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. Edin.; President of the Royal Medical Society of Edinburgh.

(*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

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loss of speech by its being due to a cerebral lesion alone, and not to any paralysis or defect of the organs of voice or of speech. It differs entirely from the silence of deaf-mutism, insanity, and defective intelligence. The patient has ideas which he in vain labours to express in words, although his organs of vocalisation and articulation are perfect. An inability to express thoughts by writing coincides, in most cases, with the loss of speech; and reading and calculation are also frequently lost. Loss of the power of articulate speech is, however, the principal characteristic of aphasia. In most cases the loss of speech is not complete; but there exists such an impairment of that function as to render the expression of thought by its means difficult or impossible. The impairment may exist in all degrees, from that in which there is merely an inability to recollect or to cause to be pronounced certain words, to that in which speech is altogether unintelligible.

In place of attempting a further definition of aphasia, I think it better to give such a selection of cases as will suffice to convey an idea of its principal characteristics.

Case I.—In 1863 a young man was brought to Professor Trousseau. Four years previously he had had a hemiplegic attack of the right side. He had recovered in a great measure the use of his limbs, but since the attack he had never said any other words than "Non," and "Maman." When asked his name, he replied "Maman;" his age, "Maman, Non." To all questions he replied thus. He had learned to write with his left hand, but could only write his surname. He was ordered to pronounce it, but he said "Maman." He was asked to write this, but he wrote his surname. Thus this man had only two words which he could say, and one which he could write; yet he was able to play well enough at cards and at draughts. He appeared to read; but as he kept the book for only a few minutes at a time, it was doubtful whether or not he could really do so. His intelligence appeared to be tolerably good.*

Case II.—A gentleman, æt. 46, had a hemiplegic attack, after which he entirely lost the power of speech. The only articulate sounds which he could utter were, "ee—o." He varied the tone of these so well, that, with the aid of expressive gestures, he was able to convey to those about him his meaning upon ordinary subjects. He perfectly comprehended what was said to him, and clearly understood what he meant to answer, but was only able to utter these sounds, "ee—o, ee—o." He believed, however, that he used the proper words for the expression of his ideas, and often appeared surprised and displeased when he was not understood. He sometimes tried to explain his meaning by writing on a slate; but he generally substituted one word for another, and almost always erred in spelling what he wrote.†

Case III.—A lady, affected with cancer of the left anterior lobe of the brain, was frequently unable to recall the names of the most familiar objects, and was reduced to express them by signs, or to point to them with her

* Trousseau, 'Clinique Médicale de l'Hôtel-Dieu de Paris,' 2nd edition, p. 590.

† Cooke 'On Nervous Diseases,' quoted in Forbes Winslow's 'Obscure Diseases of the Brain and Disorders of the Mind,' p. 412.

finger. When the word which she wanted was pronounced before her, she recognised it, and could repeat it.*

Case IV.—A man, æt. 40, was attacked with hemiplegia of the right side. The attack occurred during the night, and, when he was found in the morning, the only articulate sounds which he uttered were, "Cou si si," "Cousisi." For four months he could utter no other syllable, except, in moments of anger, an oath. When he came under the observation of M. Trousseau, he was able to write his name with his left hand. He was asked to pronounce his name; he said, "Cousisi." He was then asked to write his name, and he wrote it correctly, "Paquet." The next request was to write his address, and he again wrote "Paquet." Perceiving, however, that this was an error, he turned away his head impatiently, saying "Cousisi." He was made to copy the word "billet," and he wrote it correctly; but, being again asked to write his name, he wrote instead, "billet." He had good enough intelligence, and was able not only to play at dominoes and draughts, but even to cheat at those games. He read books; but it was observed that he read the same thing day after day, and even many times in the same day.†

Case V.—A man, æt. 60, had hemiplegia of the right side. The only words which he could utter were, "Ah! fou;" and these he used on every occasion.‡

Case VI.—Dr. Hughlings Jackson records the following case. E. H—, æt. 34, who had generally had good health, and who still looked healthy, was seized suddenly whilst walking across a room. He staggered, and then fell; and when put to bed it was found that the right arm and leg were paralysed, and that he could not speak. For a year he could not speak at all, except to say "yes" and "no;" but about that time he began to talk, if such interjectional expressions could be called talking. He relearned to say "d——n," "d——n your eyes." He had been in the habit of swearing, but now can say nothing else except "yes," "no," and "aye." I think he can now make signs, but not always correctly. He tried to tell me his age by his fingers, but was not quite correct. His writing—the penmanship of which, considering that it is written with his left hand, is pretty good—does not really consist of words at all—scarcely, indeed, of letters. It appears to me to resemble the word "damn," rather suspiciously §

Case VII.—A boy, æt. 18, had an attack of hemiplegia of the right side. The paralysis rapidly disappeared, but for three weeks he was unable to speak at all. After that time he was able to speak, but he made constant mistakes in words. His mistakes in speaking were of this kind:—"I hear quite wetty," instead of "quite well." "I can witter it in my ear." He called a book a "totano," and a chair a "handkerchief." When reading, he called farmer "farming," and consistent "constant." ‖

Case VIII.—Dr. Graves gives the following case:—A farmer in the County of Wicklow, æt. 50, had a paralytic fit in the year 1839; since

* "A Case of Amnesia," by Thomas Hun, M.D., 'American Journal of Insanity,' 1850-51, p. 358, quoted in 'Archives Générales de Médecine,' 1864, vol. i, p. 343.
† Trousseau, 'Clinique Médicale,' p. 581.
‡ Ibid., p. 592.
§ Hughlings Jackson, 'London Hospital Reports,' vol. i, 1864, p. 452.
‖ Ibid., p. 415.

that time he never recovered the use of the affected side, and still labours under a painful degree of hesitation of speech. He is, however, able to walk about, take a great deal of active exercise, and superintend the business of his farm. His memory seems to be tolerably good for all parts of speech except noun-substantives and proper names; the latter he cannot at all retain, and this defect is accompanied by the following singular peculiarity: that he perfectly recollects the initial letter of every substantive or proper name for which he has occasion in conversation, though he cannot recall to his memory the word itself. Experience, therefore, has taught him the utility of having written in manuscript a list of the things he is in the habit of calling for or speaking about, including the proper names of his children, servants, and acquaintances; all these he has arranged alphabetically in a little pocket dictionary, which he uses as follows:—If he wishes to ask anything about a cow, before he commences the sentence he turns to the letter C, and looks out for the word "cow," and keeps his finger and eye fixed on the word until he has finished the sentence. He can pronounce the word "cow," in its proper place, as long as he has his eye fixed on the written letters; but the moment he shuts the book it passes out of his memory and cannot be recalled, although he recollects its initial, and can refer to it again when necessary. . . . He cannot recollect his own name unless he looks out for it, nor the name of any person of his acquaintance; but he is never for a moment at a loss for the initial which is to guide him in his search for the word he seeks.*

Case IX.—M. Bouillaud records an interesting case, in which the patient was quite unintelligible by reason of a want of words, or from using words which did not apply to the objects which he wished to indicate. In writing, the letters were well formed, but were placed without order, not forming words, and their meaning could not be guessed at. The patient could understand what he read, but could not read aloud more than two or three lines at a time, and even then only by an extreme effort of attention and will. He could sum up two lines of figures, and, most surprising fact of all, he was able whilst in this condition to compose and write down a piece of original music. He was then able to sing the air, without words.†

Case X.—Dr. Hughlings Jackson mentions the case of an aphasic patient who could sing "I'm off to Charleston," and "So early in the morning," though he could say nothing else, except "Don't know," and "How d'ye do?" and some devotional phrases.‡

Various attempts have been made to determine the situation of that part of the brain to a lesion of which aphasia is due. I shall mention the principal of these, with the arguments which have been adduced in their support.

In 1808, Gall, the founder of phrenology, from observing the peculiar position and appearance of the eyes in certain persons who had a marked aptitude for learning and reciting by heart, was induced to place the seat of the faculties of the sense of words and the language of speech in that part of the anterior lobes of the brain

* "Observations on the Nature and Treatment of Various Diseases," by Robert J. Graves, M.D., F.R.S., 'Dublin Quarterly Journal of Medical Science,' vol. xi, 1851, p. 1.

† 'Bulletin de l'Académie Impériale de Médecine,' 1865, p. 752.

‡ 'London Hospital Reports,' vol. i, 1864, p. 448.

which rests on the orbital plates. He regarded as the organ of the memory of words that part of the brain which rests on the posterior half of the orbital plates.

Professor Bouillaud, of Paris, in his 'Traité de l'Encéphalite,'* and in various memoirs read before the Academy of Medicine,† brought forward evidence to show that the faculty of articulate language resides in the anterior lobes of the brain. He has collected the records of from 75 to 850 cases of cerebral disease, in 116 of which there was aphasia with a lesion of the anterior lobes only; in the others there was no aphasia, and the anterior lobes were found healthy. Trousseau‡ has put this localisation to the test by counting only those cases with autopsy observed during four years, as these have all the necessary conditions of exactitude. These cases are thirty-four in number, and of them eighteen are in favour of Bouillaud's view, and sixteen against it. The numbers are thus nearly equal; but it is worthy of remark that, while all of the cases favorable to Bouillaud's doctrine are cases of aphasia, only four of the contrary cases are of that character. Adding these four to the eighteen cases favorable to Bouillaud, we have twenty-two cases of aphasia, in eighteen of which the lesion was in the anterior lobes only, making Bouillaud right in 82 per cent. of the cases of aphasia. Various objections have been urged against the twelve cases which were not aphasic, but it is needless to mention them.§

The next attempt to localise the cerebral faculty of language was made by M. Marc Dax, of Sommières. He had been struck by the fact that, in all of the cases of hemiplegia with loss of speech which came under his notice, the paralysis was invariably on the right side, indicating a lesion of the left half of the brain. He compiled these cases in a memoir read before the Medical Congress held at Montpellier in 1836,‖ in which he related forty cases of loss of speech, the cerebral lesion being to the left in all. He therefore concluded that in aphasia the lesion was invariably seated in the left half of the brain. M. Baillarger has combined the statistics for and against this doctrine with the following result:—He has collected 155 carefully reported cases of hemiplegia with aphasia, and he finds that in 145 the hemiplegia was on the right side, and in the remaining ten on the left.¶

In 1865 the son of M. Dax wrote a paper** in which, after sup-

* 'Traité de l'Encéphalite,' Paris, 1825.

† 'Archives Générales de Médecine,' 1825, t. viii, p. 25. 'Bulletin de l'Académie de Médecine,' t. iv, p. 282, 1839. Ibid., 1848, t. xiii, p. 699. Ibid., 1865, t. xxx, p. 613 and p. 735.

‡ 'Bulletin de l'Académie Impériale,' 1865, p. 668.

§ See 'Bulletin de l'Académie Impériale de Médecine,' 1865, p. 842.

‖ "Lesions de la Moitié gauche de l'Encéphale coïncidant avec l'oubli des signes de la pensée," 'Gazette Hébdomadaire de Médecine et de Chirurgie,' p. 259.

¶ 'Bulletin de l'Académie Impériale,' 1865.

** Ibid., p. 260.

porting his father's view, he attempted a still finer localisation. He assigned the seat of the faculty of articulate language to the external and anterior part of the left half of the middle lobe of the brain. This localisation rested on very feeble evidence, and has not been supported by further observations.

In 1861 M. Broca, of Paris, who had been an opponent of the principle of cerebral localisations, was converted into its most earnest advocate, under the following circumstances:—A discussion had taken place, before the Society of Anthropology, between M. Gratiolet, who maintained that the principle of cerebral localisations was false, and M. Auburtin, who affirmed that Bouillaud's localisation was at least proved. In this discussion Broca took the side of Gratiolet. A few days afterwards Broca found one morning, in his wards at the Bicêtre, a patient in whom he recognised a typical case of loss of speech from a cerebral cause. I shall give an abridgment of his account of the case, as it is one of extreme interest, and gives a fair idea of the condition of one class of aphasic patients.

A man, æt. 55, named Leborgne, attacked with diffuse gangrenous erysipelas of all the right lower limb. His history was as follows:—He had been subject to attacks of epilepsy from his youth upwards, but had been able to work till he reached the age of thirty. At that time he lost his speech, and two or three months afterwards was admitted to the Bicêtre, where he remained for the rest of his life. On his admission there, he presented no symptom whatever, except the loss of speech. He could say nothing except "Tan," and by this name he was known. He understood whatever was said to him, but replied nothing except "Tan, Tan," accompanied with very significant gestures. When he was not understood, he became excited, and swore, the oath being invariably, "Sacré nom de Dieu." He bore a bad character, but was always considered responsible for his actions. After he had been ten years in the hospital, a new symptom supervened. The right arm became gradually weak, and finished by becoming completely paralysed. Little by little, the paralysis extended to the right leg, till it also became entirely paralysed, and the patient had to remain constantly in bed. He reached this condition four years after the beginning of the paralysis of the arm, and fourteen after the loss of speech. During the next seven years no fresh symptoms showed themselves, with the exception of some weakness of sight. At the end of this period he came under the care of M. Broca.

From the weakness of the patient, Broca was unable to make a thorough examination of the state of his intellectual powers, but the following details were ascertained:—He appeared to comprehend all that was said to him, but, being only able to manifest his ideas by the movements of his left hand, his meaning could not be well comprehended. Numerical replies were those which he made best, by opening and closing his fingers. He was asked how many days he had been ill, and he sometimes replied five days, sometimes six. He indicated, exactly, how many years he had been at the Bicêtre. When this question was repeated, he again answered correctly; but the third time he lost his temper, and emitted the oath already mentioned. He could tell correctly the time on the clock, and could point out the order of succession of his different lesions. Frequently, however, questions to which a man of ordinary intelligence could have replied by a gesture, remained unanswered.

Sometimes the meaning of his replies could not be made out, while at other times the reply, though clear, was wrong. It was therefore evident that his intellect was profoundly affected; but he undoubtedly possessed a degree of intelligence sufficient for the act of speech.

It was clear that in this case there had been a progressive cerebral lesion, affecting at first only a limited portion of the brain substance, and gradually extending till it caused the lesions of motility. That this lesion occupied principally the *left* half of the brain was evident from the paralysis of the opposite side of the body.

At the examination of the brain, which was not made till the organ had been hardened by immersion in spirit for two or three months, a great loss of substance was detected in the left anterior lobe, consequent on a chronic softening which had originated there, and had spread to the corpus striatum of the same side. By a careful analysis of the appearances, Broca satisfied himself that the beginning of the softening had been most probably in the posterior part of the third left frontal convolution, or, if not there, in the second left frontal convolution. As for ten years the sole symptom had been the loss of speech, he concluded that this was due to the initial lesion; in other words, that the loss of speech was caused by the softening of the second or third left frontal convolution—most probably the latter.*

Shortly after the examination of this case, Broca met with another, in which the loss of speech was the sole symptom, and in which the intelligence appeared unimpaired. The patient had only three or four words at his command; but by means of these and of expressive gestures he managed to make himself perfectly understood. He could not write from the trembling of his hand, so that it remains uncertain whether or not he could express ideas by writing. At the autopsy there was found an old apoplectic cyst occupying the posterior parts of the second and third left frontal convolutions, the brain being otherwise healthy. The second convolution was much less profoundly altered than the third; Broca therefore concluded that to the lesion of the latter convolution the loss of speech was due.†

A number of subsequent observations have shown that there is a remarkable connection between aphasia and lesions of this convolution on the left side. So far as I know, no case has been published in which there was a lesion of this convolution on the left side without aphasia.

Several cases, however, have been recorded which show that aphasia may occur independently of disease of this particular convolution. These I shall briefly mention. M. Charcot had a case in which there was aphasia with a lesion of the left parietal lobe. The lesion was prolonged across the fissure of Rolando as far as the transverse frontal convolution, which was diseased just at the point where it joins the convolution of Broca. In the latter convolution

* Broca, 'Sur le Siége de la Faculté du Langage Articulé, avec deux observations d'Aphémie (perte de la parole),' Paris, 1861, p. 16.

† Broca, op. cit., p. 32.

there was no appearance of disease, with the exception of a few "compound granular corpuscles," detected by the microscope.* This case has induced Broca to modify his opinion, and to admit that lesions of the left transverse frontal convolution may affect articulate speech. This convolution is directly continuous with that of Broca, and many anatomists class them as one. A somewhat similar case is given by Vulpian.† Several cases of aphasia with a lesion of the right side of the brain have been recorded. Boyer mentions a case in which a man received a thrust of an umbrella in the right eye, penetrating the orbital plate, and lacerating the *right* anterior lobe of the brain. The patient instantly lost the power of speech.‡ Several instances of aphasia with *left* hemiplegia are on record; but such cases are not worth much without post-mortem details. One case is, however, too important to be omitted, as a careful autopsy was made. A woman with left hemiplegia was also aphasic. After death, the right Sylvian artery was found obliterated by a clot, and the posterior part of the third *right* frontal convolution highly softened. The left side of the brain was healthy.§ That this convolution on the right side may be injured without causing aphasia is shown by a case of M. Parrot's. In this case the speech was perfect, and after death the third right frontal convolution was found destroyed in all its posterior part.‖ Similar cases have been placed on record by Fernet and Charcot.¶

Having thus discussed the various anatomical sites which have been assigned to the lesion causing aphasia, I shall now review the different theories which have been proposed as to its nature. And, first, it will be expedient to consider the nature of language itself.

Language consists essentially in the establishment of a definite relation between an idea and a sign by which that idea is manifested. This sign may be verbal, vocal, graphic, or mimic. Language may thus be divided into vocal language, written language, &c. We may speak, therefore, of the general faculty of language, meaning thereby all the different modes of expressing thought, and of the different special faculties of spoken language, written language, &c. It is held by Bouillaud** and others that all these special faculties of language are distinct and independent.

* See Trousseau, 'Clin. Méd.,' p. 600; also 'Gazette Hebdomadaire,' 17 Juillet, 1863; Auburtin, 'Considérations sur les Localisations Cérébrales,' Paris, 1863, p. 59; and Broca, 'Remarques sur le Siége, le Diagnostique, et la Nature de l'Aphémie,' Paris, 1863, p. 6.

† Trousseau, 'Clin. Méd.,' p. 601.

‡ Auburtin, op. cit., p. 56.

§ 'Bulletin de l'Académie Impériale,' 1865, p. 665.

‖ 'Gazette Hebdomadaire,' 31 Juillet, 1863.

¶ Trousseau, 'Clin. Méd.,' p. 601.

** 'Bulletin de l'Académie Impériale, 1865, p. 605.

Human speech or articulate language consists in the voluntary production of a series of articulate sounds associated in words, and has as its object the representation of a series of ideas corresponding to these words, and joined together in such a manner as to express a thought.* The expression of thought by speech requires—1. The intellectual possession of a language susceptible of being spoken; 2. A proper conception of the relation between an idea and the words which express it; 3. The will of expressing this idea by articulate sounds; 4. The possession of means of communication between the will and the muscles concerned in articulation; and, 5. The power of so co-ordinating the movements of these muscles as to produce a series of articulate sounds corresponding to the series of ideas. Speech is, therefore, accomplished by the employment of three distinct kinds of psychical force:—1. Of intellectual force, in the formation of a thought capable of being expressed in words; 2. Of voluntary force, in the determination to utter these words; and, 3. Of motor force, in the realisation of the movements necessary to the articulation of the words.† All of these forces, though necessary to the expression of thought by speech, are not necessary to the act of speech itself. In moments of emotion, the first and second may be dispensed with, and an oath or an ejaculation may be uttered without any exercise of the intellect or the will.

It is probable that a number of cerebral co-ordinations are also necessary to the proper expression of thought by speech. In order that speech may be intelligent and fluent, the ideas and the words require to be arranged in a certain order. In health the words may be arranged properly by an exercise of the intellect and the will by the speaker thinking over the words which he is about to use. In such a case the utterance of words is slow and deliberate, as the speaker requires to make a double effort of his attention in finding first the idea, and then the words by which most clearly or elegantly to express it. Where the speaker is engaged in ordinary conversation, or where he is deeply interested and excited with the subject on which he is talking, his words come quickly, and without his bestowing any attention on them. In such cases speech would appear to be automatic. To give a better illustration:—An orator is called on suddenly to speak on a subject on which he has not prepared any remarks. On first rising he speaks slowly, and hesitates as to the words to be used. His ideas are confused, and he has a difficulty in expressing himself in appropriate language. Gradually, as he warms with his subject, he finds his words come more and more readily, and his ideas arrange themselves in more regular order, till at length, in the full swing of his oration, his ideas and his words appear to come spontaneously. There is here, I believe,

* See Parchappe, 'Bulletin de l'Académie Impériale, 1865, p. 679.
† Ibid., p. 681.

an example of cerebral co-ordination—a co-ordination not merely of the actions necessary to the furnishing and proper arrangement of words, but also a co-ordination of those actions necessary for the formation and arrangement of ideas.

For the consideration of aphasia, it will be convenient to adopt a simple division of articulate language suggested by Bouillaud. He divides articulate language into two distinct elements, viz., 1st, the faculty of creating or of learning words as signs of our ideas, and of preserving the recollection of them, which he calls interior speech; and, 2nd, the faculty of pronouncing, of articulating these same words, which he calls exterior speech. Exterior speech is thus only the expression of interior speech.*

The simplest and plainest division of aphasia is that of Baillarger.† He divides it into simple aphasia, in which there is merely an inability to make use of words as signs of our ideas—and perversion of speech, in which words are used to represent ideas with which they have no connection in ordinary language. Although in actual practice these two conditions are frequently found combined, it is expedient to consider them separately.

To begin with the consideration of simple aphasia. At the first glance, it is evident that in this division there are two chief groups. In the first, there is loss of both speech and writing; in the second, there is loss of speech only. By some writers these have been designated respectively amnesic and ataxic aphasia.‡

In amnesic aphasia, or that form in which there is loss of both speech and writing, the easiest hypothesis is to suppose that there is a loss of the memory of words—or, as it has been called, verbal amnesia. Did the patient possess the memory of words, it is natural to suppose that he would be able to express himself by writing; but such is not the case. Some writers have supposed that there are special cerebral co-ordinating centres for speech and writing, and that both of these have been injured to such an extent as to render both speech and writing impossible, by reason of the co-ordinated movements necessary to each being inefficiently performed. It appears to me that such an explanation is very far-fetched, and quite unnecessary, as the theory of forgetfulness of words, though perhaps not altogether a satisfactory explanation of certain cases, is sufficiently plausible. Trousseau § has argued that a person cannot think without words; but the statement of Professor Lordat, of Montpellier, who was himself aphasic, is conclusive to the contrary.

* 'Bulletin de l'Académie Impériale, 1865, p. 618.

† Ibid., p. 818.

‡ See 'Edin. Med. Journal,' March, 1866: "Case illustrating the supposed connection of Aphasia (loss of the cerebral faculty of speech) with right Hemiplegia and Lesion of the external left frontal Convolution of the Brain," by William R. Sanders, M.D., F.R.C.P.

§ 'Clinique Médicale,' p. 624.

Lordat, after his recovery, stated that he was in the habit of composing lectures in his own mind, without being able to put a single idea into words.*

In the second or ataxic group of simple aphasia—viz., that class in which the patient, though unable to speak properly, has still the power to express his thoughts by writing—the explanation is more difficult. And, first, in examining and considering such cases, it is necessary to distinguish clearly between the mere mechanical act of writing and the expression of thought by written language. It is possible for some patients belonging to that class in which I assume there is mere forgetfulness of words, to write clearly and distinctly certain words which they possess, or which they have just heard repeated, or which they have copied; but this is merely the art of writing—it is not the expression of thought by that means. In the group of cases of which I am now speaking, the patients, though unable to express themselves by articulate language, remain perfectly capable of expressing their ideas by writing.† In such cases it is clear that the patients have not lost the memory of words. What, then, is the particular lesion in such cases? Several hypotheses have been brought forward. Trousseau‡ maintains that they resemble the first class in their being due to a loss of memory. This is a loss of the memory, not of words, but of the means of co-ordinating the movements necessary for articulate speech: in other words, the patients have forgotten how to speak.

"The infant speaks," says M. Trousseau, "only because it has learned to speak; and one can comprehend that it can forget what it has learned, and that aphasia can be the consequence of the loss of the memory of the complicated movements necessary for the articulation of words."§ Broca, who also holds this view, thinks that the successive degrees of perfection which we observe in the speech of children are to be explained by the successive degrees of perfection of a particular kind of memory, which is not the memory of words, but that of the movements necessary to the articulation of words; and that it is the latter kind of memory which is lost in this form of aphasia.

Now, the movements necessary to the articulation of words, though started by the will, are only incompletely directed by it. When we wish to utter a certain word, or to pronounce it in a certain manner, we do not consider how this is to be done. We only look to the end to be attained; we do not trouble ourselves as to

* 'Clinique Médicale,' p. 621; also Lordat, 'Analyse de la Parole pour servir à la Théorie de divers cas d'Alalie et de Paralalie,' Montpellier, 1843.

† An excellent example of this is given by Trousseau at page 615 of his 'Clinique Médicale.'

‡ 'Clinique Médicale,' p. 625.

§ Quoted by Baillarger. See 'Bulletin de l'Académie Impériale,' 1865, p. 819.

the means. We do not know all the different movements required for the articulation of words; how, then, can we remember them? How can we recollect acts of which we have not been conscious? If we adopt this explanation of loss of speech, we may as well apply it to all cases of partial or complete palsy in which the muscles are in a normal condition. I therefore consider this theory of forgetfulness of co-ordinated movements as more than doubtful.

Another explanation is that of M. Bouillaud. Bouillaud believes, and since 1825 has laboured to make others believe, that somewhere in the anterior lobes of the brain there is placed a faculty which presides directly over the co-ordinated movements necessary for speech.* He designates the seat of this faculty, the legislative or co-ordinating organ of speech. He holds that, while some cases of aphasia may be due to a loss of memory of words, the majority are owing to a lesion of that part of the brain in which is seated this co-ordinating organ of speech. This theory is a very tempting one, inasmuch as it explains the phenomena of ataxic aphasia in an extremely simple manner. It rests on the fact that, in complicated voluntary movements, the will is only the point of departure. And, since the most complex muscular co-ordinations can be accomplished without being submitted to our examination or combined by our reason, it is natural to explain this by supposing the existence of co-ordinating centres for these movements. But, granting the existence of a separate co-ordinating centre for the movements of speech, why place it in the brain? The doctrine that the gray matter of the cerebral hemispheres is the seat of intellectual power is universally admitted. If, then, we accept the theory that a portion of this gray matter is subservient to a purpose which cannot be considered as in the least degree intellectual, we run counter to all our former ideas of cerebral physiology. Is it not much more probable that the co-ordinating centre of speech is seated in the medulla oblongata? Are not the olivary bodies much more likely, as supposed by Schroeder Van der Kolk, to be the co-ordinating centres of speech, than the gray matter of the anterior lobes of the brain? M. Bouillaud, it is true, has made a suggestion that this principle may reside in the white substance of the anterior lobes, and that the gray matter immediately in contact with it may be the seat of the intellectual element of interior speech.† In other words, M. Bouillaud believes that the white or conducting part of the brain substance can regulate muscular co-ordinations. This theory is quite opposed to modern physiology. Again, if there is a cerebral co-ordinating centre for speech, does it reside on one or both sides of the brain? —in other words, is it single or double? If single, how does it

* 'Bulletin de l'Académie Impériale,' 30 Avril et 15 Mai, 1865, p. 617.

† 'Archives Génerales de Médecine,' 1825, t. viii; quoted in Bulletin de l'Académie Impériale,' 1865, p. 618, note.

govern the muscles of both sides? In those cases in which motor organs are under the special control of certain parts of the encephalon, the muscles of each side receive their nervous supply from separate sides of the encephalon; but here we should have an example of a cerebral centre seated on one side of the body, governing muscular motions on both sides. On the other hand, if this cerebral centre of Bouillaud is double, how is it that the majority of cases of aphasia are caused by a lesion of one side of the brain only? Were the organ a double one, we should expect that its destruction on one side alone would interfere only with the muscular motions of a single side, leaving those of the other side unimpeded. In such a case speech would not be greatly interfered with, for patients with paralysis of one side of the tongue talk quite intelligibly.

The original authorship of the next theory I cannot ascertain; it is upheld in France by M. Parchappe, and in this country by Dr. Sanders. This theory maintains that, in those aphasic patients who can write, the motor impulse to speech cannot be properly conveyed to the articulating muscles, or to the co-ordinating centre of articulation, by reason of some injury of the voluntary initiating or connecting apparatus. Of course in aphasia, which consists in a loss of speech from cerebral causes, the lesion must be somewhere in the brain. Supposing the memory of words and other faculties necessary to speech to reside in the anterior lobes, a lesion of the white matter of those lobes might separate and cut them off from the muscles of articulation. Thus the individual might have the memory of words intact, and have all the inclination to pronounce them, but, by reason of the interruption of the nervous current, he might be unable to cause these muscles to act. This theory somewhat resembles that of Bouillaud, but differs from the latter in this—that it does away with the difficulty of establishing a cerebral co-ordinating centre for articulation. The co-ordinating centre might be in the medulla oblongata or elsewhere, and the voluntary impulse might be conveyed thither from the anterior lobes of the brain. This theory may also suit those cases in which words are pronounced, but in an imperfect manner. Supposing the conducting apparatus to be in bad working order, the impressions conveyed by it might be so altered and distorted as to give rise to altered and distorted muscular motions.

I come now to the last theory or suggestion. It has occurred to me, while considering the various phenomena of aphasia, that possibly these, or some of these, may be due to a deficiency or impairment of those cerebral co-ordinations, of which, in a previous part of this paper, I have stated the probability. It is unnecessary here to repeat the arguments which were brought forward to show that in thought and in speech cerebral co-ordinations are necessary. If the concurrence of many different parts of the brain is essential to the

act of speech—an opinion held by many psychologists—then many different lesions might give rise to aphasia by cutting off the communication between these different parts, and so preventing the proper combination of their actions. In the present state of our knowledge of cerebral actions, very little can be said with regard to these co-ordinations; but it is conceivable that an interruption of them, or of some of them, might give rise to a difficulty or an impossibility of pronouncing, or of properly arranging, the series of articulate sounds which constitutes speech. This theory would allow greater latitude to the position of the lesion than Broca's views assert.

Having now mentioned the various theories with regard to the simple aphasia, or that form in which there is merely a loss or impairment of speech, I come to the other division of aphasia—viz., that form in which there is perversion of speech, and words are used to express ideas with which they have no connection in ordinary language.

This form admits of division into two classes. In the one, the patients believe themselves to be talking correctly; in the other, they are conscious of their errors of language as soon as the words are uttered.

In that class in which the patient utters words totally at variance with his meaning, without being conscious of the error, it is evident that he has lost the proper sense of the relation of words to ideas. The memory of words does not seem, in many such cases at least, to be greatly deficient; it is the memory of their meaning that has failed. There is, however, more than this. A false relation has taken the place of the proper one. When a patient calls for his boots, meaning his razor, and is astonished that his boots are brought to him, his sense of the settled relation of words to things must have become so perverted that he imagines words to express meanings quite different from those assigned to them.

In the other class, or that in which the patient, when he gives wrong names to objects, is immediately conscious of his error, it would appear that the proper conception of the relation of words to ideas or things, though impaired, is not altogether lost. The two classes of patients may be compared to persons of different degrees of education. The one person spells altogether badly, and is unconscious of his errors. The other also spells badly; but as soon as he sees the words written down, he perceives that something is wrong, and rectifies his spelling immediately. In like manner, the patient in whom the relation of words to objects is lost in the minor degree, as soon as he hears himself pronounce a word becomes aware that it is the wrong one. The bad spelling is detected by the eye, the wrong word by the ear.

Having now discussed the different classes into which I have

divided aphasia, I shall speak shortly of those patients who, having only a very few words at their command, are still enabled to swear or utter ejaculations when under the influence of passion. The explanation of such cases appears to me very simple. Oaths are, under such circumstances, emotional and automatic, being uttered without the interference of the intellect or the will. They partake of the nature of reflex phenomena, being excited by stimuli from without, and being uttered without the consent of the individual.

In conclusion, I have only to make a single remark on the intellectual condition of aphasics. In all of the cases of aphasia which I have seen, the intellect was decidedly weakened, but certainly not to such an extent that the abolition of speech could have been due to an abolition of ideas. I believe, therefore, that the loss of intelligence does not necessarily enter into the definition of aphasia, as it is probably due to the extensive softening of the cerebral gray matter which is found in most confirmed cases of the affection.

II. *Cases illustrating the Diagnosis of Paralytic Insanity, with Remarks* (partly translated from the French). By G. Mackenzie Bacon, M.D., Assistant Medical Officer of the Cambridgeshire Lunatic Asylum, Fulbourne.

The ordinary features of so-called "general paralysis" are so familiar to those who treat the insane in numbers, that they are apt to regard its diagnosis as a transparent and very easy matter. It happens, however, sometimes that cases arise which offer all the prominent early signs of the disease, and yet do not go on to a fatal termination. In such instances the mental symptoms are not merely arrested for a time, but the patient to all appearance recovers. It is not unimportant to bear this fact in mind for other than pathological reasons, as a too positive prognosis might recoil unpleasantly on the giver were it refuted by an unexpected recovery. There is, probably, no disease of the brain about which we should be more ready to give a positive opinion than general paralysis, for its symptoms are, as a rule, easily recognised, and its course is so uniform; yet this very fact is liable to produce a false security, and so sometimes to favour error. The most distinctive signs of this disease are allowed to be the grand or optimist illusions and incoherence which precede any actual palsy; and, knowing that these symptoms are most frequently followed by certain destructive changes in the brain, we are