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## Broca, Pierre Paul

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Without Abstract

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## Basic Biographical Information

Broca (1824–1880) was born in Sainte-Foy-La-Grande near Bordeaux, France. He attended a Calvinist Collège in Bordeaux where he earned a bachelor of letters degree and diplomas in mathematics and physical sciences. He earned the M.D. degree at the University of Paris medical school in 1848 after which he did graduate studies in anatomy, pathology, and surgery. In 1853, Broca became assistant professor on the Faculty of Medicine. He served several years as *professeur agrégé* (highest teaching certification), and in 1867, he was elected chair of *pathologie externe* in the Faculty of Medicine. In 1868, he became professor of clinical surgery. With a growing interest in anthropology, Broca founded the *Société d'Anthropologie* in 1859, the organization where he presented that for which he is best remembered, clinical cases that defined the human speech center in the cerebral cortex. Elected to a life term in the French Senate as a representative for science, he served only 6 months before his death in 1880. At that time, Broca was also vice president for the French Academy of Medicine (Clarke *1970*).

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## Major Accomplishments/Contributions

Broca made so many significant contributions in anthropology, pathology, neuroanatomy, neuropsychology, and neurosurgery, both in methodology and discovery, that only a few can be mentioned. He has been called the “father of anthropology.” His contributions included founding the *Société d'Anthropologie*, the *Revue d'anthropologie*, and the *École d'Anthropologie*, Paris. He studied human and racial origins as well as evolution of the brain (via study of skulls) and

intelligence. Combining, neuroanatomy, neurosurgery, and neuropsychology, he identified *le grande lobe limbique* which figured significantly in what became known as the limbic system, the twentieth century's focus in the search for the neuroanatomical substrates of the emotions. Several brain structures bore his name, and at least two have persisted in modern times when neuroanatomists seek to eliminate most eponyms, namely, the diagonal band of Broca and Broca's area or convolution as a cerebral cortical center essential for human speech (area 44 in Brodmann's cytoarchitectural system). His research associated with Broca's area also led to his emphasis on the left hemisphere as the dominant one for language in most humans and that, in turn, contributed to the general concept of cerebral dominance (Schiller 1979).

Among psychological historians, historians of neuroscience, and medical historians in general, Broca is best known for his role in discovery of the speech center. Psychological historians usually misrepresent Broca's role in that discovery (by attributing it *only* to Broca; see Thomas 2007); whereas, other historians usually describe the essential roles performed by Jean-Baptiste Bouillaud and Simon Alexandre Ernest Auburtin. It will be useful to summarize the roles of Broca, Bouillaud, and Auburtin.

Based on an accumulation of clinical cases, Bouillaud, a physician and father-in-law of Auburtin, had long advocated that control of human speech resided in the brain's frontal lobes. Auburtin, also a physician, had done important clinical research that supported Bouillaud's argument (Stookey 1954). During meetings of the *Société d'Anthropologie* in Paris in 1861, Auburtin, who was present but Bouillaud was not, asserted Bouillaud's argument that the human speech center resided in the frontal lobes of the brain. Auburtin also argued for localization of cortical functioning in general. Localization of function was very much a minority view at that time owing to its dismal association with phrenology. Auburtin further asserted that he had a patient upon whom he would risk his argument, and if the patient failed to confirm his position, he would renounce his support for localization. As Secretary for the *Société*, Broca was an active participant in the discussion, but as shown by the quotation below, he took no position on the localization argument.

Using his words, "by strange coincidence," Broca reported that he had a patient in his care that, upon Auburtin's approval, he offered as substitute for Auburtin's patient. Following examination of the patient, Auburtin approved the substitution, but as Leborgne ("Tan") was Broca's patient, on April 18, 1861, Broca presented the results of the postmortem examination to the *Société*. On May 2, 1861, Broca again discussed the brain of Leborgne and said, "But, while I inclined towards M. Auburtin's opinion, I did not intend to take part in the debate. I am expressing myself neither for nor against specific localizations...." (p. 495, Clarke and O'Malley 1968). Thus, Broca's involvement in discovery of the speech center might not have occurred except "by strange coincidence."

Broca did not misrepresent the discovery of the speech center; rather it was subsequent, mostly psychological, historians who did. Later in 1861 and unlike Bouillaud and Auburtin, Broca followed through with further research and presented the more convincing case of Lelong whose lesion was small and more definitive of "Broca's area," whereas Leborgne's lesion involved both the frontal and parietal lobes. By 1863, Broca had accumulated a sufficient number of cases to be

able to assert left hemisphere dominance for the speech center in most humans. Thus, Broca deserves a full but not exclusive share of the recognition for the discovery of the speech center. Subsequent research showed that Broca's area is involved mainly with the motor aspects of speech and that other cortical areas also play significant roles in human speech and use of language.

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## See Also

Cerebral Dominance

Evolutionary Psychology

Flourens, Pierre

Gall, Franz Josef

Klüver, H.

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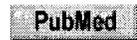
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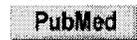
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