

## Psychiatrics and Neurology: Two Specialties, a Common Anatomico-Functional System

Juan Enrique Bender del Busto<sup>1\*</sup> and Marcel D Mendieta Pedroso<sup>2</sup>

<sup>1</sup>Medical Doctor, II Degree Specialist in Neurology, Full Professor and Consultant, Philosophy Doctor, International Center for Neurological Restoration, Havana, Cuba

<sup>2</sup>Medical Doctor, II Degree Specialist in Comprehensive General Medicine and Internal Medicine, Auxiliar Professor, Philosophy Doctor, Leopoldo Martínez Hospital, San José de las Lajas, Cuba

**\*Corresponding Author:** Juan Enrique Bender del Busto, Medical Doctor, II Degree Specialist in Neurology, Full Professor and Consultant, Philosophy Doctor, International Center for Neurological Restoration, Havana, Cuba.

**Received:** May 30, 2021; **Published:** June 29, 2021

### Abstract

The relationship between Psychiatry and Neurology remains a controversial issue, however, both have a common anatomy. It is the concern of specialists related to neurosciences, that both specialties are separate and do not have a close relationship as happened before the 19th century. The objective of the article is to make some historical considerations in this regard, describing the causes of the separation of both disciplines and the need for a rapprochement, as a consequence of the most recent scientific advances.

**Keywords:** Psychiatry; Neurology; Neurosciences

The relationship between Psychiatry and Neurology remains a controversial issue, although both specialties have a common anatomical relationship [1].

Both converge mainly in the common interest of understanding and controlling diseases of a single organ, the brain, a particularity that distinguishes us from other specialties, where the organ of interest is not shared [2,3].

We disagree with the old Cartesian mind-body dualism, where mental disorders, more intangible, would be the object of Psychiatry and those more biological, structural, would belong to the field of Neurology [4].

That is, if a disorder is consistently associated with an obvious pathological process that affects the Central Nervous System, then it is considered neurological, however, today it is well established that psychiatric disorders are not only mental, but also have a structural basis.

Consequently, the simplistic view that neurological disorders are organic and psychiatric disorders are functional is out of date.

Therefore, it is reasonable to warn of the future risk of possibly considering each psychiatric entity neurological where, due to the progress of scientific research, the biological bases of such disorders are being identified [4].

The current concern of most specialists is why both specialties, whose anatomical substrate is the brain, have to be separated by an abyss and do not have a close relationship as they should have.

Due to such considerations, the purpose of the article is to review some historical considerations related to the emergence of Psychiatry and Neurology, describing the causes of the separation of both disciplines and the need for a reunion as a consequence of the most recent scientific advances.

To elaborate it, the Google Academic search engine and the descriptors Psychiatry and Neurology, neurosciences, anatomical-functional system, history, relationship, separation and re-encounter were used. The Medline, Scielo, Scopus and Medscape databases were used.

### History of the relationship between neurology and psychiatry

The human mind has observed the brain and reflected on itself almost in unison, since the 5<sup>th</sup> century BC. The theory of the 4 elements was developed (Empedocles of Agrigento, 490 - 430 BC) and these were associated with the 4 humors in the Corpus Hippocraticum (Hippocrates of Cos, 460 - 370 BC). In addition, the first anatomical dissections of the brain recorded by Alcmaeon of Crotona were performed, from which it would be deduced that the brain was the central organ of sensations, and one of the last pre-Socratics, Anaxagoras of Klazomene (500 - 428 BC) proposed that the brain was the organ of the mind [5-9].

Vesalius (1514 - 1564), physician and greatest exponent of Renaissance anatomy, made extraordinary dissections and anatomical descriptions of the brain, urged his contemporaries to reexamine the structure and function of the brain with an open mind, and lamented that anatomy alone it could not allow him to understand how the brain regulates imagination, reasoning and memory (basic components of the intellect according to Galen of Pergamum 129 - 199) [10].

A little over a century later (1543), the *Cerebri anatome*, by Thomas Willis (1621 - 1675) (Oxford Physician and founding member of the Royal Society), of great influence in the seventeenth and eighteenth centuries, would be published. Based on the Galenic theory of the production and flow of spiritus animalis in the brain, Willis consecrated the brain as "the origin and source of all movements and conceptions" and provided the first modern proposal for the localization of brain functions: the Imagination would settle in the corpus callosum, while memory and will would settle in the cerebral convolutions. He considered the physical location of the mind to be centered in the brain. The cognitive functions of brain structures were interpreted as functionalist anatomy [5,11-13].

Thomas Willis introduced the term Neurology as the 'doctrine of nerves' [14].

Also in the 18<sup>th</sup> century, functionally specific "centers" and "pathways" were discovered: the respiratory center in the bulb (Legallois), the sensory or motor role of dorsal and ventral roots (Charles Bell and François Magendie), the crossing of the pyramids and their relationship with crossover motor disorders after brain injuries (Domenico Mistichelli and Pourfour du Petit), etc [5].

Later, in 1808, Johann Christian Reil, a German physician and philosopher, introduced the term "psychiatry" [1].

Paul Broca, Anatomist and Anthropologist (1824 - 1880) and Karl Wernicke Neurologist and Psychiatrist (1848 - 1905), specify in their works the localization of language in the left hemisphere and showed that separate areas control the fluid programming of speech and understanding of speech. language. Broca, echoing Hippocrates and Willis, writes: "The great regions of the mind correspond to the great regions of the brain" [1,15].

Jean-Martin Charcot, Neurologist and Pathologist (1825 - 1893), considers that Broca and Wernicke, the pioneers of clinical neuroscience in the 19<sup>th</sup> century, moved freely between the themes that now delimit neurology, neuropathology, psychiatry and psychology and their intimate interconnectedness is taken for granted [16].

Charcot, in turn, described "sclerotia in plaques" (multiple sclerosis), however, he conducted multiple investigations related to hysteria.

Alois Alzheimer, Psychiatrist and Neurologist (1864 - 1915), before describing the disease that bears his name, wrote his dissertation: Paralysis of the insane, caused by syphilis [17].

Constantin von Economo Psychiatrist and Neurologist (1876 - 1931) Professor of Psychiatry and Neurology at the Vienna Clinic for Psychiatry and Nervous Diseases documented the clinic and neuropathology of encephalitis lethargica. In turn, he described a cytoarchitectural atlas of the cerebral cortex [18].

Hughlings Jackson (1880) related the focal seizure to the epileptic seizure as an “intellectual crisis” or “fantasy condition” as a result of temporal mesial lesions [5,19].

Camilo Golgi (Cytologist) 1843-1926 and Santiago Ramón y Cajal Histologist and Pathologist 1852 - 1934, made, in turn, their contributions in the histology of the nervous system [20].

That is, many researchers over the years made multiple contributions to the anatomical, histological and functional description of the nervous system, regardless of its relationship with the clinic, without discriminating one specialty or the other. Charcot, Freud, Jackson, Bleuler, among many others, thought in terms of a unified study of the brain and mind, regardless of special clinical and research interests, however, it was not the future trend [4,21].

### Why did psychiatrics and neurology separate?

After all the described additions to the scientific arsenal, in the middle of the 19<sup>th</sup> century in the United Kingdom and the United States and, to some extent, throughout the world, Neurology and Psychiatry are defined as different disciplines. The era of ‘Mindless Neurology and Brainless Psychiatry’ was in full swing.

Several influences conspired and among them, the discoveries of Broca, Wernicke, Hughlings Jackson and others, as well as the edition of the mapping of the brain by Korbinian Brodmann (Neurologist) (1868 - 1918) [22].

Primary sensation, motor function and some discrete cognitive functions, such as facial recognition, for example, could well be localized.

However, mood disorders, obsessive compulsive disorder, autism and schizophrenia were much less feasible to locate and were separated from Neurology.

The figure of Sigmund Freud, Neurologist (1856 - 1939) fascinated by the relationship between the mind and the brain, studied aphasia and wrote a manuscript on the neurological bases of the mind, his “Project for a scientific psychology”. He developed the theory of psychoanalysis, which interprets mental disorder mainly in psychological terms [23,24].

It is in this way that Neurology matures as an independent clinical specialty, with close contacts with biology and similarities with Internal Medicine and Clinical Psychiatry, it is influenced by the socioeconomic, family and interpersonal relationship.

Psychiatry is described as “neurology without signs” and common psychiatric disorders were considered not to be caused by identifiable lesions in the brain. By consensus, psychiatric illnesses were sensitive to social factors [25].

Consequently, during the early 20<sup>th</sup> century, each of these disciplines followed their separate path. Neurologists focused on those brain disorders with cognitive and behavioral elements with abnormalities that also present with somatic signs - stroke, multiple sclerosis, Parkinson’s, etc., while psychiatrists focused on associated mood and thought disorders with none, or less, physical signs found in the neurological examination of the motor and sensory systems - schizophrenia, depression, anxiety disorders, etc [25].

At this stage, disorders with behavioral alterations were considered as “functional” without a structural basis, and neurology referred to symptoms that have their origin in structural changes [26].

### Why do neurology and psychiatrics tend to join again? bases for a re-encounter

Recently, contemporary neuroscience has begun to provide the techniques necessary to illuminate the dimensions of psychiatric illness.

The profound effects of schizophrenia on perception, thinking, intellectual capacity, emotion, and behavior suggest that there must be an underlying neurological disorder, but this has been very difficult to identify.

Despite this, the development of functional imaging, neurogenetics, molecular medicine, neuropharmacology and neurophysiology over the last 30 years support the development of neurosciences and, in turn, the development of behavioral neurology, which it blurs the border between Neurology and Psychiatry [1,27].

The development of imaging techniques provides an “*in vivo*” window of the disorders of the human brain related to neuroanatomical and neurofunctional changes and, therefore, a sample of the structural abnormalities of the brain is produced [28].

The meta-analysis of 168 different studies was significant, with more than 4 thousand patients with varied and classic neurological or psychiatric pathologies, in which voxel-based morphometry with Magnetic Resonance was used to compare the size of the gray matter of different brain regions between patients and controls.

In neurological diseases the greatest changes were detected in the basal ganglia, in the insula and in the temporal and sensorimotor cortex, unlike in psychiatric diseases where the greatest deterioration was detected in the cingulate, medial frontal, superior frontal and occipital, which allows us to conclude that, at least from a neuroimaging perspective, neurological and psychiatric disorders represent two different classes of disorders [29].

Regardless of introducing the term neuropsychiatry as a subspecialty in recent times, it is advisable that these sister disciplines complement each other more and more in attention to the multidimensionality of each brain disease and where the transdisciplinary is usually much more effective both for diagnostic challenges as therapeutics of our complex specialties [4].

It is worth noting that, with the support of recent neuroimaging studies in humans, the insula is re-emerging as an important area of the brain not only in the physiological understanding of the brain, but also in pathological contexts in clinical research.

The activation of the alteration of the limbic system in depression and bipolar disorder and recent research has delineated the genetic architecture of these disorders [30].

In recent investigations of the anatomy, cytoarchitecture, connections and functions of the insula, interoceptive information and its integration with emotional, cognitive and motivational signals from a matrix of cortical and subcortical regions of the same is demonstrated [31,32].

Such scientific evidence implies that the simplistic view that neurological disorders are organic and psychiatric disorders are functional is out of date. However, they are based on a structure, which is the brain.

Therefore, it is reasonable to warn of the future risk of possibly considering each psychiatric entity neurological where, due to advances in scientific research, the biological bases of said disorders are being identified [33].

The accelerated development during the last decade that has been firmly consolidated in basic research, implies that the first practical result is that neurological and psychiatric diseases should be merged as disorders of the Central Nervous System and not as diseases of different fields [4].

Neurologists-in-training should spend some time working on their psychiatric training and vice versa.

Psychiatrists are increasingly important in clinical neurology teams and vice versa, and both specialties benefit from their joint platform in basic neuroscience [34].

It is time to change the current focus of these two specialties and see them as a set of entities that are dependent on each other [35].

The border territory between neurology and psychiatry is extensive and requires the knowledge and strengths of both disciplines, but also the expertise trained through a specialized clinical, scientific, and academic program [35].

### Conclusion

Psychiatry and Neurology are two disciplines that respond to the anatomy and physiology of the nervous system, which differentiates them from other medical specialties. In our opinion, efforts should be directed to achieve an interrelation that brings neurologists closer to psychiatric aspects and vice versa, in order to better understand the manifestations of the different diseases that affect the central nervous system and that can only be achieved with a close interrelation of both specialties.

### Bibliography

1. Fitzgerald M. "Do psychiatry and neurology need a close partnership or a merger?" *BJ Psychological Bulletin* 39 (2015): 105-107.
2. Fitzgerald M. "All future psychiatrists should be neuropsychiatrists". *Psychiatrist* 37 (2013): 309.
3. Swanson LW. "What is the brain?". *Trends in Neurosciences* 23 (2000): 519-527.
4. Fuentes P. "¿Enfermedad neurológica o psiquiátrica?" *Revista Chilena de Neuro-Psiquiatría* 55.3 (2017): 149-150.
5. Avendaño C. "Neurociencia, neurología, y psiquiatría: Un encuentro inevitable". *Revista de la Asociación Española de Neuropsiquiatría* 83 (2002): 65-89.
6. Laín Entralgo, P. y otros, *Historia Universal de la Medicina*, Barcelona, Salvat, (1973).
7. Marías J and y Laín Entralgo P. "Historia de la Filosofía y de la Ciencia, Madrid, Ed. Guadarrama S.L (1964).
8. Finger S. "Origins of Neuroscience. A History of Explorations into Brain Function". New York, Oxford Univ. Press (1994).
9. Wartofsky MW. "Introducción a la filosofía de la ciencia". Madrid, Alianza Universidad (1973).
10. Colp R Jr. "History of Psychiatry". En: Sadock, B. J. y Sadock, V. A. (Eds.), *Kaplan and Sadock's Comprehensive Textbook of Psychiatry*, Philadelphia, Lippincott Williams and Wilkins (2000).
11. Keele KD. "Thomas Willis on the Brain. An essay Review". *Medical History* 11 (1976): 194-200.
12. Üstün, ÇDr. "Thomas Willis' Famous Eponym: The Circle of Willis". *Turkish Journal of Medical Sciences* 34 (2004): 271-274.
13. Campohermoso-Rodríguez OF, *et al.* "Tomas Willis, neuroanatomista y padre de la neurología. Cuad. - Hosp. Clfn. La Paz 60.2 (2019).

14. Millon T. "Masters of the Mind: Exploring the Story of Mental Illness from Ancient Times to the New Millennium. Wiley (2004).
15. Herrera L. "Procesamiento Cerebral del Lenguaje: Historia y evolución teórica". *Fides Et Ratio* 17.17 (2019).
16. Camacho JF. "Charcot y su Legado a la Medicina". *Gaceta Médica de México* 148 (2012): 321-326.
17. Pérez-Trullén JM. "Breve biografía de Alois Alzheimer". *Neurosciences and History* 1.3 (2013): 125-136.
18. Venegas-Francke P. "Encefalitis letárgica. La epidemia en los albores de la neurología". *Revue Neurologique* 68 (2019): 82-88.
19. Covo P. "John Hughlings Jackson, un científico victoriano". *Acta Neurológica Colombiana* 22 (2006): 257-260.
20. Jones EG. "Cajal's debt to Golgi". *Brain Research Reviews* 66.1-2 (2011): 83-91.
21. Baker MG., et al. "The wall between neurology and psychiatry. Advances in neuroscience indicate it's time to tear it down". *BMJ* 324 (2002): 1468-1469.
22. Zilles K and Amunts K. "Centenary of Brodmann's map—conception and fate". *Nature Reviews Neuroscience* 11.2 (2010): 139-145.
23. Dueñas J. "Sigmund Freud: padre del psicoanálisis ortodoxo". *Revista del Hospital Psiquiátrico de La Habana* 10.2 (2013).
24. Kandel ER. "Psychiatry, Psychoanalysis and the New Biology of Mind". *American Psychiatric Publishing* (2005).
25. Price BH., et al. "Neurology and psychiatry: closing the great divide". *Neurology* 54 (2000): 8-14.
26. Zeman A. *Practical Neurology* 14 (2014): 136-144.
27. Reynolds EH. "A bridge between neurology and psychiatry". *Epilepsy and Behavior* 65 (2016): 56-59.
28. White PD., et al. *BMJ* 344 (2012): e3454.
29. Crossley N., et al. "Neuroimaging distinction between neurological and psychiatric disorders". *The British Journal of Psychiatry* 207 (2015): 429-434.
30. The Insula: An Underestimated Brain Area in Clinical Neuroscience, Psychiatry, and Neurology *Trends in Neurosciences* 40.4 (2017).
31. Uddin LQ. "Salience processing and insular cortical function and dysfunction". *Nature Reviews Neuroscience* 16 (2015): 55-61.
32. Benarroch E. "Corteza insular. Complejidad funcional y correlaciones clínicas". *Neurology*® 93 (2019): 932-938.
33. Levine D. "Time to end the distinction between mental and neurological illnesses (eLetter)". *BMJ* 344 (2012): e3454.
34. Raja M. "Neurological diagnoses in psychiatric patients: the uncertain boundaries between neurology and psychiatry". *Italian Journal of Neurological Sciences* 16 (1995): 153-158.
35. Ramirez-Bermudez J., et al. "Neuropsychiatry: Towards a Philosophy of Praxis". *Revista Colombiana de Psiquiatria* 46.1 (2017): 28-35.

**Volume 10 Issue 7 Julys 2021**

**©All rights reserved by Juan Enrique Bender del Busto  
and Marcel D Mendieta Pedroso.**