No exophthalmos, enophthalmos, photophobia or nystagmus. No ptosis. Pupil round, regular and reacts to light and accommodation perfectly.

V. *Trigeminus.*—*Subjective:* Numbness under and over the right eye, inside of mouth, upper jaw and inside of cheek. No numbness of tongue. *Objective* (see Fig. 1): Corneal reflex absent on right. *Motor:* No weakness of temporals or masseters. Jaw deviates slightly to right.

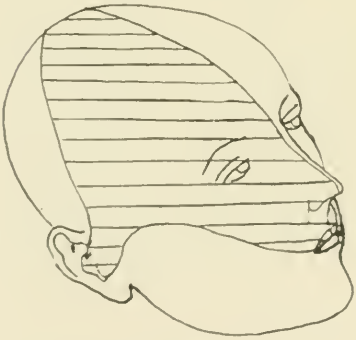


FIG. 1

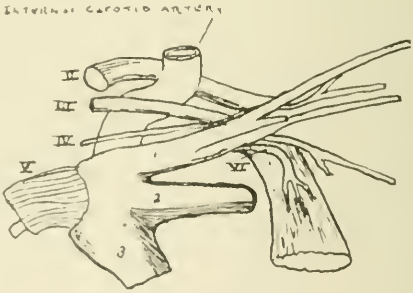


FIG. 2.

FIG. 1. Sensory chart, showing areas of hypesthesia, hypalgesia and thermal anesthesia.

FIG. 2. Showing relation of the internal carotid artery to the third, fourth and fifth cranial nerves. (From Gray.)

VII. *Facial.*—No paralysis of any part of face except eyelid on right. Naso-labial fold equal; no paralysis at corners of mouth.

VIII. *Acoustic.—Subjective:* Tinnitus in both ears for seven weeks. *Objective:* Rinne positive in both ears. Watch, two feet, right; one foot, left.

IX. *Glossopharyngeal.*—No difficulty in swallowing or speech.

X. *Vagus.*—Pulse normal. No difficulty in speech. No asymmetry of palate. No vomiting.

XI. *Spinal Accessory.*—St-cl-mast. and trapezius muscles strong and equal.

XII. *Hypoglossal:* All motions of tongue perfectly performed. Tongue protrudes in midline. No apraxia.

Cerebrum—Frontal.—There is a possible change in disposition as noted by friends. The patient is rather bucolic. Her memory is good and she is perfectly orientated.

Temporal.—No aphasia or uncinate attacks. No dreamy states or hemianopsia.

Paracentral.—Muscle sense normal. No astereognosis. No apraxia.

Precentral.—No convulsions or twitchings. Muscle tone normal. No weakness of muscle groups. Dynamometer—right 40, left 35.

Postcentral.—Touch, pain and temperature senses normal except in right trigeminal region.

Occipital.—No hemianopsia. No hallucinations of sight.

Cerebellum.—Romberg negative. Gait not remarkable. No dizziness, vertigo, nystagmus, ataxia or diadochokinesis.

Reflexes.—Superficial: Epigastric—equal and active. Abdominal—equal and active. Plantars—down, flexor, equal. *Deep:* Corneal—absent left; active right. Biceps—equal and active. Triceps—equal and active. Knee jerks—equal and active. Tendo-Achillis—equal and active. No ankle clonus. No Babinski, Oppenheim or Gordon.

Vasomotor.—No special moisture of skin. No color changes. Surface temperature not remarkable.

Sphincters.—Normal.

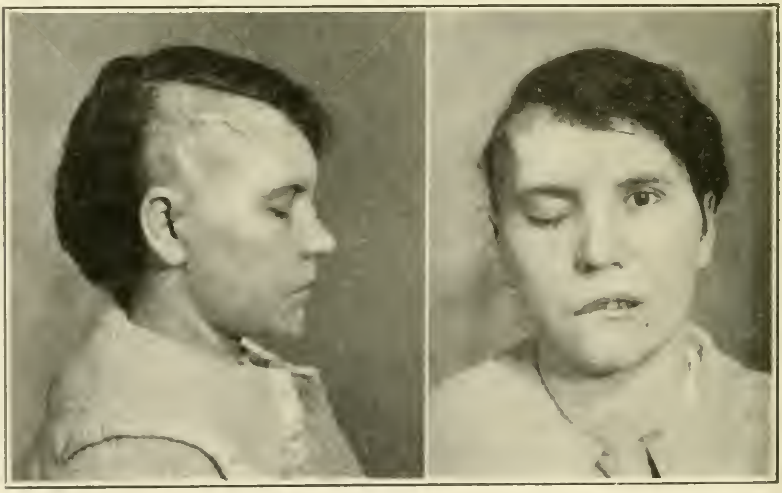
Positive Findings.—Subjective: Headaches, right frontal for seven weeks. Ptosis of right eye for seven weeks. Numbness and pain over area supplied by upper branches of right fifth cranial nerve for seven weeks. Slight involvement of third branch. *Objective:* Ptosis of right eyelid. Complete internal and external ophthalmoplegia, right. Loss of corneal reflex, right. Disordered sensation of right trigeminal area. Enophthalmos.

The patient remained in the hospital for thirty-five days before operation, without any change in her condition. During that time the possibilities of diagnosis were discussed. From the history and neurological findings it was felt that the only possible lesion to give the above symptoms was at or near the sphenoidal fissure (vide Fig. 738, p. 996, Gray's Anatomy, eighteenth edition, 1910). It is at this point, and this point only, that we find the three motor nerves of the eye and the upper two branches of the trigeminal, in close approximation (Fig. 2). The possibility of a nuclear lesion extensive enough to cover the nuclei of the third, fourth, sixth and part of the fifth cranial nerves was dismissed as improbable. A probable diagnosis of tumor at the sphenoidal fissure was made. We seemed to have no lead on the character of the growth except that it had caused symptoms rather suddenly.

Dr. Harvey Cushing operated on April 19, 1917, under ether anesthesia. I quote from his operative note:

"*Subtemporal exploration for presumed endothelioma of the trigeminus. A magnified Gasserian ganglion approach with exposure of the fossa of the ganglion.* It was found that the ganglion had been pushed downward and that there was marked atrophy of the dura surrounding it. The meningeal artery was divided between clips, and on elevating the dura the ganglion came up with it, showing a definite atrophic fossa with the ganglion considerably thinned and its division separated.

"With a knife hook an incision was made through the dura just to the outer side of the point of penetration of the two divisions. This disclosed what at first was taken to be an inner layer of dura, but on stripping up the divided layer, it was found that there was a smooth, pulsating tumor the size of a walnut, more or less filling the fossa. It was hardly conceivable that this could have been anything more than an aneurysm of the internal carotid artery, though it was in the exact situation and had produced the same symptoms that an endothelial tumor of the trigeminal sheath might have produced."



Figs. 3 and 4. Showing condition of patient ten days after operation.

The patient made an uneventful convalescence and left the hospital 20 days later. Temperature, pulse and respiration were normal throughout her stay in the hospital. There was practically no change in her condition (Figs. 3 and 4). The sensory disturbance of the fifth nerve, the ptosis and ophthalmoplegia were not relieved. There was also slight weakness of the right facial muscles at the corner of the mouth. Three months later there had been no marked change in the condition.

I have failed to find in the literature a report of any case like the above. Fearnsides[1] in an excellent article on "Intracranial Aneurysms" reports a case of aneurysm of the right internal carotid which ruptured. His patient showed ptosis and paralysis of the extra-ocular muscles except the external rectus. The patient died on the thirty-sixth day and autopsy confirmed the diagnosis. Fearnsides found that paralysis of isolated extra-ocular muscles was very common in cases of cerebral aneurysm with rupture, but before the stage of rupture localization by cranial nerve involvement was very rare.

Summary.—An unusual case of aneurysm of the right intracranial carotid artery is presented. The symptoms were: Complete ophthalmoplegia with sensory disturbances of the trigeminus. The aneurysm was seen at operation. No etiological factor was found. Rupture has not taken place after seven months of symptoms.

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[1] Fearnsides. Intracranial Aneurysms, Brain, 1916, XXXIX, 224.

THE MEDICAL TREATMENT OF GRAVES' DISEASE WITH SPECIAL REFERENCE TO THE USE OF CORPUS LUTEUM EXTRACT[1]

By Herman H. Hoppe, A.M., M.D.

The corpus luteum has been the subject of much study in recent years and much light has been thrown upon its structure and origin, since Fraenkel's paper in 1903. Perhaps the most exhaustive and critical research both as to the origin, structure and physiology of this ductless gland has been published by Novak, who has studied its relation to menstrual disorders. Other investigators have shown that the corpus luteum has not only an influence on menstruation and pregnancy, but that it probably, by an internal secretion, which is poured directly into the circulation, has not only an influence on the development and the function of the mammary gland, but that it also has a marked influence on the secondary sex characters and therefore on the metabolism of the body as a whole.

Before going on to the subject of the relation between the corpus luteum and the thyroid gland, which is the subject of this paper, let us consider briefly what we know of the corpus luteum to-day.

We know that the normal corpus luteum is developed from the Graafian follicle. Whether it is of connective tissue or epithelial origin has been the subject of quite a dispute, but Novak, to whose article I refer those who are interested in this discussion, concludes, as a result of the study of a series of 137 ovaries removed by operation, and especially by a study of the very earliest stages of development, that it is epithelial in character and is derived from the epithelial cells of the membrana granulosa of the Graafian follicles. In this view he confirms the earlier studies of Meyer and the work of Sobotta, who prove without a doubt the epithelial origin of the corpus luteum in the lower animals. He says: "There is no reasonable doubt of the origin of the lutein cells from the epithelium of the membrana granulosa." There are two kinds of specific cells in the corpus luteum, namely, the lutein cells and the paralutein cells. In addition these cells are found to have a rich blood supply, the cells covering a very rich network of newly formed blood-vessels.

It is therefore held to-day that the corpus luteum is a glandular organ, and that the epithelial cells, viz., the lutein and the paralutein cells, pour their secretion directly into the blood-vessel upon which they are embedded.

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[1] Read at the forty-third annual meeting of the American Neurological Association, May 21, 22 and 23, 1917.

The corpus luteum therefore is a ductless organ and it has a most important function in regulating the sexual life of woman. It does this probably by secreting a chemical agent into the blood stream. The effect of this chemical agent is a local one, namely, on the uterus, and perhaps a general one, affecting the mammary glands and the metabolism underlying the development and the regulation of secondary sexual characteristics. In relation to the first function, viz., in relation to the uterus, Novak says: "There can be but little doubt that the corpus luteum possesses at least a dual function: (*a*) The causation of menstruation; (*b*) the preparation of the endometrium and the fixation of the ovum in the earliest stage of pregnancy." Novak suggests that the lutein cells stand in relation to the production of menstruation, and the paralutein cells to the function of ovum fixation. "I may simply state that in nineteen corpora lutea exhibiting marked development of these paralutein cells, all except a few were removed from patients who gave histories of profuse, and in a few instances of irregular menstruation. It is curious to note that many of these patients were sterile."

It seems therefore to have been demonstrated that the secretion of the corpus luteum has an all-important rôle in normal menstruation and in normal pregnancy. It would seem reasonable therefore to conclude that a functional decrease or a functional increase may cause amenorrhea or amenorrhagia.

Being one of the ductless glands, the ovary, perhaps through the corpus luteum stands in relation to all the other ductless glands, and the ovary is the avenue through which all the other ductless glands exert their influence on the functions of the female generative organs.

That the corpus luteum also exerts an influence on the mammary glands and the metabolism underlying secondary sexual characteristics is at least possible. This is indicated by the research work of Seitz-Wintz and Fingerhut,[2] who think that they have isolated two active principles for the corpus luteum, which they say are opposite in their activity in relation to the functions of menstruation and pregnancy.

i. Luteolipoid which inhibits menstruation and when injected hypodermically diminishes the excessive flow.

ii. Lipamin, which in animal experiments stimulates the development of the sexual organs and when given hypodermatically in amenorrhea brings on the menstrual flow. Similar observations on the relation between the corpus luteum and the mammary gland have been made by Hammond and Marshall, and very interesting observations on the relation between the corpus luteum and secondary sex characteristics were made by Pearl and Surface.

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[2] Munch. Med. Wochenschrift, 1914, No. 30 + 31.

Can we regard the internal secretion of the corpus luteum as the specific internal secretion of the interstitial tissue of the ovary? Is there any other internal secretion of the ovary, which is separate and distinct from that of the corpus luteum? This question as yet is unanswered.

Now let us consider what the relations between the thyroid and the corpus luteum may be, and how a disturbance of this harmonious relation may result in hyperthyroidism.

It is quite agreed that the regulation of metabolism is the function of the ductless glands, and that the thyroid's chief function is the regulation of the proteid metabolism. At any rate we conclude this to be the case, because in Graves' disease the proteid metabolism is greatly increased and in myxedema it is greatly diminished.

According to the physiological action, Falta divides the ductless glands into two groups, the acceleratory group and the retardative group, in so far as they produce acceleratory or retarding hormones. These groups through their hormones exert an antagonistic effect on the metabolic processes of the body. Thus, for example, the hormone of the thyroid gland is regarded as an acceleratory catabolic and dissimilatory. It quickens metabolism and increases excitability. This we see in Graves' disease, whereas the absence of this hormone, which we see in myxedema, causes an arrest of growth, which is regarded as the effect of the inhibition of metabolism. Opposed to this action is the group of glands with retardation, anabolistic or assimilatory hormones.[3] They build up and stimulate assimilation. The interstitial glands have also this function (interstitial tissue of the testicles, and the corpus luteum?).

On this theory one could explain the development of the Graves complex as being the result of the degeneration of the Graafian follicle. The Graafian follicle, according to this hypothesis, does not reach maturity, it does not burst, but it degenerates, undergoes liquefaction and disappears. The corpus luteum therefore is not formed and since the specific internal secretion of the ovary is the function of the mature and developed corpus luteum, this internal secretion is not produced and the chain of ductless glands is unbalanced.

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[3] Falta, page 22.

The next point to consider is what causes the clinical manifestations of Graves' disease? It is needless to enter here into a critical consideration of all the various theories: the psychogenic, bulbar, cardiac, sympathetic and the thyroid theory.

We will consider the latter theory only, because in the light of the favorable results obtained by surgery, it seems to be the only tenable theory. This is also fortified by our present knowledge of the physiology of the thyroid and of the secretions of and interrelation of the whole chains of endocrine glands, and we believe that the thyroid theory explains more completely and satisfactorily the symptomatology of Graves' disease than any of the others. The next consideration is as to whether the thyroid merely gives out an excessive secretion, or whether the secretion is vitiated. Is there merely hyperthyroidism or dysthyroidism? Are we dealing with a perverted secretion or with an excessive secretion? The results obtained surgically would seem to indicate that the symptom-complex results from an excessive secretion.

According to Falta, poisoning and excessive function are merely synonymous terms; we do not need to assume a perverted function of the thyroid in Graves' disease. A normal secretion poured into the circulation in excess will poison the body. Falta calls our attention to adrenalin poisoning as a fitting example. We undoubtedly have in Graves' disease pluri-glandular symptoms, but we need not assume from this the existence of pluri-glandular disease, for we cannot have a marked hyperfunction of any one of the ductless glands without disturbing the functions of all or most of them. Our clinical experience and the theory on which the use of the extract of corpus luteum is based is that Graves' disease and hypothyroidism are equivalent terms.

It is a fairly well-established theory, and we have quoted Falta above to the effect that there is an antagonistic action on the metabolism of the body, between the thyroid glands and the interstitial sex glands. We would like to suggest as the basis of clinical experience—the treatment of Graves' disease—that the internal secretion of the corpus luteum has an inhibitory effect on the thyroid secretion, and that hyperthyroidism is an expression of a dysfunction of the corpus luteum in the female and of the interstitial glands of the testicle in the male. This view is also held by Claude and Gougerot, who speak of Graves' disease as being due to a hypovarie —a hypovarial disease.

The most serious theoretical objection to this theory is that we rarely see a typical Graves' symptom-complex follow the removal of the ovaries and testicles. We know however that after castration in both the male and in the female and during pregnancy, there is a marked increase in the size of the pituitary gland and this compensatory enlargement may mean a physiological compensation of function. This is borne out by an observation which I made in a very acute case of Graves' disease in a man, in whom the administration of an extract of the anterior lobe of the pituitary gland was followed by marked amelioration of the symptoms. Renon and Delille saw a Graves' disease symptom-complex disappear as the result of the simultaneous administration of pituitary and ovarian extract.

Clinically there is an abundance of proof that the sexual apparatus and the thyroid are closely associated. Graves' disease is found almost entirely among women, cases in men being rather rare. Women are affected at least six times as often as men and in my experience the proportion is still larger. Puberty is a very favorable time for its development. In the second place there is almost always a disturbance of menstruation; during the periods of exacerbation especially, we find very often amenorrhea or deficient menstruation. In women it occurs almost exclusively during the period of sexual life, being very rare before the age of puberty and very rarely developed after the menopause.

Pregnancy has a decided influence on the course of Graves' disease. Many women with Graves' disease do not conceive at all. In other cases we notice a decided improvement during pregnancy. In one of my cases the patient was comparatively well during one pregnancy, was rather bad during a second, whereas an acute and violent relapse occurred during a period of amenorrhea, but she improved for a while under the effect of corpus luteum and then relapsed so acutely as to necessitate surgical intervention. Another patient who had a mild attack of Graves' disease at the age of sixteen, which disappeared after a short period of treatment, suddenly had a very acute relapse during her first pregnancy ten years later, which continued up to delivery, all symptoms disappearing very soon after the birth of the child. This rather paradoxical relation of pregnancy and Graves' disease may be explained by the fact that when the corpus luteum of pregnancy is normally developed there is an improvement in the symptoms of the patient and when the corpus luteum of pregnancy is functionally deficient there is an exacerbation of the symptoms. This is very readily understood when we consider the great rôle which the corpus luteum plays during the early part of pregnancy, at least. On the same grounds we can explain the exacerbations and remissions which occur in the course of the ordinary cases of Graves' disease. When the rupture of the Graafian follicle is followed by a normal corpus luteum the symptoms ameliorate and vice versa.

The interrelation of the thyroid and ovary is also shown by those mild cases of myxedema, which show a normal thyroid metabolism during the interval between the menstrual periods and an active myxedema during the period. It would seem to indicate that the corpus luteum exerted an inhibitory effect on the thyroid in these cases, and that the thyroid which was capable of performing its function fairly normally during the inter-menstrual period lost its ability to do so during the period of greatest activity of the corpus luteum.[4]

Is it not possible that the same interrelation between the thyroid and the corpus luteum is at least suggested by the symptom-complex of hyperthyroidism, obesity and sterility. At times in these cases the use of thyroid extract is followed by pregnancy. We also know that absolute cretins never come to puberty.

I was impelled to use the corpus luteum in a very acute case of Graves' disease three years ago, in which there was a slight enlargement of the thyroid, a loss of weight of over sixty pounds, and in which a prolonged rest cure and the ordinary Forchheimer treatment produced little or no improvement. The woman had been married twenty-five years, had never been pregnant and menstruation was now suspended for a year. The use of the ext. corpus luteum by mouth was followed by such rapid improvement in the general nervous symptoms and the cardio-vascular symptoms especially, in a very few days, that I decided to give the corpus luteum an extensive test. This first patient made a complete clinical recovery.

In the past two or three years I have treated about twenty cases of Graves' disease. The ordinary Forchheimer treatment was attended with only indifferent success. The combination, however, of the quinine hydrobromate, ext. belladonna with the ext. corpus luteum was found to be rapidly beneficial in nearly all the cases and the improvement was usually so rapid and so marked, in a few days to a week, to convince me that rest, diet, hygienic measures, all of which I had used for twenty years before, could not account for the result, but that the corpus luteum was the active therapeutic agent.

[4] E. Hertoghe, Medical Record, 1914.

I wish to emphasize the fact that the above were all clinically cases of Graves' disease, no border-land doubtful cases of hyperthyroidism, in which the diagnosis might depend upon the bias of the observer. Twelve of these cases were of the more severe type with rapid emaciation, great nervous excitability, rapid pulse, pulsating thyroid gland, diarrheas, etc. The other eight were moderately severe cases. Of the very acute cases, one died. I saw this patient a week before her death, after her case had been in an acute state, with marked mental symptoms for three months. She had the treatment for only a week and I saw her but once, and she was practically moribund at the time. A second patient in this group, who had an attack several years before, at first improved both in weight (she had lost 30 lbs.), in her general nervous condition, and especially in the pulse rate, which dropped from 120 to 84 per minute in the course of ten days. She continued to do well under the treatment for three months and then while taking the ext. corpus luteum had a very acute exacerbation with a pulse rate of nearly 200 and signs of great exhaustion and collapse. She was operated upon and the partial removal of the thyroid was followed by relief, but not by a cure, all of the symptoms of Graves' disease being present eight months after the operation.

One other very acute case was not benefited by the treatment according to her statement, although the clinical record of her case shows that her puise rate at the first examination was 140 beats per minute, and a week later was 108. She discontinued treatment and when seen at my request a year later was in a very acute state of Graves' disease.

One of the exceedingly acute cases was a man, the only one treated. Bed rest improved him for a while, but later on he had a very acute relapse. Not knowing of any reliable preparation of the interstitial glands of the testicle, I placed this man on the ext. of the anterior lobe of the pituitary gland and he showed marked improvement, while under this treatment. Later on he passed from under my supervision.

All of the other cases have improved under the treatment, all of them have the ordinary routine treatment and in addition to hygienic measures and partial rest I combine the extract of corpus luteum 0.12 with quinine hydrobrom. 0.12 and ext. belladonna 0.006 per dose.

Only one of these cases is really cured. But all the others are improved and very comfortable. The most notable improvement and the one most quickly noticed are the cardio-vascular symptoms. The pulse rate drops very quickly and the disagreeable symptoms caused by the disturbance of circulation quickly subside. Then the general nervous irritability diminishes and the patients all return to a more or less normal condition. I have found, however, that the patients often show a tendency to relapse and have remissions if they stop the ext. corpus luteum. If the above theory of the relation of the corpus luteum and the thyroid gland is correct, this is what we would expect. If Graves' disease is synonymous with hypovarie, with a dysfunction or a diminished function of the corpus luteum we would get results just as those recorded above. The Graves' symptom-complex arises as a result of a defective or deficient secretion of the corpus luteum. If we replace the deficiency by the use of ext. of corpus luteum we relieve the patient and improve her condition. We cannot, however, change the defective biological activity of the ovary and make a defective ovary produce a normal corpus luteum. And this is the experience in my cases. Nearly all of them require the extract continuously, sometimes one dose of the above combination per day will suffice. Others require two or three doses per day. In some of the cases there are periods of months when they are apparently free from all symptoms of Graves' disease and we may interpret these periods of remission as occurring during the time when the ovaries produce normal corpus luteum.

I believe that Graves' disease in this respect can be compared with myxedema and hypothyroidism; as long as we administer thyroid extract in these two conditions, the patients are fairly normal. As long as we administer corpus luteum in Graves' disease or in the periods of exacerbation, the patient is improved and can be kept in a fairly normal state.

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THE INTRACRANIAL TREATMENT OF PARESIS[1]

By Henry A. Cotton, M.D., and W. W. Stevenson, M.D.

TRENTON, N. J.

From the remarks of the readers of the preceding papers it would appear that there was some hesitancy in using any methods but their own, even if better results are shown than by their own methods. Happily for us in Trenton, we are not committed to any particular method, and have no hesitancy in trying out the methods of others if such methods give any promise of better results than the ones we have tried. We do not believe that the final method has been reached and only by continual experimenting with new ideas can we hope for progress in this new line of treatment, and it would seem wiser if those who are interested in the treatment of paresis would adopt the same open-mindedness and give every method a thorough trial.

We had some success with the original method of Swift and Ellis, and about 33 per cent. of the cases treated were distinctly benefited and enjoyed remissions of from two to four years, and a small number are still in a normal condition. However, it was soon apparent that this method had its limitations, as the effect was not permanent and they relapsed. The intraspinal method was not as efficient as the later methods for several good reasons. In the first place it is not intensive enough, for the dosage is very small and given at too long intervals. That is, a minimum dose is given every two weeks. Again the salvarsanized serum becomes very much diluted by the spinal fluid. This defect we have tried to eliminate by draining the spinal canal before introducing the serum. And it is extremely probable that quite a large amount of serum is absorbed by the spinal cord and therefore never reaches the cortex. Lastly there may be certain anatomical conditions, especially adhesions at the base of the brain, which would prevent the serum from reaching the cortex, although in normal brains there would be no barrier.

Therefore we welcomed a method that apparently would overcome some of the difficulties mentioned above. The method of Wardner, whereby the serum was administered through a trephine through the skull directly over the cortex, seemed to us a logical one, and well worth a trial. The difficulties of the method were largely those due to the longer time necessary for the operation in each case. As we were treating ten to twelve cases a week, time was of some importance and prevented us from using the method at once. The patient had to be anesthetized for every operation and the scalp opened, but the trephining was only done twice, first on one side of the head and later on the other side. In all nearly an hour was consumed in each case. We were able to modify that time considerably by making our punctures after the second treatment, directly through the scalp into the dura, and then after allowing the fluid to drain off the serum was allowed to flow slowly under the dura. We used the original Swift-Ellis serum, the Ogilvie serum, and also used the bichloride serum after Byrnes's method. It was soon apparent that we were getting better results, and results much quicker with fewer treatments than by the original intraspinal methods. Our percentage of remissions was larger and it was not necessary to give as many treatments. Out of 51 cases admitted last year, some of them too far advanced for any treatment to be effective, we were able to produce remissions in 20 cases, so that they were able to leave the hospital, and so far only two have returned.

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[1] Read at the forty-third annual meeting of the American Neurological Association, May 21, 22 and 23, 1917.

The method of Hammond and Sharpe differs from the Wardner method in the fact that the serum is introduced into the ventricle instead of under the dura. The former method, according to Hammond and Sharpe, has a great advantage over the subdural method, especially if the pia is thickened and resists the serum. During the last year we have been using the intraventricular method and are not in a position as yet to say that it is to be preferred to the subdural method. At present we are using both methods, giving six or more treatments by the former and then several of the latter, or alternating them.

One of the difficulties we are constantly meeting is to determine the best method, for it largely depends upon the type of case that is being treated. The type of case varies so much from time to time that we have difficulty in comparing the methods used by us. It can be readily seen that a greater difficulty would be encountered in comparing the work of various investigators, and this would explain the wide variation in opinion expressed by those upholding the different methods. From our experience of over four years, it would seem that the comparison of the various methods was as follows: In the very early cases, of the type seen by the neurologists and physicians outside of institutions, it is possible that the original Swift-Ellis treatment was sufficient to eradicate the spirochete and clear up the symptoms, especially if the process was limited to the meninges; or in those cases in the preparetic stage where the disease was found to be incipient by an examination of the spinal fluid, and where as yet no marked clinical symptoms were present. We have two cases of this type that were treated in 1913 by the original Swift-Ellis method and they are still apparently normal, and attending to their business. One of them was being treated for a chronic condition of the mouth due to syphilis, and this condition cleared up under the administration of salvarsan, but the Wassermann reaction was persistently four plus. He began to show a slight defect of judgment, which was apparent to his family, and consisted of his persistence in marrying a woman of a rather notorious character, with whom he had been intimate for years. The family objected strenuously and came to us about it. A lumbar puncture was made and the tests were all positive for paresis. He received several Swift-Ellis treatments and the reactions became negative and he soon gave up his idea of marriage, and has continued his business as before. The other case was a railroad engineer who when taking his yearly examination was found to have an unusually high blood pressure and the examining physician (Dr. W. J. Arlitz, of Hoboken) had him wait and after questioning him learned that he had had syphilis five years previously. Lumbar puncture was made and all the reactions were found to be positive for paresis. He was given the same treatment as the first case and with similar results. In both cases the pupillary reflexes were sluggish and they complained of slight headaches, but aside from this no other symptoms were noted. When the process has become more extensive and the cortex has been invaded, then the Swift-Ellis method may be effective in some cases, but we have found that the symptoms are apt to recur and the fluid that was negative again becomes positive. In these cases the intracranial method is undoubtedly much more efficacious, either the intraventricular or subdural one. Even in moderately advanced cases this method has been found to be far superior to the intraspinal route.

We have given serum prepared by the Swift-Ellis method, as well as the serum by the Ogilvie method, and also the bichloride of mercury serum after the method of Byrnes. Some cases have benefited by all methods but we feel that the least efficacious is the mercury serum, and the most efficient is the Swift-Ellis serum. While we cannot believe that the intravenous administration of salvarsan alone is sufficient to effect a remission, even if the spinal fluid is drained as advocated by some, at the same time we feel that it is absolutely necessary. The cases which have had the combined treatment, both intravenous and intraspinous or intracranial, certainly do much better than those who have had no intravenous injections. For this reason we do not believe that the Ogilvie serum alone is to be recommended.

One advantage of the intracranial method is that one can give a much larger dose of salvarsan, than by the intraspinal method, for in the latter method because of the sensitiveness of the spinal cord, and the danger of producing serious damage, only a very small dose of salvarsan can be given, and only at two-week intervals. On the other hand, with the intracranial method we can give a much larger dose of salvarsan and often once a week, especially if the subdural route is used. We now give from .3 to .6 gm. of salvarsan intravenously and prepare the serum in the usual manner and then we reinforce this serum by adding .25 to 1 mgm. of salvarsan for intracranial use. We have also given .25 to 1 mgm. of salvarsan in normal salt solution, at weekly intervals, but have not used this method long enough for any conclusions to be submitted at present.

We have modified the methods of intracranial treatment, both the intraventricular and the subdural, so that the time necessary for these operations has been materially reduced. In the first place we do not give a general anesthetic, but now merely cocainize the scalp with a 4 per cent. sol. of cocaine. An incision is made over the bregma either on the right or left side of the head and about a finger's breadth from the median line. A semicircular flap is then made and the periosteum is separated from the bone. For making the trephine opening into the skull we use an Albee electric drill with a Martel attachment which prevents any injury to the dura. After the dura is exposed a small incision is made and care taken not to sever any dural vessels, and then a modified Cushing brain canula is introduced through the dura and then through the brain cortex, and when the ventricle is reached the plunger is withdrawn and the fluid allowed to flow out. During this stage of the operation the head of the table is lowered to facilitate the flow of the fluid. After sufficient fluid has escaped the serum is then introduced through the canula into the cortex, from a luer syringe and then the canula is withdrawn, and the scalp flap is sutured. The patient is able to get up from the table unassisted and walk out of the room. He is told to lie down for a little while if he feels any effects from his treatment, but usually they have no after-effects. This operation is simple and we rarely take more than nine minutes, from the opening of the flap to the closing of the flap and the end of the operation. The patient feels no discomfort and frequently converses with the physician. The Albee drill does not occasion any pain but is at times uncomfortable for the few seconds necessary for boring the skull. We have treated from ten to fifteen cases a week for the last year by this method and have only had one case in which we could say that the treatment was responsible for his death. In this case the disease was of long duration, and his treatment had been successful. There was nothing out of the ordinary in the last treatment and he went home as usual in the afternoon. The next morning he went down town and there had a convulsion and became comatose. He rallied and lived for more than ten days, but finally succumbed, and we were unable to obtain an autopsy. It is extremely difficult to decide the exact cause of death in this case. The patient was doing very well before the last treatment and we expected a favorable outcome in his case, but the course of paresis is so uncertain and varied that it is possible that he would have had the shock even if he had had no treatment. But as the shock came on a short time after the treatment we will have to admit a possible relation. This is the only case in which any serious trouble arose, so that we can assert that the intracranial method is not any more dangerous than the intraspinal method.

There has been some criticism of the treatment of paresis by both the intraspinal and intracranial methods, mostly, however, by men who have not used either method but in spite of the experience of the majority of those who have used the intravenous injections of salvarsan alone and have had to abandon it as entirely inefficient and not to be compared to the results obtained by the intraspinous or intracranial methods. Such men as Sachs, Straus and others are very much opposed to these methods and have cast considerable doubt upon their efficiency, but as far as can be learned they have not given these methods any trial at all. Their opinions can have little weight when compared to the opinions of Fordyce, Riggs, Meyer, Swift, Amsden, Ogilvie and others who have not only used the methods in question but have had uniform results. The opponents should at least give evidence that they have had some experience in the use of the methods before they condemn them entirely. The unfortunate part of the subject lies in the fact that many cases which could be benefited by the proper treatment are often treated for a year and even longer by the intravenous method alone and then when no results have been obtained the patients go to those skilled in the intraspinal or intracranial methods of treatment, but the process has advanced to the point when these methods are of no avail, and a case is lost that might have been saved. We have seen at least six cases which had had a long series of intravenous treatments and when seen by us they had become so demented that it was too late to obtain any results.

We have not used the combined mercury and iodide treatment in conjunction with the salvarsanized serum, as advocated by Swift, Fordyce and others, and we are of the opinion that our results are as good as the results reported by those who have used this form of treatment. Our main reason for not using mercury and iodide is based upon the experience of many who have treated paresis with these drugs before the advent of salvarsan, and that experience would seem to indicate that the patients derived little benefit from such treatment but rather were made worse. We are open to conviction however and if it is shown that better results are obtained by using these drugs as an adjunct to salvarsanized serum we will adopt it.

CONCLUSIONS

We wish to summarize the results of four years' experience in the treatment of cerebrospinal syphilis as follows:

1. That the intracranial (either the intraventricular or subdural) method is the most efficacious method in the treatment of paresis and should be the method of preference.
2. That the intraspinal method is the most efficient one for the treatment of tabes and luetic meningitis.
3. That salvarsan is the best drug for the treatment of cerebrospinal syphilis and preferable to diarsonal and other substitutes.
4. That the mercurialized serum of Byrnes is of doubtful value, as it is not of sufficient potency to destroy the spirochete.
5. That the success of any method of treatment depends upon the stage in which the disease is treated, and the earlier the stage the better the outcome of the treament. Therefore if possible the disease should be diagnosed in the preparetic stage or as soon as symptoms are present.
6. That every case of syphilis should have an examination of the spinal fluid at frequent intervals after all symptoms of the acute stage are lost, especially if the blood Wassermann remains positive after sufficient treatment has been given.
7. That all cases of paresis can be arrested and possibly cured if treatment is begun early enough.

8. That physicians should be taught to recognize the importance of an early diagnosis and trained to make such a diagnosis, so that cases can be referred for treatment before the process has gone too far for treatment to be effective.

9. That the treatment of paresis should be undertaken by all institutions for the insane, and all cases treated, as it is a difficult matter to decide whether a given case has reached the stage when treatment would be useless.

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The President, Dr. F. Tilney, in the Chair

FRACTURE OF THE FIRST LUMBAR VERTEBRA WITH RECOVERY

By Alfred S. Taylor, M.D.

Lieutenant D., on July 28, 1917, had a fall of some two hundred feet from an aëroplane, as a result of which he sustained a fracture confined mostly to the body of the first lumbar vertebra. He suffered but little pain but was immediately paralyzed in his lower extremities. A neurological examination was made by Dr. Frederick Tilney on July 29, which revealed the following: Motor Status: (1) There was complete loss of all motion of the toes upon the foot, the foot upon the leg, the leg upon the thigh and much reduced motor control of the thigh muscles, both extensors and flexors, internal and external rotators; distribution bilateral and equal in the two legs. (2) All the deep reflexes of the lower extremities were absent. No Babinski. Abdominal reflexes all present. (3) Muscle tone showed a marked loss or decrease in myotonus, but myotatic irritability was normal. (4) No tremors, twitchings or irregular, involuntary acts were observed in any part of the body. General Sensory Status: There was complete loss of all types and modalities of sensation in the anterior and posterior dermatomic division of sacrals five, four, three, two and one, while a relative loss was observed in the same qualities in lumbar five and four. Complete anesthesia over the dursum of the penis and in the intergluteal triangle. Slight pain complained of in the region of the first lumbar vertebra. No paresthesia or dysesthesia in any portion of the body. Visceral Control: There was retention of urine and of feces. July 30, examination showed no change in the motor control but pronounced sensory improvement was present. The anesthesia over the penis, in the intergluteal triangle and on the back of the thighs and over the gluteal region in general had markedly diminished. Patient still had retention of urine and feces, but was conscious of sensation in the urethra when the bladder was full and of the passage of the catheter. Three weeks after the occurrence of the accident the patient was able to void urine voluntarily. One week later the anesthesia had disappeared, though a slight degree of hyperesthesia still remained in the area of sacral segment two. During the first week of September the deep reflexes returned. Motor control of the thigh muscles also showed marked improvement. During this week much paresthesia appeared, showing a distinct sensory change. On September 8 the patient recognized pressure upon the little toe of the right foot and voluntarily moved it a little on September 12. The following week motion returned to all the toes of the right foot and on September 15 slight motion was possible in the little toe of the left foot. On

October 11 he began to go about on crutches, right leg showing more marked improvement than the left. At this time it was observed that the deep reflexes had become unduly active. There was bilateral Babinski, confirmed by Chaddock and Oppenheim, and slight ankle clonus in both feet. Muscle tonus not increased; sensory condition showed slight residuum of anesthesia in right foot in area of sacral one and lumbar five; a more extensive zone of relatively profound sensory loss persisting in the left foot and in the area of sacral segment one. On November 6 pronounced hypertonus was observed in the calf muscles of both legs, which made it impossible for the patient to perform dorsal flexion. The feet were put up in plaster casts, which gave excellent results. The patient could now support the full weight of his body upon the right leg. On November 27 he was able to stand and walk without the support of either crutch.

FRACTURE OF FIFTH CERVICAL VERTEBRA WITH RECOVERY

By T. P. Prout, M.D.

A young man sustained an injury to the spine on August 10, 1911, at the seashore while diving. A radiogram taken at that time showed a lesion of the body of the fifth cervical vertebra. There was partial paralysis of the upper extremities and complete paralysis of the lower except for a certain amount of ability to flex the right knee. There was presence of tactile sense throughout the body, but loss of pain and temperature senses from about the fourth sacral segment downward. There was retention of urine. Three days after the injury the patient began to get some motion in the toes and was able to flex the knees to a certain extent with some ability to pronate and supinate the feet, but he could not raise the limbs up from the bed. There was a certain amount of recession of the line of temperature sense. When seen the next time, in company with Dr. Alfred S. Taylor, the return of motion had been considerably greater in the lower extremities and there was a certain amount of return of motion in both arms. The case continued to progress, gradually improving. Dr. Taylor advised against operation and adjusted a plaster support to the spine. About the twenty-fifth of August the improvement had continued to such an extent that the right arm could be used fairly well and there was some return of voluntary bladder function. From that time forward there was uninterrupted recovery.

There remained as a residuum of the injury a certain amount of increase of reflexes, particularly of the knee, and there was a certain amount of spasticity, particularly when the temperature was low, at which time the patient could not move his muscles as well as ordinarily, but he was otherwise in his usual health.

SOME INDICATIONS FOR TREATMENT IN FRESH FRACTURES OF THE SPINE WITH CORD AND ROOT SYMPTOMS

By Charles A. Elsberg, M.D.

Dr. Elsberg believed there was no question on which there was a greater difference of opinion than the subject of the indications for and contraindications against operative interference in fresh fractures of the spine with cord and nerve root injuries. There were, however, certain premises on which all could agree. In the first place it seemed definitely established that reunion of the divided ends of the spinal cord was impossible and that no functionally useful regeneration of the non-medullated nerve fibers in the cord could occur. In the second place, in complete disorganization of the cord at any level there was an immediate loss of all power and sensation below the level of the lesion with loss of all the reflexes and of control of the bladder and rectum. The persistence of any reflexes after a spinal fracture meant that the cord lesion was a partial one, although for practical purposes it might be a complete one. In the third place, the damage done to the cord in fracture of the spine in almost all of the cases was as primary as the damage done to the bone. Therefore the question arose by what method of treatment the maximum of improvement could be obtained. Finally, fractures without cord symptoms were in a class by themselves and never required operative interference, and fractures of the spine with only nerve root symptoms seldom required early operation.

With very careful examinations, one could in the majority of instances differentiate between complete and incomplete lesions of the cord. In complete transverse section of the cord conservative measures were indicated. Stereoscopic X-ray plates were often very useful, but a careful neurological examination was more important. Too much attention could not be given to the smallest details. If a trace of the vibratory sense persisted, if the tone of some of the muscles remained, recovery was possible, improvement might soon begin and operation bring about subsequent great improvement. In those patients in whom extension of the great toe upon irritation of the sole of the foot remained very satisfactory results were to be obtained from operative interference. So much for the crushing injuries of the cord itself, those which occurred in fractures of the cervical and dorsal vertebræ, in which operation was contraindicated.

In fractures of the lumbar vertebræ, on the other hand, in which the roots of the cauda equina were affected, a laminectomy should always be performed early. There was considerable evidence to show that regeneration of the divided caudal nerves occurred and therefore a laminectomy with suture of divided nerve ends should be performed within a week of the occurrence of the injury. In partial lesions of the cord, even without interference with cord function altogether, pressure by dislocated or fractured bone might be the cause of the symptoms and relieved greatly by wide, decompressive laminectomy; otherwise the compression would certainly cause considerable permanent destruction of nerve fibers.

Extreme conservatism was indicated in those patients with the signs and symptoms of a complete transverse lesion. On the other hand, one could be too conservative with patients having signs of an incomplete lesion of the cord and many of them should be operated upon early, within the first week of the injury, unless the signs of interference with function were slight, the general condition of the patient poor or unless the existence of other severe injuries precluded operative interference. In many patients with a fresh fracture of the spine with incomplete cord symptoms, delay and waiting were wrong. The really good results would follow operation when performed early.

IS EARLY OPERATION INDICATED IN FRACTURES OF THE SPINE WITH CORD SYMPTOMS?

By Alfred S. Taylor, M.D.

Dr. Taylor said that although early operation in fractures of the spine with cord symptoms had been a topic of frequent discussion, there still seemed to be no unanimity of opinion among neurologists as to the desirability of early interference. It seemed to the speaker that the question of operation depended on the type of fracture of the spine and the resulting lesions of the cord. It seemed evident that the only ground for discussion lay in the question of the early operative treatment of fracture of the spine by indirect violence when cord symptoms were present. It was important to remember that in many cases there was complete loss of function in the cord at and below the level of the lesion and it was impossible to determine at the start whether or not there was a permanent complete transverse lesion of the cord substance, since many apparently transverse lesions showed spontaneous improvement after weeks or months. Therefore, the decision for or against immediate operation could not be based upon the presence of symptomatic complete transverse lesion of the cord.

In the hope of arriving at a working basis for the care of these unfortunates the chief consideration was the aim of treatment, whether operative or nonoperative, and consideration had to be given to the difficulties and dangers associated with the accomplishment of those aims. The treatment of the bony fracture per se was a secondary consideration, the primary aim being to preserve and restore the function of the damaged cord, which consisted of several components. The first was complete division of elements occurring at the time of injury and permanent, regardless of treatment. Second, hemorrhage, which might clear up with the absorption of the blood. Third, edema, which caused loss of cord function which could only be restored if the edema were absorbed, before the resulting pressure caused degeneration of the cord elements. In addition, displaced bone fragments pressing upon the cord caused myelitis with loss of function sooner or later. It was obvious that treatment could modify only those conditions and symptoms which resulted from the pressure of hemorrhage, edema or displaced bone. Theoretically, it seemed that laminectomy, splitting of the dura and incision of the posterior columns of the cord would relieve the hemorrhage and edema. The experiments of Allen, of Philadelphia, would so indicate. In practice, however, the speaker's experience in three cases with this measure had been most unsatisfactory, the cord oozing out when the dura was opened, and it was his opinion that this was due to the probability of having increased the damage to the cord by the repeated twisting and bending of the fractured spinal column in the handling necessary to prepare the patient for operation, anesthetizing, transferring to the operating table in the prone position and returning to bed. After operation it was scarcely possible to give external support, and there was also the danger of the increase of false motion following the removal of the arches and their ligaments. For these reasons, in the opinion of the speaker, it was undesirable to subject fractured spines, where the vertebral bodies were involved, to early operation, that is, within the first week after the accident.

It was, however, a well-known fact that patients who had survived fractured spines with the return of a fair amount of cord function were often greatly improved by exploration and the correction of such disturbances as were physically amenable to treatment, even after many months. Therefore, in the debatable cases, it would seem to be merely a question of the time at which the exploration should be done. In cases of increasing loss of function, early operation would seem to be indicated, but with improvement after a few days, there was no urgency for interference.

Dr. A. V. S. Lambert said that it was with some trepidation that he opened this discussion, because it was expected that he take sides with one or the other of the opinions expressed by Dr. Elsberg and Dr. Taylor, whether operative or conservative measures were best in vertebral fractures. Personally, he felt loath to make a positive statement concerning the procedure which he had heard discussed pro and con by everyone he had come in contact with for many years. He preferred to group his ideas around the lesion in the cord and around the mechanical difficulty that might be present, and tried to divide lesions of the cord into two groups, those in which the cord could recover below the site of the lesion and those in which it was past all hope of recovery. Both Dr. Elsberg and Dr. Taylor had brought out very clearly the fact that it was quite impossible to determine this immediately following the injury, that is, whether or not the cord had been irreparably damaged from side to side. Clinical conditions failed constantly to determine that question and even the electrical excitation failed frequently. One could not tell on immediate observation if the cord were damaged beyond all hope of repair, so the next thing to determine was the pathological condition in the spine which might or might not be relieved. Dr. Elsberg brought out the point that bone fragments might be the cause of mechanical pressure, or the source of future trouble in causing permanent pressure symptoms. Dr. Taylor, on the other hand, looked at spine fracture as a rigid bar split into two parts and in peril of slipping on one another if the support were removed. The speaker's conception of the cord was not that at the time of injury. Some years ago he carried out some experiments in confirmation of others that had been done to determine the amount of hyperflexion necessary to cause displacement of vertebræ; the type of manipulation which caused a slipping. He found that a sudden shock was required to displace the two parts of the spine, and oftentimes repeated experiments failed to cause any displacement.

Most cases rather grouped themselves into those badly treated when operated upon and those treated in a more modern way. Many of the statistics went back a number of years, at which time these patients for a laminectomy were handled, under ether, like a meal sack with rough palpation of the cord which was manipulated as if it were an abdominal organ. In other words, they were badly treated and they did badly. The speaker had been in the habit, in operating on these cases immediately following injury, of not opening the dura; of looking upon them as if possible displacement of bone gave rise to pressure and attempting to relieve that and give the cord an opportunity of regaining mobility which it would not have if it were compressed either partially by laminæ or by a displaced body.

Dr. Taylor's cases, which were so unsatisfactory, were ones that should have been reserved for conservative treatment. Cervical lesions, even tumors, were not the most favorable for operation, a certain number of them showing a propensity for sudden exitus, and the fact that the damaged cord oozed forth on having the pressure relieved was not the only question to make one hesitate in considering dorso-lumbar fracture dislocations. The partial lesions should be operated upon because they recovered more rapidly; in the long run these cases did better and the mechanical condition of free mobility of the cord was a benefit. With symptoms of complete destruction of the cord, the speaker was in favor of removing the vertebra behind the laminæ, but not of opening the dura, for this gave rise to the chance of the cord swelling and of increasing hemorrhage which it was impossible to control.

Dr. Virgil P. Gibney had seen both Dr. Elsberg and Dr. Taylor do many operations and had noted the extreme care they took in handling these important structures, especially the dura and the cord itself. He had often felt that if his own spinal column had to be opened he would want one of them to do it. Hence it was hard to criticize anything they advocated.

From Dr. Elsberg's paper he got the impression of opposition to operative procedure; then this seemed to swing the other way in the recommendation to select the procedure to suit the case, and the points of differentiation necessary to observe in examining for operation were brought out. Dr. Taylor's contention seemed to be that one should always wait awhile, and the results in the two cases presented this evening would seem to justify such waiting. The speaker had been consulted regarding the first case presented and he was glad that this young man fell into the hands of so distinguished a neurologist as Dr. Tilney, who always went fully into all the essential points of examination, and when Dr. Taylor was called in he felt there was no doubt the patient was saved. What had struck him particularly about the patient was the enormous amount of spasm in the gastrocnemius group, and when he saw the masseur put all the strength he possessed on the ball of the foot with the patient lying prone and knee in right angle flexion to make dorsiflexion possible, without a whimper from the patient, he was astonished and inquired why the foot could not be put up permanently. Dr. Tilney agreed and Dr. Gibney put plaster on the feet, with the assistance of the masseur, and succeeded in getting them down at right angles.

The recovery of paraplegics from the orthopedic point of view, and many of these cases came from a tubercular spine, was quite common, many of them having done so in two or three years. Many were subjected to laminectomy and decompression and the operative treatment did not produce as good results. Dr. Taylor's idea of putting them in hyperextension was a good one theoretically. It was not practical, however, to suspend cases, like the one under discussion, but a spinal brace benefited them because this could be fitted without risk of disturbing the fracture.

Dr. M. Allen Starr had found the X-ray of very important service in many cases of spinal fracture, the question of operation being decided by this means. The speaker had in mind four cases, which were operated upon, of fracture of a lamina with distinct pressure on the cord, and the result of the operation was to remove such pressure and was followed by recovery. The last case, operated on by McBurney, was a boy who dived off a height into what he supposed was deep water but which was shallow; he landed head down and had a fracture of a lamina in the cervical region. The fracture produced a Brown-Séquard syndrome stationary for four months before operation, but with recovery afterward in five months. Where there was a distinct picture in the radiogram and the symptoms pointed to partial lesion of the cord, one should not hesitate to operate.

There was one important point to be remembered in making a diagnosis between partial and complete lesion of the cord. When there was a question as to the cord being divided entirely, there was a symptom which might determine definitely whether there was any transmission of impulses through the cord. If irritation in some part of the body below the level of the lesion be referred by the patient, not to the point where the irritation is produced, but to a level higher than the lesion in the cord, then the lesion was not complete. For example, a badly crushed but not totally divided sixth dorsal segment; irritation on the leg or abdomen would be referred by the patient to some point on the chest or back above the sixth dorsal. Irritation starting from below but perceived in any way and referred erroneously above indicated transmission of impulses through the cord to a point of still active sensation. On irritation being set up, the patient would refer it to the region of normal sensibility.

The speaker agreed with Dr. Lambert that the dura should not be opened in many cases. If there was pressure sufficient to be relieved by such operation, that pressure had or had not destroyed the cord. If it had accomplished such destruction, opening the dura would do no good because the destroyed cord would flow out through the opening in a mass, as described by Dr. Taylor. If the cord were injured by pressure from without, by relieving the pressure one had done all that was possible. There was only one exception to this; if when reaching the dura there was evidence of hemorrhage within it, by puncturing the dura with a hypodermic needle the bloody fluid could be withdrawn without opening the dura. There was no doubt that all the speakers were correct in saying that cervical lesions were more serious in prognosis, but that was from the paralysis of the diaphragm, its spinal center being affected. Lumbar fractures did not injure the cord to any extent as the cord ended at the first lumbar vertebra. Fractures of the lumbar vertebræ affected the cauda equina and were to be treated as peripheral nerve injuries and should be operated upon and early; this might relieve a great amount of hemorrhage, or get rid of a clot lying in and around the cauda.

Dr. William M. Leszynsky had seen many of these cases in the service of two large hospitals in New York City, and he had long ago concluded that when there was complete flaccid paraplegia and other clinical indications of a transverse cord lesion, and the X-ray picture showed fracture dislocation of the vertebræ, there was nothing to be accomplished by operation. He mentioned the case of a patient with fracture of the fifth cervical vertebra; there was paresis of both upper extremities and complete paraplegia with anesthesia extending to the level of the lesion. Laminectomy was done, but the dura was not opened. In the course of a few days the arms recovered, but the patient remained paraplegic and died a few months later. Another case was that of a young man who jumped out of a second-story window to escape arrest; he landed upon both feet and fractured the os calcis on both sides; he was completely paraplegic as a result of hematomyelia. The X-ray picture was unsatisfactory. He remained in this condition for seven or eight months when improvement began. He was then discharged from custody by a magistrate and left the hospital. Eighteen months after the injury there was a typical spastic paraplegia and he went about on crutches. Two years later the spasticity had completely disappeared and he presented a classical picture of tabes with hypotonia, ataxia, and absence of reflexes.

The consensus of opinion among experienced men was in accord with the views expressed by Dr. Elsberg and Dr. Taylor. It was only in those cases in which there were indications of a partial lesion of the cord that operation was justifiable.

Dr. Leon T. Le Wald spoke about radiographic examinations of the spine. Stereoscopic views would frequently bring lesions into view where the single plate failed. If two stereoscopic examinations were made at right angles to each other a certain point would be made clear that would otherwise be obscure. If possible a stereoscopic examination should always be made and it was advisable to take another at right angles. The spine was the most difficult part of the body to radiograph on account of the confusing shadows and the narrow caliber of the neural canal, but a great deal was being done in this direction, the last field of roentgenology to receive attention, and the work of Dr. Preston M. Hickey and others had added much to the diagnosis. It would be well to ask for a lateral in addition to anteroposterior views and one from an oblique direction before accepting a negative statement about the spine.

The speaker warned against the possible misinterpretation of anomalies in the form of extra portions of a vertebra, for a fracture. Numerous examples of imperfect development of the spine had come to his attention. One of them had been regarded clinically as tuberculosis until the radiographs disclosed the fact that the deformity was due to the presence of an anomalous wedge-shaped extra vertebra. There was also a possibility of mistaking an old, healed lesion, to which an injury or an alleged injury had been added, for a recent one. In one instance a soldier was accepted for service, although he had a slight kyphosis, the defect having been duly recorded and waived by proper authority. While it was desirable to accept only physically perfect men for the army, the available number of such individuals was limited, so that the examining surgeon must use keen judgment in deciding on accepting men with slight defects, being relieved from further responsibility provided he carefully records the defect. In the case cited this was done. A year later, by chance, one of Dr. Le Wald's first duties as surgeon at a distant post was to pass judgment on a soldier who had fallen in trying to jump a ditch and claimed he had injured his spine. On stripping the man Dr. Le Wald recognized the deformity of the spine which had been present before the man enlisted, and sent to the War Department for the record of the original examination, finger prints and photograph. The identification was complete. The man confessed he was feigning the injury in the hope of receiving a discharge from the army with a pension for life. The government was thus saved many thousands of dollars. The soldier, besides losing his case, was courtmartialed and punished for malingering.

Dr. Joseph Byrne did not think that exception could be taken to anything said by Dr. Elsberg or Dr. Taylor regarding the main point under consideration. Hyperflexion and crushing of the laminæ, hyperextension, had perhaps been too much insisted upon as factors in cord injuries to the exclusion of lateral hyperflexion and extension, with or without rotation on the transverse processes such as occurred in fracture dislocations. The speaker had studied three of the four cases referred to by Dr. Taylor. In one of them, the cord was completely pulpified in the cervico-dorsal region, yet stroking the outer portion of the sole of the foot elicited a well-marked flexor response of all the toes at all times before and after operation. The return of the unisegmental reflex, referred to by Dr. Elsberg, was therefore of problematical significance. Indeed, the existence of such a reflex as a clinical entity was open to question. Two other cases of fracture dislocation about the dorso-lumbar junction were studied in Dr. Taylor's service at Fordham Hospital. In each the injury was caused by falling from a height and in each a Colles' fracture of the wrist was sustained. This latter suggested lateral hyperextension of the spine as the chief factor in causing the fracture dislocation and the neural lesions. These cases at first simulated the paraplegia of a complete transverse lesion, but subsequent study showed that they were nothing more than stretching of the cauda equina, the brunt of the injury being sustained in each case by the third, fourth and fifth sacral roots on the side on which the Colles' fracture had been sustained. Neither of these cases was submitted to operation and both made good recoveries in from two to three months. The mechanism of these two cases was suggestive; if the curves of the spinal column, especially the lumbar and sacral curves, were kept in mind and the numerous strands which go to make up the cauda equina, especially the lowermost strands with their abrupt curvings through the sacral foramina, it would be at once apparent how disturbance of the relations of the vertebræ incident to hyperflexion, lateral or antero-posterior, would have the maximal effect on the lower sacral nerves. This was very evident in models constructed to illustrate this point. Injuries of the cauda equina such as these were quite common though usually overlooked.

Dr. Charles A. Elserg, in closing, said he was glad that Dr. Starr had made mention of the indications for operation in all cauda-equina injuries. As there was considerable evidence in favor of the fact that the nerves of the cauda equina could regenerate, all fractures of the spine below the first lumbar segment with injuries of the cauda should be subjected to operation.

Regarding the question of transverse lesion of the cord, all the speakers seemed to be in agreement that extreme conservatism was indicated in these conditions. The large majority of injuries to the spinal cord in the present war gave the symptoms of complete transverse lesion and some, at least of hopeless cases had been subjected to operation. Therefore, one could not emphasize too strongly the call for conservatism in this class of cases.

Dr. Alfred S. Taylor regretted that his cases were so unfortunate as to sustain their injuries in the cervical region; they were operated upon in the forlorn hope of benefiting them, as they were otherwise hopeless. The dura was distended but did not touch the wall of the bony canal and there was no bone compression. In getting a real decompression incision of the cord one would relieve the cord substance of edema and hemorrhage, and it seemed necessary to open the dura and cut the posterior column of the cord. That experience, however, would lead one not to repeat it, but the speaker did not see that there was much advantage in a laminectomy without opening the dura unless there was bone displacement. If the cord was swollen enough to fill the canal, then there could be no objection to removing bone. Possibly, one could do a long laminectomy and separate the dura above and below the lesion so as to allow a little escape and relieve pressure indirectly, or separate the dura below and come up. Personally, after such an experience, the speaker preferred to watch someone else treat such cases for a while.

NEW YORK NEUROLOGICAL SOCIETY IN CONJUNCTION WITH THE NEUROLOGICAL SECTION OF THE NEW YORK ACADEMY OF MEDICINE

January 8, 1918

CASE OF POLYGLANDULAR DISEASE

By Hyman Climenko, M.D.

The patient, female, twenty-three years old, was born in Russia of Jewish parents. The family history was negative. Patient had had ordinary diseases of childhood, including typhoid. History of illness began with onset of menstruation; the first year she menstruated three times. She then began to gain in weight rapidly, until at fourteen years she weighed 225 pounds. After this, between fourteen and twenty years she lost 50 pounds. She began to have severe headaches. Menstruation ceased for nine months; it returned but was scanty in amount. Then patient began to lose weight until 145 pounds was reached (present weight). She was admitted one year ago at Mt. Sinai Hospital; *complaint*, polyuria, general weakness, psychic symptoms, restlessness, suicidal tendencies. At the present complained of general weakness, headaches—the same kind she had three years previously but less severe, vague symptoms of pains in the back. The patient's height is 55 inches; she is obese. On examination the eye grounds showed slight blurring of fields, yellowish spots in maculæ; a depression of the nose was noted and protrusion of the jaw. At the age of twenty-three there is complete absence of the upper teeth. Any pressure on the skull causes pain. There is tremendous development of the mammæ, which are pendulous, and there is a growth of hair on the lower extremities and on the face. The upper extremities are somewhat disproportionate, fingers short and tapering, palms broad. Reflexes are negative. There is nystagmus present. From the symptomatology one might think it was a case of nervous disease. Dr. Climenko called attention to the fact that in a case of this kind there is disturbance of metabolism and endocrinal insufficiency, but one could not say that any one gland was responsible for the symptomatology. Psychic symptoms would make one think of a pineal gland condition. Lately there had been a marked improvement in the psyche. X-ray examination showed increased intracranial pressure but no changes in the sella turcica. All the laboratory findings, with the exception of the polyuria, were negative. All kinds of treatment had been used and the symptoms remained the same.

Dr. Joshua Leiner (by invitation) presented a case of a little girl of twelve years, with marked dyspituitarism. The child had never had any disease whatever. The head showed a distinct bulging of the parieto-temporal region; face was flattened through the jaw and mouth; palate with a markedly high arch. The eyes showed lateral nystagmus; grounds normal. Secondary sexual characteristics were normal. The child was very backward; she sat up at three years; walked at three and one fourth years. She could not dress herself until six years and at eleven first began to comb her hair. At eight years she could not attend to the wants of nature. She was mentally dull, easily frightened and had phobias about cats and dogs. The Binet test showed the mental age to be about three years, the patient not knowing her second name nor her sex. After two and one half months' treatment with pituitrin the child appeared brighter and livelier and the mother stated that she appeared physically stronger. Pituitrin had done some good and it was hoped to show the child again if she kept on improving.

Dr. Morris H. Frantz (by invitation) presented a paper on "A Case of Polyglandular Disease," and exhibited his patient in connection with the reading of the paper.

Dr. I. Strauss said he might mention, in connection with this subject, a case which was still under observation. The patient had enlargement of the pituitary gland with symptoms of acromegaly. In the course of research in this case the patient was given adrenalin by hypo. After the administration of the adrenalin he got a prompt glycosuria. The adrenalin was repeated and the glycosuria became permanent with a clinical picture of diabetes of 5 per cent. sugar in the urine. This was also proved by the sugar content of the blood. This case was treated by Dr. Epstein for several months and proved to be uninfluenced by diet. Through administration of adrenalin a transient glycosuria had been changed into a permanent diabetes. The interesting part of the case came later. The patient went to Boston to be operated on by Dr. Cushing. He was suffering from severe headaches and paresthesia of the hands. Dr. Cushing proposed decompression of the skull but the man was afraid of the operation. He returned to the city and shortly after his return he said that he felt that something had distinctly burst in his head and after this his headaches disappeared and the diabetes also disappeared. The man was now very comfortable and had few subjective symptoms. Cushing said that what had occurred was that a cyst of the adenomatous type had ruptured and had relieved the man from his headaches and changed the metabolism. Cases in which the rupture of the cyst takes place, Dr. Cushing said, usually have a very bad prognosis. In this case, however, one and one half years since the rupture of the cyst the patient was very comfortable. One should learn from this case that the giving of organic extracts in pituitary disease is not so harmless as supposed. This was the only case of the kind that had been noted, but it was a warning not to handle these cases too indifferently.

Dr. Hyman Climenko said that he wanted to emphasize the endocrinology of his case. The menstrual history was peculiar. At establishment of menstruation there was usually hyperactivity of the thyroid, but the contrary was the case here. Then again, later, there must have been hyperactivity of the gland. Besides the pituitary, thyroid and ovarian gland involvement, the adrenals came into the picture, as was shown by the rapid pulse and marked disproportion between the systolic and diastolic blood pressure.

A CASE OF DYSTONIA MUSCULORUM

By M. Osnato, M.D.

Dr. M. Osnato presented a patient, a man for forty years, showing this condition.

Dr. F. Tilney said he had been particularly interested in making studies of curves of muscular activity. He exhibited charts showing simultaneous contractions of muscles. This was equal to the synergic unit and the curves showed the two muscles contracting simultaneously and in harmony. This was in accordance with the studies of Sherrington on the subject. Dystonia musculorum was allied to mobile spasm and also to some forms of athetosis. If the curve of muscle activity in this case were compared to that of Huntington's chorea, it would be found to correspond closely. They had therefore to deal with disturbance of the extra-pyramidal system. They hoped in the course of further study on the subject to decide the exact type of mobile disturbance, so as to know just what type of extra-pyramidal lesion was present in these cases.

Dr. I. Abrahamson said that the case had interested him greatly. It presented the characteristics of three kinds of tremor in one. The first of the three looked like chronic or Huntington's chorea; the second, the scoliosis or torticollis, looked like dystonia musculorum; the third appeared to be a paramyoclonus multiplex. Such a case had been under observation for years at the Montefiore Home. If the back was watched in this patient now presented, there would be seen rapid, clonic movements, described as typical paramyoclonus multiplex. The muscles involved were of the trunk and adjacent parts, not the peripheral muscles. There was a tendency towards symmetry of movements. The usual feature was the torsion of the head. It was noticeable that a single bundle of the muscle jumped. This was not seen in hysteria or in chorea, where the whole muscle acts. No doubt in this case they were dealing with an involvement of the striato-rubral system. It was interesting to see a combination of the three movements in the one patient. All three varieties of tremor had often been thought to be hysteria. This case approached more the paramyoclonus group. Dr. Dunlap's work in Huntington's chorea had done much to pave the way for some order out of the chaos which had existed on the subject of tremors of cerebral origin.

FRACTURE DEPRESSION OF FIFTH AND SIXTH CERVICAL VERTEBRÆ WITH SEVERE CONTUSION OF THE CORD; EARLY OPERATION; RECOVERY

By Joseph Byrne, M.D.

The patient was a young man twenty-two years of age. He fell in the football field and suffered an injury the nature of which was dorsal hyperextension and left lateral hyperflexion. Examination showed: movements of both arms, especially the left, impaired; paraplegia accompanied by spontaneous flexor-flexion movements. Sensory disturbances were: absence of sense of weight of body; loss for touch, pain, temperature to third thoracic on right and second on left. Reflexes: exaggerated. Operation took place twenty-two hours after injury. The depressed laminæ of the fifth and sixth cervical vertebræ were removed; dura not opened. After operation, flexor-flexion movements and motor power were completely suspended in both hands and arms. Restoration occurred as follows: Right hand and arm in three days; left hand and arm, abdominal muscles, bladder in two weeks; flexor-flexion movements in four weeks; right leg five weeks; left leg six weeks; constipation improved in eighteen months. On January 5, 1918, twenty-six months after the injury examination showed slight limp in walking; some atrophy in left hand and arm, but fair function. Sensory reflexes showed slight impairment for touch, prick and temperature. Special senses were normal. Reflexes: In mapping out the boundary of the receptive field for the flexor-flexion reflex, it was found that stimuli entering the cord below the twelfth thoracic area, and in some instances as high as the eighth thoracic root area evoked the flexor-flexion reflex. Diagnosis: The lesions were: (1) Crushing in of laminæ of the fifth and sixth cervical vertebræ (dorsal hyperextension); (2) contusion of the cord, left posterior column, direct injury, and right spino-thalamic tract region contre coup; (3) contusion or stretching of eighth cervical and first thoracic spinal roots on left; bony displacement. The flexor-flexion phenomenon was usually encountered in cases where there was almost complete anatomical or functional transverse lesion of the cord, while paraplegia is due to lesions of the pyramidal tracts. Dr. Byrne stated that opening the dura is dangerous in early operations on the spine. In such cases the patient usually died in a few days, probably from accession of air or other foreign substance to the injured cord. Surgeons believed that opening the dura causes decompression and relief of edematous tension. This was a fallacy and the operation was followed by a prohibitive mortality.

Dr. Hyman Climenko said he had seen cases of tumor of the spinal cord where there was complete paraplegia with atrophy. A number of months after operation the patients were able to walk; there was not only return of function but return of muscle volume and some of the atrophies were beginning to disappear. In some cases, where there was anesthesia from the neck down, the patients left the hospital in an almost perfect condition, so that recovery from spinal cord injuries were not so exceedingly rare. In opening the dura he believed that the mortality was due to the loss of a large amount of cerebrospinal fluid.

Dr. C. A. Elsberg said that he could not agree with one or two of the statements that had been made by Dr. Byrne. The case presented was a very interesting one and the result was very satisfactory. It was unfair to surgery, however, to state that the laminectomy "was followed by a paralysis of the upper limbs." There was no reason at all why a patient, unless he had a complete paralysis of the arms before operation, should have it afterwards. If carefully done, the operation should leave the arms as strong or almost as strong as before the surgical interference.

If the lesion in Dr. Byrne's case was at the level of the fourth or fifth cervical segments, Dr. Elsberg said he failed to see why the patient should have a spinal miosis. The only patients seen by the speaker who had a spinal miosis had had lesions at the eighth cervical and first dorsal segments. He could not agree with the statement that the dangers from a laminectomy were increased by opening the dura. In the large majority of the cases of spinal operations the dura had to be widely opened.

Dr. Joseph Byrne said that in describing the case he had erroneously stated that it was the laminæ of the fourth and fifth cervical vertebræ that had been crushed in. He meant to say the laminæ of the fifth and sixth vertebræ. The miosis and the left hand and arm symptoms were probably the result of nerve root injury although lesions of the cilio-spinal pathway anywhere in the cervical region, if severe enough, would cause miosis. This he had proved by experiments on animals. Dr. Elsberg, speaking from the standpoint of the experienced surgeon, thought it was a mistake not to have opened the dura. Dr. Byrne said he too spoke from practical experience and did not hesitate to say that in early operations (from two to forty-eight hours after injury) it was a grave mistake to open the dura where the cord was seriously injured. Death was almost certain to follow In cranial and spinal injuries, there was an unusually large service at Fordham Hospital, and the experience had been that even in the hands of the most skilled and careful operators, opening the dura was a grave undertaking. Dr. Climenko's statement that many of these cases showed atrophies which, with the lapse of time, would disappear, was probably true and indicated a very small, destructive lesion of the anterior horns or, more probably, a lesion of the nerve roots. Dr. Boorstein had given orthopedic after-treatment. It had helped the patient both physically and psychically.

Dr. S. W. Boorstein said that eight days after the injury he was asked to make some support for the patient. He put on a jacket support and pain was much diminished and improvement noted. The patient did not want to wear a brace which was later made for him. The corset seemed to help him very much, but whether that improvement was spontaneous or not one could not say.

Dr. I. Strauss presented specimens of brains showing abscess and tumor formation. For one, showing neoplasm in the posterior fossa, he was indebted to Dr. Elsberg. He asked Dr. Elsberg to give the history of the case.

Dr. C. A. Elsberg said that the history of the patient whose brain was presented by Dr. Strauss was of very great interest, and was deserving of a detailed report. The history dated back to early life. At the age of four years the patient had a suppurating left ear which left her with slight diminution of hearing in that ear and slight left facial weakness. Otherwise she was perfectly well until thirteen years ago; after a childbirth she had a slight left hemiplegia which left her with a weakness of the left arm and atrophy of the left side of the tongue. Four years ago she was operated upon for glands of the left side of the neck and the lower branch of the facial was cut. During six months before she came under his observation she had developed increasing left cerebral symptoms, and when she was admitted to the hospital, in Dr. Elsberg's service, she was completely deaf in the left ear, had complete left facial paralysis, was very ataxic and had severe headache. There was complete loss of reaction in all branches of the left auditory nerve. The question which arose was whether the patient had a nuclear degeneration or a tumor in the left posterior fossa. At the operation a bilateral suboccipital craniotomy, a jelly-like material was extruded as soon as the bone was removed. The dura was never opened and the entire left side of the superior fossa was filled with myxomatous material shown by Dr. Strauss. The pathological report was myxo-sarcoma. The patient died about ten days after the operation.

Dr. Hyman Climenko said that in this connection he had seen a case in Base Hospital No. 1. The patient had a brain abscess and was successfully operated upon by Major Bishop. The symptoms were similar to those in the case presented by Dr. Strauss. The cerebrospinal fluid was sterile, but with a large number of cells. The blood culture was negative. The abscess developed after submucous resection of the nasal septum. The patient had symptoms of general meningitis. He made a remarkable recovery.

PHILADELPHIA NEUROLOGICAL SOCIETY

October 26, 1917

Vice-President, Dr. Max Bochroch, in the Chair

Dr. N. S. Yawger and Dr. J. V. Klauder presented: (1) A case of syphilitic myelitis showing marked improvement; (2) A case of tabes dorsalis made worse by salvarsan.

Dr. Francis X. Dercum said that it was not an unusual experience in ordinary exudative syphilis of the cord to see a remarkable degree of improvement. In regard to the second case the symptoms suggest that there is more the matter with the man than simple tabes. It was not an unusual thing to note improvement in tabes, especially as regards the tabetic pains. Sometimes there is at first a severe reaction to salvarsan and not infrequently a febrile rise. Dr. Dercum said that in his experience the cases were improved in spite of such a reaction. The salvarsan inactivates the lesions for the time being but that is all. He has never allowed such a reaction to interfere with continuous treatment.

Dr. Charles S. Potts said that he believed the outlook for improvement in the first case of specific myelitis to be fair. Two cases in his own experience which were treated before the days of salvarsan, he thought worthy of mention. Many physicians seem to be under the impression, especially as regards the nervous system, that before the days of salvarsan there were no cures. As a matter of fact there were many. One was a case of typical acute transverse myelitis which recovered almost completely under the use of mercury inunctions and iodides. The man is still living, following his business as a contractor. The other case was in the Philadelphia Hospital. It was also one of typical acute transverse myelitis. He recovered almost completely and acted as a barber in the institution for a number of years. The same treatment was employed, that is, mercurial inunctions and iodide. In both of these cases the last symptom to disappear was the incontinence of urine.

Dr. Alfred Gordon said the first case was not as simple as one might think. The history runs like this: The patient was taken ill quite rapidly, paralyzed in the lower extremities, with incontinence of the sphincters, then had excruciatingly sharp pain and paralysis in the upper extremities, more in one than in the other; there was also rapid development of muscular atrophy, so that in a short time he presented a typical type of progressive muscular atrophy, with claw-like hand, etc. The pain was so excruciating that he could not sleep or eat. As far as the lower extremities were concerned, he had loss of reflexes without rigidity and he had the Babinski sign on both sides. Incontinence of the urine and feces, pain in the upper extremities, in the chest and back, paralysis and progressive muscular atrophy were the main features. He had about seven intraspinal injections. He began to improve rapidly from the beginning. When he was able to move about a little, there was a marked improvement in the lower extremities, but very little in the upper extremities. He still was unable to raise his hands and the atrophy still remained and a long time after this the muscles began to fill up, especially in the interosseous spaces. It was extraordinary and unusual. Dr. Gordon said he had never heard of a case of such rapid improvement, particularly in regard to the muscular atrophy, under the use of the treatment. Between the injections he had mercurials and iodides. Dr. Gordon was very glad to see that the patient was able to be about, able to make a living. He had been in wretched state, particularly in regard to the sphincters. In regard to the second patient, Dr. Gordon remembered him. He was a case of tabes treated with salvarsan. Dr. Gordon said he had given several hundred injections in all ways, intraspinal, intravenous, intramuscular, and he had never witnessed a case in which there was such a sharp reaction from salvarsan. Never has he read of such a rapid, sharp effect of neosalvarsan. It struck him that anaphylaxis might be considered. The question arose in his mind whether the man did not take arsenic before he took the injection of salvarsan. He might have had cacodylate of soda and now presented the anaphylactic phenomena. Dr. Gordon had observed in patients sharp reactions, headache, great restlessness, but improvement goes on in spite of these reactions. It would be interesting to know if the man had arsenic before being subjected to the injections of neosalvarsan.

Dr. J. W. McConnell said that the first man was in his service at the Philadelphia Hospital during two terms and a very interesting feature was improvement under the salvarsan treatment—the Swift-Ellis treatment. When that was discontinued and he was placed on the old treatment of mercury and iodides he grew worse. It was rather interesting from what Dr. Potts just said, not that Dr. McConnell would take issue with Dr. Potts.

Dr. Francis X. Dercum said that Dr. Potts may remember two cases of bad spinal syphilis which they had had under their care many years ago. Both patients were so paraplegic that they were carried into the clinic; both made good recoveries under the mercurials and the iodides. We fail to keep in mind, as we should always, the difference between the exudative and the parenchymatous forms of syphilis. Dr. Dercum also emphasized the value of spinal drainage.

Dr. J. V. Klauder said that to his knowledge the second patient had never taken arsenic.

Dr. Dercum said that was not a case of tabes pure and simple. The mere fact that the patient had irregular and unequal pupils showed that it was a case of tabo-paresis. The man's mental condition also suggested to Dr. Dercum at once that it was a case of paresis.

Dr. J. W. McConnell presented a patient with parietal lobe symptoms.

Dr. Alfred Gordon said that a couple of years ago, at the time there was a great deal of discussion on the lenticular diseases, he presented before the Society a case which he called at that time, and Dr. Mills agreed in the diagnosis, extra-pyramidal hemiplegia. The patient presented a spasticity of the left arm and leg; on the least attempt to move a part of the arm immediately extreme tonicity would set in in the affected side. Otherwise in spite of the duration of the hemiplegia Dr. Gordon could bend the arm without very much resistance. It reminded him of Wilson's syndrome in which this phenomenon was described by the originator of the condition. The phenomenon observed here in the left arm is very much in keeping with what Dr. Gordon said in regard to Wilson's disease, extra-pyramidal hemiplegia. In regard to the parietal lobe lesion, Dr. Gordon supposed, Dr. McConnell based his opinion mostly upon astereognosis. The man has some involvement of pain and temperature senses and he would not be surprised if he had astereognosis because the special sensibility is dependent frequently upon the general sensibility. Astereognosis is encountered in other cerebral conditions, so that to base an opinion upon the parietal-lobe involvement exclusively upon the astereognosis Dr. Gordon did not believe entirely justifiable. On the other hand, if it were a case of parietal-lobe lesion alone, and we know now that parietal-lobe lesion controls sensibility, how would one explain the motor paralysis of the patient? Another element which obscures the diagnosis was the presence of temporal hemianopsia, which also speaks against parietal-lobe lesion. He was more inclined to believe it was a case of extra-pyramidal hemiplegia involving the optic radiations and occipital lobe.

Dr. Dercum inquired whether the patient had a knowledge of the position of his limbs and of the various segments of the limbs. Dr. Dercum was inclined to believe that the blindness was a result of a separate lesion. He said further no discussion could settle the diagnosis of the case. It was not possible to escape from the conclusion that the patient has more than one lesion.

Dr. Dercum said that Dr. McConnell and he showed a case of hemiplegia some years ago like this, excepting the patient had absence of tendon reflex upon the paralyzed side. Such cases have been described as flaccid hemiplegia. They are remarkable cases and we do not know how to explain them. We do not know why we have lost muscle tonicity and still other signs of hemiplegia. That man Dr. Dercum tried to follow, but he had been taken to the psychopathic ward of the Philadelphia Hospital and had a mental attack and was taken to the insane asylum. He was not an ordinary case. He was a case where there was a syndrome plus this flaccid condition of the muscles.

Dr. McConnell said the man had some disturbance in the sense of position, particularly in the proximal portion of the limb, more so than in the distal. He purposely stated in the title or in the name which he gave to his contribution that this man presented parietal-lobe symptoms. He did not say parietal-lobe lesion because he was not sure where the lesion was.

A CEREBRO-CEREBELLAR DISORDER

By Alfred Gordon, M.D.

H. S., child, aged 9, was born at term but with instruments. Up to the age of about three and a half years she was in very good health. She walked and spoke correctly and was considered bright and wide-awake. At that time the mother noticed she would walk at times on her toes. Soon she became clumsy. After a heavy fall from the top of the stairs to the floor her walking became more faulty, she would stumble frequently. She was taken to the Orthopedic Hospital, where, the mother says, an operation was performed on one heel and under one "knee," presumably tenotomies.

At the time of the onset of the disturbance of locomotion the following symptoms gradually made their appearance: It was noticed that her speech became embarrassed and gradually became unintelligible. Her arms and hands were very awkward. She had also some difficulty of swallowing. The intelligence underwent a radical change. From a bright and lively child she became listless and imbecilic. Since that time there has been practically no change except in the ataxia of the arms.

Her present condition is as follows: She cannot stand or walk. There is a marked rigidity in the lower limbs and the attitude is that found in cases with Little's disease. The abnormal reflexes are present, namely, the knee jerks are exaggerated, ankle clonus and Babinski are on both sides. The arms and hands are still somewhat ataxic. While things do not always fall out of her hands, nevertheless there is a certain awkwardness in grasping and handling objects correctly. The mentality is markedly involved. The child is unable to grasp the meaning of words spoken, her attention is almost nil. The eyes show no changes. The sphincters are not involved. She has to be fed. At times has difficulty in swallowing. The urinary examination is negative microscopically and apart from traces of albumen there is no abnormal chemical element. X-ray examination of the skull shows a thinned-out area corresponding to the posterior portions of the temporal regions of the cerebrum. Wassermann of the blood is negative. The mother had one child prematurely born, two dead-born children and two miscarriages. In spite of the negative Wassermann in the child but in view of the mother's history, the child was placed on intensive treatment of mercurials and iodids and some improvement has been obtained in the mentality and in the ataxia of the upper limbs. According to the mother a couple of doses of salvarsan given prior to coming under observation aggravated the condition.

In analyzing the symptoms of the case and especially its course of development one naturally thinks of Little's disease, Friedreich's ataxia and Marie's heredo-cerebellar ataxia.

In Little's disease the condition is evident from very early infancy. The absence of spasticity in the upper extremities, the absence of involvement of the muscles of the face, the absence of the speech disturbance in pronunciation and articulation, and especially the mode of onset of the disease, are all facts against the diagnosis of Little's disease.

In considering Friedreich's ataxia we do not find in this case the absence of tendon reflexes, the presence of choreiform or athetoid movements, of intention tremor, of nystagmus—all symptoms characteristic of Friedreich's ataxia. Besides, there is no hereditary feature.

In Marie's disease there is a typical cerebellar ataxia, the speech is irregular and accentuated and later there is incoördination in the upper extremities. The family feature is characteristic.

The common symptoms between these affections and those in this case is especially the onset of the disorder early, but some years after birth. But in Friedreich's ataxia the onset is at about ten or fifteen years, and in Marie's disorder between fifteen and thirty-five years of age. In this patient the disorder commenced at about four years of age. While there are some similar manifestations in all three affections, nevertheless the age of the onset, the absence of the hereditary character and the practically stationary condition make this case different from Marie's and Friedreich's type.

As to the affection called cerebro-cerebellar diplegia or ataxia described by Batten, Clark and Gordon, its chief characteristic is found in its onset at birth, and ataxia in the extremities, but absence of rigidity and invariable tendency to improvement.

In this case again some of these symptoms are present, but there is no progressive tendency to improvement. Evidently there is some pathological relationship between all these affections. In spite of the fact that in this case the disorder commenced at four years of age, unlike Marie's and Friedreich's types and cerebro-cerebellar cases, nevertheless it is suggestive that all these types, including this case, belong to the variety of congenitally defective cerebrum and cerebellum. They all show an agenetic abnormality.

Dr. J. V. Klauder said that he saw this patient at the University Hospital clinic and got 4 plus serologically puncturing and cell count ran 320, the Noguchi was positive. Again, the Wassermann was 4 plus and varied from $\frac{1}{10}$ to $4\frac{1}{2}$ c.c. The child was given small doses of neosalvarsan and he could not recall any severe reactions or that the child was made worse after the injection.

Dr. J. W. McConnell said that those of us who years ago visited the Training School at Vineland might recall the case of Willie Reilly, of whom this child reminded him very much. The case was diagnosed as microcephalia and at autopsy that was the only condition found.

Dr. Gordon said that from the time the patient was treated with salvarsan to the time she came under his observation, about a year ago, the mother was disgusted with the treatment and finally she abandoned it. For a whole year the child had no antispecific treatment and the Wassermann was negative.

November 22, 1917

Vice-President, Dr. M. H. Bochroch, in the Chair

Dr. F. X. Dercum and Dr. S. F. Gilpin presented (1) a case of hysteria with a probable true epilepsy; (2) two interesting cases of hysteria; (3) a case of severe tic.

A CASE SHOWING EXAGGERATED KNEE JERK ON THE RIGHT AND ABSENT KNEE JERK ON THE LEFT, WITH EACH SIDE GIVING A HOMOLATERAL AND A CONTRALATERAL ADDUCTOR RESPONSE

By N. S. Yawger, M.D.

Unusual and somewhat obscure reflex phenomena were observed in this patient, who was from Dr. Spiller's service at the Philadelphia General Hospital.

The patient was a male, thirty-five years of age, who had been distinctly alcoholic and who at thirty-five years had contracted syphilis. At thirty-nine years he had a cerebral attack which left him with aphasia and a right hemiplegia.

Of special interest at the present time were the findings in the lower extremities. Upon the right there was decided spasticity but without patellar or ankle clonus. Upon tapping the patellar tendon, a greatly exaggerated response was obtained and simultaneously there appeared homolateral and contralateral adductor contractions; also, upon striking the right tibia there was an adductor response upon the left. There was no Achilles jerk but a typical Babinski reflex was obtained. Striking the left patellar tendon caused no movement, even upon reinforcement in the corresponding leg, but there were homolateral and contralateral contractions; there was also a noticeable contraction of the left tensor vaginæ femoris. Less pronounced effects were caused by stimulating the left tibia at various points and plantar irritation provoked the same responses.

Dr. J. Hendrie Lloyd inquired whether Dr. Yawger had tested the man by striking him anywhere else on his body.

Dr. Yawger replied that he had. In regard to the condition of the extensor quadriceps femoris muscle on the left, Dr. Potts had made the test and the reactions were nearly normal. Also, there was a fair response to the faradic current over the anterior crural nerves on both sides. The patient was more active on the left side than on the right and showed considerably more power in the left extremity. Dr. Yawger said he could not believe there was very much deterioration in the muscular tissue.

Dr. W. G. Spiller read a communication from Dr. W. B. Cadwalader regarding service in a base hospital in France.

Dr. G. F. Phelps presented a case for diagnosis.

Dr. S. F. Gilpin said that this case was interesting because of the difficulty in saying where the lesion was. Was it a cord lesion or a primary neuritic atrophy involving the arms instead of the legs? The patient complained of some subjective sensory disturbances in the little finger and the finger next to it, not a distinct pain. Her spinal fluid was negative. There was an interesting feature in taking her spinal fluid. It is two weeks since it was removed and she still feels the effect of it in headache and vertigo.

In tabes or paresis Dr. Gilpin said he never had the least hesitation in taking the spinal fluid, but in a patient who has a nonspecific history and a nonspecific fluid there often followed a severe headache and a great deal of disturbance such as this patient had.

CHICAGO NEUROLOGICAL SOCIETY

December 20, 1917

Dr. Peter Bassoe in the Chair

Dr. Edwin G. Kirk, by invitation, presented a paper entitled "Regeneration of Peripheral Nerves," which was illustrated with lantern slides.

Dr. Carl Beck, in discussing this paper, presented a patient who had sustained an injury of the musculospiral nerve on whom he had operated and sutured the nerve.

Dr. Hugh T. Patrick asked Dr. Kirk why he left an interval of 3 cm. in his operative work.

Dr. Kirk replied that he did not do this in all of his work, but did it in some for the reason that it was more impressive to have obtained action over such a gap than in a shorter distance.

Dr. Hugh T. Patrick thought the method of tubulization was much better than end-to-end suture. Many years ago he had cut and immediately sutured a lot of sciatic nerves in rabbits and in studying the line of suture in longitudinal sections made at different periods after the suturing was done, the thing that struck him most forcibly was the inexpressibly tangled condition of the nerve ends and he could appreciate the difficulty the fibers would have in getting across. He believed the tubules would facilitate union.

Dr. Beck asked if Dr. Kirk examined the nerve anatomically after suture.

Dr. Kirk stated that the dogs had been killed at varying periods, from two to six to fourteen months, but in the first few days the serum or lymph would be exuding from the cut nerve ends and with two or three days it became a substance which looked like whitish-gray matter. There should be no hemorrhage in it. Microscopically this serum showed a number of small round cells and other lymphocytes. At about the sixth day where the cut end grows down an extension of the substance could be seen, but without the shiny white appearance which the nerve had, because the fibers which were growing down were not myelinated. These fibers gradually bridged the gap.

Dr. Beck said that in his case he saw the nerve on the peripheral side where the doctor who had operated previously had sutured it and where he had placed his suture it looked like an ordinary scar which would prevent the formation of any nerve fibers. He believed for that reason that nerve suture was a mistake. The nerve must be given a free space and that fascia or a vein should be used.

CASE OF MYOCLONUS RESEMBLING THE PARAMYOCLONUS MULTIPLEX OF FRIEDREICH.

By Harold N. Moyer, M.D.

The patient, twenty years of age, presented few somatic defects. He was a well-developed lad, the glandular system and the genital organs being normally developed. The beard was sparse and thin, but the axillary and pubic hairs were luxuriant. The tendon jerks, reflexes, sensation, special senses, pupils were normal; indeed, nothing was found that would suggest organic involvement of the nervous system.

The family history was negative. After a normal birth and an early infancy free from serious illness the child, after what was thought to be an indiscretion in diet, had a convulsion when two years of age. These recurred with variable incidence until he was five years old, after which the convulsions ceased. All of the epileptic seizures were at night. He would have two or three in a month and then sometimes go a month without an attack. After the convulsions ceased he had frequent night terrors.

The movements which seemed to replace the convulsions began at about five years of age. The mother thought they were most marked in the right arm, but later became generalized. At no time had the convulsions ceased during his waking moments. The movements ceased during sleep. The patient led an active life as a grocery clerk, part of the time being spent in the open air. He found that the movements did not interfere very much with his occupation. He could run an automobile and make the ordinary repairs and adjustments on his machine. He had made a wireless telegraph apparatus. He could tie up packages in his occupation and feed himself without special difficulty, though in all of these occupations in which he used his hands it helped him very much if he rested his elbows on the table or against his body. He could drink water from a glass without spilling it, but to do so he had to rest his elbows either against his body or some fixed point. It was very difficult for him to write with a pen, but he could do so with a pencil. Cold always made the movements worse. Observation always increased the severity of the movements, particularly if he was among strangers; it was increased when he was sitting down unless he had an arm chair on which he could rest his arms. Ordinarily he was more comfortable standing, especially if he was in a street car, where his movements were likely to be observed.

The movements were sharp and irregular and it was only exceptional that they effected any considerable movements in the extremities. All of the trunk, neck and facial muscles were involved; the movements were less frequent in the arms and thighs. Apparently the forearms and legs were free from the movements; at least, they never involved the muscles of the hands and feet.

Dr. A. B. Yudelson stated that about a year and a half ago he saw this patient in the clinic. While in the reception room the movements were excessively exaggerated, which was undoubtedly due to the fact that in the presence of many other patients waiting, this patient was trying to avoid movements in their presence, but the more he tried to hold the movements in check the worse they became.

After an examination the patient was placed in front of a mirror in a room by himself and told to watch himself closely in the mirror and try to control the movements. There the patient succeeded quite well in holding his head straight and did not twitch. He started with fifteen seconds and worked up to a minute without twitching. The patient came to the clinic quite regularly for these exercises for a time and then stopped coming. Later the Doctor received a letter from him stating that he had improved considerably, but that he had been very despondent. He doubted whether this was a case of myoclonus; he was rather inclined to think it was a case of tic, since the movements were entirely absent in sleep and controllable when the patient watched himself. When the arms were relaxed the chest muscles did not jerk as noticeably as when the patient held his hands behind his back in order to hide the movements and to control them.

Dr. Meyer Solomon thought there was doubtless a certain basis for all such cases. Fundamentally there was what Adler would call an organic inferiority and it all depended upon where this inferiority was—where the break in the nervous system was. Where the higher centers were cut off, the lower had freer play. What was the difference between Dr. Moyer's case and the ordinary neurotic individual who was unstable? This was on a more fundamentally organic, physical basis with a greater degree of instability and a greater lack of equipoise. The system, physiologically, was not able to stand up under the strain. When he was awake, there were efforts to get into a state of equilibrium. The history of epilepsy indicated an organic inferiority. From a therapeutic standpoint it would seem that the best way to approach it was by physical and psychic means. He must have more rest than the normal individual, no strain, plenty of sleep and no excitement.

Dr. Patrick said if forced to treat this patient he would give him Bastian's treatment for spasmodic torticollis. Put him to bed, with large doses of hypnotics which would keep him asleep for sixteen to eighteen hours of the twenty-four. This for about two weeks; then as he was allowed gradually to come out from the drug effect he would carry out careful systematic exercises. He should be in a hospital for at least eight weeks. At first he should have only a few minutes of rhythmical exercises and then as he could do them a little longer he should do them before a mirror with some control. He thought he had noticed that as the patient became interested in the subject he stopped twitching. He would not say that the disorder was not a tic—it was not an ordinary tic. He was not willing to say positively whether spasmodic torticollis was or was not a tic; it had many characteristics that were common to all the tics, but there were other features about it which were not common to tics. He was willing to say that there were many things in this case which seemed to indicate that it was closely related to the tics. One could have a tic of the trunk muscles, even limited to one side.

Dr. Sydney Kuh presented a paper entitled "Melancholia," which will appear in full in this journal.

Dr. Meyer Solomon said he had taken the paper very much to heart. He thought the only place to treat a patient with melancholia was in a sanitarium, rather than by home or office treatment. He agreed with Dr. Kuh that the idea of marking down the disease according to the different ages did not do. He thought a less optimistic view was taken of these cases a few years ago. Although many of the cases were of the type described by Dr. Kuh, in which the patient, when despondent, would hunt through his life experiences for some incident to use as a basis for self-depreciation, nevertheless, was there also not the reactive type, where depression occurred as reaction to a definite situation in life which induced the depression and the reaction then was almost the same as in the other type? He thought if one went into the life history of some of these patients it would be found that they had always been rather illogical, slow and easy-going, without any particular aspirations to forge their way up in life, and he wondered if there was not a ductless gland disorder that would account for some of these cases. In many of the patients there was probably a groundwork of feeling of inferiority, and some reminded one in some respects of the psychasthenic type of person. The suicidal element made one think a great deal and he agreed with Dr. Kuh that just when the patients were beginning to get well was when one should be on the lookout. He felt that in some of the patients the reaction might be largely of a pschogenetic nature, and if they could be given a satisfactory view of the situation it might be a means of bringing them to a cure.

Dr. Samuel N. Clark said in reference to the last statement made by Dr. Solomon that he had tried to impart a cheerful viewpoint to some of these people without very much success, that apparent success would probably indicate that improvement had already taken place. In the State hospitals there was a smaller percentage of recoveries among the so-called involutional melancholias than in the group cited by Dr. Kuh. It was known, however, that a great many recovered. While he did not consider retardation of thought or action a diagnostic feature, he had found it less frequently in the involutional type than in the manic-depressive patients. In the recurring type occurring in the twenties or thirties the picture ran truer to the commoner type of the depressed phase of manic-depressive insanity, whereas in the later attacks which occurred at about fifty there was more apt to be agitation than retardation. In the patients who did not recover it was found that they seemed to age rather rapidly; in the course of three or four years the appearance would be quite changed. Defects of memory and judgment were looked for carefully, but nothing as characteristic as in the paretic was found. Sometimes the interest was lacking; it resembled the interest of a senile rather than that of the ordinary individual. Requests were made infrequently and in a monotonous tone and they did not take the care of themselves that they had been accustomed to do. In a number of cases there were some evidences of arteriosclerotic changes, although possibly these were very slight. Occasionally they had slight dizzy spells and possibly a syncopal attack; in some there was high blood pressure. In going over the anamneses of such cases there was often a history of over-scrupulousness and in many no history of previous attacks.

Dr. Kuh, closing, said he began his paper by stating that it was to be a very incomplete review of the subject. If he had made an attempt to cover it completely he should have mentioned the fact that about the worst thing one could do with a patient suffering with melancholia was to allow him to travel, even in the company of friends who had been warned. He had seen many instances where the good friends had come back with the corpse of a patient.

He could not agree without some limitation that some depressing event might be the primary cause. It might be indirectly—a reverse in business, the death of a relative, could not be the real cause of a manic-depressive insanity—but that it might be an antecedent he was willing to agree. Then came the depression and very often suicide. When the depression developed these patients searched their past and of course the first thing that came to them was the business reverse or other loss.

He disagreed very thoroughly with Dr. Solomon when he said manic-depressive insanity had a tendency to develop in people who lacked initiative and punch. It had been his experience that this disease occurred in persons who were highly intelligent. He had never seen a manic-depressive who was not fully up to the average of people of his or her class, and he had been frequently impressed by the fact that these people were often above people of their class, having had more than ordinary success in many instances. He thought it was the rule that there was no previous feeling of inferiority. He could not believe that it was possible to cure any such patient by any form of persuasion.

He agreed with Dr. Clark that during convalescence it was often possible to help them, but during the active course of the disease arguing was not to be considered.

Practically all of the literature on the subject of manic-depressive insanity that was available came from institutions and the class of cases that came into institutions differed from the class treated on the outside, and he thought it might be interesting to have a report based upon experience with the latter. He could readily understand that the number of recoveries seen in institutions would be smaller, for the cases seen there would be more severe than could be treated outside.

There was another thing which was a possible point of error. Considering the statement made by Dreyfus that some patients had recovered after fourteen years, it was possible that many patients in the state institutions who had been considered incurable might still recover. Conditions in the institutions perhaps explained, too, the relatively small number of histories of previous attacks.

Very often no satisfactory anamnesis could be obtained and even the fact that such patients had previously been under treatment in state institutions was not learned by the physician in charge. He had personal knowledge of a case in which there were attacks dating back fully sixteen years, with very brief intervals of sanity, which had been in state hospitals a number of times, only to be dismissed very soon, clearly because of the absence of a satisfactory history.

Translations

THE INTERNAL SECRETIONS AND THE NERVOUS SYSTEM

By M. Laignel-Lavastine

Authorized Translation by Fielding T. Robeson, M.D.

(*Continued from page 235*)

TRANSLATION

Meanwhile, in 1904, in reference to a case of acromegaly with hypertrophy of the pituitary, the thyroid and the suprarenals, I and M. Ballet[36] attempted to explain these glandular reactions by claiming functional correlations among the endocrines, and I advanced the hypothesis of a humoral process.

Shortly after, Claude[37] insisted upon the existence of several endocrine reactions in acromegalics.

After this quantitative, uniendocrine organic period there followed the polyendocrine period, which is rendered memorable by the ringing memoir of Claude and Gougerot[38] on the pluriglandular syndromes pertaining to a tuberculous case with a testicular-adreno-thyroidal insufficiency.

Subsequently on June 24 at my course at Laennec on the medical anatomy and physiology of the secretions I delivered a lecture, published afterwards,[39] on the correlation of the glands of internal secretion and their pluriglandular syndromes, and M. Renon[40] established a clinic at Necker.

Following this one spoke of nothing but pluriglandular syndromes, because really the disorders are hardly ever, if ever, limited to one gland exclusively. But after having been too limited, we exaggerated in the opposite sense. It is not logical, because the endocrinal disorders in the pathological state have many glandular echoes, as in the normal state the functional correlations run along in humoral harmony, to speak of pluriglandular syndromes when but two glands are involved.

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[36] G. Ballet et Laignel-Lavastine, Soc. de Neurol., juillet, 1904, R. N., p. 793.

[37] Claude, Soc. de biol., 28 oct., 1905, p. 362.

[38] Claude et Gougerot, Soc. de biol., dec., 1907, p. 785. Journ. de physiol. et path. gén., juin, 1908.

[39] Laignel-Lavastine, Gaz. des Hop., 14 nov., 1908, pp. 1563–71.

[40] Renon, Journ. des practiciens, 25 juill., 1908.

In addition if classical endocrine syndromes such as Basedow's syndrome, Addison's syndrome and diabetes insipidus are often allied to a microscopical lesion of the thyroid, the suprarenals or the pancreas, sometimes these lesions lack emphasis, and one is forced to admit a nervous disorder reacting on these glands. It is this that I endeavored to demonstrate in my theses on the solar plexus,[41] where side by side in Addisonian syndromes with microscopic lesions of the suprarenals I published others without such lesions. As I have stated, a syndrome being the clinical expression of a disturbance of function, it is brought about either by a glandular lesion which controls that function or by a lesion of the nervous system, which regulates that gland. To the lesional contingency is opposed the functional necessity. All the cases which are not explained by the organic theory place themselves easily, on the contrary, in the physiological theory, which is much more comprehensive. Hence one must know how to substitute the single physiological or the qualitative or quantitative polyendocrine explanation for the quantitative organic uniendocrine interpretation which is the oldest and simplest.

To sum up, endocrine syndromes may depend not only on a lesion of a corresponding gland or of its regulating nervous mechanism, but indeed upon an upset of one or the other of an infectious or toxic origin; the glandular trouble may be not only quantitative but qualitative; it may depend not only on one gland but upon many, and in the latter case with predominance on one or on several of them, sometimes without appreciable clinical ascendancy. I will therefore enumerate the uniendocrine syndromes and the polyendocrine syndromes, and I will divide the latter into two groups according as to whether a preponderance in the disorders of certain glands can be differentiated or not.

From this enumeration of the endocrine syndromes it will become evident that endocrinogenous nervous disorders exist. The interpretation of facts is more delicate from the viewpoint of the Viennese School, which, in a parallel manner to the division of the vegetative system into sympathetic and autonomic systems, and after having admitted the relationship of excitation and inhibition of the divers glands, one on the other (the triangular schema of Eppinger, Falta and Rudinger reproduced everywhere), divides these same endocrine glands into two groups, of which one formed especially of the supraranels, the thyroid and the pituitary excites the sympathetic, while the other formed especially of the pancreas and parathyroids excites the autonomic.

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[41] Laignel-Lavastine, These de Paris, 1903.

A. Uniendocrine Syndromes

The ensuing is the enumeration of nervous disorders noted in the divers syndromes as depending on the following endocrine glands: thyroid, parathyroids, thymus, suprarenals, paraganglia of the sympathetic, pancreas, pituitary, pineal, choroid plexus, ovary, testicle and prostate.

1. *Thyroid*

1. *Myxedema:* Arrest of development, dwarfism, infantilism, infiltration of the skin, mental torpor, dull ideation, defective memory, apathy, laziness, sluggishness, somnolence, taciturnity, awkwardness, slow, monotonous, raucuos, nasal voice; small pulse, rapid and irregular, sometimes with hypertension; constipation, scanty urine, subnormal temperature, chilliness, headaches, slight knee jerks; no alimentary glycosuria; sometimes epilepsy.

2. *Basedow's syndrome:* Tachycardia, arrhythmia, anxiety, pulsation of the arteries of the neck: exophthalmos, lachrymation. Von Graefe's sign (lack of synergy in the movements of the upper eyelid and the globe), Stellwag's sign (lengthening of the palpebral fissure and incomplete closure of the eyes), Möbius's sign (difficulty in convergence); facial paresis, a giving way of the legs, epilepsy, transient attacks of tetany, cramps, tremblings, ocular frontal headaches; colics, hot flushes, profuse sweats, intolerance of heat, vasodilatation of the skin, meningitic skin reaction, dermographia,[42] transient attacks of edema, pigmentations, urticaria, alopecia, diminution of electrical resistance, polyuria, albuminuria, glycosuria, anorexia, insatiable hunger, vomiting, ptyalism, hyperchlorhydria, diarrhea, rapid respiration, Bryson's sign (lack of deep inspiratory power), suffocation, amenorrhea, atrophy of the breasts, emaciation, agitation, emotional instability, volubility, insomnia, emotional stress, susceptibility, inquietude, anxiety, rage and sometimes anxiety neurosis, obsessions, anxious melancholy, cyclic insanity, restless excitement, depression, mania, melancholia, mental confusion, epilepsy.

Sainton[43] found among Basedowians sometimes signs of sympathicotonia: exophthalmos, adrenalin mydriasis, lack of lachrymal secretion, violent tachycardia, glycosuria, adrenalin reaction, an absent or inverted oculo-cardiac reflex; at other times signs of vagotonia: slight exophthalmos with enlargement of the palpebral fissure, Von Graefe's sign, increased lachrymation, abundant sweats, diarrhea, slight tachycardia, no alimentary glycosuria, positive oculo-cardiac reflex and a pilocarpine reaction; and at still other times a mixture of the two series.

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[42] Alquier, Rev. Neurol, 30 mars et 30 juin, 1914, pp. 393–401 et 795.

[43] Sainton, P., Journ. méd. français, 15 mars, 1914.

He therefore admits of three forms: sympathicotonic, vagotonic and mixed.[44]

This seems to me to be the rule. Especially as I have had occasion to see a case where the oculo-cardiac reflex was at various periods sometimes positive, sometimes normal, negative and even inverted.

3. *Thyroidal insufficiencies other than myxedema:* Infantilism, obesity, Dercum's syndrome, pseudo-lipomatosis, alopecia, premature grayness, scleroderma, urticaria, pruritus, relapsing herpes, transitory edemas, migraine, asthma, constipation, muco-membranous entero-colitis, blueness of the extremities, Raynaud's syndrome, localized erythema, nasal asthma, carbohydrate tolerance, genital irritability, hypertrophy of the mammæ, chilliness.

4. *Thyroidal instability of Leopold Levi and Henri de Rothschild:* (*a*) With dyshypothyroidea predominating: chilliness, falling of the hair, headaches, despairs, weeping fits, giddiness, transient edemas, pains, spells of suffocation, shivering fits, hot flushes at the periods; (*b*) With dyshyperthyroidea predominating: emaciation, heavy eyebrows, flashes of heat, feverishness, palpitation of the heart, intestinal spasms, irritability, emotivity, phobias, inquietude, overwhelming migraines, asthma, hyperidrosis, dysidrosis, tremblings; (*c*) Without preponderance: chilliness, chills, migraines, repeated trips to the toilet, migratory pains, "diffuses," "hemmage," redness of the eyebrows, catamenial neuralgias, anxieties, large palpebral fissure, swelling of the feet, variability in the size of the extremities, tremors, nervous crises, hysteria.

2. *Parathyroids*

1. *Tetany:*[45] Tingling and stiffness of the fingers, tonic intermittent spasms of the flexors of the extremities; flushings, temporary

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[44] B. Guillaumont, Le réflexe oculo-cardiaque dans le syndrome de Basedow, Th., 1914, p. 74.

[45] Tetanie, résultante d'une insuffisance parathyroidienne latente, congénitale or acquise, qui s'aggrave brusquement et devient manifeste à l'occasion d'une traumatisme, d'une infection or d'une intoxication surajontée, These de R. Lifschitz, 1914, inspirée par Babonneix.

edemas of the joints, normal or increased tendinous reflexes, dyspnea, tachycardia, fever, salivation, vomitings, diarrhea, Trousseau sign (hand of the accoucheur on compression of the arm), Chvostek's sign (brisk and fleeting contraction of the skin muscles of the face on light percussion of the facial nerve, over the auriculo-labial course) and Weiss's sign (brisk contraction of the muscles of the forehead, eyebrows and eyelids on light percussion of the temporal branch of the facial at the level of the external angle of the eye); hyperexcitability of the nerves to the galvanic current, particularly to the closure of the negative current and the opening of the positive current.

2. *Parkinson's*[46] *syndrome?:* Trembling, muscular rigidity, propulsion, rheumatoid pains, sensations of heat, increased tendinous reflexes, vaso-dilatation, sweats, edemas, cerebral retardation, psychic depression, vertigoes.

3. *Thymus*

1. *Vagotonic symptoms*[47] *of Basedow's syndrome* (?): Profuse sweats, palpitations, lymphocytosis, eosinophilia, sensation of weakness.

2. *Myasthenia*[48] *of Erb-Goldflam* (?): Headaches, ptosis, external ophthalmoplegia, changing and fleeting paralyses confined mostly to the head and neck, myasthenic electrical reaction of Jolly (muscular fatigue by tetanizing stimulation).

3. *Thymoprivic Idiocy* (Klose and Vogt).[49]

4. *Tetany??* (Basch).[50]

4. *Suprarenals*

1. *Addison's syndrome and suprarenal insufficiency:* Asthenia, arterial hypotension, morning nausea, morning vomitings, lumbar pains, melanoderma, white skin reaction of Sargent, amyotrophia,[51] aboulia, sadness, sometimes: tetany, epilepsy, myoclonia[52] convul-

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[46] Le syndrome de Parkinson serait hypoparathyroidien et s'opposerait a la myasthénie, syndrome hyperthyroïdien? (Lundborg). Deutsche Zeitsch. f. Nervenheilk., Bd. XXVII, 1904, p. 217; voir de plus: Gautier, J., Th., Lyon, 1913.

[47] Rose, Le thymus et la mal. de Basedow, Sem. med., 21 janv., 1914, d'après Capelle et Bayer, Biedl, Klose, Lampé et Liesegang.

[48] La coincidence très fréquente d'une gros thymus chez les myasthéniques est certaine, Claude (Acad. de méd., juin, 1914) admet a l'origine de certains cas des lésions thymiques.

[49] Klose, H., et Vogt, H., Klinik und Biologie der Thymusdruse mit besonderer Berücksichtigung ihrer Beziehungen zu Knochen- und Nervensystem, Beitrage klin. Chir., 69, p. 1, et Monographie, Tübingen, 1910 (505).

[50] Basch, K., Über die Beziehung der Thymus zum Nervensystem, Jahrbücher für Kinderheilkunde, 68, 1908.

[51] Sézary, Syndromes surréno-musculaires, Sem. méd., 5 fev., 1913.

[52] Laignel-Lavastine, Les formes cérébrales de l'insuffisance surrénal, Presse méd. d'Egypte, 15 mars, 1911, p. 89.—Frette, Th., 1913.

sions, periodic paralyses, delirium, mental confusion, coma, sudden death.

2. *Genito-suprarenal syndrome:* Feminine external pseudo-hermaphrodism with virile secondary sexual characteristics; suprarenal masculinism: amenorrhea, gynecomastia (excessive size of the male mammary glands), adiposity with discolorations of the skin, all signs of feminine maturity; in addition: hypertrophy of the clitoris, hypertrichosis wtih masculine distribution, masculine voice, increased muscular and nervous tonicity, violent character, "disorders of the mental state and affectivity may go as far as sexual inversion"[53] (Gallais); increased arterial tension, arteriosclerosis; glycosuria. "At the same time," adds Gallais,[54] "bizarre nervous and mental phenomena set in, near neighbors to maniacal excitement. The sexual instinct deviates: the character changes and becomes violent, authoritative, and crises of anxiety appear. Along with these crises and in the interim one notes vaso-motor phenomena."

5. *Paraganglia of the Sympathetic*

Chromaffin cells in the solar plexus, Zuckerkandl's aortic paraganglia, the cardiac paraganglion of Wiesel and Wiesner, Luschka's carotid gland, Luschka's coccygeal gland, the tympanic paraganglion, are for the most part[55] chromaffin organs, and in this respect pertain to the suprarenal sympathetic system. Their disturbances, from the standpoint of nervous echoes, have not, as far as I know at the present time, recognized aspects which are peculiar to themselves.

6. *Pancreas*

Diabetes mellitus: glycosuria, polyuria, polyphagia, polydipsia, neuralgias, pruritus, impotence, constipation, scant salivation, scant perspiration, dry skin, testicular atrophy, amenorrhea, loss of tendon reflexes, increased arterial tension, asthenia, headaches, lessened resistance to cold, perforating ulcer, syncopes, attacks of apoplectiform coma, paralyses, vertigoes, asthmatic dyspnea, pseudo-angina pectoris, sommolent disorders of sleep, depression, apathy, hypochondria, coma.

[53] A. Gallais, Le syndrome génito-surrénal. Thèse, Paris, 1913.

[54] A. Gallais, Diagnostic anatomo-clinique du syndrome génito-surrénal, Revue de gynécologie, janv., 1914.—Voir aussi: Truffier, Virilisme surrénal, Ac. de med., 27 mai, 1914.

[55] Voir sur ce point les réserves de N. Pende, Patologia de l'apparecchio surrenale, Milan, 1909; de C. Frugoni. La gl. carotidienne possède-t-elle une sécret. int. propre? Sem. méd., 9 oct., 1912, p. 481; de Lanzillotta, Archiv. de Fisiologia, 1 sept., 1913; et de Laignel-Lavastine, Pathologie du sympathetique (sous presse).

7. *Pituitary*

1. *Froelich's dystrophia adiposo-genitalis syndrome:* Adiposity, arrest of development or retrogression of the genital glands, genital organs and the secondary sexual characteristics corresponding thereto; somnolence.

2. *Renon and Delille's*[56] *syndrome of pituitary insufficiency:* Tachycardia, instability of the pulse, lessened arterial tension, insomnia, anorexia, painful sensations of heat, increase in the secretion of perspiration.

3. *Acromegaly:* "Marked hypertrophy, not congenital, of the upper and lower extremities and of the head," pain in the head, amenorrhea, tendinous reflexes never exaggerated, arrhythmia, syncope, sweats, polyuria, glycosuria, lessened resistance to cold, neuralgias, acroparesthesias, cramps, lancinating pains, lassitude, irritability, sadness.

4. *Giantism:* "Acromegaly in individuals in whom the epiphyseal cartilages are not yet ossified," impotence, amenorrhea, effeminacy, puerility, aboulia, asthenia, glycosuria, polyuria.

5. *Diabetes insipidus* (???):[57] Polyuria, polydipsia.

8. *Pineal*[58]

1. *Macrogenitosomatosis:*[59] Abnormal increase in growth or size, premature genital and sexual development with secondary sexual characteristics, hypertrichosis, precocious exaggerated mentality.

2. *Pineal adiposity:*[60] Diffuse obesity.

9. *Choroidal Plexus*

1. *Hydrocephalus:* Increased tension of the cerebro-spinal fluid, rapid reproduction, nervous and mental syndrome of ventricular hypertension, clouded mentality, idiocy.

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[56] Rénon et Delille, Congr. de méd., act., 1907, et Delille Thèse, 1909.

[57] Il tiendrait à un trouble du lobe intermédiare de l'hypophyse et de l'infundibulum. Harvey Cushing, The Pituitary Body and Its Disorders, Lippincott Co., Philadelphia et Londres, 1912; mais Camus et Roussy, Soc. de biol., 1914, passim, l'ont reproduit expérimentalement par lésions de la substance grise du tuber cinereum au voismage de l'infundibulum. Il desire chez le chien tout rôle à l'hypophyse dans la détermination du diabète insidipe, Presse méd., 8 juill., 1914, pp. 517–521.

[58] Dana et Berkeley, W., Med. Record, 10 mai, 1913; L. J. Kidd, Review of Neurology and Psychiatry, janv.–fev., 1913, pp. 1–24 et 55–75.

[59] Ce syndrome de Pellizi, Ogle, Oestreich et Slavyk, Frankl-Hochwart, Gutzeit, Hudovernig, Raymond et Claude, Marburg, A. Collin et Heuyer, R. Neurol., 30 mai, 1914, p. 729, serait lié à la destruction de la pinéale par une turneur chez les enfants. Au contraire, par Gallais, la pineale semblerait avoir une rôle fonctionnel analogue à celesi de la cortico-surrénale, loc. cit.

[60] L'ádiposité pinéale de Marburg serait liée à un "hyperpinéalisme"?

10. *Ovaries*

1. *Infantilism:* Amenorrhea, absence of secondary feminine sexual characteristics, obesity, scanty hair, puerility.

2. *Acquired ovarian insufficiency:* Peripheral vaso-dilatation, crises of subjective sensations of heat, sweats, continuous or paroxysmal tachycardia, palpitations, increased arterial tension, insomnia, headaches, facial neuralgias, lumbago, neuro-muscular asthenia, uncertain memory, irritability, nervous debility, hysterical crises, exaggeration of the sexual instinct?, which is more often absent or inverted; obesity, inquietude, anxiety, phobias, impulses, gastro-spasm, constipation, vomiting, vertigoes, syncopes.

"Vagotonic crises," before the periods and at the beginning of pregnancy: pallor, tendency to syncope, spells of nausea, vomiting, constipation, lessened arterial tension, rather slow pulse, positive oculo-cardiac reflex, Samogyi's sign, psychic depression, related especially to the evolution of the corpus luteum.

One must not confound these premenstrual crises or crises of the beginning of pregnancy with the reactional dyshyperthyroidism of the menopause, characterized by hot flashes, sweats, hypertension, paroxysmal tachycardia, palpitations and anxiety.

3. "*Hyperovaria*" (Dalché):[61] Precocious puberty, abundant menses, pain during and before the first day of the periods, intermenstrual leucorrhea, developed sexual instinct, variability of desire depending on the menstrual period, well-developed eyebrows, thinness, pallor, large hips, rounded contour of the lower extremities, the size of which contrasts with that of the upper, lessened arterial pressure, uneasiness causing movement and action, nervous debility, tendency to loquacity, erotic crises.

11. *Testicles*

1. *Infantilism:* Lack of development in the male genital organs, absence of secondary sexual characteristics, obesity, little hair, increased length of the lower extremities, smallness of the cranium, puerility.

2. *Acquired testicular insufficiency:*[62] Increase in size, decreased hairiness, rotundity of the figure, tendency towards obesity, increased size of the breasts, loss of desire, impotency, senility, increased arterial tension?, asthenia.

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[61] Dalché, L'hyper. et l'hypovarie, Gaz. des hôp., nos. 75 et 78, 1906. Je préfère dire dyshyperovarie.

[62] La gerodermie génito-dystrophique de Rumno et Ferrannivi serait au testicules ce que le myxoedème acquis est a la thyroïde.

The types of testicular insufficiency are, according to Rebattu and Gravier:[63]

1. The sterile.
2. Eunuchoid giantism, because the internal secretion of the testicle was of late appearance. One notes in such a case a prolonged infancy.
3. Eunuchism by castration, characterized by giantism and a youthful aspect. The secondary sexual characteristics do not appear.
4. Revertive infantilism of Gandy, or the known asexual sort of state, with attenuation of the secondary sexual characteristics and a certain degree of obesity, due to delayed testicular disorder in the adult.
5. Dyshyperdiastematosis: short lower extremities, large head, plenty of hair, especially heavy moustaches, thinness, persistence of youth, no arterial hypertension, activity, moral and physical energy.

12. *Prostate*

1. *Prostatic insufficiency:* Asthenia, diminished potency, neurasthenia, sometimes suicide.

2. *Prostatic hypertrophy:*[64] Increased arterial tension,[65] slowing of the heart action, cerebral hemorrhage, genital excitement.

B. Polyendocrine Syndromes

(*a*) *With Predominance of the Thyroid*

1. Basedovians, with hypertrophy of the thymus and vagotonic symptoms; scleroderma and tetany, amenorrhea; Addison's syndrome; acromegaly, etc.

2. Myxedematous cases with hypertrophy of the thymus, tetany, acromegaly, Addison's syndrome, amenorrhea, infantilism, hypertrophy of the breasts, etc.

3. Acromegalics or ovarian insufficients with varied disorders either psychic, nervous, vaso-motor, or trophic, entering sometimes into the myxedematous series and sometimes into the Basedovian.

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[63] J. Rebattu et L. Gravier, Étude des troubles de la sécrétion interne du testicule. Dissociation des sécrét int. et ext. du testicule. Retard de l'établissement de la sécrét int. Nouv. Iconographie de la Salpêtrière, juill.–août., 1913, pp. 257–271.

[64] Elle coïncide souvent avec l'insuffisance.

[65] L'extrait prostatique est hypotenseur et cardio-modérateur, Thaon. Soc. de biol., 13 juillet, 1907. Son injection est suivie de vaso-dilatation cérébrale. Ch. Dubois et L. Boulet, Soc. de biol., 19 avril, 1913, p. 811.

(*b*) *With Predominance of the Ovary*[66]

1. Thyroidal reaction to the ovarian insufficiency: tachycardia, palpitation, sweats, nervous irritability, vertigoes, scanty urination, tremors, anxiety, etc.

"One can no longer fail to notice," said I in 1908, "that the differences are very slight between these nervous manifestations and the picture of the attenuated forms of exophthalmic goiter. This pathogenetic idea allows of important therapeutic consequences. One can ask if it would not be of interest to institute an antibasedovian therapeusis, hemato-ethyroidin for instance, against the nervous and psychic disorders of the natural menopause, which recall trait for trait the symptoms of the Basedovian series."

Since then numerous successes of the sort have confirmed the justice of the idea.

2. Dyshyperovaria among cases of hypothyroidism:[67] anticipation, prolonged abundance of the menses, menorrhagia, metrorrhagia.

3. Thyro-ovarian disorders taken in the same sense: be it the ovarian insufficiency in the myxedematous series, or the dyshyperovaria in the Basedovian series, in all cases the nervous disorders, whatever they may be, of the dysthyroidal women are modified by the ovarian rhythm at all times

(*c*) *With Predominance of the Pituitary*

1. Infantile giants with their clinical varieties: feminism, eunuchism, crytorchidism, pseudo-hermaphrodism of the feminine type, mental puerility.

2. Acromegalics with deficiency syndromes, myxedema, infantilism, amenorrhea, obesity, asthenia.

3. Acromegalics, who on the contrary have syndromes of hyperactivity, more or less vitiated either of coöperation or supply: simple or exophthalmic goiter, arterial hypertension and atheroma, lacteal secretion.

(*d*) *With Predominance of the Suprarenals*

1. Addisonians with amenorrhea, impotence, chilliness, tetany or, on the contrary, exophthalmic goiter.

2. And very often Basedovians, acromegalics, giants, with spontaneous glycosuria of alimentary or adrenal type, this latter

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[66] Schickele, G., Kongress f. innere med., 1911.

[67] Leopold, Levi et H. de Rothschild, La peite insuffisance thyroïdienne, 1913, p. 153.

being able in certain cases to cause one to presuppose a certain degree of suprarenal activity.

(c) *Without Marked Predominance*

Take the case of Claude and Gougerot: loss of sexual characteristics, senile face, thick skin, wrinkles, pigmentations, chilliness, absence of perspiration, asthenia, lowered arterial tension, tetany, atrophy of the testicles, of the prostate, of the suprarenals, thyroid and possibly of the parathyroids.

In order to include these nervous disorders revealed in the endocrine syndromes in one complete aspect, I have grouped them together under five headings, motor, sensory, vegetative, and psychic disorders, to which I have added the results of the sympatho-vagotonic tests.

These are:

1. Motility (tonus, sthenic, reflex, voluntary);
2. Sensibility (special, general);
3. Vago-sympathetic:
    1. The sense of conscious existence (general, hunger, thirst, genital);
    2. Lisso-motility (pupil, vaso-motor, pilo-motor, chromato-motor, lisso-motor properly speaking, arterial tension);
    3. Cardiac rhythm;
    4. Digestive secretions (salivary, gastric, hepatic, pancreatic, intestinal), cutaneous (sweats), urinary (water, sugar); endocrinal.
    5. Eutrophia. General good nutrition.
4. Psychism: rhythm, response, emotion, attention, memory, intelligence, activity, sleep, instinct (sexual).
5. Sympatho-vagotonic tests: adrenalin, atropine, eserine, pilocarpine, oculo-cardiac reflex.

Now, if I set aside the sympatho-vagotonic tests, then although it is very easy to answer plus or minus to different questions concerning the nervous state just analyzed, when one considers the thyroidal syndromes, it is impossible to do the same clearly for the other syndromes. Those which furnish most of the definite answers after the thyroidal syndromes are the ovarian syndromes. One single functional whole is affected by all, that is a sense of well-being (eutrophia); but I have indicated correctly that many of the disorders allied to endocrine dysfunction may be independent of the nervous system. Whence comes this first affirmation, that it is above all the thyroid syndromes and in the second place the ovarian syndromes that are most frequently accompanied by nervous disorders?

There is therefore an enormous difference between the endocrine glands viewed from the nervous consequences resulting from their disturbances.

Moreover the importance of the thyro-ovarian relations explains the differences according to sex of one portion of the neurology and especially of the psychiatry.

If, on the other hand, one classifies the divers groups of nervous disorders, psychic disorders appear to predominate in the thyroidal syndromes, the vago-sympathetic disorders in the thyroidal and ovarian syndromes, and finally the disorders of neuro-striated muscle motility predominate in the thyroidal, parathyroidal, thymic and suprarenal syndromes. Not only then are the endocrine syndromes far from being equal as regards wealth of nervous elements, but in addition they involve a relative election amidst these elements.

It remains to discover the reasons for these varieties of coincidence in delving further into the probable mechanism of their production.

After this very summary account of the facts, let us consider their interpretation.

Among the nervous symptoms—motor, sensory, vaso-motor, secretory, trophic and psychic—revealed in the enumerated endocrine syndromes, all the world admits that there are some that are caused by endocrine disturbances; thus tachycardia and active vaso-dilatation are caused by thyroidal disorders in Basedow's syndrome, as are asthenia and lowered arterial tension by suprarenal disorders in Addison's syndrome. These glandular disorders themselves may be in their turn secondary to a nervous disturbance. I will bring to your notice such cases in the succeeding chapter. This is not really the question. The endocrino-nervous relationship is demonstrated: endocrinogenous nervous disorders do exist.

Such is my first conclusion, universally admitted. This does not mean to say that in other respects all the nervous symptoms existing in individuals afflicted with an endocrine syndrome are attached to this syndrome and dependent upon the glandular disturbance of which it is the expression. In addition, among the nervous disorders which depend upon the disturbance, one must differentiate two groups according as to whether they are related directly or only indirectly.

(To be continued)

Periscope

Miscellany.

EMOTIONAL STATES AND THE SUPRARENAL SECRETION. (Editorial, J. A. M. A., Jan., 1918.)

There has been a tendency in the past few years to assign functions of unexpected or unanticipated importance to the suprarenal glands. Through the medium of the epinephrin that they secrete, these structures are assumed to reinforce the action of the sympathetic nervous system. Introduction of epinephrin into the body has long been known to produce hyperglycemia, which is nearly always accompanied by glycosuria. In connection with this fact, the opinion has been ventured that some or perhaps most of the familiar forms of experimental hyperglycemia are dependent primarily on excitation of the suprarenal glands to increased secretion of epinephrin, which then causes an accelerated mobilization of sugar in the same way that epinephrin does when artificially introduced. As evidence that the suprarenals intervene in the production of such phenomena as the glycosurias following asphyxia, anesthesia, etc., it is contended that they cannot be obtained after removal of the glands. It has even been stated that after suprarenalectomy the normal sugar content of the blood is not maintained. Finally, since sugar is an important source of energy in muscular contraction, it has been contended that a tendency to hyperglycemia may accompany fright, anger and other emotional states that are likely to lead to augmented activity. Thus the alleged discharge of epinephrin into the circulation is made an important factor in the response to environmental stress, enabling the individual affected to "react for the preservation of its life either by offense or flight." The chain of sequences formed by emotion, discharge of epinephrin, mobilization of carbohydrate, and increased muscular efficiency represents a formidable physiologic phenomenon. Of late there have been signs from several quarters that the importance thus assigned to the suprarenals is exaggerated, if not unproved.[1] A serious blow has been dealt to this structure of hypotheses regarding suprarenal function by the critical observations of Stewart and Rogoff[2] of the Laboratory of Experimental Medicine at the Western Reserve University. Starting with the fact, demonstrated by them, that the liberation of epinephrin can be practically abolished or reduced to an insignificant fraction of its normal amount by dividing the nerve supply of one suprarenal and excising the other gland, these investigators have studied the effect of experimental procedures supposed to depend on suprarenal contributions for the genesis of hyperglycemia. They have found that the hyperglycemia associated with asphyxia and ether anesthesia is obtained in animals that have undergone the suprarenal operation described, even when no detectable residual liberation of epinephrin is present. No essential difference could be made out in this regard between these animals and control normal animals. From these results, we admit with the Cleveland experimenters, it seems impossible to draw any other conclusion than that the hyperglycemia associated with asphyxia and with etherization is not produced through the intervention of epinephrin liberated from the suprarenal glands, or at least that the liberation of epinephrin is not essential to the production of the hyperglycemia. Accordingly, the mobilization of sugar, of which these experimental hyperglycemias are the expression, is not mediated through the epinephrin secretion of the suprarenals.

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[1] Is Epinephrin Indispensable for the Organism? editorial, The Journal A. M. A., July 7, 1917, p. 40; The Suprarenals and Shock, Sept. 1, 1917, p. 729; Pituitary Functions, Nov. 17, 1917, p. 1697.

[2] Stewart, G. N., and Rogoff, J. M. The Alleged Relation of the Epinephrin Secretion of the Adrenals to Certain Experimental Hyperglycemias, Am. Jour. Physiol., 1917, 44, 543.

Nor is this the only feature of the widely quoted hypothesis relating the suprarenals to emotional states that has been brought seriously into question. Stewart and Rogoff have directly attacked the problem of the so-called emotional hyperglycemia for which the suprarenals have also been held responsible. Their experiments do not reveal any essential difference between the results of emotional excitement in normal animals and in animals that have survived the procedure already described. The investigators do not assert that their observations disprove the existence of a true emotional hyperglycemia; but they do suggest that if it exists it is a rather infrequent phenomenon, not to be elicited at will as the asphyxia hyperglycemia can be elicited, and so insignificant in amount that numerous observations would be necessary to disentangle it from the uncontrollable variations in the sugar content. But if so-called emotional hyperglycemia is an uncommon phenomenon or maybe a myth, and if emotional excitement does not actually lead to an increased output of epinephrin from the suprarenals, what becomes of the beautiful theories built on this crumbling superstructure?

"War Edema." Maase and Zondek. (Berl. kl. Woch., Sept. 23, 1917.)

Under the name war edema great attention is being paid at present in the German medical journals to a peculiar disease which seems to have become widespread throughout Germany during the present year. The disease has broken out not only in numbers of the camps occupied by prisoners of war, but also in the large towns. Maase and Zondek[1] give an account of the disease as they have seen it in Berlin. The first cases occurred in January, 1917; males above the age of forty years have been almost exclusively the sufferers. No noteworthy premonitory symptoms were observed, but suddenly great edema developed, especially of the lower limbs. The face and scrotum were often affected also, and in a small number of instances ascites and hemothorax occurred. There were no cardiac symptoms, and the urine never contained any albumin. As soon as the patient was put to bed a very marked diuresis at once began, and the edema quickly disappeared. Remissions and recurrences were fairly common. The composition of the edema fluid in these cases had been compared chemically with the fluid effusions in renal disease and obstructive conditions such as hepatic cirrhosis. The chief difference found was the high ammonia figures in the *Kriegsödem*, as contrasted with the two other conditions. The pulse-rate was markedly slowed during the disease, and examination of the blood gave, as a rule, a red count of three to four millions. This condition of anemia it was thought might probably be ascribed to hydremia. The occurrence of diarrhea was fairly common. The authors, in agreement with others, consider the cause of the disease to be underfeeding, especially the diminished quantity of fat. They suggest that toxic products of albuminoid metabolism may cause damage of the endothelial lining of the blood vessels, and so lead to edema. The high residual nitrogen and ammonia values found in the blood, urine, and edema fluids were considered to be evidence in favor of this hypothesis. By giving three patients 100 grams of fat daily for a week the authors were able to cure the disease completely without rest in bed or any other remedial measure. Another factor suggested as of etiological influence is the amount of fluid ingested. Owing to the changed food conditions most of the sufferers had been taking a more watery diet than normally in the shape of soups, turnips, and so on. The regulation treatment of the condition consists of rest in bed until all swelling has disappeared, diminution of the daily fluid intake, and bettering as far as possible of the diet. Schiff states that the disease appeared in Vienna with great suddenness. He gives the usual pulse-rate as from 42 to 56, and states that the amount of urine passed daily during the stage of recovery was commonly 3 to 4 liters. He suggests that this purely war disease has obvious similarities with beri-beri and other diseases depending on failure of vitamines. Numerous authors have described the same disease as it occurs in the camps of prisoners of war, pointing out clearly its cause and the means that may be taken to remedy it when there is the will to do so.

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[1] Berl. klin. Woch., No. 36, September 3, 1917.

EPILEPSY. H. Caro and B. H. Thom. (Journal A. M. A., Oct. 7, 1916.)

These authors report investigations of seventy cases of clinically idiopathic epilepsy without demonstrable organic lesion for the purpose of testing the validity of Dr. C. A. L. Reed's claim of the *Bacillus epilepticus* as the cause of the disease. All the seventy patients were suffering from various degrees of constipation. The blood was taken from the median basilic vein and planted immediately on agar slants and in bouillon. Each culture tube was inoculated with 1 c.c. of blood, and was not examined until the fifth day unless a growth was noted on the agar slants or the bouillon became turbid before that time. In all, eighty specimens of blood were obtained and the total number of cultures was 160. The specimens were taken at cessation of a grand mal attack and an examination showed that 156 were sterile. Of the four that showed growths, one showed staphylococci, while another specimen of this patient's blood gave sterile cultures. The other three cultures all showed a similar organism. All the growths were found before the third day of incubation and with methylene blue as a stain the organism was found to be a large oval-shaped bacillus with deeply staining ectosarc and pale staining protoplasm. It grew rapidly on the agar-agar slant and was distinctly fungoid in appearance. Injections of pure cultures made intravenously and intraperitoneally into a rabbit failed to produce any systematic disturbance, and suspecting this was a contamination, petri plates were placed about the laboratory and similar organisms were isolated. Compared with the *Bacillus epilepticus,* it was an entirely different organism. In addition to the foregoing group of cases, two patients with hemiplegia were examined, one the day following the seizure and the other at the cessation of a convulsion. These cultures were sterile. Similar results were obtained in two cases with myoclonus. The authors' conclusions are as follows: (1) In a series of seventy cases with a total of 160 blood cultures, there were 156 sterile cultures. The remaining four showed contaminations. (2) Four cases with either myoclonus or hemiplegia also gave sterile blood cultures. (3) In a series of seventeen necropsies on epileptics, Dr. Canavan, in a bacteriologic study, was unable to find any organisms resembling *Bacillus epilepticus.* (4) In conclusion, it would seem evident that in the seventy epileptic patients studied, the epileptic syndrome was not due to the *Bacillus epilepticus* of Reed.

"TO THE FOURTH GENERATION." Gaucher. (Bull. acad. méd., Paris, Sept. 26.)

The author is the family physician to an apparently healthy young couple, both free from acquired venereal disease, whose three children present manifestations of inherited syphilis of severe type. One is an idiot. As Gaucher had been the physician also of the grandfather, he recalled certain manifestations of inherited syphilis in this man who had never acquired any venereal disease. At the time, Gaucher confesses, he did not recognize the manifestations as the work of inherited syphilis—in those days less was known about inherited syphilis than now, and the total freedom from acquired venereal disease misled him. But this man's father, the great-grandfather of the three children, died in early manhood from syphilitic paraplegia.

Paralysis from Pasteur Treatment. F. S. Fielder. (Journal A. M. A., June 3, 1916.)

In most cases the Pasteur treatment is given without any special complications following. In some rare instances, however, the so-called "treatment paralysis" occurs, and its possibility should always be explained to those in whom infection is doubtful and those who insist on the treatment merely as a matter of precaution. Seven personal observations of this complication, one of them terminating fatally and six others which have been previously unreported, are given by Fielder. He discusses also the literature and has found altogether records of 143 cases, with twenty-five deaths, this figure including those reported in his article. The symptoms vary all the way from a slight degree of neuritis with little or no motor involvement to a sometimes fatal acute ascending paralysis. The mortality in the published cases, however, does not represent, he thinks, the true figure, as many mild cases are not reported. As regards prognosis, they may be roughly divided into three classes: the mild ones with transitory paralysis of face or limbs all recover; the acute paraplegias of the legs with or without the involvement of the sphincters usually recover. Death, if it occurs, is usually due to cystitis or bed sores after a long illness. The severest cases with a clinical picture of an acute ascending Landry paralysis have a bad prognosis. The symptoms usually make their appearance from eleven to thirty days after the bite, and between ten and twenty days after the beginning of the treatment. Only about one fourth develop after completion of the treatment, and most of these soon after. The onset is usually acute, with mild prodromal symptoms and males seem to be more liable than females. Young children are rarely affected. The principal explanations of the phenomena that have been advanced are: (1) anaphylaxis, due to repeated injections of foreign protein. This Fielder rejects, since the paralysis instead of being as it should be under this theory, as frequent under the classical Pasteur method as under the modified one, is not so frequent, and another point against the theory is the fact that paralysis has not been produced in animals by the injection of large amounts of normal nerve tissue. (2) The specific action of a rabies toxin in combination with the fixed virus used for treatment. This is a plausible theory, but there is no agreement in regard to it. (3) Street virus infection received from the biting animal. (4) Fixed virus infection due to the treatment. In his conclusions, however, Fielder rather favors this view. The treatment of the patient must be conducted on general principles according to the parts of the body involved. The conclusions are as follows: "(1) Paralysis complicating the Pasteur antirabic treatment is very rare, but doubtless occurs in mild form more often than is known. It affects adults chiefly, young children almost never. (2) The prognosis is good in cases of mild or moderate degree, but the mortality among the severe cases is high. (3) The administration of antirabic treatment is therefore not entirely devoid of risk. (4) The possibility of the occurrence of paralysis in any particular case, however, is so slight that it should not deter those who evidently need antirabic treatment. A person bitten by a rabid animal is much more likely to develop rabies, which is certainly fatal, than paralysis, which usually ends in recovery. (5) The slight risk of paralysis should always be explained to those who are inclined to insist on antirabic treatment in the absence of clinical or laboratory evidence that the biting animal was rabid. (6) In most instances this paralysis is caused by the antirabic treatment itself (fixed virus infection, or toxin, or both). It is not often due to street virus infection modified by the treatment. Its incubation is shorter than that of most cases of street virus rabies. (7) Variations in the strength of the fixed virus used are probably a factor in the etiology. (8) Personal idiosyncrasy is an important predisposing condition."

Cerebellar Localization. I. L. Meyers. (Journal A. M. A., Dec. 9, 1916.)

The author discussed the subject of cerebellar localization which, he says, unlike the doctrine of cerebral localization, is not developed by direct experimental evidence, but has been evolved through studies in embryology and comparative anatomy. He notices the work of Bolk, who in 1903 deduced the theory that the developmental varations of the cerebellum bear a relationship to the various muscle complexes, and he points out how the direct stimulation methods of Ferrier, and others, and extirpation methods of still others, have not furnished the undoubted proof of functional differentiation that they afforded in the case of the cerebrum. In a recently published communication, Meyers has advanced the view, obtained by galvanometrically determining the electric potential on the two sides of the body after unilateral ablation of the cerebellum, that it does not, as generally assumed, act motorially on the periphery but that it acts primarily on the motor and tonus centers of the encephalon, its function being to inhibit or control and regulate the activity of these nuclei and that the phenomena of cerebellar deficiency are therefore to be interpreted as phenomena of hyperactivity of the latter structures. The cerebellum, according to this, is a purely afferent mechanism similar to the posterior root ganglia of the cord. Meyers goes at length into the description of his method of experimenting with the centers of the cerebellum by excitation with oil of absinthe, which has a peculiar influence on these centers, and he describes the myograms of the absinthe convulsions at length, and with myograms. His conclusions from these are given as follows: "(1) The function of the cerebellum is to inhibit, control and regulate the activity of the motor cortex of the cerebrum and the paracerebellar nuclei in the medulla. (2) The phenomena of cerebellar deficiency are, accordingly, to be interpreted as phenomena of hyperfunctional and not hypofunctional activity. (3) The cerebellum is functionally differentiated for the various muscle groups of the body, indirectly, by being primarily related through its various lobules to the various motor centers in the cerebrum and the tonus centers in the medulla, just as a posterior root ganglion is, in a motor sense, related to a certain muscle complex through its corresponding group of motor cells in the anterior horn of the cord. (4) The paramedian lobule is, in this manner, related to its homolateral hindlimb, and probably also to the contralateral hindlimb; the crus secundum to the homolateral hindlimb, very likely, exclusively, and the crus primum to the homolateral forelimb. (5) These results are in general in conformity with the theory of cerebellar localization as postulated by Bolk. They differ from it only as regards the paramedian lobule, which Bolk assumed was the center for unilateral movements of the muscles of the trunk." Meyers makes the suggestion that these experiments may possibly have a diagnostic significance in suspected cases of cerebellar diseases and the administration within physiologic limits, as was done, might make certain evidences of cerebellar deficiency more obvious in suspected cases, and also aid in the location of the lesion.

Cerebral Tone. C. K. Mills. (Journal A. M. A., Nov. 18, 1916.)

Mills calls attention to the additions to our knowledge of muscle tonicity that have been made by clinicians and pathologists within the last few years and speaks of the special interest it has in hemiplegias, diplegias, Jacksonian spasms, perseveration, catalepsy, catatonia, atonic and spastic paraplegias, disseminated sclerosis, tabes, amyotonia, dystonia, and Thomsen's disease, in all of which the presence and pathogenesis of muscle tonicity are of special interest. The early and late contractures mentioned in the text-books are first noticed. The so-called early contractures of hemiplegics are usually observed in severe cases of apoplexy and usually attributed to irritation of the pyramidal fibers, quickly developing but not followed by sudden death; they may be of short duration. The musculature of the paralyzed side is usually affected, the spasticity not assuming the usual forms observed in the so-called late contractures. Late contractures usually come on from two weeks to two months after the attack, and may be considered permanent after six months. It is not correct, Mills thinks, to say they are due to secondary degeneration. The unusual differences as to hypertonia and hypotonia have not received sufficient attention. He has made a particular study of forty cases of hemiplegia and notes some exceptional conditions, such as admixtures of flaccidity and spasticity in the same limb, of which he gives one or two examples. For many years he has been in the habit of noting the presence of flaccidity at different periods after the apoplectic attack. He has seen a number of cases in which total limpness continued for weeks or months and then gradually replaced by a spasmodic condition. Total toneless paralysis is rare and doubtless requires different explanations in special cases. It has its peculiar features, and sometimes in such special form as at once to attract attention. Perseveration or tonic perseveration has attracted considerable neurologic attention. Wilson and Walshe have defined the term as "the inability owing to a central lesion to relax innervation in any muscular group or groups," and some details of Wilson and Walshe's cases are quoted. An important fact in connection with the study of tonic innervation is that the corticospinal system for the limb in which tonic innervation is found is not functionally normal; and at the same time the involvement must not be too great. Hence, it it not dependent on nor does it proceed parallel with hypertonicity of pyramidal origin. Mills is of the opinion that phenomena in Thomsen's disease are not myogenic but of central origin, thus supporting to some extent Wilson and Walshe's view. A full report is given of an instructive case under his own observation. None of the theories as to the occurrence of persistent contractures in hemiplegia have proved entirely satisfactory. Mills has held that too much attention has been confined to the pyramidal motor apparatus, and he has suggested the recognition of the existence of a special extrapyramidal apparatus for maintaining muscular tone. This idea has been developed more fully in a previous article, which is quoted. When, as most frequently is the case, the lesions of the cord or of the internal capsule are incomplete, the tonetic apparatus remaining intact, innervation will be irregular or aberrant in its manifestations, and in this way he explains much of the phenomenon. The location of this tonetic center is, he thinks, chiefly in the midfrontal cortex and the phenomena of perseveration is interesting in this connection. Necropsies seem to show that extrapyramidal lesions are to be sought for in these cases, though some involvement of the pyramidal system is also indicated.

GASSERIAN INJECTION. L. J. Pollock and H. E. Potter. (Journal A. M. A., Nov. 4, 1916.)

The authors have, in view of the uncertainty of the prevailing methods of injection into the Gasserian ganglion for the relief of trifacial neuralgia, experimented with the use of the Roentgen ray on the cadaver. Part of the experiment deals with a route used by Harris in his technic. He, with Patrick and others, employs with little modification the course adopted by Levy and Baudoin to reach the ganglion. The needle is inserted in the sigmoid notch from 1.5 to 2.5 cm. anterior to the anterior root of the zygoma or from a point immediately in front of the preplenoid tubercle to one a centimeter farther forward. The needle is directed somewhat backward and slightly forward, and at 4 cm. should reach the nerve. Failing to get perfectly satisfactory results that would authorize the use of the method on a living subject, they looked for another route and found one given by Härtel, and used in this country by Grinker. The needle is introduced through the cheek opposite the alveolar process of the second upper molar tooth. It is guided by means of a finger in the mouth so as to pass between the anterior ramus of the lower jaw and tuberosity of the superior maxilla. "Causing the needle to sweep around the buccinator muscle, the operator pushes it onward between this muscle and the masseter, coronoid process of the lower maxilla and the temporal muscle externally, into the zygomatic fossa. Continuing in the direction upward, backward and slightly inward, the needle now reaches the broad under surface of the great wing of the sphenoid, having pierced the external pterygoid muscle, which fills the zygomatic fossa." According to Härtel, the needle points to the pupil of the eye on the same side and on lateral viewpoint to the articular eminence on the zygoma. It engages the foramen ovale at a depth of about 6 cm. from the point of entrance. Maes has found the foramen more accessible from a point behind the last molar tooth of the lower jaw than from the point given by Härtel. From a study of forty skulls the writers have found that pushing a pin through the foramen ovale, hugging the anterior border of the petrous portion of the temporal bone, the point of entrance would fall in most entrances between the second and third molar of the upper jaw. They give their findings as to the distance to be reached. The anterior border of the petrous portion of the temporal bone when the head is viewed exactly laterally through the fluoroscope gives a visible shadow in living subjects. It forms a line which is a direct projection of a shadow cast by a needle entering between the second and third molar of the upper jaw. Following Härtel's directions, with a needle introduced here to a depth computed by the writer's measurements, it would be approximately at the foramen ovale, and then if it is so directed as to follow the anterior border of the petrous portion of the temporal bone, or 1 or 2 mm. below it, the anteroposterior and superior planes of the foramen ovale will be actively located. These planes cannot be located by the fluoroscope and one is guided by Härtel's directions to point at the pupil of the same eye and by the pterygoid bone. They have had but one opportunity to use this method on a living person and in that case there was immediate relief from pain, and good analgesia. In conclusion, they say that, employing the shadow cast by the anterior border of the temporal bone on a fluoroscope as a line or orientation, injection of the Gasserian ganglion by Härtel's method is made more certain.

POLIOMYELITIS IN SWEDEN. Wernstedt. (Svenk. Läk. Handlingar, Sept., 1917.)

The author conducted extensive research on poliomyelitis during the 1911–1913 epidemic, and with his co-workers proved the existence of healthy carriers and other important epidemiologic data. Wernstedt here gives the minute details of the epidemic and of their research, his report filling over 300 pages with numerous tables, maps and data compiled from a question blank sent to physicians and medical institutions throughout the country. Of the total 6,775 cases, 24.2 per cent. were in patients of fifteen or more. The youngest were five and fourteen days, the oldest seventy-eight and seventy-nine years old. In the overwhelming majority of cases the incubation period was from four to seven days. A tendency to ataxia or spasticity should always suggest possible oncoming poliomyelitis. Sometimes this did not attract attention until another case of frank poliomyelitis developed in the family. He warns that every case of diarrhea, sore throat and bronchitis should be regarded with suspicion when poliomyelitis is prevailing. Pains in the legs and even swelling of joints may be encountered with early poliomyelitis. Polyneuritis generally develops symmetrically, and has a longer course, without acute fever. Meningeal symptoms may accompany the poliomyelitis, but there is no opisthotonus, and poliomyelitis is a summer disease in comparison to epidemic meningitis, which occurs usually in winter. The lumbar puncture fluid is clear with poliomyelitis. In one of the cases the symptoms were mistaken for appendicitis and an operation was done; a few days later the characteristic paralysis of legs and bladder developed. In another case an emergency tracheotomy was done for supposed diphtheria. There were 1,239 deaths among the 6,700 cases. The mortality ranged from 10.3 to 21.4 per cent. in children under ten, jumped to twice this in older children; three times as much in adults under thirty, and four times at fifty to sixty. In treatment, he emphasizes the necessity for personal supervision and extremely careful nursing of the patient even during the stage of repair. The spread of the disease along the routes of traffic is shown by the maps. The fact that the poliomyelitis virus can continue to live in the rabbit organism suggests that it may be transmitted by animals besides direct contact from man.

REFLEXES IN POLIOMYELITIS. Regan. (Am. Jl. Dis. Ch., Nov., 1917.)

The author points out that most common symptom of poliomyelitis is an alteration in the reflexes accompanying or following a short febrile period. The patellar reflex is most frequently affected owing to the common involvement of that region of the spinal cord which innervates the quadriceps extensor group of muscles. It was altered in various ways in 81 per cent. of 818 cases. Hyperactivity of the knee jerks is usually, if not invariably, the first change to occur in the preparalytic stage. Hyperactivity of the patellar reflex is most frequent in the meningitic and ataxic cases, and in the combined types of the disease in which meningitic symptoms were prominent. Absent or normal response is the rule in purely bulbar cases, except in the very early stages. An exaggerated reflex may be encountered in an atrophied and obviously paralyzed leg. Absence of the knee jerk is most frequently encountered in the myelitic and bulbar types of the malady.

The patellar reflex may remain normal throughout the entire paralytic phase, especially in bulbar and ataxic cases. It is also common in myelitic cases when the paralysis is limited to the upper extremities and trunk. It is scarcely ever encountered where the hydrocephalus is at all marked. The plantar reflexes are exaggerated in the preparalytic stage. The reflex was altered in 41 per cent. of 643 cases specified in the paralytic stage. An exaggerated response may persist into the paralytic stage, more especially in the meningitic and ataxic classes of cases. A diminished reaction was found most common in the ataxic, the myelitic meningitic, and the purely myelitic forms of the disease. The reflex was absent most frequently in the purely bulbar and in the combined bulbar and myelitic cases. A normal reaction was encountered most often in the ataxic, bulbar myelitic and bulbar meningitic forms of the malady. Often the first sign of improvement in cases with marked paralytic involvement is the gradual reappearance of the reflex. The Babinski phenomenon is relatively rare in poliomyelitis, but it occasionally occurs in the meningitic form of the disease. Its presence in a case in which the diagnosis was doubtful would always be decidedly in favor of tuberculous, and, to a less extent, cerebrospinal meningitis. A true ankle clonus is likewise very rare in contradistinction to the other forms of meningitis. The pupillary reflex is but little altered.

MYASTHENIA GRAVIS. W. A. Jones. (Journal A. M. A., Nov. 4, 1916.)

Jones reports a case of myasthenia gravis, with necropsy, in which a thymoma was found in the thymic region just above the heart and immediately behind the sternum, imbedded in loose connective tissue and not adherent to the sternum or to any of the thoracic viscera. In commenting on the case he says the literature on the thymus gland is neither convincing nor satisfying. It seems to be generally recognized that the thymus and the thyroid are interrelated and it seems reasonably safe to assume that the thymus is in some way responsible, like the thyroid, for disturbances of bodily metabolism. It is also probable that it has some other relation with ductless glands, but their dependence on each other is not definitely determined. The presence of the thymus in a person of middle life, particularly when associated with an exophthalmic goiter, is a very strong index, he says, that the thymus is the main disturbing element, and the operator who removes the thyroid gland without recognizing a thymus hyperplasia produces a change in the circulation of the thymus which not infrequently is followed by sudden death. The relation between thymic disease and the central nervous system has never been determined. The majority of thymic deaths in young people and children are probably due to pressure effects, but this does not eliminate the probability of toxins in the blood stream also.

DO ANIMALS FEEL PAIN? Van Rijnberk. (Nederlandsch Tijdschrift voor Geneeskunde, Amsterdam, August 25, II, No. 8, pp. 671-750.)

The author here cites further examples, such as that if the tail or part of the body of a honey-sucking bee or male copulating shrimp or frog is cut off, the creature continues undisturbed to suck honey and the male does not release the female from his embrace. The twitching of the skin of a horse is a reflex action which occurs the same if the communication with the brain is shut off. He says further that veterinarians report that quite a considerable operation can de done on the large, herbivorous domestic animals while they are feeding and they may continue feeding without interruption. Dogs, cats and rabbits after severe operations in the laboratories are as lively and frolicsome as before so soon as the effect of the general anesthesia has passed off. He adds that dogs cannot be trained by the eyesight alone; there must always be some pleasurable or disagreeable experience connected with the act in which it is being trained. Even in man, he continues, the sensation of pain seems to be restricted to the outlying parts of the body. It is still a question whether sound organs in the thoracic and abdominal cavities are sensitive to pain. "In short," he concludes, "the attempt to answer the question 'Do animals feel pain?'—which the layman answers glibly in the affirmative—is to step on a treacherous trapdoor which drops one into a hornets' nest of philosophy, psychology and biology."

WOOD ALCOHOL POISONING. A. O. Gettler and A. V. St. George. (Journal A. M. A., Jan. 19, 1918.)

These writers say that national prohibition will undoubtedly lead to much "moonshining," adulteration and dilution of liquor. This is evident from the recent increase of cases of wood alcohol poisoning, six of them fatal. Such cases, the writers believe, will become still more frequent in the future in spite of rigid measures against adulteration. A warning, they think, is due to physicians, coroners and health officers as to these possibilities. Refined wood alcohol tastes like ethyl alcohol and is considerably cheaper, hence the probability of its use by ignorant dealers in liquor adulteration. The authors report the findings in the six fatal cases. The diagnostic features of acute wood alcohol poisoning are extreme physical weakness, acute gastrointestinal symptoms, blindness, and deep coma ending in collapse and death. In the chronic cases, blindness is the chief feature. A differential diagnosis from epilepsy, and especially from all types of coma, must be made. This is frequently difficult. But we should be suspicious, at least, of wood alcohol poisoning in these cases. To be of any value, treatment must be prompt. It consists essentially of getting rid of the poison in the body, and of supportive measures. The poison is slowly and incompletely oxidized in the system into still more dangerous poisons, namely, formaldehyd and formic acid and as such very slowly eliminated by the kidneys. The stomach should be washed out early and frequently and the washings tested for wood alcohol. Intravenous saline or sodium bicarbonate infusions and phlebotomy and transfusions, if the latter can be had quickly, should be employed. In addition to warmth and strong stimulation with strychnin, digitalis, caffein, camphor, epinephrin and oxygen must be given. The authors doubt the value of ethyl alcohol to replace the methyl product. For the treatment of the chronic cases they refer the reader to the article by Buller and Wood in The Journal, Oct. 1, 1904, and that of Birch-Hirschfeld in von Graefe's Archiv. The postmortems in four of the fatal cases showed, as gross appearances, marked cerebral congestion with increased cerebrospinal fluid; also marked visceral congestion and acute pulmonary edema and congestion. In addition, the heart and vessels contained only dark fluid blood. In one of two cases there was pulmonary tuberculosis and in the other, degeneration of the kidneys and liver. A chemical analysis of parts of the brain was made in all six cases and methyl alcohol poisoning found. It is important, the writers say, to note that there is a dangerous common use of refined wood alcohol in the preparation of essences, for flavoring Florida water, witch hazel, etc. They suggest, therefore, suitable legislation for the prohibition of the sale of wood alcohol for domestic uses—measures similar to laws now existing in England and Germany.

ARSENIC AND THE MENINGES. J. H. Barbat. (Journal A. M. A., Jan. 19, 1918.)

Barbat has studied the penetration of the meninges by drugs intravenously and intraspinally injected. From a careful study of the literature, he finds that only in a few instances have investigators been able to recover arsenic in the spinal fluid after its intravenous administration, and never after intramuscular or oral administration. The only important drugs that have been found to pass through the meninges and the ependymal cells are hexamethylenamin, uranin, chloroform, and in one case reported by Rotky, bromin. A review of some of the reports of the literature shows that the presence of arsenic in the cerebrospinal fluid is variable and needs explanation. Under normal conditions, we may assume that the meninges and the ependymal cells are practically impermeable to passage of all but a few drugs. What causes this impermeability? In 80 per cent. of the cases cerebral meningeal irritation accompanies the acquired permeability. The writer holds that it can be further increased by reducing the spinal pressure. The removal of the larger part of the fluid, he maintains, must create a congestion and if the capillaries are dilated, their contents will move with greater freedom. He has been able to demonstrate definitely that, in twenty-five out of twenty-six cases, arsenic is found in the cerebrospinal fluid twenty-four hours after its intravenous administration, if the spine is tapped almost dry shortly after the salvarsan or a similar product is given. He describes the technic which he employed as follows: "The patients were given intravenous injections of either salvarsan, neosalvarsan or arsenobenzol. Within twenty minutes the spine was tapped, and the fluid was allowed to run until it barely dropped, the quantity varying from 30 to 60 c.c. The fluid was collected in two portions. The first was tested for colloidal gold, Wassermann, Pandy, Nonne and Noguchi reactions, and the second portion for arsenic. In ten cases, 20 c.c. of blood were withdrawn within half an hour after the administration of the arsenic. This was allowed to clot, the serum was removed, and both clot and serum were tested for arsenic. Twenty-four hours after the spine was tapped, a second tapping was done, removing at least 10 c.c., though usually twice that amount was removed. This fluid was also examined for arsenic." Analyses of the blood serum showed that it contained more than five times as much arsenic as the clot contained and that it averaged only about eight parts per million. Within half an hour after the administration of 0.4 gm. of salvarsan, 75 per cent. is fixed in the body cells. The second portion of spinal fluid, withdrawn just after the administration of the salvarsan, showed 31 per cent. of arsenic free and 27 per cent. with a trace, while 42 per cent. gave an average of 0.2 part per million. The spinal fluid, withdrawn twenty-four hours later, showed one case out of twenty-six arsenic free, two cases with a trace and an average of 0.25 part per million in the remaining twenty-three cases. These figures would indicate that by means of this technic, arsenic can be made to pass into the spinal fluid in more than 96 per cent. of patients suffering from tabes or paresis. There has not been as yet a sufficient number of patients tried to warrant any definite statement as to the clinical value of the method, but the writer thinks that his results in absolutely hopeless cases indicate that a more extensive trial might be of value. He relates instances of improvement after the treatment. There was little complaint from the patients on account of the withdrawal of large quantities of the fluid, and the headaches that followed were no worse than those after the removal of small quantities. He thinks the method has many advantages over that of Swift and Ellis and the clinical results will be found as good, if not better.

MUSCULAR STRENGTH OF WOMEN. Clelia D. Mosher and E. G. Martin. (Journal A. M. A., Jan. 19, 1918.)

The authors offer a preliminary report on the muscular strength of forty-five average healthy college women, not especially athletic. The writers have applied the spring balance method, with certain improved modifications, to various groups of muscles separately on both sides. The full test included observations of thirty-six groups of muscles, each test being repeated from two to five times. In classifying the persons studied, the writers found a convenient method in terms of the "strength factor," which is simply the figure obtained by dividing the total strength, as determined by the tests, by the weight. Tables are given showing the results of this whole number together and in groups according to the "strength factor" by the different tests. The first group with the lowest average of "strength factor" was made up of the tallest and heaviest women with an average overweight of 30.1 pounds. Three of the eight women of this group were immature physically, though not sexually, and 75 per cent. of them show a marked lack of coördination. The third group had an average strength factor of 26.77, approaching the strength factor of athletic college men. The members of this group were also the most typically feminine. They were compactly built and lighter in weight than members of either of the other two groups and showed the highest degree of coördination. They had been physically active without exception, playing the same games as their brothers and boy cousins. Only two cases fell below the average. Details as to special tests of members of these two groups are given. The second group will be discussed by the authors in a later paper. A general comparison of the whole series of forty-five college women with a series of athletic college men, tested by Dr. Martin and Mr. Rich, gives some suggestive results in regard to the strength of the different muscle groups which can be explained to a greater or less extent by the conventional habits and clothing of women. The action of buttoning women's waists and skirts in the back causes special development of the muscles involved, such as the deltoid and the latissimus dorsi. The limitation of movements due to the skirt, for example, also explains some differences in the development of various muscle groups. A girl who was brought up in overalls until the age of twelve is compared in an interesting manner with her brother, fourteen months older. From the data as a whole, the authors tentatively conclude that there is no difference in the muscular strength of women and men due to sex as such. The differences that are most frequently found are due to differences in the use of the muscles brought about by the conventional limitations of activity or by dress. Marked overweight or underweight tends to lower the strength factor as does also lack of coördination which is too frequent in women and exaggerated by their slight or less physical activity in childhood. Effects of muscular training persist long after the particular exercise has ceased. Periodic disability in women without organic disease does not lessen their racial efficiency. Sex, therefore, the authors conclude, is not necessarily a disability. If some method can be found of adjusting work to the individual strength under the proper conditions without reference to sex, there is no reason why the potential power of woman may not be used without danger of lessening her racial efficiency.

A Consideration of Recent Serological Work on the Meningococcus. F. W. Andrews. (The Lancet, December 8, 1917.)

F. W. Andrews considers that one of the difficulties which beset attempts at the classification of bacteria is the fact that within the limits of what, on general biological grounds, would be deemed a good "species" there are often subspecies or races which differ only in their serological properties. One of the latest organisms to be submitted to close serological scrutiny is the meningococcus because the recent outbreak of cerebrospinal fever has brought it into prominence. The state of definite knowledge on this subject when the outbreak of cerebrospinal fever in England began to assume epidemic dimensions was briefly as follows: That the causal agent in this disease and in the endemic posterior basal meningitis of infants was the meningococcus. No cultural distinctions could be made between the cocci found in these two affections nor could any adequate or constant serological differences be established between them. That the meningococcus was divisible into certain subgroups by serological means, and notably by the absorption of agglutinin tests. The number of subgroups was ill-defined, but they appeared to fall into two main divisions, designated by Dopter "meningococci" and "parameningococci," respectively. That from the pharyngeal mucus, both of contacts and non-contacts, cocci could often be cultivated which had all of the biological characters of the meningococcus. In some cases complete serological identity with that organism could be established; in other cases it could not, and some writer stigmatized such unplaced forms as "pseudomeningococci." Andrews gives a résumé of the recent research work done in England, which was prompted by two immediate needs. The first was the provision of an adequate antiserum for treatment, and the second was the provision of means for recognizing the meningococcus, especially in the pharyngeal secretions. The work has been carried out by two independent groups of observers in England, a military and a civil. The military research was conducted under the guidance of Lieutenant-Colonel M. H. Gordon, at the Central Cerebrospinal Laboratory at Millbank. On the other hand, the Local Government Board turned the energies of its bacteriologists in the laboratories at Carlisle Place to a detailed study of the meningococcus from a more abstract point of view, but with special reference to the nature of such cocci from the pharynx and non-contacts. Their material came from the civil population, while that of the military investigators came from the army. Andrews states that the results of Gordon and his coworkers have the advancement in practical measures of diagnosis and treatment, including an improved culture medium adapted for general use and greatly improved methods for the cure of carriers. He refers, chiefly, however, to one branch of their work, that relating to the serological differentiation of meningococci. This was accomplished by means of the absorption of agglutinin method applied to a large number of spinal strains. By this means Gordon separated the strains into four groups, of which two were common and two comparatively rare, though sometimes numerous in certain local outbreaks: he termed them Types I, II, III, and IV. Later experience showed that substantially all the spinal strains met with in military cases of cerebrospinal fever could be referred to one or another of these types, which were very properly regarded as the "epidemic types" concerned in the existing outbreak. It was also shown that by mere agglutination tests, quantitatively carried out, a coccus could almost always be referred to its type, without the necessity for absorption tests. Certain results of much practical importance followed the application of this knowledge. (1) By supplying typical strains to those engaged in making serum for therapeutic use, sera were prepared of greatly increased efficacy in treatment. (2) It was demonstrated by several workers that the type of meningococcus invariably present in the pharynx early in the disease was always the same as that found in the cerebrospinal fluid. This not only confirms the idea that the disease is spread by means of the nasopharyngeal secretions, but also suggests that every case of cerebrospinal fever arises in a person who is already a carrier. (3) It became possible in many cases to trace the spread of the disease by the identification of carriers bearing given types of the coccus, thus facilitating epidemiological investigations. (4) When the carriers in any locality became too numerous to deal with, a test was afforded by which the carriers of epidemic types of the coccus could be sorted out, as presumably the most dangerous, and separately treated. It will be realized that this serological work had a direct bearing on the immediate control of the disease among the military population, and it was remarkable for the energy and rapidity with which it was carried out. It has been supplemented since by further experimental observations supporting the more or less specific nature of the bodily reactions against the four types of meningococci. Andrews disagrees with Gordon because Gordon speaks of his four types as "species"—a claim which Andrews contends no biologist could support—and excludes from the true meningococci those pharyngeal strains which fail to agglutinate with his four type sera, calling them "pseudomeningococci." During the past two years Andrews submitted the cocci from all cases of cerebrospinal fever at St. Bartholomew's Hospital to agglutination with the four sera kindly supplied him from time to time by Major Hine at Millbank. Twenty-six cases have been in children under five years old, and eight of these have agglutinated so poorly with the sera that he could not regard them as conforming fully to the types—one, indeed, failing to agglutinate at all. Although eighteen of the cases did conform to one or other of the four types, he believes that the meningococcus in the posterior basic meningitis of infants not rarely presents strains which differ from those of the epidemic form of the disease in adults. And if this is so the pharyngeal cocci from non-contacts cannot necessarily be excluded from the group of true meningococci on serological grounds alone. The most which we can legitimately assert is that such nonconforming or imperfectly conforming cocci are not examples of the epidemic types seen in adults during the present outbreak. The Local Government Board were unable to recognize more than two main serological groups of the coccus, and these they found connected by transitional and debatable forms. Andrews further states that so far as the number of groups is concerned the difference is apparent rather than real, for Gordon admits relationship between his Types I and III, which are often brought down by the same serum, though unequally, and similarly between his Types II and IV. Andrews offers the following working hypothesis drawn from the present state of knowledge of the meningococcus. The meningococcus is a single, definite species, recognizable by its cultural characters and fermentative reactions, and widely spread as a pharyngeal saprophyte—often a transitory one. In its most primitive form it is a relatively harmless organism, but even at this stage its protein presents two antigenic components. These two components are rarely evenly balanced, and from a serological point of view there emerge two primary races of the coccus—Group I and Group II—which correspond to the meningococcus and parameningococcus. The latter term is a misnomer since both are true meningococci. The term pseudomeningococcus is equally erroneous; so far as it has any meaning it signifies a meningococcus of primitive type and low pathogenic power. Under ordinary circumstances the bulk of the saprophytic meningococci of the pharynx are of this low type and mostly fall under Group II, though some are indeterminate. Even in nonepidemic times certain strains of these simple cocci possess sufficient virulence to attack the very young: hence we always have with us sporadic cases of cerebrospinal meningitis. For unknown reasons there is a tendency at times for certain strains to increase in virulence, and this is accompanied by an increased complexity in the structure of the antigen, taking different forms in different strains; it is not known whether the increased complexity is due to the increased virulence or vice versa.

Epidemic Cerebrospinal Meningitis. (Editorial, British Med. Journal, Jan., 1918.)

Since early in the year 1915 we have been living through a scattered epidemic of cerebrospinal meningitis, and a great deal of bacteriological and epidemiological work on the organism causing the disease and its modes of transmission has been published since that date. Among the most recent of these publications is a collection of Further Reports on Cerebrospinal Fever, issued by the Local Government Board in continuation of its report of 1916. In a preliminary memorandum by the Board's medical officer, Sir Arthur Newsholme, it is pointed out that the meningococcus is a delicate organism incapable of growth or survival at a temperature much below that of the human body. Its habitat is the human nasopharynx, where it may grow readily. It is transmitted from person to person in droplets expelled by forcible expiration from the carrier and inhaled by those in his proximity. It may also be conveyed from mouth to mouth either by direct contact, or, possibly, by some article infected by the mouth of the carrier. There is no evidence of more indirect or more distant modes of transmission.

It must be fully recognized that the meningococcus is a common inhabitant of the nasopharynx, and that its presence there rarely leads to the development of meningitis. Generally it behaves as a harmless saprophyte in non-epidemic periods. Thus Mayer and his colleagues found 158 meningococcus carriers among 9,111 soldiers at Munich in 1910, an epidemic-free period; none of these carriers developed meningitis. The significance of these figures will be appreciated better when it is realized that the meningococcus does not usually persist in the nasopharynx of a carrier for more than two or three weeks; so that a large proportion of the population must harbor the organism at one time or another, even during a non-epidemic season. At the present time the proportion of carriers in England is probably much higher than it was in Munich in 1910. Between March, 1915, and February, 1917, 1,881 persons believed not to have been in contact with cases of cerebrospinal fever were examined by bacteriologists working for the Board, and 253 of them (13.5 per cent.) were found to be meningococcus carriers. In the three years 1912–14 there were about 300 cases of the disease in England and Wales per annum; the figure rose to 3,702 in 1915; it was 2,199 in 1916, and there were over 1,000 cases among civilians alone during the first six months of 1917. Nearly four fifths of the cases among civilians occurred at ages under fifteen, and about 60 per cent. of all the cases arise in the months of March, April, and May.

Not much has been ascertained as to the conditions under which epidemics of the disease arise; there is some resemblance here between influenza, cerebrospinal fever, and other catarrhal respiratory affections. In fact, it may be generally stated, from the point of view of the epidemiologist, that cerebrospinal fever is one of a group of catarrhal diseases, and that it commonly becomes prevalent at or a little after the season of the year and under climatic or other conditions which favor excessive prevalence of influenza, bronchitis, and pneumonia. Its response to these influences, however, is erratic; it is not associated with dry years, or a series of dry years.

When considering the infectivity of the disease we are on surer ground. The risk of infection from a case of cerebrospinal fever is small, even very small; in the vast majority of instances only one case occurs in an invaded household or military hutment, and sometimes only one case in an invaded locality. Thus among 2,343 cases among civilians in 1915, multiple cases occurred in 150 only of the invaded households. It is exceptional for the infection of a patient to be ascribable to any known case of cerebrospinal fever; clearly he must have picked up the meningococcus from some carrier, but as the percentage of healthy carriers is as high as 13.5 among members of the general population in populous areas who have apparently had no opportunity of contact with a case of the disease, it seems highly probable that the carriers are more important than the cases in the causation of epidemic cerebrospinal meningitis. Further, it is pointed out that the sporadic habit of the disease, in point of both time and place, persists in epidemic times. The case rate is not deducible from the carrier rate, and the occurrence of an epidemic cannot be satisfactorily explained as due to an increase in the latter. Evidence is brought forward by five of the contributors to this volume of Reports to show that any microbe possessing the admitted morphological and cultural characters of the meningococcus should be regarded as potentially pathogenic; appeal to agglutination reactions here is held to be superfluous, though differences in these serological reactions may be regarded as having importance in directing the treatment of cerebrospinal fever by serumtherapy. Major Gordon, as is well known, does not accept this view as to the value of agglutination reactions, and much weight must be given to his opinion.

The further consideration of the healthy meningococcus carriers who are mainly responsible for the occurrence of cases of the disease suggests certain possibilities with regard to its spread. Clearly the carriers are too many to be controlled or quarantined in the ordinary conditions of life. The carrier condition may be of benefit to the individual as a means of acquiring partial immunity to the disease, but it is clearly harmful to the public as increasing the circulation of the meningococcus and facilitating the infection of susceptible persons. Again, some such susceptible persons may be a danger to others by raising the virulence of the nasopharyngeal meningococci to epidemic pitch, and before themselves falling victims to the disease may transmit these more dangerous organisms to other persons. Alternatively, epidemics of the disease may be due to the temporary enhancement of the virulence of endemic strains of meningococci by some conditions still unknown to us. The view that a more virulent strain may have been introduced into this country from Canada early in 1915 is said to be possibly correct but unproven; some military cases of cerebrospinal fever had occurred in this country before this importation could have taken effect. Can anything be done to lessen the prevalence of cerebrospinal fever in the future? The infecting agent, as has been stated above, has its habitat in the nasopharynx. It is transmitted from one person to another by such actions as coughing or sneezing without the careful use of the handkerchief: or, more directly, from mouth to mouth, as in kissing. Sir Arthur Newsholme looks forward to the time when a higher standard of conduct in regard to the spread of all such catarrhal infections will become the rule in social intercourse. Everyone will agree with him that the practice of coughing and sneezing broadcast, now unhappily so common, should be put a stop to in the interest of the public health. As for the prohibition of the more direct method of infection, even the least susceptible of bachelors would think twice before making so unreasonable a suggestion between Christmastide and the New Year.

THE PATHOLOGY AND PROGNOSIS OF GONORRHEAL MYELITIS. (Editorial, N. Y. Medical Journal, Jan., 1918.)

That gonorrhea is a general disease is to-day an established fact. It may present complications in various systems and particularly in the nervous system, in the form of cerebrospinal meningitis, polyneuritis, and myelitis. Whether or not these morbid processes are due to the gonococcus or its toxin is still an open question, but the clinical evolution would seem to plead in favor of a direct gonococcal origin.

In gonorrheal myelitis there is an exaggerated vascularization of the meninges and simple inspection shows softening of certain portions of the cord or even in its entire extent. The cerebrospinal fluid is usually limpid and small in amount. The microscopic lesions are interesting to the highest degree, but have not been thoroughly studied. The white substance is greatly altered and the same changes involve the different columns. In one case the fundamental fasciculus and Burdach's column were the most affected. The axis cylinders are preserved, but the myelin is greatly altered and at certain spots it no longer exists. In other areas it is more or less deeply divided and when stained with osmic acid shows that the segments are separated from each other. The white matter is infiltrated by leucocytes and at certain spots offers a certain degree of connective tissue organization, characterized by the elaboration of fibrillæ stained red by Van Gieson.

Numerous granular bodies are also found but, generally speaking, the nerve cells themselves show few changes. However, in the anterior horns it will be found that some of them have lost their prolongations and present a certain degree of central chromatolysis. The canal of the ependyma is dilated and its epithelium has proliferated and offers buds which project into its cavity. The vessels do not present any morbid change, but they are dilated and engorged with blood.

The meninges are normal, without any leucocytic infiltration; this likewise applies to the spinal ganglia. As to the rhachidial roots, they show little, if any, change, and when there is any they only occupy that portion nearest to the cord and become less marked the nearer the spinal ganglia are approached. The most unstable morbid changes are to be found in the white matter and consist of a degeneration of the myelin.

The prognosis will vary as the morbid process is attenuated or assumes a serious form, but it must not be forgotten that the former has a very slow evolution, that it may become complicated by amyotrophy, and above all that it may change to the more serious type of the affection, either from urinary infection or from septicemia whose starting point is a sacral bedsore. Therefore, the prognosis is always serious, and for this reason should be guarded.

Intraspinal Injections in Treatment of Nervous Syphilis. J. A. Fordyce. (Journal A. M. A., Nov. 3, 1917.)

Fordyce protests against the views expressed by Dr. Bernard Sachs in The Journal A. M. A., Sept. 1, 1917. The writer believes that if Sachs's statements are to be accepted as correct by the profession generally, great harm will be done. The former has seen numerous patients who were treated by salvarsan given intravenously in intensive courses of treatment, show marked improvement after the institution of intraspinal treatment. He reports several cases in support of his statement. It does not require the experience of a trained neurologist to convince these patients of the cause of their improvement. The advocates of intraspinal therapy have never claimed that the method should be used to the exclusion of the intravenous method. The writer reports other cases to show its good effects in tabes and other forms of nervous syphilis. In such patients there are no indications for intraspinal injection unless they develop intolerance to arsenic, skin eruptions, nephritis or hepatitis. Dr. Sachs's arguments as to positive pressure in the cerebral capillaries, the short contact of remedial agents with the foci of disease, and the slow circulation of the cerebrospinal fluid are interesting, but not of value in discrediting the results achieved. In the early florid stage of syphilis during intensive salvarsan and mercury treatment, symptoms of invasion of the nervous system are sometimes seen. This early invasive power of the spirochetes probably indicates a special strain of the germ. The value of intraspinal treatment in such cases is shown by clinical histories given. A proper conception of the syphilitic infection and the development of an efficient therapeutic procedure cannot be expected from doctors who see only the late degenerative effects of the disease. Little can be expected from treatment in the late stages, where institutional treatment is demanded. Often, only serologic examination reveals paresis in its incipient stages. Hence by early treatment we may limit the number of cases of cerebrospinal syphilis. The statement made by Dr. Sachs that claims are made for the intraspinal method by men whose chief interests are centered in changing the Wassermann reaction, in reducing the cell count, and in changing the globulin reaction, rather than in changing the clinical condition of the patient, is entirely unwarranted, declares the writer. The sweeping assertion of Dr. Sachs that the same biologic changes in the fluid have followed intravenous treatment, or repeated lumbar punctures, or the introduction of the patient's nonsalvarsanized serum, the writer absolutely denies. Dr. Sachs also says that there is absolutely no correspondence between a change in the cerebral spinal content and the condition of the patient. The writer can show many cases contradicting this. The examination of the spinal fluid has thrown much light on the beginning of the infection. The criticism and opposition of the intraspinal method are largely due, he says, to unfortunate results arising from the use of the Ravaut method. The use of this method requires the aid of trained assistance and a well-equipped laboratory, as well as experience and skill on the part of the physician. The writer gives his conclusions as follows: (1) In tabes, certain types of cerebrospinal syphilis like meningitis, meningomyelitis and meningoencephalitis, and in optic atrophy with positive findings in the fluid, intraspinal treatment succeeds in relieving or curing the conditions after failure of intravenous and other treatment. (2) It is the only procedure that can be employed after the intravenous treatment fails or when the patient develops an intolerance to arsenic. (3) With proper technic and experience, it is less dangerous than intensive intravenous treatment. (4) In paresis with stigmata of degeneration, the most to be hoped for is temporary arrest of the encephalitis. There are borderline cases of meningoencephalitis which simulate paresis and which are curable by the treatment in question. (5) The criticism of the method is based largely on the results following imperfect technic, and on its employment in cases without clear indications afforded by spinal fluid examination. Aside from these reasons, it has been condemned after short and imperfect trials. In some cases the existing lesions are activated by early injections and cured by persistence in the treatment. (6) The author's statement that it is regrettable that changes in biologic findings should be made the criterion of the efficiency of a therapeutic method is unfortunate from the standpoint of the patient as well as of the operator. . . . If we were to discard the positive knowledge gained in the past few years as the result of laboratory methods, we should be much worse off and more most impotent in the diagnosis of many cases. . . . (7) The future of the syphilitic individual and the hope of anticipating or arresting incurable degeneration is largely dependent on early and systematic examination of the spinal fluid.

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Original Articles

ECONOMIC EFFICIENCY OF EPILEPTIC PATIENTS*

By Margherita Ryther
(Social Service Department)
MASSACHUSETTS GENERAL HOSPITAL

and Mabel Ordway, M.D.
MASSACHUSETTS GENERAL HOSPITAL

Owing to the high percentage of epileptic patients coming to the clinic, the many requests for assistance in securing them employment and the difficulties encountered in finding suitable occupations for them, we became interested in discovering how many of the patients were capable of self-support or were of economic value, and whether a greater number of openings might not be secured for them in the community than the actual statistics of their employment indicate as being now available. It was quickly realized that employment is a fundamental need in the treatment of these patients. The necessity of such a study seemed clearer on account of the fact that a number of patients, whom we had made intensive inquiries about in relation to their working capacity, were considered by their employers to be able workmen and capable of self support, although barred from ordinary avenues of industry because of their special handicap—the seizure or attack.

In spite of the fact that this handicap is so serious, it was hoped that data of medical and social significance might be found which would indicate the possibility of overcoming it in one or another way, so that these patients, even though temporarily incapacitated for work by reason of their attacks, might look forward to self-support.

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* An analysis from an industrial viewpoint of 100 cases of epilepsy taken from the medico-social group now being studied at the Massachusetts General Hospital, Neurological Clinic.

As a first step toward presenting adequate preventive and constructive measures, it was considered advisable to make a general survey of the epileptic patients coming to the clinic, and in 1914 we began to study intensively, both from a medical and social standpoint, as many patients as our time allowed. We soon felt the need of making some tentative classification of our patients, and the following grouping suggested itself:

1. There is a group of patients who are not only epileptic, but feeble-minded or insane. When this is so, the mental condition becomes the controlling feature of the situation.

2. There is a small group who have attacks so seldom and are so slightly affected by them (sometimes there being but one attack in several years) that although epileptics they are very little handicapped.

3. The largest group is made up of those patients who are too sane and too capable to need segregation, unless for occasional brief periods. The apparent mental aberration and deterioration or delinquency of such patients is of too transient a nature to allow of any but an individual solution of the problem. For a few of them the institution should be a temporary refuge when community stress becomes too severe, or family relations too strained.

The report covers the cases of one hundred patients who were taken at random for intensive study. They were not chosen from the third class alone, but represent an admixture of all three classes. The histories given by these patients have all been verified—ninety-two per cent. by the family, and, in addition, fifty per cent. by employers and thirty-six per cent. by the school authorities. This does not include those patients who have their own business or are employed by relatives.

During the year 1916, out of the total number of patients (2,922) treated in the Neurological Clinic, two hundred and sixty-six patients, or nine per cent., were classified as epileptics. These figures are certainly significant, showing a need for serious consideration on the part of not only the medical profession, but social workers and laymen.

In the analysis of the one hundred cases which we are presenting in chart form we have considered it of primary importance to record in detail as many factors as possible, believing a correlation of these to be necessary for an accurate estimate of the needs and capabilities of the epileptic patient. We have therefore tabulated age, sex, nationality and social status of the patients, their education, character, the frequency and time of their attacks, and also their heredity, in addition to the occupational histories.

Chart I. Age.—The age of the patients varied from nine to fifty years, the larger number being between eighteen and twenty-years.

Chart I

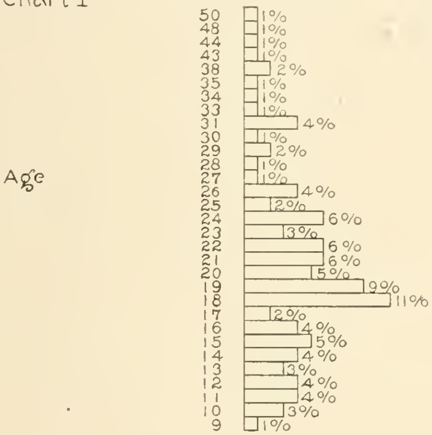


Chart II. Sex.—Fifty-four per cent. of the patients were males and forty-six per cent. were females.

Chart II

Chart III. Nationality.—Forty-five per cent. were Americans and fourteen per cent. were Irish-Americans. The highest percentage of any other nationality was five.

Chart III

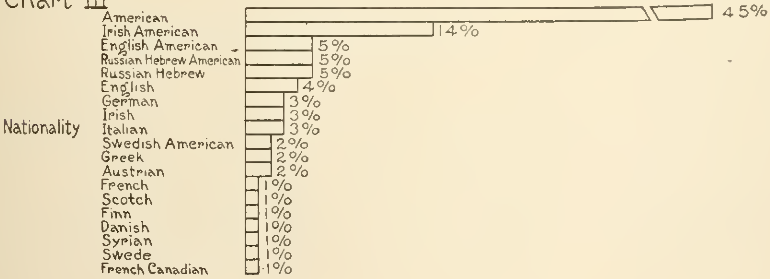


Chart IV. Social Status.—Eighty-three per cent. were single and seventeen per cent. were married. This shows a small percentage of married patients in comparison with the number shown later to be self-supporting, undoubtedly due to the number of patients under twenty years of age.

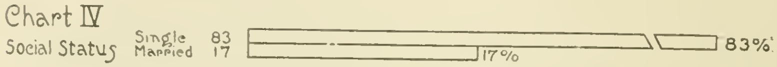


Chart V. Residences as Regards Distances from Boston. Percentage of Patients from Each District.—Forty-nine per cent. of the patients came from distances of one to five miles from Boston; twenty-four per cent. of the patients came from distances of five to ten miles from Boston; fourteen per cent. of the patients came from distances of twenty to twenty-five miles from Boston; eleven per cent. of the patients came from distances of twenty-five to fifty miles from Boston; one per cent. of the patients came from distances of fifty to a hundred miles from Boston; one per cent. of the patients came from distances of over a hundred miles from Boston.

These figures indicate that a large percentage of the patients live within ten miles of Boston, and it would not be an impractical suggestion to consider this hospital as a center of industrial supervision for this group.

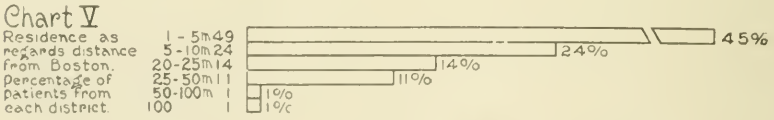


Chart VI. Educational Survey.—One patient was a normal-school graduate; 3 per cent. were high-school graduates; 7 per cent. were students in the high schools, 18 per cent. were graduates of grammar schools, 55 per cent. ranged from the fourth through the ninth grammar grades; 6 per cent. had additional education, including evening commercial and industrial courses; 11 per cent. had had schooling in foreign countries, ranging from the high school to the unrecorded grades.

Of the seventy-eight patients who had achieved a relatively satisfactory industrial standing, as shown in the industrial charts, a large percentage were graduates of the grammar school or were in the last year when leaving school. Three were high-school graduates and one was a normal-school graduate. Several patients had also had vocational training. In other words, many patients had acquitted themselves well in their school life. In a few instances, on the other hand, the school records showed that work done had been below the normal average, even in cases where the later industrial history of the patients proved that they had become capable of earning a livelihood.

It is interesting to note that in some cases the scholarship had been above the average, but that because of the effect of the attack on the classmates and the interference with school discipline, it had been found necessary to debar these children from the school. This suggests the need of provision for adequate instruction of this group.

The reports received from the schools also show a need of special training for those children who are irregular in attendance on account of the effect of the attacks.

Vocational training is suggested for one set of patients—children who because of their physical or mental equipment would not belong in the above groups, yet who are not suitable for institutional care and need training for self support.

Chart VI

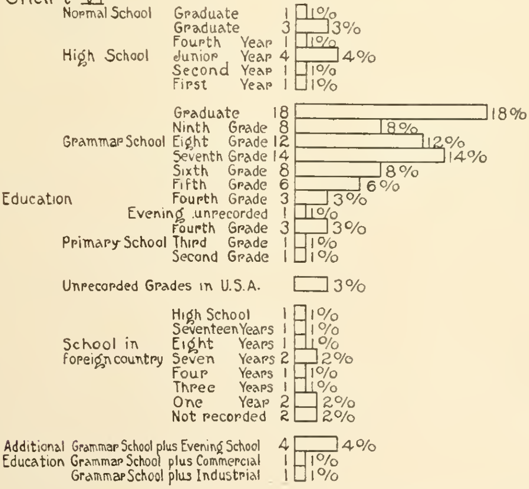


Chart VII. Character of Attacks.—Definition of terms: The "Grand Mal" attack in the chart indicates a severe seizure with loss of consciousness, convulsions, etc. The "Petit Mal" attack indicates merely a momentary period of unconsciousness resembling abstraction or absentmindedness. The "equivalents" indicate temporary psychic disturbances of various sorts.

Thirty-eight per cent. of the patients were reported as having "grand mal" attacks only; six per cent. had "petit mal" attacks only; forty-four per cent. of the patients had "grand" and "petit mal" attacks; nine per cent. had "grand mal" and "equivalents;" three per cent. of the patients had "petit mal" and "equivalents."

The industrial investigation later given shows that the greater number of jobs were lost on account of the character and frequency of attacks than on account of inefficiency of the individual. (See also analysis of thirty-one patients regularly self-supporting.)

Chart VII

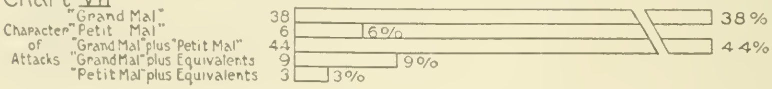


Chart VIII. Frequency of Attacks.—In seven per cent. of the cases studied the patients were averaging several attacks daily, the largest number being five; in fourteen per cent. they were averaging not more than three attacks a week; in forty-six per cent. they were averaging not more than eight attacks a month; in twenty-eight per cent. they were averaging not more than eleven attacks a year; two per cent. were having one attack in two years; three per cent. were having not more than one in three years. These numbers were of course subject to variation.

Chart VIII

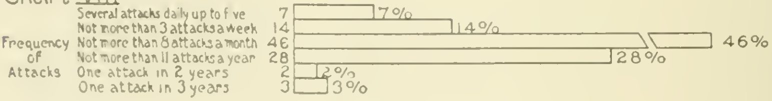


Chart IX. Time Patients were Incapacitated for Work by Attacks.—(At job or at home.) Up to the time when these statistics were compiled two per cent. of the patients had been incapacitated for work periods exceeding one month; eleven per cent. had been incapacitated for less than one month; fifty-six per cent. had been incapacitated for less than one week; eighty-nine per cent. had been incapacitated for less than one day; sixty-one per cent. had been incapacitated for less than one hour. These figures have only a relative value, because of the fact that the attacks of one and the same patient are sometimes charted more than once.

Chart IX

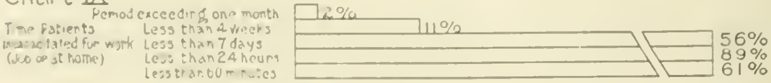
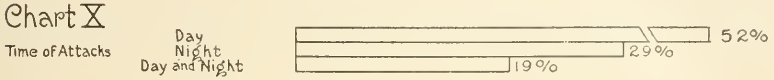


Chart X. Time of Attacks.—Fifty-two per cent. of the patients were having attacks in the daytime; twenty-nine per cent. were having attacks at night only; nineteen per cent. were having attacks day and night. Certain patients may have had attacks at night without anyone's knowledge.



CLASSIFICATION OF THE ONE HUNDRED PATIENTS WITH REFERENCE TO THE QUESTION OF WORK

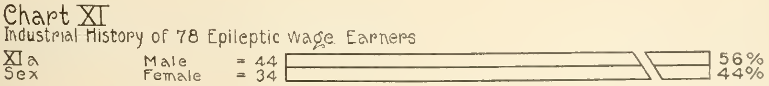
Out of the one hundred patients fifteen were under working age, *i. e.*, fourteen years. Of the remaining eighty-five patients, seven were not wage-earners.

Of these seven, six were between the ages of seventeen and nineteen. One was twenty-nine years old, has been married twice and has no children. Because of her mental deterioration we consider her an institutional case for protection against her immoral tendencies. Three of the six remaining patients are in the high school. One has recently left school and is helping with the work at home. Two are so comfortably situated financially that work for wages is unnecessary.

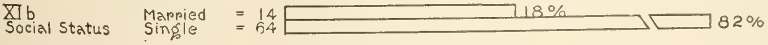
Out of the eighty-five patients of industrial age, eleven were considered either permanent or periodic institutional cases. Ten of these patients had been wage-earners, and had earned regularly or periodically three to fifteen dollars a week. Four of the eleven were permanent institutional cases, one was a dangerous epileptic; one a delinquent; two were deteriorated mentally, with immoral tendencies. Seven of the eleven were periodically institutional cases due to dependency and temporary aberration.

Industrial History of Seventy-Eight Epileptic Wage Earners

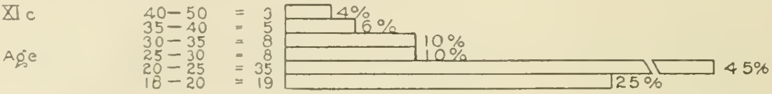
Chart XI. (a) Sex.—Fifty-six per cent. of the 78 patients were males, and forty-four per cent. females.



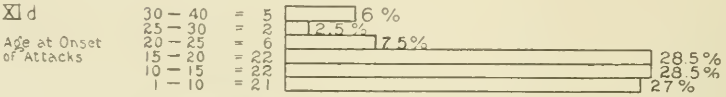
(*b*) *Social Status.*—Eighty-two per cent. of the patients were single, eighteen per cent. married.



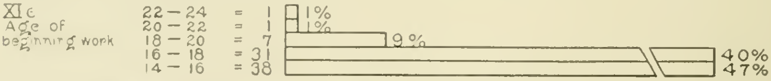
(*c*) *Age.*—The ages of wage-earners range from eighteen to fifty years. The largest group (forty-five per cent.) were between twenty and twenty-five years of age; twenty-five per cent. were between eighteen and twenty years.



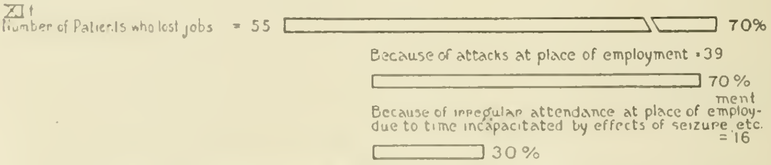
(*d*) *Age at Onset of Attacks.*—The age of these wage-earners at the onset of their attacks ranged from one to forty years. The largest group (twenty-eight per cent.) were between ten and twenty years.



(*e*) *Age of Beginning Work.*—The age of the patients at the time of beginning work ranged from fourteen to twenty-four years. The largest group (forty-seven per cent.) were from fourteen to sixteen years; forty per cent. of the patients were between sixteen and eighteen years.



(*f*) *Number of Patients who Lost Jobs.*—Fifty-five of the seventy-eight wage-earners, or 70 per cent., lost their jobs once or more; in the case of thirty-nine patients, or seventy per cent., this happened once or oftener because of attacks occurring while they were at work; in the case of sixteen patients, or thirty per cent., it happened on account of their irregular attendance or for other reasons such as temperamental difficulties, inadequacy, temporary work chances, etc.

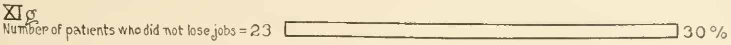


(*g*) *Number of Patients who Did Not Lose their Jobs.*—Twenty-three patients, or thirty per cent., kept their jobs, largely because they had gained skill in some particular industry previous to the onset of their illnesses and had proved themselves to be able to cope with whatever slight danger attended their employment.

A number of patients had small businesses of their own: two owned news-stands; one had a garage; one was a guide about Boston; one kept a lodging-house; one was a cane-seater of chairs; one had a small printing business; one did sewing at home for a wage; two were janitors.

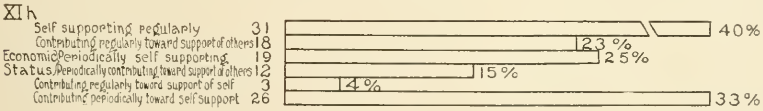
A certain number of the patients were shippers, packers and newsboys, who were working for other people, yet in an independent fashion, and were able to hold their jobs for considerable periods.

XI g

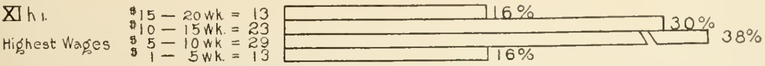


(*h*) *Economic Status.*—Thirty-one patients, or forty per cent. of the seventy-eight patients, were regularly self-supporting;[1] eighteen, or twenty-three per cent. of the patients, contributed regularly to the support of others; nineteen, or twenty-five per cent., were periodically self-supporting; twelve, or fifteen per cent., contributed periodically toward the support of others; three, or four per cent., contributed regularly toward self-support; twenty-six, or thirty-three per cent., contributed periodically toward self-support.

XI h



(*h*, 1.) Sixteen per cent. of the patients earned as their highest wage fifteen to twenty dollars a week; the highest wage of 30 per cent. of the patients was between ten and fifteen dollars a week; the highest wage of thirty-eight per cent. of the patients was between five and ten dollars a week; the highest wage of 16 per cent. of the patients was between one and five dollars a week.



(*h*, 2.) The average wage of fourteen per cent. of the patients was between ten and fifteen dollars a week; the average wage of fifty-one and five tenths per cent. of the patients was between five and ten dollars a week; the average wage of thirty-four per cent. of the patients was between one and five dollars a week.

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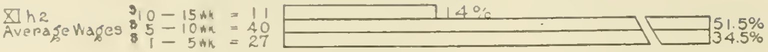
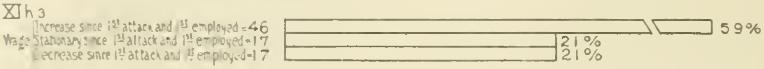
[1] Self support means at least an earning power of $7.00 a week. The patients earning no more than this were, however, living at home.



(*h*, 3.) Fifty-nine per cent. of the patients have had an increase in wages since their first attack and their first employment; twenty-one per cent. of the patients' wages were stationary; there was a decrease in the wages of twenty-one per cent.

Two patients belong to both the first and the third group.



CASE-ANALYSIS OF THIRTY-ONE REGULARLY SELF-SUPPORTING PATIENTS

This study shows that of these thirty-one patients, sixteen were between twenty and thirty years of age when this report was made; eight between thirty and forty years; four, between eighteen and twenty years; three, between forty and fifty years.

Seven of these patients were between ten and fifteen years of age when the epileptic attacks began; six were between one and ten years; seven between fifteen and twenty years; four between twenty and twenty-five years; two between twenty-five and thirty years; two between thirty and thirty-five years and three between thirty-five and forty years.

The study also shows that 12 of the patients were graduates of grammar school; three were high school graduates; one was in the third year of the high school when he left; 3 patients had been the seventh grade of grammar school, one patient had been through the ninth grade; one through the sixth grade; and one through the fifth grade; four of the patients had had schooling in foreign countries (grades unclassified); two patients had had schooling—of unrecorded grade. (Two of the patients had had additional training.)

Twenty-nine of the patients had "grand mal" attacks; two had "petit mal"; sixteen patients had both "grand mal" and "petit mal"; five had "equivalents" in addition to the "grand mal" and "petit mal" attacks.

Twenty-six of the patients had attacks in the daytime only; five had attacks at night only; six had attacks both day and night.

Nineteen of the patients had from one to three attacks a month; five had only six or less attacks a year; two had one or two attacks in a week; five had one or two attacks a day.

Twenty-six of the patients were the only members in the family who had epileptic attacks. Nine of the patients had a family history of alcoholism. (There were thirteen relatives who were alcoholic; of these, nine were the fathers of patients.) Seven of the patients gave a family history of tuberculosis. (There were eight relatives who were tuberculous; of these, five were the mothers of patients.) Six patients gave a family history of migrane. (There were eight relatives who had migrane; of these, four were the mothers of patients; four were siblings.) Four patients gave a family history of definite epileptic attacks. (There were eight relatives who were epileptic. Of these, one mother was epileptic, one daughter was epileptic; two siblings, one maternal aunt and two second cousins were also epileptic.) Three of the patients gave a family history of cancer. (Two of the relatives thus afflicted were the fathers of patients and two were paternal grandparents.) One patient gave a family history of fuges. (The one relative who was thus afflicted was the son of one of the patients). One patient had an insane father.

Detailed Study of the Thirty-one Patients

Case No. 1. Age twenty-four years; had been through the seventh grade; age at onset of attacks sixteen years. She began work in a textile mill working on a power machine. She lost her job because of attacks and was put in the folding room, where she remained three years. She was then removed to the burling department and remained there five years. She had "petit mal" attacks and "equivalents" in the daytime. She was allowed to remain because of her employer's interest in her case and because of her efficiency.

Case No. 2. Age twenty-one years; age at onset of attacks seven years. Graduated from grammar school. He had "petit mal" and "grand mal" attacks in the daytime and had about one attack a month. He was a cashier for two years; clerk in a store for two years and did messenger work for about one and a half years.

Case No. 3. Age thirty-four years; age at onset of attacks thirty years. Went through sixth grade of grammar school. He had "petit" and "grand mal" attacks in the daytime and six or less attacks a year. He did office work, messenger service and was a teamster for years. He held the latter position at the time the epilepsy began and lost it shortly afterward. Became a packer and held this job for nearly four years.

Case No. 4. Age twenty years; age at onset of attacks fifteen years. Was a graduate of grammar school. He had "grand mal" attacks in the daytime and one attack a month. He held four different positions; he was a bobbin boy in a textile mill and lost his job because of attacks; he was then a clerk in a store and lost this position because of attacks. He then became a treer and kept his place three years. Finally he lost his position and did general labor.

Case No. 5. Age forty-nine years; age at onset of attacks thirty-six years. Had schooling in foreign country, grade unrecorded. Had "petit mal" and "grand mal" attacks and "equivalents" both day and night. Had two attacks in a month. He first did office work and remained in his job fifteen years and four years after the epilepsy began. He finally lost this job because of attacks and became a night watchman and held this position for about five years when he lost it because of attacks. He then became a janitor and held this position for about four years. He continued to have attacks, but his employer was interested and allowed him to remain because he was a good workman and there was no danger in his position.

Case No. 6. Age eighteen years; age at onset of attacks thirteen years. Was a grammar-school graduate. Had "petit" and "grand mal" attacks in the daytime and one attack a month. He did clerical work in a store for about two years. He then did messenger work for about a year and lost this job because his employer thought it was dangerous for him to be going about. He finally became a cashier, and had been in this position about two years when this study was made.

Case No. 7. Age thirty-five years; age at onset of attacks twenty-four years. Had been through the eighth grade of grammar school. He had "grand mal" attacks at night. Has been a teamster for different firms for about fourteen years and for eleven years after the onset of his illness. His employer reported he was a good workman but that he had a bad temper and he had lost jobs because of it, but was always able to get work again without any difficulty.

Case No. 8. Age twenty-seven years; age at onset of attacks twenty years. Went through the seventh grade. Had "petit" and "grand mal" attacks in the daytime. He first worked in a box factory and remained there for about five years, when he changed to a better job. After the onset of his illness he was employed as a dresser in a tannery and lost this job at the end of one year because of attacks. He then became a treer in a shoe factory and was there five years, when he was badly burned while in one of his attacks. He next got a job as a cutter in a shoe factory and held this job at the time this study was made.

Case No. 9. Age thirty-four years; age at onset of attacks thirty-one years. Was a high-school graduate; had "petit" and "grand mal" attacks in the daytime and three or less attacks a month. Did domestic service after leaving school; then became a burler in a textile mill and remained there ten years and three years after the onset of her illness. Her employer allowed her to remain, although the attacks were severe, because of her efficiency and the nature of her work.

Case No. 10. Age twenty-five years; age at onset of attacks seven years. Had been through the fifth grade of grammar school. Had "grand mal" attacks both day and night and three or less attacks a month. He became first a plumber's assistant but lost his job after several months because of attacks. He then became a weaver in a textile mill and had been there only a short time when he lost his job because of attacks. He next secured a job as a weaver in another mill and had been there about nine years at the time this study was made.

Case No. 11. Age twenty years; age at onset of attacks ten years. Was a graduate of the grammar school; had "grand mal" attacks in the daytime and one attack a month. Was a clerk in a store one year and lost his job because of attacks and then did general labor for two and a half years when he changed for a better job. Became a treer in a shoe factory; was there about three years and was earning at the time this study was made about $15 to $18 a week.

Case No. 12. Age twenty-one years; age at onset of attacks fourteen years. She was a graduate of the grammar school. Had "grand mal" attacks in the daytime and two or less attacks a year. Was a power-machine operator in a textile mill for four years; lost her job because of attacks while at work. She then became a nursery maid and lost this job after a short while because of attacks. She next became a punch-press operator in a watch factory and had held this position for two years at the time this study was made.

Case No. 13. Age thirty-one years; age at onset of attacks twenty years. Was a high-school graduate; became a bookkeeper and retained her job four years, but lost it because of attacks. She then became a housekeeper and had been in this position for some time when this study was made. Had "grand" and "petit" mal attacks in the daytime and one a month.

Case No. 14. Age thirty-three years; age at onset of attacks thirteen years. Schooling in foreign country (grades unclassified). Had "grand mal" attacks and "equivalents" in the daytime and not less than two a month. Did general housework for thirteen years. Lost her jobs because of attacks but was able to get work at once.

Case No. 15. Age eighteen years; age at onset of attacks fifteen years. Patient had gone through the eighth grade of the grammar school; had "petit" and "grand mal" attacks at night and three or less attacks a year. Was a messenger for several months, then became an assembler in a shoe factory and remained there two years, leaving this place to become a punch-press operator in a watch factory, where she was at the time this study was made.

Case No. 16. Age twenty years; age at onset of attacks eighteen years. Was a high-school graduate; had "petit" and "grand mal" attacks and equivalents in the daytime and three or less attacks a year. Had been a newsboy for four years previous to the onset of his illness; he then bought a newstand and was running this at the time this study was made. He was earning on an average $10 per week.

CASE NO. 17. Age twenty-nine years; age at onset of attacks, twenty-six years. Was a graduate of the grammar school; had "petit" and "grand mal" attacks at nighttime and three or less attacks a year. Was a box-maker and then became a stitcher in a shoe factory, which position he held for about eight years and three years after the onset of his illness.

CASE NO. 18. Age twenty years; age at onset of attacks, fourteen years. Was a graduate of the grammar school; had "grand mal" and "petit mal" attacks plus "equivalents" in the daytime. Had two or less attacks a week. Was a cashier's assistant for about four years and lost first job because of attacks. She then took another job as cashier and was holding this position at the time this study was made.

CASE NO. 19. Age twenty-five years; age at onset of attacks twenty years. Was a grammar-school graduate. Had "grand mal" attacks both day and night and had two or less attacks a week. Was a draftsman's assistant for about four years, but lost his job two years after the epilepsy began because of attacks. He then became an automobile repairer and kept this job for about two years. During part of this time was working nights learning to become a pharmacist. He finally ran a small garage because his attacks interfered so with his other work.

CASE NO. 20. Age forty-eight years; age at onset of attacks, thirty-five years. Had had some schooling—grades unrecorded; had "petit" and "grand mal" attacks at night and two or less attacks a year. Was a nursery maid until thirty-six years of age and held her position one year after the attacks began and then became a clerk in a shop and held this position for two years. She then became a dressmaker.

CASE NO. 21. Age nineteen years; age at onset of attacks, sixteen years. Schooling—grades unrecorded. Had "petit" and "grand mal" attacks in the daytime and three in a year. Did farm work for less than a year and then messenger service for two years.

CASE NO. 22. Age nineteen years; age at onset of attacks, sixteen years. Schooling in foreign country; additional training in the United States. Had "petit" and "grand mal" attacks in the daytime, and one a month. Worked as a drawer on a drawing frame in a textile mill, then became a power-machine operator in a textile mill and finally was a dresser in a tannery.

CASE NO. 23. Age twenty-one years; age at onset of attacks nine months. Went through the eighth grade of the grammar school. Had "grand mal" attacks at night and one attack a month. Was a nursery maid for four years and changed this for a better job. Became a punch-press operator in a watch factory and had held this position four years at the time this study was made.

CASE NO. 24. Age twenty-six years; age at onset of attacks two years. Was grammar school graduate; had "grand mal" attacks at night and one attack a month. Was a toy maker in a toy factory; then became a waitress, and finally worked in a laundry for two years, where her employer reported that she did good work.

Case No. 25. Age twenty-two years; age at onset of attacks eighteen years. Was in the ninth grade of the grammar school when he left. Had "grand mal" attacks in the daytime and sometimes had two attacks a day. Did laboring work for a year; changed for a better job and became a fire-alarm assembler. Held this position for three years when he left for a better job. He became a packer and shortly afterward attacks began. At the time this study was made he was still holding this position.

Case No. 26. Age thirty-one years; age at onset of attacks twenty-four. Was a graduate of the grammar school; had "petit mal" attacks in the daytime and at times had one a day. Did laboring work for a while after leaving school. He was next a bag-maker for four years in the leather manufacturing concern and remained there two years after the epileptic attacks began, finally leaving for a better job. Became a shipper and held this job three years, losing it because of attacks. He then became a clerk in a store and was there for less than a year when he became assistant-superintendent in a mercantile firm.

Case No. 27. Age eighteen years; age at onset of attacks, ten years. Was a grammar-school graduate; had "petit mal" and "grand mal" attacks in the daytime and one in a month. He did unskilled labor for two months and then became a shipper, which position he held for two years.

Case No. 28. Age thirty years; age at onset of attacks, sixteen years. Was in the seventh grade of the grammar school when he left; had "grand mal" attacks both day and night, sometimes two a month. He first did general labor for a few months, then became a messenger and held this position for three years when he changed it for a better job. Did tailoring in his father's shop for ten years and earned $14 a week.

Case No. 29. Age forty-four years; age at onset of attacks thirty-seven years. Schooling in foreign country—unclassified. Had "grand mal" attacks in the daytime and sometimes one a day. Had been a weaver for three years after attacks began and then became a housekeeper, which position she held at time of this study.

Case No. 30. Age twenty-three years; age at onset of attacks fourteen years. Went through third year of high school. Had "grand mal" and "petit mal" attacks in the daytime—one a month. Did farm work for a short time and then became a night watchman and later changed this for a better job. Became a stationary engineer and held this position for two years. Finally lost his job because of attacks and then became a tree surgeon and finally a railroad fireman, and was earning $20 a week when this study was made. He left this position of his own accord because of the danger. His employers report that he was a very able workman.

Case No. 31. Age thirty-eight years; age at onset of attacks twenty-seven years. Was a grammar-school graduate. Had "grand mal" attacks in the day time, once and sometimes twice a day. Had run a boarding house for years, when this report was made.

Chart XI. i. (*a*) *Central Column.*—The following chart shows in the central column the variety of occupations held by the seventy-eight patients as well as the percentage of patients holding positions in each occupation at one or another time (see facing chart).

i. (*b*) *Left Column.*—The left column shows the length of service of each individual represented in the industry on the corresponding line of the central column. There is one space for each individual's length of service.

◇ indicates length of service less than one year.

○ indicates length of service more than one and less than three years.

◔ indicates length of service more than three and less than six years.

◓ indicates length of service more than six and less than nine years.

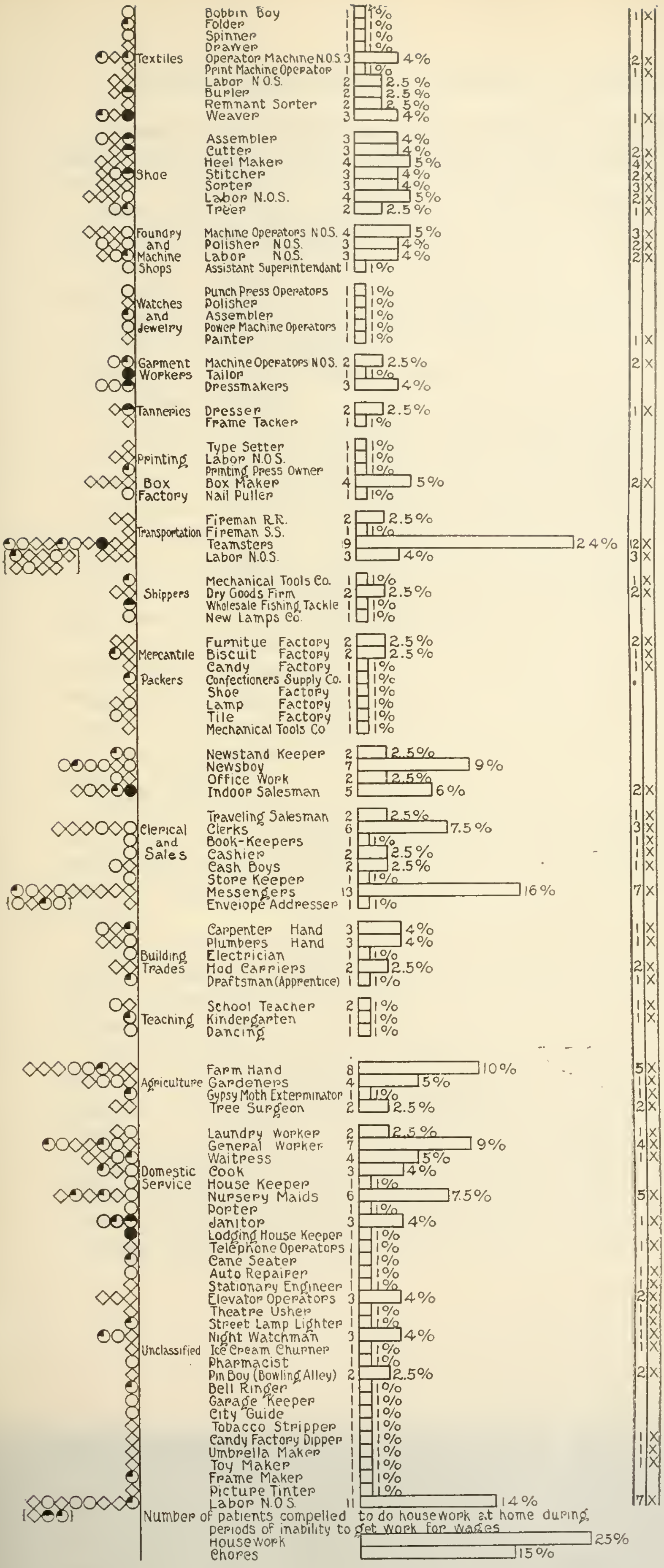
● indicates length of service more than nine and less than twelve years.

i. (*c*) *Right Column.*—The column on the right shows the number of individuals losing their jobs because of attacks while working in the industry noted on the corresponding line of the central column. The first space nearest the central column indicates the number of the individuals and is represented by numerals. The second space indicates the fact of loss of job, which is indicated by an X.

The percentage of patients in each industry at any time ranges from one to twenty-four per cent. The position of teamster was held by the largest number of patients (twenty-four per cent.), but although many of these kept their positions for considerable lengths of time, twelve per cent. of them lost their work because of attacks while on their jobs.

Messenger service attracted the next largest number (sixteen per cent.), and seven patients lost their work because of attacks while employed. The survey seems to indicate that the large number of patients resorting to this method of earning their livelihood do so because of their inability on account of their illnesses to keep jobs they had been fitted for.

Farm work has the third largest group—ten per cent. of the patients having been employed in this way in various capacities. It would seem that this would be the best field for them, but our records show that over half of the patients were discharged because of the character and frequency of the attacks and not because of inefficiency.


Textiles
Bobbin Boy 1 1% 1 X
Folder 1 1%
Spinner 1 1%
Drawer 1 1%
Operator Machine N.O.S. 3 4% 2 X
Print Machine Operator 1 1% 1 X
Labor N.O.S. 2 2.5%
Burler 2 2.5%
Remnant Sorter 2 2.5%
Weaver 3 4% 1 X
Shoe
Assembler 3 4%
Cutter 3 4% 2 X
Heel Maker 4 5% 4 X
Stitcher 3 4% 2 X
Sorter 3 4% 3 X
Labor N.O.S. 4 5% 2 X
Treer 2 2.5% 1 X
Foundry and Machine Shops
Machine Operators N.O.S. 4 5% 3 X
Polisher N.O.S. 3 4% 2 X
Labor N.O.S. 3 4% 2 X
Assistant Superintendant 1 1%
Watches and Jewelry
Punch Press Operators 1 1%
Polisher 1 1%
Assembler 1 1%
Power Machine Operators 1 1%
Painter 1 1% 1 X
Garment Workers
Machine Operators N.O.S. 2 2.5% 2 X
Tailor 1 1%
Dressmakers 3 4%
Tanneries
Dresser 2 2.5% 1 X
Frame Tacker 1 1%
Printing
Type Setter 1 1%
Labor N.O.S. 1 1%
Printing Press Owner 1 1%
Box Factory
Box Maker 4 5% 2 X
Nail Puller 1 1%
Transportation
Fireman R.R. 2 2.5%
Fireman S.S. 1 1%
Teamsters 19 24% 12 X
Labor N.O.S. 3 4% 3 X
Shippers
Mechanical Tools Co. 1 1% 1 X
Dry Goods Firm 2 2.5% 2 X
Wholesale Fishing Tackle 1 1%
New Lamps Co. 1 1%
Mercantile Packers
Furnitue Factory 2 2.5% 2 X
Biscuit Factory 2 2.5% 1 X
Candy Factory 1 1% 1 X
Confectioners Supply Co. 1 1%
Shoe Factory 1 1%
Lamp Factory 1 1%
Tile Factory 1 1%
Mechanical Tools Co 1 1%
Clerical and Sales
Newstand Keeper 2 2.5%
Newsboy 7 9%
Office Work 2 2.5%
Indoor Salesman 5 6% 2 X
Traveling Salesman 2 2.5% 1 X
Clerks 6 7.5% 3 X
Book-Keepers 1 1% 1 X
Cashier 2 2.5% 1 X
Cash Boys 2 2.5% 1 X
Store Keeper 1 1%
Messengers 13 16% 7 X
Envelope Addresser 1 1%
Building Trades
Carpenter Hand 3 4% 1 X
Plumbers Hand 3 4% 1 X
Electrician 1 1%
Hod Carriers 2 2.5% 2 X
Draftsman (Apprentice) 1 1% 1 X
Teaching
School Teacher 2 1% 1 X
Kindergarten 1 1% 1 X
Dancing 1 1%
Agriculture
Farm Hand 8 10% 5 X
Gardeners 4 5% 1 X
Gypsy Moth Exterminator 1 1% 1 X
Tree Surgeon 2 2.5% 2 X
Domestic Service
Laundry Worker 2 2.5% 1 X
General Worker 7 9% 4 X
Waitress 4 5% 1 X
Cook 3 4%
House Keeper 1 1%
Nursery Maids 6 7.5% 5 X
Porter 1 1%
Janitor 3 4% 1 X
Unclassified
Lodging House Keeper 1 1%
Telephone Operators 1 1% 1 X
Cane Seater 1 1%
Auto Repairer 1 1% 1 X
Stationary Engineer 1 1% 1 X
Elevator Operators 3 4% 2 X
Theatre Usher 1 1% 1 X
Street Lamp Lighter 1 1% 1 X
Night Watchman 3 4% 1 X
Ice Cream Churner 1 1% 1 X
Pharmacist 1 1%
Pin Boy (Bowling Alley) 2 2.5% 2 X
Bell Ringer 1 1%
Garage Keeper 1 1%
City Guide 1 1%
Tobacco Stripper 1 1%
Candy Factory Dipper 1 1% 1 X
Umbrella Maker 1 1% 1 X
Toy Maker 1 1% 1 X
Frame Maker 1 1%
Picture Tinter 1 1%
Labor N.O.S. 11 14% 7 X
Number of patients compelled to do housework at home during periods of inability to get work for wages
House Work 25%
Chores 15%

Domestic service comes next, and we found nine per cent. doing this work at different times. More than one half of the patients lost their work because of attacks.

Seven and five tenths per cent. were clerks, and one half lost their jobs because of attacks.

Seven per cent. were nursery maids, and all but one lost their jobs because of attacks.

Four per cent. worked on power-machines in mills, and one half lost jobs on account of attacks.

Four per cent. were cutters in shoe factories, and two lost their jobs because of attacks.

Five per cent. were heel-makers, and they all lost their jobs.

Two and a half per cent. were treers in shoe factories (this necessitates working with hot irons), and one lost his job.

Five per cent. worked on power-machines in machinery factories, and three lost their jobs because of attacks.

Two and a half per cent. were firemen for the railroad; one a fireman for a steamship company. They did not lose their jobs but gave them up, as they realized the danger.

One was a stationary engineer for a gas company, and he lost his job because of attacks.

Four per cent. were elevator operators. Two lost their jobs because of attacks while at work.

Two and a half per cent. were tree-climbers. Both lost jobs because of attacks.

The character of many of these occupations shows actual danger to the patient, employer, and community. However, the chart shows that the percentage of patients in the dangerous occupations is very small in comparison with the number of epileptics in industry in general.

The variety of occupations in which these patients were temporarily employed is very large, but a great many were compelled to do housework or chores at home during periods of inability to get work for wages.

The survey of the industrial history of the patients shows clearly that the length of service depends more upon the freedom from attacks than upon the efficiency of the patient or the character of the occupation; that there is a large number of patients in the community of sufficient economic efficiency to earn a living if placed in suitable positions and relieved of the fear of loss of job. It has appeared that the continual anxiety over the fear of losing their job is a greater factor in the apparent deterioration than has been supposed. One patient, twenty-six years old, believed to be deteriorated and advised to go to an institution, procured for himself a job as janitor, for $10 a week, and kept it for over a year, when he changed for a better job. During this period he has continued to have attacks at night as usual, but his mental and physical condition has improved remarkably. All of the patients give a history of feeling better when at work.

The study shows an earnest desire on the part of the patients for guidance, for they come with unusual constancy, and social investigation proved that hospital visits were a source of hope in their lives. They are told that our power to help them and others depends upon their intelligent coöperation, and our verification of their histories has proven the truthfulness of their statements, even a delinquent giving an honest report of his misdemeanors. The heredity charts (see appendix) show that one of the problems in regard to which it is difficult to advise with wisdom is that of marriage. Many patients ask our advice about this serious problem. But although we have some few facts of interest to offer on this point, the main issue is so distinctly medical in character that we do not feel it necessary to report our observations.

We have reached the conclusion that this study justifies an experiment in the treatment of epileptics such as has been developed for other handicapped patients, the blind, etc. We suggest small shops for selected groups of patients, where they can be given employment in spite of their attacks; that the patients be chosen from those who are much discouraged about their inability to earn because of attacks and who yet have ability; and that the experiment be a therapeutic rather than an economic one, at present. There seems to be no sufficient reason why shops of this sort should not be undertaken experimentally in connection with the work already established in our institutions dedicated to the work of caring for epileptic patients, or even by general hospitals. We call attention to the relative success which has attended the efforts of the Massachusetts General Hospital to establish a shop for the physically handicapped, and urge the claims of epileptic patients to similar opportunities.

The experience of epileptic institutions seems to have proved that these patients soon get used to witnessing seizures among their fellow-sufferers, and that their eagerness to learn to work and to learn is so great that they will endure much to gain these ends.

The success of patients with little businesses of their own suggests that some of them might be trained for small home-industries either in such a shop or by a visiting teacher.

The suggestion previously stated, in regard to vocational schools, may be a means of preparing potential workers.

The kindly coöperation which the employers have shown gives encouragement to the belief that ultimately many patients may be engaged in general community industries without need of concealing their disease.

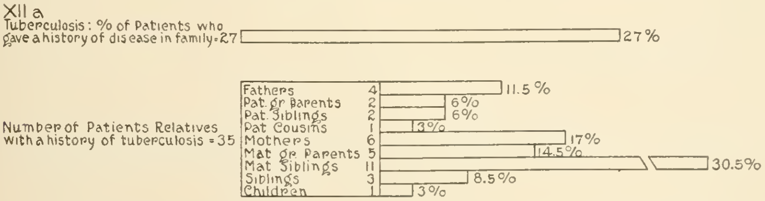
In spite of all their difficulties, a great many epileptic patients do obtain work and support themselves, and even contribute to the support of their families, and it is exceedingly important that the full significance of this fact should be appreciated. In the opinion of very many persons, laymen and physicians alike, the mental capacity of epileptic patients is to be rated as distinctly low and most of the institutional data hitherto at our command has seemed to emphasize this fact, but under suitable employment they improve in this respect.

Is it not possible for employers, physicians and all interested in preventive measures, together to plan some method whereby the laws may be so modified that many of the less handicapped epileptics may honestly remain in industry and that all may be provided with supervised employment to the limit of their economic capacity?

Appendix

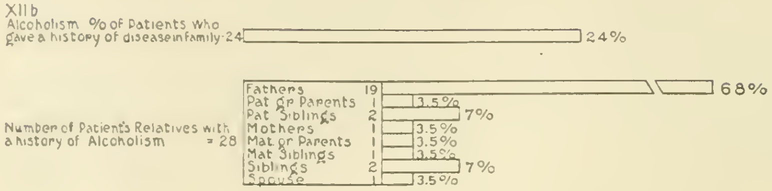
In the course of this inquiry we compiled the following facts about the heredity of these patients, which are here subjoined as having a certain interest.

Chart XII. Heredity—Direct and Collateral. (*a*) *Tuberculosis.*—Twenty-seven per cent. of the patients gave a family history of tuberculosis. There were thirty-five relatives of the twenty-seven per cent. of the patients who had suffered with this disease.



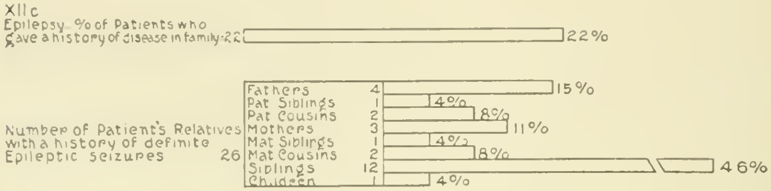
(*b*) *Alcoholism.*—Twenty-four per cent. of the patients gave a family history of alcoholism. There were twenty-eight relatives of the twenty-four per cent. of the patients who were alcoholic. (No case has been recorded as alcoholism without a definite history of continued heavy drinking.)

XIIb



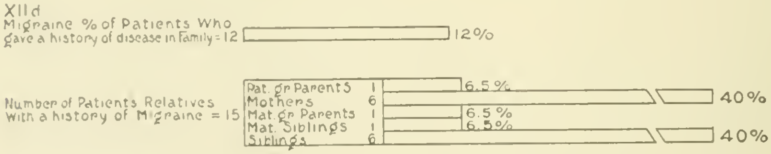
(*c*) *Epilepsy.*—Twenty-two per cent. of the patients gave a family history of definite epileptic attacks. There were twenty-six relatives of the twenty-two per cent. who had had epilepsy.

XIIc



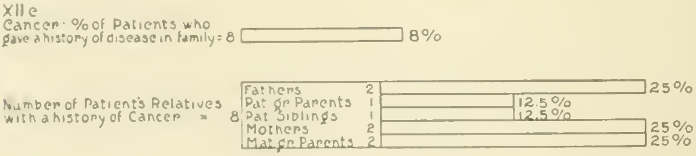
(*d*) *Migrane.*—Twelve per cent. of the patients gave a family history of migrane. There were fifteen relatives of the twelve per cent. who had suffered with the disease.

XIId



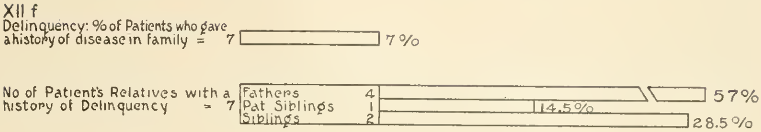
(*e*) *Cancer.*—Eight per cent. of the patients gave a definite family history of cancer in the family. There were eight relatives of the eight per cent. of the patients who had suffered with this disease.

XIIe



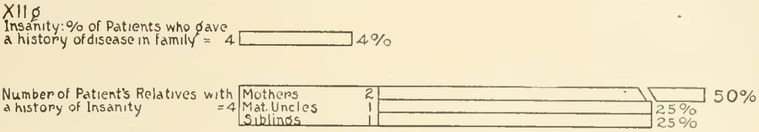
(*f*) *Delinquency.*—Seven per cent. of the patients gave a family history of delinquency. There were seven relatives of the seven per cent. of patients who were delinquents. (We have placed delinquency under heredity on account of its possible relationship in this study.)

XII f



(*g*) *Insanity.*—Four per cent. of the patients gave a history of insanity in the family .There were four relatives of the four per cent. of patients who were insane.

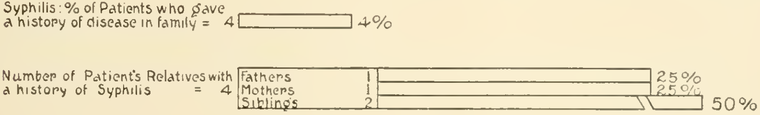
XII g



(*h*) *Syphilis.*—Four per cent. of the patients gave a history of syphilis in the family. There were four relatives of the four per cent. of patients who had been clinically diagnosed as syphilitic. (The suggestive histories have been rejected.)

The reports on the patients who are now being treated will form a basis for an accurate study of their heredity, as Wassermann tests are now made in all epileptic cases. Of the one hundred patients in this report two per cent. had positive Wassermanns.

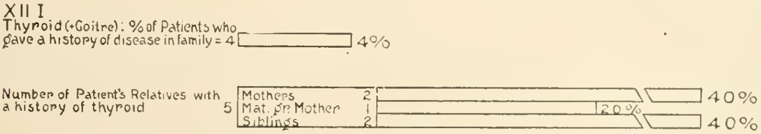
XII h



(*i*) *Thyroid* (*Exophthalmic Goiter*).—Four per cent. of the patients gave a family history of thyroid disease. There were five relatives of the four per cent. who had suffered with this disease.

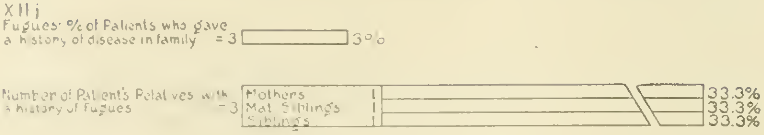
One of the patients who gave no definite family history of epilepsy in the family had a mother and maternal grandmother who had this disease.

XII I



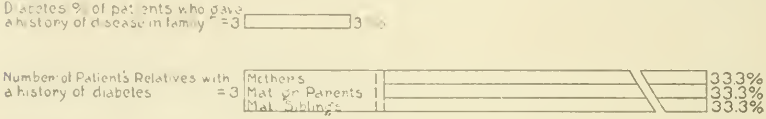
(*j*) *Fugues.*—(Definition; wanderings during temporary dissociations of personality.) Three per cent. of the patients gave a family history of fugues. There were three relatives of the three per cent. of patients who were such wanderers.

XII j



(*k*) *Diabetes.*—Three per cent. of the patients gave a family history of diabetes. There were three relatives of the three per cent. of patients who had suffered with this disease.

XII k



Mental Defects.—One patient gave a family history of definite mental defectiveness in so far as there was one relative of this patient who was feeble-minded. We were unable to secure more information regarding feeble-mindedness in the patients' families without further investigation in this respect and we are not recording any suggestive histories.

RHIZOTOMY FOR THE RELIEF OF PAIN[1]

By Charles H. Frazier, M.D., Sc.D.

It is but natural that division of certain of the posterior spinal roots should have been proposed for the relief of intractable pain of whatever source. This operation has now been performed a number of times with varying degrees of success in cases of postherpetic neuralgia, neuralgia of the upper and lower extremities and the intercostal region, in cases of amputation pains, of neuritis of traumatic and syphilitic origin, of pains due to pressure from an inoperable sarcoma or carcinoma of the spine, and to relieve the gastric crises of tabes. It has been applied once, I find, in a case of erythromelalgia and once for pain following an attack of phlebitis, and it has been suggested as a means of relieving such conditions as angina pectoris (Goodell and Earle), rebellious hyperchlorhydria and "mal perforant plantaire" (Leriche). The number of cases all told, however, is still small and the results varied. As the operation is still *subjudice* I want to put on record for review and criticism nine cases that have come under my own supervision, and later discuss some of the points in the technic concerning which there are differences of opinion.

While this contribution is devoted to a discussion of the effects of rhizotomy, it is only proper that I should, in the prefatory remarks, say a word as to the relative merits of rhizotomy and chordotomy. The latter operation implying section of the anterolateral columns of the cord, as advocated by Spiller for the relief of intractable pain, to my way of thinking is to be preferred to rhizotomy for all lesions below the sixth thoracic segment. Many of my rhizotomies were performed before I had an opportunity to observe the results of chordotomy, so in the future, for those cases which in the past I have considered suitable for root section, I would now recommend the other operation. The advantages of chordotomy over rhizotomy are almost self-evident. Technically, of course, the former is the easier of execution because but a very limited section of the cord need be exposed. Only one, or at the most but two laminæ need be removed. Furthermore the possibility of error in the selection of roots, as in rhizotomy, is avoided, and the possibility of only partial relief or of recurrence after chordotomy is quite remote. My experience in a series of cases of chordotomy convinces me of its greater serviceability and practicability as a surgical procedure for the relief of pain.

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[1] Read by title at the forty-third annual meeting of the American Neurological Association, May 21, 22 and 23, 1917.

Table I

The Author's Series of Nine Cases of Resection of the Posterior Roots for the Relief of Pain

File No.	Diagnosis	Roots Divided	Immediate Result	Final Report
1. 69	Carcinoma involving brachial plexus	$C_5\ C_6\ C_7\ T_1\ T_2$	Recovery	Measurable relief during the year patient survived the operation
2. 36391	Amputation pains	$C_5\ C_6\ C_7\ C_8$	Recovery	Pains less intense though patient still observes drawing sensation in hand
3.	Brachial plexus trauma	$C_5\ T_1$	Recovery	Substantial improvement. Patient able to resume occupation
4. 10122	Gastric crises	Left $T_7\ T_8\ T_9\ T_{10}$ Right $T_7\ T_8\ T_9$	Recovery	Five months later physicians write patient complains of no pain at all
5. 8533	Gastric crises	Left Right $T_7\ T_8\ T_9\ T_{10}$	Recovery	Partially relieved of pain
6. 11263	Metastatic carcinoma of spine	$T_7\ T_8$	Recovery	Transitory relief
7. 23730	Gastric crises	Right $T_7\ T_8\ T_9\ T_1$ Left	Recovery	Not traced
8. 33572	Intercostal neuralgia	Right $T_6\ T_7\ T_8\ T_9$	Recovery	Complete relief of original pain. At later date patient complains of pain in distribution of T_{10} T_{11}
9. 36353	Sarcoma spine	$L_1\ L_2\ S_1\ S_2$	Recovery	Almost complete relief

Resection of Posterior Roots for the Relief of Pain

In most instances the *neuralgia of herpes zoster* is a self-limited disease, lasting not more than a few weeks, but the pain occasionally persists for a year or longer, and it is only in these exceptional cases that such a radical operation as rhizotomy should be even considered. Through the researches of Head and Campbell and others it has been proved quite definitely that in the acute stage of herpes zoster the primary lesion is in the ganglion, while in the terminal stage secondary sclerotic processes may involve the nerves peripheral to the ganglion, the sensory roots or even the cord itself. Therefore division of the posterior roots should be an appropriate treatment, theoretically at least in the intractable case. The following is an example with so many interesting features that I am describing it in detail:

The patient, male, æt. 60 (File No. 30825), was admitted to the University Hospital, November 1, 1915, with the following history:

December 5, 1913, while traveling in a train he was siezed suddenly with intense pain in his right side. As the pain continued for the next three days he was removed in an ambulance to the hospital. An acute abdominal lesion was suspected and an exploratory operation contemplated, but the cause of the pain was revealed in the appearance of a herpes zoster. After the eruption appeared the pain was less acute but never subsided altogether. The patient remained in the hospital seven weeks and the pain was continuous and paroxysmal, requiring three doses of one sixth grain of heroin every night for its control. Various therapeutic measures were tried, the dry electric pad, moist hot applications and other things, but without effect. The patient tried to resume his business but was able to do very little. Finsen light baths either had no effect or made him worse.

In January, 1915, he again entered another hospital, where he was under observation for eleven weeks, and while his general health improved his pain was not relieved. The question of operation was discussed but was not considered favorably.

On his admission to the University Hospital an area of hyperesthesia was discovered in the right side extending from the spine around to the median line, from the ensiform cartilage above to the umbilicus below. At times the skin was so sensitive that he could not bear contact with his clothes. In addition to the hyperesthesia there was intense pain, varying somewhat with the weather and more or less paroxysmal in character. His physical examination revealed nothing relevant to his condition. He was seen by several neurologists, who were not disposed at the time to advise operation, but as his pain continued and from one to three grains of morphin a day were required to relieve his suffering, he pleaded for some radical means of relief. The question of an intradural rhizotomy was considered, but, before resorting to so formidable a procedure, it was decided to try the effects of alcoholic injections into the spinal root. On successive days injections were given according to our technic for injection of the ninth, eighth, seventh and sixth thoracic roots. Following injection of the eighth and ninth roots there was transitory relief, but the injections of the sixth and seventh were complete failures, at least symptomatically. The patient was discharged from the hospital with the understanding that if the pain continued with its present intensity he should return again for operation.

December 5, 1916. About a year after his discharge the patient returned to the hospital with a history of almost continuous pain since his discharge. The pain was of the same character and precisely of the same distribution. As heretofore, he required from two to three grains of morphin a day, given hypodermatically. The area of hyperesthesia, as before, extended from about the seventh thoracic spinous process above to the twelfth below; as it passed forward and downward it disappeared almost completely in the axilla, and again widened out, dumb-bell shape, until at the midline it extended from the ensiform cartilage above to the umbilicus below. In extent the area was a little less than that recorded the year before. The hyperesthesia was quite as pronounced as formerly and at times the patient suffered from this intensely.

Rhizotomy, December 13, 1916. First stage. The operation was begun under local anesthesia, but was continued under nitrous oxid-oxygen anesthesia. It was planned to remove the laminæ and spinous processes of the fourth, fifth, sixth and seventh thoracic vertebræ. After three laminæ and spinous processes had been removed, namely, those of the fifth, sixth and seventh thoracic vertebræ, the patient's pulse became rather feeble, his heart action weak, and it was deemed wise to postpone further procedure until a second operation.

Rhizotomy, December 19, 1916. Second stage. Under ether anesthesia the original wound was reopened, one more arch above and below the opening was removed, the dura opened and the cerebrospinal fluid was discharged as though under considerable tension. According to our revised technic, preliminary to the division of the roots a fine ligature of arterial silk was tied about each root distal to the point of division. Beginning with the sixth, the four successive thoracic roots were divided, and after their division there was absolutely no oozing. This degree of perfect hemostasis was attributed to the ligature, which included not only the root but the small artery which accompanies it. At the conclusion of the operation the patient was given one c.c. of pituitrin and fifteen minims of camphorated oil. The pulse rate was 108 and his general condition satisfactory. From the day after the operation and for the next twelve successive days the patient received gradually diminished doses of morphin hypodermatically until, on December 29, he received only one third of a grain and from that day on none. An examination of the distribution of the sixth, seventh, eighth and ninth roots revealed an area of complete anesthesia practically corresponding to the zone of hyperesthesia before the operation (Fig. 1). His convalescence was uninterrupted and he was discharged from the hospital three and one half weeks after the operation entirely free from pain and wholly independent of morphin.

The immediate results in this case were what I might, not unjustifiably, designate as most gratifying. In a word, by the operation I had converted a definite region of the body from one of extreme pain and hyperesthesia to a painless anesthetic zone, the patient from one dependent upon his daily ration of morphin and sedatives to one who slept the night through without a narcotic and reveled in the freedom with which he could enjoy exercise and fresh air.

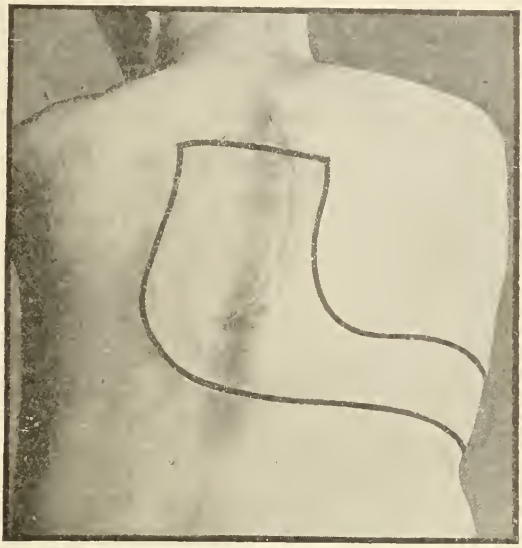

FIG. 1.

But not many weeks after the operation there were rumblings of pain, *not in the same zone as aforetime,* but in the adjacent territory. Before the operation the pain was in a zone represented by the sixth to the ninth thoracic roots, now it was in the zone of the tenth and eleventh roots. Whence it came and why it was not in that territory before the operation is the enigma in the case. The persistence of pain in a definite zone for almost three years, without the variation of a fraction of an inch, the return of pain in an outlying but contiguous territory—these are the essential facts in this rather unique case.

I find in literature the records of but four cases of rhizotomy for the relief of postherpetic neuralgia and of these, together with my own case, one recovered, two were improved, one was unimproved, and one died (Table II).

Traumatic *lesions of the brachial plexus* provoke the most distressing and nerve-racking pain. The pathology is interesting and involves a lesion not only of the plexus itself, but sometimes of the roots and occasionally of the cord. The injuring force is usually a glancing blow of a falling object on the head and shoulder, forcing the two apart, or a fall on head and shoulder with the same result. Sometimes, but not always, the clavicle snaps. The prognosis is always grave as to recovery of motor function or relief from pain.

TABLE II

						Later Death		
	Recovered	Greatly Improved	Improved	Unimproved	Operative Death	Improved until Death	Unimproved until Death	Total
Brachial plexus neuralgia	2	2	..	1	..	..	..	5
Intercostal neuralgia	..	..	..	..	2	..	1	3
Sciatica	..	..	1	1	..	..	..	2
Postherpetic neuralgia	1	..	2	1	1	..	..	5
Syphilitic neuralgia	..	..	..	1	3	1	..	5
Traumatic amputation pains	2	1	..	1	1	1	..	6
Rupture brachial plexus	..	..	1	1	..	..	..	2
Other injuries	2	1	..	..	..	..	1	4
Malignancy	..	..	1	2	1	6	2	12
Miscellaneous								
erythromelalgia	..	1	..	..	..	..	..	1
Phlebitis	..	..	..	1	..	..	..	1
Tuberculosis	..	1	..	..	..	..	..	1
Infantile hemiplegia	..	..	..	..	..	1	..	1
Cerebrospinal meningitis	..	..	..	1	..	..	..	1
Congenital origin	..	1	..	..	..	..	..	1
Total	7	7	5	10	8	9	4	50

The utter demoralization of the patient, his dependence upon morphin, the definite evidence of a plexus lesion, and the acknowledged hopelessness of any other kind of treatment, prompted me to perform rhizotomy in the following case:

The patient, a man, æt. 43, was admitted to my service at the University Hospital, May 10, 1910 (File No. 6639). On February 14, 1910, while walking along the street, the patient was struck on the left shoulder and head and crushed to the ground by a man falling from the fourth story of a building. After recovering from the shock of the accident, it became evident that he had sustained an injury to the brachial plexus. There was complete anesthesia for pain, touch, heat and cold, up to the elbow, hyperesthesia for a distance of seven and a half centimeters above the elbow and hyperalgesia in the shoulder, neck and upper chest. There was complete paralysis of all the muscles of the left upper extremity, including the deltoid and the pectoralis major and minor, and some weakness of the sternocleidomastoid. The rhomboidei, levator anguli scapulæ, and the serratus magnus were not involved. The reflexes of the upper extremity were altogether abolished, those of the lower extremity exaggerated. The oculopupillary phenomena, contraction of the pupil and exophthalmos, indicated an injury to the ciliospinal fibers of the sympathetic. There was some evidence of injury to the seventh cervical and first thoracic vertebræ. The symptom-complex indicated an involvement of structures supplied by the sixth, seventh and eighth cervical nerves, with impairment of function or irritation of the fourth and fifth cervical and the second thoracic. In addition to this, however, there was some hyperesthesia of the cervical plexus (C_1, C_2, C_3). There were also some functional disturbances of the left lower limb.

Operation.—May 23, 1910, under nitrous-oxid ether anesthesia, preceded by a hypodermic of morphin and atropin, with the patient in the reversed Trendelenburg position and on his side, a curved incision was made through the skin and down to the aponeurosis, beginning at the spinous process of the fourth cervical and extending to the spinous process of the second thoracic vertebra. On reflection of the cutaneous flap, a linear incision was made in the aponeurosis in the median line, the muscles separated from the spinous processes of the fifth cervical to the first thoracic vertebræ, which, together with the laminæ of the sixth and seventh, were removed. On opening the dural sac the cerebrospinal fluid was found to be under considerable tension and about 1½ to 2 ounces immediately escaped. Inspection revealed the following conditions: On the left

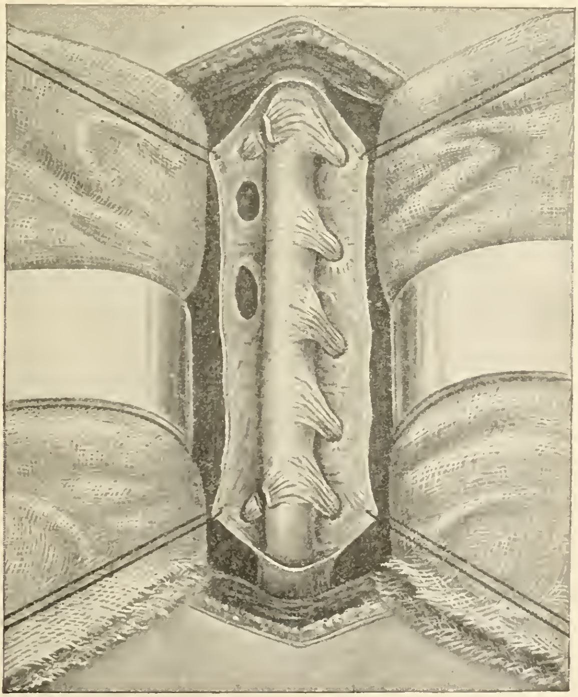

FIG. 2.

lateral aspect of the canal corresponding to the level of the sixth cervical and the first thoracic vertebræ there were two defects in the dura, each as large as a ten cent piece (Fig. 2). On the left side both the anterior and posterior roots of the sixth, seventh and eighth cervical nerves were absent. The roots evidently had been torn completely from the cord. There were some adhesions between the cord and dura on the posterior surface at the level of the seventh cervical and first thoracic vertebræ. These may have been the site of subdural hemorrhage at the time of the accident. The operation was undertaken with the intention of carrying out a purely palliative procedure. We planned to cut the posterior roots of the fifth, sixth, seventh and eighth cervical and the first thoracic nerves. As the sixth, seventh and eighth were absent and I had just divided the first thoracic, it remained only to divide the fifth cervical. The latter was reached by removing only half of the lamina of the fifth cervical vertebra. The dural incision was closed with continuous catgut sutures, the muscles with interrupted and the aponeurosis with a continuous catgut suture. A stab wound was made for the introduction of a small cigarette drain and the cutaneous wound closed with a continuous silk suture.

Comment.—Twenty-seven days after the operation, the patient left the hospital. In the interval between the operation and his discharge the amount of opium was gradually reduced until for a few days he was able to pass both the day and night in reasonable comfort with none at all, a condition which had not existed since the time of his injury three months before. He still had many of the subjective sensations in the arm, including pain of which he had complained before the operation, but the pain was more bearable and the burning sensation or hyperalgesia in the distribution of the fourth cervical and second thoracic had in a large measure disappeared. He had the reflex pain excited in the arm by stroking the hyperalgesic area on the chest. The general morale of the patient was in slight measure improved, so that he was able in the fall of 1910 to resume his practice to a limited extent.

Altogether I have sectioned the roots of the cervical cord for the relief of pain three times, the first in a case of brachial plexus neuralgia, as aforementioned, the second in a case of amputation neuralgia, and the third in an inoperable carcinoma of the neck involving the brachial plexus. The history of the second case was briefly as follows:

A. C., æt. male (File No. 36391), was admitted to my service at the University Hospital, 10-28-1917. In June, 1916, his left arm was crushed in an automobile accident. He was under treatment in another hospital for four months, during which time two amputations were performed, the last just below the attachment of the deltoid muscle. January, 1917, in still another operation several neuromata were removed for the relief of pain, but to no avail.

On his admission to the University Hospital, October, 1917, there were recurrences of the neuromata and the patient complained of pain, more at night, referred chiefly to the hand, which felt cramped.

November 2, 1917. Laminectomy, with removal of the laminæ of the fifth, sixth and seventh cervical and the first thoracic vertebræ. Four successive roots were ligated, C_7, C_8, T_1 and T_2. C_5 and C_6 were left intact as the pain was referred only to the hand. The manipulations within the dural sac were bloodless. Convalescence was uninterrupted and the patient was discharged November 19, 1917.

Comment.—The application of rhizotomy to cases of *amputation neuralgia* is of historic interest since the first operation of this character was performed for a similar condition (Abbe). The problem in these cases is somewhat involved because there is a psychic element which complicates the situation, for while, after the operation, there may be complete anesthesia in the zone to which pain is referred, the patient may still complain of pain. In other words, the pain may be in the nature of a psychalgia and not altogether of organic basis. My skepticism as to the results of rhizotomy in the unbearable pain following amputation seems to be justified by the experience of others, since in the six cases on record in literature (see Table II) the results were, on the whole, unsatisfactory. For this reason, so often attempts at relief of pain in these cases by peripheral operation are not even of temporary benefit. In the case I have just reported but three months have elapsed since the operation and the end results cannot yet be recorded, but the pain sensation had been in large measure relieved. When closely questioned the patient said he was practically free from pain during the day while at work. In summing up the situation I should say there was an evident improvement in the patient's morale, which might or might not be accepted as an evidence of relief.

The excruciating pains accompanying *inoperable lesions of the spine and spinal cord* and malignant infiltration of the cords of the brachial plexus, secondary to carcinoma of the mammary gland, suggest another indication for division of the posterior roots.

In this category I find three cases in my series of rhizotomies: (1) carcinoma of the breast with extension to the brachial plexus; (2) a metastatic carcinoma of the spine; (3) a sarcoma of the spine. In one of my patients suffering from the excruciating pains due to the recurrence of a carcinoma of the breast, I resorted to this method of relief. The patient, K. B. (File No. 69, P. E. H.), had undergone an amputation of the breast in another institution, and when

I first saw the patient three years after the operation the upper extremity was swollen and edematous and the patient complained bitterly of the pain night and day. There was a large recurrent mass in the axilla and supraclavicular region, and amputation of the upper extremity would have been of no avail. Through a unilateral laminectomy I divided the posterior roots of the fifth, sixth and seventh cervical and first and second thoracic nerves on the right side. During the year the patient survived she enjoyed a measure of relief, which seemed to me more than justified the undertaking.

The second case of this series was in a patient with a metastatic carcinoma of the spine.

The patient, a woman æt. 43, was referred to my service at the University Hospital, May 9, 1912 (File No. 11263). Four years before admission, she had undergone a complete amputation of the breast for carcinoma, and suffered no untoward symptoms until three years later, when she began to have lancinating pains in the back beneath the shoulder blades and extending to the waist. The pains, severe at first, gradually became less intense, but eight weeks prior to her admission, they returned in their old severity, and this time extended down the outer surface of the left arm. Weakness in the lower extremities had been slowly developing until, at the time of admission, voluntary movement was not possible in either leg, and control over the bladder and rectum was lost. The girdle sensation at the level of the mid-epigastrium, which had been present at first, disappeared, and was replaced by hypesthesia and later by anesthesia, so that when she came to the hospital, anesthesia was complete below this level. The upper extremities were entirely normal.

Physical Examination.—Sensory Disturbances: Thorax and abdomen: On the right side extending from the tip of the ensiform cartilage anteriorly to the lower border of the tenth thoracic vertebra posteriorly, tactile sensation was lost; the same limitation was present on the left. Sensation for heat, cold and pain and the determination of two points of the compass was lost to about the same level, the difference in the several types being so small that special charting was unnecessary. *Motor Disturbances:* There was absolute loss of power from the thorax downward. *Reflex Disturbances:* On both sides patellar and Achilles tendon reflexes were markedly exaggerated and the Babinski phenomenon typical. Ankle clonus was present on both sides, but not marked.

Laminectomy and rhizotomy, May 11, 1912, endotracheal insufflation anesthesia. Through a curved incision, the spinous processes of the sixth, seventh and eighth thoracic vertebræ were exposed and removed. In separating the muscles from the lamina of the seventh vertebra, an area of softening was found. The laminæ of these three vertebræ were removed and the following conditions noted: first, an extensive malignant infiltration of the seventh vertebra; secondly, a patch of carcinomatous tissue on the posterior and lateral aspects of the dura on a level with the seventh vertebra; thirdly, the seventh and eighth spinal roots, both anterior and posterior, were mostly destroyed by the carcinomatous process (Fig. 3).

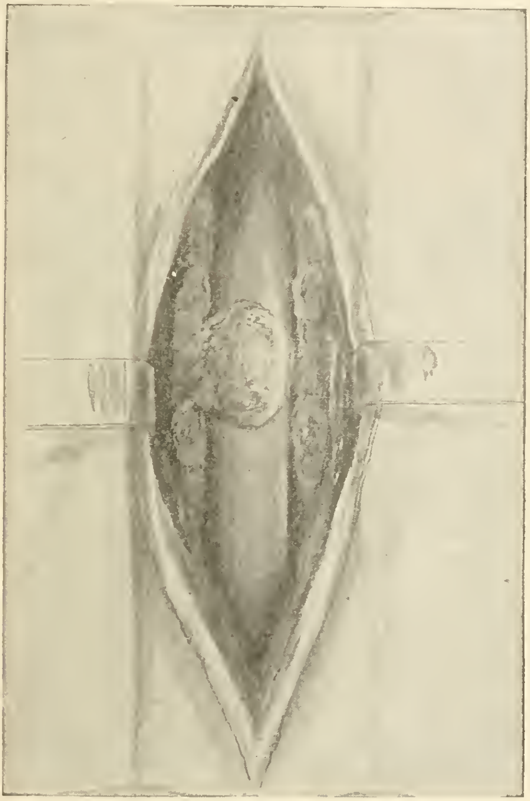

Fig. 3.

That portion of the dura which was the seat of the malignant infiltration was removed, and what remained of the posterior roots of the seventh and eighth segments were divided. Oozing from the area of bone involved was quite extensive during the operation and necessitated the introduction of two small wicks of gauze, the ends of which were brought out at either angle of the wound.

Comment.—The patient was relieved of pain immediately after the operation, but from reports received indirectly, she suffered recurrence during the year she survived the operation. I interpreted this as an evidence of involvement of adjacent roots by extension of the growth, and it would have been better had I divided one or two roots above and below the lesion instead of only those directly involved at the time of the operation.

On the whole, however, I look upon the results in this series of malignant lesions as more than justifying the operation, not underestimating all its attending discomforts, although in the future, in lesions below the sixth thoracic segment, I would substitute a chordotomy for rhizotomy.

While division of the posterior roots is strongly recommended by some for the relief of *sciatica*, I have never seen a case of this lesion in which I felt justified in recommending so formidable a procedure, which in the lumbosacral region is attended with technical difficulties not common to operations upon the roots in the cervical and thoracic regions.

Rhizotomy has been performed more frequently for the relief of the pain of gastric crises than for any other lesion. Already there are upwards of seventy-three cases on record (see Table III). My experience includes three cases one of which I will cite as an example:

The patient, a man æt. 40, was admitted to my service in the University Hospital, September 6, 1911 (File No. 10122). He complained chiefly of pain and vomiting of three years' duration. The pain was cramp-like, severe enough to double him up, and always accompanied with vomiting. There was tenderness over the hypogastrium. These attacks lasted two or three days and recurred every four to six weeks. The physical examination, excluding all negative findings, revealed the following conditions: The left pupil was larger than the right, and, while both reacted to light and distance, the reaction was sluggish. Upon the abdomen was a scar over the right rectus muscles at the site of an exploratory operation a year before in another hospital. The knee jerks, Achilles and biceps reflexes were absent even on reënforcement. There was no ankle clonus and no Babinski. With the eyes closed the station was not good. The Wassermann reaction was, however, negative. Examination, physical and otherwise, for gastric or duodenal ulcer, gall-stone disease or any upper abdomen lesion, was fruitless. A diagnosis of tabes was made, later confirmed by Dr. Charles K. Mills, and the possibility of relief by a spinal operation presented to the patient. With his approval the operation was undertaken.

Laminectomy, September 19, 1911. Under endotracheal ether anesthesia the spinous processes and laminæ of the fifth, sixth and seventh thoracic vertebræ were removed. The seventh root was readily identified, coming off the cord a little above the tip of the spinous process of the fourth cervical vertebra, and in accordance with a preconceived plan the roots of the seventh, eighth, ninth and tenth thoracic segments were divided (the tenth only on one side). Following the operation there was a zone of anesthesia extending from the ninth costal cartilage to the umbilicus. When the patient left the hospital two months later, he was entirely free from both pain and vomiting, and when last traced a year later, he had no recurrence.

Comment.—It must be borne in mind that not all cases of gastric crises will respond to rhizotomy. Through the researches of Müller, Head, Neumann and others much light has been thrown upon the innervation of the stomach. It would seem evident that the stomach is supplied partly by the central nervous system through motor and secretory fibers from the pneumogastric nerve and partly by the sympathetic system through the splanchnic afferents entering the cord via the posterior thoracic roots. While in the typical form of gastric crises we find pain, hyperesthesia and exaggerated abdominal reflexes with vomiting and hypersecretion in the later stages as a secondary phenomenon, there is another type characterized by nausea and vomiting in which pain and hyperesthesia are absent. Manifestly in the latter variety, which is of pure pneumogastric origin, rhizotomy can be of no avail, while in the former it has a firm physiological foundation in that it interrupts the afferent limb

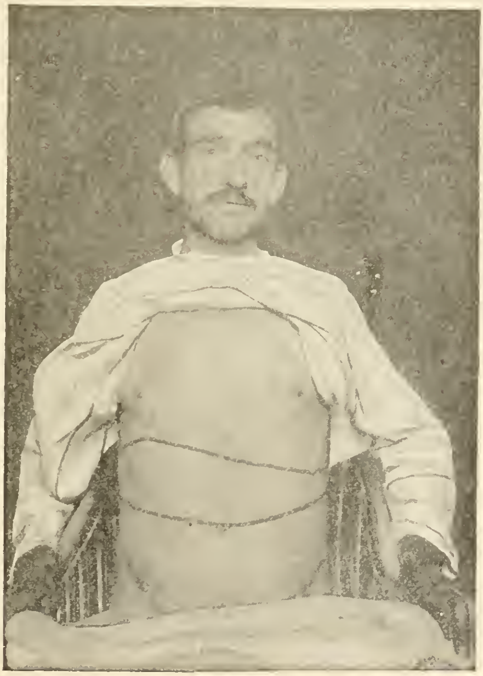

Fig. 4.

of the reflex arc. Thus a careful distinction between these two types is absolutely essential. Heile advocates an epidural injection of adrenalin into the vertebral foramina for differentiating between these two types. Should the pain disappear temporarily, it is evident that we are dealing with a case of sympathetic origin.

Assuming for the moment that rhizotomy is preferable to chordotomy for the relief of gastric crises, which roots and how many roots shall be divided? While some operators, particularly Förster, claim that at least seven roots should be resected, selected according to the area of greatest hyperesthesia from the fifth thoracic to the second lumbar, this it seems to me is too formidable a procedure for the average tabetic patient. It is my practice at the first sitting to divide as many roots as are represented in the zone of hyperesthesia, and this number seldom exceeds four or five. If there should later be a return of the painful crises in an area beyond the original zone of hyperesthesia, several additional roots may be cut at another sitting. In a number of cases reported in literature after a period of transitory relief there has been a return of the pain in an area above or below that of the original pain. We have been able to find records of 73 cases in which rhizotomy has been performed for the relief of gastric crises, of which 14 are recorded as cured, 31 improved, 6 temporarily improved, 5 unimproved and 16 deaths, 10 of which were operative deaths, giving a mortality of 13.7 per cent. (Table III). While these results cannot be considered ideal, they are encouraging when one considers the tremendous suffering and utter hopelessness of many of these cases. It should be remembered, moreover, that many of these operations were performed while the operation was more or less in the developmental state.

TABLE III

RESULTS OF 73 OPERATIONS FOR GASTRIC CRISES

Not stated	1— 1.37	per cent.
Cured	14—19.18	" "
Improved	31—42.46	" "
Temporarily improved Later recurrence	6— 8.22	" "
Unimproved	5— 6.85	" "
Operative deaths (within a month)	10—13.70	" "
Deaths (one month or later) not due to operation.	6— 8.22	" "
	73 cases	

Technic.—The performance of rhizotomy requires great nicety of skill and judgment on the part of the operator and should be entrusted only to those who are thoroughly familiar with the anatomical variations and the difficulties peculiar to this part of the central nervous system. There are many problems which should be given careful consideration before contemplating the execution of rhizotomy for any cause whatsoever. In the first place the performance of the operation in one or two stages is a matter which must be decided by the individual operator according to the circumstances of the individual case. In my opinion, the two-stage procedure should always be considered one of necessity, never of choice, and should be reserved for those cases in which the condition of the patient demands the postponement of a part of the operation to a later sitting, as for example in cases of impending shock.

Barring such exigencies, I stand firmly in favor of a one-stage procedure; the danger of infection is greatly enhanced by dividing the operation into two sittings and the difficulties attending the completion of the operation increased. The delicate manipulations called for in the identification and division of the roots demand the widest possible exposure. I, therefore, strongly condemn the unilateral laminecomy with the possible exception of such cases as require the division of but one or two roots on one side only.

Whether the roots should be cut within or without the dura has been a point of contention since Guleke's introduction of the extradural method in 1911. Guleke and the other advocates of the extradural division claim that this method entails less danger of infection and of shock from the loss of cerebrospinal fluid. The question of infection need not now enter into the discussion of the relative merits of an operation. We are not living in the days of suppurating wounds. With regard to the escape of cerebrospinal fluid, if the operating table be placed so that the opening in the dura occupies the highest level and a pledget of cotton be placed between the dura and cord at the upper and lower limits of the dural incision, the amount of fluid escaping will be too small to be of any consequence. As a matter of fact, the danger of infection and escape of cerebrospinal fluid are threadworn arguments against this and other operations in the cerebrospinal tract, and when suggested one feels as though one might be conversing with the surgical spirits of a past generation. The intradural, as a matter of fact, is vastly superior to the extradural method; it affords a wider exposure for identification of roots, it enables one the more readily to separate the posterior from the anterior roots, it is applicable to every level of the cord. It is to my mind the only acceptable method of approaching and dealing with the roots of the cord.

Before removing the requisite number of laminæ and spinous processes, the first step in the operation, some means must be adopted for identifying at least one spinous process which shall serve as a guide throughout the operation. I have found that this can be accomplished most satisfactorily by the use of the roentgenogram. If, for example, one is to divide the sixth to the tenth thoracic roots, the ones usually implicated in gastric crises, the skin over the eighth thoracic vertebra may be marked with caustic silver, a metal strip attached to this mark and its exact level confirmed by means of a roentgenogram. Knowing as we do that the eighth thoracic root leaves the dural sac between the eighth and ninth thoracic vertebræ, this root may be used as a guide and the others identified without difficulty.

TABLE IV

Number of Roots to be Cut	Landmark	Spinous Processes; Number of Laminæ to be Removed
C_5 to T_2	Tip of spinous process of the fifth cervical corresponds to point at which C_8 leaves dural sac.	Those of the fourth, fifth, sixth and seventh cervical vertebræ; possibly the first thoracic vertebra.
T_6 to T_{12}	Tip of spinous process of the sixth thoracic vertebra corresponds to the point at which T_8 leaves the dural sac.	Those of the fifth, sixth, seventh, eighth, ninth and tenth thoracic vertebræ.
Lower exposure, L_2, L_3, L_5, S_1, S_2 ..	Tip of spinous process of second lumbar vertebra corresponds to the point at which L_2 leaves dural sac.	Those of the second, third, fourth and fifth lumbar vertebræ.
High exposure, L_2, L_3, L_5, S_1, S_2 ..	Tip of spinous process of the eleventh thoracic vertebræ corresponds to the point at which L_2 leaves the cord.	Those of the eleventh, twelfth thoracic, first and second lumbar vertebræ.

After the reflection of the cutaneous flap and before the removal of the spinous processes of the identified vertebra, a silk stitch is introduced on either side through the margin of the aponeurotic layer to serve as guides after the removal of the spinous process. The necessary number of laminæ are now removed and every precaution taken to avoid hemorrhage. Oozing from the cut sections of bone is stopped with wax, bleeding from the plexus of epidural veins by tampon or ligature and bleeding points in the muscles are ligated. Small cotton rolls are laid along the wound on either side of the dural flaps to absorb the blood from the surrounding structures and to prevent its access to the dural sac. The subarachnoid space must be kept bloodless throughout the operation; this regulation must be observed to the letter.

Identification of the roots is often difficult because of the numerous anatomical variations both normal and abnormal; we must, however, be guided by the prevailing relations. Inasmuch as rhizotomy for the relief of pain involves the innervation of the upper and lower extremities and the upper abdomen, we will consider the identification of roots in these three regions respectively, that is, (1) C_5 to T_2, (2) T_6 to T_{12}, and (3) L_2 to S_2 (Table IV).

1. In the cervical region the distance traversed by the roots within the sac from their point of emergence from the cord to their point of exit is shortest, the length and obliquity of the roots gradually increasing as one proceeds caudad. We find, therefore, that the fifth cervical root leaves the cord almost on a level with its origin from the cord, that is, on a level with the fourth lamina, and to expose C_5 to T_2, the laminæ of the fourth to the seventh cervical vertebræ should be removed. Here the upper roots are smaller than the lower, the first cervical being the smallest. The second thoracic root is smaller than the first thoracic and the latter somewhat smaller than the eighth cervical. Since the cord lies directly between the anterior and posterior roots in this region, that distinction is made without difficulty.

2. In the lower thoracic region orientation forms no serious obstacle, if one bear in mind that the roots make their exit usually two and in the lowest part three vertebræ below the corresponding cord segment. For example, T_6 has its origin on a level with the fourth thoracic vertebra and makes its exit between the sixth and seventh. These roots are small and fairly uniform in size, the posterior being somewhat larger than the anterior. For the division of T_6 to T_{12}, the spinous processes and laminæ of the fifth to the tenth thoracic vertebræ must be removed.

3. In the lumbar and sacral region, two methods of procedure are open to us, the low and the high exposure, each with its respective advantages and disadvantages. The lower lumbar and upper sacral nerves have larger roots than any of the other spinal nerves, while the lowest sacral and the coccygeal are the smallest. The distance traversed by the roots within the dural sac is greatest at this level; for example L_2 takes its origin from the cord at the level of the eleventh thoracic vertebra and leaves the canal below the second lumbar. To divide those roots, most commonly sacrificed

in this region, that is L_2 to S_2, *near their points of origin* from the cord would require an opening extending from the arch of the first lumbar vertebra to the second sacral. Such an extensive laminectomy is beyond the bounds of reason. To obviate these difficulties Codivilla, van Gehuchten, Wilms and Kolb and others advocate section of the roots while still in the conus, the so-called high

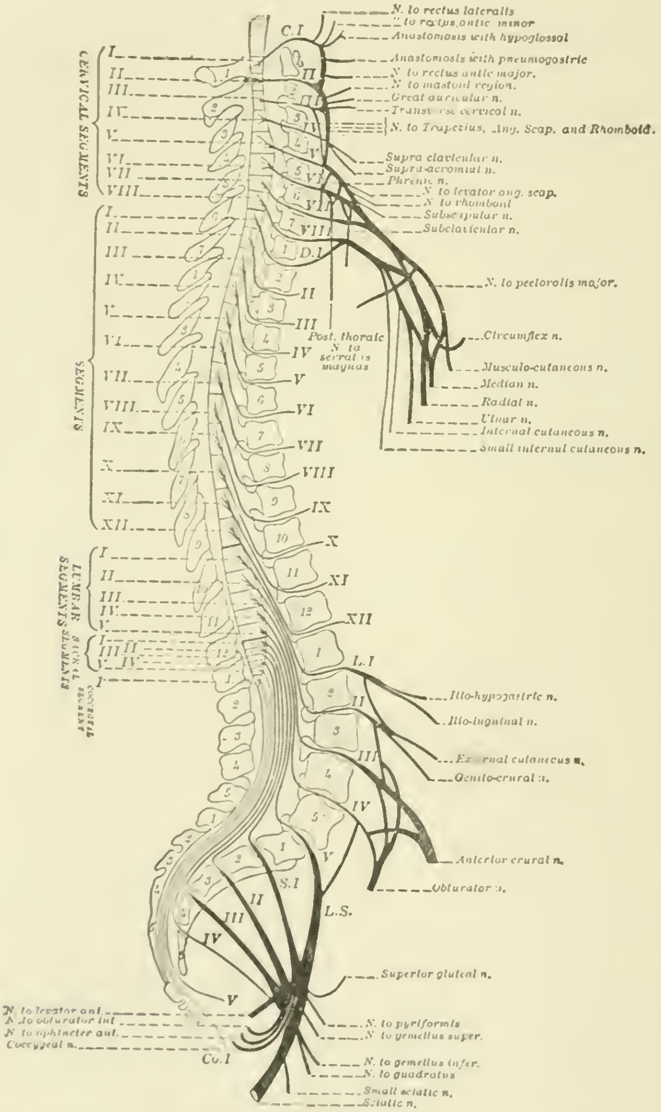
N. to rectus lateralis
N. to rectus antic minor
Anastomosis with hypoglossal
Anastomosis with pneumogastric
N. to rectus antic major.
N. to mastoid region.
Great auricular n.
Transverse cervical n.
N. to Trapezius, Ang. Scap. and Rhomboid.
Supra clavicular n.
Supra-acromial n.
Phrenic n.
N. to levator ang. scap.
N. to rhomboid
Subscapular n.
Subclavicular n.
N. to pectoralis major.
Post. thoracic N. to serratus magnus
Circumflex n.
Musculo-cutaneous n.
Median n.
Radial n.
Ulnar n.
Internal cutaneous n.
Small internal cutaneous n.
CERVICAL SEGMENTS
SEGMENTS
LUMBAR SEGMENTS
SACRAL SEGMENTS
COCCYGEAL SEGMENT
C.I
D.I
L.I
S.I
L.S.
Co.I
Ilio-hypogastric n.
Ilio-inguinal n.
External cutaneous n.
Genito-crural n.
Anterior crural n.
Obturator n.
Superior gluteal n.
N. to pyriformis
N. to gemellus super.
N. to gemellus infer.
N. to quadratus
Small sciatic n.
Sciatic n.
N. to levator ani.
N. to obturator int.
N. to sphincter ani.
Coccygeal n.

Fig. 5. Diagram showing level at which the roots leave the cord and the spinal canal.

exposure. In so doing one need remove only the arches of the twelfth thoracic, first and second lumbar vertebræ. The third sacral is the lowest root conspicuous for its size. Groves, who is in favor of this procedure, raises the filum terminale by a fine silk ligature and passes a bent probe under all the posterior roots from S_3 to L_1. While the high exposure has many advantages, such as the removal of a smaller number of laminæ and the easier differentiation between the anterior and posterior roots, it possesses this very distinct disadvantage in that it is almost impossible at that level to identify the individal roots in the conus. Theoretically, therefore, the lower exposure is the procedure of choice. If L_2, L_3, L_5, S_1 and S_2 are to be divided, the arches of the second to the fifth lumbar vertebræ

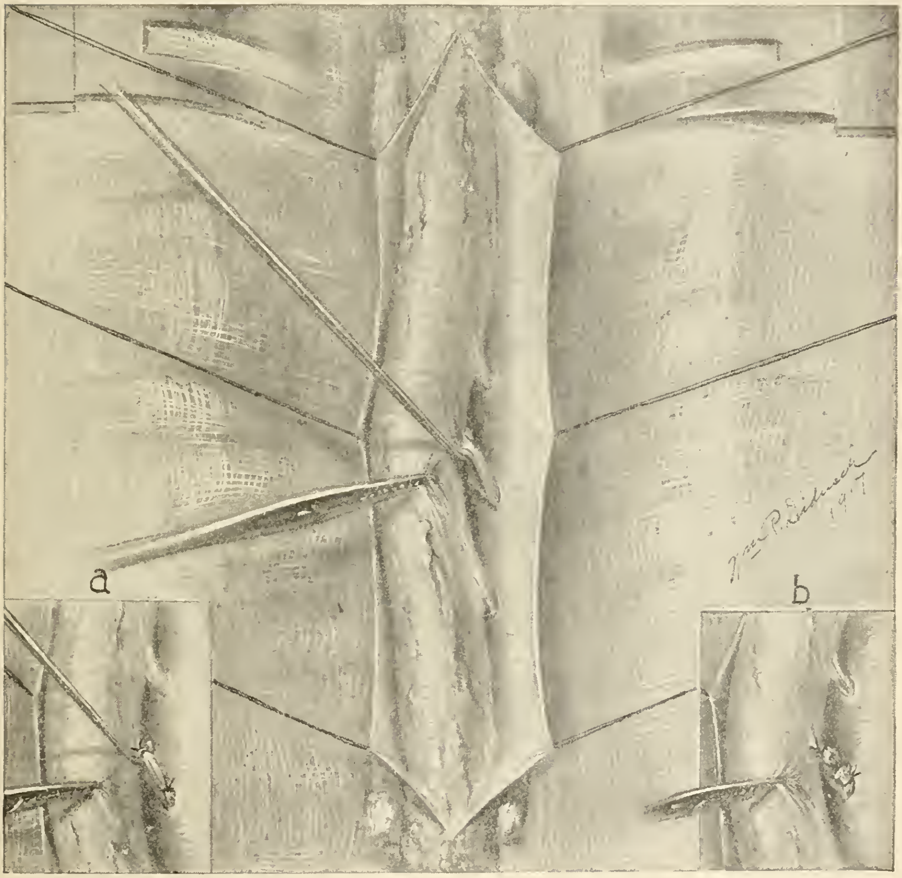

Fig. 6. Illustration to show the isolation and ligation of the posterior root.

must be removed. L_2 is found to leave the canal just below the second lumbar vertebra and S_1 and S_2 are usually just to the inner side of L_5. To distinguish between the anterior and posterior roots at this level, I trace them up as high as possible.

The number and selection of the roots to be cut depends of course upon the condition which the operation is designed to relieve. Thus for neuralgia of the upper extremity the last four cervical and the first two thoracic may have to be sacrificed, depending somewhat upon the extent of pain distribution. For gastric crisis I have only divided four consecutive roots, T_7, T_8, T_9 and T_{10}. This selection corresponds precisely with the zone of referred pain. To urge resection of two or three more roots below the tenth thoracic root, to prevent intestinal crisis at a later date, is, to my mind, not germane to the subject.

For intercostal neuralgia or for inoperable carcinoma of the spine, the number of roots to be sacrificed is clearly indicated by the boundaries of the painful zone for pain of the lower extremities, as from an inoperable carcinoma of the pelvis, the substitution of chordotomy for rhizotomy makes a discussion of the selection of roots unnecessary.

With regard to matters of technic, operations upon the roots require great delicacy of manipulation. There is no operation in which greater respect must be paid the tissues involved. Shock is readily occasioned by neglect of precautionary measures. The Stovain block, as I apply it to root operations, is most effective. Control of bleeding is an essential of all properly-conducted operations within the dural sac. To this end I have established for root section the ligation of the root without section. This avoids the bleeding that attends cutting the small artery which accompanies each root, and as regeneration of a posterior root never occurs, the physiological effect of ligation is equivalent to section.

Whatever may be the end results of rhizotomy, and in some instances its leaves much to be desired, the risks attending the operation have been negligible. There have been, in my experience, no fatalities.

Society Proceedings

PHILADELPHIA NEUROLOGICAL SOCIETY

December 21, 1917

The Vice-President, Dr. M. H. Bochroch, in the Chair

Dr. F. H. Leavitt presented a patient showing dwarfism with congenital speech defect.

Dr. F. X. Dercum presented a case of myositis ossificans.

Dr. Alfred Gordon said that he saw a case in which there was very marked bony tissue in the cervical muscles on the right side of the spine, but that was the only anomaly that existed in that particular individual. He had seen a great many cases of trophic disturbances of all kinds, but such a disseminated deposit of bone tissue in muscles he had never before seen. It would be interesting not only to examine the urine, but also the blood in regard to the alkaline or acid contents; all the excretions should be examined in a case of this kind in order to arrive at any possible hypothesis in regard to the origin of the condition.

Dr. F. X. Dercum presented a case for diagnosis.

Dr. Charles K. Mills said it was evidently a case of brain tumor. It seemed to him most likely a prefrontal tumor, probably on the left side. He thought it might be a growth in the prefrontal region involving the callosum by invasion. The coming and the going aphasia, the slight hemiparesis, the mental peculiarity and the special gait were indicative of this diagnosis. His gait was inhibitory rather than paralytic. It might be a tumor such as Dr. Mills had seen where the symptoms varied much from time to time—an endothelioma for instance with a cystic attachment. Such tumors give peculiar changes of symptoms because of variations in pressure.

A CASE OF SENSORY APHASIA ASSOCIATED WITH RIGHT LATERAL HOMONYMOUS HEMIANOPSIA

By James Hendrie Lloyd, M.D.

The patient, a middle-aged man, had been injured on the street by a motor truck and had sustained a fracture of the orbital plate of the frontal bone, as shown by the X-ray. He presented a sensory aphasia, characterized by word-deafness and word-blindness without motor aphasia, but with agraphia and astereognosis, with slight anesthesia, in his right hand. Along with this there was a right lateral homonymous hemianopsia. The patient had not a hemiplegia or even a brachial monoplegia, but he had a tremor of the right upper limb and curious electric-like shocks in it. The chief interest in the case was in the question of localization. It was pointed out that the most probable seat for a single lesion to do all this would be beneath or near the posterior ends of the first and second temporal convolutions, especially if the lesion were large enough to interrupt the various association tracts between the word center and the angular gyrus, and also the optic radiations. It would not require a large single lesion, in fact, to be so located at about the juncture of the temporal, parietal and occipital lobes, in the white substance, as to cause all these symptoms. The agraphia was a pure agraphia, without an associated paralysis, and was evidently a cortical affection, due to forgetfulness of how to make written words. It was possibly secondary to the word-blindness, because the mind in writing depends upon the mental images of the words to be written, and these were lost in this patient. The fracture of the orbital plate could of course not account for the symptoms.

Dr. Mills said he had had the opportunity of seeing and studying with Dr. Lloyd the case just presented by Dr. Lloyd to the Society. The main features of this case are, as has just been related, the development after a serious accident of right lateral homonymous hemianopsia; word-, letter-, and number-blindness; word-deafness; loss of the sense of position and passive movements; astereognosis; and not improbably some affection of cutaneous sensibility. This symptomatology points almost certainly to a very considerable lesion of the white matter of the left hemisphere in the region where the parietal, occipital and temporal lobes come together. In other words, the lesion most probably involved the parietal and portions of both the occipital and temporal lobe, the lesion being largely in the subcortex of the angular region, although extending to some extent beyond it. The question of the existence of a motor agraphia is one of much interest. Certainly the man, as Dr. Mills observed him and as Dr. Lloyd has closely studied him, showed what appeared to be a motor agraphia. To some extent this appearance of motor agraphia might be explained by the lesions causing the auditory, visual and musculo-cutaneous sensory defects. Nevertheless he may also have had some true motor agraphia. This is in its complete or nearly complete form usually due to involvement of the posterior extremity of the second frontal convolution and is generally associated with aphasic and often with hemiplegic phenomena, the lesion present involving the third frontal and the capsule and to some extent the corona radiata. In one way the existence of some true motor agraphia in this case might be explained; that is, by the involvement of the tracts which pass from the visual, auditory and musculo-cutaneous cortical centers to the second frontal convolution, either directly or as some hold by way of the hinder third of the third frontal convolution. This would give a species of transcortical or conduction motor agraphia just as paraphasia and paragraphia occur in lesions between the auditory and motor centers for speech. In the case of a patient like the one here shown the transcortical motor agraphia would be intensified by the existence of the auditory, visual and musculo-cutaneous defects, especially the last two. Dr. Mills recalled one case recorded by a French authority in which a motor agraphia was associated with lateral homonymous hemianopsia. No matter where the associating tracts between sensory centers and motor centers for speech and writing are disrupted some effect must be produced upon the centers which are united by these conducting paths. A lesion of the cerebral zone of speech, cortical or subcortical or both, so large as the one here indicated, would necessarily interfere with the entire mechanism of this zone. This man is not a motor aphasic. Nevertheless the functions of Broca's center are to some extent affected. Those of the motor graphic center may be to a larger degree involved because the lesion happens to be more destructive as regards the paths from the sensory regions to the second frontal than those to the third.

Dr. Charles S. Potts said his understanding was that all patients with word-blindness have more or less agraphia. The patient was probably not a fluent writer to start with, which would cause agraphia to be more marked if so caused by word-blindness. He had never yet seen any case of aphasia which had any clear-cut group of symptoms depending upon one center.

Dr. Dercum thought that Dr. Lloyd's case was typically illustrative of the mental deficit claimed by Marie. He doubted from the man's behavior whether the man knew that Dr. Lloyd wished him to write and secondly it was doubtful whether the man himself was willing to comply. Dr. Dercum asked Dr. Lloyd how he knew that the man could not read if the man could not understand what was expected of him. Just how much this man actually grasps of what is said to him or what is expected of him is more than doubtful. Under the circumstances the inferences as to special speech disturbances are invalidated. In his case the general mental deficit is gross. Dr. Dercum reasserted his own position with regard to the subject of aphasia and his acceptance of the views of Marie. As Dr. Potts has just stated, not a single case of aphasia can be sharply classified as a motor or sensory form. For instance the habitual occurrence of alexia with so-called motor aphasia is a case in point.

Dr. Alfred Gordon said that he did not know whether it was an unintentional omission when relating the facts concerning the agraphia that no mention was made whether the man was able to write by dictation and spontaneously. Dr. Gordon felt in this particular case the agraphia was probably due to word-blindness and deafness; these two defects are sufficient to produce agraphia. One lesion would explain the entire question of the agraphia, namely, a hemorrhage or any lesion of the angular gyrus. The intellectual deficit mentioned by Dr. Dercum could be explained on the basis of a disorder in the temporal or angular gyrus: if the man cannot hear or read he will ramble. He appears confused, does not know what he is saying, or what he wants. Dr. Lloyd dwelt on the rarity of association of homonymous hemianopsia with the symptomatology of a lesion of the angular gyrus. Dr. Gordon said that a number of such cases have been reported in the French and German literature where homonymous lateral hemianopsia in lesions of the angular gyrus has occurred. Anatomy confirms such a possibility. It is not especially rare. Dr. Gordon felt that in this particular case in spite of the frontal fracture a hemorrhage occurring in the orbital region extended way back and involved the posterior third of the first or second temporal convolution and the angular gyrus, or else a direct hemorrhage occurred in those areas by contre-coup; a lesion in this location would explain the entire symptomatology of the case.

Dr. J. Hendrie Lloyd said he was very sorry indeed that the patient made such a bad exhibition of himself. His stupid condition this evening was in accord with what his interne had told Dr. Lloyd, that the man was in better shape in the morning after a good sleep. He is much worse towards the end of the day. The discussion was in line mostly with his own views on the subject. In one sense, it was true that no two aphasics were exactly alike. Dr. Lloyd believed that in the analysis of these cases it was necessary to differentiate the four main elements of speech. In a case of word-deafness, as in this case, there is such a disorganization of the whole apparatus of speech, due to the fact that the auditory center is the primary center, the one upon which the very first acquisition of language depends in the child, that you can look for almost anything. The one thing of particular interest in this case is that the man has no motor aphasia. He can talk a straight streak, but he does not talk correctly. He has a sort of paraaphasia. This is a little bit like verbal amnesia. When you try to say just exactly what these two things are you find they dovetail, so that it is almost impossible to separate them. What is verbal amnesia? We have all had it. Every person has sometime or other experienced that amnesia which is characterized by the loss of the name of some person or place. It is not word-deafness, because if a person gives you the name you instantly recognize it. Dr. Lloyd believed verbal amnesia was an essential part of motor aphasia. He could not conceive how a motor aphasic could be in his peculiar mental condition without some verbal amnesia. In this association of right lateral homonymous hemianopsia with word-blindness there is a nice problem involved. The man has a right lateral homonymous hemianopsia. That is to say, the left halves of his retinæ are obscured, which means that he has a lesion back of the primary optic centers in the left cerebral hemisphere. Now along with that inability to see anything towards his right side, he has inability to see printed words. When you hold the latter up to him he turns his head to one side, evidently to get a view of it with the right halves of his retinæ, which are not blind, because they are presided over by the right hemisphere; but nevertheless he cannot read it. Therefore he is word-blind in his right cerebral cortex, as well as in his left. That is the point which Dr. Lloyd wished to bring out. There had been considerable written on this subject, but not exactly in the way Dr. Lloyd tried to discuss it, in the early cases of word-blindness associated with this hemianopsia. In his mind it followed that there had been a lesion deep enough beneath the angular gyrus to catch the optic radiations. He had never seen, in all his clinical experience, a case that came as near to pure agraphia as this case. The man has no hemiplegia, he has no brachial monoplegia, but he cannot write. He can do no more than make the initial letter of his name. Dr. Lloyd said he did not agree that this impairment depended to a large extent upon the astereognosis. He thought the agraphia depended more upon the word-blindness. As to mirror-writing, he would call attention to the fact that that curious phenomenon had been seen before in patients with lesions in the left cerebral hemisphere, also in left-handed idiots and feeble-minded children, as Ireland had pointed out years ago in an interesting paper on the subject.

A CASE WITH PERSISTENT CONTRACTURE OF TOES AND FINGERS ON THE SAME SIDE OF THE BODY

By Alfred Gordon, M.D.

A woman of fifty-two, married, housewife, noticed about three and one half years ago that the last four toes of her left foot gradually commenced to bend downwards and remain so. Very soon the same was noticed in the last three fingers of the left hand. At present the condition is as follows: The toes remain flexed, so that walking is very difficult and painful. The fingers are also flexed, but nevertheless she is able at times to extend them; when extended they do not remain so and soon bend close to the palm. There is no special difficulty in overcoming the resistance of both fingers and toes. There is, however, more difficulty in extending the toes than the fingers. When she attempts to open her fingers and succeeds, the palm presents a concave surface and the fingers are not parallel. She cannot hold objects in her hand for any length of time; they frequently fall out and her hand is awkward in handling objects or in doing work. The left knee jerk is plus. No Babinski. Examination for objective sensations is entirely negative. There is no tenderness of nerve-trunks; the cranial nerves are intact. There are no stigmata of hysteria.

Her entire previous medical history is negative. She had several children, no miscarriages. The eye examination is negative. The Wassermann test on the blood is also negative. Urine is normal.

Discussion.—Hysteria must be thought of, but during several weeks of observation not one stigma of hysteria could be disclosed. There was no emotional element or any other special factor at the onset of the condition. Moreover, an inquiry from relatives revealed the fact that the condition of the hand and foot remains unaltered during sleep.

As to an involvement of the peripheral nerves, there are no signs of it, as the motor power and sensibility are preserved and there is no tenderness of the nerve-trunks.. It remains to consider an organic brain lesion of extra-pyramidal nature. The absence of rigidity in any of the segments of the limbs, the increased knee jerk on the left side, the absence of the toe-phenomenon, the increase of contracture of the toes on the least attempt to manipulate the toes or the fingers—all remind one of the bilateral extra-pyramidal affection described originally by Wilson and of the unilateral extra-pyramidal condition, an example of which was presented by Gordon before this Society about three years ago (Medical Record, December 12, 1914).

Dr. Dercum asked whether there is any special etiological factor in this case; whether there was an Erb or Trousseau sign. Did grasping the arm produce any effect in extending the fingers? Was there any muscular weakness?

Dr. Gordon replied that the woman had a good grip for the left hand.

Dr. Charles K. Mills said that the case might possibly be one of hysteria, still he was disinclined to make that diagnosis. While the phenomena were similar in the hand and in the foot, there was a difference in the degree—a marked difference in the degree of hypertonia as exhibited in the flexion in the fingers and in the toes. This he thought was rather against the affection being purely functional. Perhaps we might regard the spastic state of the toes and of the hand as a form of continuous perseveration. The contractures can be straightened rather easily, but when the manipulation is stopped the parts come slowly back to their spastic position. Just where the lesion is is questionable—if there be a lesion. It may be in the pre-motor cortex or in the lenticula.

Dr. Dercum said the persistence of contractures in sleep did not negative hysteria. Dr. Gordon might remember that eight or ten years ago the question was asked in the Neurological Society of Paris whether hysterical contractures persisted during sleep and a case of Professor Raymond was selected to decide that question. A committee was formed to observe the patient during sleep. The patient now ceased sleeping spontaneously and sleep could only be brought about by the administration of sedatives. Under these circumstances the committee found that the contractures persisted during sleep; and notwithstanding all agreed that the hemiplegia with the contractures from which the patient suffered was hysterical in nature.

Dr. Gordon said in reply to Dr. Dercum's idea of suggestion by hypnosis, he had forgotten to relate that the condition of the hand and foot were the same in sleep. He had asked the relatives of the patient to watch her. They always told him that the condition of the hand and foot was exactly the same in sleep. That rather excludes the possibility of a functional disorder. The more he thought of the case the more it appeared to him to be organic, but as to the exact localization he is strongly inclined to believe it to be extracapsular.

JANUARY 25, 1918

The Vice-President, DR. MAX BOCHROCH, in the Chair

Dr. S. F. Gilpin presented a case of unilateral amyotrophic lateral sclerosis, following injury.

Dr. Alfred Gordon recalled another patient that he saw about ten years ago, a photograph of whom he had in his possession. The patient was also a man of about thirty, a football player. When, during the game, the football was thrown, he caught it, but other players jumped on him and kept his head forcibly bent forward for quite a while. When they released him he could not move. He finally got up but suffered some pain in the neck. Rapidly atrophy developed bilaterally from the shoulders down the upper limbs so that at the end of six months when Dr. Gordon saw him he presented a typical progressive muscular atrophy limited to the upper extremities, and presented Babinski reflex and increased reflexes on both sides. The atrophy was bilateral. The attitude of the head was just that of the case presented. He did not present the deformity Dr. Burr had called attention to, but the onset of the trouble followed rapidly the trauma the patient sustained. The presented case reminded Dr. Gordon of his case, especially the position of the head. Dr. Gordon felt that the trauma, which Dr. Gilpin alluded to very cautiously, was the cause in that case particularly. In regard to the lesion, he felt it was probably compression followed by a hemorrhage. It may have been a meningeal trouble and then secondary involvement of the cord itself, with secondary atrophy of the muscles.

Dr. A. H. Woods said he would hardly call the condition primary amyotrophic lateral sclerosis. It looked like a case of one-sided degeneration of the lateral tract and degeneration of the horn cells.

Dr. S. F. Gilpin said that it seemed to him after the length of time the condition had existed that it was largely in favor of it being a traumatic lesion in the beginning. What he could not understand was why it should be so localized.

A CASE WITH SYMPTOMS OF PARALYSIS AGITANS WITH EXCESSIVE CALCIUM OUTPUT IN THE URINE. IMPROVEMENT UNDER PARATHYROID TREATMENT

By F. X. Dercum, M.D.

Dr. Dercum presented a case in which the symptoms were strongly suggestive of an early or beginning paralysis agitans and in which a remarkable alleviation and final disappearance of symptoms had followed the administration of parathyroid extract. The case was briefly as follows:

M. C., white, female, aged fifty-seven, born in Scotland, married, housewife, of negative ancestry and the mother of four healthy boys, presented herself at the out-patient nervous department of the Jefferson Hospital, complaining of nervousness and a swelling in her throat. It was noted that the patient stood in an attitude suggesting paralysis agitans. The head and shoulders were slightly bowed, the arms somewhat flexed and the hands and fingers held in the position of the writing hand. In turning the patient moved as though of one piece. The facial expression also was rather fixed. Upon instruction the patient could move head and neck and the arms and hands freely, though the movements were a trifle slow. There was no tremor. The swelling in the throat of which she complained was apparently subjective; there was no enlargement of the thyroid gland. She was admitted to the ward for observation.

The personal history was negative as to childhood or other infections. At twelve years of age had an attack of nervousness marked by swooning; menstruated at thirteen. Ceased menstruating at forty-five.

Her present trouble began a year ago. A physical examination was entirely negative save for the symptoms already noted. Gait, station and reflexes normal. No sensory losses. An examination of the throat and larynx by Dr. Chevalier Jackson revealed nothing of moment. A reëxamination of the thyroid again resulted negatively. Blood and cerebrospinal fluid normal. Urine normal to the usual examination. Because of the tendency to fixed position a study of the calcium metabolism was made. A determination of the urinary excretion of calcium oxide (November 10, 1917) by Dr. Bergeim, of the department of physiological chemistry, revealed it to be .532 gm. The patient was then placed upon 1/20 grain of parathyroid extract three times daily. This was followed in the course of a few days by a remarkable improvement and finally in the course of a month by the disappearance of symptoms. The picture so closely simulating paralysis agitans entirely changed and the patient was to all intents and purposes normal. During the parathyroid administration the urine was again examined (November 18, 1917), revealing now a calcium oxide elimination of .672 gm.

The patient left the hospital, but the parathyroid treatment was steadily maintained at her own home. The improvement has steadily persisted. Later another calcium oxide determination was made, now yielding .500 gm.

There is no good reason to doubt that the improvement in the patient resulted directly from the administration of the parathyroid extract. Whether this fact, however, stands in any relation to the calcium metabolism is extremely doubtful; nor indeed is the inference justified that in the patient the symptoms were due to a disturbance of the calcium metabolism. The normal excretion of calcium oxide ordinarily runs from .1 to .3 gm. All that can be concluded from the determinations here given is that the elimination in this patient is rather high. Secondly, it cannot be concluded that the elimination was notably influenced by the administration of the parathyroid extract. It certainly was not diminished.

Dr. Milton K. Meyers asked how the calcium output is now.

Dr. Dercum said that he did not know.

Dr. Charles Burr said that he had no experience with calcium output. He had one patient with paralysis agitans and quite severe, a case who came to the Orthopedic Hospital and was put to bed He was desperately poor and he had been living almost an outcast life. Dr. Burr gave him parathyroid in addition. After some weeks his tremor decreased. He was able to walk. He still walked stiffly and had some festination, but he could walk for him with relative ease and comfort and the tremor had not ceased, but decreased greatly. Dr. Burr sent him home and lost sight of him. After that he had probably a dozen cases put on parathyroid, clinical walking dispensary cases. To them nothing happened. Dr. Burr said he did not know whether in this case the parathyroid really improved the patient or whether it was the change from his outcast environment, but he improved more than any man Dr. Burr had ever seen with paralysis agitans. He improved more than any of the other patients whom he had put to bed. Dr. Burr's own belief was that the parathyroid did something to that man. Now whether paralysis agitans is two or three different things and he just happened to strike the patient in this case needing parathyroid, where the other patients needed something else, he did not know. Even the patient's relatives thanked Dr. Burr for the improvement the man had, which was unusual.

Dr. Gordon said that the information given by Dr. Dercum and Dr. Burr was interesting and all of us ought to try the remedy. Since the experiments of MacCallum and others in regard to calcium metabolism in tetany, he had tried in a number of cases where there was tremor. He employed calcium lactate. He had no large experience with parathyroid, but in calcium lactate he recalled distinctly several cases where there was some improvement, and especially in one case of paralysis agitans, an individual of thirty-eight, in whom there was no tremor. With calcium lactate alone in gradually increasing doses he has obtained some good results. He has systematically used this drug in all cases where there is a suggestion of tremor. Dr. Burr's discussion was interesting as to the possibility of the benefit of rest itself. At the same time it was very important for us to try parathyroid in cases where such a desperate condition is brought before us, but calcium lactate itself is not to be neglected.

Dr. Charles W. Burr said he had a parathyroid preparation made by Morgan, the druggist here, so that he could be sure that it was parathyroid.

Dr. Dercum said that he could recall two cases very clearly in which a very remarkable relaxation of the muscles occurred and cessation of the tremor for a time, but unfortunately as the weeks went by the tremor recurred and persisted in spite of the use of parathyroid.

TWO CASES OF CEREBRO-CEREBELLAR ATAXIA

By Alfred Gordon, M.D.

Case I.—E. B., seven and one half years old, born normally, had an attack of diphtheria at the age of five, which lasted seven and one half weeks. From that time the mother noticed the condition from which the child is suffering now.

Station and gait are ataxic. While walking she leans forward, besides being ataxic. There is ataxia also of the upper extremities: the child has to be fed as objects drop out of her hands. The knee jerks are increased on both sides and Babinski is bilateral. The child has a very dull appearance, keeps her mouth open and apparently has difficulty of understanding when spoken to. The eye examination made by Dr. LeFever reveals the following condition: While no distinct cherry spot can be made out in either eye, the maculæ are edematous and there is some abnormal redness in the right macula. The condition could be considered as an atypical case of amaurotic idiocy. Nystagmoid movements are present.

Wassermann test is positive and gives + +.

Case II.—F. L., girl, seven years old, was born with instruments. Convulsions at birth. Commenced to walk at two and one half years and speak at three. It was noticed that she could not walk straight and frequently fell.

Examination shows the following: Gait is oscillating, she stoops forward and the body has rapid lateral movements. Romberg sign is present. The right knee jerk is normal, the left is diminished. The toe-phenomenon is present on left but doubtful on the right. The arms are somewhat ataxic and the child has to be fed, as objects drop out of her hands. Her speech is abnormal: she accentuates each syllable and speaks very slowly.

The eye examination is negative. The mentality is fair and Wassermann is negative.

The two cases present many analogous features. There are cerebral and cerebellar symptoms. The state of reflexes, the speech and the mental status belong to the former; the station, gait, ataxia of the arms belong to the latter. The first child shows no improvement within one year of treatment, while the other has improved somewhat.

In Batten's original cases (Clinical Journal, XXII, 6, p. 81, 1903), under the name of "Congenital Cerebellar Ataxia," we find the following symptoms: unsteadiness of head, trunk, limbs, in standing, in walking, alterations in speech, finally tendency towards recovery. The characteristic speech, a mild degree of ataxia and uncertain gait remained. In L. P. Clark's cases in addition to the above symptoms there was also hypotonia. In a case presented by Gordon before this Society January 28, 1916, these symptoms were also present except the hypotonia. In all those cases, including those presented to-night, there is a great similarity; nevertheless there are some variations. Cerebral and cerebellar symptoms are present in all and the onset also dates from early infancy. In spite of some variations in some cases, the type remains undeniable. Instead of cerebellar diplegia (Batten) or cerebro-cerebellar diplegia (Clark), Gordon proposed the name of cerebro-cerebellar ataxia because of the absence of paralysis which the name diplegia implies.

Dr. Dercum said these cases remotely suggest Marie's group of heredo-cerebellar ataxia. There are apt to be pupillary anomalies in Marie's affection, but there are also spastic and ataxic gaits. Dr. Gordon's cases belong to an entirely different group.

Dr. Gordon said in regard to the suggestion of Dr. Dercum in making a diagnosis he thought of Friedreich's and Marie's cerebello-hereditary ataxia. He felt it was not identical with Marie's, but at the same time he thought that they all belonged to some congenital anomaly of the central nervous system.

Dr. S. D. Immerman (by invitation) and Dr. J. Allen Jackson reported a case of paralysis agitans associated with a psychosis.

Dr. Yawger said that Dr. Spiller had reported this patient's family as a family group of pseudo-sclerosis. The article was published in January, 1916, JOURNAL OF NERVOUS AND MENTAL DISEASE. To return to the matter of paralysis agitans: one would expect in a chronic progressive mental disease that a psychosis would occasionally develop and this is what actually happens. In recent years there has not been very much written on the subject, but from '80–'85 there were a number of articles written by French physicians. Dr. Yawger had seen in a recent textbook upon mental diseases the statement that mental disease does not occur in paralysis agitans. Dr. Yawger had seen two cases of this disorder. He recalled in the Burn Brae Hospital a woman of sixty-five years who showed marked mental disease. She had delusions, mostly paranoid in character. After several months, her condition improved sufficiently for her return home. He also recalled in Dr. Mills's clinic at the University Hospital, eight or ten years ago, another case of paralysis agitans which developed a psychosis. Dr. McConnell and Dr. Yawger signed the commitment papers for this woman's detention.

Dr. Dercum said that a family history in true paralysis agitans was the exception and not the rule.

Dr. Charles S. Potts said that the brother of the patient he had known since about 1900. At that time he came into the University Hospital following a fall from a car and while there he had a marked tremor which was not of the paralysis agitans type at all. He was markedly hysterical and emotional and was supposed probably to be a form of acute hysterical outbreak following a traumatism. It cleared up while there and he went out perfectly well. Dr. Potts saw him a year or so after that in the Philadelphia Hospital and he has seen him a number of times since. When he came into the Philadelphia Hospital he always came in after a spree. He always had marked tremor but one that did not resemble that of paralysis agitans whatever and for years he had no rigidity. The rigidity which he now has and which this patient has to a much less degree was a manifestation of comparatively recent years. Edward, the brother, after rest in the hospital went out in a very fair condition and back to work, until the past five years, during which he has been practically helpless. The tremor is much increased by muscular effort. Dr. Potts said the patient shown by Dr. Immerman he had known, but he had never been on his service. There has been a good deal written about pseudo-sclerosis. Dr. Spiller and Dr. Potts made a report of a case from Blockley some years ago with diffuse sclerosis, in which they made some remarks concerning the relationship of diffuse and pseudo-sclerosis. Their view was that they were practically the same thing. The patient was a colored man who some time before death developed mental symptoms which are not unusual in this condition. Previously his symptoms had resembled those of multiple sclerosis. At the autopsy diffuse sclerosis was found. Recently it has been asserted that many of the so-called cases of pseudo-sclerosis are due to disease of the lenticular nucleus.

Dr. Charles W. Burr said that some time ago he saw this man by accident. He was walking through a ward in the Insane Department and there was a man sitting there with some tremor of his hand, with the attitude of paralysis agitans and a woodeny face and Dr. Burr said it was a case of paralysis agitans and thought nothing more about it. Later when he went over him he found that he had this tremor which, of course, is not the characteristic tremor of paralysis agitans, which is largely an intention tremor, although he often has the tremor at rest, which is increased on muscular effort. Festination is quite marked. At that time he walked faster and faster because his center of gravity was always trying to get ahead of him. He has not the physiognomy of paralysis agitans and the slow speech of paralysis agitans and not the pill moving tremor, but Dr. Burr did not see how it helped to call a thing pseudo-sclerosis when we don't know what pseudo-sclerosis is. Now as to the mental side, the textbooks state that mental things do not occur in paralysis agitans frequently enough to prove any relation. That certainly is an error of observation. Mental troubles do occur more frequently in paralysis agitans than would occur by mere arithmetical chance. What the man was Dr. Burr said he did not know. He was not a case of ordinary, everyday paralysis agitans. Also, paralysis agitans ordinarily is not a family disease. He could not recall a single case of full-fledged, undoubted paralysis agitans in which he had seen two brothers or two sisters, or a brother and a sister. So that his first hasty diagnosis when he first saw the man of being paralysis agitans was certainly not right. What it is he does not know.

BOSTON SOCIETY OF PSYCHIATRY AND NEUROLOGY

January 17, 1918

The President, Dr. J. W. Courtney, in the Chair

THERAPEUTIC EXPERIENCES WITH CASES OF TORTICOLLIS AND IMPOTENCE

By James J. Putnam, M.D.

Dr. Putnam reported further on a case of clonic torticollis in a woman of fifty, whose case he had reviewed nine months ago. The early treatment with massage had brought about some improvement. She was asocial, almost anti-social, suspicious, sensuous and self-indulgent. Proper mental reëducation combined with mechanical treatment of the torticollis effected a cure.

He spoke of another case of torticollis in an unmarried man of thirty-four, a post-office clerk. He was shy, affectionate, responsive but poorly adjusted to his environment, especially at the office where he worked. He had always had a sense of inferiority and self-distrust. He had obsessions regarding his sexual organs and was homosexual. He became much distressed by his maladjustment. A tic and torticollis developed. Mental therapy somewhat in the nature of psychoanalysis brought relief to his mental tension and disturbances and, combined with mechanical treatment, the torticollis disappeared.

A case of psychical impotence was reported in some detail in a man of thirty who was married and a highly respectable professional man. Dr. Putnam spoke of the various methods in vogue for treating this condition, such as the passing of cold sounds, suggestion and hypnosis. He said that the causes were subconscious and that the only logical method of attack was to bare the underlying motives, for which exposure psychoanalysis was indicated. He said that those presenting this condition are frequently of a psychopathic personality. Because of their sense of inferiority these individuals frequently compensate for this defect by self-assertion, which is itself an infantilism. Sex gratification may be obtained by fancying oppression of some other person, usually a member of the other sex. Coitus may be possible only during such a period of assumed oppression. The case in particular revealed but a single successful coitus. The family history of the man showed a dominating type of father who was at times unjust to the mother, for whom the patient bore great affection. The patient had always had a sense of inferiority, was sensuous and homosexual. His thoughts often ran to sexual matters, although in outward respects his actions were above reproach, and he was indeed a migh type of man. Mental therapy after some time overcame the impotence entirely and the man's wife has since become pregnant.

Dr. E. W. Taylor spoke of the habit spasm and particularly of torticollis in relation to occupation, quoting two cases which he had seen recently and in which it did not seem necessary to go into the psychical mechanism, but he thought that the latter matter required investigation in the more complicated cases.

POSSIBILITIES FOR IMPROVING THE CONDITION OF THE DEMENTED INSANE

By William T. Hanson, M.D.

Dr. Hanson presented a paper on the above subject and commented briefly on the increasing congestion in the state institutions and mentioned that a number of plans had been formulated with an idea of remedying the condition. He mentioned especially the high number of cases of dementia præcox which he characterized as a variety of human fungus, emphasizing their apathy, inactivity, listlessness, lowered vitality, in spite of which their span of life is normal.

His discussion was based on experience in an institution for chronic cases, receiving patients only by transfer from other hospitals in the state. The type of patient is usually listless, they do not understand or appreciate what is being done for them and many of them cannot be interested in anything. He compared them to machines, but unlike machines, they do not accomplish the task assigned to them except under constant and careful supervision.

The marked variability in the rapidity with which different patients dement was emphasized and needs consideration in comparative studies of methods for preventing deterioration. He spoke of the work at the Gardner Hospital where large numbers are employed in industrial work and where it is evident that such employment does retard deterioration.

He spoke of the early recognition of work as a therapeutic agent in the care of the insane, mentioning the fact that as early as thirty years ago the patients at the Taunton Hospital were making shoes and similar articles. In 1910 the State Board of Insanity appointed a supervisor of industries and since that date many of the institutions of the state have employed industrial workers. The results have been very satisfactory, though Dr. Hanson said that too much attention was being paid to output in a commercial sense rather than to the improvement of the condition of the patients, for whom the work is a therapeutic agent.

He said that reëducation of the insane was, in his opinion, not possible. That most cases of insanity never deteriorate as far as we believe and that most of them probably know more than we give them credit for seemed probable. To illustrate, Dr. Hanson quoted a case which had been inaccessible for three years, mute, negativistic, etc. Following primary anesthesia for reduction of a dislocated shoulder, the patient talked freely and greatly surprised the physicians. The idea that intravenous injections of ether might benefit such cases occurred to him but never was tried. The plan of reëducation had been tried at Tewksbury for three years and no positive results could be claimed.

The plan which had then been instituted was physical training for the patients. An instructor was engaged and put a group of patients daily through a regular routine of simple exercises in physical training. Owing to the difficulty of an individual unaccustomed to the insane doing such supervision, the teacher became discouraged and left, but not before some promising results had been attained. Later, another instructor was engaged and the training resumed, though in the meantime the patients had returned to their previous state of apathy and listlessness. The work had been well begun only to have the second teacher leave. The experience at Tewksbury seemed to indicate that such training should be given by persons who have had experience with the insane and know how to handle them, suggesting that nurses with training in physical education be used. Further, he thought that it would be a good idea to try out such a plan at some institution such as Gardner, possibly securing especially good nurses from several of the other state hospitals to carry on the experiment, should there not be a large enough group of better nurses in any one of the hospitals.

Dr. Nichols of Tewksbury was of the opinion that Dr. Hanson had rejected the plan of reëducation without sufficient reason, though the plan had been tried for several years. He felt that the plan had not been given a fair trial, for the plan of reëducation embraced not only the kindergarten and other educational features but also those of occupational and physical training. The idea of revitalization really is a part of the plan of reëducation.

He spoke of the apathy, listlessness and other physical features of many of the cases of chronic dementia as being problems for the internist to solve and spoke of the fact that despite the many autopsies and elaborate laboratory work which was being done on this very group of cases, very little knowledge had been derived from such studies.

The point that nurses accustomed to handling the insane were better fitted to give physical training to patients, when they had had such special training, was opposed by Dr. Nichols. He said that the nurses knew too many drawbacks in the handling of the insane patients which teachers without experience did not know. He emphasized the necessity of enthusiasm and initiative in carrying out such work as reëducation as well as the maximum of good food, fresh air, the best of nursing and the most skilled of medical attention.

Dr. Howard commented on the early work of the Board of Insanity in relation to the matter of occupational therapy, mentioning the fact that patients at Tewksbury were so employed when Dr. Howard was still a medical student. He spoke of the fear with which the superintendents of the hospitals started that work, feeling that such employment would be construed as an attempt to exploit the patients in the interests of the hospitals, rather than as a therapeutic measure. He spoke of the necessity of keeping in mind that the employment was intended for the good and the treatment of the patient and that even the patients, as also more normal individuals, must be employed in work to which there is some evident utility, in order to keep them happy and interested.

Dr. Scribner felt that both reëducation and revitalization were needed in the treatment of the insane to ward off rapid deterioration, believing that the difference of opinion between Dr. Hanson and Dr. Nichols was not real. He said that the character of the employment should be selected for each patient in order that the most promising results could be obtained, the object of such occupational therapy being improvement of the condition of the patient, not their cure, and the criterion of judgment as to the value of such employment should not be commercial output but improvement in the patients. Anything which could be utilized to improve the condition of the patient and to make him happy should be done.

Dr. Harrington raised the question as to why patients are permitted to dement and said that he thought the answer was in part found in the fact that the institutions are so crowded and such large numbers of patients are cared for by so few persons. That emphasized the value of individual attention, which he illustrated by quoting from an experience which he had had with a young patient.

Dr. Cohoon said that he had had some experience with reëducation methods at the State Hospital for the Insane at Howard, R. I., and that he believed in all such methods, but from a practical standpoint among the chronic insane his experience at Medfield was that where the men were kept busy with the pick, shovel and wheelbarrow and the women in the fields and at work in other places the results were very good; that where efforts of this sort had been made at Medfield it was found that the patients were more orderly and neater in their appearance.

In closing the discussion, Dr. Hanson emphasized the point that the cases should be followed actively from the very start and the plan as outlined and discussed should be applied early in order to retard deterioration. Many of the cases which had been studied at Tewksbury were very badly demented and very little could be done with them, for there was very little from which to start.

FEBRUARY 21, 1918

The President, DR. C. G. DEWEY, in the Chair

AN UNRESOLVED CASE OF WAR SHOCK

By Lawson G. Lowrey, M.D.

Dr. Lowrey presented a case in which there were grounds for supposing war shock in an Italian of twenty-four who had enlisted in the British army in June, 1915. He claimed to have been wounded in the leg and gassed in August, 1916. Later communications, however, showed that he was in the Napsbury Hospital in May of that year, evidently psychotic then.

In November, 1917, he was removed to this country at the request of his family. He showed periods in which he was very talkative and at times reënacted the experiences of the trenches. One night he escaped from the house and paced beneath a tree as a sentry. Auditory and visual hallucinations were evident. He was finally taken to the Psychopathic Hospital.

When examined, he was dazed, confused, disoriented and hallucinated. He was very inaccessible, his movements were slow and his speech schizophasic. During this time he seemed to be learning his environment anew. The family history was poor, including illiteracy, feeble-mindedness, epilepsy and delinquency. Physical examination disclosed unequal pupils, slight ataxia, absent left abdominal reflex, asymmetrical knee jerks and absent ankle jerk on the right. Serological examination was negative. The case seemed clearly one of dementia præcox. He had several periods of excitement during which he dramatized the war experiences. His memory was completely shattered. At times he was prayerful, at times resistive and irritable. Hallucinations were not constant.

Lately the patient has become more accessible and denies now that he ever was wounded. The gassing referred to appears to be the memory of an etherization during a mastoid operation done years ago. More letters have come which show clearly that he was definitely paranoid dementia præcox when he was at Napsbury. Because of the physical findings, however, it seemed that there might be justification for the idea that war shock played a part in the development of the psychosis.

A CASE OF MULTIPLE TUMORS, WITH EXHIBITION OF X-RAY PLATES

By J. W. Courtney, M.D.

Dr. Courtney presented a short communication on the above case, seen by him at the Peter Bent Brigham Hospital with Dr. Christian, to whom he is indebted for the use of hospital records and X-ray plates. The patient was a married woman of forty-three. The family history was unimportant. The previous history was also unimportant, except that for four or five weeks prior to the middle of February, 1917, the patient had suffered from headaches which varied in site—either frontal region, sinciput and occiput. In latter region they were associated with stiffness of the neck. There had been no vertigo, nausea or vomiting, and no loss of vision.

In February, 1917, she had a sudden attack while sitting in a chair. This was characterized by a peculiar stare, followed by a faint of a few minutes' duration. After the attack the tongue was found to deviate to the right, while the corner of the mouth drew to the left. The pupils were equal, speech dragging and thick in character, right arm weak, ulnar distribution and right face numb. There was also twitching of this side of the face. The patient was conscious and rational but seemed to have some memory defect. There was no swelling over the head or dilatation of its veins. Pupils equal and regular and their responses normal. Slight ptosis on right. Corneal reflex sluggish on that side. Optic disks very pale; optic cups 2 or 3 D. deep. Blood vessels normal. The patient left the Brigham after ten days, improved. The tentative diagnosis of cerebral thrombosis was made.

In April, 1917, a small swelling was noticed in front of the left ear. This did not appear to increase in size. In August a similar swelling appeared over left eye. At the same time patient complained of pain and loss of power in right leg. Subsequently growths were found in right leg, right arm, back and scalp above the right ear. Her headaches continued and patient grew increasingly stuporous. When seen by Dr. Courtney in November, 1917, she was stuporous and could not be roused. Examination of the tumor in front of the left ear showed that it was gelatinous and rather freely movable. The tumor over the left eye gave the clue to the nature of the growths. It was gelatinous like the others, but had a hard bony ring about its base, indicating that it had pushed forward from the bone medulla. The clinical symptoms naturally suggested a protrusion of the growth into the left frontal lobe as well. The X-ray plate exhibited by Dr. Courtney showed that the growths were identical with those seen in a plate, also exhibited, taken in another case in which the diagnosis of multiple myelomata was confirmed by necropsy.

REACTION PHENOMENA IN CASES OF REPRESSION AND IMPULSION

By William Healy, M.D.

Dr. Healy read a paper on the above subject. He called attention to the fact that the problems of conduct, as such, have not as yet become one of the fields for the psycho-pathologist, despite the great opportunities in that field for study and constructive work. He said that the problems were worthy of the best scientific effort in investigation and diagnosis as well.

The paper dealt with the concrete data from studied material of conduct problems rather than with the theoretical considerations of the mental mechanisms involved. Dr. Healy emphasized early in the paper that one of the most striking characteristics in some types of conduct is the unusualness of the accompanying phenomena. Very often the behavior does not follow the ordinary path of human action, nor does it point to any kind of usual satisfaction. To illustrate, Dr. Healy quoted from the record of a boy of fifteen in whom there was a special temptation to steal an automobile. The past history of the boy was not noteworthy. He was a thoughtful, quiet, sedate and refined boy, opposed to the coarse language of his comrades and quite desirous of the company of a nice young girl of about his own age. The boy related his physical and mental states at the times of the temptations to steal, saying that he would get all excited and nervous, that he would get hot and sweaty and that he had frequently experienced these phenomena. When he had finally taken a machine, as he did several weeks later, all the nervousness left him and he felt calm and relieved. This is a remarkable fact, since it is usual for the delinquent to experience nervousness after the act, when the fear of discovery and punishment comes upon the offender. A study of the recent past of the boy revealed that for several months prior to the theft, a new feature in the form of loose talk about girls had come into his life through contact with a certain group of less refined boys. These boys also committed petty thievery, and from them he received the suggestion of stealing. The final relief of his situation came when he jumped into an automobile in front of a hotel in Boston and drove the car home, after which he hid the machine for several weeks before it was discovered. He used it very little; apparently the possession of it satisfied his impulse. During these weeks he appeared entirely normal and assures that he had not the slightest feeling of concern over the possibility of the car being found or of the consequences which might follow.

Another case was cited, that of a young theological student who found in the act of stealing a satisfaction which was incomprehensible to him. To be sure, the feeling of regret and remorse followed, but not for some little time. His also was a case in which ideas of sex matters and ideas of stealing were primarily associated with a strong emotional bond. Here, too, the act of stealing was preceded by a period of restlessness and nervousness. Exploration of the inner mental content resulted in complete freedom from the imperilling temptation.

The results of impulsion delinquency are not always pleasant, frequently they are far from enjoyable and may be very painful. Dr. Healy cited a case of a young college man in whom the worry of his silly thievings had led to a state of distinct depression, in spite of which, however, he continued to steal. The money which he secured in this way was never spent. Despite his great shame, however, he admitted that there was some sort of a temporary satisfaction in the act.

Another group of impulsions which Dr. Healy discussed was that of running away from home. Sleeping in weeds or in ash cans in the alley of a big city, obtaining food from fishermen, picnicers or by begging, could hardly be considered as an adequate substitute for a warm bed and regular meals at home, but Dr. Healy mentioned several cases of young boys having run away from home and having subjected themselves to severe unpleasant experiences for no obvious reasons, the real source of the impulsion only being found by thorough analytic inquiry.

The nature of the accompanying phenomena of the physical and mental life of the individual who is both the active agent in the repression and the subjective sufferer from the repression, is a matter of much interest. A mother of a boy of eight told of the lad complaining of a peculiar headache or pain in the back of the head and who complained much of a certain sex word bothering him. The word would cause dizziness, sleeplessness, confusion and headache. Dr. Healy referred to several instances of a similar nature.

The reader called attention to the fact that various forms of nervousness and nervous tension are evident in repressions. He quoted the case of a pathological liar of thirteen who showed marked signs of nervous disorder. She had been taken out of school by order of a physician and much concern had been expressed over her very nervous state. Another case in point was quoted, a boy of eleven. In this case, as in those mentioned earlier, sex matters and stealing were found associated and there was also the nervousness and sleeplessness related to bad words.

A case of exhibitionism in a man of thirty-four was discussed. The man was a high-minded, intelligent, rather neurasthenic fellow, who was entirely unable to account for his decidedly peculiar and, even to himself, highly offensive actions. Other cases of impulsion, such as running away, were quoted and discussed. In a number of them there were present the symptoms of nervousness, tension and restlessness preceding the act. In several, the phenomena of a word producing pain, dizziness and headache were noteworthy. Dr. Healy spoke also of the sex impulsions in the light of these other delinquent impulsions and emphasized the difficulty of ascertaining the link in the mechanism of some of the cases of the Jack the Hugger type. Several such cases were discussed.

In conclusion, Dr. Healy called attention to the anomalies of behavior and the mental reactions with their accompanying physical manifestations as problems for the psycho-pathologist. The problems should be approached singly, without prejudice, sympathetically and without haste. He felt very sure that the field was highly favorable for investigation and that it promised much in the possibilities of cures.

Dr. Putnam said that he thought it would be impossible to overemphasize the importance of the matters which Dr. Healy had discussed. The problems of education which the tendencies of these children bring to the front are of significance, not alone for the sake of the juvenile courts, but for the welfare and training of all children in the home and in the school. The actual delinquencies which bring the children of the poorer people into public notice and endanger their future careers and their relations to the community, are psychologically not different from the tendencies that thousands of children of the very best families the country over exhibit, in the form of day-dreamings and cravings. Ideas of violence and temptations to steal, for example, come up constantly in the histories of people who, from the point of view of outward behavior, are absolutely above reproach, and may give rise to feelings of misery and inhibition. But these ideas, if they do not wholly originate in early childhood, become gradually accentuated at that period, through a false use of the imagination. At present little is done to neutralize such tendencies, and although, in fact, they are difficult to handle, the first step toward handling them is to recognize their meaning and their possible results. In short, the subject of behavior is one of immense importance, from both the psychological and educational standpoints.

Dr. Courtney said that what impressed him particularly in Dr. Healy's paper was the similarity of the phenomena exhibited by the delinquents described to those observed in intellectual petit mal. Certain of Dr. Healy's cases betrayed one or more of the stigmata of the congenital psychopath. In practically all the suddenness of onset of the criminal impulses, the associated vertigo, the more or less frequent fugue episodes and the various obsessions combined to bring to mind the picture of a *diluted* form, so to speak, of epilepsy.

Dr. Healy, in closing the discussion, said that many of the cases, such as he had spoken of, left untreated, do not right themselves, many go on to more serious difficulties. He had recorded some instances of long careers of criminal behavior, with frequent appearance in court and repeated sentences, which had begun in the manner and with the phenomena stated. For that reason, early recognition and treatment were of the highest import, for many of the cases yield readily and completely to proper therapy then.

Translations

THE INTERNAL SECRETIONS AND THE NERVOUS SYSTEM[1]

By M. Laignel-Lavastine

Authorized Translation by Fielding T. Robeson, M.D.

(*Continued from page 302*)

The direct endocrino-nervous relationships have numerous examples, both clinical and experimental: tachycardia in Basedovians, hypotension in Addisonians, mydriasis following the conjunctival instillation of adrenalin, etc.

The indirect endocrino-nervous relationships are often extremely difficult to outline precisely, and it is in their study that one part of the difficulties of the question lies.

I will also divide these relationships into four categories.

The first category includes the indirect endocrino-nervous relationships through evolutional morphological intervention. Thus a lesion of the thyroidal body sustained in early infancy, even in utero,[68] arrests the general development of the organism, and thereby interferes with the appearance of secondary sexual characteristics with all their consequences.

The glandular disorder, appearing in utero, in infancy or adolescence reacts on the development of the organism. The relationship comes essentially under the domain of ontogenesis and morphology. The secondary nervous disorders result from structural anomalies, which are themselves secondary to the glandular lesion.

The second category, near neighbor to the first, includes indirect endocrino-nervous relationships through humoral morphological intervention. Thus normally the suppression of the ovarian function at the menopause entails well-known modifications of the female organism, the exaggeration of which determines, among other disorders, trophic symptoms such as a subcutaneous adiposity and development of hair. This example may also serve for the comprehension of a third category: the indirect endocrino-nervous relationships through a humoral intervention. The latter are extremely frequent; they are explained very naturally by the functional correlations under the influence sometimes of the hormones and sometimes, and perhaps more often, of the general modifications of metabolism (loss of calcium for example[69]) set free by the glandular disturbance or even directly by the cause of the latter.

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[68] J. Parhon, "Quelques considérations sur l'importance des fonctions endocrines, pendant la vie embryonnaire et foetale et sur leur rôle dans l'organogenèse," Presse med., 1er oct., 1913.

For example increased arterial tension among Basedovians seems to be allied to the fact that their blood contains more adrenalin than that of normal individuals. Asher and de Rodt explain it by the fact that thyroidal hypersecretion reinforces the action of adrenalin; by an indirect route the terminal organs of the sympathetic may be in a state of excitation, and as the secretory nerves of the suprarenals belong to the sympathetic, an increased secretion of adrenalin may result.

Per contra, to explain the tachycardia, one must invoke another factor besides the experiments, experience teaches only that the products of *normal* thyroidal secretion augment the excitability of the autonomic nerves.

A fourth category is established by indirect endocrino-nervous relationships through nervous intervention. This intervention is excited at times physiologically and at other psychically. In the first case it consists for example of headache due to a meningo-encephalic vascular disturbance under the influence of a cervical sympathetic disorder of thyroidal origin.

In the second case it consists for example of a phobia (fear of dying, of having heart disease, of becoming insane, etc.) determined by a diffuse anxiety allied to a menopausal tachycardia from excitation of the sympathetic of thyroidal origin, and the accuracy of this mechanism is shown by the cure of such cases with hemato-ethyroidine (unpublished personal observations).

One can consider this last group, which is very important in psychiatry, as a fifth category, and speak of indirect endocrino-nervous relationships, through psychic intervention. These relationships simply dogmatize the facts. They do not explain them. The Viennese school in a series of remarkable studies has attempted to interpret them. I will leave to my co-worker, Professor Biedl, the honor and pleasure of explaining these researches, which he partly instigated, and which he has had the wisdom to publish already with his collaborators and pupils, showing admirable command of the subject.

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[69] Chiari et Fröhlich, Arch. f. exp. Pathol. u. Parmak., 1911, p. 214.

At the end of this analysis I will only remark that if the pharmacodynamic division of Langley, Eppinger and Hess of the vegetative system into the autonomic and sympathetic systems introduces in its own interest a new standard in the nomenclature of the nerves, up to now based on anatomy, and that if it is better now to think in terms of physiology rather than of anatomy, nevertheless the pharmacodynamic idea is not the whole of physiology, and the three present divisions of the vegetative system into the anatomical, physiological and pharmacodynamic do not fit their valencies together with any precision.

In a parallel manner to this division of the vegetative system Eppinger, Hess, Falta and Rudinger have divided the endocrine glands into two groups, one vagotrope and the other sympathicotrope. As I have already stated the vagotropes are the pancreas and parathyroids, and the sympathicotropes are the thyroid and the adrenals, to which Falta and Berterelli have added the infundibular portion of the pituitary. Now the analysis of nervous disorders in the endocrine syndromes shows moreover that the vagotonic and sympathicotonic disturbances, far from being always opposed to each other, exist at times in the same individual, not only consecutively but simultaneously, and accordingly there is not a simple and constant relationship between the endocrinal disturbance and the nervous disorder of one or the other group.

Things then seem much more complicated than one would have believed, and the classifications of the Viennese School, even if they have rendered, and still render, great service in arranging the phenomena, do not seem as yet sufficiently adequate in real truth to act as a basis for new systematizations.

2. Endocrine Disorders in Nervous Syndromes

In all individuals suffering with nervous diseases endocrine disorders may coexist; but I will only outline the cases in which these endocrine disorders may be under the direct or indirect influence of the nervous syndromes, or which play a rôle in determining the nervous symptoms, although their clinical manifestations are not evident. Following this point of view I will divide these syndromes into three large groups: sensory-motor, vegetative and psychic.

A. SENSORY-MOTOR SYNDROMES

Among these syndromes there are a great number that can have nothing but a relationship of casual coincidence or a more or less mediate attachment. That is why I eliminate the hemiplegias, paraplegias, ataxias, muscular atrophies, vertigoes, tremors, athetoses, choreas, spasms, myoclonias, contractures, convulsions, myotonias, hypotonias, myatonias, neuralgias, distributed pains, migraines, paresthesias by evident organic affections of the nervous system, with known lesions of the nerves, of the spinal cord or brain, even though endocrinogenous toxic functional nervous disorders often exist coincident with nervous symptoms of an organic nature. Certainly as bearing on the subject, for example, are the hemiplegias due to hemorrhage of the optic thalamus, often allied with suprarenal hypertrophies (Frouin), and which readily appear to be due to increased arterial tension secondary to dyshyperfunction of the adrenals; in like manner the cerebral hemorrhages of the menopause, allied also to ovarian insufficiency by the intervention of sudden hypertensive shocks in the vasomotor ataxia of that critical period; as well as, although inversely, increased suprarenal secretion by excitation of the splanchnic in the course of tabetic crises (there are endocrine secretory crises just as there are exocrine); also aspongiocytosis in these same suprarenals subsequent to the incessant motor agitation in cases of chronic chorea or mania (unpublished personal notes); also those tabetics or cases of syphilis of the nervous system with myxedema, infantilism, tetany, etc., caused by concomitant syphilitic lesions of the nervous system and the glands. In the first two cases the relationhip is too indirect and mechanical; in the two following the relationship is inverse, neurogenous, direct and indirect; in the last the coincidence arises from a co-effect of the same cause, namely syphilis, acting on two different parts of the body. One could multiply such examples without profit.

I will retain among the sensory-motor syndromes only those whose pathology is still disputed, and which appear sufficiently often in coincidence with endocrine disorders for the hypothesis of a relationship between cause and effect to be at least worthy of discussion.

Such are

1. Certain intermittent paraplegias: thyroid, parathyroids, thymus, suprarenals.
2. Periodic paralysis (Westphal).

3. Pseudo-paralytic myasthenia gravis (Erb-Goldflam):[70] thymus, parathyroids.
4. Myopathies:[71] thyroid.
5. Certain vertigoes: pituitary, suprarenals, ovaries.
6. Certain tremors: thyroid.
7. Certain choreas: thyroid, suprarenals.
8. Certain spasms.
9. Certain myoclonias.
10. Tetany: parathyroids.
11. Parkinson's syndrome:[72] parathyroids, thyroid(?), pituitary(?), ovary(?).
12. Epilepsy: thyroid.
13. Eclampsia: parathyroids.
14. Myotonias.
15. Congenital myatonia.
16. Hypotonia.
17. Acroparesthesia.
18. The cephalgias: thyroid, ovary.
19. Migraine: thyroid.
20. Certain paresthesias.

In this résumé I wish to state that the sensory-motor syndromes coming under the precise heading of the chapter: endocrine disorders in the nervous syndromes have not been described, so to speak, but I have nearly always indicated nervous syndromes in which endocrine disorders should be looked for in order to understand them. I have been guided therefore more by the relative symptomatic importance of the nervous and endocrine manifestations than by the causal relationship. From this last point of view I must distinguish at first the cases, few in number, where the endocrine symptoms are caused by nervous disorders, such as the endocrine insufficiencies described recently by Claude, in the train of the crises of Erb-Goldflam myasthenia, and later on the more numerous cases where the nervous symptoms are caused by endocrine disorders.

This subgroup is not to be confounded nevertheless with that of the nervous disorder in the endocrine syndromes, because in the latter there is a clearly outlined endocrine syndrome, while in the former there is merely an endocrine commotion. If they are confounded owing to their relationship of pathological causality, they are to be distinguished clinically in definite types, with, in addition, all their intermediates between them.

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[70] Tobias, Neurol. Centralbl., May 1, 1913, pp. 551-62.

[71] Oppenheim, H., Congres de Londres, 1913.

[72] Sainton et Barré, Soc. de Neurol., 26 juin, 1913. R. N., 15 juill., p. 55. Parhon et Goldstein, Soc. des sc. mèd., Bucarest, 1909, 1910; Encéph., oct., 1912, p. 228.

This having been stated, two remarks arise from the preceding résumé. It deals especially with syndromes having paroxysmal manifestations and with disorders bearing on qualitative variations of motility.

This rôle played by the endocrine glands in paroxysmal nervous manifestations did not escape a clever clinician like Léopold Lévi,[73] and he has proposed the name of endocrinolepsies for such paroxysmal syndromes, because they burst forth of a sudden, like an explosion (lepsy, λαμβανειν to seize) and they are subordinated to an endocrine disturbance.

The principal endocrinolepsies are, according to Léopold Lévi, ordinary migraine and ophthalmic migraine, ordinary asthma[74] and nasal asthma, muco-membranous enteritis, urticaria, relapsing edemas, periodic hydarthrosis, acute exacerbations in chronic rheumatism, paroxysms of gout, crises of grayness of the hair, crises of anxiety, acute paroxysmal goiter.

I feel that I can add certain convulsive, tetanic, paralytic and asthenic crises.

These crises, sudden, variable, relapsing, subject to disappearance through the use of simple organotherapy (most often thyroidal, sometimes adrenal) or complex, are as a rule dominated by the feminine sexual life.

According to Léopold Lévi the endocrine disorder is the pathological mordant which sensitizes centers already predisposed. In thyroidal endocrinolepsies, he claims a hyperthyroidal paroxysm which activates the nervous centers by a local vaso-motor blast. I might state with equal reason that it is a general law of the nervous system to respond in intermittent fashion to continuous stimulation.

Be that as it may I have continued to insist on the paroxysmal character of sensory-motor syndromes, such as tetany, myasthenia, migraine, which seem allied with endocrinal disturbances.

Secondarily I recall that the schema of Lundborg,[75] open to discussion from certain viewpoints, has the merit of synthesizing the physio-pathology of the thyroid and parathyroids and of showing the rôle played by the parathyroids in the neuro-muscular regulation. It is in this way that he connects tetany, paralysis agitans, myoclonia (myoclonus, epilepsy), myotonia, with a parathyroid insufficiency, and pseudo-paralytic myasthenia and periodic myatonia with a hyper or dysfunction of the parathyroids.

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[73] Léopold Lévi, Endocrinolepsies, leurs charactèrs généraux, Soc. de méd. de Paris, 9 janv., 1914, pp. 44–47.

[74] La crise hémoclassique initiale découverte par Widal et ses collaborateurs dans l'asthme, Rev. méd., juill., 1914, comme dans l'urticaire et l'hémoglobinurie paroxystique, Sem. méd., 1913, n'élimine pas le facteur nerveux réactionnel et ses connexions endocaines.

[75] Lundborg, Deutsche Zeitschr. f. Nervenheilk., Bd. XXVII, 1904, p. 217.

Tetany is alone to-day no longer in doubt, as far as the other affections are concerned—it is nothing but an hypothesis as yet. The most firmly established hypothesis appears in relation to Parkinson's syndrome. In this instance as Roussy and Clunet[76] state the parathyroids may be found in a condition of hyperplasia. As to the relation of this condition with the syndrome, it is ignored. It is quite possible, according to Claude,[77] that it consists of a simple reaction of defense in the organism.

B. VEGETATIVE SYNDROMES

In this enumeration I will follow the plan of my Pathology of the Sympathetic[78] now being published.

(*a*) *Tegumentary Syndromes*

1. Local syncope of the extremities: thyroid, suprarenals, kidney.
2. Acrocyanosis: thyroid, thymus.
3. Erythromelalgia: ovaries, thyroid, suprarenals.[79]
4. Acroparesthesia: suprarenal.
5. Erythema: thyroid.
6. Urticaria: thyroid.[80]
7. Dermographia: thyroid.
8. Purpura: liver.
9. Pruritus: liver, kidney, thyroid.
10. Melanoderma: suprarenal, thyroid.
11. Vitiligo.
12. Hyperidrosis: ovaries.
13. Chromidrosis.
14. Seborrhea: thyroid(?), testicles(?), ovaries(?).

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[76] Roussy et Clunet, Arch. de méd. exp., 1910, no. 3.

[77] H. Claude, Soc. de Neurol., fev., 1910.

[78] M. Laignel-Lavastine, Pathologie du Sympathique. Esquisse d'anatomo-physio-pathologie clinique, 1 vol. in-8 de 600 p., Paris, Alcan, 1915?

[79] Moleen, G., Journ. Amer. Med. Ass., 17 août, 1912.

[80] Les modifications sanguines qui précèdent la crise d'urticaire, ses rapports avec l'anaphylaxie, sa cause determinante ramenée par Widal et ses élèves (Widal, Abrami et Et. Brissaud: L'auto-anaphylaxie, Sem. méd., 24 dec., 1913), à un conflit entre colloïdes, n'excluent pas l'importance de la thyroïde dans les prédispositions réactionnelles et les manifestions neuro-cutanées.

15. Goose flesh: thyroid(?).
16. Premature grayness of the hair: thyroid.
17. Alopecia: thyroid.[81]
18. Hypertrichosis: thyroid, suprarenals, testicles, ovaries.
19. Zona and herpes.
20. Scleroderma: thyroid.
21. Raynaud's gangrene: thyroid(?).
22. Acute angioneurotic edema: thyroid.
23. Trophedema: thyroid(?), pituitary(?).
24. Adiposity: pituitary, thyroid, ovary, pineal.

(*b*) *Osteo-articular Syndromes*

26. Acromegalia: pituitary.

(*c*) *Syndromes of the Neuraxis*

29. Syndromes of the cervical sympathetic: thyroid(?), suprarenal.
31. Mydriasis: thyroid.
32. Myosis: suprarenal(?).
33. Glaucoma.
34. Glittering eye: thyroid.
35. Exophthalmos: thyroid.
36. Migraine: thyroid, ovaries.
37. Cephalic vaso-dilatation: ovaries(?).
38. Epilepsy: thyroid, ovaries.
39. Vertigoes: suprarenals, ovaries, thyroid.
40. Euphoria: thyroid.
41. Melancholia: thyroid, suprarenals, ovaries.
42. Anxiety: thyroid, ovaries.

(*d*) *Circulatory Syndromes*

43. Vascular spasms: suprarenals.
44. Increased arterial tension: suprarenals, pituitary.
45. Vaso-dilatations: thyroid, ovaries.
46. Arterial hypotension: suprarenals, pituitary.
47. Palpitations: ovaries, testicles, thyroid.
48. Tachycardia:[82] thyroid, ovaries.
49. Bradycardia: pituitary(?).

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[81] Sabourand, Ann. de dermatol., mars, 1913.

[82] La théorie endocrine de la tachycardie paroxystique a été exposée par Savini (Arch. des mal. du coeur, nov.–dec., 1912). J'en ai confirmé l'au dernier l'exactitude chez une femme à la ménopause qui quérit par opothérapie ovarienne.

50. Arrhythmia.
51. Cardiac neuralgias.
52. Syncope: thymus, suprarenals.

(e) *Respiratory Syndromes*

54. Asthma: thyroid.
56. Acute edema of the lungs: suprarenals.
57. Rhinorrhea.

(f) *Digestive Syndromes*

58. Hypersalivation.
60. Gastric crises.
61. Enteralgic crises; thyroid.
65. Digestive atony.
66. Digestive spasms.
71. Diarrhea.
72. Glycosuria: thyroid, suprarenals, pancreas, liver, pituitary.
78. Constipation: thyroid, pituitary.
80. Muco-membranous entero-colitis: thyroid.

(g) *Urinary Syndromes*

84. Polyuria: pituitary (?).
85. Albuminuria.
89. Too frequent urination: thyroid.

(h) *Genital Syndromes*

95. Impotency: prostate, testicles.
96. Priapism: suprarenals.
98. Ovarian crises.
101. Frigidity.
104. Menstrual troubles: thyroid, ovaries.

(i) *Endrocrine Syndromes*

105. Basedow's syndrome: thyroid, thymus.
106. Addison's syndrome: suprarenals.
107. Polyendocrine sympathetic syndromes.

(j) *General Trophic Syndromes*

108. Hyperthermia: thyroid.
109. Hypothermia: thyroid.

111. Diabetes mellitus: pancreas, suprarenals.
112. Emaciation: ovaries, testicles, thyroid.
113. Obesity: thyroid, pituitary, pineal, ovaries, testicles.
114. Herpetism: thyroid.

All these vegetative nervous syndromes are the functional results of very different causes. Such glands as I have marked opposite to them simply indicate that in certain cases the endocrine disorders, which have been noted in coincidence with the nervous disorders, have played a rôle in the determination of these nervous syndromes, or that inversely the endocrine disorders are secondary to the nervous commotions.

In fact it is often very difficult clinically to keep from confusing the angio-tropho-neuroses and their endocrinal consequences with the endocrinopathies and their vegetative nervous consequences.

Quite often the symptomatic intricacy and the paucity of chronological and established data are such that one is forced to have recourse to a synthetic expression, such as sympathosis,[83] which I have proposed, and which simply indicates a vegetative nervous syndrome. Among the univocal sympathoses, the sensory, circulatory, lisso-motor, secretory and trophic sympathoses constitute the framework for the preceding facts. I must call attention to the considerable rôle that these vegetative nervous syndromes play in dermatology in their vaso-motor, secretory and trophic types and in psychiatry in their cenesthetic and vaso-motor types.

It is here that one grasps the closeness of the connections between the internal secretions and the vegetative nervous system, and one understands thereafter the interest of the study of the sympathetic and the vascular glands in domains like dermatology and psychiatry,[84] where taken clinically they still conform partly to a botanical classification.

Just as I have laid stress elsewhere[85] on the rôle of the sympathetic in that which I have called the pathology of the border made up of those humoral reactions or reflexes saddled on neurology, dermatology, psychiatry, visceral medicine and the pathology of metabolism, one can claim that there is a whole endocrino-vegetative chapter still to be written in dermatology, as in digestive, circulatory, respiratory, urinary and mental pathology.

(*To be continued*)

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[83] Laignel-Lavastine, Les sympathoses, Presse méd., sept. 20, 1913.

[84] Laignel-Lavastine, Le sympathique et les viscères dans les affections mentales, Traité internat. de Psychol.-pathol. Dans ce travail je montrais l'importance de ce que Münzer nomme très hereusement "la décentralization de la psychiatrie."

[85] Laignel-Lavastine, Définition du sympathique, Gaz de Hôp., 1912.

Periscope

American Journal of Insanity

(Vol. 73. 1917. No. 4)

Abstracted by Dr. C. L. Allen, Los Angeles

1. Social Service in State Hospitals. G. M. Kline.
2. Psychosis with Schizophrenic and Freudian Mechanisms. C. C. Wholey.
3. Psychoanalytic Tendencies. Wm. A. White.
4. Psychiatric Aspects of Pellagra. W. C. Sandy.
5. Manic-Depressive Psychosis in Negroes. E. M. Green.
6. Manic-Depressive and Dementia Præcox. H. H. Drysdale.
7. Psychology of Hysteria. W. G. Somerville.
8. Dreams and Their Interpretation. Robt. Jones.
9. Reception and Care of New Admissions. C. G. Wagner.
10. Biological Aspects of Dementia Præcox. F. W. Langdon.
11. War and Neuroses. C. B. Farrar.
12. Psychoneuroses and Etiology of Sex. A. Gordon.

1. *Social Service in the State Hospital.*—A description of what is being done at the Danvers State Hospital to supply "The needs of the Patient," "The needs of the Institution," and "The needs of the Community." The work has developed until it now includes the following divisions:

1. Investigation of special cases for specified purposes usually relative to after-care of patients who are under consideration for discharge or trial visit at home.
2. The securing of histories, medical and social, outside the hospital.
3. Home visitation or after-care of out patients.
4. Systematic boarding out of patients in private families.
5. Connecting needy persons with the proper agencies.
6. The weekly attendance upon out-patient clinics.

The author gives an interesting account of what is being done under each of these heads with illustrativs cases.

2. *A Psychosis Presenting Schizophrenic and Freudian Mechanisms with Schematic Clearness.*—An explanation on Freudian lines of the case of a woman 32 years old, who seems to have always had a strong tendency to romancing and to have been given to sexual fancies, who developed the delusion that a young man employed in the same office was in love with her and intended to marry her. There appeared hallucinations of hearing his voice which at times sneered at her, again commanded and finally made love to her. At the climax of her psychosis she in her wish-fulfilment reached a point at which she imagined that they were married and about to consummate their union, when the figure of Christ appeared and she was at once filled with a sense of awe and shame. At this time she was for some days disoriented and confused but later began to clear. She then began to think that the lover was annoying her again and wrote notes about him which brought her under examination and she was committed. At the hospital, isolated from everyone but physician and nurses, she gradually regained insight and in time was

convinced of the unreality of the voice she had been hearing. During her readjustment she showed a period of exaggerated religious scruples, worried about offenses of her past life and constantly kept a Bible in her hands. The whole case history reads like that of a manic-depressive attack with a paranoid trend. The author finds by his psychoanalysis that this woman, originally of strong hysteric tendencies, had had in youth a father-daughter complex and later had fixed her libido upon herself—narcissism. Six months later her persecutory ideas had disappeared and she seemed indifferent to the former lover. The author thinks that her readjustment consisted in the repression of the heterosexual and her return to a more comfortable infantile homosexual plane.

3. *Psychoanalytic Tendencies.*—One of the greatest contributions to the problems of psychiatry has been made by psychoanalysis, namely, the genetic conception of the psyche. The concept of a history for every psychological structure, of an embryology and a comparative anatomy for each psychic fact, so to speak, has relegated to the background the mere descriptive psychology of the neuroses and psychoses and has raised psychopathology to an interpretative level, a level at which symptoms are accepted in the light of their meanings only. This conception calls for an energic concept of the psychic force, "libido," "horme," "elan vitale." Coupled with this theory of the libido as energy are the concepts of "conflict" and "will to power," which sees in all biological tendencies an effort to transcend their limitations through the power of development. The original concept of a self-preservative and race-preservative libido comes to be divided still further into a gastro-intestinal libido, skin libido, eye libido, ear libido, muscle libido, etc. Here we have an energic conception of the libido which is operating both in the history of the individual and in that of the race, striving to effect the problems of integration and adjustment at both the higher and the lower levels. This is something a good deal more than mere sexuality. The old dualistic conception of mind and body finds no place in this newer way of looking at the phenomena of nature. Adler's concept of organ inferiority the author thinks an attempt to show why the "conflict" takes the forms it does. The study of the neuroses and psychoses constantly emphasizes the infantile character of the reactions upon which these conditions depend. With this all, Adler's conceptions of inferior organs, the idea of the hormones as energy distributors and Bolton's view of underdevelopment of the cortex as a basis of psychoses fit in here. On the physiologic side the higher forms of conscious activity may be conceived of, as conditioned reflexes in the sense of Pawlow. Comparative philology, religion and folk-lore have been worked over according to these modern concepts, while in philosophy psychoanalysis has allied itself with the pragmatic movement. This, as the author sees it, is the present-day setting of the psychoanalytic movement. It truly calls for a "transvaluation of values" in that it no longer views the individual as a subject for laboratory experiment but deals with human beings in the raw. Man after all is "human, all too human." It must not be lost sight of that psychoanalysis had its origin in therapeutic endeavor, and the author is convinced that it has a distinct value, but leaving out this consideration, it is bringing to us a better understanding of the psychological meaning of symptoms, and so we are coming by degrees to a more comprehensive idea of what the psychosis as a whole means in the history of the individual. Psychoanalysis has broken its way through the line of defenses which surrounded the accepted methods of study of abnormal mental phenomena and has brought to us a broader and deeper way of looking at things.

4. *Psychiatric Aspects of Pellagra.*—Pellagra is characterized by gastro-intestinal, skin, and nervous and mental symptoms. In South Carolina it was estimated by the State Health Officer in 1914, that there were 6,000 cases.

During the latter half of 1915, there were admitted to the South Carolina State Hospital 606 patients, of whom 160, or over 26 per cent., were pellagrins.

The large death rate of this hospital has been due mainly to pellagra, over 61 per cent. of the deaths for one year being attributed to this disease. Considering the clinical types, it must be remembered that most frequently the clinical manifestations of a psychosis are the peculiar and characteristic reactions of the individual affected by the etiological factor. The exact type of psychosis hence does not always bear a specific relation to the etiological factor, but rather may be an exaggeration, a more or less common mood swing, natural disposition or constitutional make-up.

In the 160 cases of the author's series, the infective-exhaustion psychosis was the most frequent, occurring in 35 per cent. of the cases. The prognosis is grave, especially when symptoms of cerebral irritation or central neuritis develop.

The manic-depressive psychosis was seen in over 11 per cent., the depressed type more common than the manic. The senile psychoses appeared in 10 per cent., dementia præcox or allied conditions in over 12 per cent., while over 14 per cent. were left unclassified. It is often difficult to determine the relation between pellagra and psychosis. Pseudo-paretic conditions occur, to be differentiated from general paresis by the laboratory findings. These probably belong in the infective-exhaustive group. The presence of pellagra in any case may modify, not only the course and clinical picture, but seriously affects the prognosis. Rest in bed with careful nursing and a properly balanced diet are the essential features in treatment.

5. *Manic-depressive Psychosis in the Negro.*—During six years there were admitted to the Georgia State Sanitarium 2,877 negroes, among whom 501 cases, or 17.4 per cent., were diagnosed as manic-depressive. In 443 cases, in which the form of attack is noted, it was manic in 325, depressed in 62, circular in 26, mixed in 23, and undetermined in 7. It is hard to get among this race accurate previous histories, but as far as this could be done, there was evidence of one previous attack in 114 cases, two previous attacks in 55 cases, three previous attacks in 23 cases, four previous attacks in 8 cases, five previous attacks in 5 cases, six previous attacks in 7 cases, eight previous attacks in 1 case, ten previous attacks in 1 case, "several" previous attacks in 32 cases. The number of cases of manic-depressive reported in the statistics from different institutions varies greatly but they all show that where the negro population is large, the proportion of cases of this psychosis is high.

6. *Manic-depressive and Dementia Præcox Psychoses.*—A review of the main points in the differential diagnosis between these two psychoses. Not suitable for abstraction.

7. *The Psychology of Hysteria.*—The author describes hysteria as "a functional nervous state closely related to hypnotism, characterized by various and peculiar symptoms and phenomena, and dependent on suggestions, either auto or external. These suggestions accompanied by strong emotions produce ideas, in the form of wishes or desires, which ideas become dissociated or submerged memory complexes, and are the unconscious motives which determine the hysteric's symptoms and actions. The symptoms then are the expressions of dissociated or submerged wishes, and are unconscious means for the attainment or fulfilment of a wish." He finds it extremely difficult, often impossible, to distinguish between hysteria and malingering. In fact he thinks that one results from subconscious willing, the other from conscious willing. Traumatic hysteria he thinks no different from any other kind of hysteria. He illustrates his views by short descriptions of nine cases, traumatic and otherwise.

8. *Dreams and Their Interpretation.*—The author relates some remarkable coincidences which on the surface would seem to show that dreams

sometimes have a prophetic character, but hastens to add that we hear of this only in the case of the coincidence, but are not informed about the thousands of failure to coincide. He discusses to some extent the probable mechanism of dreams, but is unable to add anything new in this regard. With the Freudian ideas as to dreams, he is not in sympathy, thinking that the sexual element is greatly overexaggerated and while the revival of interest in dreams, and the study to which this has led is welcomed, nevertheless, there has been a pandering to the lower instincts of human nature and the decencies of sex have suffered.

9. *The Reception, Examination and Care of New Admissions.*—An account of the methods used at the Binghamton State Hospital, with suggestions by the author as to the place of diet, hydrotherapy, exercise (calisthenics), occupation, and amusement in the treatment of the acute insane. Dr. Wagner's suggestions are inspiring.

10. *Biological Aspects of Dementia Præcox.*—In a disease which is world-wide and which incapacitates such a number of people in the most promising period of life, as dementia præcox, any contribution to the knowledge of it cannot but be of value. The author passes in review the theories as to its causation and considers its physical stigmata. Among these he is especially struck by the simian type of hand first described by Stoddart which consists in (1) The palmar surface of the thumb faces forward in the plane of the fingers; (2) when the thumb is flexed, its terminal phalanx does not rotate inward as in the normal hand; (3) the fingers are hyperextensible at the metacarpo-phalangeal joint. The author in a recent study of 44 unselected cases of dementia præcox found that in 35 this stigma was present. Another sign of possible biological bearing has been described by Steen, and might be called "the Egyptian attitude." In sitting the patient holds his arms close to the trunk, the elbow joint in stiff extension, the hands pronated and resting on the lower part of the thighs or even on the knees, an attitude seen in ancient Egyptian statues. Any practical plan for the treatment of dementia præcox should recognize the biological tripod of subinvolution, neurotoxemia, and faulty psychogenesis. The obvious indications are (*a*) Removal of the patient from sources of "psychic conflicts" and "difficult adjustments"; (*b*) rest, physical and mental, in bed if necessary; (*c*) attention to anemic and other morbid blood states; (*d*) eliminative measures by hydrotherapy and otherwise; (*e*) nutritional and constructive agencies, which should be pushed to the limit.

11. *War and Neurosis.*—The author, who is psychiatrist to the Military Hospitals Commission of Canada, first describes the arrangements for caring for the men invalided home, especially the provisions for the nervous and mental cases, then devotes the great part of his paper to the consideration of war neuroses, particularly "trench neuroses" and "shell shock." His conclusions he sums up as follows:

1. Cases with gross lesions of the central nervous system present questions essentially surgical and neurological Psychotic symptoms do not as a rule accompany them, in particular not the so-called traumatic neuroses.

2. Apparently any individual of sound constitution and inheritance may at the front exhibit minor, transitory neurotic symptoms which are strictly reactive and may be classed as physiologic.

3. That severe war neuroses may at times develop in persons apparently quite normal has been asserted by some competent observers, but the concept of normality is quite elastic so this question cannot be considered as settled.

4. It remains true that in the majority of severe war neuroses of all types, there is evidence of a personal element of psychopathic potential.

5. The factor of exhaustion may lead to collapse or to acute transitory fatigue states, and if severe and protracted, to progressive physical deteriora-

tion. War experience has not established its etiological importance in the neuroses or psychoses.

6. Psychic disturbances among troops may be (*a*) accidental, *i. e.*, such as occur in the community generally and cannot be attributed to service and (*b*) reactive, those which stand in some specific relationship to conditions of army life.

7. The reactive group is made up essentially of psychoneuroses, which may be divided epochally into (i) anticipatory neuroses and (ii) trench neuroses.

8. The type of the trench neurosis is the condition called "shell shock" which usually consists of a transitory concussion syndrome followed by a more or less protracted neurotic phase.

9. Trench neuroses occur usually in unwounded soldiers. There is no satisfactory evidence that trauma plays any part in their causation. Some well-qualified observers hold, that as a result of contemporary military experience, the concept of the so-called traumatic neuroses should be abolished.

10. The drift of opinion is unmistakably toward the psychogenic basis of war neuroses of all types, including shell shock. Even in an initial unconsciousness or twilight condition of some duration there is evidence that the psychogenic element may have as great if not a greater rôle than the item of mechanical shock, though this is also important.

11. Clinically the trench neuroses present in the main hysteric and depressive neurasthenic syndromes and combinations thereof. In this sense there is nothing new or specific about them.

12. Their specific, distinctive, character resides in the fact that the precipitating causes are unique and strongly color the symptom-pictures further in the conspicuous reactive motor phenomena, and in the more or less specific ideogenic moments.

12. *Psychoneuroses, Psychoses and Mental Deficiency in 2,000 Cases.*—The author has studied his records in 1,100 cases of psychoneuroses, 660 psychoses and 240 cases of mental deficiency with morbid psychic manifestations, from the standpoints indicated in his title. He finds that the affective make-up of the individual plays probably the most important rôle in conditioning the form of psychotic manifestations appearing and has noted that incidents calculated to upset the emotional balance preceded the outbreak of the psychosis in a great number of his cases, whatever the clinical forms assumed. "While in the majority of instances these incidents can in no way be considered the fundamental causative factors of the psychic disorders because of the profound pathological nature of the individual's mental make-up, nevertheless in view of the rapid onset of the disturbances immediately after the appearance of the incidental factors, also in view of the emotional character of the incidents which per se must have had a powerful influence upon the affectivity and through the latter on the formation of ideational complexes, for all these reasons an effective relationship must unhesitatingly be admitted." These considerations the author thinks of importance from the point of view of prevention.

C. L. Allen (Los Angeles).

Journal of Mental Science

Abstracted by Dr. W. C. Sandy, Middletown, Conn.

(Vol. 63, No. 261)

1. Zola's Studies in Mental Disease. J. Barfield Adams.
2. Dreams and their Interpretation. Freudian. Robert Armstrong Jones.
3. Vegetative Nervous System and Internal Secretions. Frederic J. Farnell.
4. War Hospital for Mental Invalids. R. D. Hotchkiss.

1. *Zola's Studies in Mental Disease.*—Adams demonstrated Zola's ability as a psychological novelist by describing a series of characters found in the Rougon-Macquart novels presenting the data in a modified clinical history form. He calls attention to the fact that these "pictures of mental disease are as interesting, if not more so, to the general practitioner as to the alienist," for the characters depicted are rarely seen in an institution environment but rather in the midst of their everyday surroundings. Among the conditions described are hysterical and præcox-like reactions, delirium, constitutional inferiority, alcoholic psychoses with deterioration, "impulsive insanity," and various grades of mental deficiency.

2. *Dreams and Their Interpretation.*—After discussing dreams from an historical standpoint and relating some striking examples of coincidence and apparent prophecy, the author takes up the mechanism of dreams with a critical examination of the Freudian interpretation. He feels that dreams are states of relaxed consciousness in which memory associations mostly of events to which no attention has been paid are brought to the surface resulting in a confused impression. He objects to the "censor," symbolism and the "puzzling terminology" such as "dramatization," "distortion," "displacement," "transference," and the like. He says, "there has been an unnecessary pandering to the lower instincts of innocent men and women on the part of those who describe themselves as psycho-analysts," and "that among psychiatrists—in this country (Great Britain) at any rate, thanks mainly to Dr. Mercier—Freudian is dead." Following the paper appears the discussion, mostly anti-Freudian, with, however, one who appreciates and points out the good in the Freudian and Zurich schools.

3. *Vegetative Nervous System.*—Farnell points out the divisions of the visceral nervous system and how disorder of the same may result in varied symptom-complexes depending upon whether the vegetative system proper, or the symptomatic or so-called "thoracic autonomic" are affected, either system alone or both in combination. In the treatment of certain conditions, the possibility of inter-reactions and complicated mechanisms must be remembered and therapy varied accordingly. Thus, a case of apparent cretinism, unsuccessfully treated by the thyroid gland, later on regarded as a case of pancreatic infantalism, was greatly improved by fifteen grains of pancreatin, three times a day. Still later, however, syncopal attacks with evidence of poor circulation were corrected by the addition of three grains of suprarenal extract.

"Hyperthyroidism is a symptom of hypersensibility of the sympathetic system or an irritability of the autonomic system."

In closing, the author calls attention to the psychoses representing maladjustments towards the environment and says "can it not be that this system, the vegetative nervous system, plays a most important part in adjustment and acts as the most essential stimulator into action?"

4. *War Hospital for Mental Invalids.*—In the first part of this paper, Hotchkiss describes the changing over of the Renfrew District Asylum into a war hospital for mental invalids. Only twenty-five of the former inmates were retained for farm and other outside work, the others being transferred to other institutions. The kitchen, laundry and store remained essentially the same, the former two requiring a larger number of employees. "The pack store," important as a part of a military hospital, cared for the hospital, service and civilian clothing of the soldiers, rigid rules and forms making necessary the keeping of a strict inventory constituting a complete history of each article. The office force had to be increased fourfold owing to the complicated army forms and methods. The male attendants were partly former attendants enlisted in the R. A. M. C., others men over military age or unfit for active service and still others regular R. A. M. C. men. There

were a certain number of women nurses for bed and convalescent cases. The superintendent remained in charge, other members of the staff being obtained from different institutions.

In about a year, 942 cases were admitted. These were classed as follows: manic-depressive psychosis, 188, or 21 per cent., most of which were depressions; alcoholic insanity, 152 cases, 18 per cent., including delirium tremens and chronic delusional states; mental deficiency, 151, or 18 per cent., including all degrees of feeble-mindedness from the high to the medium grade, many of whom under the stress of actual fighting became a source of actual danger to their comrades and some of whom suffered from episodes of excitement, confusion or depression, from which they recovered under appropriate treatment; confusional insanity, 134 cases, 16 per cent., the majority of these occurring in active service as from exposure to high-explosive shell fire, the fact of being buried, the shock of seeing comrades killed and so forth, many showing evidences of a neuropathic or psychopathic disposition; dementia præcox, 118 cases, 14 per cent., 11 catatonic, 14 paranoid and 93 simple form; paranoia, 44 cases or 5 per cent., many of whom had evidently been delusional a long time but the strain of the campaign had caused an accentuation of the symptoms; general paralysis, 22 cases, 2 per cent., twelve of which being completely examined by laboratory methods with positive findings. There were other organic cases, including tuberculous meningitis, hemiplegia, traumatic destruction of brain substance, brain abscess and syphilitic meningitis. Seven were epileptics, all but one (a traumatic case) being old cases. Four were not insane, one of these a malingerer, whose apparent stupor and inability to speak was broken by ether anesthetization.

During the year, 500 expeditionary cases were discharged. Of these, 139, or 16 per cent. of the total admissions, were sent to asylums; 155, or 18 per cent., returned to duty; 40, or 4 per cent., discharged as recovered and 111, or 13 per cent., as relieved to the care of friends; 5 as recovered and 37 as relieved were transferred to other hospitals for further treatment of bodily condition; 11 died and 2 escaped.

Book Reviews

AN INTRODUCTION TO THEORETICAL AND APPLIED COLLOID CHEMISTRY, "THE WORLD OF NEGLECTED DIMENSIONS." By Dr. Wolfgang Ostwald. Authorized Translation from the German by Dr. Martin H. Fischer. New York, John Wiley and Sons; London, Chapman and Hall, 1917.

This volume presents in English the substance of a course of lectures delivered in this country and Canada shortly before the outbreak of the war. The aim of these lectures is to bring before the scientific world, especially the workers in chemical investigation and technical application of chemical knowledge, this separate branch of chemistry. The author conceives modern colloid chemistry as an independent science in itself, so distinct is its place in the study of substances and so important and far-reaching its possibilities in scientific understanding of many things which molecular chemistry and physical chemistry have hitherto been unable to explain. Its practical applicability to all sorts of industrial chemical problems, to biological problems, to medicine as well as to any other branch of practical chemistry is just beginning to be recognized.

The attempt to define colloids, and the description of them which this involves, suggests at the beginning why this science has such a wide range, and why also that, even though its importance gives it a place of its own, it is still a branch and a most important branch of the whole science of chemistry. The combined definition and description is illustrative of its really vital and wide significance in the economy of nature, and upon this the author constantly lays stress. It represents merely a series of states through which substances pass or in which they become held under certain conditions. Thus it is the science of substances which stand between coarse suspensions on the one hand and molecular solutions on the other. The essential distinguishing property is the degree of dispersion, which in the colloids is so fine that unlike the coarse mechanical suspensions they cannot be analyzed microscopically, only ultramicroscopically, and they pass through ordinary filters, while they are coarser than molecular solutions and cannot like them diffuse or dialyze. Nevertheless a continuous transition from one system to the other is possible and is everywhere in process, so that "colloids merely represent a realm differentiated for practical purposes from a continuous series of systems."

This forms the keynote to the very interesting discussion of the various properties which further distinguish this system practically from the others. Examples are given either of artificially producing the colloid state or discovering it in nature and utilizing and understanding its properties, or of changing to transitional forms and discovering also the variety of these transitions, which is of limitless application in all the departments of science and practical life. Colloid chemistry is a very youthful science, but its possibilities are enormous. For it is through it that these many obscure properties and their great variety of effects can be discovered and utilized. To this these lectures form the introduction and the insistence upon the transition phenomena, principally through change in dispersion, is the very essence of colloid chemistry.

JELLIFFE.

STUDIES IN MAGIC FROM LATIN LITERATURE. By Eugene Tavenner, Ph.D. New York, Columbia University Press.

It is not to depreciate the value of this work to state that this lies mainly in the large amount of material the author has brought into this small compass. He has gleaned extensively at first hand and presents proof of the existence and prevailing and tenacious hold of magic upon the custom and the thought of the Latin people, when even intellectual culture sought to discountenance it. It is interesting how such higher culture yet reveals itself still under the bondage as well as the romantic coloring of the magic mode of thinking and acting.

All this Tavenner disperses throughout his collected material in his dissertation upon this feature of Latin and Roman life. He believes this tendency toward magic beliefs and practices, and the actual employment of magic in thought and action indigenous to the Latin people and not imported from another culture, and, as it still held sway during Roman intellectual progress, so to a degree flourishing to-day in the Italian mind and life. He has not entered at all deeply into the subject of the real meaning of magic in the lives of these and other peoples, which would have brought a more suggestive comparison of the same forms of magic existent here as elsewhere, and therefore come closer to its significance as a stage of human thought. He does not lay sufficient emphasis upon it as a necessary earlier mode of dealing with life's phenomena, which protracts itself still into the present time, in those traces of the past which linger in individual and nation. There is however much material here such as the "magic" realm of individual dream analysis reveals as of great psychic import still in the problem of living. The book is for this reason, as well as for its fulness of scholarly research, another source of comparative testing and evaluation of human material to aid in its understanding and guidance,. such as falls to the educator and the physician. It is also as the author informs us but the beginning of such a further collecting of material of former lives. He is inclined to treat it as past history merely. To the practical psychologist it must be interpretative also for the lives of to-day and their psychic inheritance and recapitulation, which condition present-day adaptation to the same life problems.

JELLIFFE.

TWO STUDIES IN MENTAL TESTS. I. VARIABLE FACTORS IN THE BINET TESTS; II. THE DIAGNOSTIC VALUE OF SOME MENTAL TESTS. By Carl C. Brigham, Ph.D. Princeton, N. J., and Lancaster, Pa., Psychological Review Company.

The two studies here reported were made as a result of certain questions propounded at an informal conference upon the Binet-Simon scale of mental tests and their validity as they stand as quantitative tests for intellectual diagnosis. The questions resolve themselves into three, the influence of the personal equation of the examiner and the examinee, importance of environment and previous training, and equal availability for both sexes.

The personal equation is found to bear a marked influence, most of which on the side of the experimenter can, it is believed, be obviated, since it was found to be due to variations in use of apparatus, in technique and to observation errors made in marking. There was also found a correlation between the effect of school training and crtain tests at least. Sex differences were found to be very slight.

Upon these first findings Brigham goes on to examine the Binet-Simon tests and other mental tests derived from them or modeled upon them to find whether they do offer a suitable basis for diagnositic decision. It is in the higher grades of feeble-mindedness that particular difficulty offers itself in the way of diagnosis. Tests must take into account the determination if possible of the question whether feeble-mindedness represents a qualitative difference from the average or normal, constituting a different species, or only a quantitative difference consisting only in amounts of intelligence. The experimental examination of the many tests tried out and reported here shows such confusion, to some degree, from the entrance of the factors discussed in the first part of this study, but more from the predominantly qualitative nature of the tests that the writer feels that the only hope for this form of testing lies in the recognition of the absolutely empirical need which workers in this field must for the immediate future at least make the basis of their effort. As the tests now stand certain features have a special application in determining special abilities or disabilities, but do not form criteria for graduated quantitative measurement and are therefore not of clear diagnostic value in determining the degrees of feeble-mindedness, or in its higher forms, of its existence. The writer believes that from a skeleton plan of test, permitting of more elasticity in the empirical use of it, a satisfactory scale might be evolved. He recognizes however how little is known of the actual mental processes involved in the tests and certainly a deeper appreciation of the profundity, obscurity and complexity of psychic factors at work even in the lowest grade of intelligence will be the chief aid to securing some satisfactory form of test. The fact that this limits the absolute reliability upon static tests gives them really a more decisive value. It helps to make them what they should be, a necessary but restricted background for understanding what the limitations and the potentialities of a life are, considered in the light of all its psychic factors, with the intellectual measurement as only a framework basis.

L. Brink.

La Syphilis et L'Armée. Par G. Thibierge. Collection de Précis de Médecine et de Chirurgie de Guerre. Paris, Masson et Cie Editeurs.

This is a very direct and practical consideration of this very important subject. The author presents first certain facts which cannot be disregarded from a military standpoint nor from the point of view of civil health. He clearly sets forth the increasing prevalence of syphilis through conditions surrounding and constituting military life, calling attention to the widespread sources of contagion. It menaces the efficiency of the army and its effects flow back most seriously upon the civil population. Not the least of the latter of these is the inevitable invasion of the disease into married life. Clear statements concerning the frequency of the disease emphasize the importance of a direct facing of the problem which it imposes upon the medical authorities, particularly in military service.

Careful detailed instruction is given in diagnosis. The first or chancre stage of the disease and the secondary syphilis are both discussed in detail as of special interest in military medical service. Tertiary syphilis receives only brief reference. The question of treatment is taken up very fully and practically.

Prophylaxis and surveillance of prostitution are submitted to the same careful discussion. The aim of the writing, to bring a very practical pressing situation to attention and to definite action upon it, is the keynote of the whole presentation. Syphilis is a distinct contagious disease and must be as precisely and specifically dealt with as any other such disease. It is therefore first of all a problem for medical and military activity, though no less a question to be approached in a movement for education and self-control, both individually and in a broad social way.

Jelliffe.

Acute Poliomyelitis. By George Draper, M.D. Philadelphia. P. Blakiston's Son and Company.

Dr. Draper has so well succeeded in compressing into a small space so much clinical and experimental data concerning this important and still baffling disease, that the book forms a most useful practical manual. It provides the experimental student with a concise statement of the steps of progress thus far made in the field and the avenues for further research and clinical applicability which lie just ahead. It likewise provides the practitioner with the best results of past experience and study in a form in which he will find it of ready access and clearly and concisely arranged for practical use.

The stages of investigation and the growth of knowledge regarding the disease are outlined in a brief history. The discussion of its etiology presents the question of susceptibility to it, incidence in race, age or physical and psychical type. Another short chapter is devoted to the appearance of the disease, based upon Wickman's first study of its epidemiology, and applied particularly to the recent New York epidemic. Each phase of the discussion is condensed into a short chapter touching experimental or practical clinical aspects. The classification of types is based not upon variability in the course of the disease but upon the predominance of one phase of this course or another and the obscuring or not of any phase. This is emphasized in order to guard against the previous non-recognition of many cases in which some one phase or more were obscured. The use of serum is presented in its possibilities of benefit and with careful consideration of its proper use, the time, amount and method of administration, with also rare possibility of danger in its employment. This is all based upon experimental work, particularly that of Flexner and Amoss in regard to the meningo-choroid complex as a defensive mechanism.

Treatment of the acute symptoms is presented but the prevention and treatment of the paralysis are merely mentioned. For this the reader is referred by the author to Lovett's "After Care of Poliomyelitis."

Jelliffe.

The Practical Medicine Series. Comprising Ten Volumes on the Year's Progress in Medicine and Surgery. Under the General Editorial Charge of Charles L. Mix, A.M., M.D. Volume X. Nervous and Mental Diseases. Edited by Hugh T. Patrick, M.D., and Peter Bassoe, M.D. Series 1915. Chicago. The Year Book Publishers.

Although this little volume has been passed unnoticed in these pages until it has been followed by others of the same nature and aim, it has by no means been superseded by these. It contains material from the best research and gathered from original publication, translation and abstract which has a lasting value in the progress of clinical and pathological study in neurology and psychiatry. Special note, for example, is made of the work of Eppinger and Hess on Vagotonia, which remains a classic in bringing this important subject of the vegetative nervous system to fuller consideration and establishing its place in neurology. This is only one of the many topics reviewed in the latest study upon them, which mark the steady advance and with it the firm building in the practice and study of nervous and mental diseases. Of particular interest also is the attitude toward war neuroses and both interpretation and treatment of the disorders which arise in consequence of it, as they are viewed in this first year of the war. They thus form an important part of the history of this phase of the subject to be later pursued.

Jelliffe.

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Original Articles

THE PSYCHO-NEUROTIC SYNDROME OF HYPERTHYROIDISM*

By Malcolm S. Woodbury, M.D.
CLIFTON SPRINGS, N. Y.

The plan of approach to our subject is as follows: During the past four years we have treated at the sanitarium four hundred and sixty-five cases of varying degrees of hyperthyroidism. I shall omit from consideration cases of thyroid under-activity. Ever since Graves' disease was first described it has been universally recognized that this condition is associated with more or less clear evidence of nervous and mental disturbances, but despite the voluminous endocrine literature, I have failed to find definite definition of the exact types which one may expect to encounter, with the exception of the somewhat incomplete observations of Maude. I shall doubtless fail to cover the mental anomalies which are probably secondary to thyrotoxicosis, but shall hope to outline a somewhat definite symptomatology with a view to assistance in diagnosis and a reasonable ground for decision as to what mental and nervous states one may expect to relieve by suitable treatment.

Statistics which are available from home and foreign literature are to a preponderating extent obtained from institutions for the feeble-minded and the insane. Such sources of information are of less value to the average physician than are statements based on the study of those not actually insane, or congenitally deficient, first, because the hope of reasonably early relief depends on early recognition, and, second, because there is always the doubt between cause and effect in the insane, as practically any incidental condition is discoverable in the study of any large group of the insane. Our problem is rather to take the ordinary cases of thyrotoxicosis from the viewpoint of the internist, and trace the types and degrees of cerebral and nervous manifestations which may be encountered and which may reasonably be considered as secondary to this state. To refer briefly to the literature in passing[1] McCord and Haynes have noted only .5 of 1 per cent. of cases of thyroid hyperactivity in their special endocrine investigation of cases of the feeble-minded. That manic states may occur concomitantly with thyrotoxicosis has been long recognized. Robertson[2] described such a case in 1875 and referred to others. Heuer[3] has reported a number of cases of cranial nerve palsy in exophthalmic goiter. A report from Raymond and Serieus[4] states that the physic disorders of Basedow's disease "are not at all specific and may take on any form," and that "these physic symptoms should be considered apart from this disease and referred to the morbid process to which they properly belong," they regard the two states as "parallel and independent." Ballet[5] in 1890 reported a case characterized by persecutory delusions in which he regarded the thyroid toxemia as causative; he also regarded maniacal agitation as common and depressive symptoms as sometimes present. Hammes[6] mentions manic-depressive insanity as developing in the course of Basedow's disease, and also the rare occurrence of dementia præcox. He quotes Sattles as stating that there is no Basedow's psychosis, but simply the precipitation of mental states to which the patient is already predisposed. Hammes[6] reports a case of Basedow's disease associated with melancholia with delusions in whom the mental state suddenly changed to a maniacal state and was followed in two days by coma and death. Blanc[7] emphasizes the thyroid and autonomic relationship in certain cases of dysthyroidism. Ramadier and Marchand,[8] reporting studies on thyroids of insane patients in a goiterous district, found no more instances of microscopic change in the thyroid in the insane than in the non-insane. Harrower[9] has recently emphasized the relationship between the endocrine organs and neurasthenia. Packard,[10] in an analysis of eighty-two instances of psychoses associated with Graves' disease, lays stress on pyschopathic heredity and after enumerating depression, exhilaration, excitement, irritability, apprehensiveness, hallucinations, delusions, incoherence, delirium, memory defect, paraphasia, phobias, and seizures as occurring in the order named, he concludes that Graves' disease is probably an exciting rather than a fundamental cause. Buckley[11] says that hallucinations can be produced in susceptible persons by feeding thyroid extract.

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* Read before the Atlantic County Medical Society, at Atlantic City, February 6, 1918.

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[1] Frequency and Significance of Dysfunction of Internal Secretory System in Feeble-minded, C. P. McCord and H. A. Haynes, New York Med. Journal, Vol. 105, pp. 583, March 31, 1917.

[2] Graves' Disease with Insanity, Dr. A. Robertson, Journal Mental Science, XX, pp. 573.

[3] Cerebral Nerve Disturbances in Exophthalmic Goiter; Report of Case Associated with Bulbar Paralysis, Dr. Heuer, Am. Journal Med. Sciences, Vol. 151, pp. 330, March, 1916.

[4] Psychic Disorders in Basedow's Disease, Drs. Raymond and Serieus, Abs. Am. Journ. Insanity, Congres de Blois, 1892, Vol. 49, pp. 449.

[5] Persecutory Delusions in Graves' Disease, Dr. Ballet, Le Progres Médicale, Abs. Am. Journal Insanity, Vol. 47, pp. 78, March 8, 1890.

[6] Internal Secretions—and Neurology and Psychiatry, Dr. Hammes, Journal-Lancet, Vol. 36, pp. 449, August 1, 1916.

[7] Thyroid—Treatment of Neurosis, Dr. Blanc, J. Progres Méd., Vol. 32, pp. 95, March 24, 1917.

It should be again emphasized that our present object is, in as far as possible, rather to trace the mental and nervous course of the non-insane cases of thyrotoxicosis. Not until after reviewing the cases which form the basis of this paper did I read the most interesting remarks of Maude.[12] He approached the subject as I have attempted to do, and I am impressed with the general similarity of views to which such a plan of study leads. I am told by the superintendent of one of our large state hospitals for the insane that whereas instances of hyperthyroidism associated with exalted states are not uncommon, other types have not come under his observation. From our series, and from other reports aside from those coming from institutions for the insane, I believe that it is safe to say that only a relatively small proportion of hyperthyroid cases actually become insane. While all the cases forming the basis of my remarks have been treated in the sanitarium, I have not had opportunity to examine personally nearly all, though I have examined a large number of them. Three hundred of these histories have been subjected to as close analysis as possible and the remainder have been looked over for any unusual anomalies. For the sake of brevity and interest I shall refrain from making a purely statistical statement. In this series the following clinical classification will suffice for our purposes.

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[8] Le glande thyroide chez le alienes, par J. Ramadier et L. Marchand, L'Encephale, An. 3, pp. 121, aout 1908.

[9] Internal Secretion and Neurasthenia in Women, Dr. Harrower, Am. Journ. Obstetrics, Vol. 7, pp. 630, April, 1916.

[10] An Analysis of Psychoses Associated with Graves' Disease, Dr. Packard, Fredk. H., pathologist and asst. physician, McClean Hospital, Waverly, Mass., Am. Journal of Insanity, Vol. LXVI, No. 2, October, 1909.

[11] The Relation of Hyperthyroidism to the Nervous System, Dr. Albert C. Buckley, reprinted from the N. Y. Med. Journ., incorporating the Philadelphia Med. Journal and the Medical News, December 6, 1913.

[12] Mental Changes in Graves' Disease, Dr. A. Maude, Journal Mental Science, XLII, pp. 27; Mental Changes in Exophthalmic Goiter, Dr. A. Maude, Medical Press and Circular, 1895, LX, pp. 228, Abs. Am. Journ. Insanity, Vol. 52, pp. 263, published in 1895.

1. Those cases showing definite goiter but entirely free from any symptoms aside from possible pressure symptoms. These are the so-called simple and cystic cases.

2. Those cases showing symptoms (aside from purely nervous and mental symptoms), unquestionably associated with thyroid toxemia. These include, first, the type showing exophthalmos; second, types showing toxic symptoms without exophthalmos, that is, the thyrotoxic goiters, which include the condition known as hyperthyroidism and also toxic adenomata—the latter belong in this class probably because, as Goetsch has shown, they frequently have zones of overactive tissue surrounding the adenomatous area.

Of the 300 cases, 48 were symptomatically entirely non-toxic, *i. e.*, there were either simple or cystic goiters. These patients were all free from significant nervous or mental symptoms. It should be remembered that they were not specifically studied from the psychic viewpoint, as they were observed by various members of the staff. This same condition, however, also holds true of the remainder of the series. Of the non-toxic goiters one patient had torticollis, two were noted as nervous and fatigued from overwork, one as rather loquacious, but on the whole, from the neurological and mental viewpoints, they were negative. Thirty-four cases were eliminated from the series, because although they had certain symptoms such as mild tachycardia, there were complicating conditions, such as tuberculosis, arteriosclerosis, chronic nephritis, gastric ulcer, valvular heart disease, myocarditis, post-operative conditions, etc., which clouded the diagnosis. These patients did not, however, present any psycho-neurotic symptoms of possible thyroid origin not fully covered in the cases which were clearly defined instances of thyrotoxicosis. The remaining 218 cases all showed evidences, aside from the psycho-neurotic, of sufficient definiteness to clearly warrant the diagnosis of thyrotoxicosis, *i. e.*, they had of the characteristic tachycardia, tremor, goiter and exophthalmos, more than one symptom sufficiently marked so that in the absence of other possible etiological factors the diagnosis which had been made appeared on analysis entirely justified. It is significant that whereas in the simple cases only two patients are spoken of as nervous—a remarkably small proportion considering the large number of nervous patients admitted to the sanitarium—in the toxic cases some mention of a nervous condition is made in every instance except in one quiescent case, despite the fact that the vast majority of the cases were seen before we were attempting any definite analysis of the nervous symptoms and very many were examined by members of the staff having no special interest in nervous or mental conditions.

In the thyrotoxic group the following conditions should be noted: Four patients developed post-operative delirium of short duration. This was always more marked at night, and apparently accompanied by very disturbing dreams. In my opinion, however, post-operative delirium is more common in severe cases than this figure indicates, though in this series it has been very transitory. One patient, a severe thyrotoxic case, developed delirium very shortly after admission and died in a few days without operation. As I have stated, nervousness was noted in every instance except one in this group and varied from moderate nervous hypertension, in mild cases, to extreme restlessness, excitability and irritability in the more severe cases. Apprehension was very frequently noted, and either it or a decided tendency to groundless worry (though the two states are not identical) appeared in 17 per cent. of the cases, I have no doubt that more specific inquiry might have increased this percentage.

Depression was specifically complained of in 7 per cent. of the cases. Of other rather frequent symptoms vertigo and insomnia are prominent. Two cases of idiopathic epilepsy were noted. Two of a mild manic-depressive type. One of involutional depression. Two were paranoid. One developed confusional insanity.

The relationships could not be definitely established in these psychopathic cases. Both epileptic cases were thyrotoxic—which was also true of the mild manic-depressive cases, one of whom had a possible psychic etiology of more apparent significance than her thyrotoxic state.

The case of involutional depression with goiter proved clinically, and with the aid of the adrenalin chloride test, to be free from thyrotoxicosis.

The case of confusional insanity occurred in a woman of inferior mentality, who had recently had a cerebral hemorrhage.

From my knowledge of these instances of true psychosis I incline to the view that the thyrotoxicosis was probably an incidental and possibly exciting, rather than the fundamental element. Admitting this, we still have certain rather marked symptoms, apparently exceedingly closely, and in some form constantly present, in thyrotoxic cases. The true psychoses just mentioned showed the hallucinations, delusions, etc., incident to each type, but no others of the thyrotoxic group showed such manifestations. A few instances of true hysteria occurred in the thyrotoxic group. In addition to nervous hypertension, depression, apprehension, worry, insomnia and vertigo, the following symptoms were frequently noted: deficient concentration, usually regarded by the patient as impairment of memory, several instances of impairment of consecutive thought, as noted by Reynolds, and called by him "mental chorea," and a rather characteristic type of speech. In the early progressive cases, a remarkable increase in general efficiency with added aptitude for detail is quite common. Loquaciousness is also common, as is a state of excitability, in which patients are exceedingly easily startled. In advanced cases marked nervous fatigue is almost constant, and a history of "nervous breakdown" is usual. Emotionalism, agitation, obstinacy, failure to think clearly and logically, are all seen with sufficient frequency of relation to be significant. Muscular twitchings aside from tremor were seen in three cases.

It may appear from this conglomeration of symptoms that it would be difficult to outline anything which might be called a fairly clear picture of the thyrotoxic mental and nervous states. This is not, however, so difficult, and the failure will come rather from lack of skill in description.

Cerebration and the motor system are undoubtedly overstimulated even in the early active thyrotoxic state. The following composite picture of cases, all of the exophthalmic type, representing the stages from onset to death, seems to me to outline what I should call the typical mental and nervous manifestations of exophthalmic goiter.

A young lady of thirty had had a small goiter for five years. She had been able to attend to her duties until just before her admission. She had fine tremor of hands, tachycardia, and slightly increased prominence of the eyeballs. She was sent us by Dr. Thomas Boggs, with the hope of relief without operation. She had been a teacher for several years, and for the past two years had been in charge of an important private school, a position of considerable responsibility. She showed evidence of ordinary nervous hypertension, and on questioning stated that for the past year she had shown marked increase in ability to work, was in other words more efficient than formerly, and had acquired a *great aptitude for detail,* an attribute in which she had formerly been rather deficient.

Mr. S., who held an important public office, had passed through a similar phase of over-efficiency, and then had become fatigued, irritable, intolerant, exceedingly restless, obstinate, suffered from insomnia, was persistent in following whatever plan looked good to him in spite of argument or advice, had the incisive manner of speech, was talkative and very easily startled. He was very actively thyrotoxic.

Mr. C., also subject to symptoms similar to those just detailed, stated that, together with his state of excitement, he had days of depression, without self-accusatory ideas, simply intensely "blue." These periods, while transitory, were quite constantly recurrent, despite the fact that the predominating symptoms were those of excitement. Incisive speech was very marked. He was fatigued and very weak. He was easily startled, jumped at the slightest noise and was emotional. He was an actively toxic case with very marked exophthalmos.

Mrs. R., a fulminating case, after a history of passing in general through the cycle above described, very shortly after admission developed hallucinations and delusions, became delirious, went into coma and died. It may be said in passing that the first patient after returning to her work developed irritability, marked fatigue, excitability and frequent transitory depressed periods, and was obliged to give up all activity. This general sequence of symptoms may be fairly said to form a group characterization of our active exophthalmic cases. The exophthalmic goiter, mental and nervous picture, is then first one of overcerebration and overstimulation of the motor system (restlessness, tremor, etc.), early characterized by a sense of well-being and efficiency. This state is followed, if the toxic condition progresses, by restlessness, excitability, rapid incisive speech, irritability, deficient consecutiveness of thought, in some cases apprehension, susceptibility to being very easily startled, fatigue, emotionalism, with brief periods of depression, obstinacy, and may in extreme cases go on to definite delirium. Such a picture is most readily explained by three factors, first, cerebral hyperemia; second, thyrotoxicosis per se; third, a toxic state secondary to the vast increase of waste products of metabolism. Aside from this picture there is another less clear cut but no less real. It is harder to recognize and hence in a sense it is of more importance. This is the state that is associated with the milder degrees of thyrotoxicosis such as are found in certain cases of adenomatous goiter, and in the condition usually spoken of as moderate hyperthyroidism, though the latter when it becomes active, certainly presents what is probably in many cases the early stage of the exophthalmic type, and symptomatically is identical with it. These cases, especially the adenomatous, while toxic, are free from exophthalmos, and run a more sluggish course. In such cases the symptoms do not vary especially in kind from the exophthalmic group, they do, however, differ in degree and relationship. For example, whereas we are aware that days of depression are common along with the excitement of the exophthalmic patient, the actual complaint of mental depression as made by the patients in our series predominated in non-exophthalmic toxic cases as compared with the true exophthalmic 10 to 1. The depression in these cases is more prolonged, lasting often for several weeks, or longer, but it is not associated with self-accusatory delusions. Of our three cases showing such delusions, one was an involutional depression, in all probability free from thyrotoxicosis, though having a goiter. Two were of the manic-depressive type, and while both had a moderate degree of thyrotoxicosis, and were of the non-exophthalmic type, both had been subjected to psychic strain of unusual severity and of a type very likely to give rise to distressing obsessions in the one case and to delusions in the other; furthermore, one was evidently congenitally psychopathic, the other traced the onset of mental symptoms to a severe febrile delirium of malarial origin.

The cases showing a considerable degree of continuous depression without delusions seemed more closely associated with sluggish adenomatous goiter than with any other type, though we have not had enough pathological data to say positively about this. This second group (the thyrotoxic without exophthalmos) shows as a rule moderate nervous hypertension, fatigue, irritability, depression, weakness, and the other symptoms already mentioned, though as a rule in a much less striking degree than in the true exophthalmic cases, though they may take on a high degree of activity, under which circumstances the nervous and mental symptoms closely parallel those in the active exophthalmic cases. Depression is, however, more marked in this group than in the exophthalmic group, and differs from the depression of melancholia, or involutional depression in the absence of self-accusatory delusions. Very likely, as is claimed by several, the depressive condition may, as in the two cases mentioned above, go on to a real depressive psychosis in patients who are primarily psychopathic, but I regard the depression *without* delusions the rather characteristic type in the group under discussion. In other words adenomatous goiter symptomatically bears, in a very general way, to active exophthalmic goiter rather the relation of the chronic to the acute process, and is more frequently associated with definite mental depression. The incisive speech to which I have several times referred is staccato, rapid, clear-cut, and very precise.

The question now arises whether in these lower grade toxic types the symptoms may not closely simulate neurasthenoid states without endocrine origin. Undoubtedly they may practically identically do so. It is only quite recently that satisfactory means of differentiation have been available in doubtful cases. The two methods which are available are studies in basal metabolism, and the application of the adrenalin chloride test of Goetsch. I can make no definite statement in regard to the former as we have not yet used it, but the reports of Boothby and of Plummer seem to indicate a great field of utility for this plan of study. An apparatus recently utilized by Benedict seems to offer a simplified method of much clinical value. As to the adrenalin chloride test, I am indebted to Dr. Emil Goetsch for his courtesy in describing his method in detail several months ago, so that we have had the opportunity to try it out on a good number of cases, and in doubtful instances we at present regard it as of the highest value, having arrived at this degree of confidence by applying it to numerous positive and negative cases, and having kept a post-operative as well as a clinical check on it. The theory of the test is that the sympathetic nervous system sensitized by the overabundant toxic thyroid secretion, over-reacts to the administration of small doses of adrenalin chloride given subcutaneously. The technique is as follows: The patient is kept quietly in bed, all sources of disturbance are, in as far as possible, removed. Observations are made on blood pressure, pulse, tremor, condition of palms, color about the lips, and on such subjective symptoms as the patient may have, such as palpitation, sense of nervousness, etc. One half of one cm. of a 1 to 1,000 adrenalin chloride solution is administered hypodermically in the arm. The observations are then immediately repeated, and again each five minutes for a period of an hour and a half. Highly toxic cases respond very vigorously, with marked increase in pulse rate, increase in systolic pressure, palpitation, tremor, etc. In such cases for clinical purposes long observation is not necessary, for the picture is unmistakable. In doubtful cases, the full technique should be very carefully carried out. Fresh solution should be used. Unless one gets a rise of at least ten points in pulse and in systolic pressure, associated with other positive symptoms, the test is regarded as negative. Aside from the development of the typical thyrotoxic picture in positive cases, the behavior of the skin vessels is interesting. The vasoconstriction noted not long after injection by pallor about the lips and drying of the hands, with increasing coldness of hands and feet, is followed after a time by flushing and warmth. Contrary to one's first suspicion, the physician who is keen on the trail of thyroid cases will be obliged by the use of the Goetsch test to concede suspicious cases as actually non-thyrotoxic fairly frequently. If the test brings certain suspicious cases into the thyroid fold, it certainly excludes others equally suspicious. Goetsch has worked out in a very convincing manner the relationship which the adrenalin chloride test bears to symptomatology, operative findings, pathological findings, and postoperative results. When the metabolic method and the adrenalin chloride method shall have been duly correlated and checked up, we shall be on the safest ground at present possible in these cases, but in the meantime I would like to recommend that those of you who are interested in this problem try out the adrenalin chloride test if you have not done so, as we have found it to be easy of application and most helpful. We have seen marked reactions in highly toxic cases, but have seen absolutely no untoward results.

SUMMARY

First. The contention of certain alienists that the thyrotoxic psychosis does not deserve a separate classification is very likely correct.

Second. Despite the above fact there is in the non-insane cases of thyrotoxicosis a very definite mental and nervous picture differing in degree and somewhat in type according to the acuteness and type of dysthyroidism.

Third. Depression of moderate duration is more common in thyrotoxic non-exophthalmic cases than in the exophthalmic, and when it occurs in the latter it is usually much more transitory; in neither is it usually associated with self-accusatory delusions.

Fourth. The presence of such nervous symptoms as have been described, if accompanied with any other classic symptoms of dysthyroidism, regardless of the size of the thyroid, should arouse suspicion.

Fifth. In all such cases if it is possible to study basal metabolism it is very desirable to do so, but whether this is possible or not, the adrenalin chloride test, as described by Goetsch, should certainly be applied.

MELANCHOLIA*

By Sydney Kuh, M.D.

RUSH MEDICAL COLLEGE, CHICAGO

It is not my intention to attempt this evening to cover the entire subject of melancholia, but rather to select for discussion such points as appealed to me as being of interest to a gathering of neurologists, who are in daily contact with such cases. In order that we may understand each other, it will be necessary to state at the outset what the term melancholia means to *me*. This is made necessary by the great confusion which still exists in the classification of mental diseases, a classification about which no two text-books fully agree and which has undergone incessant changes since the birth of the science of psychiatry. I propose to include under the title of melancholia all such mental disturbances as are characterized by mental depression, as dominating symptom, with delusions of a depressive type, particularly of self-depreciation, and by inhibition, and which have in common a hopeful prognosis, whether these mental disturbances occur in an isolated attack, or recur periodically, or alternate with periods of exaltation, regardless of the age at which the illness comes on. And this at once leads to the first point, which I desire to discuss with you this evening. It is still the practice in most of our hospitals for mental diseases to separate in their classification those cases of mental depression which develop late in life, under the term of involution melancholia, from those seen in younger individuals. This differentiation has its basis in the fact that melancholia in the aged seems to give a less favorable prognosis, that its course in many instances is a very protracted one and that in not a few cases the disease terminates in a permanent and progressive dementia. I need hardly emphasize here the importance of differentiating between that simulation of mental impairment, which we see so often even in younger individuals suffering from mental depression, which is simply the result of inhibition and concentration upon morbid ideas, resulting in apparent loss of memory and judgment because of the greater difficulty encountered in attempts to raise memories above the level of consciousness, but not the result of an actual *loss* of old memories and association greater than that which constantly occurs in all normal individuals. It cannot be denied that dementia does not infrequently supervene in the mental depression of the aged. But here, as elsewhere in psychiatry, attempts at basing a classification merely upon the age, at which the disease occurs, has been—I believe—a failure.

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Again and again in the literature of manic-depressive insanity we find the statement that this psychosis is often found complicated by arteriosclerotic changes, that in it a tendency seems to exist particularly to very early changes of this type in the vascular system and Stransky seeks an explanation of this well-known phenomenon in the theory of a common basis. Both early arteriosclerosis and manic-depressive insanity, he says, may have their origin in the same tendency to "neuro-psychotic" degeneration. He believes that the degeneration within the walls of blood vessels may, in some instances at least, act as an exciting cause of the psychosis under discussion. It is this tendency to arteriosclerotic changes that affords a ready and plausible explanation for the occasional occurrence of dementia in aged manic-depressives.

We know that direct heredity is found more frequently in manic-depressive insanity than in the majority of other mental disturbances and this same tendency is very evident in the histories of so-called involution melancholias, as is a history of earlier, milder attacks in the same individual, some of them occurring long before the age of involution.

Perhaps the most convincing proof that there is no fundamental difference between the periodic depressions of youth and those of advanced age has been furnished by Dreyfus, who followed up the histories of all cases of melancholia (as then differentiated from the depressed phase of manic-depressive insanity) and of so-called "depressiver Wahnsinn" treated at the Kraepelin clinic in Heidelberg between 1892 and 1906. The total number of cases thus investigated was 81, not quite 1½ per cent. of all admissions. He too notes the frequent occurrence of a history of earlier attacks of depression terminating in recovery. In about 8 per cent. of these cases a terminal dementia resulted. He could discover no difference either in anamnesis, symptomatology, course (excepting as mentioned presently) or termination of the two forms. Involution melancholia, however, usually had a more protracted course and the danger of death was somewhat greater because of a heart weakened by senile changes, lesser resistance to such diseases as tuberculosis on account of the advanced age or because of a complicating arteriosclerosis.

Of the 81 cases followed up by Dreyfus, the original diagnosis proved to have been incorrect in two. Of the others—including a few with a somewhat doubtful diagnosis—44 had recovered, 8 were on the road to recovery, 20 had died, 4 were known to have become demented, while 2 others probably also had suffered permanent mental impairment. The deaths had been due in part to cardiac trouble, in part to disease of other internal organs, while the rest had committed suicide. About 66 per cent. then had either recovered or were recovering at the time of the reëxamination, about 25 per cent. had died from intercurrent diseases and about 8 per cent. had become demented as a result of complicating arteriosclerotic brain changes.

Quite striking are his statistics as to the duration of the malady. Only 64 per cent. of the cured cases recovered within the first three years, while in 8 per cent. the disease lasted between eight and fourteen years.

The fact that so many of these cases are cured—it seems to me—should in itself show the absurdity of considering them "involutional." That age should give the malady a certain coloring is not surprising. We know that extreme youth will do that with mental disturbances, why not then also advanced age?

We know that in manic-depressive insanity either only the one or the other phase may become severe enough to necessitate institutional care, we know too that laymen do not readily recognize the milder forms of alienation and that they are particularly slow to recognize the pathological character of such slight emotional fluctuations as characterize the cyclothymia of Kahlbaum. Were it not for these facts the number of cases in which the history shows an attack of this type earlier in life would undoubtedly be much greater, particularly when we take into consideration that the cases with a record of earlier attacks practically always show these to have been less severe than the ones developing at the "involution" period.

These considerations, it seems to me, show conclusively that both "involution" melancholia and the depressed phase of manic-depressive insanity must be considered one and the same disease, a conclusion which Kraepelin himself seems to have accepted in the latest edition of his larger book.

I shall have very little to say about the symptomatology of melancholia. There is only one point which seemed to me worth speaking of here and that is the frequency with which the delusions of patients suffering from this disease are based upon actual occurrences, trifling and unimportant in themselves, but enlarged upon and exaggerated by the morbid mind, until to it they seem to overshadow all other events of their lives. How petty an experience may serve this purpose was perhaps best illustrated by a patient seen many years ago, who constantly repeated that she was a thief, had disgraced her family, brought shame to her good husband, etc. It was weeks before I learned to know the basis of this morbid idea. Years before she had made some purchases at a department store and had paid for them. When the merchandise was delivered she found one clothes pin which she had not ordered. At that time she considered writing a postal card calling attention to the error, but had very wisely given up that plan as absurd, incidentally showing that tendency to being over-scrupulous, which we so often find in the history of melancholias. The incident had been forgotten when years later her morbid state brought it back to her as evidence of her utter depravity. Was this not an instance of searching the past for something that would form a suitable basis and explanation for the depression? Is not this the way in which most—or perhaps even all—delusions of self-depreciation originate; are they not subconscious attempts at explaining the primary emotional change? Talks with intelligent patients who had recovered from melancholia seem to support such a theory.

To differentiate melancholia from other depressed mental states is not always an easy task and if I discuss here the differential diagnosis, I do so, not only because I have known others to fall by the wayside, but rather because of my own difficulties in this field which have led me to give this question a good deal of thought and because some sad experiences have—I hope—not passed without teaching me a little. That periodic insanity is not necessarily manic-depressive insanity, I presume will be conceded by all. Dementia præcox, in particular, seems to me to have not infrequently an intermittent course, closely simulating periodicity and periods during which emotional disturbances dominate the clinical picture, are not rare. This periodic course is probably most common in the katatonic type. The depression of dementia præcox, I believe, usually gives a less consistent picture than that of melancholia. Often the facial expression will at once suggest the correct diagnosis, when the dysharmony between emotional life and thought content lets the patient hold forth about his unhappy experiences with a face which suggests either apathy or even hilarity. In the insanity of adolescence there is not, as a rule, any consciousness of being ill; while the patient suffering from melancholia, though not comprehending the nature of his disease, at least feels and knows, as a rule, that he is not well. I know, of course, of the occurrence of hypochondriacal delusions in both maladies, but they are a different thing from the feeling just discussed.

I hesitate about making a diagnosis of melancholia in a markedly depressed patient who does not also have persistent insomnia, a lasting loss of appetite and other disturbances of gastro-intestinal function and who does not lose weight rapidly. Pfoerringer is undoubtedly right when he says that a gain in weight without a subsiding of the emotional disturbance speaks for the diagnosis of dementia præcox. I need not here speak of the diagnostic value of such symptoms as marked negativism, the " Vorbeireden " of Ganser, verbigeration, stereotyped acts, etc.

Theoretically there should be little difficulty in distinguishing general paralysis from melancholia, but in practice it is not always a simple matter. I cannot agree with a distinguished colleague who says that every case of insanity with a positive Wassermann is a general paralysis. Even insanity associated with Argyll-Robertson pupil, with positive findings in the spinal fluid, with absent knee-jerks is not necessarily general paralysis. It may be—and in my own experience has been in several instances—a tabes combined with manic-depressive insanity. Syphilis is certainly not an uncommon complication in the latter disease, since the manic phase leads to sexual excesses and promiscuous intercourse. If you will bear the possibility of such a combination in mind you may be saved some of my own unpleasant experiences.

It has been said that in those very rare instances in which a manic-depressive later on developed a general paralysis—there are only few such cases reported and I have myself never seen one—that there the latter disease will often run a " circular " course.

The tendency to the theatrical, suggestive of the intentional, the greater suggestibility, the presence of stigmata will serve to differentiate hysteria from melancholia and difficulties—not of a very serious nature, however—will arise only in those cases when hysteria and melancholia occur in the same patient. A brief period of observation will—I believe—always be sufficient to clear away any doubt as to the correct diagnosis.

The fact that neurasthenics are not infrequently depressed and fearful is probably responsible in those cases—not so very rare—in which mild melancholia (" cyclothymias ") are mistaken for neurasthenia. If we find added to the emotional disturbance a disarrangement of the digestive functions, then the diagnosis of " nervous dyspepsia" is liable to be made. This, in spite of the fact that experience has taught us that appetite, motor and secretory processes in the gastro-intestinal tract are influenced to a marked degree by emotions and thought-content, as has been demonstrated in animals by the famous experiments of Parvlow and his successors. A correct diagnosis is all the more important in these cases, because an intensive treatment of the gastro-intestinal symptoms may and often does aid the development of hypochondriacal ideas in melancholias, while a very strict diet is harmful in other ways. The well-known tendency of the neurasthenic to run from one physician to another, to try all sorts of quack remedies, the reluctance of the depressed patient to seek medical advice, form a sharp contrast. The periodicity of cyclothymia is another valuable aid in diagnosis. The depressed neurasthenic gets relief from diversion, forgets about his troubles, when he is entertained, while the melancholy patient is never more unhappy than when he finds himself in a crowd or at an entertainment. The neurasthenic, says Pilcz, is egotistic, the melancholiac altruistic.

In general it may be said that an increase of depression during the morning hours, a rapid loss of weight or the presence of precordial dread speaks for the diagnosis of melancholia. A suicide during the morning hours is more likely the result of this disease.

I shall briefly discuss the treatment, even though I may be able only to reiterate things with which you are all familiar, because of its importance in a disease with so hopeful a prognosis. Since we may feel confident that our patients will—at least in uncomplicated cases—recover, unless they kill themselves, our first duty is to make suicide impossible. This danger of self-destruction exists even in the mildest cases, even in cyclothymias. It is—if I may believe my own experience—not greatest during the acme of the disease, but rather during convalescence, when our patients are better able to plan. It is then that they are most liable to dissimulate, in order to cause the nurse to relax in her vigilance and to obtain the long-desired opportunity to do away with themselves. If rest in bed were of no other avail in the treatment of the disease than in making supervision easier, it would be well worth ordering, but in addition to this it saves the patient's strength and limits to some extent the arousing of painful associations, since a man who does not move about has less contact with the outer world. It is this latter consideration, above all, which makes it undesirable to treat such patients at their own home, unless conditions be exceptionally favorable. I have found it not only useless, but often positively harmful to *argue* with the patient about his delusions. On the other hand to permit him to satisfy his craving to discuss his morbid ideas, painful as it may be for the physician, often seems to give at least some temporary relief to the patient. Do not dismiss these patients too soon. It is well, I believe, to keep them in the sanitarium for some time after their recovery. Remember the possibility that they may be dissimulating in order to regain their freedom. They are never safe until they demonstrate convincingly full insight into and correction of their morbid ideas. If discharged too soon they may commit suicide, suffer a relapse or else find themselves at liberty during that brief period of exaltation—usually mistaken by laymen for evidence of their joy at recovery—which so often follows a melancholia.

In closing, just one word about the drug treatment. I am thoroughly convinced of the value of opium in large doses, particularly in those cases in which fear is a prominent symptom. In several hundred cases treated with this drug I have never yet seen a patient who after recovery showed the slightest inclination to continue its use. But in spite of this, I am always most careful to keep the patient in ignorance of what he is taking, so as to make it impossible for him to satisfy a craving, should it arise. I also invariably instruct the nurse never to leave the drug in the room occupied by her charge.

Melancholia is the only nervous disease in the treatment of which I occasionally use alcohol. Both as a sedative and as a mild hypnotic it seems to me to be of distinct value.

SPINAL TUMORS: STATISTICS ON A SERIES OF 330 COLLECTED CASES*

By Carl R. Steinke, M.D., F.A.C.S.

AKRON, OHIO, SURGEON TO THE AKRON CITY HOSPITAL AND THE CHILDREN'S HOSPITAL

Sir Victor Horsley operated upon and removed the first spinal tumor in the eighties. The subject of spinal tumors has been developed almost entirely since that time, not only as to diagnosis, but also the operative technique.

Spinal tumors have the same etiology as tumors elsewhere in the body, and vary considerably in type, there being 40 varieties in the collected cases. They are generally single, although a number of multiple cases have been reported. They seldom recur when thoroughly removed.

To classify spinal tumors as to location the following subdivisions have been generally adopted: primary and secondary vertebral; intradural and extradural extramedullary; intramedullary; and caudal.

Early Symptoms.—Most of the symptoms of vertebral tumors are due to pressure on or changes in the nerve roots and the cord. Pain is generally the earliest and most resistant symptom. There may be a girdle pain of a persistent character. There may be external signs of a tumor, provided the growth is well posterior. The spine may be rigid with or without one of the spinal curvatures. Tenderness develops and, usually after several months, signs of compression assert themselves, although pathologically there may be no cord destruction. The location of the pain and the extent of the paralysis varies with the location of the lesion. In benign tumors the symptoms are slower in progress and more the character of cord tumors of the extramedullary type.

Symptoms of extramedullary tumors vary according to the location and relations. If they are near a root or roots then the root pains will be the first symptom and may be the only one for a varying period of time. When they are on the posterior surface of the cord, pain in the back may be the only early sign. If the growth is anterior there will be, more likely, muscle palsies and cramps.

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* This material was collected for Dr. Charles H. Frazier of Philadelphia and I am greatly indebted to him for the privilege of using it. All the cases we could find in the literature up to May, 1915, are included, as well as Dr. Frazier's unpublished cases.

[1] Read before The Summit County Medical Society, Akron, Ohio, February 6, 1917.

Symptoms of intramedullary tumors begin with numbness and tingling in one or more extremities followed by motor disturbances.

Tumors of the lumbar region give bladder and rectal disturbances early. Tumors high in the cervical region cause respiratory alterations.

Thus it will be seen the early symptoms, while definite, are misleading, as one is apt to treat local manifestations until the progressive symptoms produce more definite data for diagnosis. Alterations in reflexes or the Brown-Séquard complex may develop. When cord symptoms develop, root symptoms lessen or disappear. Starr gives the following sequence of symptoms: (1) peculiar pains limited in distribution; (2) increase of reflexes below the lesion; (3) paraplegia; (4) loss of sensibility; and (5) loss of all subjacent reflexes. The sequence of symptoms is very important for the diagnosis and correct valuation of the symptoms of spinal disease.

To differentiate the extramedullary (either extradural or intradural) and the intramedullary types, both as to the relation to the cord and the diagnosis of the level of the tumor, would be sufficient for a paper in itself and will not be discussed at this time.

Treatment.—Spinal tumors, with the exception of gummata and possibly malignancy, are treated best surgically. Without operation the outcome is sooner or later fatal. Malignant disease of the vertebræ can be treated palliatively in one of two ways: (1) by posterior spinal root resection; (2) division of the antero-lateral tracts, as described in 1912 by Spiller and Martin. The former is only temporary, while the latter gives more lasting relief from the severe unbearable pain. Removal of the growth is soon followed by recurrence in nearly every instance, and drugs lose their effect in time. A plaster jacket immobilizes the spine, thus lessening the suffering. Roentgen ray and radium should be tried. Benign tumors of the vertebræ are rare and, as a rule, may be excised.

Extradural tumors can be removed quite easily, with practically 40 per cent. of cures or greatly improved, and a mortality of about 33 per cent. out of 55 cases. Intradural tumors are more difficult to remove; however, in 97 cases, 48 (49.5 per cent.) were cured or greatly improved, and 34 (35 per cent.) died within two years.

Tumors of the cauda are more difficult to remove because of the number of roots in this region. The roots may surround the growth or even pass through the tumor, making careful dissection necessary for removal. Elsberg doubts if it is best to attempt removal when they are very large and suggests the two-stage operation. Of the 30 caudal tumors in this series, 13 (43.3 per cent.) were cured or greatly improved, while 14 (46.6 per cent.) died.

Intramedullary tumors should be operated in two stages, as advocated by Dr. Charles A. Elsberg and Dr. Beer, of New York City, in 1911, to allow the tumor to extrude itself from the cord. It is difficult in some instances to differentiate the subpial from the intramedullary tumor, so that some subpial tumors may be reported as intramedullary and vice versa.

Elsberg says: "There is no more satisfactory operation in surgery than the removal of an extramedullary tumor of the cord. The patient usually stands the operation, if it be done rapidly, and recovery is prompt." Elsberg operated 22 extramedullary cases without operative mortality. Horsley had 22 cases without a death. Fedor Krause had a mortality of 37 per cent. out of 26 operations. The cases in this paper include all cases dying up to two years after the operation, as well as the direct operative mortality.

The removability of the tumors in 203 cases is shown in Table I.

Treatment after Tumor Removal.—After-treatment consists in passive motion and turning the patient in bed, massage, and electricity. The stitches may be removed in 7 to 10 days and the patient gotten out of bed in 14 days. If too many fibers are not totally destroyed, the recovery of sensation and motion is astonishingly rapid and simultaneous if the pressure has been about equal on each. In the intramedullary type the recovery is not so rapid.

Pathology of Different Types.—Primary vertebral tumors are not common, there being 45 cases (13.6 per cent.) in the collected group of 330 cases. Twenty-one of these are sarcomata, about two thirds occurring between the ages of twenty and fifty. Primary sarcoma nearly always begins in the arches and consequently early forms a visible or palpable tumor. When sarcoma is secondary it is from direct extension and seldom from metastasis. Other less common primary tumors are osteomata, chondromata, and fibromata.

Carcinoma is the most frequent growth, practically never being primary. Carcinoma generally attacks the lateral and posterior bodies of the vertebræ, usually within the limits of the lower cervical and middorsal regions. About 60 per cent. are secondary or metastatic from cancer of the breast and most often of the scirrhus variety. Other more common original foci are the prostate and thyroid.

Of the extramedullary extradural tumors there are 55 (16.6 per cent.) in this group. As most spinal new growths arise from the arachnoid, pia or cord tissue, the extradural tumors are more rare and are usually circumscribed, which makes them easily removable. The more frequent types of extradural tumor are fibromata 14 (25 per cent.), sarcomata 13 (23.3 per cent.), and hydatid cyst 9 (16 per cent.).

The intradural tumors arise, mostly, from the arachnoid and pia and are rarely metastatic. The more frequent types are fibromata 22 (22.5 per cent.), endotheliomata 16 (17 per cent.), psammomata 13 (13.3 per cent.), and sarcomata 10 (10.3 per cent.).

Of the 36 intramedullary tumors 12 (33.3 per cent.) are gliomata (including glio-sarcoma), 6 (16.6 per cent.) inflammatory reaction processes equally divided between cysts and tuberculomata, and 12 unclassified.[1]

Of the 30 caudal tumors 9 (30 per cent.) are endotheliomata, 9 (30 per cent.) fibromata, and 5 (17 per cent.) sarcomata.

TABLE I

Location	Total	Tumor Location Incident to									
		Tumor Removal					Relation to Cord				
		Removed	Partly Removed	Not Removed	Found at Necropsy	Not Stated	Anterior	Antero-lateral	Posterior	Postero-lateral	Not Stated
Total	203	139	35	19	8	2	20	15	71	51	46
Extra medullary: Intradural	83	70	4	6	3		6	9	31	31	6
Extra medullary: Extradural	32	30	2					2	11	11	8
Intramedullary	32	14	7	7	3	1	1	1	16	3	11
Root and Cauda	19	11	5	1	2		2		5	2	10
Vertebral: Primary	25	13	10	2			9	3	5	2	6
Vertebral: Secondary	9	1	6	2			2		3	2	2
Miscellaneous	3		1	1		1					3

The nature of a spinal new growth can seldom be determined before operation, except, possibly, gumma. Metastatic tumors of the cord are rare. Of the 330 cases there are 97 (29.4 per cent.) intradural, 55 (16.6 per cent.) extradural, 45 (13.6 per cent.) primary vertebral, 36 (11 per cent.) intramedullary, 30 (9.1 per cent.)

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[1] Six of the tumors found at necropsy following operation were anterior.

TABLE II

Pathological Diagnosis	Pathology According to																							
	Level							Sex			Age								Prognosis					
	Total	Cervical	Cervico-Dorsal	Dorsal	Dorso-Lumbar	Lumbo-Sacral	Not Stated	Male	Female	Not Stated	1–9	10–19	20–29	30–39	40–49	50–59	60–69	Not Stated	Recovery	Greatly Improved	Slightly Improved	Unimproved	Died	Not Stated
FIBROBLASTOMA:																								
Fibroma	26	8	3	10		4	1	12	12	2	1	4	6	4	5	3		3	9	8	2	1	6	
Fibro-adenoma	1			1				1							1				1					
Fibro-endothelioma	3	2		1				2	1						2		1		1	1	1			
Fibro-muscular	1					1			1						1					1				
Fibro-myxoma	4			3		1		3	1			1	1		2				2	1			1	
Fibro-myxo-sarcoma	2		1	1				2								1	1			1	1			
Fibro-sarcoma	29	10	1	9	1	8		19	10			4	3	7	5	7	3		5	7	3	1	13	
MYXOBLASTOMA:																								
Myxoma	3	1		1		1		2	1				1			1		1	1			1	1	
Myxo-lipoma	1			1					1						1				1					
Myxo-sarcoma	1					1			1					1							1			
CHONDROBLASTOMA:																								
Enchondroma	6	2		3		1		3	3				1	1	2	1	1		2				4	
Chondro-sarcoma	2			1		1			2				1	1						1			1	
OSTEOBLASTOMA:																								
Osteoma	4			2		2		3	1					1	1	2				1	1		2	
Osteo-fibro-sarcoma	1					1		1					1						1					
LIPOBLASTOMA:																								
Lipoma	4	2				1	1		2	2			1					3		2	1		1	
ENDOTHELIOBLASTOMA:																								
(*a*) *Hemangio-endothelioblastoma:*																								
Angioma	4			4				4					1	1	1	1				2			2	
Angio-fibro-sarcoma	1			1				1								1				1				
Angio-lipoma	2			2					2							2				1	1			
Angio-sarcoma	4	1		1		2		1	3				2		1	1							4	
(*b*) *Lymphangio-endothelioblastoma:*																								
Lymphangioma	1					1		1				1								1				
(*c*) *Dural endothelioblastoma:*																								
Dural endothelioma	25	9	1	8		7		10	14	1		2	5	5	6	2	1	4	5	9	1	1	9	

TABLE II—(*Continued*)

Pathological Diagnosis	Pathology According to																							
	Level							Sex			Age								Prognosis					
	Total	Cervical	Cervico-Dorsal	Dorsal	Dorso-Lumbar	Lumbo-Sacral	Not Stated	Male	Female	Not Stated	1–9	10–19	20–29	30–39	40–49	50–59	60–69	Not Stated	Recovery	Greatly Improved	Slightly Improved	Unim-proved	Died	Not Stated
LYMPHOBLASTOMA:																								
Lympho-sarcoma	2			2					1	1				1				1		1			1	
MYELOBLASTOMA:																								
Myeloma	3	1		1		1		3						1	2					1	1		1	
MELANOBLASTOMA:																								
Melanoma	3	1		1		1		2		1			1	1			1						3	
GLIOBLASTOMA:																								
Glioma	17	5		9		2	1	8	8	1	1	1	3	3	4	2		3	2		2	2	11	
Glio-sarcoma	4	1		1		1	1	2	2				1		3					1			3	
NEUROBLASTOMA:																								
Neuro-fibroma	6	3		3				4	2			1	3		2				1	1			4	
Neuro-fibro-angioma	1			1					1						1								1	
Neuro-fibro-glioma	1			1					1						1				1					
Neuro-fibro-sarcoma	1			1					1				1						1					
EPITHELIOBLASTOMA:																								
Adenoma	3			3				1	1	1				1	1			1			1	1	1	
Carcinoma	10	1		5		4		2	8			1		2	4	1	1	1					10	
EMBRYOBLASTOMA:																								
Teratoma	1					1		1						1									1	
Dermoid	2			1		1		1	1			1	1								1		1	
INFLAMMATORY REACTION PROCESSES:																								
Tubercle	8	1		5		2		5	2	1			1	3	1	1		2		2	1		5	
Gumma	1	1						1							1								1	
Cyst	10	3		6		1		5	3	2		2	1	2	3			2	4	4	2			
UNCLASSIFIED:																								
Sarcoma	66	10	2	39	1	14		43	18	5	2	4	15	15	11	8	5	6	10	10	8	4	32	2
Psammoma	13			13				1	12				1		9	1	1	1	7	1	1	1	3	
Hydatid	11			6	2	3		9	2			1	4	2	4				1	2	4		4	
Not stated	42	11		25		4	2	16	17	9		1	6	10	9	4	2	10	5	4	5	7	19	2
Total	330	73	8	172	4	67	6	169	135	26	4	24	61	63	84	39	17	38	60	64	38	19	145	4

TABLE III

Prognosis	Total	Prognosis According																						
		Level						Sex			Age								Location						
																			Extra Medullary				Vertebral		
		Cervical	Cervico-Dorsal	Dorsal	Dorso-Lumbar	Lumbar	Not Stated	Male	Female	Not Stated	1–9	10–19	20–29	30–39	40–49	50–59	60–69	Not Stated	Intradural.	Extradural.	Intramedullary	Root and Cauda	Primary	Secondary	Miscellaneous
Total	330	73	8	172	4	67	6	169	135	26	4	24	61	63	84	39	17	38	97	55	36	30	45	13	54
Recovery	60	10	3	37		9	1	31	23	6	2	7	11	5	20	4	2	9	25	7	3	5	6		14
Greatly improved	64	17	2	30		13	2	27	31	6		5	10	18	8	9	5	9	23	14	6	8	8		5
Slightly improved	38	12	1	17	2	5	1	20	16	2		4	4	8	14	3	1	4	11	13	5	1	3	2	3
Unimproved	19	2		13		4		10	8	1	1	2	3	4	5	2	1	1	4	3	4	2	2	1	3
Died	145	31	2	72	2	36	2	79	55	11	1	5	32	27	36	21	8	15	34	18	16	14	26	10	27
Not stated	4	1		3				2	2			1	1	1	1						2				2

caudal, 13 (4 per cent.) secondary vertebral, and the location not stated in 54 (16.3 per cent.).

The relation of the tumors to the cord in the various locations is given in Table I.

The pathological classification is given in Table II, together with the number of each at the various levels, and according to sex, age, and prognosis.

The prognosis of spinal tumors at the various levels and according to sex, age, and location is shown in Table III.

Table IV

Spinal Tumor Location as to Prognosis and Incidence of Level

Location		Total	Early						Late (After 2 Yrs.)					Level			
			Recovered	Greatly Improved	Slightly Improved	Unimproved	Died	Not Stated	Total	Recovered	Greatly Improved	Slightly Improved	Died	Cervical	Dorsal	Lumbo-sacral	Not Stated
Total		330	60	64	38	19	145	4	25	14	7	2	2	79	174	71	6
Extramedullary	Intradural	97	25	23	11	4	34		10	5	3	1	1	34	61	2	
	Extradural	55	7	14	13	3	18		6	3	2	1		9	35	9	2
Intramedullary		36	3	6	5	4	16	2	2	2				15	17	1	3
Root and Cauda		30	5	8	1	2	14		4	2	1		1			30	
Vertebral	Primary	45	6	8	3	2	26		2	2				7	23	15	
	Secondary	13			2	1	10							1	7	5	
Miscellaneous (not stated)		54	14	5	3	3	27	2	1		1			13	31	9	1

The early and late (after two years) prognosis as to location is shown in Table IV, as well as the incidence of level.

The course of the disease is generally slow but gradually progressive. Death follows, due to exhaustion from pain or complications such as myelitis, pyelonephritis, decubitus, and septicemia. In this series the shortest time symptoms were present before operation was 15 days, the case having been reported by Stursburg. The longest time was 15 years, while the average was 28.43 months for 279 cases. The prognosis is always fatal except in the cases of gumma or following operation.

Conclusions

1. Tumors must be operated early to obtain the best results.
2. Cord operations must be delicately performed.

3. The post-operative treatment is important.

4. If few fibers are destroyed, marked recovery or cure follows within a few months to two years.

5. If the symptoms have been slight, recovery may be expected.

6. If marked spasticity remains, resection of the posterior spinal roots is indicated.

FAMILY SPASTIC PARALYSIS

By G. H. Williams, M.D.

FIRST ASSISTANT PHYSICIAN, COLUMBUS STATE HOSPITAL

The following cases of family spastic paralysis occurred in a branch of the family tree of case No. 8803, admitted to the Columbus State Hospital May 12, 1915.

The family is located in one of the hill counties of southeastern Ohio and for many years have intermarried to some degree. Some few members who have left the community have married new stock and do not show such deteriorating tendencies.

The great-grandfather, A. S. (1), of the affected children was an alcoholic, insane and a criminal who served a sentence in the Ohio Penitentiary for horse stealing. He married N. A. (2), of whom we know nothing except that she died of senility. They had four boys and five girls.

One girl, M. S. (3), married an alcoholic, M. S. (4), who was a case of mental depression and suicided. They had four boys and three girls. All of the boys were alcoholics—one a criminal, and one died of tuberculosis. One was divorced. One of the girls was divorced.

A second daughter, C. S. (30), of A. S. (1) was unmarried and died of tuberculosis.

A fourth daughter, F. S. (32), married, died of tuberculosis, and of her three children two died of tuberculosis.

One son, J. S. (115), of A. S. (1) was a case of mental depression and died of tuberculosis. He married M. C. (116), who was an asthmatic. They had six sons and four daughters, with many grandchildren.

One son, P. S. (123), was very deaf, a second son, J. S., Jr. (134), deaf and epileptic, a third son, J. S. (140), insane and epileptic. A daughter, J. S. (166), married A. L. (167), who died of cerebral tumor. She had an illegitimate son—with four other sons and two daughters.

One of the sons, J. L. (168), has pronounced phobias. One of the daughters, T. L. (179), is an epileptic and was at one time a patient in the Ohio Hospital for Epileptics. While away from the institution she married an epileptic, C. R. (180), who had also been a patient in the same hospital. They have had three children—two dying in infancy.

A second daughter, T. S. (185), of J. S. (115) and M. C. (116) first married an epileptic, McD. (186), from whom she was divorced—one son a stutterer. No children from her second marriage.

A third daughter, N. S. (189), died of cancer. She had an illegitimate son and later married the man who was the father of the illegitimate son of her sister, J. S. (166).

The second son of A. S. (1) and N. A. (2) was H. S. (192), an alcoholic who died of senility. He was married and had two sons and two daughters. One of the daughters, M. S. (194), married, and one of her daughters, J. S. (197), had an illegitimate son, who has been arrested as a petty criminal. Another daughter of M. S. (194) died of tuberculosis.

A second daughter, J. S. (206), of H. S. (192) was badly deformed for many years because of "muscular rheumatism."

The third son of A. S. (1) and N. A. (2) was J. S. (211), an alcoholic who was drowned—probably suicide. He married R. C. (212), who died of cancer. She was a sister of M. C. (116), wife of J. S. (115), the first-mentioned son of A. S. (1). J. S. (211) had one son, whose daughter had but one ear.

The fourth son of A. S. (1) and N. A. (2) was C. S. (52), grandfather of the cases to be described. He has a petty criminal record, has been a patient in one of our state hospitals for the insane and is now showing senile dementia. He has been married three times. His first wife was A. (53). They had two daughters. One of these, C. S. (56), married G. N. (58), had two children, was divorced, later married G. C. (57), no children, divorced, again married G. N. (58), one son, and is again divorced.

The second wife of C. S. (52) was E. C. (73), a sister to M. C. (116) and R. C. (212). E. C. (73) was a patient in one of our state hospitals for the insane and died of tuberculosis. She had an illegitimate son.

To the union of C. S. (52) and E. C. (73) were born three sons. One, B. S. (82), an alcoholic with criminal tendencies, married B. S. (83), who comes from a quarrelsome criminal family.

A second son of C. S. (52) and E. C. (73) was A. S. (86). He is case No. 8803. He has served a term in the Ohio Penitentiary for manslaughter, has been married twice, in each case to a prostitute, and was seeking to remarry his first wife without a divorce from the second when arrested, found to be insane and committed. He is now a patient in the Lima State Hospital for Criminal Insane. Mentally, he is an imbecile.

The third son of C. S. (52) and E. C. (73) was W. S. (74) father of the cases. He is of medium intelligence, indolent, addicted to alcohol and at times shows criminal tendencies.

The third wife of C. S. (52) was E. R. (90), of fair mentality and badly deformed from birth. They have three sons and four daughters. One son W. S. (106) was recently arrested in connection with the birth of an illegitimate child of M. S. (80), one of the cases to be described. Another son, C. S., Jr. (107), is an imbecile.

In addition to the children mentioned, E. R. (90) had an illegitimate daughter, M. S. (75), who is the mother of our cases.

M. S. (75) is a woman of good intelligence, industrious, kind, and it is due to her excellent powers of observation and keen memory that I am indebted for much of the history.

To the union of W. S. (74) and M. S. (75) were born four boys and two girls. There were no miscarriages and the mother had good health with normal labor in each pregnancy.

The family history outlined was secured through the kindly co-operation of the family physician, friends and relatives. There was no field worker available. We have traced in all approximately two hundred and fifty persons, and, as is shown, we have delinquents, criminals of all degree, tuberculosis, cancer, imbecility, epilepsy, illegitimacy, alcoholism and other psychoses, with neuroses and different forms of organic nervous diseases.

I first saw the cases in February, 1916, and at that time the two children who were living and suffering with the disease seemed to be in a far-advanced state. Practically all the history was written and the examination made at that time. I saw the cases again in March, 1917, and any marked changes have been noted.

No. 1. E. S. Male, age twenty-two, married. History of headaches and alcohol at times to excess. Otherwise negative.

No. 2. B. S. Female. Died in 1913 at seventeen years of age. Disease was manifested at five years. First symptom was walking on the toes, and was thought to be due to new shoes. The gait grew worse, with reeling, frequent falls, later convulsions and finally paralysis of the lower extremities. This change extended over a period of four years. There were at times contractures. Sight gradually failed until she was totally blind. There was some divergence of the eyes, pupils at all times large but no ptosis. Scanning speech. Difficult swallowing, eating little but semisolids. Gradual loss of muscle tone in arms and forearms, bilateral wrist drop, finally paralysis. No trophic disturbances, injuries healed rapidly with general hypesthesia. When nine years of age patient tried to walk with crutches but would fall backward. For five years after paralysis of the lower extremities she was able to spend the day sitting in a chair. Was in a happy mood most of the time, but showed no development mentally after disease first appeared.

No. 3. W. S. Male, eighteen. Age at onset eleven years. Attended school two terms, learning fairly well. Initial symptoms were nervousness, shaking of hands, inability to hold objects, falling in walking, speech defect. Patient was examined in bed in February, 1916. At that time had been confined to bed for one year.

Height five feet and six inches, brown hair, gray eyes, smooth face, head fairly well shaped, adherent lobules, poorly formed palatal arch, large goiter. Teeth are bad, tongue clean, bowels irregular, abdomen distended and tympanitic. Hemoglobin 90 per cent. Blood smears and Wassermann negative. Incontinence of urine. No urinalysis.

Nervous and Muscular Systems.—Recognizes colors. Cannot read. Right pupil larger than the left. Reacts slightly to light and slowly to accommodation. Sight is gradually failing. Eyes are widely opened, no ptosis, but a slight divergence of the left eye; lack of tone in facial muscles. When seen in 1916 the mouth was widely opened, pronounced facial grimaces but at the present time the facial muscles have lost their tone. In 1916 showed scanning speech, guttural laughter, could whistle but not sing, but since February, 1917, has been unable to speak. Tongue protruded in the median line with no atrophy, head falls from side to side unless supported. Muscles of the arms and forearms are spastic with bilateral wrist drop. The dorsal muscles of the hand are atrophied, fair grip, lack of coördination in hand movements. Last examination showed claw hands. In 1916 patellar reflexes were markedly increased, mild spasticity of leg muscles, pronounced Babinski; legs and thighs are atrophied. Feet hyperextended, slightly inverted. When last seen the patellar reflexes were lost, no spasticity. During past year patient had at times convulsive attacks affecting both arms and legs, and occasionally the legs were so contracted that the heels pressed against the buttocks, causing pressure sores. Skin reflexes are diminished; the skin of feet and legs purple. The knees and the tops of the feet are calloused, due to crawling. Thermo-anesthesia over thighs and legs. No mental development after the disease started. Most of the time in happy mood, although occasionally irritable. Deterioration is very marked. Died October 18, 1917. Had gradually grown worse mentally and physically. No autopsy.

No. 4. M. S. Female, age sixteen. Age at onset seven. Attended school one year before becoming sick. First symptoms were dragging of toes and inability to hold objects in her hands. Later, involvement of neck muscles and falling of the head from side to side. When seen this year she had regained some control of the neck muscles. Early speech defect. Examination shows an underdeveloped girl, height four feet and eight inches with upper part of body well nourished, dark brown hair, brown eyes, face full, body skin in good condition with the exception of recent burns on left wrist and outer angle of left eye. Good appetite, clean tongue, fair teeth, irregular bowels. Pulse rapid—130—of poor volume. Accentuated pulmonic and aortic second sounds, no murmurs. Blood pressure 70 mm. No examination of blood made. Urine shows albumin and hyalin casts. Began menstruating at fourteen years of age. No special change in the nervous system following advent of menstruation. Later grew worse at menstrual times, having fainting attacks. Has had vicarious menstruation from nose for several months. Examination of the abdomen, breasts and vaginal examination show patient to be pregnant. She was later delivered, and a cousin arrested as the father of the child. It might be well to state that after recovering from this pregnancy she grew better in some ways physically. The lack of tone in the neck muscles grew better, the increased heart action subsided and her anemia disappeared. In November of 1916 she fell while trying to walk, fracturing her left clavicle and after this had partly healed she had another fall, injuring it again.

Nervous and Muscular Systems.—No impairment of smell. Recognizes colors, sees to read and knows her letters. Inequality of pupils at first examination but at last they were equal, reacted to light but not to accommodation. Eyes are widely opened, no ptosis, facial muscles show lack of tone. Mouth widely opened most of the time, facial grimaces. Talks in a low tone, slow scanning speech; can whistle and sing. Tongue movements are normal, no atrophy. Arm, forearm and hand muscles show some slight atrophy. Grips are diminished. Elbow and wrist reflexes are much increased. F. N. and F. F. tests show incoördination. There is atrophy of the thighs and legs, feet are inverted. When first seen the legs were extended on the thighs, fixed, but at the present time can be flexed. Mild spasticity and pronounced Babinski. Patellar reflexes are markedly exaggerated. No ankle clonus; can stand alone and walks some by clinging to others or to objects, really pulling herself about the room. It has been impossible for her to walk with crutches, but for a time was able to walk with a single stick by throwing her weight forward upon it. Her feet drag and when first seen were flopped to the floor like a flail. The leg muscles are growing worse rapidly. General hypesthesia, some vasomotor changes, skin is mottled. Mentally there has been no development; she is in a happy mood most of the time; frequently sings some of the songs she learned at school.

No. 5. R. S. Male, fourteen, appears normal. For many years was not allowed to sleep or associate with the other children, the mother thinking the condition was contagious. Examination showed nothing abnormal except enlarged tonsils and adenoids.

Mentally, is in good condition, making fine progress in school. In September, 1916, visited an oculist in Columbus and was given a correction for a severe myopia.

No. 6. F. S. Male, twelve. Is in the fifth grade at school. Had diseases of childhood; has at all times been easily frightened. Superficial examination showed his musuclar system to be in good condition. He occasionally shows some squints or tics with slight twitchings of the muscles of the chest and upper extremities. These grew better during the year and were not present in 1917. There is a slight inequality of pupils; gait is normal. He has a small goiter.

Strümpell, who was one of the early observers of this condition, described one type beginning between the ages of twenty and thirty years, showing rigidity of limbs, exaggerated reflexes and spastic gait, weakness of lower muscles, with the arms unaffected. Pathologically they show a pure sclerosis of pyramidal, cerebellar and Goll tracts.

The other groups, occurring between three and six years, or later, correspond to the spastic paraplegia of adults with some mental retardation.

Rhein in Volume 44, JOURNAL OF NERVOUS AND MENTAL DISEASE, gives an exhaustive treatise of this subject. He has made a complete review of the reported cases and divides them into the following groups:

1. Type by Strümpell in which the legs alone are affected—the arms and cerebral region unaffected.
2. Type in which disease extends to the arms and may or may not show mental failure.
3. Type showing some symptoms indicating implication of the cerebellum. Along with spasticity of legs may be added cerebellar symptoms, nystagmus, scanning speech with or without mental deficiency.
4. Type in which bulbar symptoms are added to the spasticity which involves the arms and legs.
5. Type in which spastic paraplegia is associated with muscular atrophy either in legs or arms.
6. Type in which tremor in the legs or arms, or both, may be associated with spastic paraplegia. With these cases may be classified those in which the symptoms are those of disseminated sclerosis.
7. Type of family spastic diplegia.

The cases we have described are difficult to place in any of the above classes, unless it should be the sixth division. We must recognize that these were seen the first time very late in the disease—and an earlier examination would probably have shown the cases more clearly defined.

Spiller believes the family spastic paraplegia to be the result of degeneration of the distal portion of the pyramidal tracts—the result of imperfect development. Others have found degeneration of the pyramidal tracts either high or low; others, changes in the cerebellar tracts, Goll's tracts, cells of the anterior horns, in the cerebellum and in some cases sclerotic patches through the cord.

DIMINUTIVE VISUAL HALLUCINATIONS IN MIDDLE-AGED WOMEN DURING THE INVOLUTIONAL PERIOD

By Alfred Gordon, M.D.

OF PHILADELPHIA

The psycho-sensorial disorder which I am about to describe presents some interesting features, although difficult of interpretation. It consists of visual hallucinations the character of which lies in markedly diminished dimensions of beings or objects with integrity of their relative proportions. The perception of the diminished size has reference exclusively to the objects of the hallucination but not to the surrounding objects, which remain unaltered to the hallucinating individual. Total consciousness of the hallucinations is characteristic.

The literature on this subject is very meager. Since 1832 there have been very few scattered observations. In that year Macnish in his book on the Philosophy of Sleep mentions an interesting case of a man who during convalescense from an attack of cholera saw diminutive beings of three feet height dressed in picturesque costumes. As he gradually regained his health, the objects appeared smaller and smaller and less frequently. One night while he was sitting all alone at the table they appeared before him and danced on his table. Being very much annoyed, he then suddenly struck the table with his fist and cried out: "Get away from here at once, you little devils." The hallucinations disappeared and never returned.

The next record we find in Leuret's work of 1834, entitled "Fragments philosophiques sur la folie." His case was taken from an old ecclesiastical book: The devil came at night and knocked on the door of Father Macaire asking him to get up and to join other priests in night prayers. At once he went in the church, where he commenced to pray to the Lord. Suddenly he saw a multitude of diminutive Ethiopians running through the church around the priests, who remained seated; one made a priest go to sleep by pressing his eyeballs; another put a finger in a priest's mouth to make him yawn; others placed themselves on the neck and shoulders of the priests; others turned into women. Father Macaire, praying to the Lord, speaks of his soul filled with illusions. Brierre de Boismont in his book on Hallucinations in 1852 reports several cases. In one the patient saw around his great toe Tartars, Roumanians and Turks fighting against each other. In another case the patient having fever and headaches saw a crowd of small human figures all of the same size and placed at the same distance. When one of these figures vanished, immediately another took its place. Having no delirium the patient was able to make a correct observation of his hallucinations. The same author speaks of several aged women suffering from senile dementia who could see thousands of little children around them. The following four cases came under my observation:

Case I. Mrs. M. S., aged forty-five, complained of vague nervous disturbances of a functional nature. She first consulted a gynecologist, who advised removal of the uterus and ovaries. This was done. The operation aggravated her condition and from that time on she had at various intervals paroxysms of major hysteria. Although she recovered from the surgical procedure, she never left her bed for six months. She then presented in addition to the above attacks of hysterical outbreaks also vague pain all over the body, headache, marked insomnia and anorexia. At times she would become slightly confused, but the latter state would soon disappear. During the last four months she developed visual hallucinations of a peculiar character. At first only in the evening and later at any time during the day but always preceding and following a hysterical paroxysm she would see a great many little children filling the room, laughing and chatting with each other. Some of them would climb on her bed and come closer and closer to her until she felt their little hands around her neck. At that moment she would scream and enter the semiconscious state of her hysterical paroxysm in which she threw her arms in various directions and raised her body in a condition of opisthotonos. As soon as consciousness had been regained, she would see the little figures again but gradually moving away from her at longer and longer distance until they became invisible. These images appeared also without an accompanying hysterical paroxysm, but then they would only remain in the room and sit on the bed without approaching her neck. The patient was not delusional. During the intervals between the paroxysms she frequently discussed her hallucinations. She realized the absurdity of the visions, laughed at them, ridiculed them. She insisted, however, on explanations; she wished to know the raison d'être of the images of little human beings. She was anxious to know why adults did not appear, but only children. At no time did she fear the apparitions and finally she accepted them as inevitable and ceased to find explanations. Even then she was not delusional, as she assured her physician and myself that they would eventually disappear, as there was "nothing to it" to use her own expression. Later she made a complete recovery. She remembers now those hallucinations and frequently refers to them in her conversations.

Case II. Mrs. C. M., aged fifty-eight, presented at various intervals during a period of several years a neurasthenic symptom-group from which she had never recovered. During the last two attacks, which lasted two and four months respectively, she had visual hallucinations of the following character: While she was in bed late in the afternoon she would notice men and women crowding her room and standing around her bed. In whichever direction she would turn her head she saw them standing and looking at her. What particularly astonished her was their sizes and dimensions. They all appeared to her exceedingly small in stature and in individual features, although they were all adults and some of them of middle age. In spite of their size the parts of their bodies were all in proportion to each other. When she stretched out her hands to reach them and touch them, they would promptly recede. Once she got out of bed to catch them, but the further she went after them, the further they moved away from her and when she returned to bed she found them all standing at each side at the foot and head of the bed. The hallucinations would last about 30 minutes and then suddenly disappear. The patient fully appreciated their unreality, spoke of them frequently to everybody and was convinced of the fact that they would disappear. After having had experience during one period of her breakdown and remembering that the hallucinations then disappeared she was fully convinced this time that they were only temporary and without any special consequence. At no time was the patient delusional.

Case III. Mrs. A. K., aged forty-one, having had at thirty-five double oöphorectomy, was suffering from attacks of petit mal for the last ten years. At forty she had a gastro-intestinal disorder with a prolonged diarrhea during a period of two months. At that time while in bed she developed visual hallucinations. Every object and human being in the room appeared to her of extremely small size, not larger, she said, than that of a man's finger. Besides, there were also a great many unfamiliar people whom she never met before and who were also of the same diminutive size. The most interesting feature of these hallucinations is their sudden onset and sudden disappearance. All at once she would see everything and everybody, also strange bodies, in a very small size. As the woman suffered from petit mal, the sudden appearance of the images suggested the possibility of a psychic equivalent. However the duration of the vision was not that of epilepsy, as each hallucinatory attack lasted at least thirty minutes and a few of them two hours. Besides, she remembered them and she was perfectly conscious of their unreality, as she frequently criticized them. Her constant solicitude was to know why the visions appeared at all and why in such ridiculous shape. As she was very intelligent and observant she called attention to the fact that the hallucinations would occur after an exceptionally profuse attack of diarrhea. The condition lasted as long as the intestinal disorder.

Case IV. Mrs. K. S., aged fifty, widow, psychasthenic, having presented formerly at various times obsessive phenomena, developed at the age of forty-eight periods of depression. She recovered from each attack. At no time was she delusional. During the last attack of depression, which lasted longer than the others, for the first time she presented hallucinations—both auditory and visual. In the latter she saw strange adult people of an unusually small size. They were all men and appeared mostly towards evening and only when she was left alone in the room. Then they would crowd the room and around her bed; all wore the same clothing and of the same color, which was red; none of them had a hat on, and all had very few hairs on their heads. She heard them whispering unintelligible words, although of a pleasant nature. The visions would disappear as soon as someone would enter the patient's room. She fully realized the absurdity of the hallucinations, as she frequently spoke of them to all who visited her in the most critical manner. She was convinced of their unreality. She eventually recovered from the attack of depression and the hallucinations also disappeared.

The common characteristics of these four cases are: visual hallucinations of obsessive nature with preservation of consciousness; the objects of the hallucinations were of diminutive size; to some all objects appeared very small, to others the familiar people appeared normal and the visual images were made up of uncommon faces. Curiously enough the individuals of the images are all of the same size, of the same color, of same coverings, standing in the same positions and all doing the same act. Finally they all occurred in individuals of female sex and of middle age, during the involutional period of life.

The pathogenesis of this curious visual phenomenon presents difficulties for a proper interpretation. Under the name of micropsy has been described a manifestation in which familiar objects appear to be placed at long distance from the observer. Some writers observed at the same time diminution of their size. But this visual phenomenon cannot be placed in the category of hallucinations, as it refers exclusively to objects and beings which are actually in existence. When a real object appears to be placed far removed from the observer's eye, and appears of a different size, the inference is that there is some error either of accommodation or convergence or of both. Such is the view of Otto Veraguth, who in his work on Micropsy and Macropsy (Deutsche Ztschr. f. Nervenheilk., 1903, Bd. 24) discusses the pathogenic mechanism of the visual disorder.

K. Heilbronner (Deutsche Ztschr. f. Nervenheilk., 1904, B. 27) in his work on Mikropsie and Allied States bases his opinion on the occurrence of micropsy in epilepsy. He believes that the musculature of the eyes is not the original cause of the disorder, but the cortex, and especially that portion of it which controls the muscular sense, including the muscles of the eyes. A toxin affecting that cortical area will produce micropsy. However simple the pathogenesis of micropsy may appear, the same can not be applied to hallucinations, as the latter is fundamentally different from the former. While the phenomenon of micropsy exists in connection with objects genuinely existing, the phenomenon of hallucinations has reference to objects not existing. While in the former phenomenon the objects preserve their mutual relation as to their individual size, shape, form and space, exactly as it occurs in reality, in the latter phenomenon there is a striking uniformity in all the objects and beings seen as to their color, size, shape, form and to their activities. The former is merely a visual illusion, a misplacement of objects actually seen, the latter is an abnormal visual phenomenon of objects never seen by the individual before.

In 1847 Sauvet described in the Annales Médico-Psychologiques a case of ether intoxication in which the individual for twenty minutes saw a diminutive woman dance before him on the piano cover. Similar observations were made in alcoholism, cocainism, chloralism. de Clérambault observed it in tabetics, in paretics and in a blind paranoiac (Ann. Médico-psychol., 1909). The four personal observations related above are particularly conspicuous by the conscious and obsessive character of the visual disorder, and they occurred in individuals free from psychoses. To apply to actual hallucinations the pathogenesis of disordered accommodation and convergence, viz., purely an ocular disorder as advanced by Veraguth (loc. cit.), will mean to identify hallucinations with micropsy. We have seen above that they are two different phenomena. The diminutive visual hallucinations may occur in non-delusional individuals as obsessive manifestations and in psychoses either as obsessive or non-obsessive phenomena. In the latter case they are either intimately associated with or form a part of delusional mentality.

When we attempt to determine the pathogenesis of this phenomenon we meet with some difficulty. In case it is obsessive, as it was in my four patients, its pathogenesis is to be determined from obsessions in general. In the subject under discussion we are dealing with a special variety of the obsessive hallucinations, namely with a uniformly diminutive size of the objects seen. Do we find or can we observe any relationship between the character of the hallucinations and the state of health or the age or the sex of my patients?

The first patient had paroxysms of major hysteria and the diminutive images appeared before her either preceding or following an attack. In the second case the patient had several attacks of neurasthenia and in each of them the hallucinations were present. In the third case the patient had petit mal for ten years but the visual hallucinations occurred during a severe attack of a gastro-intestinal disorder. In the fourth case there was a history of several attacks of depression and during the last attack, which was unusually prolonged, the hallucinations developed. A neurasthenic state, a gastro-intestinal disturbance, a prolonged depressive condition, all found in the last three cases, suggest strongly the possibility of a toxic state with the disappearance of which the hallucinations disappeared. The occurrence of hallucinations in conditions produced by internal or external toxic elements is a common and a very familiar picture. It does not, however, explain satisfactorily the reason of the peculiar character of the hallucinatory images. Why did the objects appear in the shape and size of extreme diminution, resembling children, why in such a number, why so uniform in diminution of size, why did they crowd the room and bed and why did all these children put their arms around the patients' necks?

In searching for an explanation one cannot accept merely the toxic doctrine alone, although toxicity was present. The latter must be considered as a factor which by reason of abnormal elements circulating in the bloodvessels of the cerebrum is capable of disturbing the psycho-sensory functions and the special sensorium in particular, thus producing visual or other hallucinations, but it fails to elucidate the nature and character of the false perceptions, such as for example in the phenomenon under discussion. We have seen above that a disturbance of accommodative and convergent power of the eye muscles may be applicable to the phenomenon of micropsy, in which actually existing objects appear far removed from the patients' eyes and therefore impress as being small, but they are not at all applicable to genuine hallucinatory manifestations, in which suddenly appear in a diminutive form objects and beings which did not exist before, while the surroundings remain in their natural relations to the patient. If a toxic metabolic state may play the rôle of a disturbing factor in the genesis of morbid manifestations in the sphere of special sensorium, it does not nevertheless throw any light on the origin of the elements composing the disorder. An effort in the field of psychological speculations is more directly indicated than an attempt in the realm of physiological inferences, such as intimated above.

In a contribution entitled "Obsessive Hallucinations in a Child and Psychanalysis" (Journal of Abnormal Psychology, 1918) I expressed the view that visual images which arise in the sphere of the sensorium in a normal waking state and in dreams or in pathological states are but an exteriorization of the predominant subconscious complexes. The latter concern all our past experiences in the intellectual and sensory spheres which never totally disappear and which under the influence of some disturbing factor (from whatever source it may come) reach the conscious ego and assert themselves in fanciful picture formations, viz., hallucinations. The latter may be either an exact or an altered reproduction of more or less remote events which actually occurred in the life of the individual. Sometimes we observe only substitutions which apparently have no resemblance to the former events but a close analysis will reveal a genuine relationship between them.

In turning again our attention to the four cases one is struck by the occurrence of the special hallucinations in patients who are all females, all of whom are mothers and all of middle age. They were suffering at the time from metabolic disturbances, which, as we know, are apt to produce disorders in the psychic sphere, otherwise speaking they produce changes in the personality. When the latter takes place, the psychic activities controlled by the involuntary and passive cerebration are found in full display. All ideas, impressions, thoughts, wishes, sensations and experiences in general which occurred in the past, although apparently forgotten, are reproduced. They may all appear as visual or auditory hallucinations. The latter, as we said before, are but an exteriorization of the subconscious complexes. Wishes, thoughts, sensations, etc., of mothers are chiefly interwoven with anxiety and concern about children, who in the majority of cases constitute the central focus towards which all their activities are directed. The same unfaltering solicitude is applied by the mother in every possible way to her children whether they are infants or youths. Otherwise speaking, the most persistent, the most permanent and consequently the most powerful relation of the mother to her children with all that this implies in the sphere of profound and lasting emotions forms the chief and the strongest elements of the subconscious complexes in a woman. Herein lies, I believe, the possible explanation of the peculiar visual phenomenon observed uniformly in my patients. Toxic elements in the last three cases provoked a disturbance in the psychic functions with the result of alteration of the personality and formation of obsessive hallucinations. The element composing the subconscious world became active and the most potent of them produced the special coloring, so to speak, of the visual images and contributed to the formation of hallucinations in which children with all their characteristic behavior, such as crowding around their mother and embracing her, played the most conspicuous part. The alteration of personality on which the hallucinations developed was caused by metabolic disorders in three of my patients and by hysterical paroxysms in one patient.

Society Proceedings

NEW YORK NEUROLOGICAL SOCIETY

February 5, 1918

The President, Dr. Frederick Tilney, in the Chair

A CASE OF LEPROSY OR SYRINGOMYELIA

By Clarence P. Oberndorf, M.D.

Dr. Oberndorf presented this case for differential diagnosis between leprosy and syringomyelia. The patient, a mulatto-colored boy twelve years of age, was born in New York, but from the age of six to nine years lived in the British West Indies. Three years ago it was noticed that his left hand was becoming weak and that it was slow in healing when bruised. After a year the right hand became weak and both hands have since become progressively weaker. Eight months ago the patient ran a nail into the right foot and the wound did not heal with normal rapidity. About five months ago it was noticed that he could not close his right eye and that the right side of the face was paralyzed. He has occasionally burned his hand or forearm without being aware of it.

Family history was absolutely negative; both parents were living and well, as were five brothers and sisters. Physical examination showed a well-nourished boy of twelve. The skin of the face was thickened, especially on the right side, and showed a tendency to cracking. The mucous membranes of the nose showed tendency toward ulceration and was occluded by bloody crusts. The nose itself was markedly saddle-shaped, even for a negro, and was tender when pressed. On the ulnar side of the right forearm there was a large, indolent, grayish black scab formation adherent to the skin. The palmar surfaces of both hands showed numerous ulcers in various stages of suppuration and cicatrization. Over the left external condyle, for example, there was a flat, smooth, reddened scar and a nodular induration of the skin of the right upper arm. Over the back were numerous leucodermatous areas, an especially large one with a raised, reddened, indurated margin was found over the sacrum. The skin of both legs showed a tendency to scaling and over the left foot especially were scabs and ulcers. The cervical and inguinal lymph nodes were enlarged, hard and discrete and those of the right axillary likewise large. The submental gland was about the size of a marble, and tender when pressed.

The Wassermann test was negative. Differential blood count showed polys. 66 per cent., lymphocytes 16 per cent., large monos. 15 per cent., eosinophiles 3 per cent. Smear from the crusts of the ulcers showed numerous acid-fast, long, rod-shaped, encapsulated organisms which had not been identified. Sections from the skin of the arm and about the heel failed to show the lepra bacillus. The X-ray showed no destruction of the bones of hands or feet.

Neurological examination revealed the following: Pupils reacted to light and accommodation. There was a paralysis of the right side of the face with inability to close the right lid. There were fine tremors of the tongue. Otherwise no cranial involvement.

Both ulnar nerves were thickened and rather tender; slight pressure upon them caused tingling in the fourth and fifth fingers. There was slight weakness of adductors of left upper arm. Flexion of left forearm was weaker than extension. There was wasting of extensors of both hands; both wrists flaccidly dropped and clawlike contracture of fingers of both hands. Both elbow jerks were diminished; wrist jerks not obtained. There was anesthesia to pain, temperature and light touch over the right arm from the elbow downward and on the left arm from the upper third downward. Position sense was intact in the fingers; pressure sense quite well preserved over the anesthetic area. Both abdominal and cremasteric reflexes were present. There was slight weakness in the dorsal flexion of both feet, especially the right. Areas of anesthesia to pain, temperature and light touch extended over the right leg from the lower third of the thigh downward, and on the left leg from the knee downward. Position sense was preserved in the toes on both sides, though the patient was at times uncertain in the right great toe. Deep pressure sense seemed preserved. The left knee jerk was diminished; right knee jerk not obtained; ankle jerks absent.

Over the leucodermatous area on the sacrum there was a definite indication of some alteration to appreciation of touch, pain and temperature. Fibrillary twitchings were constantly observed in the shoulder muscles, latissimus dorsi and the pectorals.

Dr. Hyman Climenko referred to a case which he presented to the Society last May in which the diagnosis between leprous neuritis and syringomyelia was very difficult indeed. There was a mixture of central and peripheral symptoms that obscured the diagnosis. The predominance of the central symptoms as well as the relatively small involvement of the skin led to the diagnosis of syringomyelia. In Dr. Oberndorf's case, however, the presence of peripheral symptoms only as well as the well-defined skin lesions pointed to leprous neuritis. Besides, syringomyelia rarely if ever occurred at so young an age.

Dr. William Steinach considered that in this case the involvement of the facial nerve clearly defined it as one of leprosy rather than syringomyelia. In the latter disease one was dealing with a cord condition, a gliosis of gray matter; in leprosy the nervous symptoms were due to a multiple neuritis. Lepra often resembled syringomyelia, so much so that Oppenheim in one of the later editions of his book gave a number of differential points at length. In leprosy, the disease usually began distally in the extremities, whereas in Morvan's type of syringomyelia the condition more often began at the shoulder girdle. Then, too, the anesthesia in lepra occurred in plaques, while in syringomyelia it was segmental in character and depended on the level of the cord involved.

Dr. Clarence P. Oberndorf, in closing expressed his belief that the diagnosis in this case was leprosy, although the organism, an acid-fast, intracapsular, rod-shaped bacillus, isolated in February, had not been identified. The facial involvement alone, as Dr. Steinach said, made the case one of leprosy rather than syringomyelia. The most interesting feature, however, was the preservation of deep muscle sense with absence of heat, temperature and light touch sense.

A CASE OF BRAIN ABSCESS

By Hyman Climenko, M.D.

Dr. Climenko presented this case for the three points it illustrated: (1) An apparently trifling operation on the nose might give grave results; (2) to show the importance of timely diagnosis in brain abscesses and the great importance of timely and skillful surgical interference; and (3) because this patient presented the symptoms of aphasia which had not clearly been worked out.

The patient, an enlisted private in the United States Army, a Pole, aged twenty-four, was sent to the Columbia Base Hospital with a diagnosis of epilepsy from the St. Nazarre Hospital in France, where they observed one of the seizures. While at the Columbia Base Hospital the patient developed no epileptic seizures. He complained of vague pains in the head, not localized, and also vague pains in the abdomen and back. It was supposed that the headaches might be due to a nasal defect from which he suffered and accordingly, on December 17, 1917, a submucous operation for a deviated septum was done. On December 24 the patient developed spastic paralysis of the right upper extremity, with rigid neck; no Babinski or clonus. Lumbar puncture revealed a large number of leucocytes. The picture was that of an epidemic cerebral meningitis. No growths were obtained from the blood or from the fluid. From the nasal discharge, however, streptococci and staphylococci were cultured.

On December 25 Dr. Climenko saw the patient for the first time. He had a typical right-sided hemiplegia of the spastic type, marked Babinski and clonus and the abdominal reflexes were absent. There was no choking of the disc, but the right lower half of the face was paralyzed and the tongue protruded straight. The pupils reacted well. The head was retracted and held rigidly. A double Kernig was present. Apparently the patient could not understand ordinary English, previously familiar to him, but spoken to in his native tongue he replied promptly. It could not be determined whether he suffered from anosmia. There were no sensory disturbances of any kind; astereognostic sense was intact. A diagnosis of brain abscess was made and an operation to evacuate the abscess was deemed advisable, and accordingly Major Bishop operated the same day, December 25, exposing the Rolandic area. Report of the findings was as follows: The dura was thick and high tension was felt. When the dura was incised it felt as if the knife passed through an exudate and that the dura had lost its elasticity. The cortex was rather white and covered with an exudate resembling coagulated pus. This exudate under the microscope showed pus cells. The patient made a complete recovery.

A CASE OF SPINE FRACTURE WITH BROWN-SÉQUARD SYNDROME

By Hyman Climenko, M.D., and Captain D. Stettin, M.R.C.

The speakers presented this case because of its interest from the following reasons: The sensory distribution, the peculiar subjective sensations of the patient and the fact that the physical findings could not be correlated to a single focus. The patient, an enlisted private in the army, a Canadian, aged thirty-four, on June 8, 1917, dived into a shallow tank without calculating its depth. He struck his head and immediately realized that he could not get out while under water, but remembers nothing more. He was unconscious for two and a half days. Then he recovered consciousness to find himself paralyzed on the left side of the body, the left eye closed and the left side of the mouth drooped and pulled to the right. The right side "felt hot." His head was bruised and any movement in the head and arms gave him severe pain. There was incontinence of feces. Regarding the urine, there was difficulty in starting the stream but once started it could not be stopped. The patient remembers having had diplopia; the secondary image was on the same plane and about four feet to the right of the primary image. There was never any rigidity of the neck but the neck pained on movement.

Improvement began and continued gradually, until there was complete sphincteric control. At present the patient complains of a sensation of heat in the right leg, dragging of the left, inability to use the left arm and some drooping of the left eyelid. The diplopia disappeared in a few weeks. At present there is distinct limitation of movement of the toes of the left foot and of the left ankle; flexion of left knee and thigh intact; motion of the left lower extremity in toto diminished and sagging of the same extremity; limitation of resistance movements; left Babinski and clonus; left patellar reflex present, right absent; left cremasteric slighter than the right; all the left abdominals absent; left knee jerk greater than right; left crossed adductor reflex. On the left hand: flexion of the inner three fingers which can only be opened when the patient supinates and pronates the arm; left wrist and elbow jerks greater than right; atrophy of the intrinsic muscles of left hand. Sensory disturbance beginning about five centimeters from the median line at the left of the nipple on the right side continues down to Poupart's ligament, getting nearer to the median line as it descends. Pinprick causes a sensation of heat. Complete analgesia exists from Poupart's ligament down for about three centimeters. Pinprick here causes a sensation of heat and a tickling sensation; localization sense absent, the patient indicating sensation a few inches distally to the point of the pin. Posteriorly the same condition obtains. Temperature sense is also disturbed in some areas, the patient mistaking cold for hot and vice versa. Hair sense is almost entirely absent. Growth of hair on skin of right dorsal region markedly diminished as compared to the left. Vasomotor reaction presents the following phenomenon: slight stroke with the fingernail gives a line of pale rose hue and a few seconds afterward on both sides of the line for about three centimeters a band of paleness appears which has distinct, clear-cut edges on each side. This lasts for about one minute and then gives place to a rose hue which remains for a long time. The deep muscle sensation as well as kinesthetic sense are intact. The left side of the face is paralyzed in the lower two thirds and there is a distinct endophthalmia on the left and weakness of the upper eyelid Normally reacting pupils and negative backgrounds. Somewhat diminished corneal reflex on the left.

X-ray showed compression fracture of the bodies of the fifth and sixth cervical vertebræ. X-ray of the head is negative.

The unconsciousness of two and a half days' duration, the diplopia and the paralysis of the lower face could not be accounted for by a lesion of the spinal cord. A cerebral lesion had to be considered. Either a fracture of the base of the skull, though none was shown by the X-ray, or a lesion of the cerebral cortex had to be thought of. A fracture of the base of the skull was excluded, for in order to have facial paralysis through such a fracture the lesion would have to be very extensive, involving the petrous portion of the temporal bone; also the paralysis of itself would be of the lower neuron type and not the upper. In addition, a fracture that would involve the third nucleus at the base would also involve the peduncle and the paralysis would have been much more extensive than it was here; besides it would have been of the closed type, thus giving Weber's syndrome. It must therefore be concluded that the factor here was a cortical lesion, besides the spinal-cord lesion. The endophthalmos and the drooping of the eyelid could be explained by sympathetic involvement.

Dr. S. P. Goodhart thought that in addition to the cervical lesion at about the level of the sixth dermatome there were probably nuclear lesions of the third and possibly the sixth. A peripheral third was not likely; there was no alternating hemiplegia, as there would have been had the crus cerebri been the site. The usual ciliospinal lesion would have given only a slight ptosis due to the unstriped involuntary muscle strands, or Mueller's muscle, in the upper lid. The case might be a typical Brown-Séquard with the addition of the above, or perhaps a right cerebral lesion with hemiplegia due to hemorrhage added thereto and to the local cervical partial crush or hemorrhage.

Captain D. Stetten, in closing the discussion, pointed out that the X-ray plate showed a very definite lesion of the vertebral column. There was a distinct compression fracture of the fifth and sixth cervical vertebræ with a backward dislocation of the body of the fifth. This bony displacement had caught the left half of the cord at the seventh to eighth cervical segments where the majority of the anterior horn cells for the triceps were situated. A more or less complete flaccid or lower neuron paralysis of the triceps resulted. There was apparently a double lesion, one very definitely in the cord and another rather difficult to determine in the brain.

CLINICAL MANIFESTATIONS AND BASIS FOR THE TREATMENT OF SOME ENDOCRINOPATHIES. (Illustrated with lantern slides)

By Walter Timme, M.D.

Dr. Timme presented this address. He found it necessary in discussing the various manifestations of the endocrinopathies to deprecate some of the terms generally used to denote them. It was difficult to find adequate terms to define some definite syndromes for the reason that as soon as one began to denote one series of symptoms by name or combination of names, such as exophthalmic goiter, one began to differentiate types that actually could not be so differentiated, for one was put to the difficulty of describing certain cases as exophthalmic goiter without the goiter, or exophthalmic goiter without exophthalmos; as that seemed absurd these cases were denoted by saying they were hyperthyroids. Then some investigator found some of the symptoms in exophthalmic goiter were really hyperadrenal. So throughout the entire syndromes these difficulties were encountered. In actuality, one could sometimes in describing the manifestations take one tissue of the body after another and more or less ascribe the changes taking place in it to any one of the endocrine disorders.

Take first those changes that occurred in skeletal growth. There was a definite relation between various endocrinopathies and variations of the bony structure: in long bones of the extremities, too long for the trunk; a jaw too broad for the rest of the head; a head too small for the body; teeth too crowded or spaced teeth; but always some disproportion. Then there were abnormalities of the skin: a skin secreting too much sebaceous material; a skin that became atrophied and one such as was seen in psoriasis. There was the hairy growth: exuberant or sparse, and the distribution. There were nails that were brittle, growing too fast or too slow. Then there were other difficulties of abnormal endocrine origin that were encountered; for instance, those that could be roughly divided into vagotonic and sympathicotonic: blood pressure too low or too high; pulse rate too slow or too fast;

condition of the blood cells, such as extremely high red blood cell count, low or high leucocyte count, high eosinophile count, and plasma changes such as would be indicated by inability of the plasma to combine with carbon dioxide.

Now in justice one could not describe a change that did not actually occur in a large number of cases without corresponding changes in other tissues by any particular name explanatory only of the first change. Such a name as exophthalmic goiter was inadequate; one might as well call pneumonia a febrile cough. The illustrations of the manifestations which would be given later would show that many of the names by which particular diseases were termed did not truly denominate the syndrome.

Before deciding on the cause of the manifestations the patient presented, it was necessary to select such symptoms on which therapy could be based, and that selection was the purpose of this study. It was complicated and difficult and sometimes impossible to accomplish. The inter-relation between the various glands was so complicated that it was very hard to determine the basic gland that began the disturbance. One could not find a better illustration for the inter-relation of the endocrine glands than that in which Darwin described the struggle for survival between the species in the red clover field which in order to grow properly was dependent upon wide fertilization. The bumblebee while gathering the honey distributed the pollen, but had an antagonist in the field mouse which ate the honey. The presence of cats kept down the number of mice. Therefore it followed that when one saw a luxuriant red clover field, one could assume that there were cats in the neighborhood.

The condition must be found, not that which was dominating the picture but that which was the key to it, and when reaching the crux it might be found to be something apparently extraneous. Extract the mice from the field and the bumblebee was too well fed by excess honey to fly about sufficiently to properly fertilize the field. Nature stimulated the bee by putting an antagonist in the picture and got greater activity. It was necessary to find in the clinical picture whether the bee, or the mouse, or the cat was lacking, and, if so, whether some substitution could not be made without disordering the rest of the mechanism. That the manifestation might be produced by some complicated disorder was admitted, but the crucial gland that started the disarray in the wrong direction must be found.

One type gradually merged into another type, for instance, status thymicolymphaticus; there was a form in which the genital organs in a male were distinctly female; another was a development of acromegaly; there was the status thymicolymphaticus which occasionally had been produced through thyroid disturbance. Where one began and another ended none could say, so there could not be an all-sufficing term to describe these specific syndromes.

The manifestation of a particular glandular disturbance should never be alone considered as the basis for the entire treatment. Only in exceptional instances would the apparent manifestation of dyspituitarism mean that pituitary must be administered but, following this therapy, the subsequent indication of a drag upon the adrenal would show that the crucial gland was the adrenal and then treatment could be turned in that direction. If there was a history of stock deficiency, family deficiency, say in the thyroid, then the chances were that the changes originated there and this formed the basis for treatment. But take it by and large, the manifestation usually seen in itself did not form the basis for treatment; the case had to be studied; each patient had his own endocrinopathy and it could not be dubbed acromegaly, exophthalmic goiter, etc., and the matter rest there. These names merely denoted one symptom of the specific disease and such symptoms might be present in many widely separated syndromes.

Dr. Smith Ely Jelliffe expressed surprise that Dr. Timme, with his erudition, should have omitted the most important part of Darwin's illustration; it was not only a question of the clover, the bumblebee, the mice and the cats but the old maid who kept the cats. In including this, he would have brought into the inter-relationship of the whole problem the very factor the speaker wished to dwell upon now, the Hippocratic attitude of regarding the body as a whole: not this or that organ, but the individual in his entirety. Dr. Timme had explained how complicated the mechanical factors in these endocrinopathies were, but he said nothing about the enormously greater complex mosaic of emotional factors which played their important rôles in these obscure conditions.

In order to get at the analysis of the emotional factors, it was necessary to take into account an energetic conception of the human body, which latter is nothing more or less than a mechanism for the *capture, transformation* and *release* of energy; capture through receptors, transformation by means of all bodily organs, and release through glandular activity, metabolism and muscular activity.

What are organs anyway? They are structuralized experience. In the course of hundreds of millions of years, slow growing in adaptation to the vast sources of cosmic energy, man has constructed new types of adapters. Man had more than the five receptors ordinarily recognized as senses; he probably had more than fifty if one were to believe the evidence of comparative histology. The time came when better types of release mechanisms were needed to meet the increasing capacity to take in energy. Speech then arose, a symbolic form for releasing energy. Speech, then, meant nothing more or less than a release mechanism to get over the whole symbolic group of wishes and desires.

In considering the basis of a syndrome, all these factors should be taken into consideration as well as those mentioned by Dr. Timme. Any organ might show a number of changes, all of which should be studied in relation to the vegetative control, but in this control due consideration should be given to the great physiological relationship between the psyche and the vegetative nervous system; the endocrinous glands were under control of this vegetative nervous system and therefore some of these endocrinopathies are a series of effects, not causes. Psychoanalysis shows how the psychic modes of handling energy which the individual has built up react on the chemical and physical processes, the endocrinous glands playing their part under the vegetative system.

A patient had recently exemplified this very nicely. In December, 1916, her husband sent her to the speaker for treatment, stating she had Bright's disease, and he sent her to a hospital where she remained under observation for two weeks for a complete physical status. At the end of this time the report stated that she was suffering from chronic nephritis which caused high blood pressure of 235 systolic, her most alarming symptom. In trying, at the urgency of the husband, to locate the real factor causing the high blood pressure, since the hospital diagnosis offered no dynamic interpretation, the speaker discovered there were important psychogenic factors which were of great moment. She related a dream among other things in which she had seen three men in sulkies behind fast horses driving like mad up a hill with a grade of fifty per cent. A woman began to shriek, for as the men got to the top of the hill one turned to the left, ran into a stone wall and the dream ended in the consciousness of a tremendous smashup. Here was a psychic factor of an intense internal anarchy. After six months of analysis, the blood pressure had gone down to 135, there was less albumen in the urine and the whole series of pathological reactions was very much improved. She had had continuous headache for four years, but there was none now. She had been continually constipated for ten years, but this condition was now relieved. The intense series of unconscious emotional factors had their direct influence on the metabolism as there was as a consequence of the psychic factors a marked *hyperadrenalism*. No endocrine therapy, however, was employed.

Dr. Jelliffe closed by saying he did not wish to be interpreted in any sense as intending to express any criticism of the attitude toward the endocrinopathies that had been presented, but he did wish to plead that that attitude of mind be enlarged and that in addition the factors he had spoken of be taken into consideration in studying these cases.

Dr. H. Climenko believed that as yet a definite opinion could not be formed as to the function of the pituitary by judging from the roentgenogram of the sella turcica. From his own experience as well as from the literature, Tilney showed that the sella turcica was not the only place where the pituitary was found. The speaker had had two cases, one of which he reported, where the X-ray plate showed a complete absence of the sella turcica, yet it did not follow that these cases had no pituitary, an impossible deduction since the gland was essential to life. He closed by asking Dr. Timme if he could explain how the administration of pituitary substance could cure hemianopsia.

Dr. S. P. Goodhart had found, in a series of muscular dystrophy cases studied at the Montefiore Hospital, very manifest evidence of polyglandular involvement in every case. The individual cases showed different glands involved, or rather diminishing features suggestive of a particular endocrine involvement; hirsutes, osseous changes, acromegalic features, pineal gland influence, adrenal pigmentary variations, etc., all distinctly suggesting the influence of endocrine secretion. Dr. Timme's results of therapy were convincing of the belief that endocrinal treatment in early life might prevent the development of many of these dystrophies, later so incurable.

Dr. Walter Timme explained that because of his friendship for Dr. Jelliffe, who was down on the program to discuss his address, he wanted to leave something for him to say, which was why the emotional factor in these endocrinopathies had not been touched upon.

It was true, as Dr. Climenko said, that the size of the sella turcica was not an indication of the degree of function of the pituitary gland, but the size of the sella necessarily limited the maximum size of the gland unless it spilled over. Of the type of gland without a sella he had seen a few instances. In reply to Dr. Climenko's question, how the administration of pituitary substance could cure hemianopsia, the speaker would also like to know; he did know, however, that he had had three cases and Dr. Charles A. Elsberg had had one. There were cases where hemianopsia had vanished under a combination of pituitary and thyroid treatment.

What Dr. Goodhart said regarding early therapeutic treatment of cases of muscular dystrophy was true. It was also important to recognize the early changes in the beginning of an acromegaly: if a patient found his shoes getting too small; if there was a growth of hair in adult life where it should not be; or if a patient expressed subjective states he had not felt before, attributable to autonomic or vegetative disturbances, they might be forerunners of endocrinous disturbances that brooked no delay in treatment whatever. Many could be helped if they coudl be recognized at that stage.

CHICAGO NEUROLOGICAL SOCIETY

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The President, Dr. A. W. Rogers, in the Chair

REMARKS ON EXAMINATION OF RECRUITS FOR NERVOUS AND MENTAL DISORDERS

By Hugh T. Patrick, M.D.

The first thing to note is that the conclusions on recruits as to nervous and mental disorders, aside from obvious organic disease of the nervous system, are different from those of the ordinary medical examination in that they have to be reached without physical signs. This, in the experience of Dr. Patrick, has applied to at least nine tenths of the registrants who have been referred to him for examination. His experience has not been very extensive. Last summer he examined the men who were suspected of having nervous or mental disease on one of the primary boards and after that he examined for the three appeal boards sitting in the city; two for Cook County and one for the surrounding eight counties. Most of his examinations, however, were for Board Number One.

This matter of acceptance or rejection without any physical signs is sometimes perplexing. Cases of organic disease of the nervous system were infrequent. There were several palsies of childhood, one or two cases of cerebrospinal syphilis or its remains, one multiple sclerosis. That was about all in the organic line.

Of the cases without any physical signs, the following is an instance of one type. A perfectly irresponsible young fellow had attended school, but when he had hardly gotten into grammar school began to absent himself from home for a day or two at a time. Later he would stay away for a week. After that his absences would last for several months. This was not a case of unconsciousness or ambulatory automatism, but just irresponsibility. He would go off and tramp or lead some sort of an existence in some other town. Then for some casual reason he would come home again. Of course, all the evidence to be had in a case like that would be the evidence of the statement of the patient and of others. Of course he was rejected. He was built for a deserter.

In the same class were nearly all the epileptics. It is universally considered that epileptics are to be unconditionally released. Evidence in the way of scars, the voice, physical stigmata, etc., is of very little value. It has not been his experience to find on the tongue of epileptics distinctive scars unless the tongue has recently been bitten. In these cases it is essential to get a statement from the patient and a separate statement from members of his family or others. The same thing applies to a good many cases of dementia præcox. The physical signs are of exceedingly little value. Mental depression and psychasthenia fall into the same category as does, to a very large extent, high-grade imbecility. All we can do is to ask questions and receive answers. In all of these it might seem that there was a good deal of difficulty because there is not any one thing concerning which the patient may not tell a plausible tale or lie *ad libitum*, but Dr. Patrick found very little difficulty, especially if it was possible to talk with one or more members of the family or with some acquaintance. For any one who is really familiar with these neuroses and psychoses, it is very seldom that one had any doubt in coming to a conclusion. There was no more reason for doubting one's diagnosis than in ordinary civil practice, though conditions were entirely different. Naturally, many of the men exaggerated their ailments. Some of these were very interesting, even entertaining. A feeble-minded boy tried to make himself out more feeble-minded. He worked for his father in a small grocery store. Dr. Patrick asked him if he made change. He said, "I make it but my father always has to watch me." "John, how much are 2 times 9?" "I do not know." "You do know." Finally he said 17. "How much are 3 times 9?" "26." "4 times 9?" "35." He always missed it by one. I then had his father come in and said to him, "John has been lying like a thief," and adduced the answers he had made me. The father said, "He knows better than that." John was brought in and the father, shaking his fist at him, said, "You tell him the truth." Then he answered the same questions promptly and correctly.

A thing that was perfectly obvious was that the certificates and affidavits from physicians brought in by the men were practically of no value, unless one happened to know the doctor. In the first place, it goes without saying that a family physician frequently will favor the patient. In the next place, some of the diagnoses were erroneous, not to mention a very few instances of what looked like deliberate falsification. One patient came in with a certified statement that he had chorea, which he had not. He had epilepsy. Another one brought in a certificate of epilepsy and he had a psychasthenia. It required only some very careful questioning to bring this out. Another came with a sworn statement that he had chronic urethritis; if he had it did not amount to anything. He had dementia præcox. Another man was induced to appeal by his friends on account of ill health. His written statements as to ill health were very vague, but something about wanting only justice in this country gave a clue and the case proved to be one of dementia præcox with delusions of persecution.

In questioning the registrants one must proceed a little differently from the course one follows with patients who come voluntarily to the office for their own good. Leading questions are to be avoided, but it is wise, especially in cases of epilepsy, to ask pseudo-leading questions which are really misleading questions. In other words, to trap a man into saying he has symptoms which are absolutely incompatible with the disease he claims to have. But for one really familiar with the ordinary neuroses and the different forms of epilepsy there is but little difficulty. Dr. Patrick has seen no case of whole-cloth malingering, but many of exaggeration. One young fellow almost went to his knees, begging not to be sent.

One of the problems with which we have to deal is the estimation of the degree of disability of the psychasthenic and the defective. How bad must a psychasthenic be before he can be rejected and how feeble-minded must the defective be? Regarding mental defectives, not any of the formal tests (Binet-Simon, etc.) are of great value. It is not a matter of determining the mental age of the registrant, but whether he will be qualified to do what will be asked of him in this present activity. In regard to psychasthenics, some of them will be made into better men than ever before by the military training. It is also perfectly obvious that some of them are bound to go to pieces before they get out of the training camp. The experience all along the line has been that given a certain number of psychasthenics who are able to get along fairly well with the requirements of civil life, a certain proportion will break down in camp. A certain added number will break down when they get into active military service and an additional proportion will go to pieces when they come to the firing line. As neurologists it is our duty to give the government the benefit of the doubt in these cases and not send to the army men that we have any doubt about. Recently Dr. Patrick had a talk with Major Pierce Bailey and he was very strongly of the opinion that very few of the psychasthenics ought to be sent, especially in the present state of organization. That, too, seems to be the opinion which one gets from the literature of France and England. It is the unstable and psychasthenics who get shell shock—which covers a multitude of sins. A recent letter from Batten, of London, stated that one of their great problems is the management of these cases of shell shock; to get them well and back into some profitable activity in civil life. At the present time when we have no well-graduated service we should, even at the expense of criticism from our colleagues who are not neurologists, reject these men from the draft.

Our classification of service has just begun. We now have two classes. In England there are five classes, the fifth being men who can do nothing except a certain amount of clerical work at home. Quite a fair proportion of the men who now come up for examination are absolutely no good as fighters on the front line, but may be very useful in many activities back of the front. One of the very first cases Dr. Patrick examined last summer was an intelligent, steady, hard-working, exceedingly timid fellow. He had practically assumed that he would not be accepted. He said, "My doctor tells me there is not one chance in a hundred of my being accepted," and he was absolutely right if one had in mind a fighting soldier. To the question, "What is your business?" he replied, "I work for ———, manufacturers of clothing." "What do you do?" "I do office work." "Just what sort of work do you do?" "Well, I have charge of a large order of military caps for the government." "Very well. Why could you not look after the caps and clothing for the army?" With almost pitiful eagerness he inquired, "Doctor, would they let me do that?" "I do not know, but they ought to." He represents a class of men who could be very useful in the army, but not as fighters. He is as competent as any one would wish for the quartermaster's department, but if that boy were put in the front trenches, he would at once be a burden and an expense to the government.

Another individual hardly fitted for front rank work is the bad migraine case. Diagnosis again made without physical signs What can a man with a really disabling migraine do? He cannot do very much when he has an attack, but he might be very valuable between them. Illustrating the value of classified service was a young man who was a cashier in a country bank, healthy, vigorous, an excellent business man, but he had a slight defect of one hand. It would not interfere with many, many useful activities, but he would not make a fighting man.

Just one more point and that is about the rejection of mental defectives, who are leading useful lives in civil activities. Three illustrative cases. These three men had all been passed, but were rejected by Dr. Patrick on the appeal board. The first was a perfectly obvious imbecile, strong as a young bull. He was making a living and what he did was to pack sausage in boxes. That he did with a faithfulness which was altogether admirable. He had been doing it for several years and earned fair wages, which were regularly paid to his father, who took care of him. He was as incapable of learning the various things that a soldier has to do as he was incapable of learning the sausage business. Because he had been perfectly well physically and because he was going regularly to work and earning his living, he was passed by the examining board, which was a mistake.

The second case was a chap who did market gardening and he did it well. His friends greatly exaggerated his feeble-mindedness. He knew all it was necessary to know about cultivating vegetables, but was quite incapable of attending to the business end of market gardening. He was almost the entire support of a family, but was totally unfitted to become a soldier.

The third was a man who for six or seven years had carried mail from the village post-office to the railway station and from the railway station to the post-office. In these seven years he had missed only one train. That is better than some normal persons would do. He does not have to be sent. His job is his pride and his joy. He attends to it with a regularity and faithfulness that cannot be beaten. His mental age undoubtedly is of low grade. He could not learn to be a soldier in a thousand years. These three men *had* to be rejected, because they were totally unfitted for military service. Where they are they are useful, self-sustaining citizens. In the army they would be only a trouble and an expensive burden.

NEUROLOGICAL CONDITIONS ENCOUNTERED IN A CANTONMENT[1]

By Ralph C. Hamill, M.D.

The problem Dr. Hamill had to work with at Fort —— was an entirely new one to him and was quite overwhelming. When he began to work he encountered considerable disregard and lack of consideration. It was obvious that they would give one office room and quarters and see that one was properly messed, but as far as helping in the work, that the post surgeon would not do.

Dr. Hamill had two types of people to handle: Student officers and enlisted men. He was supposed to examine only the former. They wanted to make good. They were there on their own volition and they wanted to be found fit. But also he had an opportunity to see many enlisted men. These were all volunteers. The officers' training camp consisted of 2,550 men. He had to examine all of them neurologically.

They all came to the barracks, a company at a time. Fifteen to thirty men would strip and stand waiting until the doctors could get to them. At first he took them at the end of the examination, after they had been through the hands of the rest, but when he got them and tried to examine for facial tremor, for example, it was practically impossible because every man had facial tremor; they were excited and he could not get an answer out of any of them. So then he took them at the beginning of the examination. They were all nervous because they knew it was the final examination. They had to stand outside the barracks and wait to be admitted. The barracks were not warm. He examined as late as November when it was very cold.

The pupils of all were examined. Dr. Hamill stood with his back to the window, had the men come up one at a time and he examined their light reaction, outline of pupil, etc. This was interesting work because in the space of a couple of hours one saw 150 pairs of pupils, and he noted several different types. The light yellowish or yellowish-gray irises almost universally had very small pupils. On the other hand the dark aquamarine irises had almost universally big pupils. Then the very dark brown irises distinctly showed two types—one with a very small pupil and one with a very large pupil. All those whom he found with any slight irregularity of the pupil he had come to his office later and he examined their reflexes. He also tried for a Romberg sign in every man. For the mental examination the captains were instructed to pick out the men who were dull or who were called "sissy" by the other men. Of these he was sent about 175 altogether. Whenever he could he did what was possible in the way of psychological examination. In the beginning he started in by asking them what they had done with their lives: namely, what education they had had and at what ages they had graduated in the different grades, what occupations they had had and how much money they were getting. In other words, he tried to get some idea of how they had succeeded in their work. That he supplemented with the Binet-Simon test for adults. He was very much disheartened to find how few of them measured up to the Binet-Simon scale. He watched carefully for signs of nervousness. If the man did not come up to an ideal reaction, he did not feel that was sufficient to throw him out even though he tried two or three times. For instance, there was a young fellow who was a teacher of chemistry and instructor in military affairs at one of the state universities, under a regular army officer. He was working for his Ph.D. in soy-beans. In Dr. Hamill's first examination he failed completely. He came back a second time and was asked all the chemistry questions of which Dr. Hamill knew the answers. He asked him why legumes were good for the soil and a lot of other things. He was surprisingly stupid. When they got through with the second examination he implored Dr. Hamill to allow him to send him his reprints to show his mentality. Major Joseph Collins had a session with him and said he was a moron. And yet this man had graduated from college at the usual age, was working for a Ph.D. degree. He had, to be sure, hung around college all his life—he was then 35 or 36 and was still working for his Ph.D., but there was possibly some excuse, as he had to earn his living. Dr. Hamill did not recommend his discharge, though Major Collins advised him to do so. Dr. Hamill considered that the confusion or panic he got into the first time he examined him acted to make him appear stupid to an unwarranted degree.

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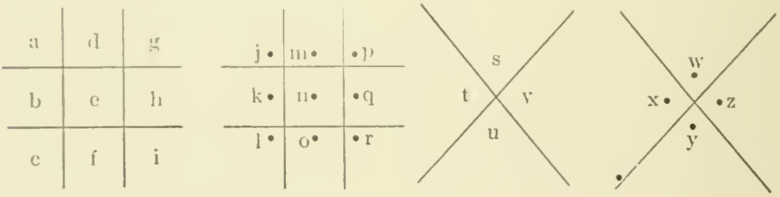
[1] Dr. Hamill, having gone to Italy in the Red Cross service, has had no opportunity to revise his remarks.

Dr. Hamill also used the Healy code. That seemed to be the best way of getting them down to earth again.



To make the code quite clear the letters a, b, c: ⌟ ⊐ ⌝ are written, the patient is told that in the first two figures the letters run in threes from above downward and in the last two figures they run contraclockwise. Also that the first and third figures differ from the second and fourth in that the latter have dots in the angles. Then the word "men" ⊍ □ ⊡ is written for the patient. He is then asked to write the word "yes" ∧ □ ∨. So far he is allowed to look at the code. The code is then covered and he is asked to write the test word. Dr. Hamill would explain this code to them and show them how to write two or three different words. He would then ask them to write a certain word, for instance, "administration," using that word because it started with "a," had "i" several times, "m" and "n" coming close together and "t" coming after "s." In other words, to see just how they would use the information he had given them. He watched them to see if they would use the "n" sign to aid in determining the "n" that came next. Most of them would not. Then he would see whether they would note the second "i" from the first "i." Many of them would put down "s" right away. Practically all of the best men would immediately put down the "t" after the "s." Those on the other hand who were stupid—and that is the only word to apply to them, because they were not mental defectives—would not remember that "t" came next to "s" in the code and they would go clear back and count from "a." The repeated going over the letters leads to confusion. The defective is deficient in self-confidence. He begins to wonder if some of the symbols are not wrong. In a long word such as administration there is a danger of losing one's place. With these two doubts assailing him the defective usually broke down at about the fourth syllable. The ones for whom Dr. Hamill recommended discharge would simply not try to finish a word like "administration."

He worked in this way for about a month when Major Collins came to the fort. He went at the men differently. He talked to them for a little while to get them quieted down and then he would ask such a question as, "Tell me concretely what led to the outbreak of this war." They might start out in a fairly concrete way, in which case they would get through pretty well. On the other hand if they would start out with something like "It is a war between autocracy and democracy," he would say, "Is that concrete?" Then they would get so confused they would not be able to say anything intelligent for several minutes. Dr. Hamill was struck with the fact that when it came to the mental examination any little thing would upset the men. For instance, a man came with a note saying that he was a sissy and was known as "a perfect lady" by the men in the company. Dr. Hamill kept him waiting outside his quarters about fifteen minutes and it was a cold morning. When he came in he told him to stand in front of the fire and get warm. He said to him, "What is your name?" He gave that. "Your age?" He gave that. Dr. Hamill said, "What is your occupation?" He burst out with: "I want it distinctly understood that if there is any question of my mentality I am going to resign right away." His voice was high-pitched and querulous. Dr. Hamill felt he had borne out his commander's diagnosis very well. He said that is all right and if he felt that way about it, he had better do it. There was no question about mentality. Dr. Hamill was simply trying to find out what the man was best fitted for, but if that was his attitude, he had better resign. This was a great mistake because this man had political friends and Dr. Hamill was called to the Colonel's office. He said to Dr. Hamill that there must be more tact in these examinations because if there was any trouble these men would get their congressman to go to the War Department and the War Department would question the Colonel. This indicates the attitude of these men toward any mental examination. It was an entirely different matter if they were tested for tuberculosis, for syphilis or for heart disease or anything else, but the minute they had word to come to Dr. Hamill's office, there was trouble.

Dr. Hamill later adopted Major Collins' procedure more or less and would ask them questions as to what their general information was. He would ask them 19 times 19. Most of them would multiply it out mentally. Then he would show them the quicker way of taking 20 times 19 and subtracting 19. Then in order to test concentration and to furnish an interlude, he would call their attention to such a story as follows:

"There was a son of a governor of Indiana who was first officer on a P. and O. liner. As the ship was going through the Red Sea it was overtaken by a typhoon and the officer was swept overboard. The crew threw him a life-boat but a shark grabbed him and all that was left was a trace of blood on the sea."

Dr. Hamill would tell this story and then ask if they knew what a P. and O. liner was. He had only one out of 175 who could tell him. He did not think that is indicative of a great deal, yet it does show a certain restriction in a man's reading. It had not carried him broadly afield. He then would explain what a P. and O. was and would ask them if they knew where the Orient was. He told them these boats sailed from London to the Orient. What peninsula did they pass? He asked them that to see if they would recognize Spain as a peninsula. He then would ask them if they could tell him concretely what bodies of water the ships would pass through going from London to the Orient. He examined thirty school teachers and not one single one could answer that question. They would say, "Well, you have to go through the Atlantic Ocean." "Is that the first?" "They would go down the Thames then the Atlantic." "Would you go directly from the Thames into the Atlantic?" Etc., etc. By that time they would be too confused to go further. It was very interesting to see how easily the school teacher, accustomed to make dogmatic unquestioned statements, became confused when his assertions were objected to.

Then Dr. Hamill took up the Red Sea. "What great historical event occurred at the Red Sea?" Most of them would say Moses and then he would ask them to tell him the story. There was one curious incident. There was a bright young fellow who had traveled considerably to whom he told this story. He asked him to tell him the bodies of water ships would go through. He told him, but left out the Red Sea. Dr. Hamill then asked for the story. He said, "There was a son of a governor of Indiana who was a first officer on a P. and O. liner. The steamer was going through the—I wasn't paying attention to the place you spoke of—anyway it was overtaken by a typhoon and he was lost." There was in his case evidence of a complex having to do with blood. Dr. Hamill recommended his discharge.

It struck him there were certain types of reaction on the part of these men, particularly their voices. Some of them controlled their voices and they were perfectly normal. Others did not speak up. They were obviously holding their voices down just as hard as they could. One or two of them said, "What in hell is all this about, this is not the army." Some of the company commanders were good enough to send some of their best men in order to make the poor men not realize that they were the dregs of the company. These good men would go right through every test without the slightest hesitation. They would not be twisted. For instance, one of these, a member of the West Virginia legislature, showed not the slightest hesitation in any of his replies. He wrote this code right off. He repeated the story. He multiplied 19 times 19 and 29 times 29 without the slightest hesitation. He was known as one of the best men in his company.

The neurasthenic men did come through fairly well in spite of the fact that they got confused. Some of the men wanted to tell about their various interests or their various handicaps in life. It seemed as though they wanted to be friendly and thereby pass the examination.

He had one interesting experience in the case of a moron. This young man had peculiar ears that came up to a point, the lobes attached. He had a common school education, was a clerk and assistant teller in a small town bank for two years and had for two years been employed by the Standard Oil Company of New York. Dr. Hamill asked him the difference between kerosene and gasoline. He could not answer. He then asked him what specific gravity meant. He said, "That is weight." "What is the weight compared to?" He could not tell. Dr. Hamill then asked him about the Federal Reserve Bank Act. He could not tell. He asked him what he was interested in outside of his work and he said in church work. He asked him the difference between a catholic and protestant. He immediately took on a superior air and did not say anything. "Can you tell me anything about that?" He said, "I was brought up not to discuss religion." "What is the difference between a democrat and a republican?" He did not answer. "You are going to be an officer, you will have to describe things to your men. I want you to discuss something for me so I can get an idea of your power of description. I want you to tell me the difference between a democrat and a republican or any other question you will discuss with me." He said, "I was brought up not to discuss religion or politics." "What would you do if you caught your pastor and a woman in a compromising situation?" He said, "It would be none of my business." "What would you do if you were compromised yourself?" He said, "I would try to get out." Dr. Hamill recommended his discharge and later was called in as a witness in the trial. He was asked if he had any questions to ask in regard to the result of the examination. He said: "Did you consider that a fair examination you gave me? Did you consider the question you asked me a fair question to ask a person?" Dr. Hamill said he did not remember the questions. The man said, "Did you not ask me what I would do if I caught my pastor and a woman in a compromising position?" Dr. Hamill then remembered the details of the examination and admitted the indiscretion.

Dr. Hamill had three interesting glandular cases. The first, a man of thirty-eight, was very fat; a fairly pendulous abdomen. His skin was very smooth and looked almost myxedematous. His thyroid gland was distinctly bigger than normal. He had testicles about the size of good-sized peas. He had almost no penis. He was knock-kneed. He had been married eight months and then had been divorced. He said his wife was a hellion. I do not know what his wife said about him. He said sexual matters did not trouble him. The second man, aged twenty-seven, could not measure up to the Binet-Simon test. He could not do anything in this general information test. He had the same physical appearance as the first man, though the abdomen was not drooping. The testes were pea-sized, the penis normal and the thyroid enlarged. The third case had more of the female shape than the other two. This boy was nineteen. He had breasts about the size of those of a thirteen-year-old girl with distinct feeling of glandular tissue. The thyroid was uniformly enlarged; the penis was quite large; the testes pea-sized. He had a girl with whom he would sit up until four in the morning. However, the girl was a "very good girl" and there was "nothing wrong" in their relations. His mother was fifty years old when he was born and he was an only child, which was extremely interesting. One is tempted to speculate on the idea that the ovaries, at very nearly the end of their ability to functionate, could produce life to be sure, but not life that was capable of reproduction.

It was interesting to study the different types of enlisted men and to wonder why some of them enlisted. They were nearly all volunteers. Some of them would think up any excuse to get out of working. Dr. Hamill had a similar experience to that of Dr. Patrick in the case of epileptics. He would say to some of these supposed epileptics, "How do you feel when you are going to have a fit? A little dizzy and a little light-headed?"—and then after a time they would go on and have a fit. Then he would give them a slap in the face and they would stop. With a few of them he tried to talk and make them ashamed of themselves. He would tell them that if that was the way they were going to meet their difficulties all through life, they might as well be thrown on the scrap heap now, and those who were going to make anything of themselves would come out of it. For instance, one thirty-two-year-old red-headed Irishman, who had had a great deal of difficulty at home, had enlisted and gone to Texas. He was on his way to Europe with his regiment. On the train coming up from Texas he had to stand in line and pretty soon he felt as if some one was pushing him and he fell over. Then he got a pain in his stomach and before he got through he was put off the train at some little town and operated upon for appendicitis. As soon as he was over the appendicitis operation he was sent to Fort

——. By this time he had what he thought was a left hemiplegia coming on after a fit. He was sent to Dr. Hamill for examination, who suggested to him to go ahead and have a fit. He accepted the sympathetic suggestion. Dr. Hamill slapped him in the face, told him to get up and then gave him a talking to. He cried like a baby. The next day he shaved all the people in the prison ward and said he was going to make good.

It was interesting to study the effect of fatigue on these men. An article on this subject has been published by Ramsay Hunt in the Journal of the American Medical Association. Dr. Hamill had one company of men who had been digging trenches for forty-eight hours. Those men were the most stupid bunch of humanity he had ever seen in his life. They could not answer any question. Their reflexes were sluggish and tremors were all over their bodies. He had them come back forty-eight hours later and tried to size them up again. The first time he took up fifteen and thought them all extra stupid. The second time he took fifteen or twenty and they all did well.

Another thing that interested him very much was the fact that almost every man who came for mental examination had dilated pupils. After they had been in fifteen or twenty minutes the dilatation would diminish.

There was a good deal of feeble-mindedness among these enlisted men, some on an organic basis. For instance, there was one boy with an internal strabismus on the left side and the left side of the face was smaller than the right. Dr. Hamill had him strip to be sure that his extremities were all right. The right leg and right arm were appreciably smaller than the left. He hopped well on the left leg but not on the right. He was exceptionally well built. He was distinctly feeble-minded and homosexual as well.

He saw about fifteen or twenty cases of dementia præcox. He did not know how much dementia præcox they had before they came into the army. There was a lack of vasomotor tone such as we see in dementia præcox. Some of these fellows made very poor gradings when one tried to get any general information out of them. There was one of the candidates for the officers' training camp who developed an acute catatonic attack. When Dr. Hamill tried to examine him all he would do would be to stand at attention and ask if the lieutenant would allow him to sit down. When Dr. Hamill tried to give him some medicine, he used it as a mouth wash. It was perfectly obvious that he had some homosexual ideas in his mind and that this mouth washing was a part of that symptom. He is now at St. Elizabeth's Hospital, Washington.

Translations

THE INTERNAL SECRETIONS AND THE NERVOUS SYSTEM

By M. Laignel-Lavastine

Authorized Translation by Fielding T. Robeson, M.D.

(*Continued from page 389*)

C. Pyschic Syndromes

My report[86] in 1908 at the Congress of Dijon on psychic disorders due to disturbances of the glands of internal secretion, the excellent report of Professor Parhon[87] at the Congress of Gand in 1913 on the glands of internal secretion in their relationship to psychology and mental pathology and the recent article of M. Van der Scheer[88] have outlined and brought out the question.

In order to avoid criticism I refer to their works and enumerate the results which are the least doubtful.

(*a*) *Syndromes of Cerebral Debility*

1. Anencephalia: suprarenals.
2. Idiocy and cranial malformations:[89] thyroid, parathyroids, suprarenals.[90]
3. Imbecility.
4. Backwardness:[91] thyroid, pituitary, ovaries, testicles, thymus.
5. Mental debility.
6. Psychic imbalance.[92]

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[86] Laignel-Lavastine, Congrès des aliénistes et neurologistes, Dijon, 1908.

[87] C. I. Parhon, III^e Congrès internat. de Neurol. et de Psychiatrie, Gand, 1913.

[88] W. M. Van der Scheer (de Meerenberg), Die pathogenetische, Stellung der Blutdrusen in der Psychiatrie, Jahresversammlung der Nederlansche Vereeniging voor Psychiatrie en Neurol., 3 juill., 1913.

[89] Bertolotti, Presse méd., 2 mai, 1914, p. 334.

[90] Guilorowsky, Influence d'hypoplasie surr. sur ce cas d'idiotie, Congr. assist. des aliénés, Moscow, janv., 1914, Arch. de Neurol., mars, 1914, p. 163.

[91] Hastings-Gilford, Influence des glands a secret. int. sur le developp., Congr. internat. de Londres, 1913, sect. de Psychiatrie, rapp.

[92] Cot. Ch. et Dupin, Insuff. glandul. et anormaux, Enceph., mars, 1913, pp. 223–34.

(*b*) *Syndromes of Delirium*

7. Mania:[93] thyroid, suprarenals, ovaries.
8. Melancholia: thyroid, ovaries, liver, suprarenals, kidneys, pituitary.
9. Mental confusions: liver, kidneys, thyroid, parathyroids, pancreas, pituitary, suprarenals, ovaries, testicles.
10. Systematized hallucinatory deliria.
11. Systematized deliria without hallucinations.
12. Genital perversions: ovaries, testicles, prostate, suprarenals.

(*c*) *Syndromes of Dementia*

13. General paralysis: suprarenals, thyroid, pituitary, etc.
14. Dementia præcox:[94] testicles, ovaries, pituitary.
15. Cerebro-arteriosclerosis: suprarenals, testicles.
16. Senile dementia: parathyroids, thyroid, testicles, ovaries.
17. Epileptic dementia.

(*d*) *Neuro-psychic Syndromes*

18. Epilepsy: thyroid, parathyroids, testicles, ovaries.
19. Nervosism: thyroid.
20. Hysteria: thyroid, ovaries.
21. Neurasthenia: suprarenals, testicles, ovaries.
22. Psychasthenia: thyroid, ovaries, testicles, suprarenals.

This analysis of endocrine disorders investigated, discovered or supposed, in the psychic syndromes allows in the first place the conclusion that just as psychic symptoms are met with frequently in endocrine syndromes, so are endocrine disturbances indicated very often in the psychic syndromes. Moreover one should state that the value of the indicated endocrine disorders is very uncertain, and the confirmation of a clinical endocrine sign or glandular test is vastly more important than an organotherapeutic result and above all more important than the existence of endocrine lesions, because we know the utter banality of all these.

The frequency of pathological endocrino-psychic associations are not explicable alone by fortuitous coincidences and more or less mediate attachments. It seems to me necessary to admit, in certain cases at least, a relationship of casuality. This conclusion which I advanced in 1908 has been confirmed by numerous authors, and recently by M. Parhon in 1913. This relationship of casuality varies moreover according to the case. Eliminating fortuitous coincidence I will sum up in a few lines my ideas on the more or less mediate bonds between endocrine and psychic disorders, on the causal rôle played by the psychic syndromes in endocrine disorders and on the causal rôle played by the endocrine disorders in the psychic syndromes.

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[93] Lafora, G. R., Folie manique depressive et hyperthyroidisme, Revista clin. de Madrid, 15 oct., 1913, pp. 294-301.

[94] Dercum et Ellis, J. of Nerv. and Mental Disease, fev., 1913, pp. 73-90.

1. Relationships of Connection between Endocrine and Psychic Disorders

In this heterogeneous group I place the cases in which the frequency of association between endocrine and psychic disorders makes one think that it consists of something more than a coincidence, and in which nevertheless one can not demonstrate a clear relationship of casuality.

Thus psychic excitations give rise to fits of rage or anxiety. In a similar way to psychic changes, modifications of endocrine secretion, thyroidal for example, appear to me to be among the factors that make up that physio-psychic complex called emotion. Some think that the psychic factor is causal, others like Redmond and Sauvage[95] think that "the phenomenon of emotion is the result of auto-intoxication, due to a sharp destruction of endocrine equilibrium." I consider that the mechanism is a triple one: at times the psychic act releases the secretory act, at others the endocrine act releases the psychic act, and at still others the endocrine and psychic action are both the coresults of the same cause. It consists of a proximate adherence.

Take for another example a given case of juvenile general paralysis with infantilism. The meningo-encephalitis like the atrophic thyroidal sclerosis, being the results of hereditary syphilis, are both coeffects of the same cause. The two syndromes, psychic and endocrinal, are therefore bonded by a relationship of mediate adherence.

2. Causal Rôle of the Psychic Syndromes on the Endocrinal Disturbances

In the normal state one can not deny that psychic excitations determine disorders of secretion. The experiences of Dumas and Malloizel and the results of Cannon, where emotion has increased the quantity of adrenalin in the blood, like the classic case of Trousseau of exophthalmic goiter caused by a fit of rage, are instances of the kind.

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[95] Redmond and Sauvage, Soc. de psychiatrie, 10 fev., 1913.

In the pathological state the results are the same: motor agitation caused by delirium may bring about almost complete aspongiocytosis of the suprarenals, as I have had occasion to observe in the insane. It is therefore plain to me that the psychic factor may bring about the endocrinal result. Moreover the psychogenic mechanism of endocrinal disorders is not uniform, and if in certain cases it is directly psycho-secretory, it is much more frequently indirectly psycho-physio-secretory, the intermediary perhaps being the physico-chemical modifications of divers viscera of life of relationship or of nutrition.

3. Causal Rôle of Endocrinal Disorders on the Psychic Syndromes

This rôle, by far the most important, is not always uniform. One can differentiate three large divisions as I have already shown in 1908.

1. Sometimes the endocrinal disorder arising in utero, in infancy or adolescence reacts on the development of the organism and the brain: the psychic disorders result from anomalies of structure.

2. At others the endocrine disorder, compatible with existence and a relative functionating of the organism, brings about in organic as well as psychic life more or less reciprocal modifications of various modalities.

3. At still others the endocrine disorder no longer moderate but massive produces, along with grave disorders of the organism, intense cerebral reactions, which reveal themselves always in the same way by classical toxic psychoses of the mental confusion type.

These three divisions seem to me to explain the facts of the third group with sufficient connection.

1. The first is the most simple. It remains essentially in the domain of ontogenesis and morphology. The mental puerility of infantilism is an example.

2. The second is on the humoral order. The internal organs being specifically modified by the elective disturbance of one or many of the selected internal secretions, the anatomical elements which they bathe are by such modified in their vitality. There result accordingly pathological changes along with somatic, anatomic and functional alterations. The former like the latter, reflexes of a like humoral disorder, present a debased series of a frank pathology or normal model.

With greater precision, one can differentiate with Parhon three varieties in the humoral action of the endocrine glands on the psyche.

In the first place these glands directly influence the nervous system itself, and one can distinguish, with Munzer, sympathicotonic, vagotonic (or better autonomotonic) and polytonic glands, these last being able to affect, for example, the cerebral cortex, the autonomic system and the sympathetic. The tonicity of one or many cortical centers being influenced, their psychic function will thus remain the same. However, this psychic function will respond equally to changes in the cerebral circulation, the state of the respiration, the oxidation of the body, and the chemical composition of the blood—for example the richness or poverty in calcium salts, etc. Now one or the other of these influences, if not all, are affected by the sympathicotonic or autonomotonic action of the endocrine glands.

Side by side with this action, more or less directly central, Parhon claims a peripheral action "which moreover may be itself partly the consequence of a central action"; it is the action of the endocrine glands on the sense of conscious existence.

He adds that "the action of the genital glands must acknowledge partly at least a similar mechanism." Finally the endocrine glands, by their action on the general metabolism, bring about modifications of different tissues, which affect the psyche through humoral, nervous reflex or psycho-cenesthetic means.

3. "Finally, I claimed, the third mode of action, the massive, of the endocrine disorders on the mental life, which is characterized by toxic psychoses, is often very complex in the sense that the cerebral intoxication is not only the result of the disturbance of the incriminated gland, caused by the concomitant syndrome, but the result of a series of associated or secondary functional insufficiencies. It is thus that in cases of Addison's disease with delirium the discovery of azotemia by Sicard and Haguenau[96] might give rise to the hypothesis that renal insufficiency may have been added to the suprarenal insufficiency in the mechanism of delirium, but the statement must be made that the determination of azotemia has no interest unless such is not terminal, because of its known frequency immediately before death.[97]

In a word the endocrine disorders in nervous syndromes, whether they have been established by clinical or anatomical methods or induced by physiological or therapeutic proofs, are face to face with the nervous syndromes.

[96] Sicard et Haguenau, Soc. méd des Hôp., 15 mai, 1914, p. 902.

[97] D. Dumitresco et A. Popesco, Presse méd., 27 juin, 1914, p. 487.

1. It may be a relationship of simple fortuitous coincidence.
2. It may be a relationship of more or less mediate adherence.
3. It may be a relationship of causality: at times the nervous disorder has determined the endocrine disturbance, at others and inversely it is an endocrine disturbance which has determined the nervous syndrome, but the frequent clinical latency of the former may interfere with the comprehension of the cause of the latter.

It is necessary to remember that to a patent nervous disorder there is frequently attached a latent endocrine cause. One should therefore look for an endocrine cause in any nervous syndrome of an unknown or obscure origin. But one must not be determined to find such in spite of everything, and to accept contingencies for necessities.

In conclusion, all the facts gone over in this critical review are explained aside from coincidence and coeffects of the same cause, at times by a direct or indirect endocrino-nervous relationship through a morphological intermediary (evolutional or humoral) or a physiological intermediary (humoral or nervous) or a psychic intermediary, at others by a direct or indirect neuro-endocrinal relationship through a direct morpho-evolutional, physiologic reflex or psychic intermediary or through the same indirectly (motor activity, general nutrition), and at still others by recurring endocrino-neuro-endocrinal relationships and neuro-endocrino-psychic relationships.

This is explained in the following table.

ENDOCRINO-NERVOUS RELATIONSHIPS

- *A*. Coincidence.
- *B*. Connection.
  - Proximate.
  - Mediate.
- *C*. Causality.
  - 1. Simple...
    - 1°. Endocrino-nervous.
      - (1) Direct.
      - (2) Indirect through intermediaries.
        - Morphologic evolutional.
        - Morphologic humoral.
        - Physiologic humoral.
        - Physiologic nervous.
        - Psychological.
    - 2°. Neuro-endocrinal.
      - (1) Direct.
      - (2) Indirect through intermediaries.
        - Morphologic evolutional.
        - Physiologic reflex.
        - Psychologic.
        - Motor activity.
        - General nutrition.
  - 2. Double...
    - 3°. Endocrino-neuro-endocrinal.
    - 4°. Neuro-endocrino-nervous.

B. Endocrino-Neurological Sketch

In practice, that which matters is less the neurogenous endocrine disorders than the endocrinogenous nervous disorders.

Of course the endocrine disorders secondary to the nervous disorders are very interesting theoretically and practically. Theoretically they show the unity of human personality and not only the influence of nervous disorders on the secretions and nutrition, but in addition, to use an old expression which illustrates the picture, the mastery of the soul over the body.

Practically their interest is twofold, because attenuated and masked by the nervous syndrome, they may nevertheless modify and complicate it, as can be seen in certain tabetics and general paralytics. Inversely when very marked they may mask more or less through their symptomatic richness the clinical expression of the nervous disorders which cause them, and thus effect a change with an endocrine syndrome which is clinically primitive. This is the case in certain Addisonian and Basedovian syndromes, which are not originally endocrinogenous but neurogenous.

Endocrinogenous nervous disorders, which are infinitely more frequent than neurogenous endocrinal syndromes, form altogether an extremely important group, which, unburdened with morphologic and endocrinogenous trophic syndromes in which a nervous factor is not constant, constitute the greater part of functional neurology.

I intend in this sketch, as a practitioner, to limit myself almost entirely to that which functional neurology owes to endocrinology.

I will take my illustrations from certain ordinary symptoms, endocrino-vegetative syndromes, traditional psychoneuroses, temperaments and characters.

1. Ordinary Symptoms

Among the ordinary symptoms I retain arbitrarily asthenia, headache, insomnia, anxiety, sweats, constipation, arterial hypertension and obesity in order to show that there are for each of these symptoms certain cases which arise from an endocrinal cause, and that daily one should give an endocrine factor consideration in pathogenic diagnosis. It should be considered but not determined upon except on the authentication of well-marked signs, that is to say, clean cut and frank. Moreover most frequently such consideration ends in elimination.

(1) Asthenia

Asthenia is abnormal fatigue. It is either general or more especially motor or psychic.

Motor asthenia is an extremely commonplace symptom, due to various causes, either infectious, toxic or psychic.

Among the motor asthenias of endocrinal origin, the first to be recognized was the asthenia of Addison's disease. It is connected with adrenal insufficiency, and is accompanied by arterial hypotension.

In addition there are motor asthenias allied with adrenal insufficiency, which are not Addisonian. This fact is well known to-day. They are very common and are usually but not always accompanied by arterial hypotension.

Their recognition and consequently their organotherapeutic treatment will permit the cure of a large number of sick, ticketed as neurasthenics, cyclothymics, melancholics and even hypochondriacs. Certain cases of arteriosclerosis with hypotension enter into this category. The interesting point is that they were often asthenics already at the beginning of their arteriosclerosis, while they still had hypertension. This asthenia of hypertensive arteriosclerotics existing from the beginning is well understood to-day. Maurice de Fleury among the first has shown its frequency. In such cases there is often a dyshyperfunctionating of the suprarenals. This asthenia of hypertension through dyshyperfunction may be recovered from completely through a simple regime. It can after a period of years border on asthenia due to adrenal insufficiency, an insufficiency itself secondary to the old glandular hyperfunction and without mechanical participation of cardiac insufficiency; I have followed a lot of such cases in the last ten years.

The majority of endocrinogenous muscular asthenias are suprarenal, but there are others which are thyroidal, thymic, parathyroidal, pituitary, ovarian, testicular and polyglandular.

Dejerine and Gauckler[98] have brought the weight of their authority to the support of these data.

The endocrinal origin of a muscular asthenia having been recognized, diagnosis is not complete. The cause must be determined. In the simple cases it is sometimes an infection (a beginning tuberculosis, convalescence from grip or diphtheria, etc.), at others an intoxication. In the more complicated cases it is a vascular, nervous or psychic disturbance, under the subjection itself of a previous endocrinal disorder. It is often like this in the hypophysics of Martinet,[99] a typical case of which I have actually seen, which merits publication by itself.

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[98] Dejerine et Gauckler, Les asthénies périodiques crises de fatigue. Presse méd., 17 juin, 1914, pp. 457-459.

An important fact is that the asthenia may be not the result but the cause of an endocrinal insufficiency. Claude[100] believes this to be the case in the paralytic myasthenia of Erb-Goldflam. According to him the endocrine glands are normal or rather increased in size, but they are exhausted by an effort truly excessive. This is brought about by the entrance into the circulation of poisons to the nerve and muscle cells of inconstant origin, but which, in certain cases, arise from a disordered thymus. In the Erb-Goldflam syndrome the multiple insufficiency of the endocrine glands by functional exhaustion is therefore secondary, just as the disappearance of spongiocytes in the suprarenal cortex is secondary to an intense or prolonged muscular agitation. I have had occasion to confirm in eight cases this fact grasped experimentally by Mulon[101] and clinically by Porak.[102]

(2) HEADACHE

Not only migraine,[103] but the most ordinary headache may be of endocrinal origin. Many of the headaches called neurasthenic come under this heading. The most frequent of the endocrinogenous headaches are those of thyroidal[104] origin. As a general thing slight concomitant signs of hypothyroidism, such as palpebral edemas, anorexia, constipation, somnolence, chilliness, muscular and articular pains assist the diagnosis; but sometimes the thyroidal disorder does not reveal itself except by the headache, which of itself and through causal elimination should possess an indicative value. These headaches are very frequent among women; are more or less governed by genital life, improved by sexual relations[105] and cured by pregnancy. I have gathered typical cases of the kind in my practice.

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[99] Martinet, Syndrome hyposphyxique, Pr. méd., 21 déc., 1912. S. hyposphyxie et insuff. plurigland., Ac. de méd., 22 avril, 1913, et Pr. méd., 2 août, 1913.

[100] H. Claude, La myasthénie paralytique et les syndromes asthéniques par insuffisance surrénal, Acad. de méd., 9 juin, 1914, et Soc. de Neurol., 28 mai, 1914. R. N., 15 juin, p. 786.

[101] Mulon, P., Soc. de biol., 26 juill., 1913, p. 189.

[102] Porak, Mém. inéd.

[103] Léopold Lévi et H. de Rothschild, Acad. de méd., 14 nov., 1911, p. 22: Répertoire de méd. int., mars, 1912; Goett, La migraine thyroïdienne, Th. Bordeaux, 1909. Flatau, La migraine, Berlin, 1912; A Véron, id., Th. Lyon, 1914.

[104] Gaujoux, Céphalée hypothyroïdienne et opothérapie, Soc. des Sc. méd. de Montpellier, 14 mars, 1913; Bilancioni, G., Il Policlinico, sez. pratica, 23 mars, 1913, pp. 401–6.

[105] Migraines de jeunes filles guéries par le mariage, migraines de jeunes femmes absentes le lendemain de l'accomplissement des devoirs conjugaux.

After the thyroidal types, the ovarian, testicular, pituitary, suprarenal and polyendocrinal headaches are to be noted.

(3) INSOMNIA[106]

Among the insomnias those of Basedow's syndrome and the menopause, which come under the heading of dyshyperthyroidism, show the existence of endocrinogenous insomnias.

The most frequent of these is the dyshyperthyroidal, seen clearly in the cases that I have just cited. It is probably present in many of the psychoses, where one knows that thyroidal excitation is frequent. It is to be suspected at least in the "nervous" where no other appreciable cause justifies its presence.

The insomnia of acquired ovarian insufficiency seems to contradict this precedent.

Perhaps it conforms to the same lines as the insomnia of certain cases of hypertension of the fifties, where the genital functions are lessened.

(4) ANXIETY

The anxiety of Basedovians and of many women at the menopause and its cure by hematothyroidin, confirmed many times by Alquier, Rose, myself and many others, show the existence of endocrinogenous anxiety due to dyshyperthyroidism. This anxiety seems really to be that of the anxious melancholias. It is already known that the works of Parhon tend to show the rôle played by the thyroid in what he calls the affective psychoses.[107]

The anxiety frequently noted in acquired ovarian insufficiency seems to be controlled by the same mechanism.

Clinically considered, all anxiety that does not possess warrant should make one suspicious of an abnormal excitation of the thyroid.

(5) SWEATS

A vagotonic reaction, released by pilocarpine, arrested by atropine, the sweats which come on in crises at the menopause, are associated in the hot flushes with active vaso-dilatation, but may be present alone. Symptomatic in this instance altogether of acquired ovarian insufficiency and of thyroidal reaction, they are seen in the two conditions. We are all familiar with the frequent sweats of Basedovians.

[106] A. Salmon, La fonct. du sommeil, Vigot, 1910.

[107] Cette voie permettra peut être de trouver des raisons aux intermittences de toutes des syndromes d'excitation et de dépression, maniaques et mélancholiques.

According to this there are endocrinogenous sweats due to dyshyperthyroidism. This vagotonic expression referable to thyroidal excitation is associated very often with sympathicotonic manifestations of a similar origin. It is thus in the classical hot flushes of the menopause.

(6) Constipation

Spastic constipation, "vagotonic," which yields to belladonna, is a nervous symptom.

Its recognition in cases of hyperchlorhydria, in certain neurasthenics, in women at the menopause or at the beginning of pregnancy, permits of cures as easy and complete as they are brilliant, through the use of the well-known belladonna pillule of Trousseau and Pidoux.

Then again it is frequently caused by ovarian or testicular insufficiency with abnormal excitation of the thyroid, as seen in the observations of Marañon.[108]

This constipation must be carefully distinguished from the constipation of myxedema, from the general type of constipation, such a common sign of hypothyroidism, and which is cured by organotherapy.

Thus the same symptom in its gross clinical expression may be of thyroidal origin, and point nevertheless to two different mechanisms, excitation or insufficiency of thyroidal secretion. This instance of thyroidal constipations is not the only example of endocrinogenous constipations that can be given. There appears to be one also of pituitary origin, although the cure of certain atonic constipations by the extracts of the posterior lobe of the pituitary does not demonstrate the nature of this, inasmuch as these extracts act as excitants of unstriped muscle tissue by virtue of their pharmaco-dynamic properties, and not on account of their elective vicarious or stimulating[109] action on the pituitary.

(7) Arterial Hypertension

To Vasquez belongs the credit for having described in man "arterial hypertension due to hypersecretion of the suprarenals," which Josué confirmed by experiments. In advance of this permanent hypertension, hyperadrenal secretion may show itself through hypertensive crises, which have been classical since the time of Pal. Moreover, there are other hypertensive crises besides the endocrinogenous, and among the latter others besides those due to hyperadrenal secretion. Those which are allied with disturbances of the pituitary, ovary, testicles, prostate, thyroid and parathyroids, have been recognized. In like manner there are permanent arterial hypertensions which are not endocrinogenous, and among the latter some which are not of suprarenal origin.

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[108] Marañon, G., Hyperchlorhydric et hyperthyroïdism. Revue de méd., 10 mars, 1914, pp. 161–83.

[109] Hallion, loc. cit.

There is no need to continue. I have simply tried to show that there are arterial hypertensions which are nervous endocrinal syndromes, because they depend upon a vascular spasm, of endocrinal origin.

(*To be continued*)

Periscope

The Psychoanalytic Review

(Vol. IV, No. 2)

Abstracted by Louise Brink, A.B.

1. Social and Sexual Behavior of Infrahuman Primates with Some Comparable Facts in Human Behavior. E. J. Kempf.
2. A Psychoanalytic Study of a Severe Case of Compulsion Neurosis. H. W. Frink. (Continued from Vol. IV, No. 1.)
3. Technique of Psychoanalysis. S. E. Jelliffe. (Concluded from Vol. IV, No. 1.)
4. Pain as a Reaction of Defence. H. B. Moyle.
5. Some Statistical Results of the Psychoanalytic Treatment of the Psychoneuroses. I. H. Coriat.
6. Critical Review: Adler's Conception of the Neurotic Constitution. B. Glueck.

1. *The Social and Sexual Behavior of Infrahuman Primates.*—This study is made upon six macacus rhesus monkeys, in which an affective reaction is easily aroused, to attain if possible more insight into the philogenetic determinants of the social and sexual life of man. For it is more and more realized through hospital experience as well as in general clinical practice that the psychogenic psychoses depend chiefly upon sexual determinants. This means that the individual is the host of certain phylogenetic sexual motives, which are biologically unproductive and require tabooed forms of stimulation of forbidden areas, and are also affectively fixed upon some forbidden or unresponsive object. For this reason a series of motives have had to be developed to control or divert these. The failure of the latter results in those abnormal sexual tendencies, which are here submitted to investigation when they are still of service in man's infrahuman progenitors.

One subject was timid and shy and revealed a continued self-defensive watching of his associates, and when strange ones were introduced the typical anxiety reactions of an anxious, distressed, self-depreciatory patient. Others showed varying degrees of aggressiveness, the largest and strongest dominating the band. One more cruel and sadistic was not a favorite with the rest, showing this tendency to dominate both in food-getting and sexual activity toward those weaker than himself but never attempting domination of the two stronger. Fear and hatred affects interfered with his acceptability as a sexual or a play object. In all the monkeys, when sexual desire was stimulated to a partial degree, immediately various means were resorted to with both aggressor and object which led to a summation of affect ending in definite activity. Incoördinated movements resulted at times when conflicts between affective states were in evidence, fear, hunger, interfering with sexual desire. Sadistic forms of play seemed to exercise a distinctly erotic effect. Fear of a persecutor and anger at the threatened attack was often projected upon a weaker member of the group, as a clever counterattack defense, characteristic of daily human behavior, but particularly of the paranoiac method of solving inner conflict.

The catatonic attitude was frequently assumed to resist attack. One example of this behavior was strikingly illustrative of the intermingling of fear and erotic satisfaction in the hallucinatory experiences of various sorts of manipulation and sexual assault upon catatonics. The possession and retention of food was often purchased by the offering of sexual favors.

These observations upon the choice and cumulative employment of stimuli in order to attain to the full activity of the sexual reflexes are instructive in the understanding of the choosing of socially desirable forms of stimuli for man and the avoidance of undesirable and forbidden ones, by the shifting of value from the one to the other, which is coming to be understood as largely the work of psychiatry. The relative value of various forms of stimuli and the alteration of these values under shifting circumstances furnishes food for consideration in regard to social adjustment based upon biological needs.

The selective tendencies of the male toward his environment seem, in these observations, to include, more than in females, a sexual inclination toward his own sex, antecedent to heterosexual interest. Homosexuality shows itself with these animals as a stage preceding heterosexual activity, or there is reversion to it in case of absence of heterosexual opportunity. It appears to belong to a weaker, less matured state.

Sexual desire and acquisitiveness seem to go hand in hand, cessation of the former through fatigue or satiety is accompanied by lack of interest in the surroundings. This is markedly stimulated again, however, when sexual desire is active. Social interest in his fellows seems to be to the monkey of distinct sexual value. It is probable, the investigator thinks, that it has also been so originally in human society, and only secondarily, through cultural regulations, the necessity to restrain his sexual tendencies, has man learned other values for his social activities. It was probably thus also in his first relations to animals. They had at first a sexual value to him, which gradually lost itself in their usefulness to him in economic ways.

We need, the author insists, a clearer insight into the phylogenetic constitution of man, such as this exposed in the infrahuman primate, in order to understand those tendencies which he feels obsess him perversely. Only thus can he be saved from the anxiety and despair, which make his struggle a losing one and drive him into a psychotic defense. Instead, through an understanding of the phylogenetic history of these tendencies and their "conditioning" he is assisted to an efficient and satisfactory sublimation of them.

2. *A Psychoanalytic Study of a Severe Case of Compulsion Neurosis.*—Combined with the assault obsession mentioned in the last number of the Review[1] was a wish for pregnancy, while the gratification of these two wishes through phantasy rather than in actual marriage formed part of the conflict not yet revealed. Some light was thrown upon this by the patient's unsurprised acceptance of the fact that her husband was discovered to have tuberculosis. She was evidently prepared for this in the unconscious for her mind had, as the analysis showed, been occupied with this subject. She had manifested by various signs a fear of tuberculosis in the analyst, identifying him in a complex concerning some weakness with the former lover and with the husband. This proved then finally to be her fear regarding the first lover, also why she had not expected to marry him, or marrying him had expected that his life would have been short. Here however the patient showed further resistance, revealing that this was not all of the conflict. Her continued opposition and resistance to interpretation broke down at last in an admission that she was guarding stubbornly the secret of a past history of tuberculosis in her own life. Her fear was not of the disease but that the fact of her having it would be a hindrance to her marriage. She was always

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[1] JOURNAL OF NERVOUS AND MENTAL DISEASE, Vol. 46, No. 5, November, 1917, pp. 380, 381.

pursued by the fear, reanimated on a number of occasions, of the discovery of the fact. At the same time she rebelled against deceiving the man she might marry, when she might perhaps develop the tuberculosis again after marriage. A special conflict was aroused when she had opportunity to marry a man who could have provided well for her but whom she did not love. At this time there were signs that the disease was again active and moreover her desire for marriage was interfered with by her father complex. The assault obsession here served a double purpose in diverting the tuberculosis complex to another level. Further analysis after the first confession showed several reasons why she had actually chosen, in the two instances of the lover and the man she finally married, a man whom she plainly regarded as tubercular. Further her attachment to her father was such a consciously recognized one that she consciously preferred a consumptive husband that she might have early to return to the parental home. Her infatuation with the first lover occurred when she felt herself ill and wished to escape the necessity of returning to work. It was then that she had recourse to magic, and her fear in regard to the effect of this was complicated again with her fear of discovery and with the knowledge that both she and the lover would suffer from the effects of tuberculosis rather than of magic.

3. *Technique of Psychoanalysis.*—Jelliffe brings forward some suggestions which Kaplan has made showing that a symbolism in concrete things, a sensational-symbolic phase, is common in all spheres of communication. The unconscious language is entirely one of symbols, many of which are unintelligible to the conscious interpretation of symbolism. Any symbol, even in consciousness, is of special distinct meaning only to the one who uses it. In the same way in the unconscious are special determinants for the particular symbols employed. Yet a study of symbolism proves that these symbolic usages are readily seized upon by associative processes, which adopt symbols as substitutes. The psyche can be shown by simple experience to grasp at sensational-symbolic representation. The presence of strong affective states causes the energy involved in them to seek symbolic currency for the complexes to which they belong.

Emphasis is laid upon the value to the beginner in psychoanalysis of a familiarity with Freud's "Interpretation of Dreams." Jelliffe himself has used to advantage a graphic representation of the formation of the manifest dream picture from determinants out of lower levels, and the course of the analysis back to these levels. This is in turn illustrated by typical dreams which manifest the form of the conflict at the various levels of the life history. In order to call attention not only to the past history but the forward tendency of each individual life, space is given to an epitome of Maeder's "The Dream Problem," in which the forward tendency, the "prospective function" (Monograph Series, No. 22) of the dream is fully discussed. This may be emphasized in the analysis after the exhaustive analytic occupation with the complexes, upon which Freud insists, has been carried out, for this tends to the final solution of the conflict and adaptation to reality.

In closing the author stresses the seriousness of the task of the psychoanalyst. The dynamic and plastic nature, however, of the material with which he works enables him to search out little by little the lost libido and redirect it to an efficient and healthful adjustment to life. The task demands caution and patience with details, but it also brings both physician and patient into a broad cosmic view of the past as well as of the present and future. The problem is a concrete one and involves an acceptance of the fact of a preservation of the past. It leads however to the understanding of life in its manifold efforts at expression and an efficient freedom of energy activity for civilization's tasks.

4. *Pain as a Reaction of Defense.*—Pain without an adequate physical

basis is the prominent symptom in this case. The general principles involved are the failure of the personality to develop around one main line of activity or interest, manifesting itself in a childish attitude toward the environment and a childish mode of emotional reaction, with the clinging to a relationship no longer conformable to actual conditions. In the face of these actual conditions then the patient proves inadequate, and a need is felt for some justification of the dominance of the infantile instinctive desire over real duties and responsibilities. The brief outline presented reveals this to be the case with the patient under consideration. The breakdown dated from the death of the father, with whom there had been an unusually close intimacy and fellowship, and the attempt by prayer and hallucination and in dream to detain or summon again her father's spirit or by wish for death for herself and her family to go to him. Her confinement shortly after the death of her father increased her reaction against the duties which were thus further put upon her. Religious interest, which developed only after the father's death, was another evidence of her desire to go to him, away from the real world. Her psychic disturbance as well as the pain which she suffered kept her a confirmed invalid and separated her from the distasteful duties of the home life, confining her to institutional life. The patient was hyperesthetic both physically and emotionally and it was evident that the pain, for which no sufficient somatic cause could be found, as well as the psychic conditions, were used to justify to her relatives her absence from her place in the world and to keep her in her childish form of reaction.

5. *Some Statistical Results of the Psychoanalytic Treatment of the Psychoneuroses.*—Coriat has sought to meet the criticism that psychoanalysts present no statistical results of their work. His results are from cases in which only complete psychoanalysis was done. The cases which he finds amenable to analysis are principally severe hysterias, compulsion neuroses, sexual neuroses, stammering, anxiety neuroses and certain psychoses such as the paranoiac states, manic-depressive insanity, and dementia præcox. Failure of recovery was due to incomplete transference (resistance), inability to break down disturbing complexes, unwillingness on the part of the patient to give up the neurosis. The progress and result were marked by the disappearance of the neurotic symptoms best shown in the change in the character of the dreams. With homosexual individuals, which showed a large proportion of cures, the dreams would change to a distinct heterosexual character, from a previous disturbing homosexual nature. The recovery depends largely on the emotional transference, and since this is successful in hysterias, compulsion and anxiety neuroses and homosexuality, these show a large number of recoveries. In stammering the transference was difficult and therefore no complete cure was attained. The results in dementia præcox lead to the conclusion that psychoanalysis may be quite effective in treating early or latent cases. Here as in the other psychoneurotic and psychotic forms of disturbance, the treatment is based upon a psychodynamic conception of the disturbance and the mechanisms through which it has been produced. These statistics prove psychoanalysis an effective therapeutic procedure in cases where other forms of therapy have been tried in vain, such being the author's experience in a number of instances. Recovery and improvement were found to be due to the actual use of the psychoanalytic technique and not through any method or rational explanation or reëducation of the symptoms, reaching to the basis of the disturbance by penetration into the unconscious rather than teaching or training the individual to evade his disturbance.

6. *Critical Review: Adler's Conception of the Neurotic Constitution.*—Glueck looks upon Adler's study of the neurotic character as one of the attempts which mark later scientific research to interpret rather than merely

describe mental disease. It too is based upon a belief in psychic determinism, which seeks for every manifestation a sufficient cause, as Freud has emphasized. Adler has carried this search for causes still further, Glueck believes, and built the superstructure of his investigations upon Freud's earlier recognition of the force of infantile wishes driving the individual onward to inadequate and unserviceable expression. Adler conceives that it is the fictitious goal which such an individual sets before himself which is productive of the neurotic symptoms, rather than that they arise from this driving of forces behind. From the feeling of insufficiency resulting from somatic inferiority, there is a sense of psychic inferiority, as well as an attempt at psychic compensation. This is common to the life of every individual, but in those who have greater inferiority to combat and less psychic ability for compensation, there arises an overcompensation with the creation not only of a fictitious goal, incompatible with reality, but a making of the compensatory processes objects to be attained and not merely means to a successful adaptation with reality. Such an individual heightens his ego-consciousness, his wish to dominate, and makes of his psychosis or psychoneurosis the attainment phantastically of this end. Thus Adler discovers the anatomico-pathological or somatic basis for psychic anomaly. In doing this he lays emphasis upon sexual inferiority as always present, but does not give the sexual so exclusive a place, as he conceives Freud to do, among the many devices of which the neurotic makes use. The Œdipus complex he views as the effort of the individual to establish his sense of security by identification with the father. Or any symptom complex is utilized in the same way as a defense against yielding to constitutional weakness and a means of establishing a feeling of power.

Book Reviews

CONGENITAL WORD-BLINDNESS. By James Hinshelwood, M.A., M.D., F.R.F.P.S. Glasg. H. K. Lekis and Co., London.

This small volume contains matter of interest to medical workers and to educators as well. The author has gathered into it the results of various studies, observations and practical effort with cases of word-blindness, acquired, congenital and hereditary. He gives greatest space to the first division of the topic, as he wishes to impress upon his readers the clear explanation of what word-blindness is in its clinical manifestation, and as he conceives it, its organic basis, to which he gives the testimony of pathological findings in a number of cases. All this has been best worked out in cases of acquired blindness. He urges careful and distinctive diagnosis, with reservation of the term word-blindness for the pure fact of defect in the area of the brain devoted to visual word memory. This he believes to be the left angular gyrus in the ordinary right-handed person, the opposite for the left-handed. If this is either destroyed or cut off in its connections it cannot function. In many cases however this defect is only unilateral and the opposite area of the brain can be trained to take up the function. This has been tried in a number of the author's cases with positive success, but varying in degree according to the duration of the word-blindness, and the perseverance and interest of the subject and other influencing factors. That it can in such cases be accomplished by perseverance and also largely by the aid of the auditory areas, the author fully believes, and has found that the same prognosis may be confirmed in the congenital and hereditary cases with the same conditions. The author also discusses the relation of this defect to retention of memory for musical notes and figures, from which this defect frequently is quite distinct.

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