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Historical Pathologica

The hidden side of Santiago Ramon y Cajal

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Summary
Alongside his anatomical studies, which laid the foundations of modern neuroanatomy, Santiago Ramón y Cajal also showed a lively interest in studying dreams, hypnosis, and the world of the paranormal. On his travels to worlds far removed from anatomy, Cajal sometimes strove to find potential neuroanatomical explanations for the phenomena he encountered, while at other times he simply allowed himself to be carried along by his curiosity, with no preconceptions. His investigations in such diverse spheres of knowledge and human behavior are an exceptional example of a scientific epoch that has since disappeared.

Key words: neuroanatomy, hypnosis, dream

Introduction

Today, the term neurosciences covers a variety of disciplines ranging from psychopharmacology to neuroanatomy, from biology to psychoanalysis, from philosophy to genetics. This modern conception of a field of research on human mental functioning evolved during the 20th century in training courses, clinical practice and research efforts, which often went their separate ways, confined within disciplinary settings with rigid boundaries. Some of the leading figures in the neurosciences – and, oddly enough, some of the most important among them – nonetheless remained more than willing to be side-tracked even as they opened up new knowledge pathways. This is the case, for instance, of Santiago Ramón y Cajal (1852-1934), the founder of modern neuroanatomy, whose work on "The Texture of the Nervous System of Man and Vertebrates" [1] is a masterpiece in the history of science. Throughout his life, and especially in his later years, Cajal combined the rigor of his anatomical research with his interest in (or even fascination for) other phenomena of mental functioning.

It is hard to say how this was viewed by Camillo Golgi (1843-1926), who was one of the editors the journal *Pathologica* [2]. In fact, the Spanish scientist's studies are virtually absent from the journal for the first 30 years of its publication. He is never mentioned, not even in the columns providing updates on the international literature contained in every issue of the journal. The scientific battle involving the two Nobel prize-winners at the time was common knowledge and the Spaniard's interests outside neuroanatomy are quite likely to have accentuated the very well-known contention [3] between Ramon y Cajal and "*el sabio de Pavia*", as the Spaniard called Camillo Golgi [4]. It is worth adding that Cajal's respect for Italian science was unaffected, however, and resurfaced

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Figure 1. Santiago Ramón y Cajal in his early thirties.

years later, when the Spaniard went to great lengths in 1934 to have the well-known anatomist Giuseppe Levi released from prison. As emerged more clearly only recently [5], Cajal wrote to the Spanish embassy in Italy, emphasizing the internationally-acknowledged scientific value of the man's work as an argument for releasing Levi, who was being detained in Turin for political reasons.

Ramon y Cajal lived in a time of ferment and contradictions. While materialist and positivist views were attempting to go beyond the metaphysical assumptions regarding the human mind, there was growing interest in a grey area of anomalous phenomena, suspended between the bizarre and the paranormal.

For most of the 19th century and up until the early years of the 20th, all the social classes, from the lowest to the aristocracy, were engaging in magnetic-hypnotic practices that sometimes trespassed into the world of spiritism. The distinction between hypnotism and spiritism was often not very clear to the general public. Hypnotists' theatrical performances were widespread, and just as popular as the spiritist meetings organized in people's homes.

For several decades, people from the newborn European and North American middle classes would meet in the most intellectual salons to attempt to make contact with the spirits of the dead, just as witch doctors and sorcerers had done for millennia. These experiments were taken extremely seriously, and the direct involvement of important figures from the scientific and cultural worlds meant that they turned into events worthy of an accurate account in the newspapers and consequent debate. The effort to find in spiritism an "experimental" surrogate for religious faith was characteristic of the decline of positivism.

Cajal was infected by such interests too, but it is only recently that this part of his biography has been further investigated [6]. His interest and skill in the fields of art (he realized some of the most beautiful and unsurpassed portraits of brain cells and diagrams of nerve fibers), anthropology, paleontology, and even photography are better known and have been more

thoroughly examined, partly because – even before receiving the Nobel prize – Ramón y Cajal had been president of the Spanish Society of Natural History. In this and other societies, Cajal rubbed shoulders with some of the most important biologists, geologists, paleontologists and prehistorians of his time [7].

Not just neuroanatomy

In various periods of his life, Ramon y Cajal took an interest in hypnosis, a topic that was the object of much research at the time. This was prompted by the publication of Charcot's findings at the Salpêtrière Hospital, and by the efforts made to draw the attention of Europe's collective imagination to demonstrations of hypnotism, such as those of Charles Lafontaine (1803-1892) in Switzerland, Carl Hansen (1833-1897) in Denmark, and Alfred or Albert Edouard d'Hont (1840-1900), better known as Donato, in Belgium. For a long time, such interest in hypnosis went hand in hand with a fascination for magical and mysterious phenomena. In the scientific world, it contributed to the development of the early forms of psychotherapy, and consequently to treatments in the mental health domain outside asylums. In the last years of his life, Cajal admitted: "I have also written, but I do not know if I will succeed in publishing a book on hypnotism, spiritualism and parapsychology, that should have seen the light 20 years ago" [4].

It is worth recalling at least two fundamental moments in Cajal's work on hypnotic phenomena, which go to show that he was moving beyond the reductionist approach to the most complex manifestations of the mind.

One episode concerns his experimental use of hypnosis as an analgesic for his wife, Silveria Fananás, when she was delivering their sixth child in 1888. Cajal was a professor at the University of Barcelona at the time, and he published an account of his experiment in 1889 [8].

The other episode goes to show just how keen Ramon y Cajal was to understand the neurological basis for altered states of consciousness. He wanted to try and explain apparently incomprehensible and miraculous phenomena, even going so far as to found a *Comité de Investigaciones Psicológicas*.

He explains in his autobiography, *Recuerdos de mi vida* [4] how he received women with hysteria, neurasthenics, maniacs and spiritist mediums in his own home. "*Within a short space of time we collected a copious collection of interesting documents. (...) Just to mention the experiments with hypnosis conducted on healthy people with no apparent neurological disorders: after reaching the indispensable degree of sleepiness and passiveness, we induced on command, both asleep and on awakening, a waxy analgesic cataplexy, positive and negative hallucinations (...), total or partial amnesia, the evocation of forgotten images (…), and finally the total abolition of free will (...). We achieved prodigious results that would arouse the envy of the best miracle-worker: a radical change of emotional state, a restored appetite in hystero-epileptics refusing to eat, the treatment of various kinds of chronic paralysis of a hysterical nature, the abrupt cessation of attacks of hysteria with loss of consciousness, the complete abolition of the pain of childbirth (...).These miraculous cures rapidly became famous (...) and it would have been a good opportunity for me to establish a sizeable clientele for myself had my character and my taste permitted (...). But, in the end, these experiments with suggestion left me with ambivalent feelings of surprise and disappointment: surprise at the reality of phenomena of cerebral automatism that I thought I would have only seen at a magnetizer's farcical circus act; and disappointment in seeing the degree to which the much-praised human brain,"masterpiece of creation", suffers from the enormous defect of suggestibility.*". Cajal ultimately had to put an end to his experiments, however, when he realized that his activities held an irresistible appeal for an audience of lunatics, far removed from his field of interest.

That said, it is thanks to contributions to neuroanatomical knowledge from Ramon y Cajal, among others, that psychiatry followed the "somatic model" of mental disease, based on histological studies on patients' brains, and rooted in principles of hereditability and organicity [9]. There are traces of this "advanced" somatism in *Pathologica* too: in 1912, there were reports of experiments aiming to demonstrate particularities in the serum of blood from patients with mental disorders, such as one article entitled "Psychopathies and neural antibodies" [10]. This approach was even applied to the study of hypnosis, and it is clear from the numerous works on the physiological grounds for hypnosis [11,12] that this was not just an issue arousing a transient curiosity, but part of a line of lively research for decades.

As the scientific disciplines focusing on the mind evolved, Cajal retained his interest in hypnosis and also turned his attention to studying dreams. He recorded his thoughts in a diary, speculating on the anatomical basis of our dreaming: "*When we sleep, we do not rest completely (...). The cells in which unconscious images are recorded stay awake and become excited, rejuvenating themselves with the exercise they did behind the back of the conscious mind*". He im-

agined that the cells dedicated to critical faculties during the daytime and those activated in the experience of dreams might function alternately [13]. In 1908, when he was working on theories about dreaming, he wrote "*Dreaming is one of the most interesting and most wondrous physiological phenomena of the brain"*. He wanted to look beyond the visual hallucinations and perceptions in dreams, not to seek a psychoanalytical interpretation, but simply to investigate the colors and other details of people's perceptions in their dreams. He tried to identify the areas of the brain where the physiological activity causing dreams takes place [13].

Ramon y Cajal was not the only scientist to be seduced by distortions in our mind's perceptions, the world of dreams, and the shaky boundaries separating our real psychic faculties from parapsychological manifestations. He was living in a time when the confines of ordinary perception had been overridden by advances in technology and new knowledge in the realms of physics. The radio really did make remote broadcasting possible, and the discovery of X-rays made what was invisible become visible. Scientists like Lombroso, Flammarion and countless others were concentrating on exploring this frontier. Great attention was being paid, for example, to the studies conducted by Cesare Lombroso (1835-1909) and psychiatrists of the caliber of Enrico Morselli (1852-1929) on Eusapia Palladino, the famous medium [14]. "*As happened for hypnotism*", wrote the eminent psychiatrist Augusto Tamburini (1848-1919), "*these topics must now, in every cultured nation, be taken out of the hands of charlatans and fanatics, and submitted to scientific investigation and discussion, responding to those who find it unworthy of a serious scientist to take an interest in them with the words of Laplace: that we are so far from understanding all the forces of nature that it would be hardly philosophical to deny the existence of phenomena simply because they still appear inexplicable based on the current state of our knowledge*" [15].

In the final years of his life, Ramon y Cajal dedicated more of his energy to these interests, writing a book entitled "*El mundo visto a los ochenta años*" [16]. He also wrote an essay, "*The Hallucinations of Sleep*" [4,13], in which he expanded on his research on dreams, methodically recording his own and even turning to a medium in Saragossa for the purpose of conducting spiritist experiments (though this cooperation was soon abandoned when it emerged that the medium was a swindler).

With time, Ramon y Cajal's research in the field of psychological investigation was gradually forgotten, partly due to the fact that his writings on hypnotism, spiritism and metaphysics disappeared, destroyed when the Alfonso XII Medical Center in Madrid was bombed during the Spanish Civil War [6]. His diary about his dreams seemed to have been lost forever as well, but somewhat incredibly reappeared in Spain in 2014, where it was published under the title "*Los suenos de Santiago Ramon y Cajal*" [13]. This volume contains 103 dreams described by the father of neuroanatomy, one of which he had called "Tactile dream": "*I dream that they remove my skull and only the skin covers my brain. I feel the contact between brain and skin, and the falling of a weight to one side. I hold it back with my hands, awaiting the doctor who will make a protective skullcap for me out of who knows what (…). I find this very natural for it, and for my brain to be covered just with my skin, without any further protection (...). I awake when I see that my brain is falling out*".

Conclusion

There are some scientific disciplines – like population genetics, for instance, or even psychiatry – that have broad and sometimes fluctuating boundaries, and their best interpreters have drawn on the most diverse sources of knowledge. Histology, on the other hand, especially at the time of the major discoveries made at the start of the 20th century, seems to be a discipline with rather restrictive and well-defined borders, capable only of drawing on its own progress. We might wonder whether the interest that Cajal took in such eccentric disciplines as those mentioned here can be disregarded as a passing fancy, a sort of weakness, or whether instead it deserves to be valued as bearing witness to the strength of his intellect and his far-reaching curiosity, and as a source from which he drew to develop new intuitions on the human mind when he returned to investigating its secrets under the microscope. Such an approach clearly contrasts with the growing tendency nowadays to attribute more value to in-depth study, to a whole professional lifetime dedicated to a specific discipline and narrow field, which has given rise to the modern-day phenomenon of hyper-specialization. When it comes to understanding human beings, however, Ramon y Cajal's experience reminds us that eclecticism can be a valuable resource for scientists to nurture, helping them to see through new eyes what remains invisible to a more conventional gaze.

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