

when committed, is done by persons labouring under mental disease, crime and insanity having clearly a natural alliance which puzzled the old classic philosophers as well as modern psychologists, in regard especially to the question of responsibility. "A knave is always a fool" says the proverb; and Hale had an axiom, that "all criminals are insane." It has almost been asserted in as many words by eminent psychologists, that "all murderers are insane." Without going this length, I must admit that I am satisfied that, as a class, criminals are extremely liable to mental disorders and diseases, apart altogether from imprisonment.

Hear the divine Plato on this subject:—"All *disgraceful conduct* is not properly blamed as the consequence of voluntary guilt; *for no one is voluntarily bad*; but he who is depraved becomes so through a certain habit of body and ill-governed education. All the vicious are vicious through two most involuntary causes, which we always ascribe rather to the planters than the things planted, and to the trainers rather than those trained." Such doctrines, whatever truth may underlie them, are not tenable to the extent which this philosopher held; otherwise we must in a great measure set aside all moral responsibility.

Paralytic Insanity and its Organic Nature. By Dr. FRANZ MESCHÉDE. Abridged from 'Virchow's Archives,' 1865, by G. F. BLANDFORD, M.B. Oxon.; with a Prefatory Note.

THE disorder commonly called "general paralysis of the insane" presents so many points of interest to the pathologist and the physician, that as a necessary consequence it forms the commonest topic among the writings of those who specially study insanity. But after so much observation and so many treatises, it is disheartening to find that even now scarcely more than one fact with regard to it is laid down as settled and established beyond the possibility of doubt. One there is, the saddest that can be. It is, that for this malady we hitherto have found no cure; that to diagnose it is to pronounce the sentence, not only of incurable insanity, but also of speedy death. The marvel of the whole is, that although death occurs in every case at no very distant period, though post-mortem examinations of general paralytics are made by hundreds every year in this and other countries, yet even at this day no two observers are agreed as to the pathology and morbid anatomy, as to the part in which it has its origin, or which constitutes its peculiar and proper seat. No

wonder that the whole of the morbid anatomy of insane brain is vague and ill-defined, when this, the specially fatal form of mental disease, still hides itself from us—still wraps itself in the mystery which envelopes all that relates to mind. I make no apology for drawing the attention of the readers of this Journal to a paper on the subject, published in the October and November numbers of 'Virchow's Archives,' 1865, and for giving a short and necessarily imperfect summary of its contents, it being too long for reproduction. But as every outline must needs be unsatisfactory, I trust my readers will go themselves to the original. In default of opportunity of examining many brains of paralytic patients, I present as a contribution to the English treatises on the subject these observations of another.

First of all, however, I wish to make a few remarks; one upon the nomenclature of this disease, and especially upon the new name lately bestowed upon it. This, "general paresis," was introduced to us by Dr. Ernst Salomon, a translation of whose paper appeared in this Journal in 1862. Paresis is not a new word; it is an old medical term familiar to the readers of the 'Zoonomia' and other works of that time. In barbarous Latin, worthy of the days of Sprenger rather than of the era of the microscope, Dr. Salomon explains paresis as "insania paresans," "paresifying mental disease." At the same time, he enumerates a great many but not all of the synonyms of various authors. The term most universally known, which has been, we may almost say, officially adopted, is the time-honoured "general paralysis," or "general paralysis of the insane." There needs some strong reason for changing this. The name we substitute ought certainly to be a better and not a worse. But is there a single reason why paresis should be preferred to paralysis? Is there any meaning of the verb *παρίημι* which squares with the symptoms of the disorder more than that of the verb *παράλυω*? Physicians in ordinary practice, who have seen with me patients in the earliest stage of the disease, have objected to the term "general paralytic" as inapplicable to men who showed no diminution of bodily strength. Yet the only meaning which paresis has which makes it in the slightest degree available is that of *slackness* or *weakness*. And not only is this word substituted for general paralysis, but it is applied to ordinary hemiplegia, being usually converted into *pareesis*. An old gentleman the other day lost the use of one side, and I was rebuked by the family for calling his malady paralysis, and told that the most eminent of the faculty had pronounced it to be only *pareesis*. But are there no other names? If we object to the term "general paralysis" as vague and unscientific, must we go back a hundred years and rout out a disused word from the garret of our great-grandfathers, and apply it to a new disease unknown to them? We generally give M. Calmeil the credit for

having first fully described the disease with accuracy and clearness. No work even now surpasses his own, or that part devoted to it in his treatise on the inflammatory diseases of the brain. M. Calmeil denominates it "periencephalite chronique diffuse." Here we have a definite appellation, almost a definition. It conveys a pathological theory, true or false. It would be well, I think, to adhere to such a term as this till we have reason to reject the theory and can substitute another and a better in the place thereof. I have seen it stated that M. Calmeil considers it to be a meningitis. Dr. E. Salomon says, "Calmeil makes it a peri-encephalo-meningitis chronica diffusa." Calmeil does nothing of the sort. In his 'Maladies Inflammatoires,' i, 486, he says distinctly, "Sans nier l'influence réactive que l'état inflammatoire des méninges est à même d'exercer sur les centres nerveux encéphaliques, dans les cas où se manifestent les symptômes que nous venons de passer en revue, nous croyons bien plus rationnel de les attribuer principalement à l'état d'inflammation permanent où se trouve elle-même la substance corticale des hémisphères cérébraux." The article of Dr. Meschede of which I propose to give a summary will bring strong testimony to corroborate this view of M. Calmeil, and will vindicate the propriety of still maintaining the name he has originated, viz, "periencephalitis chronica diffusa."

Much discussion has arisen as to whether the symptoms of general paralysis are simply added to ordinary insanity—epiphenomena, as they are called—or whether it is altogether a distinct and special disease. Here it would seem that we are drifting back to old doctrines, according to which diseases are to be looked upon as entities. If we put aside the question whether general paralysis be or be not a special disease, and consider only what that is which is diseased, what is the "pars affecta," we shall arrive at greater certainty.

The readers of this Journal do not require to be told that the "pars affecta" in general paralysis and in non-paralytic insanity is one and the same. We may arrive at this conclusion apart from the post-mortem examination of diseased brain. The symptoms of the two forms in life will indicate, I think, that the seat is the same, and will aid us in interpreting the pathology of the disorder. Although, speaking generally, the exalted notions, the *délire ambitieux*, stamp with a certain distinctiveness the mental disorder in general paralysis, as the stammer marks the bodily affection, yet it is not to be forgotten that in many cases these are both absent. On the other hand, there is not a single delusion of ordinary insanity that we do not find in paralytic patients. "Believes himself given over to the devil"—"Thinks poison is put in his food"—"Believes he has committed sins too enormous to be forgiven"—"Thinks he is going to be arrested." These are from four cases of general paralysis. And in cases of ordinary curable mania we constantly find

exalted delusions of being kings, inventors, millionaires. All this shows that the line of demarcation between ordinary insanity and general paralysis is excessively fine, and the whole history and progress of the latter points rather to a difference in degree than in kind. That general paralysis is intractable, *malignant*, is the one fact we are certain of. Probably the distinction between it and other curable forms of insanity is analogous to the difference between certain innocent and malignant growths. There is a tendency to depart more or less from healthy structure. This tendency in some is strong, and the growth is malignant; in others it is weak, and the new formation is not so far removed from what is normal, and if excised does not return.

It may be objected that the paralytic symptoms, the inarticulate speech and quivering lips, point to a different seat of disease. It may be said that in ordinary mania there are no paralytic symptoms, that in progressive dementia following upon mania there is no loss of muscular power. These objections do not, I think, point to any different seat of disease, but only to a gradually advancing degeneration and decay of the parts originally attacked. That these parts are the same in both ordinary mania and in general paralysis, seems indicated by these considerations:—

1. General paralysis constantly exists, and is evidenced beyond any doubt by the mental symptoms without any perceptible defect of articulation or other lesion of motility. This is a fact which must be familiar to all my readers, and I therefore shall not stop to adduce cases. It constitutes one of the difficulties of diagnosis in this class of patients.

2. The defect connected with the inarticulate speech seems as if it lay in the highest nerve-ganglia which impel the muscles and supply force to them along the conducting fibres. The fault lies at the origin, not in the course of the transmission, not in the transmitting organs. This appears if we closely examine the phenomena of the defective articulation. The patient by an effort can correct it. When he exerts himself—when he shouts, for example, he speaks clearly. I am now speaking of the early stages. When, by a violent effort of will, he forces all his nervous energy in one direction, he does that which he wishes to do. The defect appears to be in the nerve-centres which supply the volitional power. And this will account for the absence of unilateral symptoms, which are often absent throughout, and which, when they are found, are chiefly the sequelæ of apoplectic or epileptic attacks. Up to the last, many patients seem to have nothing the matter with their limbs and muscles except a deficient supply of force.

If we take other forms of abnormal muscular action, we may find in a similar way that the defect arises not in the parts themselves or in the conducting nervous organs, but in what we must call the

highest mental originators of nerve-force. An instance is at once suggested by general paralysis. This is ordinary stammering. In spite of all that has been said about the action of the laryngeal muscles, &c., it is now, I believe, generally held that stammering depends on mental emotion; that the mental centres are the seat of the disorder, and that to avoid it we must, as Dr. Carpenter says—

1. Reduce mental emotion;
2. Avoid exciting mental emotion;
3. Elude mental emotion.

This has been well urged by Dr. Monro in a pamphlet entitled 'Stammering and its Treatment,' by Bacc. Med. Oxon., 1850. General paralytics do not stammer always—do not always lisp over the same word. This would appear to be an affection of a very high nervous centre. And probably the same may be said of some forms of chorea. Certainly it may, of all the quiverings and shakings that depend on terror or the like. Poor Æneas says—

“Obstupui, steteruntque comæ, et vox faucibus hæsit.”

3. Another reason for thinking that the seat of the disease we call “general paralysis” is identical with ordinary insanity, is that the cause is so often the same. Although it sometimes appears as if the former were more often due to physical causes than the latter—due to drinking, sexual excess, and the like,—yet it very frequently is clearly attributable entirely to mental causes. Dr. Sankey gives several cases, and every one will recollect some such. Now that great mental emotion is capable of producing not only ordinary insanity, but actual organic lesion, whether of general paralysis or of other kinds, is a fact, I believe, much overlooked. We are so apt to think that organic lesion is the cause of the mental derangement, that we overlook the fact that mental disturbance may produce organic lesion. Yet, while writing this, I happened to take up the May number of the ‘Medical Mirror,’ which contains a case related by Dr. Broadbent:—“A servant-girl, æt. 24, in perfect health, goes for a holiday on September 24th to the British Museum: she meets her sweetheart walking with another woman; a violent scene ensues, the young man tearing a brooch containing his portrait out of her shawl. Next day she fretted very much; on the following day she became violent and delirious—in fact, maniacal. She then fell into a state of stupor, and was admitted into St. Mary’s Hospital on the 29th. She evidently heard and saw, but all the mental faculties were oppressed. No paralysis. She was noisy all the night. Next day she was delirious, constantly talking; not answering when spoken to. On October 2nd she became rather suddenly comatose, and died. P.M. exam.—The convolutions appeared to be slightly flattened, and the surface of the hemispheres was paler and the veins less full than usual. Brain-substance firm and pale: in the left hemisphere, external to the thalamus and corpus striatum, and slightly

above their level, was found a very large recent clot, estimated to weigh at least an ounce." Here we have a healthy young woman dying very rapidly of an apoplectic clot after violent emotional excitement at an age when apoplexy is rare, especially in women. There was no paralysis, and the symptoms throughout were mental as well as the cause. This case seems valuable to those who are considering the relations of functional and structural disorder in mental diseases. General paralysis, then, may begin in the same centres as ordinary insanity, and be produced by the same causes; but it may go on progressively till it causes degeneration and destruction of those parts—not remaining stationary, like chronic mania or dementia.

One word as to the nature of the disease. Not long ago, general paralysis was considered an inflammatory affection, and treated as such by the remedies then supposed to be efficacious in such cases. I have seen many patients treated by a course of bichloride of mercury, but without good result. It is possible, however, that the theory was more correct than the mode of treatment. General paralysis seems to be the peculiar degenerative inflammation of the cortical part of the brain, ending in total annihilation of the life—that is, the functional activity—of the part. It seems as if each of the viscera has its own peculiar degenerative disease; other disorders, as cancer, tubercle, abscess, &c., being more or less incidental and depending on extraneous causes. Thus, the liver has its proper disease destroying its excreting and secreting function. So have the spleen and the kidney. Dr. Salomon has noticed the analogy between general paralysis and Bright's disease. And probably the adhesion of the capsule of the kidney, the tearing of the granular surface, and the disappearance of the cortical portion, may have suggested a comparison even to superficial observers.

When we say that general paralysis is an inflammation, we must clearly understand what we mean by this. In Mr. Simon's admirable article in Holmes' 'System of Surgery,' we read that "the phenomena of inflammation are modified phenomena of textural life. There is an excess but an incompleteness of textural change, shown, on the one hand, by effete material unremoved, softened and degenerated tissue; on the other, by nascent forms unapplied, which have either perished before maturity, or definitely ripened into mere abortions of texture." And further he says, "The action whereby inflammation begins is one which physiologically cannot be distinguished from hypertrophy. The line of distinction is drawn where the effort of hypertrophy becomes abortive, and where the forms of increased growth are mixed with palpable refuse of increased decay. . . . Cancer and inflammation have the most intimate morphological affinity; and probably what is distinctive of cancer lies far less in the nature of its textural phenomena, than in the

hitherto unknown causes which give them their fatally continuous progress.”

A nodule of cancer continues to spread, returns where excised, and progresses till it destroys life; while a similar non-cancerous nodule is removed, and does not return. The cause of the ineradicability of the former, however, is not explained by any known laws. In the same way, the hyperæmic and hyperactive condition of the brain in simple acute mania subsides, perhaps recurs, subsides again, and so on; while the hyperæmic condition of general paralysis leads us at once to textural change and death. But we cannot as yet discriminate the origins of the two conditions. Truly we may call general paralysis the malignant disease, the true *morbus maleficus* of the gray matter of the hemispheres.

I have presumed to offer these remarks as a preface to the summary of Dr. Meschede's paper. His strictly inductive observations serve to test the accuracy of these views, which are as much deductive as inductive. The whole, I think, points to that unity of disease which modern science teaches, rather than to the special entities which diseases were thought to be in the days of nosological classifications. Specific remedies are almost abandoned; probably specific diseases will share the same fate.

I now proceed to the article by Dr. Meschede.

I. General view of the disease.

General paralysis appears to have greatly increased during the last ten years. It is interesting to us, because it chooses its victims as a rule from amongst the males of the better classes; it prostrates those organisms which appear the strongest, and at a time when they are at the height and zenith of life and activity. It is a problem worth solving, the discovery of the nature, causes, and cure of this fatal disease, which is as yet a psychological puzzle.

While the mental powers are sinking to destruction, the self-feeling swells to a pitch of grandeur. The patient, as he declines to the condition of the brutes, feels himself lifted up to the dignity of a god, thinks himself God and above God. The phenomena of a violent storm pass before our eyes, agitating the depths of the mind with fierce eruptions and never-ceasing force. Sometimes the symptoms are milder; the mind-organ wastes with less sparkling glow. The victims of this form appear in a state of beatific rest; their life floats on as in an Olympus of the happy. If we only observed these easy dreaming “emperors of the world” and “higher gods,” we might be inclined to look on the disease as an exquisite passive atony, to deny the first active symptoms, and to consider the image of an overwhelming storm as an extravagant phrase—only that suddenly outbreaks of mania flash out to tell us that

even here a consuming fire still burns under this covering, and carries on slowly, but surely, the work of destruction.

Certain epochs in this work of destruction are prominently marked out by the attacks of paralysis, in which the patient suddenly collapses in convulsive movements in the midst of the apparent harmony of his existence. In cases running an acute course, these attacks come on in the height of the fury, after the rush of ideas and the tempest of emotion have been getting more and more intense for some days. But even in the more chronic cases they give notice of their advent by an increased agitation, and are accompanied by a heightened temperature and unmistakable signs of cerebral congestion. With and after each attack, the mental and bodily strength declines. The motor powers are impaired so that the central influence is withdrawn, and inharmonious irregular muscular movements follow. Parts of the mental acquisitions, too, are destroyed, and fade from the memory. So the world of mind, step by step, sinks to ruin. Even if the patient after a few days recovers somewhat, so as to leave his bed, if the connection of body and mind is somewhat restored, yet it is evident that the cohesion of the life of the mind is thrust down a step lower, and cannot again be raised to the former level. So these attacks mark out the steps by which the paralytic process goes on to complete annihilation. The actual cause of these attacks is not yet clearly made out. There is not always a hæmorrhage in conjunction with them. They are the co-effects of the paralytic process, but are worthy of note because even in the slower cases they indicate an active organic process of destruction, and draw attention to the decay which step by step advances.

II. *The exalted delirium and the progressive destruction of the mental strength, symptoms of organic processes going on in the brain.*

The exaltation which is so characteristic of general paralysis arises not out of weakness of intellect; it is not only a disturbance of the imaginative activity, but its essential point is an exorbitant expansion of the feeling of self. The life of ideas is influenced by the dominant emotion, and shapes itself so as to correspond. The feeling is not the consequence of the ideas; for often we find in general paralysis the feeling of grandeur without any delusions of greatness—also the feeling generally precedes the outbreak of the peculiar delusions. The ideas vary, changing from minute to minute; the feeling is constant, and forms the ground of the ideas. Now the causes which bring about a change of feeling are partly mental and partly bodily, and both work upon and through the brain. The effect of sudden and violent passions is well known;

it extends to the nervous system, to the secretions, &c. On the other hand, organic diseases of any part have a deep influence on the emotional condition of the mind, and that without the intervention of ideas. Now everything which promotes the feeling of self calls up pleasure, everything which thwarts calls up pain. The brain is the organ through which the mental influences work upon the remaining organisation, and *vice versa*, through which organic conditions affect the feelings, being itself a part of the organism and subject to organic changes. Therefore, we must conclude that organic changes of the brain affect both the feelings and ideas. The life and activity of mind and feeling ebb and flow according to the strength of the organic excitation. We see this in the influence which exciting substances, as wine, exercise on the emotional activity. We also observe that a certain degree of turgescence and of organic tension calls up a feeling of pleasure and contentment. The turgescence and tension of the brain will produce this feeling of pleasure, and affect the emotions and ideas more than that of any other organ, because there is no intermediate step. Out of the importance of the excitation by means of arterial blood, arises the necessity for recognising the importance of changes of the tissues. These principally take place in the inner layer of the cortical substance of the cerebrum, which is provided with an ample capillary network. On this we must particularly bestow our attention.

The excitation which is produced by vital stimuli may in the brain attain a strength which exceeds the limit of health. In this case the mental activity, especially the emotions, must also undergo an increase. We see such an excess of excitation in intoxication. In general paralysis we see this heightened condition accompanied by irritative turgescence and an accelerated change of tissue, which awaken in the patient the feeling of an energy of life never known before, of indescribable pleasure and delight, which, however, through the consumption of the 'oleum vitæ' and the nerve-force, lead to the annihilation of the organic elements. In this way we may explain both the immense expansion of the self-feeling and emotional impulses, and also the final disruption of the mental life. Certain particles of the mind-organ on whose vitality the mental functions depend are in a constant condition of heightened vital activity, and so the ideas also undergo an increase, the idea of self gains in intensity, and the patient leads a life of greater power and greater pleasure, and constructs his ideas accordingly.

Now, as the organic changes in the brain are chiefly brought about by the nerve-cells, we conclude that the delusions of grandeur of the paralytic are a manifestation of the disturbance of the cell-life. The relation of his "ego" to the outer world is altered, his "ego" becoming continually greater and mightier. He feels himself hurried

along by the impetus of the organic processes, and free from all hindrances and incumbrances such as usually influence the emotions, but which now are no longer taken into account. There is now no longer the oppressed feeling of a trouble-laden pilgrim of earth. He is released from earthly bounds, and is a god. The consciousness of insufficiency which always floats before our eyes, exists no longer for the paralytic. All the old ideas which once were present in the mind merely as wishes or imaginary thoughts, or ideal fancies, are now revived, and acquire life and the appearance of reality; and whatever ideas are started in the organ of ideation, are produced only in the dominant note of the exalted feeling.

A new life and a new view of the world starts up to the patient with the morbid and increased action of the nerve-cells. Out of a new fountain of mental strength established in his organism he has visions never before known.

Beautiful thoughts and ideas stream along and overleap all opposing conceptions arising from external facts. The world needs reforming. Of the relations of earthly life he takes no notice. Where these really oppose his doings or wishes, his self-feeling reacts in rage, which does not, however, last long. It vents itself in furious mania and dangerous attacks, or in a volley of threats.

The destructive nature of the process is soon apparent. In the intellect we see not only a stormy disturbance, but also striking defects. There is an extraordinary forgetfulness, an inability to take in outer perceptions and occurrences, and fix and engrave them. All the activity of the mind is centrifugal, not centripetal. And so the mind gets worn out, and all the exaltation comes to an end, and often intense depression follows. There is such a rapid metamorphosis of the organic part, that the idea-images are wiped away and are only of ephemeral duration. There is no fixed delusion except in certain chronic and hybrid cases.

III. *Different opinions of authors as to the seat and nature of the organic process.*

We have hitherto considered the phenomena of the distorted mind. The deductions we have reached require completion by means of pathological anatomy. This will determine whether, when the storm has ceased and the fire is extinguished, real organic products of this fire are to be found. We shall have to test our view of the organic foundation of the "megalomania" by the microscope and micro-chemistry. We arrive at two questions: What is the seat, and what is the nature of the anatomical change, which is at the bottom of the paralytic process? In the works of authors since Haslam we find a jumble of contradictory opinions, arbitrary hypotheses, and the strangest explanations. Almost every part of the brain has been assigned as the seat—cerebrum and cerebellum, white

and gray matter, ventricles and cortex, membranes and cranium, cellular tissue and vessels; and every kind of change has been called the cause—hardening and softening, œdema, sclerosis, hypertrophy and atrophy; hæmorrhagic, fibrinous, and albuminous exudations; meningitis, congestion, and extravasation; atony, rheumatism, athroma, stasis, &c.

This divergence of opinion leads us to think that the real organic change is not yet known; and this is conceded by such men as Esquirol, Calmeil, Guislain, Falret, Conolly, and Griesinger.

IV. *Parenchymatous inflammation of the cortical substance, the basis of paralytic insanity.*

Looking at the series of phenomena thus briefly sketched out at the time—the intensity, the progressive rise and fall of the storm which bursts upon both mental and vital powers,—we cannot help feeling that the so-called general paralysis of the insane is not a mere negative state like other paralyses, but an active process, the expression of an independent activity consuming the mind, and so reducing the patient to a passive existence. Observation, not of the dementia of the final stage, but of the behaviour in the acute and early period, teaches that here all is fire and flame, storm and tumult, even in the bodily functions. Hasty eagerness, excesses in eating and drinking, and profusion of secretions and excretions, salivation, erections and ejaculations, accompany the first outbreak. And continual and excessive play of the emotions is no less common. If this be the character of the first stage, consideration of the final state leads us to the *à priori* conclusion that the total confusion or destruction of the mental life cannot come to pass without deeply ravaging changes occurring to the organ which carries on the mental processes.

A series of investigations carried on since 1857, by the eye and the microscope, have led me to the conviction that degeneration of the nerve cells of the hemispheres of the cerebrum, especially of the cortical portion, constitutes the peculiar intrinsic pathologico-anatomical change in paralytic insanity. The alteration of the cells is found in different degrees from mere parenchymatous swelling down to their reduction to molecular detritus. In advanced cases all the transition forms may be seen. There may be an aggregate of fat-globules with the characteristic outline and nucleus of nerve-cells. The nucleus will be surrounded closely by small fat-globules highly refracting, and also with pigment-granules yellowish and shining; or the outline will be seen only round one half of the cell, the other half being replaced by a margin of globules. And besides cells with a perfect outline, but filled with fat- and pigment-granules, there are others which have completely lost all outline, and are a mere collection of granules round a nucleus, as to the nature of

which we should be in doubt if we met with them elsewhere or isolated. In acute cases running on quickly to death, we do not always perceive these stages of degeneration so completely defined. The granulated cells occur more rarely, and we find more with a definite outline and with only a moderate amount of fat-granules and pigment. There is, however, a general swelling, a congestive turgescence and succulence of the cortical part. On section, it appears wet and darker than it ought. Often we may notice with the naked eye a bright red appearance, not so much of the surface or the pia mater as *in the inner layer*. This redness only penetrates to the surface in the more advanced stages and in certain spots. It is of different degrees, ranging from pale rose to dark violet; sometimes of as bright a red as a phlegmon or conjunctivitis. It is not due to post-mortem causes, to blood-gravitation or imbibition, for it is chiefly observed in the anterior parts of the cerebrum, especially on the convexity and in the temporal lobes, and also the parts which are most intensely red are frequently marked by punctiform capillary apoplexies. The microscope shows us in this portion a highly developed capillary network filled to excess with blood-corpuscles, with here and there points of extravasation and elongated vessels. The nerve-cells in this appear softened, more voluminous and more isolated. We seldom see this stage, because death does not usually occur till much later.

So then we have hyperæmia and parenchymatous swelling of the inner layer of the cortical substance on the one hand, and fatty pigmentous degeneration on the other, as the beginning and the end of the organic changes in general paralysis. Between these poles lies the destructive process, which by analogy we conclude to be a parenchymatous inflammation. Although the identification of hyperæmia or redness with inflammation is a much-disputed point, yet a marked and pronounced red injection and congestion are always strong indications of inflammatory action. And if we go through the cardinal symptoms of inflammation, we shall find not unfrequently that we may recognise *swelling* in the firm tension of the sac of the dura mater. The next requisite, *heat*, is not to be proved by the thermometer *in loco*; but the investigations of Dr. Ludwig Meyer have shown an actual increase of the general bodily temperature, whilst my own prove that during congestive exacerbations the heat is above the normal, whilst at times of collapse it is below. And we are warned by the redness and turgescence of the face, the hot temples, the reddened ears, that an increased cerebral congestion is present, and that the proper heat of the brain undergoes an advance. The fourth symptom, *pain*, we must not look for, because the malady attacks the organ of intellect, not that part of the brain which perceives pain. Patients protest they never felt so well. But they feel sensations in their heads which indicate what is going on

there, and in the premonitory period they often complain of actual pain. These have been cases where traumatic or syphilitic affections were at work, where meningeal irritation prevailed. And the absence of pain in the best-marked stages of general paralysis is an argument against the theory of its being a meningitis.

The passive character of the final stage in general paralysis must not make us think that the whole is a passive process; neither must we be misled by the diminution of the volume and weight of the brain-substance. The brain-atrophy is only one of the results of the disease; it is not the cause of the paralytic insanity. In the outset, not the atrophic, but the hypertrophic, are the victims of this. We have only to look at the strong athletic frames, with their full muscles, the well-formed skulls and florid faces. Here we have an excess of nutrition and over-stimulation. A primary atrophy cannot produce the phenomena of excessive activity. The exaltation of the self-feeling cannot be a consequence of depression of the nutritive process.

In cases of some duration the degeneration of the nerve-cells is visible even with the naked eye. We have no longer the redness of the inner layer of the cortical structure, not even the light rose tint, but a peculiar dark, dull yellow; and on trial with the scalpel or finger the consistence of this layer appears altered—sometimes softer, more frequently harder, like leather or felt. This is brought about by the shrinking of the tissue on the destruction of the cells, by condensation of the connective tissue, Virchow's *glia*, and by wasting of the vessels. In this yellow layer blackish-brown or rust-coloured spots, caused by pigment accumulations, are met with, the result of capillary extravasations, of active processes connected with an afflux of blood.

For the examination of the nerve-cells I have used preparations, either fresh and wetted with cerebro-spinal fluid, albumenised water, hydrochloric acid, glycerine, carmine solution, weak chromic acid, or pieces macerated a long time in these media so as to isolate the cells. I have also allowed pieces of the cortical substance to dry in a dry chamber, so that thin transparent slices could be cut off with a knife. With a low power, 40 to 120, we can survey at once the whole thickness of the cortical part, and detect the change in the integrity and size of the cells. I usually compare preparations taken from parts of the brain which appear normal with those visibly affected; and I also compare portions of the brain of paralytic patients with others from the brain of the insane who are not paralytic, and also with those from the brain of the sane. A favorable opportunity for such an instructive comparison was afforded me by two patients who died on the same day, one of whom suffered from paralytic dementia, the other from epileptic dementia with hemiplegia. The difference in the nerve-cells was most striking. In the general para-

lytic, the cells appeared large, and, in very advanced stages of degeneration, filled with fat- and pigment- granules; the sharp outline was partly obliterated, so that they often appeared only as heaps of granules with a nucleus. In the epileptic, the cells were smaller, sharper; the outline more perfect, much clearer and more transparent; very few fat- or pigment-granules. The capillaries here appeared slender and delicate, and the network they formed was but scanty; while in the paralytic patient the capillary network was much developed, and the walls of the vessels thickened and convoluted.

The degeneration of the inner layer is not uniform over the whole of the cerebrum, but prevails in certain definite localities. It is tolerably constant in the convolutions of the temporal lobes, and on the convexity, along the longitudinal fissure, and also in the frontal lobes; much less on the basilar surface, and least of all in the convolutions of the posterior lobes. I have also found the cells of the gray matter in the interior of the brain altered; *e. g.* the corpora quadrigemina. My researches, however, in this direction are too few to enable me to form a final judgment.

This much appears to me certain—that the changes in the inner layer of the cortical substance constitute the peculiar and intrinsic organic ground of paralytic insanity. This assertion, arrived at by comparative pathological observation, tallies with physiological investigations as to the functions of the different parts of the brain, which, without discussing them here, amount to this—that the convolutions of the great hemispheres, especially the cortical part, have a closer relation to the functions of the mind, particularly to the operations of ideas and thought, than any other part of the encephalon.

The other cranial and cerebral changes which we meet with are too variable and too inconstant to be able of themselves to constitute the essential pathological lesion of general paralysis. The ventricles are often distended with fluid; but often they are of normal size, or even contracted. The ependyma may be granular and full of amyloid corpuscles. The choroid plexus may be hyperæmic and full of cysts. The white substance of the hemispheres may be dry and inclined to sclerosis, or œdematous and softer than it ought to be; of dull colour, with stains of rose or yellowish hue. The soft meninges are in many cases partially thickened, œdematous, with stains of ecchymosis, occasionally with true thin blood extravasations. The vessels of the pia mater are often hyperæmic upon the convexity, in places atheromatous, in a few cases blocked by emboli. The arachnoid is, over a greater or less extent, milky and thickened, studded with Pacchionian granules, and by these united to the dura mater; also so luted with the pia mater to the surface of the brain, that on removing the meninges the cortical substance comes away

with them. On the inner surface of the dura mater we find in many cases a thin, gelatinous, soft, hæmorrhagic, pseudo-membranous layer, reddened by points of extravasation, or by fine vessels, especially on the parts corresponding to those of the inner layer usually attacked by inflammation, viz., the temporal fossæ, the convexity, and anterior fossæ. These layers are mostly thin, sometimes stratified, often only consisting of a rust-brown or blackish pigment. They are the residua of an afflux of blood to the brain. Of themselves they constitute no process of meningitis.

The condition of the skull varies. The dura mater is often closely adherent to it. The condition of the connective tissue is not clearly made out. It is easy to understand that this, especially its cell elements, must undergo change, as a consequence of the inflammatory parenchymatous degeneration.

Although no one of these changes can be looked upon as the essential condition of paralytic insanity, yet they play their part, albeit a minor one, in the psycho-paralytic drama. Their importance varies; they may be starting-points or predisposing influences, or modifications of the process, or co-effects or consequences of secondary significance. If the nerve-cells of the inner cortical layer come into a chronic condition of irritation and altered nutrition; if the organic vital motion of the same is altered and accelerated, running on to dissolution and disorganisation; if the inflammatory state which was once outside the nerve-cells has extended to them—then first do we have distinct general paralysis.

People are too fond of looking upon the nerve-cells and fibres as a kind of privileged class of cell elements, whose higher dignity cannot be subjected to the processes of vegetative life and disease, and which can only undergo functional disturbance. Some think, with reference to the nerve-cells, that there must be either perfect integrity or total annihilation of their action. This is a mistake. The nerve-cells are developed out of embryo-cells. They have a common origin with all other cells. Their existence is prolonged along with the whole living organism. From this they imbibe their nutrition; cut off from this, they perish. Though through differentiation they have a specific mode of existence, yet they never cease to depend on the continuous vegetative force of the organism, or cease to take part, to live and move, therein. They have their development, their history, their different ages—their adolescence, decrepitude, and premature old age. They depend on the arterial blood, so that pressure on the carotids interferes with their function, which is restored when the flow of the *pabulum vite* is allowed to go on again. If, then, the nerve-cells partake of the vegetative life, they must be subject to the disturbances of it. Though they are endowed with special energies and functions of a higher order, yet their nutrition may undergo a degeneration which may pervert their

function, and lead it out of its accustomed track without reducing it utterly to inaction. In this vegetative life there are many degrees between perfect health and death. The nutritive functions may undergo a shock by which they may be brought into an anomalous state, and a conflict of heterogeneous phenomena may result, exhibiting that condition which we call *disease*. We must here recall Virchow's stand-point of cellular pathology—the independence of the individual cell-life, the relative autonomy of cells. If we grant this to cells, so must we also presume a greater possibility of disturbance of their vital movements, a greater capacity for disease; and we must assign certainly not the lowest place to the cells of the central nervous system, presiding as it does over muscular movement, and receiving from all sides excitation.

The capillary network in which the nerve-cells of the cortical substance are imbedded not only mechanically regulates the blood-flow, like the pendulum of the brain-clock, but it is the bearer of a vital vegetative process; it is the canal system which conducts the heating material which the nerve-cells need for their life and strength. In the inner layer of the cortical substance the system of conducting arteries resolves itself into a thick network of the finest capillaries, and here the chief seat of the organic nutritive phenomena is to be looked for. Here the vegetative life of the brain is most concentrated, the interchange is most active; and if by irritation it is forced, it must undergo an excitation which will exceed the bounds of health. If severe mental distress inflames and breaks in upon the mind, both the bounds of the vegetative life and of the functional activity will be broken down, and then follows destruction of mental strength. This violent action is inharmonious, turbulent, confused, presenting the characteristics of destruction and annihilation, bringing into jeopardy the stability of the organ. Both the centripetal and also the centrifugal energy of the cerebrum is weakened, the receptivity and recollection, and also the expression of ideas and wishes. This shows that not only dynamic or functional disorder exists, but also organic disease—that the mind-organ is attacked at its very core.

These views are confirmed by observation of the *ætiology* of the disorder. It is favoured by everything which causes cerebral congestion and irritation. Men are attacked whose activity of brain-life and brain-circulation is in excess, whose feelings are much excited, who are harassed by business, and who, by reason of a kind of psychical hyperæsthesia, feel keenly the weight of strokes of fortune; men who eat a strong flesh diet, much meat and drink—who fully taste life's troubles and joys, excitements and delights—whose brain is much irritated, somatically and psychically, and whose

power of resisting is weakened by hereditary taint or illnesses. The slower kind of men are seldom attacked.

Sex, too, confirms it. I have found seventy-seven men attacked, while only twelve women were sufferers. Women have no business, and less cerebral irritation; they are not injured by alcohol or tobacco.

Age proves the same thing. General paralysis is a disease of prime manhood. Few cases happen before the age of twenty-eight or after sixty. It comes on when the brain is at the climax of development and its maximum of weight. The average age is about forty-one and a half years. Just before the brain reaches its highest weight, there appears to be great nutritive excitation going on, and great attraction of nutritive material to bring the development to perfection. Any forced nutrition or over-stimulation at this period will bring about parenchymatous swelling, and lead later to disorganisation. The inflammatory process goes on in a series of exacerbations, one following another, and attacking one set of cells after another. The downfall of the mind is gradual, marked out by apoplectiform or epileptiform attacks.

[Dr. Meschede then gives the result of four post-mortem examinations of typical cases to illustrate his theory.]

I. The first is that of F. G—, who when admitted was sixty-two years of age, and had shown symptoms of general paralysis for three and a half years. After nine or ten months he died. Post-mortem examination thirty-six hours after death. The heart was enlarged, the muscular substance soft and fatty; the aorta was thickened and atheromatous; the arch was dilated like an aneurism; the spleen contained many small calcareous concretions; the kidneys showed traces of fatty degeneration; the skull was thick and heavy, the diploe vascular; on the inner surface of the dura mater was a thin pseudo-membranous layer, of a rusty colour, in the right temporal fossa; the arachnoid was here and there milky and thickened, with œdema of the pia mater and subarachnoid space; the pia mater was adherent in places to the cortical substance; the arteria foss. Sylv. dextr. was obstructed by an embolus. The cerebrum was œdematous and soft; the white substance yellowish, with yellow and rose-coloured stains; the gray matter soft, dark, and yellowish—in certain places reddened. Both ventricles distended and full of opaque serum.

The microscope showed on the surface of the left corpus striatum a patch of softening, consisting of granular detritus, fatty particles, fatty and degenerate nerve-cells, and cells in a state of transition. The vessels were partially diseased, and one small capillary was blocked by an embolus.

In the inner layer of the cortical substance of the cerebral convolutions, the microscope showed considerable degeneration of the

nerve-cells, while in the outer layer little was to be seen. The cells appeared to consist of fat- and pigment-granules. Many had lost the sharpness of their outline; many were mere rudiments of cells; many were larger than usual. Here and there were collections of granules in the shape of cells. A portion of the inner layer, magnified from fifty to sixty-five times showed hundreds of opaque, yellowish-brown, pyriform granules, standing out against the clear connective substance. These appeared like miniatures of the degenerate nerve-cells, and were arranged with tolerable regularity, increasing in number and size from the periphery to the white matter. The vessels of the inner layer formed a thick network, and were somewhat dilated, atheromatous, and fatty. These changes were most noticeable in the discoloured portions. In the outer layer this development of vessels was not to be seen.

In the gray substance of the corpora striata and quadrigemina advanced fatty degeneration of the nerve-cells was visible.

II. E— was admitted when forty-three years of age, after a month's illness, with symptoms of acute general paralysis. In a fortnight after admission he had an apoplectic-paralytic attack, and died the following day.

Post-mortem examination forty hours after death.—The heart was somewhat large and covered with fat. The muscular structure showed commencing fatty degeneration. There was thickening and atheroma of the aorta. There was congestion and hyperæmia of most of the viscera. The skull was rather thin. The sac of the dura mater was completely filled by the brain. In the right half of the basis cranii, chiefly in the temporal fossa between the dura mater and arachnoid, was a dark, half-liquid, recent blood extravasation, from one half to one and a half line in thickness. Neither the pia mater nor the arachnoid were perceptibly thickened. Nowhere were there any pseudo-membranous formations. There were some spots of atheroma on some of the arteries of the base. The whole of the right temporal lobe, especially the inner layer of the cortical portion, was completely softened and almost gelatinous. The cortical part, when cut through, displayed an outer layer of a whitish-gray colour, and an inner very highly reddened. The first varied little from the normal tint. The inner was of a dark red colour, and showed, even to the naked eye, a highly developed network of vessels, and many capillary apoplexies. The microscope showed in the softened portions of this inner layer extravasated blood-corpuscles, granular masses, nuclei, softened and fatty nerve-cells, and transition forms.

This was a case of paralytic insanity running an acute course. The inflammatory character of the disorder is manifest, and it is

the inner and not the outer portion of the cortical substance that is softened and degenerate.

III. The next may be termed a subacute case. N—, 53 years of age, was admitted September 16th. Before he was attacked, he had become religious and somewhat gloomy. In August his speech was affected, and exalted ideas showed themselves. These were chiefly of a religious character. In November he had two paralytic attacks, and died November 24th.

Post-mortem examination thirty-one hours after death.—Skull small, thickened. Dura mater adherent. The soft meninges thin and delicate; the arachnoid atrophied and perforated. Here and there the pia mater was adherent to the brain. The substance of the cerebrum was soft and somewhat moist. In the posterior lobes, the inner layer of the cortical portion was slightly reddened. The change of texture was unmistakable; it was soft and pappy. In the temporal lobes and in the anterior part of the frontal lobes, the inner layer was highly reddened, vascular, and very soft. The cortical substance was everywhere of its normal thickness, and presented no appearance of atrophy.

The microscope showed in the reddened portions of the cortical substance aggregates of fatty granules, either in the form of nerve-cells or in amorphous collections. In places the cells appeared full of fat-granules, in others the cell-outline was lost. The network of vessels was highly developed, the walls in a moderate state of fatty degeneration. The viscera of the body presented nothing remarkable. There was atheroma of the ascending aorta and its arch.

In this case, which may be called subacute, there was no marked atrophy of the convolutions, nor sign of meningitis; but there was great injection, softening, discoloration, fatty degeneration, and destruction of the nerve-cells of the inner layer of the cortical substance. There was some amount of alteration in the gray matter of the optic thalami; very little in that of the corpora striata.

IV. The fourth was a chronic case of a man of great muscular development, who had indulged in both sexual and alcoholic excesses. X—, admitted October 1, 1855. His malady had commenced in the first half of 1854, when 48 years of age. He displayed inarticulate speech, kleptomania, and loss of memory. The course of the disease was remitting, without active symptoms. Sometimes there was depression. He had hallucinations both of hearing and sight. After a gradual decline, he died of pneumonia after an apoplectic attack, February 18, 1859.

Post-mortem examination thirty-six hours after death.—The right lung showed pneumonic infiltration and yellowish softening. The

heart was healthy; atheromatous thickening at the commencement of the aorta. The other organs presented nothing very remarkable.

The skull was hard and thick. The soft membranes upon the convexity, especially on the anterior half of the cerebral hemispheres, were thickened and adherent to the brain-substance. The cortical substance was discoloured and soft, the nerve-cells were in a state of fatty degeneration. There were many granule cells and others in a state of transformation. The vessels were tolerably free from fatty change. On the floor of the fourth ventricle were some amyloid corpuscles.

In conclusion, we observe that in these four cases the skull, meninges, and consistence of the brain differ. All four agree in there being one constant and identical modification, a parenchymatous degeneration of the inner layer of the cortical substance, which we must look upon as the essential change in general paralysis. We find it in remitting and chronic cases, in acute and subacute. In chronic cases we find residua of the active process, pigment-stains, alterations of the membranes, regressive destruction of the cell elements; but without undervaluing the significance of the changes of the meninges, we must look upon the parenchymatous inflammation as the essential cause of paralytic insanity.

CLINICAL CASES.

Remarks on Aphasia, with Cases. By J. KEITH ANDERSON, M.D.
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(Read before the Royal Medical Society of Edinburgh, 9th March, 1866.)

IN the following remarks I have endeavoured to combine and arrange the opinions expressed by recent writers on the loss of speech which depends on disease of the brain, and which is frequently present in cases of paralysis. This cerebral loss of speech has been designated by the various names of alalia, aphemia, aphasia, and verbal amnesia. As aphasia is the term generally employed, I shall make use of it in this paper.

Aphasia is a disease, or a collection of symptoms, which it is difficult strictly to define; but its leading features may be shortly stated as follows:—Aphasia is distinguished from all other forms of