THE

BOSTON MEDICAL AND SURGICAL JOURNAL.

NEW SERIES.]

THURSDAY, SEPTEMBER 1, 1870.

[VOL. VI.—No. 9.

Original Communications.

APHASIA, AND THE PHYSIOLOGY OF SPEECH.

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PART I.—APHASIA.

For the sake of a definite line of reading, the writer selected the above subject a few months ago, and has jotted down in the course of study such facts and theories as seemed to have the most importance, without regard to their novelty, and with no attempt to separate the well known and common place from those more new and startling. The desire was not to throw new light on the subject, but to collect enough of the scattered rays existing to illuminate the obscure relations of the faculty of speech to the other cerebral functions.

Historical Survey.—The literature of aphasia has assumed such proportions during the last ten years as to render it difficult to select such facts as shall best represent its growth. The symptom, aphasia, has from the first been swallowed up in discussion concerning the location of the faculty of speech, and this discussion is decidedly of French origin. It seems imperative, therefore, to present an outline of it here, however frequently it has been summarized before, since it is the French root, stimulated by French enthusiasm, which has produced such luxuriant foliage. The little fruit which has yet ripened is not quite of the expected variety. The following facts are collated from French authorities.

Cases which would now be called aphasia were recorded by ancient writers, but excited little intelligent interest till the present century. Cullen and Sauvages, as Trousseau says, wrote many deplorable things on *alalia*. Towards the close of the last century, J. P. Frank distinguished various kinds of *alalia* from *aphonia*, but attributed the aphasic symptoms to partial paralysis of the tongue. Joseph Frank

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also failed to perceive the higher sources of loss of speech, and sought the lesion in the medulla at the roots of the glosso-pharyngeal and hypo-glossal nerves.

In 1810, Gall commenced the publication of his great work devoted to the localization of the mental faculties. By conjecture, based on his early observations of the prominence of the eyes (*yeux déprimés*) in persons whose power of memorizing words was great, he placed the faculty of language in the anterior lobes. He also supported this view by two cases of loss of speech—one reported by Pinel and one by Baron Larrey.

According to Bouillaud, Gall did not distinguish clearly between the faculty of language on its mental side and the power of coördinating the movements necessary to articulate speech. This distinction he himself made in a memoir read to the Academy in 1825 (*Traité de l'Encéphalite*). In this paper he affirmed that the centre of coördination for speech was in the anterior lobes. In 1839, he supported his views with new facts and arguments, and once more in 1848. He claims at this time to have found no evidence opposed to his theory of location, in seven or eight hundred cases collected by him. He even offered a reward of five hundred francs for a single case of extensive disease of the anterior lobes without impairment of speech. In the discussion of 1865, he denied that any such case had been presented. He had, however, previously attached to his offer the difficult condition that he should have an opportunity to see the patient, living, and the brain after death, in order to personally verify all the facts in the case. This want of confidence on the part of M. Bouillaud in his *confrères* may well excuse an occasional lack of it in strangers.

In 1820, Lordat, who became aphasic himself eight years after, ascribed the affection, which he called *alalia*, to defect of the centres of coördination used in speech. After his recovery, he stated that he was conscious of no impediment to thought, but could neither express his ideas by written nor by spoken words. He argued from

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his own case that words were not necessary to thought.

In 1836, Dr. Marc Dax, in an essay entitled "*Lesions de la moitié gauche de l'encéphale coïncidant avec l'oubli des signes de la pensée*," stated that as far back as 1800 he had noticed the frequent concurrence of loss of speech and right hemiplegia. His essay was republished in 1865, and was referred to a committee whose report furnished the basis of the famous discussion at the Academy of Medicine in Paris. (*Gaz. Hebdom.*, Paris, 1865, Avril, No. 17, p. 259.) In 1863, Dr. G. Dax, in a paper read before the Academy, had endeavored to show that not only was the lesion in aphasia invariably seated in the left hemisphere, as his father had shown, but in the anterior and outer portion of the middle lobe of it.

In 1856, Dr. Marcé endeavored to show a distinction between the coördinating centres for speech and writing, but did not attempt to locate either. (*Mem. Soc. Biolog.*, 1856.)

In 1861, a discussion arose in the *Société Anthropologique* upon the localization of the cerebral functions. Dr. Gratiolet asserted that such attempts had been heretofore failures. Dr. Auburtin cited cases to show that the anterior lobes of the brain were the seat of the coördinative power necessary to speech. M. Broca, though at first sceptical, in consequence of two striking cases of aphasia which opportunely occurred, became one of the strongest partisans of the localization theory. He not only placed the lesion in aphasia in the left anterior lobe, but believed he had found the seat of the faculty of *articulate language in the posterior third of the third left frontal convolution*. His two cases were first published in August and November, 1861. (*Sur le Siège de la Faculté du Langage Articulé*. *Bul. de la Soc. Anat.*, Paris, 1861.)

In consequence of this bold theory of M. Broca, observations of the lesions in aphasia became more frequent and exact. Clinical observations, with and without autopsies, were reported by Drs. Charcot, Vulpian, Parrot and Fernet. Trousseau was at this time collecting the many admirably described cases which form the ground work of his annesic theory of aphasia. Dr. J. Hughlings Jackson was investigating the causes of aphasia, and, in 1864, published a most suggestive paper on the "Loss of Speech; its Association with Valvular Disease of the Heart and with

Hemiplegia of the Right Side." (London Hospital Reports, vol. i.)

In April, 1865, commenced a long and interesting discussion upon aphasia in the Academy of Medicine. In December, 1864, M. Lelut, one of a committee consisting of Messrs. Bouillaud, Béclard and Lelut, to whom had been referred the paper of Dr. M. Dax, had made a minority report. In it he briefly disavowed the whole theory of localization, and classed all attempts at locating the faculty of speech as unscientific and phrenological. The following April, M. Bouillaud presented a majority report, reviewing the subject at length and criticizing M. Lelut severely. He defended the doctrines of Gall in general, and confirmed his location of the sexual faculty in the cerebellum and of the faculty of speech in the anterior lobes. Trousseau followed in a critical analysis of some new cases of his own, and summarized the observations recorded up to that time in an able and eloquent manner. He presented and argued at length his theory of amnesia, or loss of memory, as the cause of aphasia.

The discussion was continued for several weeks, and was participated in by Messrs. Parchappe, Briquet, Bouillaud, Piorry, Baillarger, Bonnafont and Cerise. Messrs. Parchappe, Baillarger and Cerise, physicians to hospitals for the insane, opposed the theory of local faculties, strongly maintaining the unity of mind. Fournie (*Physiologie de la Voix et la Parole*, Paris, 1866) and Vulpian (*Leçons de Physiologie du Système Nerveux*, Paris, 1866) also rejected this theory.

Since 1865, the literature upon this subject has been constantly extending in scope and interest, and English authors have continued the investigations inaugurated by the French savans. The prominent papers on aphasia, and the questions suggested by its phenomena, are as follows:—Dr. Gairdner, *On the Function of Articulate Speech*, Glasgow, 1865; Dr. Banks, a paper in the *Dublin Quarterly Journal of Mental Science*, February, 1865; Dr. Wm. Ogle, *Aphasia and Agraphia*, St. George's Hospital Reports, 1866; Dr. Moxon's theory of the *One-sided Lesion in Aphasia*, *British and Foreign Review*, April, 1866; Dr. Wilks on *Nervous Diseases*, *Guy's Hospital Reports*, 1866; Dr. Popham on *Aphasia*, *Dublin Journal of Mental Science*, Aug., 1867; Dr. Robertson, in the *British Journal of Mental Science*, Jan., 1867; Dr. Hughes Bennet, read before the *British Medical*

Association at Norwich, 1868; Dr. J. W. Ogle, thirty cases of Defective Speech, with Disease of the right Side of the Brain, *Lancet*, 1868, vol. i. p. 371, vol. ii. p. 111; Maudsley concerning Aphasia, *Lancet*, Nov. 28th and Dec. 5th, 1868; H. Charlton Bastian, M.D., On the various Forms of Loss of Speech in Cerebral Diseases, in the *British and Foreign Review*, Jan., 1869, p. 209, to April, p. 470; Dr. Carnley, *Medical Times and Gazette*, Feb. 13th, 1869; and Dr. Bateman, in the *British Journal of Mental Science*, 1868 and 1869, and in the *Lancet*, Feb. 13th, 1869.

The principal papers by American observers which have come to my notice are the following:—Dr. Austin Flint, Sr., Cases in the *N. Y. Medical Record*, No. 1; Dr. Richardson, in the *Buffalo Medical Journal*, quoted in the *Richmond Medical Journal*, May, 1867; Dr. Wilbur, of Syracuse, in the *American Journal of Insanity*, July, 1867; On Aphasia as illustrated by Congenital Defect, Dr. Seguin, late Resident Physician of the New York Hospital; A Statement of the Aphasia Question, with a report of fifty cases, *Quar. Jour. of Psychological Science*, vol. ii., Jan., 1868; Dr. Edes, a fully reported case, with an autopsy and microscopical examination, *Boston Med. and Surg. Journal*, Feb. 6th, 1868; and Dr. Bartholow, *Jour. of Mental Science*, April, 1868.

Dr. Niemeyer has reported a case of aphasia, with remarks, which may be found in the *Times and Gazette*, Jan., 1870. The recent contributions of German writers may be found in Dr. Bateman's paper, in brief (*Jour. of Mental Science*, Jan. and April, 1868).

Aphasia.—The term *aphasia* was first adopted by Trousseau. The old term, *alalia*, included, as he says, "a monstrous assemblage of contradictory phenomena," and was entirely inappropriate to the symptoms he wished to include. *Aphemia*, besides having a double signification, was not comprehensive enough, having been applied by Broca to the loss of articulate language alone. The adoption of a name would seem to imply the duty of definition. This Trousseau gave, in spite of his attempted refusal. He makes aphasia include, in varying proportions, the loss of memory, or amnesia of speech, writing and gesture. "Aphasia," he says, "consists in a loss of memory for words, in a greater or less degree; of the memory of acts by which words are articulated; and of intelligence." (*Clinical Medicine*, vol. i. p. 273.) He rejects such cases of defective speech or ex-

pression as depend on the paralysis of the organs involved, without loss of memory or of coördinating power.

Since the name and definition are Trousseau's, we will select one of his cases by way of illustration. It is translated and slightly abbreviated from the *Bulletin de l'Académie de Médecine* (vol. 30, p. 650). "A poor workman, who had been educated at a seminary for the priesthood, and whose mind was therefore somewhat cultivated, was seized with apoplexy after a debauch. There was paralysis of the right side, and from the moment of the attack he could only say, *cousin*. When irritated by questions, he would sometimes cry out *Sacrou!* with the evident intonation of an oath. When nearly well of his paralysis, I tried to teach him to write. He wrote his name, *Pacquet*, correctly, but when asked to write the name of his wife, *Julie*, he still wrote *Pacquet*. The name of the month was also *Pacquet*. This was the extent of his ability in writing. When asked to make the gesture of a man playing the clarinet, he made that of a man who beats a drum. When shown how to blow a clarinet, he imitated the motions clumsily; but when asked to beat the drum, he hesitated a moment, and then went on blowing the clarinet. Here, then, was a man of cultivation prevented from manifesting his thoughts either by speech, writing or gesture."

To complete the illustration, it is necessary to observe that the mind was impaired in this case. The attention was feeble and the memory badly defective. It is to this defect of memory that Trousseau attributes the symptoms in aphasia. The defect, according to his definition, should implicate not only those nerve cells which serve as a storehouse for words, but those which preside over the coördination of the movements necessary to speech. The above case is, I think, quite a typical one, according to Trousseau's definition. His eloquent peroration before the Academy will develop still further his idea of aphasia. "The aphasic person, gentlemen, has become almost a child, with this difference only, that he has almost entirely forgotten what the child has never learned. The brain of the child is a field upon which the plough does not trace in vain its fertilizing furrow; the brain of the aphasic is the sea, where the prow of the ship leaves no trace."

Aphemia.—M. Broca uses the term *aphe-mia* in a more restricted sense than aphasia implies. The following is from his *Mémoire sur le Siège de la Faculté du Language Ar-*

ticulé:—"The abolition of speech in persons who are neither paralyzed nor demented, constitutes a symptom so singular that it appears to me useful to designate it under a special name. I will give it, then, the name of *aphemia*, for what these patients lack is simply the faculty of articulating words. They hear and understand all which is said to them; they emit vocal sounds with ease, and execute with their tongues and lips movements much more extensive and energetic than those required for the articulation of sounds."

The two cases to which M. Broca owed his conversion do not seem to have been purely aphemic. In the first, the patient could neither speak nor write. In the second, the one in which the lesion was so exactly limited to the second and third left frontal convolutions, the patient could not guide his hand to form letters, as M. Broca himself admits. He used, however, a very expressive pantomime, and seemed to understand all which was said to him. M. Broca therefore assumes that the general faculty of language was unimpaired. Since cases of pure aphemia are very rare, the advocates of M. Broca's theory have in most instances been obliged to assume a connection between the loss of articulate speech and lesion of the third left frontal convolution, in presence of many other symptoms and of more varied and extensive lesions.

It is necessary to admit the existence of aphemia in a few well-observed instances. Trousseau mentions two or three only: one of a porter who could not speak a word, but who wrote a clear account of his attack; another of a gentleman who was speechless, but who gave orders and kept up a correspondence in writing. A still more remarkable case was that of a merchant of Valenciennes, who could write, but who was unable to read aloud what he had just written. (Bul. de l'Acad., 1865, vol. 30, p. 651.) Here the power of thought and of expression by writing remained, but, aphemia existing, the words just written could excite no audible response.

Forbes Winslow, out of twenty or more cases of defective speech, gives but one which can be considered pure aphemia. (Dis. of Brain and Mind, p. 495.) Of thirty-four cases reported by Dr. J. Hughlings Jackson, there is not one of aphemia. (Lond. Hospital Reports, vol. i.) Of the twenty-eight cases related by Trousseau in his Clinical Medicine, in fourteen the general faculty of language was impaired or destroyed. In thirteen the loss of the pow-

er of writing is not mentioned, but may be fairly inferred in some of them, while in others there was paralysis of the right hand, or inability to write when well. The only remaining case is that of M. Broca, which, we have seen, was defective as an example of aphemia. Of some thirty cases adduced on both sides, during the discussion at the Academy, but four were cases of aphemia. Two of these have been mentioned above, and were presented by Trousseau, the other two being offered by M. Bouillaud.

It was conceded then, by both parties, that aphemia, pure and simple, might exist; but our figures show out of a hundred or more cases of aphasia but five in which the faculty of writing persisted. In most cases of aphasia a certain degree of facility of expression by gesture remains; and is often the only guide in estimating the state of the intelligence. The power of designing, of calculation, of composing, playing, and singing music, or of playing games, may be affected or remain intact. All such cases, more or less complex, in which loss of speech is the chief symptom, M. Bouillaud considers as cases of aphemia, with additional symptoms which may or may not be present.

I have been unable to gather any cases in which these secondary symptoms have existed independently of affections of speech. A few cases of so-called *agraphia* are on record, but the inability to write has always been accompanied or preceded by some aphemic defect. As at present generally understood, aphasia includes both aphemic and agraphic defects in varying proportions; and, as we shall soon show, due sometimes to an impaired memory, sometimes to faults of coördination, and sometimes to both.

Amnesic and Ataxic Aphasia.—Using the term aphasia to cover that assemblage of symptoms most common in cases of loss of speech, not depending on paralysis or dementia, let us consider the distinction between the mental and motor side of such cases. Are the functions called memory and coördination lost independently of each other? It is evident Trousseau has viewed his cases particularly in their mental aspect. He argues at length the probable impairment of intellect in all of them. He thinks Lordat was deceived in his estimate of his own mental power while aphasic. He makes loss of memory for words the chief symptom, and styles loss of coördinating power the loss of memory for acts by which words are articulated.

His definition admits the existence of

ataxic symptoms to some extent in all cases, but he attributes them to amnesia. The idea of the act by which a word is pronounced exists in the mind only in gross, there being no consciousness or memory of individual muscular actions. We can only will the result of certain combined actions which follow spontaneously. In fact, so automatic does speech become that the adult is seldom conscious of this act of will, unless special attention is given to it. We are, therefore, unconscious, and do not remember the acts by which words are performed. It would be difficult for any but a teacher of elocution, or articulation, to recall or describe such acts without at the same moment performing them by way of reminder.

With proper deference, I would suggest that when memory, in the ordinary sense, takes no part in an act, the loss of power to perform such an act should not be set down to loss of memory. It seems like a forcible perversion of language, for the sake of adapting facts to a theory, to speak of mental and motor symptoms as alike due to loss of memory. If by memory is meant the unconscious power of retaining and reproducing impressions which the nerve cell possesses wherever found, then paralysis may be styled a loss of memory. The term was evidently used in its ordinary sense as applied to words; and if so, it was illogical to use it in a different sense when applied to the acts by which words are performed.

M. Bouillaud, in 1825, distinguishes between the mental and motor aspect of speech, and in 1865 opposed the amnesic theory of Trousseau. M. Broca says, in relation to aphemia:—"One can make, then, two hypotheses on the nature of the special faculty of articulate language. In the first it will be a superior faculty, and aphemia will be an intellectual disorder. In the second it will be a faculty of an order much less elevated, and aphemia will be only a disorder of locomotion."

The integrity of the faculty of language, on its mental side, can only be determined by spoken or written words, by acts performed in response to the requests of others, or by the subsequent testimony of the patient. As the first two modes of expression are absent and the third usually much impaired in aphasia, the evidence is necessarily limited. The best test of such integrity is furnished in those few cases where the lesion has spared the power of writing. Since the written corresponds exactly to the spoken word, and it is unnecessary to

suppose duplicate word-centres superintending the two methods of expression, the facility of expression by writing must be an index to the condition of the intellectual word-centre. In other terms, when the faculty of speech on its mental side is at fault, the written and spoken word will be equally affected. If the coördinating power alone is impaired, articulate speech may be affected independently of the power of writing.

It may be objected that the patient, in the case selected from Trousseau, could only say *cousin*, and could only write *Pacquet*. Being a well-marked case of amnesic aphasia, the power both of speaking and writing was nearly lost, but the want of identity in the written and spoken words remaining may be attributed to lesion of the fibres conveying voluntary impulses. Aphasia is seldom purely amnesic or purely ataxic, but partakes of both characters, or leans more or less decidedly to one or the other form, with a varying amount of impairment of voluntary transmission.

A case or two of incomplete aphasia, coming under my own observation, may prove better by way of illustration than others in which the entire loss of speech prevented all knowledge of the subjective phenomena.

A man, aged 60, of eccentric habits and insane tendencies, became more and more irascible and suspicious, giving way at last to horrible delusions respecting the conduct of his children. While denouncing them to his brother, he was seized with an attack of apoplexy, the more prominent effects of which were transitory. He retained his delusions, however, and also firmly believed that at the moment of the attack his brother had struck him. When I first saw him, there existed a defect of speech, which his friends referred to the apoplectic seizure. There was no labial nor lingual paralysis, and his articulation was perfectly distinct. There was a great defect in his expression of ideas which resembled incoherence, but seemed due to loss of memory. Substantives were remembered with difficulty, and pronouns were badly misapplied. He made strange circumlocutions to express his ideas which seemed definite enough to his mind, although delusional to some extent. Only those constantly with him could unravel his meaning.

For instance, in asking for his shirt and drawers, he would say, "Give me them that were on my breast, and those that I wear on my legs." In alluding to his brother's death, he used the singular peri-

phrase, "when he was about being got through with." He could write freely, but his expressions were of precisely the same character. For instance, in referring to his children's conduct and its effect on himself, he wrote:—"You will be guilty of the death, of the tears of those, and prayers of those, who have lived the life of an honest man. *I mean J— B—.*" As if, by a happy effort, he succeeded, in the last sentence, in making a clear statement of himself as the person referred to. His gestures were often expressive of anger or impatience, but gave little help in understanding his meaning beyond designating objects and directions.

This case shows a partial affection of the general faculty of language, on its mental side, occurring in a case of delusional insanity, in consequence of an apoplectic seizure. The loss of memory for substantives in this case was partial, but in a case reported by M. Piorry in 1826, and in others of more recent date, this loss has been quite complete. M. Piorry gave to this form of aphasia the term *amnemonomia*, and charges Trousseau with having stolen his theory and given a new name to the same disease.

A gentleman, formerly prominent in business and politics, presents the following permanent defects of speech, with hemiplegia of the right side. There is no lingual or labial paralysis discernible, and yet articulation is very clumsily performed. At times he pronounces a few sentences distinctly; at others his speech is a mere jumble of sounds. At times he can say "Hopkinton," which has become a sort of test word with him, quite well; at others it degenerates into something like "Blopsingson." He gets impatient when unable to make himself understood, and closes the conversation by saying quite distinctly, "I can't talk."

His expression is also defective for another reason. He retains his interest in politics, and often attempts to relate some incident in his experience, but usually forgets the names of persons and places important to his story. In such case he likewise gets impatient and says, "I can't remember." He also has the singular habit of saying "no" when he means "yes," and the opposite. He has not learned to write with his left hand, as he thinks it would be useless to try. He is aware of the double nature of his defective expression, and thinks the mental is nearly as bad as the motor difficulty. The want of co-ordination is, however, the most striking

feature of the case. His intelligence is but little impaired, aside from loss of memory for names. There is less emotional disturbance than is often seen in cases of hemiplegia without aphasia.

The preceding cases were under the care of Dr. Walker, at the Boston Hospital for the Insane.

[To be continued.]

SIMPLE DRESSING BY CONTINUED MOISTURE.

By Dr. LEON LE FORT. Translated by FRANK W. DRAPER, M.D., Boston.

THE mortality after operations, higher in military than in civil practice, greater in the larger hospitals of cities than in the smaller country hospitals, more considerable in those of Paris than in those of London, depends especially on the more or less frequent development of two formidable complications, pyæmia and erysipelas. Sometimes, in some of our hospitals, these diseases become so grave and appear with such frequency that they may be characterized as an epidemic, so that, at such seasons, one can hardly make a simple incision without seeing erysipelas follow; while if operations of some magnitude are ventured upon, it is with dread of pyæmia.

Such a condition of things becomes a source of constant peril to our patients, but it is also of positive interest in the progress of science, unavoidably pre-occupied with the uncertainty of its results. Surgery in Paris is compelled to assume extreme caution, while elsewhere, surgical practice, without doubt occasionally rash, can proceed ordinarily to a degree of boldness excusable by the extreme rarity of those grave complications which are so frequent in the majority of our hospitals. When the diseases are seen to extend with all the characteristics of an epidemic, and when it is remarked, moreover, that these epidemics, like that of puerperal fever, are limited sometimes to one hospital, sometimes to another, and are confined to one series of patients without invading an adjacent number, it is hard not to confess that equally with puerperal fever, there exists an underlying cause for erysipelas and pyæmia, capable of producing these effects, and to be sought for in some other condition than the contagious or rather infectious character of accidental wounds, surgical or puerperal.

In order that such epidemics should develop, it is necessary that there should be one spontaneous case as the origin; they