Nicolás Achúcarro as seen by Dr Wenceslao López Albo

J. J. Zarranz

Emeritus Chair of the Department of Neurosciences. Universidad del País Vasco, Bizkaia, Spain. Instituto de Investigación BIOCRUCES, Barakaldo, Bizkaia, Spain.

ABSTRACT

Dr Wenceslao López Albo dedicated three articles to his master, Dr Nicolás Achúcarro. The second article was published in 1923 in *Gaceta Médica del Norte*, the official publication of the Bilbao Academy of Medical Sciences, and has been completely overlooked. It has not been cited in any of the numerous scientific articles or biographies dedicated to the Basque neuroscientist. This work presents and discusses that article, the longest of the three, in which Dr López Albo put the greatest effort into describing the extraordinary personality of Dr Achúcarro. The other two articles by Dr López Albo and the commemorative sessions that the Bilbao Academy of Medical Sciences dedicated to Achúcarro in 1918 and 1968 are also briefly discussed.

KEYWORDS

Achúcarro, Bilbao Academy of Medical Sciences, Gaceta Médica del Norte, López Albo, Spanish neurohistology

Introduction

The figure of Nicolás Achúcarro, described in a classic article by Dr Laín Entralgo¹ and in two extensive biographies, ².³ seems to have gained importance with time, as reflected by the considerable number of recent publications dedicated to his memory,⁴¹¹³ in which no few clichés are repeated. However, it is surprising that those articles should not reference one of the most detailed descriptions of the figure of Achúcarro, written by one of his direct students, Dr Wenceslao López Albo.

The latter dedicated at least three articles to the figure of Dr Achúcarro. The first article was based on the short speech he gave during the commemorative session organised by the Bilbao Academy of Medical Sciences (ACMB) few months after the death of Dr Achúcarro, which was published in a special edition of *Gaceta Médica del Norte* (GMN) in 1918 (Figure 1). 4 Such

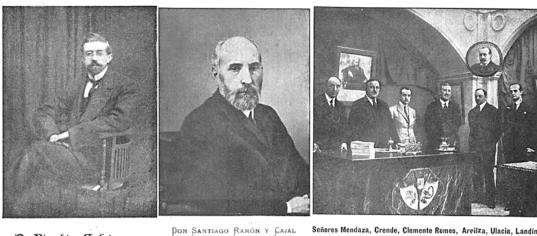
important local personalities as the mayor of Bilbao and Dr Areilza, Dr Landín, and Dr López Albo participated in the session. Another López Albo's contribution to the knowledge of the figure of Achúcarro was a lecture given at the Residencia de Estudiantes that was later published in the journal *Residencia*¹⁴ and cited by several authors.

Lastly, the second article published was based on a lecture delivered at the Bilbao Artistic, Scientific, and Literary Athenaeum, which was printed in full in GMN in 1923 (Figure 2).¹⁵ This publication of López Albo has been completely overlooked, and is not cited in any of the references consulted; only López Albo himself cited it in his 1926 article.¹⁶

As the article is extensive and well-structured, and specifically addresses the personality of the neuroscientist more than his scientific contributions, I considered it worthwhile to rescue it from obscurity

Corresponding author: Dr Juan José Zarranz E-mail: jj.zarranz@hotmail.com

Received: 6 May 2020 / Accepted: 11 June 2020 © 2019 Sociedad Española de Neurología



D. Nicolás Achúcarro

Presidente honorario de la Academia

Academia de Ciencias Médicas de Bilbao

Solemne sesión necrológica celebrada en honor del malogrado

Dr. D. Nicolás Achúcarro



Figure 1. Images from the commemorative session dedicated to Dr Achúcarro at the Bilbao Academy of Medical Sciences in 1918, published in the Gaceta Médica del Norte. Santiago Ramón y Cajal was appointed Honorary President, and his portrait always presides over the sessions of the executive board at the Academy. Dr López Albo is the last figure on the right.

and make it available to those interested in the figure of Nicolás Achúcarro.

Objective

The aim of this work is to revisit the article that López Albo published in GMN in 1923,15 which is probably the study with the greatest focus on the personality and other human aspects of Dr Achúcarro, written by someone who knew him, and to make the text available to those interested in the Basque neuropathologist.

Methods

GMN was the official publication of the ACMB and was born independently in 1895, several months before the academy. The name GMN was maintained until 1925. In 1926, mostly due to the influence of Dr López Albo, who was designated its editor-in-chief, the name of the journal changed to Revista Clínica de Bilbao (RCB). An original collection of GMN and RCB, in addition to digitalised versions, can be found in the archives of the ACMB. Articles can be requested from academia@ acmbilbao.org.

With the aim of describing the extraordinary contribution of Dr López Albo to the life of the ACMB and its official publications,17 a review was conducted of all issues of GMN (later RCB) published from López Albo's arrival in Bilbao in 1915 to his exile to Mexico in 1937. One study identified in the review was López Albo's GMN article published in 1923, which has not been cited by any of the authors who have written on Dr Achúcarro. This work provides a detailed summary with several direct quotations from the article.

To set this article within the context of the other contributions dedicated to Dr Achúcarro, I also review and briefly describe the remaining articles published in GMN after the ACMB's commemorative session held in honour of Dr Achúcarro shortly after his death in 1918. 14 Of the numerous articles comprising the ACMB's next homage to Achúcarro, to mark the 50th anniversary of his death in 1968 and published in another special edition of GMN¹⁶ (Figure 3), I briefly review only those written by people who knew Achúcarro and could provide some details shedding light on his personality. The history of the ACMB and its official publications is addressed in several articles. 19-21

Results

Summary of Nicolás Achúcarro's life1-3

Achúcarro was born into a comfortable family in Bilbao in 1880 and received an extensive and thorough education, with a particular focus on foreign languages, which later enabled him to travel. He spent one year at a college in Wiesbaden, becoming fluent in German. He studied part of his university degree in Madrid and furthered his education in Germany. His most influential professors were Cajal and Madinaveitia. Still a student, he learnt histological techniques with Simarro, who also introduced him to neuropsychiatry. He furthered his training in France, a Italy, and Germany, especially with Alzheimer (1906-1908). He organised the neuropathology laboratory of the Government Hospital for the Insane in Washington, D.C. (1908-1910). Achúcarro returned to Spain, where he had few opportunities in the public healthcare system, although he was afforded an office and a consultation at the Hospital Provincial de Madrid; there, his work providing neurological care and training took precedence over his work in psychiatry. With the help of Cajal, he was able to establish a laboratory where he continued with his research and developed a school of students, including Pío del Río Hortega. He developed new staining techniques that significantly contributed to the study of glia. Achúcarro was especially interested in the glioarchitecture of the cerebral cortex, among many other topics in the fields of histology and histopathology. He published 40 articles in four different languages in less than a decade (1906-1916)11,18: in 1915 he started

Biografía del Dr. Achúcarro

Su personalidad y su obra científica

Conferencia dada en el Afener Artístico, Científico y Liferario, de Bilbao, el dia 31 de Marzo de 1923

POR W. LÓPEZ ALBO

Señoras y señores:

Invitada la Academia de Ciencias Médicas por el digno Presidente de este Ateneo, a que, en una serie de conferencias dedicadas a enaltecer el recuerdo de vascongados ilustres, prestara su concurso exponiendo la biografía del doctor Achúcarro, es mi deber participar, antes que nada, a esta docta Corporación, el agradecimiento de la Academia de Ciencias Médicas por no haber olvidado a investigador médico de tanto relieve científico, y, después, testimoniar a la Academia de Ciencias Médicas mi reconocimiento al haberme honrado con este designio, que hubiera sido

Figure 2. The first page of López Albo's article on Dr Achúcarro, published in the *Gaceta Médica del Norte* in 1923

to develop the first symptoms of the disease that led to his death in 1918, following a grievous period of disability due to paraplegia and severe pain. Achúcarro self-diagnosed Hodgkin disease, although there is no evidence of histological confirmation.

Summary of Wenceslao López Albo's life^{13,17,22}

López Albo was born in Colindres in 1889 and studied in Valladolid and Madrid. He considered Achúcarro his master, together with Simarro and Gayarre. López Albo visited several neurology and psychiatry centres in France and Germany in the latter months of 1914, and moved to Bilbao in 1915. He was able to open a nervous and mental diseases consultation at Hospital de Basurto, although he was not officially appointed. In 1924 he was designated director of the Zaldívar Asylum. He

^a Two historical errors are frequently repeated in Dr Achúcarro's biographies: *1)* when Nicolás visited Pierre Marie's service, he was at Bicêtre, not at La Salpêtrière; *2)* Dr Achúcarro obtained his doctor honoris causa degree from the University of Fordham and not Yale.

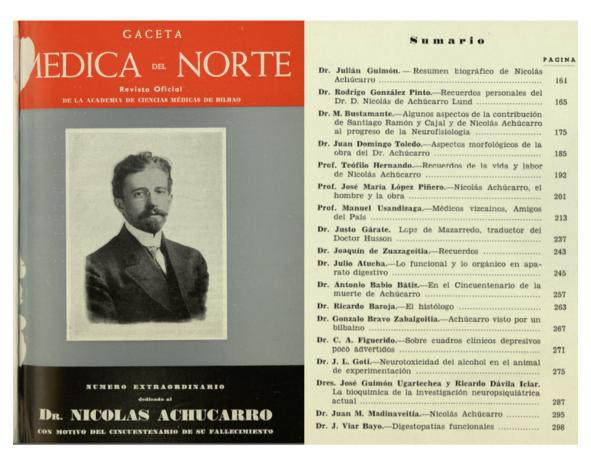


Figure 3. Cover of the journal and list of participants in the extraordinary session of the Bilbao Academy of Medical Sciences held to honour Dr Achúcarro on the 50th anniversary of his death in 1968

truly promoted interest in neurology within the ACMB (of which he was president between 1921 and 1922) and its official publications, in which he published approximately 100 communications, articles, and other contributions.¹⁷ In 1928, he was appointed Head of Neuropsychiatry and Medical Director of the recently inaugurated Casa de Salud Valdecilla, leading an ambitious and cutting-edge clinical, teaching, and research project.¹⁹ Strong local opposition and financial difficulties ruined his project, so he resigned and returned to Bilbao in 1930. With the political changes that occurred in Spain in 1936, he was called to return to Valdecilla, but he had to leave Spain in 1937 with the arrival of Franco's troops in Santander; after a complicated journey, he settled in Mexico City, where he died in 1944, shortly after a surgery. He is believed to have published at least 150 articles, with a strong focus on neurological subjects but also addressing the organisation of psychiatric care, teaching, selection of lecturers, etc.

A eulogy by Dr López Albo in 1918

In this short speech,¹⁴ unlike his 1923 article, Dr López Albo dedicated more time and interest to Achúcarro's professional and research career than to his personality. He underscores that he considered Achúcarro a genuine representative of the modern young regenerationists and pro-Europeans who had emerged in Spain, with a vast education and knowledge of languages, in addition to a jovial, joyful character and wry wit. These traits of his spirit and personality were also mentioned by his contemporaries including Marañón, Ortega y Gasset,

and Lafora,^{2,3} and are repeated in all the articles about Dr Achúcarro. López Albo summarised Achúcarro's post-graduate education in Europe and his work in Washington before returning to Madrid.

He also underscored that Achúcarro's training in histology, beginning during his time as a student, was decisive because ultimately, "Achúcarro was above all an accomplished histopathologist, as well as a notable neurologist and psychiatrist"; this opinion was widely shared by other authors. 17 On this point, he insisted that while Achúcarro was a great clinician, he "mainly dedicated his enthusiasm and work to the histopathology of the nervous system." López Albo reviewed Achúcarro's publications and highlighted his contributions of new staining methods for glia, as well as his premonitory vision of both the structural and the neurochemical role of glia, an idea that is now universally accepted. 23,24

He recalled meeting Achúcarro at the nervous system consultation at Hospital Provincial de Madrid and reviewed his teaching activity. To conclude, he mentioned the praise that Leon Azoulay (the great histologist who translated Cajal's texts into French) dedicated to Achúcarro, whom he considered not only a great histologist but also especially a selfless person, "an enthusiastic patriot who worked for the glory and scientific relevance of his country," who had also started a school.

The rest of the ACMB's commemorative session in 1918

Besides Dr López Albo, several other speakers participated in the session. Only first-hand accounts from people who personally knew Dr Achúcarro will be mentioned here. Dr E. Areilza,25 an important physician in Bilbao who played a central role in the creation of the Miners' Hospital of Montes de Triano, the Antituberculous Sanatorium in Górliz, and the Hospital de Basurto, among other significant contributions, and was also president of the ACMB, recalled his surprise at Achúcarro's broad, up-to-date knowledge at one of their meetings. As a surgeon, he was amazed that Dr Achúcarro was aware of the latest developments in traumatic shock, in which he saw an opportunity to study the role of glia, as in the genesis of any emotion. Dr F. Landín²⁶ underscored Achúcarro's defence of specialisation and his focus on effort. He recalled that Achúcarro, already ill and disabled, would say to his acquaintances "I still feel capable of happiness; if you would take me to the laboratory I would be glad to continue my work." According to Dr Landín: "Achúcarro was not a hope that dissipates but a reality that is lost."

Dr López Albo's 1923 article in GMN¹⁵

López Albo started by congratulating the Artistic, Scientific, and Literary Athenaeum of Bilbao for organising the tributes to important citizens from Biscay and for including Dr Achúcarro among them. Likewise, he thanked the ACMB for having invited him to present the figure of Dr Achúcarro. That first Athenaeum was founded by Álvaro Alcalá Galiano, and was short-lived.

Subsequently, López Albo advised that his lecture would focus more on the personality and human side of Dr Achúcarro than on his scientific work. He divided his speech into several sections: personality, cultural knowledge, teaching activity, organisational skills, and teaching skills.

Personality

The first thing Dr López Albo highlighted about Achúcarro's personality was his great focus on objective experimental and clinical research, as a continuation of the work of his masters Cajal, Simarro, and Madinaveitia: Achúcarro distanced himself from medicine based on memory and imagination, which neglected basic sciences, laboratory work, and bedside clinical experience. He belonged not to the group of "subjective, acritical thinkers, hypocrites, or upstarts" but to "the balanced group of rationalists who are guided in life only by observation and thinking," even acknowledging "the fallibility of our senses and reason" in understanding, for example, the higher functions of the brain, including memory, awareness, intelligence, and free will. He also distanced himself from scientific dogma: "through his knowledge, he aimed to establish not a doctrine, but only a system to better satisfy the relativity of human science." He was a creator and did not assimilate the ideas of others without severely judging them beforehand. "He therefore belonged to the exceptional class of men who contributed to scientific progress."

In terms of his social relationships, Dr López Albo highlighted that "another characteristic of Dr Achúcarro was his kindness and courtesy in all his acts," especially when treating patients, whom he attended with the same care and kindness regardless of their social status.

He also noted that even when Achúcarro criticised the undesirable aspects of his scientific and social setting, he always concluded with a message of "understanding and kindness"; "he was tolerant," "even with his sarcastic comments he was true and loyal."

Dr López Albo summarised by stating that "Dr Achúcarro was a man of value and merit." He had a privileged intelligence, an unprejudiced imagination, an energetic drive, an astonishing working capacity, and total ideological independence. Already as a young adult, he was able to culminate a praiseworthy body of work in the midst of the mediocrity of Spanish scientific circles at the time.

López Albo concluded that Dr Achúcarro was "kind, modest, hard-working, a rationalist, a wise creator with an independent spirit."

Cultural knowledge

López Albo highlighted that Achúcarro had a vast general knowledge and that his knowledge of foreign languages enabled him to follow developments in the international scientific literature. He considered Achúcarro to be the genuine representative of the young Spanish scientists of the time who wanted to be part of the European cultural setting. At this point, Dr López Albo summarised Dr Achúcarro's training at several European centres^b.

Teaching activity

López Albo considered Achúcarro to be a "master without being a pedant," who knew, as a scientist, the limits of knowledge. He transmitted his eagerness to establish diagnoses by following up patients until the post-mortem study, when necessary, in order to identify clinical-pathological correlations. Even when this meant openly acknowledging that he had made an error. As an anecdote, López Albo cited the case of a young man who was admitted in a hard-to-define state suggestive of psychogenic disease, which Dr Achúcarro classified as a possible "sexual complex" (a fashionable term at that time). The patient died suddenly and the post-mortem study revealed a huge tuberculoma in the cerebellum. Achúcarro would ironically acknowledge his own diagnostic error in public.

b With a small mistake, as he considered Dejerine a student of Charcot when he was actually a disciple of Vulpian at the "petit service" in La Salpêtrière. López Albo cited several of Dr Achúcarro's teaching initiatives, including the histology and histochemistry lessons he gave as interim professor at Cajal's department, a series of lectures on histopathology of the cerebral cortex at the Residencia de Estudiantes in 1912-1913, and ten master lecturers on child psychiatry in a course on paedagogy for mentally abnormal children, addressing the fundamental concepts for understanding the structure of the brain.

López Albo also highlighted Achúcarro's direct instruction of his students and collaborators, both in clinical practice (in his nervous and mental disorders consultation) and in his experimental work (in the laboratory he organised with the help of the Board for Study Extensions). We can conclude from López Albo's remarks on this point that he himself had little interest in histology or histopathology, and never attended the laboratory, unlike many others including Pío del Río Hortega. In this regard, Dr López Albo told an anecdote coloured with some sense of national pride. In 1922, a session was held in Paris to commemorate the centenary of Bayle and his theory on the neuropathology of general paralysis. The great neurologist Jean Lhermitte commented that they were yet to determine the origin of the abundant pathological glial cells in the cerebral cortex in general paralysis. Dr Sanchís Banús, a great neuropsychiatrist initially trained by Dr Achúcarro and who published an account of that trip,27 stated that "a Spanish scientist, Dr del Río Hortega, also a student of Dr Achúcarro, had already established their mesodermal origin."

Organising skills

Dr López Albo mentioned the organisation of the previously mentioned laboratory of the Board for Study Extensions and the other important laboratory that Achúcarro had previously established during his stay in Washington. He highlighted that Alzheimer, whose department was like an "Almanach de Gotha" of European neuroscience, recommended Nicolás Achúcarro as the best candidate to be employed by the government of Washington to organise a neuropathology laboratory. Achúcarro not only made this a reality, but also ensured the centre worked at a high level, obtaining original results that he published in different articles in the journal, which he also launched.^{5,8,17}

Dr López Albo underscores another organisational achievement of Dr Achúcarro: after returning to Spain, he promoted the Patronato para los Niños Anormales ("Council for Abnormal Children"), which unfortunately suffered the incompetence of politicians.

Research skills

This aspect was not the main subject of the article, and Dr López Albo divided it into two main sections: general histology and histopathology. As mentioned in his introduction, he gave few details on either of the two fields. In the field of general histology, he highlighted the studies on the structure of the pituitary gland and the pineal gland, the connective tissue of the heart, the fine reticulum of epithelial cells, and the structure of the encephalic glia and its relationship with the vascular system, among other subjects. In the field of histopathology, López Albo highlighted the studies on rod cells and their origin, the ependymal alterations in different pathologies, cortical alterations in dementia, lesions in general paralysis, lesions in chorea, etc, in addition to Dr Achúcarro's detailed doctoral thesis on experimental rabies in rabbits.

To conclude, López Albo noted that Dr Achúcarro was very interested in mental processes, showing a very openminded approach and a "spirit open to the exaltedness of universal phenomena and ideas, which embodied the universal within the individual," all against the context of impeccable professional ethics.

He added a list of 26 works by Dr Achúcarro, far fewer than the 39-40 cited by other authors, written between 1906 and 1916. 11,18

The session marking the 50th anniversary of Achúcarro's death

López Albo did not participate in this session, as he had died in exile by the time it was held. The session was very extensive, featuring 23 speakers. Only the authors providing more personal first-hand data will be mentioned.

Dr J. Guimón,²⁸ who twice served as president of the ACMB, was an important urologist and a pioneer of the short-lived School of Medicine at Hospital de Basurto, during the first statute of autonomy of the Basque Country; he made a brilliant summary of the life of Dr Achúcarro.

Dr T. Hernando²⁹ gave a more human, more personal portrait, as he had studied with Achúcarro. To describe some of Achúcarro's qualities, together with his sense of fellowship and humour, he recalled anecdotes of a trip they made together to Paris and London in 1909. Dr Hernando acknowledged that he felt like a bumpkin, as it was his first trip abroad, and was amazed by how readily Dr Achúcarro moved around Paris and acted as a host, as well as in London. As a novelty, he provided something that no other biographer of Achúcarro could provide from direct sources, which is the extraordinary memories he left everywhere he went, as such figures as Babinski, Lhermitte, and Kraepelin's daughter had personally told Dr Hernando.

Other moving testimonies were given by R. Baroja,³⁰ J.M. Madinaveitia,³¹ and J. Zuazagoitia.³² Baroja recalled running into Achúcarro at Quai d'Orsay station. His silhouette reminded Baroja of a "peaceful and smiling Viking". Dr Achúcarro returned from a histology course at the Institut Pasteur, weighed down with histological preparations that he unloaded on poor Baroja, who declared they were full of "horror and terror", in a series of "-mas", "-osis", and "-itis," whereas Achúcarro transmitted his enthusiasm for knowledge and the development of new staining techniques.

J.M. Madinaveitia³¹ recalled the young Achúcarro when he gave practical lessons at his father's laboratory, and mentioned his happy, determined, kind, and serene character. He also told of their meeting at Dr Gereda's sanatorium at the foot of the Toledo mountains, when Achúcarro was already stoically enduring terrible pain due to the advanced stage of his illness.

J. Zuazagoitia³² met Achúcarro in his last years and also described, in addition to his smile and joyful character, some other remembrances, such as walking with him and Miguel de Unamuno, who had been Achúcarro's teacher in college. Zuazagoitia especially remembered the years they spent together during his doctorate in chemistry, at the Residencia de Estudiantes "on the hill of poplars" that Juan Ramón Jiménez mentioned. The Residencia housed several of Dr Achúcarro's students, including Calandre, Sacristán, and Prados, who could not stop talking about Achúcarro. Like Laín Entralgo¹ and others, Zuazagoitia recalled Achúcarro's Nordic appearance, inherited from his mother, who was of Norwegian descent. He also stated that "not enough emphasis has been placed on the links with foreign people in Bilbao," an undoubtedly

positive cultural mix. He concluded with one of the multiple references to his patriotism, this time in words of Unamuno: "Achúcarro wanted to live and die in Spain, when he could have developed a brilliant career abroad."

Discussion

To today's readers, especially those more familiar with the personality and work of Dr Achúcarro, many of the aspects referenced by López Albo in the 1923 article that motivated this study and in the other two works more briefly addressed will be familiar and far from original, as they have repeatedly been noted in the articles and monographs subsequently dedicated to Achúcarro. However, López Albo's 1923 article merits discussion, as it was probably one of the first to largely address Achúcarro's personality, with the advantage that it constitutes first-hand testimony, considering that López Albo and Achúcarro knew one another well. His conception of Dr Achúcarro's personality coincides with the direct testimony of great figures who knew him and unanimously praised him, including Unamuno, Cajal, Marañón, Ortega y Gasset, and Juan Ramón Jiménez; these testimonies are gathered in several articles and biographies of Dr Achúcarro. 1-3

It is difficult to find another personality as outstanding as that of Achúcarro, who only inspired appreciative comments, both regarding his personality and his work, without any discordant comment that may have arisen from envy or resentment. Without a doubt, his extraordinary kindness and generosity were the foundation of such a positive conception among all who knew him.

In terms of his work, there is also unanimous agreement in considering that while he was a great clinician, his main interest was basic laboratory research, both in histology and histopathology; in the latter field he followed the classic path of clinical-pathological correlation, especially in the field of dementia: direct inspiration from his master Alzheimer.

Achúcarro's premature death prevented further development of his incipient school, which included del Río Hortega, and the school did not survive the catastrophe of the Spanish Civil War. Del Río Hortega, like many other important neuroscientists and neuropsychiatrists such as Lafora and even López Albo, also suffered the disastrous consequences of the Spanish Civil War and exile, which contributed to a hiatus of

several decades in the development of these disciplines in Spain.

Conflicts of interest

The author has no conflicts of interest to declare. This study has received no public or private funding.

Acknowledgements

I would like to thank Loreto Mendiola (secretary) and Eduardo Areitio (librarian) for their help in accessing the biographical collections of the Bilbao Academy of Medical Sciences.

References

- Laín Entralgo P. Vida y significado de Nicolás Achúcarro. Medicamenta. 1962;XXXVII:36-40.
- Vitoria Ortiz M. Vida y obra del Dr. Achúcarro. Bilbao: La Gran Enciclopedia Vasca; 1968.
- 3. Moya G. Nicolás Achúcarro; su vida y obra. Madrid: Taurus Ediciones; 1968.
- Campos A. Nicolás Achúcarro. Su vida y su legado a los cien años de su muerte. Anales RANM. 2018;135:125-31. DOI: 10.32440/ar.2018.135.02.rev02
- Zarranz JJ. Nicolás Achúcarro Lund (1880-1918). Neurosci Hist. 2014;2:74-8.
- MCN Biografías [Internet]. [s.l.]: MCN Biografías; [s.d.]. Achúcarro y Lund, Nicolás (1880-1918); [cited 19 Apr 2020]. Available from: http://www.mcnbiografias.com/app-bio/do/show?key=achucarro-y-lund-nicolas
- Biografías y Vidas. La enciclopedia biográfica en línea [Internet]. Barcelona: Biografías y Vidas; ©2004-2021. Nicolás Achúcarro y Lund; [cited 19 Apr 2020]. Available from: https://www.biografiasyvidas.com/biografia/a/ achucarro.htm
- 8. Gondra JM. Nicolás Achúcarro (1880-1918): first histopathologist of the Government Hospital for the Insane in Washington, DC. Rev Hist Psicol. 2019;40:2-12.
- Rahmani R, Pacheco L. A modo de fichas sobre clásicos de la Psiquiatría (XXXI): Nicolás Achúcarro Lund. Lmentala [Internet]. 2017 [cited 19 Apr 2020];56. Available from: http://lmentala.net/admin/archivosboletin/Achucarro.pdf
- 10. Sánchez Grangel L. Médicos españoles. Salamanca: Universidad de Salamanca; 1967. Nicolás Achúcarro en el recuerdo de sus coetáneos; p. 345-54.
- Real Academia de la Historia. Diccionario Bibliográfico Electrónico [Internet]. Madrid: Real Academia de la Historia; ©2018. Nicolás Achúcarro Lund; [cited 19 Apr 2020]. Available from: http://dbe.rah.es/biografias/4970/ nicolas-achucarro-lund
- 12. Balcells M. Historia general de la neurología. Madrid: Grupo Saned; 2009.
- 13. Izquierdo Rojo JM. Historia de la neurología clínica española: 1882-1936 [doctoral thesis]. Madrid: Universidad

- Complutense de Madrid; 2015. Available from: https://eprints.ucm.es/52056/1/5305377122.pdf
- 14. López Albo W. Discurso. Gac Med Norte. 1918;XXIV:26-31.
- 15. López Albo W. Biografía del Dr. Achúcarro. Su personalidad y obra científica. Gac Med Norte. 1923;XXIX:225-44.
- López Albo, W. Nicolás Achúcarro. Residencia. 1926;3:221 Available from: https://arhipa.org/documentos/HOA/ LopezAlbo_Nicolas-Achucarro.pdf
- 17. Zarranz JJ. Wenceslao López Albo y su relación con la Academia de Ciencias Médicas de Bilbao. Gac Med Bilbao (In press).
- 18. López Piñeiro JM. El hombre y la obra. Gac Med Norte. 1968;18:199-211.
- Carea MG, Goiriena de Gandarias JJ. Gaceta Médica de Bilbao, cien años en Bilbao. Bidebarrieta. 2005;16:223-48. Available from: https://www.ehu.eus/ojs/index.php/ Bidebarrieta/article/viewFile/18589/16454
- Villanueva Edo A. La Academia de Ciencias Médicas de Bilbao. Ciento ocho años de servicio a la medicina vizcaína. Gac Med Bilbao. 2002;99:88-90.
- 21. Gondra J. Biografías de médicos. [cited 19 Apr 2020] Available from: https://www.ehu.eus/documents/1970815/2421082/Gondra+Rezola,%20J.+Biograf%C3%ADas+de+m%C3%A9dicos.+Bilbao/937d8e6a-96f1-4745-bc14-aff7b833e45d

- 22. Real Academia de la Historia. Diccionario Bibliográfico Electrónico [Internet]. Madrid: Real Academia de la Historia; ©2018. Wenceslao López Albo; [cited 19 Apr 2020]. Available from: http://dbe.rah.es/biografias/35618/ wenceslao-lopez-albo
- 23. Verkhratsky A. Matteole M, Parpura V, Mothet O, Zorec R. Astrocytes as secretory cells of the central nervous system: idiosyncrasies of vesicular secretion. EMBO J. 2016;35:239-57.
- 24. Verkhratsky A, Zorec R. Astroglial signalling in health and disease. Neurosci Lett. 2019;689:1-4.
- 25. Areilza E. Discurso. Gac Med Norte. 1918;XXIV:11-5.
- 26. Landin F. Discurso. Gac Med Norte. 1918;XXIV:20-6.
- 27. Sanchís Banús J. Impresiones de un viaje científico a París. Arch Med Cir Espec. 1922;8.
- 28. Guimón J. Resumen biográfico de Nicolás Achúcarro. Gac Med Norte. 1968;18:161-7.
- 29. Hernando T. Recuerdos de la vida y labor de Nicolás de Achúcarro. Gac Med Norte. 1968;18:191-7.
- 30. Baroja R. El histólogo. Gac Med Norte. 1968;18:262-5.
- 31. Madinaveitia JM. Nicolás Achúcarro. Gac Med Norte. 1968;18:295-6.
- 32. Zuazagoitia J. Recuerdos. Gac Med Norte. 1968;18:243-4.