

Cajal's educational environment in his adolescence and student years

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ABSTRACT

This article describes how Justo Ramón Casasús so decisively influenced the career of his son Santiago Ramón y Cajal, first during Cajal's adolescence, and then during his years at the Free School of Medicine in Zaragoza. The article is based on Cajal's own accounts which he published in *Recollections of My Life*. In the first volume, *My Childhood and Youth*, he provides biographical sketches of some of his teachers and classmates, including Genaro Casas Sesé, Bruno Solano, and Joaquín Gimeno y Fernández Vizarra. I will also address the changes at the Zaragoza Faculty of Medicine caused by shifts in government policy in the latter third of the 19th century.

KEYWORDS

Justo Ramón Casasús (Cajal's father), Zaragoza Faculty of Medicine in the 19th century, Genaro Casas Sesé, Joaquín Gimeno y Fernández Vizarra, Cajal's anatomical drawings.

Violent and troubled times

Spain's political scene was a turbulent one throughout most of the 19th century. The Peninsular War was followed by the absolutist reign of Ferdinand VII and then by the reign of Maria Christina of the Two Sicilies, who acted as regent until her daughter Isabella turned thirteen. The scars and ravages of Spain's guerilla war against the French invaders were still very much in people's minds at the outbreak of the First Carlist war in 1833, when followers of Infante Carlos, Isabella's uncle, took up arms to declare his accession to the throne. In 1868, Spain's Glorious Revolution spread through the entire country and resulted in the abdication of Isabella II, who went into exile in Paris.

Several generals, including Riego, Zumalacárregui, Espartero, Prim, O'Donnell, Topete, Serrano, Pavía, and Martínez Campos took part in the political events that followed. One way or another, each of them played a part in the proclamation of the first Spanish Republic, the six years of democracy following that proclamation, and the subsequent accession of Amadeo I to the Spanish throne. Spain's independent cantons were tolerated at first, but later suppressed. The crew of a frigate from the the Canton of Cartagena disembarked in Almería with drums and cannon, demanding tribute. Estanislao Figueras, Francisco Pi i Margal, Salmerón, Emilio Castelar, and others made names for themselves either as figures in different succes-

sive governments or in the forces opposing them. Two more Carlist Wars were to take place during these years. The monarchy was restored yet again after Martínez Campos publically declared support for Alfonso XII, the son of Isabella II, as king of Spain.

Spain had lost all of its overseas colonies by the end of the 19th century. In 1822, the year in which Cajal's father Ramón Casasús was born, Bolivar liberated Ecuador from Spanish rule.¹

The Industrial Revolution began in the late 18th century and continued to bring changes throughout the 19th century, but its effects were more pronounced in Great Britain and other European countries than on the Iberian Peninsula.

'Iron roads' began to be built in developed countries. Zaragoza's first steam locomotive arrived in 1886, and rail transport began to change the face of the city, which was to become the communications hub of north-eastern Spain.

In any case, times were hard. After Pope Pius IX launched his liberal reforms, the Catholic Church in Spain swung toward the ultramontane end of the pendulum.² The Pope lost the Papal States in 1870.

Teaching medicine in Zaragoza in the 19th century

During the 19th century, Zaragoza's Faculty of Medicine suffered a number of major setbacks at the hands of the

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central government. In 1807, the entire faculty was closed as a result of the dictate written by the Marquis of Caballero: "Royal decree by His Majesty and the members of the Supreme Council reducing the number of literary universities of the kingdom; such universities as are suppressed will be merged with those remaining, according to proximity; and all must adhere to the Programme of Studies approved for the University of Salamanca" (Madrid, 1807). However, the reform could not be implemented due to the outbreak of the Peninsular Wars.

Once Napoleon's troops had left the country in 1818, the educational plan applied in 1806 was re-established and the reform of 1807 was repealed, thanks to the University's successful petition to the king. The Regent's Decree of 1823 subsequently introduced changes to departmental structure and textbooks that would affect the medical school in Zaragoza.

On 22 September 1824, all Spanish universities were ordered to suspend classes until a new educational plan could be published by Francisco Tadeo Calomarde y Arriá, Minister of Grace and Justice during the absolutist rule of Ferdinand VII.

On 18 November 1824, Calomarde, who had drawn up the new programme of study, sent a letter authorising professors in Zaragoza to resume teaching on 18 November 1824. Calomarde's reforms may have been beneficial from an administrative point of view, but they hampered the progress of culture.

In 1834, universities clashed with the Ministry responsible for overseeing them. The Directorate General of Studies created a committee to design a provisional educational plan which was to remain in force until 1845. The programme for a medical degree spanned six academic years, with seven subjects offered per year.

In 1857, the reform commonly known as the Moyano Law, implemented for the purpose of reorganising educational institutions, designated only six universities that would be permitted to teach medicine and award medical degrees. The Zaragoza Faculty of Medicine and many others were suppressed. As stated in Article 134: "Faculties of Medicine awarding licentiate degrees shall be recognised in Barcelona, Granada, Santiago, Seville, Valencia, and Valladolid, as well as the Central University in Madrid."

After the Moyano Law came into force, Zaragoza's Faculty of Medicine ceased to exist. The capital of Aragon remained without a medical school for nearly 15 years.

In 1866, a decree by Minister of Development Ruiz Zorrilla was published on 24 October with the aim of organising higher education and different faculties of arts and sciences. This degree stated that students would be required to complete secondary education before they could be enrolled in medical school.

In 1868, the State approved the creation of an institution for teaching medicine in Zaragoza. It was named the Free School of Medicine (*Escuela Libre de Medicina*). The centre was funded by Zaragoza's provincial and municipal governments.³ It was here that Santiago Ramón y Cajal would begin studying medicine in 1869. His father, Justo Ramón Casasús, worked as an assistant professor of dissection at the same medical school.⁴ Several years later, on 29 September 1876, the Zaragoza Faculty of Medicine was definitively reopened, this time as an institution subject to oversight by the central government.

The most frequent diseases of the nervous system at that time were listed as epilepsy, brain congestion, pellagra, encephalitis, apoplexy, and infantile convulsions.⁵ We should note that the terms 'epilepsy' and 'convulsions' as they are understood today have similar meanings.

Don Justo Ramón Casasús

There can be no doubt that the professor with the greatest influence on the career of Santiago Ramón y Cajal, Nobel Prize in Medicine, was his father, Justo Ramón Casasús. Don Justo is a fascinating character study (Figure 1).



Figure 1. Don Justo Ramón Casasús

Ramón Casasús was the third son born to a peasant family in Larrés, a small village near Sabiñánigo in the province of Huesca, on 6 August 1822. He died in Zaragoza in 1903 after a long and productive life. Antonia Cajal Puente, who was to marry Ramón Casasús, was also born in Larrés on 13 July 1819; her family were weavers by trade.⁶

From a very young age, Don Justo worked in the fields and took care of livestock, which were typical activities for farmers' sons. At the age of 16 or 17, he left home and became apprenticed to a surgeon from Javierrelatre.

Near the Pyrenees, and in other Aragonese counties such as Cinco Villas, land was commonly inherited by the oldest son or heir (*ereu* in Aragonese⁷ or *heredero* in Castilian; the letter 'h' does not exist in Aragonese). The purpose of this custom, entrenched in Aragonese culture, was to avoid dividing and re-dividing productive land, thereby maintaining inherited properties intact. In light of this custom, the economic context, and their own lot in life, younger sons had to leave home as soon as possible in order to earn a living. Traditionally, some families sent their younger sons to a seminary to study for the priesthood. In certain cases, rebellious boys who were not very devout were also placed in seminaries by parents in the hope that any knowledge they could acquire there would serve them later in life.

Another way of earning a living was to 'head down the mountain' to find work. This is the most likely explanation of why Don Justo decided to make his way to Javierrelatre, where he became a surgeon's apprentice. Thanks to this opportunity, the young boy from Larrés first came into contact with a lesser form of medical practice. During his first years as an apprentice, he taught himself to read using books from the surgeon's library.⁶ In 1843, he ended his apprenticeship in Javierrelatre and journeyed on foot to Zaragoza. He had now truly left the mountains.

When he arrived at the capital, he began working for a barber in the Arrabal district, on the 'left bank' of the Ebro River. In addition to working, he also studied, successfully completing his secondary school certificate with very good marks. After earning his diploma – and without saying a word to the barber – he sat a competitive exam in order to obtain a position as a practitioner at Hospital Provincial. He passed the exam.

As a practitioner, he was given room and board plus a salary of three *duros* per month. Once he had been there

for several months, he decided to study for a second-class surgeon's qualification. Unfortunately, he was forced to give up studying surgery in 1845 when the medical programmes at Hospital Provincial and every other hospital in Zaragoza were suppressed by the government.⁴

Surgeons and practitioners

The title of 'practitioner' (*practicante*) was still in use during a large part of the 20th century. For example, a barber shop run by a practitioner was still to be found in the 1940s in Zaragoza's Arrabal district (Sixto Celorrio street). The practitioner in question never bothered with shaves or haircuts since he employed two barbers for that purpose. He, on the other hand, went from door to door administering injections to everyone on the left bank of the Ebro. Before asking the patient to expose his thigh, the practitioner would sterilise his needles and syringes in a pot of boiling water which he heated over an alcohol burner. Whenever he lit the burner with a match, he would make good use of the match to light his cigarette. Patients with wounds that needed to be treated or sutured were also attended in the back room of the barber shop. 'Practitioner' may have been tinged with a slightly different meaning in Don Justo's days.⁸

The figure of the barber-surgeon had been handed down from earlier times. During most of the 19th century, people were familiar with many different types of surgeons – 'empiricks' who only spoke local languages, humanist surgeons who had studied formally in Latin, and *sangradores* or blood-letters – who moved in different social spheres and had received different types of training. In 1836, Isabella II of Spain acceded to the request by the 'blood-letters' that their name be changed, and established the following surgical hierarchy: first-class surgeons (those with a medical licence); second-class surgeons (otherwise known as college surgeons); and third-class surgeons (blood-letters). Fourth-class surgeons, the lowest rank, referred to practitioners not included in any of the above categories.

Don Justo qualifies as a second-class surgeon

The story of how Cajal's father completed his education is well worth telling. When Justo Ramón Casasús found himself unable to study surgery in Zaragoza, he left the city and reached Barcelona after a seven-day walk. He may have joined a group of travellers able to

defend themselves from the highwaymen and bandits along the road. His idea was to continue his surgical training.

After many hardships and a long search in Barcelona, he found work at a barber shop in Sarria. The barber also granted him permission to attend classes so as to further his studies. After several months, Don Justo decided he needed more income and set up a portable barber's stall at the port. His employer found out about the scheme and fired him, quite understandably. Don Justo then started up a small and modest barber shop near the port, and continued with both his barber-surgeon duties and his classes.⁶

In 1847, with Ramón María Narváez as its Prime Minister, Spain entered an economic crisis that worsened in early 1848. This situation, combined with the influence of the Revolution of 1848 in Paris, led to popular revolts in many parts of Spain. In response to these revolts, the Montjuïc detachment opened fire on Barcelona, and one of the cannonballs destroyed Don Justo's barber shop; he himself was wounded in the thigh. Despite these setbacks, the country boy from the Pyrenees completed his studies and qualified as a second-class surgeon.

At this point in his life, Don Justo returned to Larrés to court his childhood sweetheart Antonia Cajal. Once they were engaged to be married, the young surgeon began seeking a position that would give them a good start in life.

Ramón Casasús in Petilla

Don Justo's quest for a job brought him to Petilla de Aragón, where he first worked as a second-class surgeon.

Although Petilla is part of Navarre, the village is an enclave that is completely surrounded by the county of Cinco Villas in Aragon, and it is closer to the Aragonese towns of Sos del Rey Católico and Sádaba than to any towns in Navarre. Peter II of Aragon named the village as collateral on a loan granted to him by Sancho of Navarre in 1209. Since his father's debts were still unpaid as of 1231, James I of Aragon formally delivered Petilla to Navarre.

The writ dated 24 January 1848 declared that Don Justo Ramón Casasús, licensed second-class surgeon, was to exercise the duties of the surgeon of the town of Petilla de Aragón from 10 January to 30 September 1848. He was offered 30 loads of wheat for an entire year, free use of the living quarters located above the town hall, and firewood that would be provided neighbours with livestock able to haul it. In any case, if he did not wish to live in the house in question, he would be compensated with half an ounce of gold to let one more to his liking.

The surgeon was expected to visit patients as soon as he was informed that they were ill. Another of his tasks would be shaving the townsfolk in the barber shop, and he was required to provide a pair of scissors so that they could cut each other's hair.

Ramón would also be responsible for treating venereal diseases and scabies, although he was allowed to charge a supplement for these treatments. If any of the townsfolk were to fall ill in the nearby mountains or outlying farms, the surgeon was required to come to their aid as soon as he could be notified. The patient's family or acquaintances would do their part by escorting him on horseback on both legs of his journey.⁶

Once he had settled down in Petilla, he decided it was time to marry Antonia Cajal Puente; their wedding was celebrated in the parish church in Larrés on 11 September 1849. Don Justo would be employed as Petilla's second-class surgeon from 10 January 1848 until September 1853.

The couple's first child was born in that town on 1 May 1852, and they named him Santiago Felipe.

In October 1853, Ramón y Cajal's family moved from Petilla to Larrés, where Don Justo had been hired as a licensed surgeon. He expressed great satisfaction at having been granted the opportunity to return to his hometown. Their second son, Pedro, was born in Larrés. However, just two years after obtaining the position, Don Justo clashed with the town council. It seems that the trouble started over the selection of a council member, when Don Justo nominated a candidate who was not in the council's good graces.⁶

They left Larrés in early 1856, and Don Justo successfully applied for the position of town surgeon in the town of Luna, where he worked for a year before moving once again to Valpalmas, an even smaller village nearby. He was to exercise the duties of surgeon of Valpalmas until 1860. It was in this village where Santiago Ramón y Cajal began attending school in 1857. Here, his father made use of a shepherd's cave to round out his elder son's education in French, geography, physics, arithmetic, and grammar. Don Justo's and Doña Antonia's third child and first daughter, Pabla, was also born that year.

Ramón Casasús earns his medical degree

Before leaving Valpalmas in 1858, Don Justo, who was now 35, decided to become a certified doctor. He requested a locum for his practice and, according to one version of the story, left for university in Madrid to earn his licentiate degree in medicine and surgery.⁶

However, another version states that Ramón Casasús was awarded his degree in Barcelona, and he is known to have studied there. In addition, a third hypothesis claims that he studied in Valencia, and it is entirely likely that he earned his degree from that university.⁹

Historians also believe that his interest in anatomical dissection may initially have been sparked by Antonio Menéndez Rueda, who was his professor in Zaragoza, Barcelona, and in Valencia.⁹

In any case, what we do know is that Dr Ramón Casasús had his medical degree in hand in the summer of 1860, a year after his fourth child and second daughter, Jorja, was born.

In 1860, the doctor moved to Ayerbe with his family and began work as a physician. He attended patients not only in Ayerbe, but also in the neighbouring villages of Linas, Riglos, Los Anquiles, and Fontellas.

In late 1865, having offended the Town Council of Ayerbe on this occasion, Don Justo left town for a practice in Sierra de Luna before moving on to Gurrea de Gállego in Zaragoza province. Two years later, the town council of Ayerbe extended the olive branch, and Dr Ramón Casasús returned to his former practice.

Don Justo sent his sons Santiago and Pedro to the Institute of Huesca for the 1865-1866 academic year. Santiago had already completed his first two years of secondary education in a Piarist school in Jaca, and Pedro was just beginning the first year. The doctor decided to separate his sons in order to decrease the unruly influence of the elder one on the younger. Pedro was lodged in a boarding-house, and Santiago was apprenticed in a barber shop. Don Justo's design was to instil some responsibility in his first-born and provide him with a means of earning a living in case he failed as a student.⁶

While Pedro passed with flying colours, Santiago failed Greek and his marks in other subjects left much to be desired. Enraged, Don Justo put his elder son to work for a shoemaker in Gurrea de Gállego, where the Ramon y Cajal family still resided at the time. That summer, as mentioned before, the family returned to Ayerbe, where the doctor found another shoemaker's shop that would allow his son to continue his shoemaking apprenticeship.

Santiago would remain in this trade for a year. After that, Don Justo tried sending his eldest son to school in Huesca once again. Santiago told him that his marks would improve if he were allowed to study drawing,

and his father agreed to the terms. As a safeguard, however, he also found employment for his son as a barber's apprentice. Santiago Ramón y Cajal was awarded full marks in drawing, and Don León Abadías, his professor, enthusiastically informed Don Justo that his son was the best student he had ever had, and that he would have a bright future as an artist. But Dr Ramón Casasús, who thought that his son should become a doctor too, was unmoved.⁶

In the summer of 1868, after finishing his school year, Santiago returned to his family's home in Ayerbe. His father, determined to make the most of the summer, began teaching him anatomy beginning with osteology; they obtained the bones they studied from the pauper's grave in the cemetery. At that point, Dr Ramón realised that his son's ability as a visual learner was considerably greater than his capacity for verbal retention and memorising texts.

On 27 September 1869, Santiago obtained his secondary education certificate from the Institute of Huesca. Don Justo accompanied his eldest son to Zaragoza (the doctor and the rest of his family would remain in Ayerbe), and there he enrolled Santiago in the preparatory courses he would need to enter university. He also found him an assistantship; this time, Santiago would be working for one of his surgeon acquaintances.

The Ramón y Cajal family in Zaragoza

Don Justo had decided to move to Zaragoza, and returned to that city in late 1870. His candidacy for a position as doctor at Hospital Provincial was successful, and a few months later he was also named interim professor of dissection at the Faculty of Medicine. He was aided in this undertaking by his friendship with Don Genaro Casas, the dean of the Free School of Medicine. In October, he was named head of osteology and dissection for first-year and second-year classes in the medical programme.

Dr Ramón's status as an interim professor and his abrasive personality sparked tensions and resulted in incidents with the other professors. His colleagues at the school wished to restrict his classes to practical dissection and exclude him from presenting theoretical lectures. They argued that Dr Ramón's skill as an orator left much to be desired. When the Provincial University became a state institution, the Free School of Medicine merged with it to become a Faculty of Medicine. It too became subject to central control, and the Ministry of Education required confir-

mation of the qualifications of all interim professors that had been appointed so as to incorporate them into the general university hierarchy. To this end, every candidate had to take competitive exams in the city where he worked, and Don Justo would therefore be examined in Zaragoza. The family erupted in argument; both Santiago and Pedro tried to dissuade their father from subjecting himself to the ordeal of an examination. Don Justo was well over 50 and his sons did not think the experience would be good for him.⁶

Don Justo did take his exam, and completed the last exercise brilliantly. The president of the jury told him, "you did a good job that time; what a pity that your other exercises were nowhere near that level". He failed the exam. Young Santiago, enraged by the examiners' treatment of his father, visited the president's house to give him a piece of his mind. That much we know, but no one can be certain of what happened there that day.

Dr Ramón stepped down from his positions as assistant lecturer and as the interim chair of dissection in March 1883. The doctor was 61 years old when he relinquished all of his university duties. He then devoted his time to practising medicine. He was still a physician at Hospital Provincial, and he also had a large number of private clients who thought very well of him.

Santiago's mother and Dr Ramón's wife, Doña Antonia Cajal, died in 1898 at the age of 76. She had been suffering from chronic illness for several years. In contrast, Don Justo was fit as a fiddle, despite his advanced years, and his affair with a 26-year old woman had left her pregnant.⁶

Don Justo's daughters Jorja and Pabla were the ones who took care of their mother; his sons also visited, but only occasionally, due to their pressing responsibilities. Santiago was now living in Madrid, and Pedro in Cádiz; both were department chairs.

Tensions mounted in the family when Antonia died. The girls were determined that their father should marry the other woman, and a priest named Pellicer and Jorja Ramón in particular finally convinced him to do so. Don Justo then married Josefa Albesa of El Bojar (Castelló de la Plana), the mother of the child born two years before. Santiago opposed this marriage and demanded that his father respect his mother's memory.

After the wedding, the daughters left their father's house in San Jorge street and set up a home of their own. Pabla and Jorja remained on good terms with Don Justo, and so did Pedro, who had requested a transfer from Cádiz to Zaragoza. Santiago never spoke to his father again,

unable to forgive the misery which Don Justo had inflicted on Doña Antonia in her last years of life.

Dr Ramón Casasús died at the age of 81 on 12 September 1903 in his house in San Jorge street. He was buried in Zaragoza's Torrero Cemetery. He left 75% of his properties to his children Santiago, Pedro, Pabla, and Jorja, and the remaining 25% to Josefa Albesa and their son. Santiago and Pedro relinquished their parts of the inheritance to their sisters, who never married and lived quietly on their rents.⁶

Don Pedro Ramón y Cajal

While Santiago was studying in Zaragoza, his brother Pedro, who was still in secondary school, failed one of his classes. Pedro, a very responsible student, knew only too well how his father would react to the news. Not daring to explain his failure to Don Justo, he made plans with a friend and the two of them ran away from home. They left Spain, and upon reaching Bordeaux, they stowed away on a sailing ship bound for South America, the *Queen*.

Pedro and his friend had some difficult moments as stowaways; they were discovered, clapped in irons, and imprisoned in the hold. The voyage lasted three months, and both food and water were scarce. Pedro got into a fight with an Italian sailor and wounded him with a spoon; the latter's companions tried to throw Pedro overboard, but a crew member stepped in and saved his life.

Once he reached South America, Pedro Ramón y Cajal enlisted in the revolutionary forces of Uruguay, saw action, and was injured in a skirmish. Timoteo Aparicio, a guerrilla commander from La Pampa, hired Pedro as his secretary, and the two of them and their band charged into battle all over Uruguay.

After seven years, the young revolutionary and one of his Italian comrades made plans to desert the company, and they did so taking Aparicio's horse and pistol with them. They were caught and summarily condemned to death. Don Justo knew nothing of his son's doings, but the Italian boy's father did, and mobilised his contacts at the Italian consulate to prevent his son's execution. The Spanish consulate, made aware of the situation by Italian diplomats, also interceded for Pedro, who therefore escaped death by firing squad.

As on his outbound trip, Pedro returned to Spain by way of France. This time, an outbreak of the plague at Port Mahon, the ship's destination, forced it to dock elsewhere.

The young man decided to journey to Zaragoza by train. The story relates that when he caught his first glimpse of

the city, he left his compartment for the viewing platform, from which he could see the silhouette of the Basilica over the Ebro River. Turning back to the door, he invited his travelling companions to pray to the Virgin with him, but they were not so inclined. Undeterred, he began praying fervently when there was a tremendous crash and the train lost speed. He then received a blow to the back that knocked him to the floor. After the impact, he saw that the train had derailed and slid down the embankment. Once he had recovered the use of his senses, he rushed to the aid of his travelling companions, but when he entered their compartment, he found them all dead.⁶

When Pedro returned from South America, he was 24 years old. He began studying medicine in Zaragoza and earned his medical degree in 1881. From that year to 1888, he worked as a rural doctor in the towns of La Almoldea and Fuendelajón. Based on his results on a competitive exam, he would later be selected as a chair at the Cádiz Faculty of Medicine; however, as soon as he was able to do so, he transferred to the medical school in Zaragoza where he continued to teach. His son Pedro Ramón Vinós also taught medicine in Zaragoza.¹⁰

Cajal at the University of Zaragoza

In *My Childhood and Youth*, Cajal lists the professors at his preparatory school as Florencio Ballarín, the Chair of natural history; Marcelo Guallart, who taught physics; and Bruno Solano, an instructor who at that time taught advanced chemistry.

He described the former as follows:

Old Don Florencio Ballarín, a contemporary of Ferdinand VII, by whom he was persecuted for liberalism and also for disrespect to the august person of the monarch, was a learned teacher, endowed with a flexible imagination and a forceful dictation. He was the first person whom I heard defend with true conviction the necessity of teaching objectively and with experiment, which is today so much talked about and so little practised. He talked with the example before him, and thus his lessons in zoology and mineralogy were highly instructive to us, since they were given in the museum and in the botanical garden respectively.^{11,19}

Florencio Manuel Ballarín

Professor Ballarín was born in Sariñena in 1801 and died in Zaragoza in 1877. He was a naturalist, doctor, and botanist. He belonged to an influential family among the rural aristocracy. He had obtained a licentiate degree in philosophy before earning a Master of

Arts; he was also awarded a doctorate in medicine in Madrid in 1844. He became Chair of the departments of physics, general pathology, therapeutics, and mathematics at the University of Huesca. He was later transferred to Zaragoza, where he taught as the locum for the chair of botany and served as the interim chair of natural history. He was made chair of natural history in 1846, and held that position until his death.

His work as an educator was significant and he was a staunch supporter of objective, experiment-based pedagogy. He gathered complete collections of plant, insect, and mineral specimens for his natural history department. Professor Ballarín served as the director of the Botanical Garden of Zaragoza, dean of the faculties of philosophy and medicine, and chancellor of the University of Zaragoza.

His collection of medicinal plants won the bronze medal at the 1858 Agricultural Expo in Madrid. During the cholera epidemic of 1834, he directed one of the hospitals that had been set up in Zaragoza for the purpose of halting the spread of the disease.¹²

Don Santiago describes Bruno Solano as a gifted teacher:

What pleasant, yea, angelic speech was his! What supreme skill he had in making comprehensible and delightful, by means of illuminating comparisons, the most difficult points or the most abstruse ideas...Solano possessed in addition a magnificent literary gift. He was a writer who hardly wished to write!^{11,19}

Bruno Solano

Solano hailed from Calatorao, where he was born in 1840; he died in Santander in 1899. He was a celebrated chair of general chemistry as well as the first dean of the Faculty of Sciences in Zaragoza. He was also its first official professor of chemistry, as well as the founder of its renowned School of Chemistry.¹²

During the outbreak of cholera of 1885, Zaragoza had no chemistry laboratories other than that located at the School of Chemistry. As the Imperial Canal, the city's water supply, was suspected of harbouring the disease, Solano was entrusted with the task of analysing the water. The townsfolk were growing tense and worried, but Solano was able to verify that the water source was not polluted and told the mayor the good news in unequivocal terms: "my mother is the light of my life, the life which she herself gave me; and all can be reassured, for I would have no qualms about

giving my mother these waters suspected of spreading disease".¹⁰ He was the founder and president of the first board of the School of Arts and Occupations. His research projects helped expand the region's wine-growing industry. To this end, Solano studied in the laboratories of Professor Nicloux in Paris and Professor Jorgensen in Copenhagen. His areas of study included both how to combat epidemics (*Uncinula, oidium*) and how to select yeast for wine fermentation. With the provincial government's permission, he set up a practical oenology laboratory. Solano may well be regarded as the founding father of biochemical and agricultural chemical research in Zaragoza.

Solano died in such poverty that his colleagues and students had to take up a collection to raise the money for his funeral and to transport his remains from Santander to his resting place in the Zaragoza cemetery, next to his mother.¹²

During his three years studying at the university, Santiago



Figure 2. The chapel at Hospital Provincial de Nuestra Señora de Gracia



Figure 3. Illustration by Cajal on display in the auditorium in Zaragoza

assisted his father with dissection studies. They worked together in a small building in the garden belonging to Hospital Provincial de Nuestra Señora de Gracia. Cajal's book and a few other publications mistakenly refer to the hospital as 'Santa Engracia' (Figure 2).¹¹

In addition to studying anatomy, young Santiago painted his microscope slides in oils or watercolours, and in these early years he had already generated a good-sized collection of illustrations. They could not be published in book format because the printing industry in Zaragoza was not up to the task in those times, but some of his illustrations are still on display in the amphitheatre at University of Zaragoza (Figure 3).

Another testimony to Cajal's artistic aptitudes

is that he studied how to use lithographic crayons and burins as a means of illustrating his first histological studies, in light of his scarce monetary resources.¹³

Santiago was most inspired by his anatomy and physiology classes; he himself admitted that he only studied the other subjects to get a passing grade. At the end of his second year, he was granted a position as the Dissection Assistant.

The author informs us that on one occasion, he had a heated argument with Professor Genaro Casas; not long after this incident, Don Genaro told Santiago's father, "you have a son who is so stubborn that, when he believed he was right, he would not keep quiet, even if the lives of his parents depended on his silence".^{11,19}

Cajal explains that Don Genaro was a friend of his father's dating back to when they both studied in Barcelona. In addition to mentioning their argument, he described Don Genaro as a small man whose face was marred by a large wen on his forehead, but observed that the professor's otherwise sickly and misshapen appearance would vanish whenever he began speaking. My own history professor, Francisco Oliver Rubio, said that Don Genaro used to push his cap forward to cover up his wen, as we see in all of his portraits. (Figure 4).

Genaro Casas Sesé

Casas Sesé, born in Yebra in 1817, was the son of the village apothecary. His main interest was clinical medicine, and he died in Zaragoza in 1886. He trained in Barcelona, where he obtained his licentiate degree in surgery in 1846, and then in Madrid, where he completed a doctoral degree in medicine in 1847. Both Santiago Ramón y Cajal¹¹ and Santiago Loren⁴ wrote his name 'Jenaro', which is a valid alternate spelling, but if we read Casas Sesé's study titled *Cólera Morbo Epidémico*, we see that he himself spelled it with a G.¹⁴

Dr Casas Sesé first practiced medicine in Ejea de los Caballeros, the town in which he was a subdelegate of medicine. He also rendered distinguished service to that town during the cholera epidemic of 1855, which earned him a number of royal recognitions.¹² He later rose to the level of provincial representative. After having transferred to the Aragonese capital of Zaragoza, he braved its cholera epidemic as well, and was one of the most distinguished figures among those who tried to limit the ravages of the outbreaks.

Dr Casas Sesé held the chair of medical pathology at the Faculty of Medicine before being named its dean.¹⁰ When he died, his remains were interred in the crypt at Hospital de Nuestra Señora de Gracia in the area reserved for benefactors.

Don Genaro was a very influential figure in Aragonese medicine in the late 19th century. The different texts he wrote show how involved he was in the processes of inter-

preparing and developing medicine in his time. He made full use of different European approaches to pathology and he did so critically, with an emphasis on the methodological aspects of practising medicine.¹²

Cajal regarded Casas Sesé as the founding father of the Aragonese school of medicine, and remarked that in addition to being an eminent practitioner and a model for dedicated professors, he was a first-rate orator. Cajal also recalled Don Genaro's masterly exposition on Virchow's *Cellular Pathology*, stating, "We all revered and loved him, for his zeal as a teacher was as great as his ability and his kindness."^{11,19}

Don Pedro Cerrada y Gajón was another professor whom Cajal held in high esteem.

Pedro Cerrada y Gajón

Cerrada y Gajón was born in Utebo in 1815 and died in Zaragoza in 1895. He completed his studies in the Faculty of Medicine in Zaragoza. His life's work took shape in two phases; first, he was a rural doctor who practised in various towns in Aragon, as well as in Hernani in the Basque province of Guipúzcoa.¹⁰ In 1863, he moved to Zaragoza, and remained there to the end of his days. It was here that he was granted the chair of general pathology at the Faculty of Medicine in 1879; in 1893, he was made president of the Board of Directors of the Professional College of Doctors.

In Dr Cerrada, young Santiago found a conscientious physician and a reflective teacher, who once told his class, "I regret that I do not know enough chemistry, and am too old to learn it. It is your task to study it, for therein lies the secret of many pathological processes."^{11,19}

In *My Childhood and Youth*, Cajal also tells how he entered a contest for a prize in topographic anatomy and operations, the subject taught by Manuel Daina. His exercise was to describe the inguinal ring, and he won the prize. Despite this, Nicolás Montells, one of the members of the tribunal, approached him and spat sourly, "Understand that you are not fooling me. That is copied."^{11,19}

Nicolás Montells Bohigas

Professor Montells Bohigas was a student at Zaragoza's Faculty of Medicine and practised in the towns of Mallén and Gallur. He later transferred to Hospital de Nuestra Señora de Gracia in Zaragoza.

He headed the department of surgical pathology in Zaragoza for an extended period of time and also published a general surgical pathology textbook. Montells Bohigas served as dean of the Faculty of Medicine for several years. We know of one essay that he presented as a lecture: *El pauperismo y la miseria* [Poverty and misfortune]. In this somewhat am-

biguous and unoriginal humanist speech, he argued that misfortune is intrinsic to human nature, and therefore solving the problem of the unfortunate was a matter for Christian charity rather than for government policy. During the cholera epidemic of 1885, he worked with the committee that researched treatment options.

While on this committee, he defended the position that the disease was caused by microbes and would therefore require the discovery of antimicrobial medicine.¹²

In *My Childhood and Youth*, we also learn the names of Cajal's classmates: "there were among my fellow-students a number of exceptional youths. I remember still Pablo Salinas, Victorino Sierra, Severo Cenarro, Simeón Pastor, Joaquín Jimeno, Pascual Senac, Andrés Martínez, Jose Rebullida and others."^{11,19}

Manuel Simeón Pastor y Pellicer

Simeón Pastor studied medicine in Zaragoza, but continued his training as a doctor in Madrid. When he returned to his native city, he was successful in his bid for the position of chair of therapeutics, medical substances, and prescriptions in 1882.

Simeón Pastor taught that subject until his death in 1905. He underlined the need for experimental treatment centres in medical schools in order to rationalise drug indications and thereby reduce the influence of wanton commercialisation of pharmaceutical products.¹⁰

Severo Cenarro

Cenarro was also in Cajal's year at school. An army surgeon, he founded the first Committee on Hygiene and Cleanliness in Tangier in 1883 in his capacity as an adjunct to the Spanish embassy and a consulting member of the city's Board of Health.

Although Cajal's memoirs refer to a Hilarión Jimeno y Fernández Vizarra and a Joaquín Jimeno, these two brothers (and their descendants) spelled their names with a G and not a J. One of these descendants was Alberto Gimeno Álava, an outstanding neurologist largely responsible for



Figure 4. Don Genaro Casas Sesé

creating the Madrid school of neurology, distinguished member of the Spanish Society of Neurology, and great-grandson of Joaquín Gimeno y Fernández Vizarra.

Joaquín's biography appears twice in the *Enciclopedia Espasa*.¹⁵ In one entry, his first surname is written with a G and the second surname is erroneous ('Pizarra' instead of 'Vizarra'); in the other entry, his first surname is written as 'Jimeno', but the second surname is correct.

If I am not forgetting someone [Cajal wrote], from among my poetic classmates only Joaquín Jimeno [Gimeno] continued to write, and became the editor of a political daily. Jimeno, however, who afterwards came to be professor in the Faculty of Medicine, and an able and distinguished politician (he belonged to the *posibilista* party), had an excellent foundation in in grammar and the humanities and exquisite literary taste, which I, unfortunately, lacked.^{11,19}

Joaquín Gimeno y Fernández Vizarra

Joaquín Gimeno was born in 1856 in Monzalbarba, a rural neighbourhood of Zaragoza where his father worked as a doctor. He later was selected as a chair at the Zaragoza Faculty of Medicine after a round of competitive exams. Joaquín Gimeno worked as a doctor in Hospital de Nuestra Señora de Gracia. His dedication to politics drove him to become a city councilman and after that, first deputy mayor. He was a member of the Royal Academy of Medicine and president of the Provincial Board of Public Instruction, which was the highest authority on matters of primary education at that time. Gimeno was an outstanding journalist and well-known for his devotion to Aragon and Zaragoza. He published a critical essay titled *Vamos muy despacio* in which he described the slow march of progress in Zaragoza in his time. Gimeno also edited a newspaper, *La Derecha*, which presented the most moderate version of democratic republicanism.¹⁶

He died of pulmonary tuberculosis at the early age of thirty-seven,¹⁷ an event that inspired a heartfelt letter by Emilio Castelar.



Figure 5. Don Joaquín Gimeno y Fernández Vizarra

If we visit Plaza Paraiso today and see its amphitheatre, a splendid neo-Renaissance building, we must recall that Joaquín Gimeno was the one who promoted the development of the Lezcano lot.¹⁸ The building's intended purpose was to house the faculties of medicine and science. The first stone was laid in 1887 and the amphitheatre

was inaugurated in October 1893. Its architect was Ricardo Magdalena Tabuena. This monument is the only Spanish university building to have been named a cultural heritage site.

In June 1873, at the age of 21, Santiago Ramón y Cajal earned his licentiate degree in medicine.

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