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SATURDAY LECTURES.

No. 6.

PAUL BROCA
AND THE FRENCH SCHOOL OF ANTHROPOLOGY.

A LECTURE

Delivered in the National Museum, Washington, D. C.,

APRIL 15, 1882,

-BY-

ROBERT FLETCHER.

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THE SATURDAY LECTURES.

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LECTURE.

LADIES AND GENTLEMEN:

You have heard a great deal in these latter days of the Science of Anthropology, and while many of you, doubtless, have been following its investigations and discoveries with interest and profit, others will be prompted to inquire: What is Anthropology, and when, and by whom, was it discovered or invented? To the first part of the question it is unnecessary for me to reply, as Professor Mason, in the second lecture of this course, gave a lucid exposition of what constitutes the science in question; but the reason of its existence, and the circumstances attending its establishment and recognition in the scientific world, it is the purpose of this lecture concisely to explain.

Taking a comprehensive view of the subject, it would be correct to say that anthropology has existed since the earliest days of human civilization. Classical literature shows us Strabo and the geographers describing races—ethnographers; Galen and his followers as anatomists and physicians—biologists, as we should call them now; and Plato and the metaphysicians as psychologists. We go back to Justinian for the first records of an important branch of sociology, the origin of law, and the technologist cannot afford to overlook Vitruvius and Vegetius in tracing out the early history of tools, arms and weapons. But it is not with the separate sciences which together form what we now call anthropology, tempting as the subject is, that we have to do, for the theme is much too vast for the time at our disposal.

I must remind you that the term itself has been used with very different meanings by the theologian, the anatomist, and physician. "Journals of Anthropology," of which there were many in Germany a hundred years ago, were mostly devoted to medicine and surgery. Its use in its present comprehensive sense arose with the establishment

of the Paris Society of Anthropology, about twenty-five years ago, and its fitness for the purpose was so manifest that it has superseded to a great extent the narrower titles of ethnology and archæology. At the present day there are Societies of Anthropology in nearly all the capital cities of the world. They were all founded, more or less, upon the model of the Paris society, which is acknowledged as the parent from which this flourishing progeny has sprung.

It will be more convenient for our purpose to begin with a description of these associations as they now exist, and then, in a brief biography of the eminent Frenchman who founded the Paris society, show you in what manner the science of anthropology received its birth and baptism.

The first French Society which made the study of mankind the especial object of its enquiries, was founded in Paris in the year 1800, and was known as *La société des observateurs de l'homme*—the Society of Observers of Man. From their programme, and from the meagre reports of their transactions which appeared from time to time in the *Magasin encyclopédique*, it is evident that the natural history of man chiefly occupied their attention. In 1803, this association was united with The Philanthropic Society (*La société philanthropique*) and lost its scientific identity. In 1838, there was founded in London, under the presidency of Sir Thomas Fowell Buxton, the leader of the party advocating the abolition of slavery in British dominions, a Society for the Protection of the Aborigines. The object of this association was political and not scientific, but one of its members, a Mr. Hodgkin, visited Paris a year later for the purpose of establishing a French society on the same basis, and came into communication with many eminent men, among whom was the celebrated naturalist, William Edwards. The attempt to found a French abolition society failed, but the interest excited in the cognate subject of race led Edwards and his friends to establish the Ethnological Society of Paris, (*a.*) whose existence was officially authorized by the Minister of the Interior, in August, 1839. This society published two volumes of memoirs, and one, of its

transactions. The work it achieved was excellent in kind, but its membership was never large, and no great degree of zeal was evinced by those belonging to it. In 1842, the American Ethnological Society (*b*) was founded by Albert Gallatin, and in 1844, the Ethnological Society of London (*c*) was established, both after the model of the French Society.

Possessing no museum for the accumulation of specimens, the Ethnological Society of Paris devoted itself mainly to the investigation of certain races, their habits and customs. Unfortunately, too, for its prosperity, it took up with great heat the subject of slavery, which was being fiercely debated in France in the years 1847-8. The society was interested only in the question of race, and of the single or multiple origin of mankind, but an absurd belief became general that ethnology was, in some mysterious manner, another name for abolitionism, and this prejudice survived to be an obstacle in the establishment of the Anthropological Society, ten years later.

What the circumstances were that led to the foundation of the latter society, through what discouragements and obstructions it forced its way onward, and what success was at last achieved, will be described in the biographic sketch of Broca which will be presently attempted.

The time was ripe for the undertaking. The society was established in 1859, (*d*), and in the years immediately preceding rapid advances had been made in the various branches of knowledge which constitute anthropology. In England, Davis and Thurnam had begun their great work, the *Crania Britannica*; in Sweden, Retzius was carrying on his remarkable studies in craniology; Morton, of Philadelphia, having amassed the collection of skulls which was, for many years, the richest craniological collection in the world, had produced his important work, the *Crania Americana*. Boucher de Perthes, after eighteen years of labor in the quaternary deposits of Abbeville, had at last triumphed over ridicule and malice, and had seen his proofs of the great antiquity of man accepted by the leading palæontologists of the world. In Denmark, the Kitchen-middens,

those silent chronological records of the devouring appetite and progressive luxury of primeval man, had been explored and described by Worsäae and Thomsen. In Switzerland, the unusual subsidence of the waters of the lakes had brought to light the relics of the lake-dwellers; and, not less memorable, on the 24th November, 1859, there appeared in London a modest looking volume which has probably exerted more influence on scientific workers than any one book ever published—its title was: *The Origin of Species*, by Charles Darwin.

Prof. Huxley, speaking of this occurrence twenty years later, said:

“It was only subsequent to the publication of the ideas contained in that book that one of the most powerful instruments for the advance of anthropological knowledge—namely, the Anthropological Society of Paris—was founded; afterward, the Anthropological Institute of this country and the great Anthropological Society of Berlin came into existence, until it may be said that, now, there is not a branch of science which is represented by a larger or more active body of workers than the science of anthropology. But the whole of these workers are engaged, more or less intentionally, in providing the data for attacking the ultimate great problem, whether the ideas which Darwin has put forward, in regard to the animal world, are capable of being applied in the same sense, and to the same extent, to man. That question, I need not say, is not answered.”

It may seem almost superfluous to explain the allusion to the lake-dwellings and the kitchen-middens, but some of the younger members of this audience may be glad to learn what is meant by those terms.

In Switzerland the winters of 1853 and 1854 proved to be so dry and cold that the usual spring freshets in the rivers were wanting, and the level of the water in the great lakes was lower than had ever before been recorded. Accident led to the discovery of some ancient piles, and other evidences of man's work. The result of long-continued investigations may be briefly stated, as follows: *The Pfahlbauten*, or pile-works of Switzerland, were villages built on piles

driven into the water on the edges of the lakes. They communicated with the land by one or more bridges, and there is no doubt that defence against wild animals as well as human enemies was the motive for this method of erecting habitations. The debris of the household necessarily fell into the water, together with tools, weapons and ornaments, and thousands of such articles have been recovered from the soil of the lakes around these piles, together with the bones of animals which had served for food. The larger number of these pile-works were erected during the stone age, before the use of metal was known to man; but in Western Switzerland the remains belong to the bronze age, vast numbers of bronze implements and ornaments having been recovered from them. From one settlement alone 500 bronze hair-pins, such as peasant women adorn their hair with, were obtained. Troyon has made an estimate of the population of these lake-dwellings; his figures are 32,000 for the stone age, and 42,000 for the bronze period. The addition to our knowledge of pre-historic man obtained from these Pfahlbauten has been of incalculable value.

Accident, in like manner, drew attention to the real import of certain shell-heaps in Denmark. They had been regarded as raised beaches, the results of upheaval; but with such an origin the shell-fish must necessarily have been of kinds which would live together. They would be of all sizes, and would be mixed with sand and gravel. In the shell-heaps—now known as kitchen-middens, from the Danish Kjökkenmödding, kitchen-refuse heaps—the shells are nearly all of full-grown individuals, and of kinds which do not live together, and no sand or gravel was found in them. Flint implements and bones of animals, birds and fishes abound in them; and it became evident that these shell-heaps had been sites of villages of neolithic man, and that the shells and other remains had accumulated in consequence. Results as interesting as those obtained from the exploration of the lake-dwellings followed, and the museums of Copenhagen are rich with the spoils of the kitchen-middens. Similar shell-heaps have been found in almost all countries.

It was under the auspices thus outlined that the Society of Anthropology of Paris began its career. Its success was assured as the quality of its work became known, and within ten years, in all the chief kingdoms of Europe, societies of like purpose were organized, and are in the full tide of prosperity and active occupation at the present day.

And here it may be well to explain why the term "ethnology" has been so generally superseded by the term "anthropology." The former, as you are aware, is the science which treats of the races of men. Linnæus and Buffon were its chief founders, but Blumenbach moulded it into the shape which it yet preserves. It is to him that we owe the five divisions of the human race which still maintain their place in our school-books, though they have long since been discarded from scientific description. Ethnology classifies mankind according to certain resemblances of features, color, hair, dress, weapons, and the like; anthropology takes his anatomical structure as the basis of comparison. Broca, speaking of the two, says: "Ethnologists regard man as the primitive element of tribes, races, and peoples. The anthropologist looks at him as a member of the fauna of the globe, belonging to a zoölogical classification, and subject to the same laws as the rest of the animal kingdom. To study him from the last point of view only would be to lose sight of some of his most interesting and practical relations; but to be confined to the ethnologist's views is to set aside the scientific rule which requires us to proceed from the simple to the compound, from the known to the unknown, from the material and organic fact to the functional phenomena."

You were told in a preceding lecture that ten distinct sciences were included under the name of anthropology; ethnology, much shorn of its significance, being one of them. You will see then that the more comprehensive term was necessary to indicate the scope of the investigations pursued.

I propose next to give you a succinct account of the societies which were founded after the model of the Paris association.

In 1861, Rudolph Wagner of Göttingen and DeBaer of St. Petersburg organized a German Anthropological Association, (*e*), which was to meet every second year in a German city. Its first meeting was held at Göttingen, but the death of Wagner, which took place soon after, interrupted its further progress.

In 1863, arose the Anthropological Society of London (*f*). It was formed by the secession of a large number of members of the Ethnological Society, and speedily became so successful that it at one time numbered 800 members. It continued to exist under its original title until 1871, when the Ethnological Society consented to unite itself with its ambitious offspring and the designation assumed by the united associations was: The Anthropological Institute of Great Britain and Ireland (*g*.) The Ethnological Society published 13 volumes of Transactions; the Anthropological Society published 9 volumes, and the Journal of the Anthropological Institute has now entered on its twelfth year.

In 1865, the Anthropological Society of Madrid (*h*) was established, its first meeting being held on December 17. Owing to political complications, so common in that unhappy country, and to the opposition of the priesthood, no further meetings were permitted, and the Society, which had attained a membership of 300, continued in a languishing condition until February, 1869, when its second meeting took place.

In Moscow, in 1866, the Society of the Friends of Nature (*i*) established a section of anthropology. Endowed with ample revenues this section has been as efficient as if it had been an independent society. It possesses a valuable museum and, in 1867, a brilliant exposition of anthropology took place under its management.

In 1868, the Berlin Society of Anthropology (*k*) was organized and speedily attained foremost rank from the importance and extent of its investigations. Virchow, the illustrious physiologist, statesman and scholar, still presides over its meetings. The Society publishes the Journal of Ethnology.

In 1870, the Anthropological Society of Vienna (*l*) was founded, and at their first meeting, February 13, the opening address was delivered by Rokitansky. The Society publishes its own transactions.

Italy was next to continue the good work, and, in 1871, was established the Italian Society of Anthropology and Ethnology (*m*). Their transactions are reported in the Archives of Anthropology and Ethnology, a monthly journal, handsomely illustrated, which is published at Florence under the editorship of Mantegazza.

In 1871, in the city of New York, there was founded a society known as the Anthropological Institute of New York (*n*). Its sole work was the publication of its Journal, "Whom the Gods love, die young," says the Greek proverb: the "Journal of the Anthropological Institute of New York" must have been the especial object of celestial regard as it expired with its first number.

In 1877, Poland entered the field, and the Academy of Sciences of Cracow (*o*) established a section of anthropology which publishes its own journal.

In 1879, the Anthropological Society of Washington, D. C., (*p*), was founded, and has continued to thrive.

During the present year, Dr. Aurèle de Torok, of Hungary, who had been for some time studying at the Paris school, was placed in charge of a section of anthropology in the University of Buda-Pesth, with instructions to form a museum.

There are many subordinate societies besides those described; they are generally affiliated with the societies of the capitals. For example, there is an Anthropological Society at Liverpool, another at Oxford, another at Manchester; one at Lyons, one at Bordeaux, and even in the Isle of Man there is a section of anthropology in the Manx Society of Sciences.

Another important result of the interest felt in these pursuits has been the organizing of congresses of anthropology, meeting in different cities at stated intervals.

There is the German Association for Anthropology (*g*)

founded in 1870; their first meeting was held in Berlin, and their transactions appear in a goodly quarto, the Archives for Anthropology, published at Brunswick.

But the most important congress, in view of its achievements, is the International Congress of Anthropology, and Pre-historic Archæology (*r.*) Their first meeting was held at Neufchatel in 1866; the second at Paris in 1867; the third at Norwich, England, in 1868; the fourth at Copenhagen in 1869; the fifth at Bologna in 1871; the sixth at Brussels in 1872; the seventh at Stockholm in 1874; the eighth at Buda-Pesth in 1876; and the ninth at Lisbon in 1880. I believe the next meeting is to be held at Venice this year. The transactions of this association are published after each congress.

Finally, it must be added that the British Association for the Advancement of Science, after much contention, has established a section of anthropology. The French Association of the same name began with such a section as part of its original organization.

I have no doubt that my hearers are reasonably grateful that this dry enumeration of societies and their productions has come to an end; but it has been shown that all of these associations, congresses and sections owe their origin to the Paris School of Anthropology, and as that school, in its turn, derived its very existence from the genius and energy of one man, we are brought naturally to the point where a sketch of the life and work of the founder of European anthropology comes properly into our plan.

Pierre Paul Broca was born at Sainte Foix-la-Grande, in 1824. The town which announces itself to the world under this pretentious title is situated in the department of the Gironde, on the bank of the Dordogne, forty miles from Bordeaux, and contains about 4,000 inhabitants. It was the birthplace also of Gratiolet, distinguished, like Broca, in anthropology as well as in medicine.

It is always interesting, and, indeed, essential to the due estimation of a distinguished man, to state what may be

known of his parentage, and of what it is now the fashion to call his early environments.

Broca's father, Dr. Benjamin Broca, was an army surgeon, and had served throughout the memorable war in Spain under the first Napoleon. The campaigns over, he returned to his native town where he married and settled down to practice his profession. He was a man of marked traits of character; of unflinching probity and courage, and charitable to an extreme. From him his son derived his taste for the natural sciences as well as a grave irony which characterized them both. The son used to quote an ironical remark of his father's which is amusing enough to be related. The elder Broca flourished in the time when the doctrines of Broussais attained such astonishing popularity, and blood-letting and rigorous diet were the treatment in vogue. Against these views, Dr. Broca fought valiantly, and it is told of him that after a consultation over a patient prostrated with typhoid fever, hearing the physician in charge prescribe, as the only nutriment, a broth to be made of frog's feet, Broca turned back from the doorway and said, "and above all things, be sure to skim off the fat!"

Dr. Broca, senior, acquired a large country practice, but which was not very lucrative, for his rule was to charge the rich but little, while to the poor he gave his services and paid for their medicines. When, in later years, after the death of his wife, he removed to Paris to reside in the house of his distinguished son, the whole country round was in sorrow for his loss, and his indigent clientage presented him with a silver-gilt cup inscribed "To the physician of the poor."

An amusing story is still told in Sainte-Foix of this excellent man which exemplifies his unflinching benevolence. At a late hour, one cold and dark winter night, a peasant requested him to visit a person taken seriously ill, in a distant hamlet. The good doctor left his comfortable fire-side without hesitation and accompanied the man along a lonely pathway, inaccessible to all but pedestrians. Arriving, at length, at a small cluster of cottages, the man turned

to him and said, "Many thanks, doctor. You see I was afraid to come along these lonely beaches by myself, in the middle of the night, so I invented the little story of the sick person to get you to come with me; much obliged for your company." And the fellow disappeared in the darkness, leaving the doctor to return as best he could.

I have been told by Dr. Ford Thompson of this city that when in Paris attending the clinique under Professor Broca at the hospital of La Pitié, he was struck with the appearance of an aged gentleman who, with edifying punctuality, formed one of the large class which followed the professor through the wards. This venerable man would listen with equal interest and admiration to the luminous explanations, the subtle diagnosis, or the fecund illustrations which the accomplished surgeon would give utterance to, at the bedside. This was Dr. Broca, the father, finding his chief enjoyment, in the evening of his days, in watching the daily work of the son who had so far outstripped him in fame.

Broca's mother was the daughter of a Protestant preacher, named Thomas. She was an excellent woman, of great intelligence, and endowed with a prodigious memory. This latter quality was inherited by her son. The Brocas were of old Huguenot stock, and traditions were rife among them of the persecutions which the grandfather and great-grandfather had suffered in the days of the *dragonnades*.

There is no doubt that his early training by the kind, manly father and the clear-sighted sensible mother, together with the traditions of their family history, bred in the young Paul the courageous love of truth and hatred of injustice and oppression which marked his entire career.

In 1832, he entered the college of Sainte-Foix which was, at that time, the resort of the élite of the Protestant youth of France. Some of the most distinguished men of the reformed church were educated at Sainte-Foix; among whom were Monod, Coquerel, and Pressensé. When seventeen years old, Paul Broca obtained the three diplomas of bachelor of letters, mathematics, and physical sciences. In 1842, he presented himself for examination at the Polytechnic

School, intending to make physical sciences the basis of his future work, but his father, loth to see his own practice lost to the family, persuaded his son to adopt medicine as his profession. An additional motive for his compliance was the recent death of his only sister, a very lovely girl of great promise, whose loss made the parental home very lonely. Broca did not trouble himself about his career; he used to say, in after life, that in any occupation, he could have made such a place as his abilities merited; and with his healthy organization and unparalleled capacity for work, it is probable that he was right.

He went to Paris, and entered his name at the Faculty of Medicine, and thus began a career unequalled for the rapidity of its progress. In 1843, he became an *externe* at the hospitals, and in 1844, he became an *interne*. He was then twenty years of age, a period at which most students of medicine have only entered themselves. In 1848, he became prosector of anatomy, and obtained the silver medal of the Public Assistance. He graduated as Doctor of Medicine in 1849; the Academy of Medicine decreed him the Portal prize in 1850, and, in 1853, he was named Assistant Professor of the Faculty of Medicine, and Surgeon of the Central Bureau, being then only twenty-nine years old.

In 1847, he was elected a member of the Anatomical Society of Paris, and for many years he was the most active of the distinguished young men who raised that society to its present pre-eminence. His researches into the histology of cartilage and bone, with the aid of the microscope, of the use of which in anatomical researches he was one of the strongest advocates, have remained unsurpassed of their kind to the present day.

In the Society of Surgery he was equally active, and its transactions bear witness to his zealous labors.

It is not within the scope of this lecture to describe his surgical or physiological work; the general result, in the number of his productions, will be given at the close. It must be said, however, that his brilliant investigations into the localities of the functions of the brain led the way to

the discoveries and applications of Hitzig, Ferrier, and Charcot; of his larger works, the Treatise on Tumors, and the Treatise on Aneurisms, still hold foremost rank. Broca's devotion to anthropological studies, during the last twenty years of his life, have tended to overshadow his work in surgery and physiology. A good judge said of him, that in no country or age had any man of thirty produced so much of value in surgery as he.

He was associated with Beau and Bonamy in the production of their splendid Atlas of Descriptive Anatomy, and the third volume of that work, comprising splanchnology, is entirely his work.

It is scarcely necessary to say that this brilliant commencement of his career soon settled the question of his return to the banks of the Dordogne. The father was proud of his son's success, and the good mother, when told of his achievements, sacrificed her own wishes, as mothers do, and said, "my pride is gratified, but not my heart."

Honors continued to flow in upon him. He was made secretary and then vice-president of the Anatomical Society; secretary and then president of the Society of Surgery. The Academy of Medicine admitted him in 1866; he was their vice-president in 1880, and president-elect for 1881. In 1867, the Faculty of Medicine appointed him to the chair of pathology which he exchanged for that of clinical surgery.

It remains now to speak of Broca's connection with the Society of Anthropology of Paris. He was its founder and, in the words of one of his panegyrists, "the very soul of it for one and twenty years."

In 1847, he was one of a commission appointed to examine the bones discovered in excavations made in the ancient church of the Celestins. In drawing up this report, (which was afterwards published in the first volume of his Memoirs on Anthropology,) he was led to read all the books he could find, and they were not many, upon the subject of craniology. In those days ethnology was confined to a narrow circle of inquiry, chiefly to debates upon mon-

ogeny and polygeny, or the doctrine of the origin of the human race from one source or from many. The Ethnological Society of Paris, founded, as I have before stated, by William Edwards, having ended its discussions upon this subject, and finding nothing more to say, itself came to an end in 1848. Ten years later, Broca, who had arrived at some conclusions upon human hybridity which he desired to make known, communicated them to the Society of Biology. But the young discoverer had yet to learn what pusillanimity could do to retard investigation. His remarkable memoir demonstrated the unlimited fecundity of human hybrids, and as this was opposed to the doctrines of the monogenists, Rayer, the President of the Society, requested Broca to desist from further communications. The memoir "On animal hybridity in general, and on human hybridity in particular," was published in the *Journal de la physiologie*. It was afterward translated by Dr. Carter Blake for the London Society of Anthropology, and was published in their memoirs. This condition of things made it evident that a new society was needed, and Broca conceived the idea of a Society of Anthropology.

Broca's plan was to start with not less than twenty members. Six from the Society of Biology joined him, but others, including the members of the defunct Society of Ethnology, turned a deaf ear to his solicitations. After a year's efforts, he had only nineteen signatures, including his own. He met with every obstacle from those in authority; M. Rouland, the Minister of Public Instruction, sent him to the Prefect of Police, who, in turn, sent him to the Minister of Public Instruction. Their purpose was to weary him out, for with the perspicacity usual in such functionaries, they firmly believed that the novel term, anthropology, covered some form of political conspiracy. Finally, thanks to the intervention of Professor Tardieu, a chief of division of the prefecture of police was induced to authorize the nineteen to form their society and hold meetings. He held Broca, however, personally responsible for anything which might be said by his associates which should appear to be an

attack upon government, religion, or social order; and, to ensure the realization of these prudent precautions, he directed that a police officer, in plain clothes, should attend each meeting and report to the prefect the tenure of the proceedings.

Does not this sound as if we were discoursing of something that took place under Louis quatorze, or Philip the second? And yet it occurred in our own day, some twenty years ago, in the most civilized city of Paris. We are accustomed to look upon our own absolute freedom in such affairs as a matter of course, but it may not be unprofitable to occasionally stop to consider it in the light of comparison.

It was under the conditions described that the Society of Anthropology of Paris held its first meeting, on the 19th May, 1859. The word anthropology was substituted for ethnology to show the far wider scope proposed. It included, in effect, the entire natural history of the human race, whether in the present, in the past, in its general characters, in its subdivisions into races or varieties, in its origin, or in its relations with the rest of nature. This programme comprehended not only ethnology, or the study of human races, but anthropology, or the study of mankind. It included, also, a great number of auxiliary sciences: zoölogy, comparative anatomy, geology, palæontology, prehistoric and protohistoric archæology, linguistics, mythology, history, psychology, and medicine itself. And as among all these diverse and divergent studies it was necessary to establish some central basis, the founders of the society, who were all young physicians, determined, in accordance with the views of their leader, to select that which is most fixed in man, namely, his organization and functions; in a word, his anatomy and physiology.

With such a vast field before it, there was no reason to fear that the new society would perish for want of sustenance like its predecessor, the Society of Ethnology. As its programme became known, new members eagerly joined it, and when the first volume of its bulletins was published, the defiance and distrust which it had excited rapidly sub-

sided. M. Rouland, the Minister of Public Instruction, deigned to authorize it in 1861, and, in 1864, it was recognized formally as a society of public utility, by a decree of the Council of State. After this date, the attendance of the special police agent at its meetings was discontinued.

During the first three years of the existence of the society, Broca filled the office of secretary. It was a burdensome task for a man of his numerous avocations to undertake, but it was of the highest importance that the transactions of the young society should be edited with talent and appear with punctuality. He excelled in the difficult art of giving the integral meaning, but without prolixity, of what was said in the ardor of debate. He was skillful in ignoring the common-places of the chronic speaker; the man who always "rises to give his views," though he has generally nothing to communicate. These *comptes rendus* are master-pieces of their kind, especially when it is considered that they were written from memory, for he took too active a part in discussion to have time to take notes.

In 1863, the increase of the Society made it necessary to appoint a General Secretary, electable for three years; Broca held the office till his death. Professor Pozzi says, "Broca was the soul of the Society of Anthropology. It was he who founded it, he who made it live through its first trying years, and that by the preponderating influence of his incessant labor and the communicable ardor of his love for the growing science. The powerful influence of Broca, especially visible at the beginning of its career, was not less real to the very close, in spite of the care which he took to avoid the appearance of personal control. Even when he abstained from taking part in any irritating debate, his attitude, the few words which might escape him, his vote, infallibly indicated to doubting minds, upon which side reason, moderation, and justice were to be found."

Upon the establishment of his Society, Broca began a craniological collection and, thanks to the surgeons of the navy, with whom he kept up an active correspondence, it soon attained respectable dimensions. Nevertheless, a

museum cannot be well maintained without a laboratory, and the difficulties in the way of obtaining the latter were very great, for the law forbade the taking subjects for dissection anywhere except to the rooms of the Faculty of Medicine. In 1867, however, Broca was nominated as one of the professors of the Faculty of Medicine and the difficulty was solved. He was entitled to a laboratory for his personal investigations, and two small rooms were assigned him for the purpose. It was here, with M. Hamy for his assistant, that he began his researches in the comparative anatomy of the primates. It was here, too, that he invented many ingenious instruments to be employed in craniometry, or the measurement of the skull. In connection with this especial work of Broca's, it may be well to give some explanation of what constitutes craniometry, without doubt, the most important part of our laboratory work. Craniometry comprises measurements of the dry skull, both its external and internal surfaces, its various angles, its relation to the spinal column, its internal capacity and the proportion and weight of the brain; external measurements are to be made, whenever possible, in the living person also. Moreover, these measurements, to be of value, must be made in large numbers, so that the average, or mean, may be trustworthy. To obtain these dimensions, many complicated and costly instruments have been invented, the greater number of those now in use having been devised by Broca. I had intended to bring some of these instruments here in order to give you an illustration of the manner in which they are used but I found that it would occupy more time than we can spare. I shall read you the names of Broca's craniometric inventions.

In 1860, he invented the *craniograph*; an instrument for giving the profile of the skull.

In 1864, the *new goniometer*. The instrument in use, for many years, for taking the facial angle was the one invented by Dr. Morton of Philadelphia; Jacquart made a vastly improved instrument, but Broca's goniometer had the merit of simplicity and cheapness.

In 1867, he produced the *stereograph*.

In 1869, the *cadre à maxima* and the *micrometric compass*.

In 1870, he invented the *occipital goniometer*, an instrument for ascertaining the angle of the back of the skull.

In 1873, he brought to perfection a surprising number of instruments mostly for the investigation of the *endocranium*, or interior of the skull. A perplexing obstacle in the pursuit of craniology was the difficulty, or rather, impossibility, of obtaining measurements of the interior without sawing open the cranium. This would spoil the specimen and could not, of course, be permitted. The instruments about to be mentioned were to be introduced through the occipital foramen, the large aperture in the base of the skull.

The *cranioscope* enabled a bright light to be thrown upon the interior of the skull by means of a mirror and lamp.

The *porte-empreinte intra-cranien*, or intra-cranial molder, is an instrument charged with a piece of wax by which a mold can be obtained of various portions of the interior.

The *endograph* is an ingenious contrivance for tracing on paper the curvatures and outlines of the endocranium for comparison with the external surface.

The *millimetric roulette* is a small wheel, graduated in millimetres, for measuring the curved outlines on tracings.

The *endometer* is an instrument for measuring internal diameters.

He invented, also, the *sphenoidal crochet* and *optic sound*; the *pachymeter*, an instrument for measuring the thickness of the skull at any point; the *turcica crochet*; the *acoustic sounds*; the *craniophore*; the *craniostat*; the *facial demi-goniometer*; the *auricular goniometer*; the *flexible bi-auricular square*; the *cyclometer*; the *facial median goniometer*; the *orthogon*; the *flexible goniometer*; the *goniometer of inclination*; and the *tropometer* for measuring the degree of torsion, or twisting, of the humerus, or arm bone, a racial characteristic of importance.

I fear this list of names has been rather tedious, but it is not only pertinent to the subject as illustrating Broca's mechanical ingenuity, but it may enable those present who

have no special acquaintance with craniology to form some conception of the immense and intricate labor involved in accurate measurements of the skull. Professor Huxley, speaking of these elaborate instruments, says, "One can not mention the name of Broca without the greatest gratitude."

This, then, was the beginning of the Laboratory of Anthropology. In 1868, the Minister of Public Instruction, M. Duruy, conceived the happy thought of establishing the practical school of high studies—*L'école pratique des hautes études*—by giving an annual allowance and an official character to the various laboratories connected with institutions of learning. Broca's laboratory was included. He at once instituted a system of teaching which attracted so large a class that he was obliged to ask the dean for permission to use a larger theatre.

The progress of the school was interrupted by the Franco-German war of 1870-1. Broca was, at that time, professor of clinical surgery at the hospital of La Pitié, which was from the very beginning of the siege of Paris crowded with wounded men. To these and to the care of the hospital he devoted himself exclusively, and his laboratory was forsaken. He had been one of the three directors appointed to take charge of the Public Assistance. During the days of the Commune, for which, as sterling republican and patriot, he had a supreme detestation, he remained at his post in Paris, taking care of the patients still in his hospital, but busying himself in taking plaster-casts of brains, thus beginning the superb collection of cerebral molds which is now to be seen in the Musée Broca. The President of the Council of Public Assistance fled to Versailles without notifying Broca, who was the vice-president, and leaving the money and securities in charge of the cashier. The danger of a seizure of these valuables by the communists was imminent, and Broca determined to save them, if possible. He, himself, carried them away, night after night, in carpet-bags, and concealed them at the hospital of La Charité, by the aid of the director. He was careful to leave three or

four thousand francs in the safe, and, much to the disappointment of the insurgents, this was all that they found when, a day or two later, they made the anticipated raid. Apprehensive that the treasure might, in some way, be traced, Broca devised a bold scheme for its removal to Versailles. A wagon loaded with potatoes started for the hospital of Ivry with the precious carpet-bags concealed underneath them, and as soon as it had safely passed the outmost guard, the wagon was turned toward Versailles, which it reached in safety, and the bags were duly delivered to the over-prudent president. The amount thus saved to the government by Broca's firmness was seventy-five millions of francs, (\$15,000,000.) After the victory and the return to Paris, the directory of the Public Assistance was dissolved, and not even a vote of thanks was offered for this eminent service.

Broca was not the man to trouble himself about compliments. He had done his duty and now all his energies were devoted to bringing forward his beloved science. He founded the *Revue d'anthropologie*, the first number of which appeared in 1872, and this journal he continued to edit as long as he lived. His next undertaking was to establish a School of Anthropology, and so irresistible were the ardor and persuasion he brought to bear that in May, 1875, the Dean of the Faculty assigned him the second story over the Musée Dupuytren for the new school. For the purpose of furnishing and starting it, the sum of thirty-five thousand francs was subscribed by twenty-three members of the society. The work was commenced in July and completed in the following spring. The new school, however, was not to escape its share of opposition. The clerical party denounced the project without ceasing, branding its professors as atheists and materialists, and so thoroughly did they succeed in alarming the Minister of Public Instruction that that functionary was, with great difficulty, persuaded to authorize the school to proceed; when he, at last, did so, it was only for a year, and every difficulty and discouragement was thrown in the way.

Broca persevered through it all and, on the 15th December, 1876, the School of Anthropology was opened by him with a discourse entitled "The Programme of Anthropology," which has been translated into many languages. "It was," says Pozzi, "an eloquent plea *pro domo sua*," and certainly it was his own edifice, the school which he opened that day. Unlike most institutions in France, it had been established without the aid of the government, and by the personal efforts of the founder alone. Some time later, so brilliant was the success of the new school, the Municipal Council of Paris, and the Council-General of the Seine, spontaneously allotted it an annual subsidy of twelve thousand francs.

Still the ministry maintained its old position of distrust and almost hostility. Every year, it was necessary to apply for a new authorization which it required renewed efforts and influence to obtain. It was even then granted only for another year, and individually; that is to say, each professor was authorized, by name, to teach, but they were forbidden to call themselves a school, as indicating their solidarity. At length, the election of 1878 consolidated the republic and placed all institutions, contending for progress, in their rightful position. The School of Anthropology was duly and permanently authorized. Further, the Chambers voted it an annual subsidy of twenty thousand francs, which joined to its other resources, raised its annual income to thirty-four thousand francs, or nearly \$7,000.

The Society of Anthropology, the Laboratory and the School, all united in the same locality, formed, thus, a confederation known as the Anthropological Institute. The students from the school were admitted to the laboratory, where measurements and dissections were made under the direction of Paul Topinard, assistant director, and of Chudzinski and Kuhff, curators. In the neighborhood is the important library of the Society, and the finest anthropological museum in the world. Since the death of its founder, it has been appropriately named La Musée Broca.

It may be imagined with what satisfaction Broca witnessed the completion of his labors to establish his favorite

science on a permanent basis. Of his own work in Anthropology, it is impossible, in the limits of a lecture, to give any adequate account. His friend, Professor Pozzi, has attempted a bibliography of his writings which he admits to be imperfect, and which yet covers seventeen pages, in double columns of small type of the *Revue d'anthropologie*, which is a large octavo in size. I have been able to add some few articles to Pozzi's list, and, of the whole, have made the following enumeration :

Broca's contributions to the medical sciences, embracing anatomy and physiology, both normal and pathological, and surgery, number 243 articles and volumes. His papers on the anatomy and functions of the brain are 53 in number. His last and most important work on this subject, a treatise on the morphology of the brain, was left unfinished.

In anthropology, I find 109 articles and volumes upon comparative anatomy and general anthropology ; 48 papers on general craniology, and 35 on special craniology ; 27 papers on ethnology, and 19 on miscellaneous subjects. The total number of his printed articles and volumes, so far as ascertained, is 534. It is to be remembered that a large part of these papers are quite extensive, running through several numbers of the journals in which they appeared. Many of them were reprinted in pamphlet form, and he, himself, commenced a collection of his anthropological memoirs, of which three large volumes were published. Among the more important of these contributions may be mentioned his paper on Linguistics and Anthropology ; his General Instructions for Observations on Anthropology. This last was a codification of the rules necessary to be observed by travelers and investigators ; it was issued in 1865, and was completed ten years later by the Instructions in Craniology and Craniometry. This very valuable and original work had immense success, and was translated into nearly every modern language. Of his writings on the brain, the more important are his memoir upon cranio-cerebral topography ; on the great limbic lobe ; on the olfactory centres, and his admirable treatise on cer-

bral nomenclature. One of his discoveries in this connection is associated permanently with his name. Certain patients who preserve the memory of words, have full use of the larynx, mouth and lips, have yet lost the power of articulation. The disease is called aphemia or aphasia. Broca observed that in the autopsies of these patients there was invariably present a diseased condition of a portion of the third frontal convolution of the brain on the left side. This convolution, thus inferred to be the seat of language, is known as "the convolution of Broca." In a vast number of cases, the prediction has been made, during life, that a certain portion of this convolution, the surface of its lower third, would be found diseased, and it has been fulfilled with mathematical precision. There are some exceptions in which the disease is found in the third convolution on the *right* side. Singularly enough, in most of these cases, it was found that the patients had been left-handed, and in these the right side of the brain is generally more developed than the left. The subject of the localization of the functions of the brain—by which we mean the discovering of the particular convolutions or other portions of the brain in which reside the functions of animal life—is of the highest interest; but is still to be considered as under investigation.

When, in 1872, it was determined to found a French Association for the Advancement of Science, after the model of the English Association, Broca took an active part in the organization. He was one of the provisional council of which Claude Bernard was the President. He established the section of anthropology, which has been brilliantly successful, the need of such a section not being denied in France as it had been in the English Association.

While all this work was being done in anthropology, it must be borne in mind that Broca was a professor of the Faculty of Medicine and a Surgeon of Hospitals, and that his duties in these connections required some hours of every day for their discharge. He was an incarnation of work. Naturally, the question arises, what was the quality of this amazing quantity of work performed, and would it have

been better for his fame if he had concentrated his energies upon fewer subjects? In some persons, production is a slow process, accompanied with extreme tension of the brain; the thought dwells a long time in the mind before it assumes the form in which it is to appear; such persons bring forth in sorrow and in pain. This was not Broca's case. To express his thoughts with extreme rapidity, whether by speech or pen, was, to him, the most facile of functions. It seemed play rather than work. And yet, Trélat, a critical judge, said of him, "Broca never wrote anything that came down to mediocrity." His mind was essentially many-sided, of restless activity and well sustained by the admirable physical organization which he possessed. His intense love of truth and the ardor of his convictions, at times, led him to too great vehemence of expression. He was impatient with those who did not see the truth as he saw it, or did not see it as rapidly as he did. His work in anatomy, physiology, and surgery stands, to this day, mostly unquestioned. His qualifications for anthropology are forcibly stated by one of his pupils, Professor Ball, who says: "Anthropology is a compound of so many other sciences that the intervention of a grasping and encyclopædic mind like Broca's is almost invaluable to form the connecting link between so many different branches of human knowledge. An excellent mathematician, a first-rate anatomist, a good Greek scholar, Broca combined in himself that diversified knowledge which the subject requires, with the synthetical tendencies which condense these disseminated forces, and make them converge upon a single point."

In person, Broca was of the middle height and strongly built. His broad forehead and lustrous brown eyes gave a very noble expression to his face. In private life, his relations were in every way admirable. Benevolent and generous, he was adored by his family, and those who were once his friends were his friends for life,—he "grappled them to his soul with hooks of steel." He was a delightful companion in his social hours. He had traveled much, and would relate his adventures and observations with great

humor. I may be allowed to quote one incident which he loved to recount.

While traveling in Spain he came to Seville and, desiring to be shaved, sent for the nearest barber. Figaro appeared and, knowing that his customer was a famous surgeon, refused to receive any recompense. "Sir," said he, with a lofty air, "that is never allowed between professional brethren!" The class of barber-surgeons exists to-day, in Spain, as it did when Cervantes wrote.

The crowning public honor of Broca's life remains to be told. In 1879, the Senate nominated him as permanent Senator, representing Science. He was proposed, of course, by the left. The right, or monarchical, side, made fierce opposition. He was an unyielding Republican, the founder of the Anthropological Institute, which meant free-thinking and atheism. They searched his writings for doctrines to convict him and, with great joy, published this quotation, "I would rather be an apé brought to perfection than a degenerate Adam." But this proved to have been a saying of Claparède's and not of Broca's. A sentence was taken from his Programme of Anthropology, "There is no faith, however respectable, no interest, however legitimate, which must not accommodate itself to the progress of human knowledge and bend before truth, if the truth be demonstrated." Even this scarcely orthodox doctrine, it seemed, was qualified by the preceding sentence which said that "science must keep aloof from anything not within its province."

Broca, with characteristic independence, took no part, whatever, in the proceedings, but he was elected. On the 19th February, 1880, a banquet was given him by some of his most attached friends, members of the Faculty of Medicine, of the Academy of Medicine, of the Society of Anthropology, of the Senate, of the Chamber of Deputies, &c., in commemoration of the high honor bestowed upon him. It was the grandest banquet ever given to a scientific man. The long table was filled with those who had shared his struggles and labors at different parts of his career from the

College of Sainte-Foix to the Senate. Professor Verneuil, his life-long friend, said to him, "If we are in great strength around thee, it is because thou hast continually made new friends, and hast never lost a single one."

In his speech of acknowledgment, Broca said, "they would not have thought of me if they had not known with what certainty they could count upon my devotion to republican principles; and if, among many others not less trustworthy and more skilled in political knowledge, they have chosen a man of science, it is because they hold science in high consideration, and believe that to serve science is to serve one's country best."

His speech was one of the most eloquent he had ever delivered, and ended with a sentence that proved strangely pathetic, in the light of the after occurrence. He said, "were I superstitious, I should believe, from the great happiness I experience to-day, that some great danger was threatening me."

Five months later, these now sorrowing friends followed him to the grave. On Tuesday, the 6th July, 1880, he was in his seat at the Senate and was attacked suddenly by faintness. The next day, he had apparently recovered, and Thursday evening was passed in work with his friend, pupil, colleague, and successor, Dr. Paul Topinard. Toward midnight, he was suddenly attacked with difficulty of breathing, he rose from his bed and, in ten minutes, he expired. The post mortem examination discovered no lesion of any organ,—no cause for this sudden taking-off. "Cerebral exhaustion" was the medical periphrasis, which implied two things;—that the man had worked himself to death and that how he died was a mystery. He died at the comparatively early age of 56, in the very plenitude of his powers and the height of his renown.

He was buried in the cemetery of the old church of the Celestins, in which his first labors in craniology had commenced thirty-three years before, and which led to his long course of studies in anthropology. The Vice-President of the Senate, M. Eugène Pelletan, in his oration at the grave,

said, after an eloquent eulogy upon the dead, "A new science, human palæontology, has just originated under our feet; at hundreds of ages of depth, our fore-fathers have been, in some way, surprised, lying pell-mell in the midst of the giant fauna of a vanished creation. Broca was one of the valiant pioneers who penetrated the foremost into the subterranean world of humanity, and who understood best how to throw light on such history as is left of it."

His work is continued by those who were his disciples and colleagues. Gavarret is the director of the School of Anthropology, Matthias Duval is director of the Laboratory, and Dr. Paul Topinard is the General Secretary of the Society and director of the *Revue d'anthropologie*.

The museum, now the *Musée Broca*, continues to increase its treasures; a recent number of the *Review* states that there are more than seven thousand specimens in craniology alone.

Broca left an enormous quantity of notes and drawings; also, two quarto volumes which contain the measurements of crania made by him during twenty years. These are divided into sixty-four series of different races, and record more than 185,000 measurements.

Madame Broca, his widow, has devoted a sum of money to found a "Broca prize"—*le prix Broca*. The subject of competition is "human and comparative anatomy in relation to anthropology." Writers of all nations may compete but their papers must be written in French. The prize is 1,500 francs, and it is to be bestowed every two years.

There is not much more that needs to be said of Broca and his work. If Europe be now garrisoned with societies of anthropology composed of earnest workers, loyally co-operating with the votaries of other sciences, and daily adding to the vast mass of facts and observations which have been accumulated concerning man, it is indisputable that it is to Broca we are indebted for their existence. Of his remarkable fitness for the task which it fell to him to undertake, there can be no doubt, but it was one predominating quality of his moral nature which gave him his

great influence over other men, and which has made his work so authoritative and enduring, and that was his unswerving love of truth. In science, he was always the judge—never the advocate. Pure and lofty-minded, he stood aloof from intrigues, and honors came to him unsought. The laureate's words may well be said of him,—

“Who never sold the truth to serve the hour.”

In conclusion, allow me to remind you that there is what may be termed a moral side of the science whose history we have been considering. To spend our hours in the study of man—to reflect upon his marvelous metamorphosis from the grimy savage of the cave to the gentleman of to-day—to ponder upon his curious devices, his laws, his marriage-customs, his battles, his religions, is to fill our minds with a belief in a common brotherhood more convincingly than peace societies or missionaries can teach, and to lead us to repeat with Terence:—“I am a man—therefore all human things concern me.”

* * I desire to acknowledge my obligation to Prof. Pozzi's article in the *Revue d'anthropologie* for much of the details of the founding of the Institute.

NOTES.

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- (h) Sociedad de antropologia de Madrid. (1865.)
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- (l) Anthropologische Gesellschaft in Wien. (1870.)

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- (n) The Anthropological Institute of New York. (1871.)

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- (o) Komisya antropologii Akademii Umiejetności w Krakowie. (1877.)

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- (q) Deutsche Gesellschaft für Anthropologie, Ethnologie und Urgeschichte. (1870.)

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* * This society meets annually in some German city. The first meeting took place in Berlin in 1870.

- (r) Congrès international d'anthropologie et d'archéologie préhistorique. (1865.)

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