Neurologic progress and prospects : chairman's address, delivered before the Section on Nervous and Mental Diseases of the American Medical Association, at the Fifty-fourth Annual Session, held at New Orleans, May 5-8, 1903 / F.W. Langdon.

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NEUROLOGIC PROGRESS AND PROSPECTS.

CHAIRMAN'S ADDRESS, DELIVERED BEFORE THE SECTION ON NERVOUS AND MENTAL DISEASES OF THE AMERICAN MEDICAL ASSOCIATION, AT THE FIFTY-FOURTH ANNUAL SESSION, HELD AT NEW ORLEANS, MAY 5-8, 1903.

F. W. LANGDON, M.D.
CINCINNATI.

INTRODUCTORY.

Mankind in general and practitioners of the healing art in particular may be likened to the different groups of dwellers in a series of narrow and deep valleys surrounded by lofty mountains. Each ordinarily obtains a restricted view of his own valley and sees little or nothing of the others. When by chance or intent they meet on an eminence, which is far above all their natural habitats, their view is not only broader and more accurate as concerns their own individual valleys, but extends in varying degrees over the domains of others.

So it is with the members of our guild, when they rise to a higher intellectual plane at meetings such as this; their respective views broaden and tend to harmonize with those of their fellows, while at the same time the aggregate of their fields of mental vision is vastly augmented.

The general practitioner surveys the domain of the specialist, getting here and there an idea, while the specialist broadens his horizon by contact with the generalist and by a more comprehensive view of the work of his confrères.

GENERAL CONSIDERATIONS.

The classic observations of Broca[1] (1861), establishing a definite cerebral location for the function of articulate speech, were followed up so assiduously, during the

next three decades, by numerous investigators, that the period named may be termed the era of gross localization of nervous functions. In marked contrast with that period the past decade may be fitly characterized as an era of progress in knowledge of structural organization of the nervous system.

The biologic law that function precedes and determines structure is here paralleled in the sense that knowledge of function has preceded and led up to knowledge of intimate structure.

Beginning with the demonstration by Cajal[2] (1893-94) of the anatomic individuality of the neuron, the labors of a host of enthusiastic investigators throughout the civilized world have rendered the decade now closing a most memorable one in neurologic progress.

The histologic, physiologic and pathologic fields have been lighted up as never before. A new terminology has been necessitated by the newer knowledge of neuronic architecture of the nervous system; and we find, in consequence, the older terms: areas, masses, nuclei, fiber tracts and reticulum, replaced largely, or at least added to and elucidated, by "neuron," axon, dendrite, collateral process, gemmule, etc.

As one result of all this labor and progress our present-day conceptions of the real nature of many diseases of the nervous system are in marked contrast with those of a former era. To none is this more apparent than to the practitioner, who compares his modern text-books and the literature produced at such gatherings as this with the same sources of information of a decade or more ago.

That this knowledge of intimate structure as related to function, both physiologic and pathologic, is still progressing at a rapid rate is a matter for profound congratulation, since its obvious tendency is to furnish an increasingly definite foundation for the more successful application of therapeutic measures. A second result may be observed in the rather more optimistic views as to the possibilities of prophylaxis and therapy in diseases of the nervous system which pervade the modern neurologic mind.

NEUROLOGIC PROGRESS.

During the past year the progress of neurologic medicine has been satisfactory, though not marked by brilliancy of achievement.

No supreme discovery or demonstration approaching in importance that of "the neuron" has been announced. Yet a steady advance has been kept up along the "firing line," and the skirmishers, represented by the workers in research laboratories, have penetrated farther than ever into the territory of the heretofore unknown with noticeable advantage to the position and strength of the "main army."

While "the neuron" maintains its position as a "star of the first magnitude" in the neurologic firmament, its lustre has been perhaps a trifle dimmed by the observations of Bethe and of Ballance and Stewart on "The Healing of Nerves."[3] Briefly, these appear to affect the neuron doctrine as follows:

1. They indicate that destroyed axis cylinders of peripheral nerves are reproduced, not by down growths from the proximal ends of the cut or degenerated axons, but by proliferation of neurilemma cells of the separated portions of the axis cylinder.

2. These observations also indicate that a peripheral axon (axis cylinder) is not originally a mere outgrowth from a single spinal neuron body (nerve cell), but is a result of the fusion of a chain of cells, the prototypes or equivalents of other chains represented in the neurilemma.

3. When the axon is destroyed the remaining neurilemma cells take up the task of producing a new one by proliferation and end-to-end fusion of new cells.

Two facts stand out prominently in this connection. First, that these observers admit that development is more or less incomplete unless the newly reproduced distal segment is eventually joined to the proximal end; another illustration of the law that structure is dependent on function.

It will also be noted that these observations apply to peripheral neurons only, and do not in any way affect the status of the central neurons, since their axis cylinders are devoid of neurilemma, and hence must apparently depend on their neuron bodies for trophic influence. Moreover, reproduction of these central axons when once destroyed is almost unknown, only a few observations on the subject existing in the literature (Worcester).[4]

The painstaking and admirable observations of Apáthy,[5] extending over a period of fourteen years and

published some six years ago, were claimed by him to show that the entire nervous system is permeated by a network of ultimate fibrillæ passing unbroken through the neurons. They have been in part accepted by Bethe and Nissl, who also consider that the resulting "fibrillary hypothesis" invalidates the neuron doctrine. As these fibrillæ themselves, according to Apáthy's showing, are a product of certain neuron bodies (cells), the conclusion that they are of secondary importance only seems justified at present.

Far from disproving or supplanting the neuron doctrine the "fibrillary hypothesis" of Apáthy seems to the writer to have merely attained the dignity of an appendage to it; an appendage, doubtless of considerable import, it is true, but just how important remains to be determined by its verification in a larger series of organisms than earthworms and leeches.

NEURODYNAMICS.

The nature of nerve force and the conditions of its transmission yet remain an unopened book, of which Professor Loeb[6] has essayed to exhibit to us the title page in his ingenious application of the electro-chemical theory of ions to the dynamic processes of the neuron and muscle cell.

The main landmarks of his hypothesis may be briefly stated as follows:

1. An ion is the electrolytic representative of an atom, but is, theoretically, much smaller in size.

2. Ions, like the electrolytes of which they are the ultimate electrical units, are positive or negative, hence anions and kations.

3. Their function, by their presence in definite proportion in each tissue, is to preserve the "labile equilibrium" of the colloid materials of protoplasm on which its activities depend.

4. Variations in these proportions or attempts to restore the same to normal (through electro-chemical action) give rise to function in the particular tissue that is the seat of such variation at any given time.

5. Hence, the dynamic process of neurons, as of muscle cells, may depend on the proportions of ions of, say calcium, sodium, potassium, etc., that are present at any particular instant.

6. This, if verified, would apparently indicate that the dynamics of function reside in the ions, while the

quality and direction of function only are conditioned by the histologic structure and connections of the neuron.

Dercum[7] and others have proposed, some years ago, a theory of "amœboid protrusion and retraction" of neuron processes (gemmules) in order to account for the "make" and "break" of function in physiologic as well as pathologic (functional) states; accounting in this way for sleep and other suspensions of consciousness, as well as for various paralyses of functional character.

While this idea has probably served a good purpose in directing attention to changes in the neuron, as the basis of function, yet the type and nature of the movement referred to is obviously too gross in character to satisfy the demands of the problem.

The bearing of the theory of ions, however, is quite another matter. It is much easier to conceive of an alteration in electro-chemic status as the basis of changes in nervous function than to attribute them to so coarse a process as physical retraction and elongation.

In fact, in commenting on this topic it has been the custom of the writer to say to his classes that, while the theory of physical retraction and expansion is not tenable in this connection, yet it is quite conceivable that a break in chemical relations, a chemical retraction and reapproachment, so to speak, might account more satisfactorily for the facts. The same may be said of an alteration in electro-chemical status, due to variations in ions.

PSYCHODYNAMICS.

The impression that "psychic" activity may exist independently of physical agents still appears to obtain a hold even on some medical minds, and is not confined to the devotees of the various so-called "cults" patronized by the laity and exploited by charlatans.

It seems hardly necessary to say that such independent existence of "psychic" activity has not been demonstrated in fact, and in the nature of things is not likely to be.

CLINICOPATHOLOGIC.

Pellagra has been demonstrated by Ceni[8] in a remarkably complete series of experiments, to be due to infection by micro-organisms belonging to the mould fungi, namely, the *Aspergillus fumigatus* and the *Asper-*

gillus flavescens. Either species may act in any given case, but seldom both.

These organisms reach the human subject through the medium of infected maize, but are also observed in mouldy bread, etc.

The parasites pass from the intestine in the form of spores, become localized in various tissues and organs (lungs, pleura, pericardium and pia-mater), and there elaborate and emanate very virulent toxines, which give rise to phenomena of general poisoning, as well as to local inflammatory process of a diffuse character.

The nervous symptoms which have led to the classification of pellagra as a nervous disease consist of widespread alterations in sensation, motion and intellect.

Thermalgesia along the spine, numbness and formication of the legs.

Tremor, motor inco-ordination and paraplegic weakness are common.

Apathy, incoherence and melancholic symptoms are noted.

The mortality is high, but recoveries do occur. The importance of the discovery is evident when we realize that: 1. Sixty thousand persons suffer from the disease in Italy alone at the present time. 2. By reason of the fact that the author has devised a plan for the successful treatment of the disease by the serum of immunized goats and horses.

Although limited, so far as known, to Italy and southern France, in which countries it is traceable to the use of unripe and badly kept maize as a food, the disease interests us for three reasons:

1. It affords an example of a distinct neuron degeneration due to a definite organism.

2. The symptoms, strongly suggestive in some cases of ataxic paraplegia (combined sclerosis), in others of paresis, and in others of ankylostomiasis (Harris[9]), may call for differentiation from those affections in this country.

3. Owing to the well-known occasional presence of the aspergillus in the auditory canal, where it has heretofore been considered an object of local rather than of general pathologic import.

MYELITIS.

Acute myelitis, so-called, is one of the diseases of

which our knowledge of the pathologic nature is being gradually developed.

The older idea that the inflammation was the primary factor, the vascular disease and softening secondary, has been practically reversed in a large proportion of the cases, thus bringing the subject in line with similar processes in the brain, where the vascular disease (endarteritis and thrombosis) has long been recognized as the primary element in acute softening.

Singer,[10] in a valuable résumé of the subject, reports two autopsies, both showing obliterative arteritis of syphilitic origin, and refers to nineteen others, fifteen of which presented a syphilitic history. His conclusions are:

1. So-called acute myelitis is found on microscopic examination, in the majority of recorded cases, to be not inflammatory, but due to thrombosis of spinal vessels.

2. That by far the most common cause of this thrombosis is syphilitic arteritis, and that senile arterial degeneration forms a considerable proportion of the remaining cases.

3. This view as to the pathology is confirmed clinically by the analogy between this disease and cerebral thrombosis.

Williamson,[11] in 1894, advocated the same views, which are now accepted to a greater or less extent by Gowers, Oppenheim, Marie, Dana, Church and Peterson, though Singer, as above quoted, takes a rather more advanced stand as to the comparative frequency of thrombosis as a cause. A somewhat extensive clinical experience leads the writer to heartily indorse these views of Singer, the bearing of which on our therapy is obviously of great practical importance.

BRACHIAL NEURITIS.

Somewhat analogous to the problems presented by acute myelitis are those relating to the pathology of brachial neuritis, especially of those of uni-radicular type.

E. Farquhar Buzzard,[12] in an important article in *Brain*, reports six carefully worked-out cases, and suggests that vascular lesions, embolic or thrombotic, better explain these cases than the older idea of a neuritis of toxic or "exposure to cold" origin. His conclusions are as follows:

1. "There exists a clinical group of cases in which the

symptoms (localized muscular atrophy in shoulder, arm or hand muscles, sensory dissociation and hypesthesia) strongly suggest a more or less complete destruction of functional continuity in one of the spinal nerves forming the brachial plexus.

2. "The objective disturbances of sensibility resulting from this lesion closely conform with those observed by Sherrington after cutting a posterior root in a monkey. They differ in some respects from the anesthesia produced by the division of a peripheral nerve. The objective hypesthesia is not associated with any subjective sensation of numbness, and is consequently overlooked by the patient.

5. "The atrophy of the affected muscles is in excess of what might be expected in view of the fact that many of the muscles receive fibers from two or more spinal nerves.

6. "The condition generally occurs in persons who have at some time been the subjects of a disease affecting the cardio-vascular system. The morbid process is probably vascular in character and may be sudden or gradual in its onset."

PACHYMENINGITIS HEMORRHAGICA INTERNA.

Barratt[13] records an exhaustive series of investigations on man and lower animals, the results of which indicate that intravascular thrombosis is the probable essential lesion leading to the formation of the so-called false membrane in this disease He concludes: "Finally, the view may be advanced that pachymeningitis interna hemorrhagica is a morbid process in which the essential lesion is a separation of fibrin, usually within the blood vessels, on which the other changes in this condition are largely if not chiefly dependent." The article is well illustrated.

LOCAL PANATROPHY.

Sir William Gowers[14] contributes a brief but interesting article under this title.

"In certain areas of the trunk, limbs or face, which vary in diameter from that of a nut to that of an orange, or larger, there seems to be wasting of all the subcutaneous tissues down to the bones, with slight change in the skin, which is then distinctly thinner and slightly discolored. The aspect of the areas may be described as that of a subcutaneous excavation." Even the bones may

be affected. The distribution is without definite relation to the muscles or nerve distribution. No hypothesis is advanced as to its cause.

BLOOD CHANGES IN EPILEPSY.

Pugh[15] contributes an important article "On Certain Blood Changes in Idiopathic Epilepsy," based on an investigation of forty cases. His conclusions are:

1. The alkalinity of the blood (in epileptics) in the interparoxysmal period is lower than the average of the control cases.

2. The diminution is gradual and progressive, and is more marked in those cases suffering from gastric catarrh and constipation.

3. There is a marked sudden and pronounced fall immediately prior to the onset of the fit.

4. There is a further fall in the alkalinity after the fit is over; this diminution is seen from three to ten minutes after the attack.

5. This after-diminution depends on the duration and severity of the muscular twitching and on the degree of the alkalinity in the inter-paroxysmal period.

6. There is a gradual return of the blood to its normal alkalinity, which takes place in five to six hours, the rise being more marked in the first hours.

7. If the alkalinity keeps at a low value it may determine the onset of another fit.

8. The diminution after the fit is due to the chemical end products of muscular metabolism, i. e., sarcolactic and carbonic acids and not to substances in direct relation to the epilepsy.

9. The diminution after a nocturnal fit takes a longer time to return to the normal than the diminution after a day fit.

10. It is impossible to elevate and maintain the alkalinity within physiological limits for any appreciable length of time by the administration of drugs.

11. There is a leucocytosis after a fit. The increase is due to the small hyaline cells, also to a less extent to the large hyaline cells. The polymorphonuclear cells are diminished. There is an increase in the eosinophile cells some hours after the attack.

12. The leucocytosis is not so pronounced in *status epilepticus;* it diminishes with each seizure.

Respecting treatment the author remarks: "The ef-

fect of drugs on the alkalinity is transient, and it is impossible to elevate and maintain the alkalinity within physiological limits for any appreciable length of time. The bromides elevate the alkalinity even to the normal of the control cases for a certain time, but on continued administration, and even when the dose is increased, the alkalinity fails. The best results were obtained from strontii bromid, sodi bicarb, aa: gr. 15 *ter in die;* for some time the alkalinity was maintained at a high value, but only to fall again. Suprarenal extract has apparently little effect on the alkalinity. The effect on the mental state was good, and all the patients subjected to the treatment recovered from their mental confusion much sooner."

One case escaped the headache usually following the fits.

"In all the cases the number and frequency of the fits were much increased, and on this account the suprarenal treatment was stopped. These results are very different from those obtained by Dr. Hill,"[16] who reports improvement from the use of suprarenal therapy, both as regards the mental state and the frequency of the attacks.

SYMPTOMATOLOGY—CEREBRAL LOCALIZATION.

Phelps,[17] from a study of brain injury and disease, reinforces the view of Bianchi,[18] that the frontal lobes are the seat of the "psychic" functions proper, and particularly advocates that the left prefrontal region is especially concerned in mental processes.

X-RAY LOCALIZATION.

Charles K. Mills[19] reports a case of brain tumor localized by the *x*-ray, which confirmed the clinical diagnosis, being the second instance of this nature, the first being by Church.[20]

Gould[21] contributes a critical study of DeQuincey, Carlyle, Darwin, Huxley and Browning, as regards the cause of their chronic ill health. His conclusions, supported by arguments that are well worth consideration by the neurologist, are, that the opium habit of De Quincey, the ill-temper and dyspepsia of Carlyle, the neurasthenia of Darwin and the headaches of Huxley and Browning were all due to eyestrain, and could have been avoided by resort to modern methods for the detection and correction of errors of refraction.

LUMBAR PUNCTURE.

The usefulness of this procedure as a diagnostic aid has been extended to surgical diagnosis by Tuffier (vide Hughes[22]), who suggests that a blood-stained cerebrospinal fluid means vertebral fracture.

Monod[22] has found leucocytosis of the cerebrospinal fluid in locomotor ataxia and in general paresis, but "nothing significant" in alcoholism hysteria, hemiplegia or neuritis.

REFLEXES, ETC.

Babinski has enriched our list of clinically available signs by the addition of five within about as many years. Some of these are so little known in America, generally speaking, that brief reference to them here may not be amiss.

1. The "Babinski sign"[23] proper, or the "toe sign," is a reflex extension of the great toe in response to mild plantar irritation. This sign continues to hold its own as a most reliable indicator of organic disease of the "pyramidal" tract. The normal plantar reflex is a flexor movement of all the toes.

2. The achilles tendon reflex is a plantar flexion of the foot at the ankle joint, following a tap on the tendo-achilles. The patient, during this procedure, kneels on a chair or lounge with the feet hanging over its edge. The response (plantar flexion of ankle) is weakened or absent in true sciatic neuritis and in tabes. It may be absent early in tabes where the knee-jerks are not yet lost. (Bramwell, *Brain,* 1901, 554.)

3. The sign of "combined flexion of the thigh and trunk."[24] To investigate this reflex the patient is placed on his back on a horizontal surface with arms folded across his chest. He is then asked to assume the sitting posture without using his hands. In a hemiplegia of organic origin this effort is accompanied by a raising of the paralyzed limb, which is flexed at the thigh but extended at the knee. In a functional (or so-called hysterical) hemiplegia the paralyzed limb remains flaccid and parallel with the sound one.

4. The "platysma sign"[24] of Babinski is obtained by asking the patient to forcibly open the mouth against the resistance of the investigator's hand placed beneath the chin, or by asking him to flex the head on the neck while the operator applies resistance to the forehead. In either case the platysma contraction is absent or les-

sened on the paralyzed side in organic paralysis, while there is no difference in the two platysma contractions in a functional hemiplegia.

5. The sign of "exaggerated flexion of the forearm."[24] This is due to hypotonicity of the muscles by reason of which a greater degree of flexion is permitted on the paralyzed side in recent organic paralysis. In functional paralysis the hypotonicity is absent and the degree of flexion similar on both sides. Babinski remarks of this sign: "Since the phenomenon may occur to a slight extent in health, it is of value when it is very decided."

THE SUPRA-ORBITAL REFLEX.

This reflex, as described by McCarthy,[25] is obtained by tapping, with the finger or a light hammer, over the trunk of the supra-orbital nerve on the forehead. The normal response is a contraction of the lower eyelid. The presence of this response is evidence of integrity of the fifth and seventh cranial nerves. The reflex is present in central lesions involving motion or sensation of the face; absent in peripheral lesions of the fifth and facial nerves. It is important that the observer stand behind the patient in testing for this reflex, so as to avoid the involuntary winking due to visual-motor reaction.

THE LIP REFLEX OR "MOUTH PHENOMENON" OF NEWBORN CHILDREN.

While referred to briefly by Loos, 1896, and Escherich, 1898, Thomson[26] has given us a fuller and well illustrated account of this reflex, which has received little attention heretofore. It would appear to be one of the most fundamental organic reflexes which is essential to the very existence of the species, consisting as it does of a protrusion of the lips, and in some instances of sucking movements, brought out by tapping the upper or lower lip near the angle of the mouth. It occurs in all healthy newborn infants when they are asleep, according to Thomson. It seems to be exaggerated in infants who are taking chloral or who are having or about to have convulsions.

OPPENHEIM'S REFLEX.

If the inner side of the leg be stroked firmly from above downwards with the handle of a percussion hammer (or other blunt firm instrument) along the posterior border of the tibia or a little posterior to it, commencing

about a hand's breadth below the knee and going downwards nearly to the ankle, the result in healthy individuals and in cases of functional nervous disease is either negative or it produces a plantar flexion of the toes.

In lesions of the pyramidal tract there is an extension of the toes and abduction or adduction of the ankle.

Oppenhein[27] is of the opinion that this reflex is not identical with Babinski's "toe sign," inasmuch as it is often present in cases of spastic paresis where Babinski's reflex is doubtful; moreover, it does not occur in the small proportion of healthy persons who exhibit the Babinski reflex; finally, the involvement of the tibialis anticus and occasionally of the peroneus is another point of difference from the phenomenon of Babinski.

ANKLE CLONUS.

Wier Mitchell[28] calls attention to the fact that the motor element of ankle clonus is manifested through the soleus muscle alone, the gastrocnemius taking no part on account of its relaxed state due to its femoral attachment.

THERAPY—HYSTERIA AND NEURASTHENIA—REST TREATMENT.

Dejerine[29] reports two hundred severe cases of this class treated by the Wier Mitchell plan of isolation, milk diet and rest, but without massage. He had only two failures. The treatment is also emphatically indorsed by the reviewer (Alexander Bruce).

We have heard so much of the "rest" treatment of neurasthenia since its introduction to the profession by Dr. S. Wier Mitchell, some years ago, that it is a trifle refreshing, to say the least, to find the pendulum swinging to its antithesis, the "work" cure.

A group of contributors on the subject are noted: Pearce (massage), *Internat. Med. Jour.*, 1902-03; Sinkler, Hydrotherapy, *Milwaukee Med Jour.*, 1901; Pearce, F. S., *Alienist and Neur.*, 1902, p. 259; Schwab, S. I., *Interstate Med. Jour.*, 1902, 248.

A pertinent query in this connection would appear to be: Have we not been a little too liberal in the application of the term "neurasthenia" as we were with "hysteria" until within a few years?

It is not possible that we apply the term neurasthenia —which should be literally translated, simple dynamic weakness due to lowered vitality—to a large group of

affections characterized by "irregularity in function," or "lack of balance" in dynamogenesis.

In such cases a transfer of function is the logical method, and here the "work cure" finds its place. True exhaustion, it appears to the writer, must still call for rest.

RAYNAUD'S DISEASE.

Cushing[30] advocates "treatment by the tourniquet" to counteract the vaso-motor spasm of Raynaud's disease. The case reported (in a woman of 35) was a severe one, with decided arterial spasm and great pain, accompanied by a local asphyxia of all the digits, with almost daily exacerbations. Superficial gangrene of one or more of the toes or fingers occurred on several occasions.

"On Nov. 10, 1900, during an exacerbation of pain and asphyxia chiefly affecting the left upper extremity, the flat rubber bandage was first employed as a tourniquet about the upper arm. Its application caused considerable local discomfort and pain referred to the side of the thorax (inter costohumeral?)

"On its removal, after one or two minutes' application, a bright flush of the extremity followed, with increase of surface temperature and a much more readily palpable radial artery. The vaso-motor relaxation lasted only a short time, but the patient expressed a sensation of considerable relief. From this time seems to date the beginning of her improvement.

"The tourniquet was applied daily to one or another member according as the symptoms indicated.

"The application was finally extended to periods of five minutes or longer.

"The relief to the burning pain was so pronounced that after the first few trials the patient was not only very willing to submit to the temporary discomfort of constriction, but would call for it."

Serum therapy continues to hold out hopes to the neurologist. Its use in pellagra by Ceni[7] has been already alluded to.

Bruce,[31] after a trial of serum treatment in paresis, concludes as follows:

1. "General paralysis is a disease directly due to poisoning by the toxins of bacteria, the point of attack of which is through the gastric and intestinal mucous membrane.

2. "The poisoning is probably a mixed poisoning, but

the bacillus coli is apparently one of the noxious organisms.

3. "The result of treatment with serum, taken from a case of general paralysis in a condition of remission and injected subcutaneously into an early progressive case, points strongly to the fact that some form of serum therapy is the proper treatment for this as yet incurable disease." He now proposes to use serum from a horse immunized to the bacillus coli.

Dormiol, a hypnotic and sedative, has received attention from A. McGugan,[32] who considers it "equally effective" as chloral and pleasanter though more expensive. Other writers speak favorably of the remedy (see Amer. Year Book M. & S., 1903, 526). The dose is stated at thirty to sixty minims of a 50 per cent. solution.

THE NEUROLOGIC PROSPECT.

The two great problems in intimate relation to biologic progress, "the struggle for existence" and "the survival of the fittest," give us little trouble in a practical sense, since they are solved for us in the vast laboratory of Nature. From the enormous mass of material there worked over, however, there must result, as in most laboratories, a considerable proportion of "by-products," to borrow a chemical term—biologically speaking—of organisms below the standard; again others that are perhaps above it.

In other words, the more or less "unfit" are produced along with the "fittest." This gives rise to a third problem, which we may term "the utilization of the unfit."

To the various attempts of civilization to solve this problem we owe the existence of medicine, religion, law, ethics and art in general. There arises from its attempted solution such important and perplexing subproblems as:

1. The management of the mentally afflicted and of the physically helpless from various causes.
2. Of the criminal and dangerous classes generally.
3. Of the inebriate and moral invalid.
4. The question of the legal responsibility of various defectives.

Most questions of therapy in general.

In short, the extensive series of problems presented by the necessity for intelligent care of the defective, the

delinquent and the depraved. It would be a narrow view from the standpoint of civilization, which would seek only the extermination of these classes, for it is a self-evident truth to the thoughtful, that they are necessary by-products of the laboratory in which Nature works out her most important ends. It remains for us, therefore, to utilize and improve or render them harmless.

The first of these subproblems, the management and treatment of the mentally afflicted and otherwise helpless, so as to obtain the best practical results, is yet in process of solution. Much has been done, but more remains.

A growing tendency to combine the heretofore widely separated subjects of neuropathy and psychiatry is evident from a glance at the world's literature. It is being recognized that their separation has been too radical. By the reception of the acute insane into the general hospitals the best interests of these patients, from a therapeutic and economic standpoint, is often conserved, and at the same time the teaching of psychiatric medicine to the general practitioner is made more effective. It is probable that we have gone too far in the separation of these closely-related subjects and that the complete general hospital of the future must provide for both classes of patients.

In the words of Maudsley: "Mental disorders are neither more nor less than nervous diseases in which the mental symptoms predominate, and their entire separation from other nervous diseases has been a sad hindrance to progress."

Sibbald,[33] in an able article on this subject, says: Wards for mental diseases do not require to be distinguished from other medical wards, and residence in sick wards does not entail the industrial and social injury that as a matter of fact follows residence in an asylum. Such wards have also the advantage over an asylum that a patient who goes there is saved from the mental shock which is often felt on entering an institution largely devoted to the care of the incurably insane. The writer can emphatically indorse this view of the subject from his experience in the wards of the Cincinnati Hospital, where a limited number of acute insane are treated.

The establishment of special or "psychopathic hos-

pitals" for the separate treatment of the acutely insane, is along the same general line of progress and has been vigorously advocated of late years. I need only refer to the able address of my predecessor (vide Dewey[35]) for the details.

Peterson[36] and Brower[37] also contribute important articles on this subject. In the establishment of separate institutions for the epileptic the states of New York, Ohio, Pennsylvania, New Jersey and Massachusetts have already taken an advanced stand, and their example is likely to be followed elsewhere

THE HOSPITAL FOR CHRONIC DISEASE.

In our anxiety to provide proper hospital accommodations for the acutely ill there is some danger, according to Dr. E. W Taylor,[31] that we may overlook the claims of the chronic invalid. At present no provision is made for such except as paupers, in institutions variously characterized as infirmary, poor-house, alms-house, etc.

Dr. Taylor's contention that the interests of these patients and of the public in general would be better subserved by removal of the stigma of pauperism so far as possible is well taken.

A movement toward the solution of the second subproblem on our list has been inaugurated by the establishment of separate hospitals for the criminal insane in New York state, and the subject is now being agitated in Ohio[38] and elsewhere.

As regards the third problem, the care and treatment of the inebriate, it has been solved only so far as the well-to-do are concerned by private institutions, many of great merit and doing excellent work. The work should be extended so as to be available to those of the most limited resources.

In attempting the solution of the problem of the utilization of the unfit the physician has to deal with many who have been launched on the sea of life to make their "struggle for existence" with insufficient vital capital; with others who receive a fair start in this respect, but whose working capital has been impaired by the various stresses of circumstances, which we call "disease" and "accident"; and finally, with the very large number whose dynamic potentiality is sufficient for ordinary needs, if properly directed and conserved, but which fails to meet extraordinary demands or improper

use. It is evident that "the strenuous life" is not for either of these classes.

The prophylactic and therapeutic efforts of the physician, therefore, must be largely addressed to the maintenance of nutrition, the regulation of function and the conservation of energy.

TEACHING OF PSYCHOLOGY AND PSYCHIATRY.

As an important adjunct to the better management of the above problems we need chairs of psychology and psycho-pathology in our medical colleges generally. (vide Persching[39]). Many have not even full chairs of neurologic medicine proper. It is largely due to this omission, and the consequent indifference of practitioners to psychiatry as well as psychotherapy, that the various isms, pathies and "cults" flourish as they do.

To successfully solve this problem we must do better than they, i. e., we must add to a sound therapy based on solid anatomic, physiologic and pathologic foundations, the same subtle, but none the less effective, psychotherapy which is the sole weapon of the pretender.

TO SUMMARIZE THE OUTLOOK:

We may look for important aids to neurologic progress, to serum and other antitoxic therapy; to cytodiagnosis and hematologic procedures generally; to organic and electro-chemistry; to prophylactic hygiene and dietetics; to a wise adjustment of function to structure; to special institutional measures and to better facilities for teaching neurology in general, including psychology, psychiatry and psycho-therapy.

The future of neurologic medicine as worked out along these lines will be of vast importance to the welfare of humanity.

"All things come to him who waits," *he who would utilize them must act.*

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