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## PART I.—ORIGINAL ARTICLES.

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*The Pathology of General Paresis.* By W. H. O. SANKEY, M.D. LOND.,  
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THE term General Paresis, proposed in this Journal by Dr. Ernst Salomon, in place of general paralysis, appears to have been well received. It possesses the advantage of being distinct, and not likely to lead to confusion, and is therefore adopted here.

Perhaps no part of psychological medicine has of late received the same amount of attention as this disease. The well-worn excuse, therefore, that a disease so familiar to the specialty is still unknown to the general practitioner of medicine, must be abandoned; and, on the contrary, a writer on the subject may now take it for granted that there is no need to speak of the symptomatology.

The present article will be confined to an examination of the theories, views, &c., which have been lately put forth upon the pathology of the disease.

The following questions, or opinions, are to be found scattered through the various authors who have written on general paresis:

1. That the disease is of modern origin, or at least much more prevalent at the present day than formerly; that it is more common in certain countries, districts, climates, &c.

2. That general paresis is a complication of the different forms of insanity; that the paralytic symptoms are epiphenomena engrafted upon the original disease, and are in fact the means through which insanity often terminates fatally.

3. That, on the contrary, general paresis is a species—a *morbus per se*—entirely distinct, therefore, from all other kinds or forms of mental disease.

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4. That general paresis never occurs but in connection with some form of mental aberration, as mania, imbecility, &c.

5. That the disease is not insanity complicated with paralysis, but rather a paralysis complicated with insanity.

- 6. That cases occur entirely without mental disturbance.

7. That there are two distinct forms—one with and one without delirium.

8. That there exist various forms, and a pseudo-form.

These different propositions may be classified under two heads.

1. Those relating to the nature of the disease; and 2, those relating to its diagnosis. To the first category belong Nos. 1, 2, 3, 4, 5, and 6, 7, and 8 to the latter.

With respect to the etiology of the disease, Dr. Skae, no longer ago than 1860, in his concise article in the 'Edinburgh Medical Journal,' still alluded "to the difficulty which he found to exist among physicians generally of recognising the disease when it exists;" and such a difficulty has in itself a pathological interest and signification, in two ways, viz., in the first place in connection with its history, and secondly, with respect to its prevalence. Since the complete recognition of general paresis is really of only forty to fifty years' date, it may be asked—Is it a new disease? for if so, we must look for its causes in something of the same date, as modern habits of life, modern hygiene, &c. But on this point there is sufficient evidence at once to settle the question that the disease is old, and that its diagnosis only is modern. Some writers believe they recognise the description of it in Cælius Aurelianus. The following is extracted from our old English author, T. Willis, who wrote in 1672, and seems to have been written with a certain familiarity of all the phenomena of the disease:

"Observavi in pluribus, quod, cum cerebro primùm indisposito, mentis hebetudine, et oblivione, et deinde stupiditate et *μωρώσει* afficerentur, postea in paralyisin (quod etiam prædicere solebam) incidabant, . . . . propterea enim, prout loca obstructa magis, aut minus ampla fuerunt, aut paralyisis universalis, aut hemiplegia, aut membrorum resolutiones quædam partiales accidebant. . . .

"Particulæ oppilativæ à cerebro delapsæ, inque medullam oblongatam provectæ, nervos quærundam facies partium musculis destinatos subeunt, inque ipsis spiritum vias obstruendo, linguæ paralyisin, modo in his aut illis, oculorum, palpebrarum, labiorum, aliarumque partium musculis resolutionem patiunt."—Cap. ix., p. 280, 'De anima Brutorum,' &c. Studio Thomæ Willis, M.D., Amstelodami, MDCCLXXII.

These passages, and their context, carry back the date of the observation of the symptoms a couple of centuries, and prove that the knowledge of their importance lay dormant for a century and a half; for it was more than 150 years after Willis wrote the above that Esquirol published his work, and to him is due the credit, though

he attributes it to Haslam, of attracting attention more pointedly to the disease.\*

Secondly. With respect to the backwardness in its recognition, which undoubtedly has existed to a great extent, and perhaps does still unduly continue, the fact possesses a pathological import, inasmuch as the cause of the difficulty may be due to an immunity of certain localities, nations, or classes of persons from the affection.

Dr. Skae writes: "In the Asylum at Montrose, with about 300 inmates, there are at present no cases of general paralysis. I single out this case, in illustration of the different prevalence of the disease in different localities for this reason, that Dr. Howden, the physician of that asylum, having been four years an officer of the asylum under my care, I feel confident that he would recognise the disease with the same certainty and facility which enabled him always to find about twenty-five cases in the Edinburgh Asylum; and the fact cannot be referred to his seeing the disease with different ideas of it from my own."

Dr. Skae writes also, that he believes, "from facts which might be cited," that the disease is on the increase. It is well known, also, that certain parts of Europe are almost free from it. This difference in the prevalence in different localities, in the different sexes, and in different classes, is doubtless pregnant with signification, if its solution could be achieved.

But to leave the general question of the etiology of the disease, and to address our inquiries into the more important matter—the nature of the disease—we find the following opinions broached:

1. That the paretic symptoms are epiphenomena. This was the opinion of Esquirol; it was or is maintained by Delaye, Calmeil, Georget, Pinel neveu; by Griesinger, and by all the German school, as far as I am able to discover, and by most of the writers of the former period. A modification of this opinion is given by Dr. Skae, who writes, *loc. cit.*—"This disease may be described either as a form of insanity complicated with general paralysis, or as a general paralysis complicated with insanity."

2. It is argued on the other hand, that general paresis is a distinct morbid species. This is a more modern and, in France, the more generally received opinion. It was first enunciated by Bayle. It has been strenuously supported by Salomon in this journal, Par-chappe, Jules Falret, Delasiauve, and others.

These two propositions appear to contain all that is really important on the question. The rest of the arguments or differences that have arisen in the discussions on the subject would seem to have turned

\* The rest of the medical history of general paresis is given in Dr. Skae's paper, 'Edinburgh Medical Journal,' vol. v, p. 884.—See also Morel's 'Traité des Mal. Mentales,' p. 805; and Baillarger, 'Annales Medico-Psych.,' Oct. 1859, p. 511.

upon how much or how little is to be included under the title of general paresis.

The main propositions are such as may be fairly investigated by the usual method of clinical examination, and the question resolves itself into this—Is there a disease, general paresis, distinct from all other diseases in its etiology, progress, and pathology? The question is not whether the diagnosis of such disease is yet perfect and defined. Those who argue for the specific nature of the malady would not assert that they have arrived at the last analysis of this subject; but they would seem to assert that certain cases of disease, which can be described, in a very large proportion, have a common cause and pathology.

The clinical inquiry may be directed to the history, causes, progress, and pathology.

With respect to the history of the disease, if the symptoms are epiphenomena only, or complications engrafted upon another disease, or arise at any epoch during its progress; then, firstly, all second and third attacks of insanity should be equally liable to have the epiphenomena engrafted upon them as first attacks; and secondly, the symptoms should occur in old cases, or in cases in which the patient has been insane many years, as often as in cases of more recent origin.

Firstly, with respect to the occurrence of the symptoms of general paresis in cases of second attack. I find, then, since my residence at Hanwell, I have received 2280 patients, and out of these there have been 61 affected with general paresis. At Hanwell about 20 per cent. of the cases admitted are not first attacks. Out of the gross number, therefore, of patients received, 456 of my patients were affected with second, or third, or fourth attacks of their malady.

The ratio of cases of general paresis to the admission, is therefore 2280 divided by 61 or 37; and if general paresis affected the second admissions in the same proportion as the gross number of admissions, then  $\frac{1}{37}$  of the 456 patients should present the well-known symptoms. In other words, there should be 12 patients among 456 affected with general paresis. Whereas, out of 61 patients whom I have found to be actually affected with that disease, there is not one who can be strictly said to be affected with a second attack of insanity. Out of the 61 there are five cases of equivocal kind; that is to say, two of the five were reported on admission to be labouring under a second attack of insanity. The particulars of the first case are as follows: C. C.—a married woman, separated from her husband and married to another man, who is an attendant at an asylum for the insane, was taken with the following symptoms: “she wandered away from her home, and went about into the other lodgers’ rooms half undressed,” and was unable to find her way back. She was considered insane and sent to a County Asylum. Her disease there was entered *mania a potu*. She was discharged after six months’ residence, and she

returned to cohabit with the attendant, who said she appeared pretty well on her discharge, up to the period of her admission into Hanwell, except on one or two occasions, when she exhibited certain symptoms of general paresis, which the informant, from his experience with the insane, was enabled to recognise. She "stuttered in her speech." The paralysis chiefly affected the tongue; at times she could not speak for several minutes; she "mumbled in her speech." "Since she left the asylum she has been gradually failing in her memory." She was admitted into the Hanwell Asylum twelve months after her discharge from the other public asylum, or eighteen months from the first appearance of any symptoms, and she died twenty months after admission, or thirty-eight from the commencement. This case was clearly no second attack, although it was so reported, but one in which there was simply a remission of the symptoms, the occurrence of such remissions being well recognised and fully admitted by every writer. The next case was probably of a similar kind, but not so well authenticated. A woman was seized with the pains of labour while away from home, and was delivered by the roadside, and shortly after became insane and was taken to the workhouse. The husband, an agricultural labourer, visited her there from time to time, and found her talking nonsense—"sillified, no ways raving." She got better, and returned home after nine months, and she was said to be cured. The husband considered her quite recovered; "but only more forgetful, and not so tidy as she used to be." One day, six months after this, on returning from his work he found her and all his children stripped stark naked. She was speedily sent to the asylum, and on admission had all the symptoms of confirmed general paresis. The other three cases, reported to be second attacks, were all patients discharged by myself, all known to be labouring under the symptoms of paresis when discharged. One was that of a married woman, also separated from her husband and living with another man. Her symptoms had undergone slight remission, and she was under an order to be removed to a distant asylum—the settlement of her husband. She was removed by her sons on the usual undertaking, and was readmitted after the lapse of fourteen months, having wandered away from her home and lost herself, and having been picked up by the police. The other two cases were discharged under the pressure of friends, and who remained out but very short periods—one a month only, the other nine weeks—so that, instead of 12 cases being found among the 61 cases of general paresis of patients who had been formerly insane, there really was not one *bona fide* example.

Secondly. If the parietic symptoms are epiphenomena only they should be met with as frequently among the old inmates of asylums as among the fresh cases. If these symptoms are to motility what imbecility is to the intellectual faculties, we ought rather to find

general paresis more frequently developed in the old cases than in the recent. It has been, indeed, denied that true general paresis ever occurs in chronic cases, or cases of long standing; and there are states which closely simulate the true disease. But it must be also admitted that, in a small proportion of instances, the true case of general paresis is met with in patients long resident and long insane. Among the 61 cases analysed by myself, there are 2 in which the diagnosis was entered as general paresis; at the time one had been in the asylum twenty-one years, and one twenty-four years; and such occurrence is admitted even by Parchappe,\* one of the strongest advocates of the special nature of the disease. And the argument is not that insanity will give an immunity from attack of general paresis, but that general paresis does not occur so frequently, and certainly not more frequently, in older cases.

Again. From an analysis of 105 fatal cases of general paresis, occurring in both male and female departments of this asylum, and in which the duration of the attack was accurately ascertained, I find that 69 terminated before the close of the third year, and 86 before the end of the fourth year; 13 only reached the sixth year, and 5 only lived beyond the eighth year from the first commencement of the symptoms of insanity; so that at the end of five years, about 90 per cent. of the paralytics were dead, but in five years only 31 per cent. of all cases taken generally terminated by death. If, however, paresis followed the ordinary cases of insanity, the duration of the paretic cases should be at least equal to ordinary cases.

Another mode by which the question may be tested, whether the disease be a distinct disease, a *morbis per se*, or whether the symptoms are mere addenda, epiphenomena, is in connection with its etiology. As far as I am aware, the subject has not been heretofore examined in the mode about to be mentioned. It is calculated, however, to throw additional light upon the subject, and the object of the present communication is not to advocate a particular hypothesis, but to sum up the evidence which can be derived from any source, and which may at all elucidate it. It is admitted that an hereditary tendency to insanity of some kind exists in some of the subjects of general paresis. Now, when a disease is communicated by any means, the disease received should be of the same kind or species as that from which it was derived—there should be an identity of disease transmitted. It must, however, be remembered that the character of the evidence with respect to hereditary transmission is not always very satisfactory. Moreover, there are very different degrees of hereditary consanguinity, and the proof or evidence cannot be so absolutely determined as in the case of infection by personal contact.

\* 'De la Folie Paralytique,' p. 27.



In the communication of an infectious disease the seed is sown and germinates almost under our eyes, and a given species produces examples of the same species, with occasional variation of type only. But with hereditary transmission it is a matter of uncertainty both what species is sown and when it is sown. Moreover, as we have all the blood of more than one family in our veins, so we may inherit the ills of several of our ancestors; and since such morbid inheritances may lie dormant in the system for an indefinite period, there is more uncertainty whence a particular disease may have derived its origin. Or, to go back to the metaphor of the seed, though we have pretty strong convictions that a seed always produces its own species only, yet we find in fresh-turned earth, weeds previously unknown to a particular locality occasionally make their appearance, which would seem to have sprung up from seed of totally different kind.

Calmeil, who does not advocate the theory of the specific character of the disease, says one third of the cases of general paralytics come from parents or families in whom hereditary predisposition to insanity exists. In 1826 he wrote: "Some of the (plusieurs) patients affected with general paralysis belong to families in which there existed hereditary predisposition to insanity. But it is impossible to determine whether the disease is more common among such than among those in which there is no such tendency."—'De la Paralyse,' p. 370. In 1859 he writes ('Maladies Inflamm. du Cerveau,' tome i., p. 272): "Many families are loath to confess to hereditary tendency to insanity, and we state roundly that a third of the patients with general paralysis come from parents either insane or paralysed." This appears to express the common opinion, but our present question cannot be determined by such general statements. I have collated 41 cases of females and 68 males affected with general paresis, in which the subject of hereditary tendency has been carefully examined. The cases of the females were patients of my own; the 68 males were patients of Dr. Begley. The history of each case was received directly from the relatives. In no case are the facts entered from the order of admission, and in which the details are furnished by relieving officers, &c., and neither my colleague nor myself collected the facts in particular reference to any line of argument. Hereditary tendency was found to exist in  $\frac{1}{4}$ th of the males and  $\frac{1}{4}$ th of the females, or in 19 cases out of the 109, or between  $\frac{1}{5}$ th and  $\frac{1}{6}$ th of the whole, or in 14 $\frac{1}{2}$  per cent. among the females, and 19 per cent. among the males, and 17 $\frac{1}{2}$  per cent. among the two sexes. But hereditary predisposition among all cases amounts to 20 per cent., instead of 14 $\frac{1}{2}$  per cent. among the females, and 22 per cent. instead of 17 $\frac{1}{2}$  per cent. among the males; so that, though hereditary tendency is found to exist as a predisposing cause to general paresis, yet it less frequently predisposes than other cases of mental disease.

M. Calmeil goes further, and asserts that the transmitting disease

or the disease from which the general paresis has been inherited, may be of various kinds—in some cases mania, others melancholia, monomania, dementia, &c. He gives no data on which he arrives at this generalization, which is to be regretted. Nor were my own facts originally collected to elucidate the subject, and indeed it is not easy to collect such data, for though the histories are gathered in all cases directly from the relatives, they are often unable to say what form of disease the ancestor, or predisposing person, had. The term hereditary predisposition is in itself somewhat of indefinite signification. There are sources of error both as to the kind of disease and the degrees of consanguinity to be reckoned. Among 41 cases on which my own notes afford information relative to this point, hereditary predisposition is found reported in 6. In analysing the evidence of the 6 cases of hereditary predisposition 4 may be classified as of less doubtful character and 2 of more doubtful. Thus of four females, in whose cases hereditary predisposition was found to exist, the father of one was an epileptic; one had a sister insane; the third had two brothers paralysed; the fourth had an aunt “queer.” Of the two patients whose cases are classed as of doubtful hereditary causes, one had a mother “insane at the last.” The second had a sister a congenital idiot. Such is the evidence of hereditary predisposition among the females. Among the males hereditary predisposition was recorded, in 13 cases out of the 68, and my colleague is distinguished for the great care and impartial accuracy with which he collects his facts. I should class these 13 cases thus—in 8 the tendency was of the less doubtful character, 3 more doubtful, and in 2 the relationship and detail is not recorded. Of the 8 cases, the subjects of 6 had a parent insane, 3 of whom were said to be paralysed, 2 had an uncle and aunt insane. One of the patients, whose parent was paralysed, had two other members of his family stated to be affected in mind, one being an epileptic. The three of the more doubtful instances of hereditary transmission are—1, the father died of apoplexy; 2, a daughter committed suicide; 3, father had a brain fever. In the examination of the 109 cases, therefore, there was discovered evidence of a predisposition to insanity in 12 cases only, which were really unequivocal, and the consanguinity was that from parent to child, or direct transmission, in seven cases, and all insane, and there was distinct evidence of paralysis in three of the seven. The evidences of transmission was presumptive only in the remaining 5 cases, the relationship being by uncle or aunt; in three cases; two said to be insane and one called “queer.” The consanguinity was by brother and sister in two cases, one a sister insane, and the other two brothers paralysed. The evidence of hereditary transmission of paralysis itself, therefore, extends to 5 out of the 12 cases; and when we remember that the disease is one, which is not well known to the



general public, the above data are upon the whole favorable to the view that general paresis is distinct from other cases of insanity, both in the difference in degree by which it is liable to be transmitted, and also because there is a strong presumptive evidence that the species when transmitted is transmitted in kind.

Again, there are, or have been, at Hanwell, in the male and female departments, 55 patients bearing blood relationship to each other; 44 females and 11 males have had relatives in the asylum, all of whom have been known to me or my colleague, and the form of their disease personally verified. In one patient only did the symptoms of general paresis exist. This patient was also an epileptic. Her niece is still in the asylum affected with epilepsy, but without any symptoms of paresis at present.

Among the predisposing causes is included the peculiar epoch of life at which the affection commences, and this has been fully investigated by most authors, and is not found to differ materially from the epoch at which insanity generally commences. The different liability of the sexes is, however, well established, and adds considerable weight to the arguments for the special character of the disease. The disposition of mind or character may also act as a predisposing cause. It is not easy to reduce the data to a concise formula of expression, but I think there may be recognised among those who become affected with general paresis, a disposition or character in which the emotional feelings are not properly under control. Persons of this kind have been in some instances endowed by nature with strong emotions. Others have, by long indulgence in the exercise of these feelings, lost the due control of them, or have never possessed sufficient intellectual power to keep them in check. Whichever be the case, the animal part of their character becomes strongly expressed; they follow the bent of their inclinations; they are governed by their hopes; they are literally, whether taken in the good or bad signification of the word, sensualists. As examples of this kind of disposition, I find among my own patients, whose cases I have been examining, persons who are imprudent, reckless, extravagant, &c., and governed solely by their longings, desires, ambitions, appetites, and lusts; and certainly a very large proportion have committed sexual improprieties; many paretics also, as is well known, have previously indulged in drink.

Among the patients treated during the last few years were the following:

1. A young woman, of handsome exterior, at the age of eighteen became a mistress: passing from one man to another three times, and living on each occasion in the greatest luxury. At the age of thirty was deserted, took to drink, lived upon the proceeds of her furniture, became reduced to the lowest grades of vice and misery, and became insane.—2. A very handsome young female, was an

inmate of a public hospital, and attracted the attention of a medical student, who educated and married her. They ran through £10,000 in a very short period. The husband had to fly his creditors. She lived at first upon a pension allowed by his parents; she was found pursuing an irregular life; the allowance was stopped, and she became insane.—C. C—, married, and had a child at fifteen years of age, became irregular in her life, and was deserted by her husband, and she married another man, with the cognizance of the first husband, and also, latterly, of the second, who continued to live with her.—M. A—, a tradesman's wife, deserting her children, ran away with a gentleman, with whom she lived a very fast life. The par amour died of drink, leaving her £500, which she spent in three months, and became insane.—A married woman, æt. 54, formerly in affluence, deserted her husband, and lived with a porter at a railway.—A. S—, married at the age of sixteen, against the wishes of her parents; was ill-used by husband, and was syphilised by him. He deserted her; she supported herself by prostitution, following soldiers at barracks, and died of general paresis at the age of thirty.—A daughter of an opulent tradesman, at an early age, was found to be misconducting herself with more than one of her father's workmen, was reproved, and ran away from home. Was sent to various reformatories, but was always incorrigible. She became a prostitute by choice, pursued her course, became more and more abandoned, drank, and at length was sent to prison for theft. She died at the age of forty-eight of general paresis.

Out of 35 cases, of whom the history of the disease is complete, 11 are known to have led an habitually irregular life, with respect to sexual indulgence, and of 14 only was the information satisfactory as to the contrary state of things; and of these fourteen, one had had an illegitimate child in early life, but since, according to her mother, had lived correctly; and one other was a married woman, who left her husband on the day after her marriage.

Though the above evidence is not conclusive, it appears to show that the predisposing causes which lead to general paresis are of peculiar kind, and rather favours the opinion of the specific nature of the disease. It is corroborated by a fact, for the knowledge of which I am indebted to Dr. Conolly, who tells me that in his large experience he has never met with a case of general paresis among females of the upper classes in society. The predisposition to the disease would appear to stand in the following order, therefore. The most liable are—

- 1, males of the lower classes;
- 2, males of the upper classes.
- 3, females of the lower classes;
- 4, females of the upper classes.

And this order of sequence may be considered to be also that of the subjugation of the animal passions in the different classes.

With respect to the determining cause, M. Parchappe states that the disease is always caused by a concurrence of predisposing and determining causes, which are not, however, separably peculiar to the disease, but by their conjunction become so. The determining cause he considers to be any prolonged mental effort. In this category he includes all sensual indulgences, as drink, &c., and all those vices epitomised in the English terms of "fast life."

In the cases which have come under my own observation, moral emotions have appeared to have been the exciting or determining cause more frequently than the purely mental; for instance, I find recorded as exciting causes, "the conviction of a son for theft," "seduction and suicide of a daughter," &c. This does not appear to differ from the determining causes in other forms of insanity.

*Morbid Anatomy.*—The morbid appearances found after death in general paresis are (1) those found by the ordinary examination, or with the unassisted vision. And (2) the microscopical character of the various tissues. The former appearances have been repeatedly described by Parchappe, and most writers on the subject.\*

But the question here is not whether general paresis presents anatomical lesions, but whether such lesions are special and confined to the form of disease, and differ from the appearances found in other forms of insanity. To examine into this question, a comparison has been separately undertaken between fifteen cases of general paresis and fifteen other cases of other forms of insanity selected indifferently, and the examination has been made in a particular manner, and always by the same observer—myself. The mode adopted requires some explanation. A table of possible morbid appearances, as far as could be foreseen, or experience had taught to be important for special observation, was first prepared; and each part of the brain has been, as it were, catechised by its aid. Thus, so far as the table goes, there is not only positive but negative evidence with respect to each appearance recorded.†

\* 'Parchappe de la Folie Paralyt.,' p. 13. Dr. Skae, 'Edin. Med. Journal,' vol. v, p. 885. 'Annual Report Roy. Edin. Asylum,' 1854. Griesinger, 2 Aufg., s. 443.

† The table has been found greatly to facilitate the process of recording the morbid appearances, and not only of recording, but also of analysing them afterwards, which may be found of assistance to others. It will be seen that the table is arranged in the following method. 1, External characters, and 2, Internal. The internal appearances, are subdivided into those relating to the membranes, and 2, those connected with the brain substance; those latter again divided into the general and special characters of the cerebral matter. Under this arrangement, the particular characters are placed, and each concrete fact is numbered in the order of its sequence; the number, therefore, can be used as a symbol or algebraic formula for the particular morbid appearance: thus, the symbols B 25, 33, stand for the following facts, that the pia mater is abnormally adherent to the grey matter, and is thickened in its texture; but in analysing a number of cases, it is much easier to separate out all the

The following is the table relating to the head. Each concrete fact, it will be seen, has a symbol attached, as A 1, 2, &c. The 2nd column enumerates the frequency in which each appearance was found in fifteen cases of general paresis, and the other column the frequency in the fifteen other cases, and which consisted of the following forms of disease:—3 cases of melancholia, 1 mania, 1 folie circulaire, 2 monomania, 2 epileptic mania, 2 dementia, 1 senile imbecility, 1 imbecility and spinal paralysis, 1 imbecility following hemiplegia, 1 imbecility after epilepsy.

cases in which B 25 occurs than to go through each case separately, and by the arrangement B 25 will be always found in the same position with regard to the rest. It of course occasionally happens that a morbid appearance is confined to a portion only, that is fractional part of the brain, in which the symbol is written in the form of a fraction, thus  $\frac{B\ 25}{a}$ , a in this case standing for the anterior portion of one of the cerebral lobes. For in order to complete the system, a table of each known fractional portion of the brain as fornix, corpus callosa, &c., has been formed, a Greek letter affixed to each item. In taking the notes, of course only the positive is stated and not the negative, but since each brain is duly submitted to examination by each item, the symbols prove also the non-existence of any particular appearance as well as the presence of others.

EXAMINATION POST-MORTEM.	Symbol.	Fifteen Cases of General Paresis.	Fifteen Cases of other forms of Insanity.
<b>Head I. EXTERNAL CHARACTERS</b> .....	<b>A</b>		
<b>A. General characters</b>			
Form of cranium .....	1		
Profile			
Frontal region large and occipital small	a	1	1
Frontal and occipital equal .....	b	9	8
Frontal region small, occipital large ...	c	4	6
Plan, or horizontal section			
Oval form .....	d	9	10
Circular .....	e	3	0
Egg shape, larger in front ... ..	f	0	0
" " behind.....	g	2	5
Elevation			
Vertex low.....	h	13	13
" high .....	i	0	2
Wide in parietal regions .....	j	0	0
Narrow in ditto, or conical head.....	k	0	0
Irregular form .....	l	0	1
Measurements .....	—	5 × 6½	5 × 6
Hair			
Natural .....	2	0	0
Much .....	3	5	7
Little .....	4	6	6
Colour			
Light .....	5	3	2
Red.....	6	1	0
Dark .....	7	7	7
Grey (degrees DDL, DL, DLL)* .....	8	3	5
Integuments			
Normal .....	9	14	15
Abnormal			
Infiltrated with serum .....	10	1	0
" " blood .....	11	0	0
Adventitious tissues			
Fatty tumour .....	12	0	0
Purulent collection .....	13	0	0
Periosteum			
Normal .....	14	15	15
Abnormal			
Injected .....	15	0	0
Solution of continuity .....	16	0	0
Bone			
Thickness normal Diplöe distinct .....	17	8	7
" abnormal			
Increased			
Dense. Diplöe indistinct ...	18	7	6
Spongy.....	19	0	2
Diminished in thickness.....	20	0	3
Solution of continuity			
Injuries .....	21	0	0
Diseases			
Caries.....	22	0	0
Absorption.....	23	0	0

\* DDL, equivalent to two of Dark to one part of Light hair, &c.

EXAMINATION POST-MORTEM.	Symbol.	Fifteen Cases of General Paresis.	Fifteen Cases of other forms of Insanity.
<i>Head I. EXTERNAL CHARACTERS—continued.</i>	<i>A</i>		
Vascularity			
Normal .....	24	10	11
Abnormal			
Increased .....	25	5	4
Diminished.....	26	0	0
Infiltration			
Purulent .....	27	0	0
Sutures abnormally open .....	28	0	0
II. INTERNAL.			
A. Membranes .....	<i>B</i>		
1. Dura mater			
I. Normal .....	1	7	5
II. Abnormal			
Adherent to bone .....	2	4	3
to arachnoid .....	3	1	1
Altered in structure			
Increased in thickness			
Membranous .....	4	3	4
Bony.....	5	0	2
Diminished in thickness.....	6	0	0
Heterologous formations			
Cancer .....	7	0	0
Tubercle .....	8	0	0
Altered in colour			
Yellowish.....	9	0	0
Injected (degrees ', " , "" ) .....	10	1	1
Solutions in continuity .....	11	0	0
2. Arachnoid			
I. Normal .....	12	1	6
II. Abnormal			
Adherent .....	13	1	1
Altered in structure			
Increased or opaque (degrees ', " , "" ) .....	14	12	4
Contents, abnormal			
Dry .....	15	0	0
Serous effusion.....	16	11	3
Lymph effused.....	17	2	1
Pus .....	18	1	0
Blood			
Fluid .....	19	0	0
Coagulated .....	20	0	1
Tubercle .....	21	0	0
Adventitious products .....	22	0	0
3. Pia mater			
On Surface of convolutions			
Normal (strips readily) .....	23	0	7
Abnormal (non-adherent) .....	24	7	7
Adherent to grey matter .....	25	8	1
Vascularity increased.....	26	15	7
" diminished .....	27	0	2
Serum in meshes .....	28	9	5
Blood ....	29	1	0



EXAMINATION POST-MORTEM.	Symbol.	Fifteen Cases of General Paresis.	Fifteen Cases of other forms of Insanity.
<b>Head II. INTERNAL. Pia mater—continued.</b>	<i>B</i>		
Pus effused .....	30	0	0
Lymph .....	31	0	0
Tubercle .....	32	1	1
Abnormally thickened .....	33	0	0
" attenuated .....	34	0	0
Plexus choroïdes			
Normal.....	35	0	2
Abnormal			
Increased in thickness .....	36	0	2
Diminished " .....	37	0	0
Vascularity increased .....	38	4	3
" diminished .....	39	0	0
Serum in meshes			
transparent .....	40	0	0
opaque .....	41	0	1
<b>B. Brain substance</b>	<i>C</i>		
1. General characters			
Touch			
Weight			
Cerebrum .....	1	av. 34½	35½
Cerebellum and pons.....	2	" 5½	5½
Specific gravity			
Cerebrum, white substance .....	3	" 1.039	1.041
" grey " .....	4	" 1.034	1.031
Cerebellum, white " .....	5	0	0
" grey " .....	6	0	0
Consistence (generally) firm .....	7	3	5
" flabby.....	8	3	4
Sight			
Colour, generally			
Dark .....	9	0	0
Pallid .....	10	0	0
Congested .....	11	8	5
Shape and form			
Regular .....	12	0	0
Irregular .....	13	2	1
Convulsions close.....	14	0	7
" open.....	15	9	3
Atrophy simple.....	16	0	0
" by pressure .....	17	0	0
(not including pressure by limpid serum.)			
Hypertrophy, or swollen brain.....	18	0	0
2. Special characters			
A. Grey matter .....	<i>D</i>		
1. Normal .....	1	0	0
2. Abnormal			
Colour, dark .....	2	8	3
" light .....	3	3	11
Injected			
Suffused .....	4	12	6
Punctiform .....	5		

EXAMINATION POST-MORTEM.	Symbol.	Fifteen Cases of General Paralysis.	Fifteen Cases of other forms of Insanity.
<i>Head II. INTERNAL—continued.</i>			
Extravasated .....	D 6	0	0
Layers distinct .....	7	5	7
" indistinct.....	8	10	6
Consistence firmer than normal.....	9	5	4
Softened			
Red .....	10	} 0	4
White, creamy.....	11		
Abraded or eroded (v. 15).....	12	0	0
Solutions of continuity			
Morbid growths .....	13	0	1
Mechanical .....			
1. Before death .....	14	0	0
2. By removal of membranes...	15	8	1
Atrophy, simple .....	16	1	0
" by pressure .....	17	0	0
B. White matter .....	E		
1. Normal .....	1		
II. Abnormal			
Colour, dark .....	2	2	1
" pale.....	3	4	3
Injected			
Suffused .....	4	} 8	8
Punctiform .....	5		
Extravasated (see 17).....			
Consistence, firm, (degrees ', " , "" )	6	8	4
" softer .....			
Red.....	7	} 5	4
White.....	8		
Solutions of continuity			
a. Morbid			
I. Defined			
Cysts, containing			
Serum .....	9	0	0
Puriform fluid .....	10	0	0
Blood .....	11	0	0
Coagulum.....	12	0	0
Fibrine .....	13	0	0
Heterologous growths...	14	0	0
Foreign body .....	15	0	0
Calcareous .....	16	0	0
II. Undefined or diffused			
Blood, extravasation .....	17	0	0
Puriform fluid.....	18	0	0
Heterologous growths....	19	0	0
b. Mechanical			
Injuries.....	20	0	0
Edema.....	21	0	0
Hypertrophy .....	22	0	0
Atrophy, simple .....	23	0	0
" by pressure.....	24	0	0
C. Vessels			

The greatest difference that, from the comparison, was found to exist, was in the frequency of occurrence of effusion beneath the arachnoid (B 16), which was found 11 times in the 15 cases of general paresis, and 3 times in the other cases. A similar discrepancy existed in the increased vascularity of the pia mater, which occurred in every case of general paresis, and in 7 of the other cases. Adhesion of the pia mater to the grey matter (B 25) occurred in 8 of the 15 cases of general paresis and in one of the other cases. This appearance is not, therefore, pathognomic of the affection. The next most frequent difference was found in the state of the convolutions, which were abnormally open and wider apart in 9 of the cases of general paresis, and in 3 of the other cases. Injection of the white substance existed in 12 of the cases of general paresis, and in 6 of the other cases. The colour of the grey matter was found to be darker than normal in 8 cases of general paresis, and in 3 of the other cases. The layers of the grey matter were indistinctly marked in 10 of the cases of general paresis, and in 6 of the other cases; and the white matter firm in 8 of the paretic cases, and in 4 of the rest. On the other hand, the periosteum of the calvaria was found more frequently normal in the paretic cases, in the proportion of 12 to 4 of the other cases. There was a difference also between the colour of the grey matter, which was of lighter colour than normal in 11 of the other cases, and in only 3 of the paretic; and the pia mater stripped readily from the convolutions in 14 of the other cases against 7 of the cases of general paresis.

These facts are evidence in favour of the difference of general paresis from other cases of insanity, although they fix upon no particular morbid appearance as distinctly pathognomic of the affection.

*Microscopical Anatomy.*—During the last few years there have been thrown out various surmises with respect to the condition of the grey matter of the hemispheres in general paresis. Since Parchappe directed attention to the portion of the brain, it has received a very large amount of attention from pathologists, and especially from microscopical pathologists. But no writer, perhaps, has so plainly asserted the morbid condition of this portion of the brain in general paresis as Dr. Ernst Salomon, in this Journal. The pathology of the disease, as it may be read there, is, as it were, settled and determined; nevertheless, my friend must allow me to submit his article to a little critical examination, as it is also my intention to submit the author's facts whom he quotes to the test of the microscope. Dr. Salomon writes—"The honour of having demonstrated the anatomical changes in paresifying mental disease belongs to the Vienna school (Wedl, Rokitansky)."

"K. Wedl has in every case of general paresis demonstrated an hypertrophy of connective tissue on the small arteries and veins in

the pia mater and cortical portion of the brain" (p. 377, No. XLIII, 'Journal of Mental Science').

I have Wedl's 'Beiträge zur Pathologie der Blutgefäße,' Wien, 1859, before me, which is the treatise Dr. Salomon refers to and quotes, and I cannot find a single word about general paresis under that or any other name alluded to. The opening words are—"Die Atrophie der Gehirnrinde ist, wie bekannt, insbesondere an mit Blödsinn behafteten Individuen vertreten; Sie tritt um so prägnanter bei den blödsinnigen Griesen hervor," which appears in English to be—"Atrophy of the cortical substance of the brain, it is known, occurs especially in individuals affected with imbecility, and is particularly observable in the imbecility of the aged." The fact actually being that the Germans do not separate the cases of imbecility with paralysis from that without, and do not treat general paresis as a distinct disease. Dr. Salomon continues quoting still from Wedl:—"On the outer wall of the vessel is a hyaline, imperfect layer of connective tissue, studded with oblong and rounded nuclei. This layer of connective tissue, projecting over a greater or less extent of the vessel, undergoes, with the nuclei occurring in it, in the direction from within outwards (from the periphery of the vessel towards its centres), a fibrillar change." This passage appears to be quoted from the following:—"An den peripheren Schichten dieser hyalinen Anlagerungen scheinen solche Stellen, wo schon ein fibrillärer Zerfall in einem kleinen Bezirk eingetreten ist, darauf hinzuweisen, dass die fibrilläre Umwandlung der glashellen Schichten mit ihnen Kernen von der Peripherie gegen die Lichtung hin erfolge." If what takes place 'in the pia mater and cortical portion of the brain' in general paresis be described on the authority of this passage, it is somewhat singular that Dr. Salomon should not have read the first part of the paragraph from which the above words were taken. The paragraph commences thus:—"A very favorable place to follow out the hypertrophy of the walls of the vessels, and their transformation into variously swollen cellular fibres, is the walls of the ventricles in chronic hydrocephalus;" that is, the appearance is said to occur, not in paresis, but hydrocephalus; and not in the cortical substance of the convolutions, but in the walls of the ventricles. So that, so far from Wedl proving a lesion to be special to paresis, he proves the contrary, and that the lesion in question is at least common to other cerebral diseases and to other portions of the brain.

Wedl's treatise is not on the state of the brain or insanity at all, but on the blood-vessels. The argument of the treatise may be thus briefly stated:—That the small blood-vessels and capillaries generally, play an important part in various morbid processes, that a proliferation of cells takes place on the walls, and which, variously modified, are concerned in the formation of pus, cancer, tubercle, &c. Or, by the shrivelling and subsequent atrophy of the cells, an oblite-

ration, by shrinking, of the vessel itself, occurs, and a consequent conversion of the obliterated vessel into bands or fibres of connective tissue; that the atrophy of the capillaries is followed by a defective nutrition of the part concerned.

By the aid of Wedl's very excellent treatise, I have myself submitted a number of cerebral vessels to microscopical examination, and have compared the state of the vessels in persons dying sane, and in various forms of mental disease, with the vessels of those dying by general paresis. To examine the capillaries, the best mode appears to be to take about a cubic inch of the cerebral substance from the summit of the brain, together with its investing membranes, and carefully to submit it to the action of a stream of water until the whole of the cerebral matter is removed. It is necessary to be careful to use filtered water only after the membranes are completely washed; they may be stained with a colouring matter, but my own preparations are immersed in a strong solution of litmus, and are preserved in Goadby's B. Fluid, which is a strong solution of salt in water. The vessels will be completely coloured and fit for examination on the second day. The following account of the various morbid appearances found in the capillaries is given by M. Wedl:

1. A wavy, longitudinal marking in the structureless connective tissue of the walls of the vessels, and which he considers to be due to a shrivelling of the nuclei, and which ultimately results in an obliteration of the passage of the vessel. This appearance I have not recognised in my examinations of the brain.

2. He notices the appearance of fine, transverse ridges, which at first are only visible next to the margin of the vessel, but which subsequently can be traced further towards the axis, and at the same time the wrinkling becomes more irregular and assumes a brownish colour. This appearance is exhibited in fig. 3, *b*, from one of my own cases of general paresis. He believes these transverse markings proceed from the shortening of the vessels. To my mind, the contrary appears more probable, and that the shortening is produced by the contraction of the substance which he names hyaline deposit.

3. Besides the atrophy described above (§ 1), he has met with hypertrophy of the walls in different forms of chronic mental disease, forming a bulging or bump-like hypertrophy of the walls, and which does not correspond to aneurismal enlargements of the channels; and he believes he has seen these elevations that have become transformed into a finely striped mass of connective tissue. This appearance is also described by Rokitansky,\* who gives two figures of the appearance, copied and reduced in fig. 1. He describes this appearance thus:—Anomalies of the calibres of vessels are met with in two forms—1, as a simple enlargement, with or without elonga-

\* 'Lehrbuch der Pathol. Anat.,' B. ii, s. 381.

tion, with winding, twisting, or hank-like doubling (fig. 1, *a*), more common in the skin and mucous membranes; and, 2, as a circumscribed, spindle-shaped, one-sided, sacculated, bulging of the vessels, as aneurisms in the small and capillary arteries and

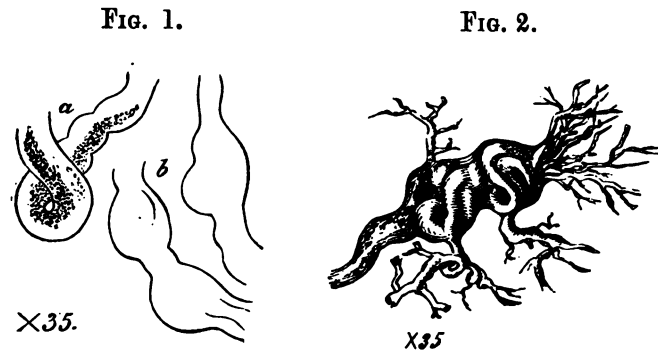


Fig. 1. Reduced from Rokitansky.

Fig. 2. From preparation in possession of the author.

varices in the veins (fig. 1, *b*); and he describes the latter to be met with in the brain in old encephalitic centres. In my own earlier examinations I believed I had detected this aneurismal enlargement or bump-like swelling of the vessel, and sketched several such appearances from two cases of general paresis, in one of which cases the preparation has been saved, and is the specimen from which fig. 2 is copied, and which, in the bare outline, will be found to be very similar to fig. 1 from Rokitansky; but a more thorough examination brought to light the real nature of the preparation, and showed that the appearance was due to a varicosity of the vessel rather than to an aneurismal condition. The verification of the convolutions of the vessel, enclosed in a somewhat dense sheath of homogeneous membrane, beset with earthy particles, needs the strong light of the achromatic condenser, and  $\frac{1}{4}$ -inch object-glass to render its definition perfect. In nearly every case of general paresis since examined by me there has been discovered some disposition towards a similar condition.

4. Wedl also describes a layer of hyaline embryonic connective tissue on the outer walls of the little arteries and veins, beset with oblong and grouped nuclei, which project in the form of nobs, and which he considers are due to hypertrophy of the connective tissue. "These hyaline deposits of the little arteries and veins amount to



one fourth, one half, and one third of the transverse diameter of the vessel, or at times exceed its diameter altogether. They occasionally form the nidus of olein, of reddish-yellow, brown-red or deep-yellow grains, of different sizes, and amorphous calcareous salts." This appearance is familiar to me in my own preparations, and is shown in fig. 3, *a*, taken from a patient who died of general paresis.

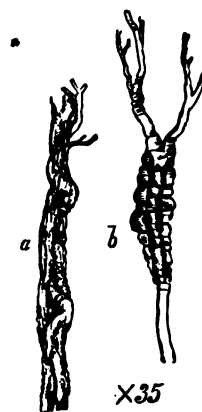
5. Wedl also examined into the condition of the blood-vessels, especially in reference to the proliferation of cells in the walls. The consideration of the question would lead me too far from my present argument, which is whether there exist essential histological differences in the minute anatomy of general paresis and other forms of mental disease.

There is to be found, in fact, a slight or apparent difference between the views propounded by Wedl and those of Rokitansky, and which the former thus alludes to, and endeavours to avoid by saying that, though he considers that the capillaries are converted into fibrous cords, that this does not necessarily imply that such is the only mode by which an excess of connective tissue occurs :

"Um etwaigen Missverständnissen vorzubeugen, erlaube ich mir gleich hier zu bemerken, dass aus dem Gesagten Keineswegs noch mit Bestimmtheit sich folgern lässt, die bindegewebigen Wucherungen überhaupt, also auch die interstitiellen nähmen stets und nur ihren Ausgangspunkt von den Gefässwandungen."

My own examinations of the capillaries in about twenty cases of insanity, and of which seven were from patients who died of general paresis, lead me to the conclusion that the capillaries of the cortical substance are more or less diseased in every case of general paresis. I do not find, however, that the amount of alteration bears any relation to the date, degree of imbecility, or impaired motility ; nor have I detected any correspondence between the diseased condition and the etiology ; but, on the other hand, I have not found the same amount of abnormal appearance in the capillaries of the other cases. My own observations will be better understood if postponed until the views of Rokitansky, in the treatise to which Dr. Salomon alludes, have been considered. Rokitansky's treatise is entitled 'Ueber Bindegewebs-Wucherung im Nervensystem,' or, 'On the

FIG. 3.\*



\* Fig. 3. From preparations in possession of the author.

Exuberance or Overgrowth of the Connective Tissue in the Nervous System.' Like the treatise of Wedl it was a contribution read before the Academy of Sciences of Vienna, and it was written, the author says, to bring together subjects which, from the plan of his large treatise ('Lehrbuch der Pathol. Anat.'), were necessarily disjointed. There had been long known to him, he says, an appearance in the spinal cord, and which he had described, consisting of a softened substance, which is homogeneous in its composition, and which, on cutting through the cord, appears to run over the margins of the incision. On examining this substance, there arose the question whether it was to be considered (1) as a new product, or (2) as an exuberant growth ('Wucherung') of the normal tissues; and next, what changes it undergoes, and what is its relation to the induration of nerve substance. He states that the microscopical examination of this matter shows it to consist of a ropy, formless moisture, interspersed with little granular, glistening nuclei, in varying quantity.

On the addition of acetic acid, the substance becomes imperceptible from transparency. The naked cell-nuclei, in an unexpectedly great number, mostly sharply defined, become clearly distinguishable; and Rokitansky looks upon this matter as analogous, if not identical in nature, with the normal tissue as found in the ependyma in children. He says that originally the whole nervous centres are, as it were, developed in, and held together by, a similar or connecting mass, which is continuous throughout the nervous centres, and that the ependyma in the matured texture of the brain is nothing more than this connecting medium coming out on the free surfaces, outside and in. This connective tissue, according to Rokitansky, undergoes various morbid changes, viz.—1, an hypertrophy or overgrowth; it may then gradually harden, and finally undergo transformation into fibrous connective tissue.

When hypertrophy of connective tissue occurs in the brain, Rokitansky says that the essential elements, or other normal elements, of the cerebral matter, as ganglion-cells, vessels, &c., are thrust apart or separated by the interposing substance. "*In the grey substance the ganglion-cells appear inflated, their continuations are undoubtedly torn, and the nerve-tubes penetrating the grey substance*" are destroyed. The substance in question undergoes a transformation into that of a fibrous connective tissue. It loses its hyaline quality, and becomes of a greyish-white; and it appears as very fine, sometimes softer, sometimes stiffer, filaments, which cross each other in the most variable directions. Occasionally a still further transformation of this substance takes place, and it becomes a stiff, greyish-yellow mass, and which is usually circumscribed in extent.

In connection with the hypertrophied tissue is found amyloid corpuscles, turned blue by iodine. Bodies resembling these, but ren-

dered brown only by iodine, which he calls colloid corpuscles, and here and there a fatty or earthy granular, aggregate and agglomerate, fat-granules and incrustation-cells. These Rokitansky believes proceed from a retrograde metamorphosis of the nerve elements.

The process described occurs in various forms of Nerve-disease, in the brain, spinal cord, or nerves, at times in circumscribed spots, at times more widely or even universally diffused. It may commence in a small focus, and spread; it occurs as an acute or slowly invading disease. Rokitansky believes that it is *not* to be looked upon as an *inflammatory affection*, since exudation and its elements are absent, as well as extravasations in any quantity. He writes—"The forms of the disease, of which the overgrowth of the cellular tissue of the nerve-centres must be considered as the essential anatomical element, are very manifold." With respect to his investigations particularly directed to cases of general paresis, with the 'monomanie des grandeurs,' Rokitansky found that the changes stand in intimate relation to the pia mater, and occur usually and primarily in the convex surface of the brain. He says that he has found frequently that the white layer interspersed between the ganglion substance has disappeared. The microscopical examination exhibits appearances which differ according to the stage of the disease, and are—(a) an unusual quantity of connective tissue, forming the bed for the nervous elements, and which is sticky and tenacious, give the gray matter a loose or succulent character. In older cases it becomes stiffer. Lastly, it becomes fibrous, and retracts, causing adhesion of the pia mater. (b) The nerve-tubules he found to be varicose, broken, and the pieces are formed of various forms—club-form, pestle-shaped, rings, &c. The ganglion-cells appear distinctly inflated. (c) But with the above there are seen colloid and amyloid bodies.

The changes in the pia mater consist in adhesion to the surface of the brain, in varicosity of the veins, in their winding, tortuous, coil-like, twisted course, and in aneurismal dilatation of the little arteries.

My own examinations have only as yet extended to the capillaries, but I have, of course, incidentally examined the brain substance, but at present must confine myself entirely to the vessels.\* There appears to be some amount of tortuosity in the capillaries in every case of general paresis. This tortuosity in places amounts to a simple, sharp curve or twist; in places to a kinking of the vessel (fig. 3, *a*); in others to more complex twisting, until it forms, in fact, little knots of varicose vessels of very complicated kind (fig. 2). I have not found

\* The preparations illustrative of these conditions I shall be very happy to show to any member of the Association.

this appearance in any other form of mental disease, but it is described as existing in other cases both by Rokitansky and Wedl.

I have never been able to convince myself of the existence of anything like aneurismal dilation. Can it be that these little knots of varicose vessels have been mistaken, as they were at first by myself, for aneurismal enlargement? It must be borne in mind that the two are very different conditions pathologically, and a multiplicity of aneurisms confined to one set of capillaries is not a morbid state that analogy of other morbid states would lead us to expect. Varices of vessels confined to circumscribed localities are at least more common.

Another appearance which my preparations show is what is called a hyaline deposit around the capillaries (fig. 3, *a* and *b*,) fitting, as it were, more or less closely to the vessel, in greater or less degree of transparency and extent, in some cases approaching a brownish hue and marked by transverse lines like commencing contractions. This appearance I have found more common in cases of general paresis, but in one case of epileptic mania a corresponding appearance was present. The character of the surrounding substance was somewhat different in character.

The presence of this hyaline around the capillaries, the frequent occurrence of fibres traversing the preparations of cortical substance of general paresis appear to be due to an excess of connective-tissue fibres in these cases. Whether this excess is from what Rokitansky calls 'Wucherung,' or overgrowth of the original connective medium, or is thrown out by the capillaries, or is formed conjointly by both, is and must probably remain hypothetical; but excess of connective tissue, I think, can be demonstrated.

To me it appears highly probable that the hypothesis of Rokitansky is correct, as well as that of Wedl, relative to the formation of connective tissue from a material thrown out by the capillaries, and that in the first stage this material is hyaline; that it afterwards contracts; that in contracting it throws the capillary into bends or kinks, as in fig. 3, *a*; that as it goes on contracting it becomes less hyaline, more fibrous, and at length like a sheath; that if converted into fibres, it has no share in the formation of the innumerable fibres that can be seen lacing and interlacing across the field when a portion of gray matter of a parietic brain is under the microscope. It appears more probable that these are formed as Rokitansky suggests.

With respect to the essential nature of this morbid substance, Rokitansky says it is not to be considered as a heterologous formation, nor a product of inflammation.

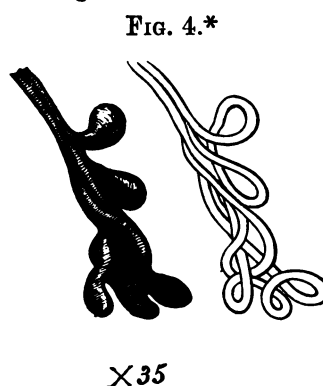
Its relation to the phenomena of general paresis cannot yet, in my opinion, be clearly defined. The condition is not confined to general paresis. Rokitansky, as already described, met with it in other

forms of disease. It can, therefore, only be the essential morbid change in paresis by occupying a particular seat, as the cortical surface of the brain, or by a special rate of progress, as by being chronic in one disease and acute in another. The peculiar relation of the exuberant development of the connective tissue, and the condition of the capillaries and small vessels, is another point on which more information is desirable.

Bearing in mind this variation of the seat of the affection and rapidity of morbid processes, it may be asked whether those allied affections which have been alluded to in previous pages of this communication, under the name of pseudo-forms and several distinct forms, may not be nearly allied, and vary in their symptoms by varying in the seat and activity of the morbid growth.

A case having certain characters of general paresis, yet differing widely from the typical cases, lately occurred to me, and in which the following appearances were found after death:—On cutting across the right crus cerebri, it was found to be evenly spotted with red points of the size of pins' heads. On opening the cavity of the fourth ventricle a growth was found to fill up the whole of the right side of the cavity, and the substance of the cerebellum was pressed upon by this growth. It had the external characters of encephaloid cancer. Microscopically, it was found to consist of a homogeneous, viscid substance, interspersed with nucleated, angular cells, resembling epithelium-scales, but of small size; but scattered through the substance were numerous capillaries arranged in loops, surrounded and imbedded with this ropy matter. These vessels were distended with blood; they appeared to be all of uniform size, and without branches. Some of the loops were simple, some were very short, but they appeared at the periphery of the morbid growth to terminate in complicated hanks, each hank being closely surrounded with a layer of the viscid substance. The appearance of these vessels is shown in fig. 4. This disposition of the capillaries in connection with this growth, which in ordinary language would be called cancer, is interesting in connection with the varicosity of the capillary vessels in the exuberance of connective tissue in general paresis.

And the symptoms are no less interesting in relation to the question of pseudo-forms of paretic disease. The patient was reported to be



\* Fig. 4. Capillaries from a case of so-called cancer of the cerebellum.

labouring under a second attack of insanity. On this subject there was doubt, however. She had been insane, at all events, above nine years before any paralytic symptoms occurred. The difficulty of motion commenced gradually in the lower extremities, and gradually increased, and she died about seven months after. Her tongue was slightly affected. She had slight difficulty in pronouncing the labials. The memory failed towards the last, but the mind improved in other respects. There was no *monomanie des grandeurs*. There was no increase in the difficulty of articulation at the last, and no difficulty of swallowing. The lower limbs were drawn up about three or four days prior to death. So far as the difficulty of movement in the limbs, the slight mumbling articulation, and some amount of imbecility, the case might be considered to belong to the category of paresis. But in investigating the pathology of general paresis, it is obvious that such cases should be separated from cases of truer type; but the growth, though circumscribed and more obvious than the exuberance described by Rokitansky in the cortical substance of the hemispheres, is apparently not widely different from it in nature; and if so—if this growth has an affinity to the exuberant growth of paresis—the symptoms were modified by its circumscribed position, and by its rapidity of development, probably. On the other hand, if such growths really are allied to cancerous affections, then the affection described by Rokitansky, ‘*Bindegewebs-Wucherung*,’ and which, he says, is not the product of inflammation, and not a heterologous formation, may be nearer to cancerous or allied diseases; and the modern views in respect to the latter affections renders such approximation in kind between these diseases less improbable than was formerly supposed.

In conclusion, it must be acknowledged that there is much which is undetermined with regard to the pathology of general paresis, and especially as to its anatomical character and diagnosis from allied affections. The labours already expended upon the subject are approaching or surrounding the truth, probably, but the truth is not yet eliminated in a form in which we can consider it free from admixture of doubt. With respect to the symptomatology, certain cases appear to have a great resemblance to each other; still many cases occur in every asylum with admixture of paretic symptoms, which have yet to be clearly explained—for example, cases complicated with epilepsy, cases which recover, those clearly resulting from excessive drink, besides those called chronic alcoholism; and explanations are wanting why, in some cases, the disease commences in the motor and in other cases with the mental symptoms. The microscopical examination of the brain substance itself, both of the cerebrum and cerebellum and cord, is a work which requires to be more fully prosecuted, and is obviously one which must yield important results. I am enabled to assert this from the progress I



have already made, and I am happy to say I have enlisted my friend Dr. W. H. Dickinson, of St. George's Hospital, to assist me in prosecuting an inquiry into this part of the subject.

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*Chance*. By J. STEVENSON BUSHNAN, M.D. Heidelb., Fellow of the Royal College of Physicians, Edin., Resident Proprietor of Laverstock House, Salisbury.

"THERE is no such thing as chance," cries the would-be philosopher. How, then, should there be such a word representing, as it surely does, a distinct idea? Our confident friend will hardly deny that equivalent to chance there is in every language not merely one but many words, each conveying the same definite thought from one mind to another, from boy to boy, from girl to girl, from woman to woman, from man to man. Does Tom speak unintelligibly to his fellows when, seeing Jack throw a stone and hit a bird, he shouts out, "Ah! by chance. Jack is no marksman"? When Jane threads her needle more cleverly than her more expert sister Mary, is she reproved for obscurity if she confesses to her superior readiness that time having been by chance? When Miss Emma writes to her dearest friend how she begins to suspect it can hardly be by chance that Mr. Edward meets her so very often in her walks, does her dearest friend fail perfectly to understand her meaning? When B. says that C. and his partner were winners at whist last night by the mere chance of good cards, is there any one so dull as to misapprehend the observation? When the traveller views Stonehenge, he pronounces it at once a work of design. When he gazes on Staffa or on the Giant's Causeway, in spite of the perpetual intrusion of the idea of these being works of art, he satisfies himself at every moment, by a slight reflection, of their being the effects of chance; and so, likewise, of the Grotto of Pausilippo, and many other natural appearances over the world.

What, then, is the idea which passes thus currently from mouth to mouth and from mind to mind, wrapt up in that word which our small philosopher is so desirous to blot out?

Chance is a negative term. It refers to something void of design. Chance is the negative of intention. Chance events are events which come to pass without any intelligent agent having put things in train for their occurrence. If the term negative offend our opponent, we will describe chance as the complement of design. Whatever does not happen by chance, must happen by design; and,