

sufficient to mark such cases as intrinsically distinct from those in which a constitutional defect is the cause of the tendency to relapse after varying intervals, thereby placing upon the disease the stigma of chronicity."

ITALIAN.

By *W. Ford Robertson, M.D.*

The Relation of Epilepsy to Auto-intoxication.—C. Agostini (*Rivista Sperimentale di Freniatria*, 1896, pp. 267 and 435), following up the researches of Voisin and of Mirto, who have shown that the urine of epileptics possesses a special toxicity, and those of a number of other observers who have demonstrated that true epileptic fits can be produced as the result of auto-intoxication by abnormal products developed in the gastro-intestinal canal, has made an investigation into the composition and toxicity of the gastric fluid and urine in a number of cases of epileptic insanity at various periods in relation to their fits. The great care and strict attention to scientific requirements with which he appears to have carried out this difficult research, are such as to inspire confidence in the accuracy of the results he has obtained, as well as of the conclusions he has deduced from them. Without overturning any long-accepted theories he has made what certainly appears to be a most important contribution to our knowledge of the pathogenesis of epilepsy, and he has formulated new principles of treatment which, while they seem in the light of his investigations to be eminently rational, have already, as carried out by himself at least, been followed with success of a very remarkable and promising kind.

He finds that in the intervals between the fits the gastric juice is in most cases normal as far as can be recognised by mere chemical analysis, with, however, a tendency to hyperacidity and especially excess of hydrochloric acid. For a short time previous to a fit, and for some time afterwards, there are changes indicating a condition of transitory dyspepsia. An epileptic convulsion, in proportion to its duration and intensity, greatly disturbs the whole digestive functions of the stomach, increasing the secretion of hydrochloric acid and mucus, favouring the development of abnormal fermentation products, leading to the appearance of biliary acids, lowering the peptic action, and diminishing the sensibility, motility, and absorbing power of the organ. In the intervals between the fits the toxicity of the gastric juice (tested upon rabbits) is not necessarily greater than in healthy individuals, provided the patient is not suffering from chronic gastric catarrh. In the prodromal period in relation to a convulsive seizure, and especially in those cases in which there is chronic

gastric catarrh, the stomach wash displays energetic and constant toxic properties. After a convulsion this toxicity is still further increased. Attacks of petit mal increase the gastro-toxic power in a similar manner. The poisonous principles appear to be of the nature of leucomaines, and are probably the same as those that are found in the gastric fluid of dyspeptics in general. Examination of the urine shows that in the intervals between the fits the tissue metabolism of epileptics is below normal, as evidenced by the elimination of azotised substances (urea, uric acid, and creatinin), phosphoric acid and chlorides. The excretion of azotised products is further diminished in the prodromal period. After a violent motor fit there is an increase in the density and acidity of the urine, and in the elimination of all the ordinary products of tissue change, except chlorides. None of the abnormal constituents of the urine that may appear after a fit do so regularly or constantly. The urine of epileptics has always a greater toxicity than that of normal individuals. This toxicity is increased in the period immediately preceding a fit. After a convulsion the urine is hyper-toxic and remains so for more than twenty-four hours. The toxicity is always proportionate to the gravity of the gastro-intestinal disturbance associated with the fit. It is probably due to products that have the general reaction of leucomaines. The administration of bromides distinctly diminishes the toxicity of the urine.

The author maintains that in a large proportion of epileptics the fits are preceded by marked symptoms of gastric catarrh. In the intervals between the fits the catarrh in most cases disappears, but in many it persists, becoming aggravated about the time of the fits. In those patients who have chronic catarrh of the stomach the epileptic phenomena are more frequent and more severe. He believes that this chronic or transitory gastric catarrh is accompanied by putrefactive changes in the contents of the stomach and intestines, and the formation of toxic substances which become absorbed and tend to accumulate in the blood, giving rise to the malaise, headache, furring of the tongue, etc., which precede the occurrence of a fit, and finally determining the convulsion or series of convulsions. He has found that all measures tending to the elimination of such toxic products, or to the prevention of their formation, diminish the frequency of the fits or altogether prevent them. He further believes that the processes of oxidation are usually deficient in epileptics. Hence leucomaines absorbed from the intestinal canal are not completely oxidised as in healthy persons. He also thinks it is probable that in epileptics, on account of the morbid functioning of the nervous system, excretory processes take place with abnormal slowness, so that there is a tendency to the retention in the system of products of reduction that ought to be eliminated. He fully recognises that idiopathic epilepsy is essentially a cerebral disease, and

would look upon it as the result of "a polymorphic degenerative state," the most constant and almost pathognomonic feature of which is the existence of "somatic and functional asymmetry." He rejects the view of Chaslin and others according to which epilepsy is due to a special brain sclerosis. But while admitting the existence of a cerebral abnormality that predisposes to epilepsy and often actually determines it, he contends that it is logically and experimentally proved that in many cases the determining cause of the repetition of the fits is auto-intoxication. The irritation occasioned by the toxic agents produces either hyper-excitability of the psycho-motor centres, or exhaustion of their inhibitory power, permitting the tumultuous action of the lower automatic centres. These toxic agents need not have epileptogenetic properties. They act simply by increasing the vulnerability of the imperfect and unstable nervous system of the epileptic.

Since auto-intoxication plays so important a part in the production of epileptic fits, Agostini advocates that we should endeavour as far as possible to remove the factors of such intoxication. In the first place we must correct gastro-intestinal catarrh when it is present, and endeavour to remove toxic substances that may have formed in the alimentary tract. As the best means of attaining this object he recommends repeated washing out of the stomach with salt water, especially when fits are anticipated and during the occurrence of a series. He also advises the use of purgatives, saline enemas, diuretics (especially lactose) and the abundant administration of milk along with salol or naphthol as intestinal antiseptics. In the second place we should endeavour to increase the activity of processes of oxidation and of normal tissue changes in general. These objects, he thinks, are best secured by the use of small doses of alcohol, careful hygiene, fresh air and a moderate amount of muscular exercise. With regard to diet he does not agree with Haig that epileptics should become vegetarians. He has found that a purely vegetable diet gives even worse results as regards the fits than a purely meat diet, a circumstance which he attributes to the fact that vegetable albumen putrefies more readily than animal albumen. He recommends a mixed diet with plenty of milk. Lastly, we should endeavour to diminish the reflex activity of the cortical nerve-centres which in epileptics are in such unstable equilibrium. He believes that the only really effective drug for this purpose is bromide of potassium. He recommends that it should be given in somewhat smaller doses than those generally used, and that it should be combined with salol. Its efficacy is increased by the antitoxic therapeutic measures already mentioned. If gastric catarrh appears the administration of bromides should be suspended, and the attention directed to the removal of the catarrh.

The Structure and Origin of Granulations of the Ependyma.—G. B. Pellizzi (*Rivista Sperimentale di Freniatria*, 1896, p. 466) has written a paper upon this subject containing a number of points of considerable interest. He holds that granulations of the ependyma are composed essentially of proliferated neuroglia, and that the surface epithelium plays no part in their formation. In their early stages they are covered by a single layer of epithelial cells which never show karyokinesis. As they increase further in size this epithelial layer tends to become shed. He maintains that the appearances indicating proliferation and downward growth of the epithelium described by Beadles (*Journal of Mental Science*, 1895, p. 32) as the first stage in the development of these granulations, are due merely to the circumstance that adjacent centres of neuroglia proliferation have raised the epithelium over them, leaving only a narrow space between. Regarding the causes of this localised proliferation of neuroglia, he rejects the theory of Weigert that it is to be found in the degeneration and loss of the surface epithelium, and consequent removal of the resistance that it normally offers to the growth of the underlying tissue. He also gives reasons for being unable to accept the theory of Beadles according to which ependymal granulations "owe their origin to an irritative cause—possibly some chemical substances contained in the fluid of the ventricles, or present in the blood." His own view is that they form in consequence of certain morbid changes in the vessels of the ependyma, in the immediate neighbourhood of which the neuroglia proliferation always starts. The most important of these changes is hyaline degeneration of the whole vessel wall. How this vascular disease stimulates the growth of the adjoining neuroglia, the author does not pretend to be able fully to explain.

The chief interest of Pellizzi's paper really lies, however, in the fact that it contains what is probably the first answer by an authority of weight to Weigert's arguments in support of his new theory regarding the structure of the neuroglia, contained in his recently published monograph. Weigert's main contention is that the long accepted view according to which the neuroglia is composed entirely of special cells and their processes, is erroneous, and that the tissue really consists of two anatomically distinct elements, namely fibres and cells. Pellizzi rejects this new theory, and maintains that the description of the neuroglia given by Golgi is still the correct one. Some of the principal considerations that he opposes to the case made out by Weigert are briefly as follows. Weigert's new staining method gives what is evidently a special and very fine chemical differentiation between the fibres and protoplasm, the former retaining the stain, while the latter is left colourless and invisible. But a chemical differentiation of this kind does not suffice to disprove that these tissue elements are continuous. When the evidence of various methods is taken the continuity of protoplasm and fibre becomes convincingly de-

monstrated. Of special importance in this relation is Vassale's modification of Golgi's silver method, of which Weigert does not appear to have known. Lastly, the fine chemical differentiation between fibre and protoplasm obtained with Weigert's method in the case of the normal neuroglia, is in a large degree lost when the method is applied to hypertrophied neuroglia-cells such as are contained in ependymal granulations. A gradual transition of the one element into the other then becomes apparent in many instances.

A New Italian Neurological Journal.—Remarkable evidence of the zeal with which neurological studies are at present being pursued in Italy, is furnished by the fact that the directors of the *Rivista Sperimentale di Freniatria* have recently found it necessary, on account of the ever increasing number and importance of the original papers requiring publication, to start in association with their long established quarterly a new monthly journal, to which they have relegated the bulk of their reviewing work. This new journal, which began to appear at the beginning of last year, and which is named the *Rivista di patologia nervosa e mentale*, is edited by Professor Tanzi of Florence in conjunction with Professors Tamburini and Morselli. It aims at being "an Italian review of all the neurological and psychiatric work published in Italy and abroad." Each issue also contains, however, three or four usually short original papers. Among these there have already appeared many of great importance, such as those of Vassale and Generali upon the parathyroid glands, and several by Lugaro upon nerve cells. The journal is certainly one that can be strongly recommended to the attention of those in this country who desire to keep in touch with the rapid advances that are continually being made in every department of neurology by continental workers.

The Respective Value of the Chromophile and Achromophile Parts of the Protoplasm of the Nerve-Cell.*—Lugaro (*Rivista di patologia nervosa e mentale*, 1896, January) has advanced a number of arguments, based largely upon observations of his own, in support of the view that the achromophile part of the protoplasm of the nerve-cell is composed of filaments and that the wave of nerve force is conducted by these and not by means of the chromophile part, as had previously been generally supposed. The latter, he maintains, represents an interfilamentous mass, so that Nissl's staining method only gives as it were the negative of the proper structural configuration of the protoplasm.

* There is at present no English word that exactly translates the Italian adjective *chromofilo*. The term "chromatic," which might be employed, has long been used in histology as the adjectival form of "chromatin," which is exclusively a nuclear structure. It seems, therefore, necessary to introduce these new terms in order to avoid confusion between the stained elements of the protoplasm of the nerve-cell and those of the nucleus in preparations by Nissl's method.

Since the publication of this paper these views have received support of an important kind. Ramon y Cajal has advocated the theory that the achromophile part of the protoplasm is related to conduction, and Nissl has admitted that only a negative picture of the protoplasmic structure is presented in preparations by his method.

The Pathology of the Nerve-Cell.—In a later paper than the one just noticed, Lugaro (*Rivista di patologia nervosa e mentale*, 1896, August) has given a very valuable *résumé* of the present position of our knowledge of the pathology of the nerve-cell, along with an account of a number of highly important original observations and conclusions bearing upon the subject. At the outset he gives some useful recommendations regarding the best histological technique. He maintains that Golgi's method is reliable for the observation of certain pathological changes, but only if care is taken to obtain proper fixation. He strongly recommends the employment of Cox's modification of the sublimate method, which, he says, gives the most constant and regular reaction, and preparations almost quite free from precipitates. Even with this method, however, it is essential, in order to avoid artificial changes in the nerve-cells, to use only very thin pieces of tissue. He further recommends that the mercurial deposit should be blackened by one or other of the many procedures now employed. The plan he adopts is treatment of the sections first with a solution of hydroquinone (1 in 500), and then with one per cent. hyposulphite of soda. This method gives images that are perfectly black and "the preparations are unalterable." (This expression might lead one to infer that cover glasses may be placed on these sections with impunity, but the writer has found that this is not the case). For the study of the chromophile and chromatic elements, he recommends sublimate fixation, and staining with a cold solution of thionine. Full details of this method, which are not given in the paper under review, may be found in the issue of the above journal for February last. For the observation of modifications of the achromophile part of the protoplasm, he employs sublimate fixation and staining with Heidenhain's iron hæmatoxylin and Delafield's hæmatoxylin.

The methods of Golgi and Nissl have revealed certain general types of alteration, rather than special alterations characteristic of single affections. The most important pathological process affecting the nerve-cells revealed by Golgi's method is *varicose atrophy*. It consists in a progressive alteration of the cell, beginning in the extremity of the protoplasmic prolongations, proceeding along their course, and reaching the body of the cell. It first shows itself in the loss and agglutination of the little spines that cover the fine dendrites. At a later stage these fine dendrites assume a varicose appearance. Then the large prolongations become deformed, acquiring a rugose appearance.

Finally the body becomes deformed and vacuolated, and the whole cell may entirely disappear. Varicose atrophy has been recognised in a considerable number of affections of the nervous system, including general paralysis, secondary dementia, alcoholism and rabies. It has also been observed to follow various experimental lesions. A second morbid change in the nerve-cell revealed by Golgi's method is *varicose hypertrophy* of the axis cylinder, which has also been found in various nervous affections. Regarding the significance of these changes, Lugaro thinks that it cannot yet be established with certainty. One can exclude, however, that varicose atrophy can express a simple disturbance of the nutrition of the element, or an alteration essentially of an initial character. It can be shown by other methods that in its first phase, and probably also before the condition is initiated at all, the cell-body presents changes in the protoplasm. It therefore appears to him probable that varicose atrophy expresses not a simple pathological alteration, but a final destructive process which naturally reveals itself first in the most delicate parts. Regarding varicose hypertrophy he thinks it is very improbable that it can be separated from lesions of the cell-body, since it has been demonstrated with the aid of Nissl's method that a lesion of the nervous prolongation results in changes in the cell-body.

The most noticeable, most constant, and earliest of the changes observable in the nerve-cells with the method of Nissl is the process of disintegration of the chromophile part of the protoplasm, to which Marinesco has applied the term *chromatolysis*.^{*} Its exact mechanism is still uncertain and obscure. The descriptions that have been given of it by various observers differ in numerous particulars. This uncertainty appears to Lugaro consequent upon an analagous uncertainty regarding the normal structure of the protoplasm, and especially regarding the essential conformation of the chromophile part. He himself regards this portion as composed of a mixture of elements of different degrees of colourability, and disposed in the manner of a sponge. In the process of chromatolysis the denser parts persist longest, giving rise when they finally break down to the slightly coloured granular matter that presents itself in the degenerated protoplasm. Chromatolysis has been observed, especially in the nerve-cells of the spinal cord, in a large number of both acute and chronic diseases affecting the nervous system, as well as in various forms of poisoning and after certain experimental lesions. Another form of alteration revealed by Nissl's method has been described by Sarbò and others under the name of "homogeneous swelling." Lugaro maintains that the individuality of this process has not been established, and that it is to be regarded as simply represent-

* *Chromolysis* would be a much more appropriate term.

ing an advanced phase of the process of chromatolysis. The condition termed "sclerotic degeneration," in which the nerve-cell appears shrunken, intensely stained, homogeneous, and surrounded by a broad pericellular space, is one that is, he thinks, artificially produced by the action of hardening agents under circumstances not well understood.

Lugaro thinks it is of great importance that in the study of pathological material the results of the methods of Golgi and Nissl should be compared. These methods are at one in establishing the possibility of a partial degeneration of the protoplasmic prolongations and of the cell-body itself, phenomena which probably have a special importance in connection with mental diseases. It seems certain that in a large number of affections of the nervous system the elements, notwithstanding that they are altered, functionate, though in a manner more or less abnormal, and that they are able to remain in this state for many years.

Although the method of Nissl is capable of revealing the most minute initial alterations in the protoplasm of the nerve-cells, it is unable to inform us at what point the process becomes irreparable, or how and when the achromophile part is affected. Some inductions regarding the behaviour of this part have, however, recently been drawn by Marinesco from observations made in repeating the classical experiments of Nissl on the effects of section of the peripheral motor nerves. According to these experiments, after section of a motor nerve, one may observe in the corresponding central cells a progressive fragmentation of the chromophile elements, which starts from the origin of the nervous prolongation, and gradually extends in about four days to the whole cell. The chromophile part now appears finely powdered. About the fourth day the cell body begins to swell, and the prolongations appear homogeneous. Afterwards the latter disappear altogether, and the shrunken nucleus moves towards the periphery. The process may continue until the cell is completely destroyed. It does not occur equally in all the cells affected, so that its different stages can be observed side by side. Marinesco distinguishes in this process two phases. In the first the central end of the cut nerve remains intact, while in the cell there is manifested *une réaction à distance*, characterised by more or less complete dissolution of the chromophile elements; in the second there is disintegration of the achromophile part, and consecutive degeneration of the central end of the nerve. This change in the achromophile part of the protoplasm is not directly observable, but is deduced mainly from the results of the process, the disappearance of the dendrites, the alteration in the nervous prolongations, and the general deformation of the cell. Lugaro has repeated these experiments, employing also the methods mentioned for the coloration of the achromophile part of the protoplasm. The results he has obtained fully confirm the observations of Nissl and Marinesco, and also the

inductions of the latter with regard to the behaviour of the achromophile part. In the reactive phase of the change this portion of the cell retains its delicate striation, but in the second or degenerative phase this appearance is lost.

The author urges the great importance of studying the condition of the achromophile conducting part of the nerve-cells as well as that of the chromophile part, both in experimental work and in disease. Alterations in the chromophile elements represent only a reaction of the cell to a disturbing force. On the other hand changes in the achromophile part are to be regarded as degenerative and irreparable. Nissl's method allows of localisation of the seat of a lesion with perfect exactness, but it does not enlighten us as to pathogenesis, regarding which there is at the present time in relation to a large number of diseases, complete obscurity, or interminable controversy. Much of this obscurity would be removed by the systematic employment of methods for the coloration of the achromophile portion of the nerve-cells on experimental and clinical material.

The Parathyroid Glands.—The great advances made within the last few years in our knowledge of the physiology of the thyroid gland have revealed the important functional relationship of this organ to the nervous system, and thus invested it with a new and special interest for the neurologist. But it would seem that in the comparatively small parathyroid glands we have organs possessing a still closer physiological relationship to the nervous system. The experiments that have recently been carried out upon these bodies by Professor Vassale, of Modena, and Dr. F. Generali (*Rivista di patologia nervosa e mentale*, 1896, March and July), have yielded results the importance of which to medical science can hardly be overestimated. At an early stage of their investigations, which were carried out upon cats and dogs, they ascertained that there were four parathyroid glands in these animals instead of two, as had been supposed since their discovery by Sandström in 1880. This anatomical fact was independently observed by Kohn about the same time. Recognising how all previous experiments upon these bodies had been invalidated by this error in regard to their number, Vassale and Generali instituted a new series of experiments which have yielded results of the most remarkable kind. Attention has already been directed to the subject by the writer at considerable length in a digest in the April number of the *Scottish Medical and Surgical Journal*. It will be sufficient here to indicate briefly the main facts that these Italian observers have demonstrated by their experiments. They have shown conclusively that the parathyroid glands are not embryonic remnants as had previously been generally maintained, but organs of vital importance in the animal economy. When they are completely removed the animal dies within a few days, after having exhibited various morbid phenomena chiefly referable to implication of the nervous

system, including depression of spirits, tremors, paralysis of the muscles of mastication, rigidity of the posterior limbs, unsteadiness of gait, general muscular weakness, and slight convulsions. They have shown also that the acute symptoms that have been found to follow thyroidectomy in many animals are due not to loss of the thyroid, but to contemporaneous removal of the parathyroid glands, for they have demonstrated that the thyroid may be completely extirpated without the animal showing any of the serious symptoms previously associated with this operation, if even a single parathyroid gland is allowed to remain. This indicates that arrest of function of the thyroid produces only myxœdema. The authors promise a further communication on the subject dealing especially with the results of parathyroid feeding. Later experiments by other workers on the Continent have already confirmed their observations, but they have shown also that in some animals ablation of the parathyroids is occasionally not followed by a quickly fatal result, but by a special form of cachexia. The question whether or not this cachexia of parathyroid insufficiency corresponds to any disease known in the human subject has not yet been answered. The microscopic changes that have been found in the spinal cord after death following removal of the parathyroid glands, have already been referred to by Professor Bianchi in the previous issue of the journal.

The Treatment of Insanity by means of Abscesses produced by the Hypodermic Injection of Turpentine.—G. Albertotti (*Annali di Freniatria*, 1896, pp. 23 and 147) has made an extensive trial of this method of treatment in various forms of insanity, injecting usually from one to two grammes of turpentine into the external aspect of both thighs. Full details of each experiment are given, and the results recorded are certainly remarkable. The author claims that the treatment is perfectly safe, and that it is one of the most potent means of obtaining improvement, particularly in the acute forms of insanity.

RETROSPECT OF CRIMINAL ANTHROPOLOGY.

By Havelock Ellis.

H. H. Holmes (or, to call him by his real name, Herman Webster Mudgett), a qualified practitioner of medicine, whose extraordinary career of crime attracted world-wide attention and has caused his name to be coupled with that of Wainwright, was during the last days before his execution carefully studied by Professor Arthur MacDonal and Dr. E. S. Talbot (MacDonal, "Criminological Studies," *Report of the Commissioner of Education*, Washington, 1896; Talbot, "H. H. Holmes," *Journal of the American Medical Association*, Aug. 1, 1896). The case is one of