PeAPA | Publicación Electrónica
ASOCIACIÓN PALEONTOLÓGICA ARGENTINA

www.peapaleontologica.org.ar

On the trail of jesuits, explorers, and scientists: a history of paleobotany in Argentina

EDUARDO G. OTTONE[1]

1. Consejo Nacional de Investigaciones Científicas y Técnicas – Universidad de Buenos Aires (CONICET–UBA), Instituto de Estudios Andinos Don Pablo Groeber (IDEAN), Departamento de Ciencias Geológicas, Facultad de Ciencias Exactas y Naturales, Universidad de Buenos Aires, Pabellón II, Ciudad Universitaria. Intendente Güiraldes 2160, C1428EHA Ciudad Autónoma de Buenos Aires, Argentina.

Recibido: 04 de julio 2022 - **Aceptado:** 21 de julio 2023 - **Publicado:** 25 de Junio 2025

Para citar este artículo: Eduardo G. Ottone (2025). On the trail of jesuits, explorers, and scientists: a history of paleobotany in Argentina. *Publicación Electrónica de la Asociación Paleontológica Argentina* 25(1): 49–62.

Link a este artículo: http://dx.doi.org/10.5710/PEAPA.21.07.2023.434

ISSN 2469-0228

Asociación Paleontológica Argentina
Maipú 645 1° piso, C1006ACG, Buenos Aires
República Argentina
Tel/Fax (54-11) 4326-7563
Web: www.apaleontologica.org.ar

ARTÍCULO Año 2025 - 25(1): 49–62 PeAPA Publicación Electrónica ASOCIACIÓN PALEONTOLÓGICA ARGENTINA

ON THE TRAIL OF JESUITS, EXPLORERS, AND SCIENTISTS: A HISTORY OF PALEOBOTANY IN ARGENTINA

EDUARDO G. OTTONE[1]

[1]Consejo Nacional de Investigaciones Científicas y Técnicas – Universidad de Buenos Aires (CONICET–UBA), Instituto de Estudios Andinos Don Pablo Groeber (IDEAN), Departamento de Ciencias Geológicas, Facultad de Ciencias Exactas y Naturales, Universidad de Buenos Aires, Pabellón II, Ciudad Universitaria. Intendente Güiraldes 2160, C1428EHA Ciudad Autónoma de Buenos Aires, Argentina. *ottone@gl.fcen.uba.ar*

Abstract. Jesuits such as Alonso de Ovalle and Antonii Sepp, naturalists-explorers such as Alcide d'Orbigny and Charles Darwin, and scientists such as Alfred Wilhelm Stelzner and Rudolf Zuber discovered and collected fossil plants from the 17th century onwards. The first descriptions and illustrations of material recovered in our country date back to the second half of the 19th century and correspond to European researchers such as Hans Bruno Geinitz, Ladislaus (Wladyslaw) Szajnocha, and Fritz Kurtz. Argentine paleobotany was born as a paleontology specialty in the 20th century.

Key words. History. Paleobotany. Argentina.

Resumen. TRAS LOS PASOS DE JESUITAS, EXPLORADORES Y CIENTÍFICOS: UNA HISTORIA DE LA PALEOBOTÁNICA EN LA ARGENTINA. Jesuitas como Alonso de Ovalle y Antonii Sepp, naturalistas-exploradores como Alcide d'Orbigny y Charles Darwin y científicos como Alfred Wilhelm Stelzner y Rudolf Zuber, descubrieron y coleccionaron plantas fósiles desde el siglo XVII en adelante. Las primeras descripciones e ilustraciones de material recuperado en el país son de la segunda mitad del siglo XIX y corresponden a investigadores europeos como Hans Bruno Geinitz, Ladislaus (Wladyslaw) Szajnocha y Fritz Kurtz. La paleobotánica argentina surgió como una especialidad de la paleontología en el siglo XX.

Palabras clave. Historia. Paleobotánica. Argentina.

FOSSIL plants have been known in Europe since ancient times. For instance, in the 1st century, Pliny the Elder (23–79) in "*Natvralis Historiae*" referred to the presence of petrified wood. Then, in the 13th century Albert the Great (*ca.* 1200–1280) also mentioned plant petrifactions in "*The Mineralibus*" (Ottone, 2008a). In addition, the first illustrations of vegetal fossils date back to the 17th century (Wilding, 2005). Remarkably, the 17th and 18th centuries constituted a period of great changes in European science: leading institutions, such as the Accademia dei Lincei in Roma, the Jardin Royal des Plantes Médicinales in Paris—which became the Muséum National d'Histoire Naturelle during the French Revolution—, or the Royal Society of London, were founded in the 18th century. These cenacles were the framework to the Enlightenment, an intellectual movement that had science and humanism as principles and led to modern science's foundation. Moreover, the study of plant fossils was no stranger to this paradigm shift. Taxonomic works with descriptions, comparisons, and illustrations of fossil material began to be published during the first half of the 19th century. Seminal contributions by Kaspar Maria von Sternberg (1761–1838) or Adolphe Théodore Brongniart (1801–1876) account for this fact (Cleal *et al.*, 2005). Knowledge of fossils and particularly plants became relatively popular during that century. Interestingly, in literature Jules Verne's "*Voyage au centre de la Terre*" described the fantastic finding in the depths of the earth of "*la végétation de l'époque tertiaire dans toute sa magnificence. De grands palmiers, des espèces aujourd'hui disparues*" (the vegetation of the Tertiary Period in its fullest blaze of magnificence. Tall palms, belonging to species no longer living) (Verne, 2003, p. 260). This novel was published in 1864.

That very year, while children were reading about Cenozoic palms in France, President Bartolomé Mitre (1821–1906) ruled the Argentine Republic. This country had been recently unified after years of fratricide wars between the Unitarian and Federalist parties. Even though Jesuit priests in the 17th and 18th centuries and European explorers during the first half of the 19th century had accounted for

the region's natural history, science itself had mostly been set aside in these lands. Notwithstanding, the Argentine government radically changed this state of affairs in the 1860s with the creation of the Departamento de Ciencias Exactas de la Universidad de Buenos Aires—devoted to the teaching of Pure and Applied Mathematics and Natural History (Ramos, 2016)—, the foundation of the Academia Nacional de Ciencias in Córdoba Province under the guidance of Hermann Burmeister (1807–1892) (Tognetti & Page, 2000), and the building and commissioning of the Museo de La Plata with the direction of Francisco Pascasio Moreno (1852–1919) (Fasano, 2002). Paleontology, particularly the study of fossil plants, would develop in these new institutions, projecting from then on to the rest of the country.

This contribution goes through the paleobotanical findings from the 17th to the 19th centuries and the first taxonomic studies of the late decades of the 19th century. The most important events related to the study of fossil plants and the institutionalization of teaching and research of Paleobotany in the country in the 20th century are also highlighted.

JESUITS

The Society of Jesus, created by Ignacio (Íñigo) de Loyola (1491–1556) in the first half of the 16th century, arrived in the Río de la Plata area at the beginning of the 17th century to spread the Catholic faith, developing, at the same time, an outstanding scientific activity. The Jesuits founded in northern Argentina, Bolivia, south of Brazil, and Paraguay what became known as 'the Jesuit Reductions', where hundreds of Guarani people and a few priests lived and worked until the society was suppressed all over the Spanish Empire in 1767 (Ottone, 2008a). The Jesuits produced a big *corpus* of texts that included historical data, ethnographic information, and description of the *gea*, flora, and fauna, having Ioseph de Acosta's "*Historia Natvral y Moral de las Indias*"—published in 1590—as a model.

The Chilean Alonso de Ovalle (1601–1651), in his "*Historica Relacion Del Reyno de Chile*", was the first author to refer to the presence of petrified wood in the Argentine territory. Ovalle (1646, p. 126) stated that the Paraná river "*conuierte en Piedra los ramos de los arboles, que caen dentro del, el gouernador Hernan darias natural del Paraguay Cauallero de grandes prendas, y fingular talento de gouierno, tenia en su casa un árbol entero, todo hecho de piedra, que sacaron del Rio*" (turns into stone tree branches that fall into it; governor Hernandarias, born in Paraguay, a gentleman of great intelligence and talented ruler, had in his home an entire tree, completely made of stone, which had been taken out of the river). This story about Hernando Arias de Saavedra (1564–1634), also known as Hernandarias, the first Native American to hold the office of governor of the Río de la Plata area and Paraguay towards the end of the 16th century, was introduced by Ovalle but also repeated by other Jesuits (Ottone, 2008a).

The French Nicholaus du Toit (1611–1680) in "*Historia Provinciae Paraquariae Sociatatis Jesv*" (du Toit, 1673), the Spanish Pedro Lozano (1697–1752) in "*Descripción Chorographica del Terreno, Rios, y Animales de las dilatadifsimas Provincias del gran Chaco, Gualamba*" (Lozano, 1733), José Guevara (1719–1806) in "*Historia de la Conquista*"—published in the 19th century—, José (Ioseph) Sánchez Labrador (1717–1798) in "*Paraguay Natural*"—still partially unpublished—, and the Austrian Martin Dobrizhoffer (1717–1791) in "*Historia de Abiponibus, Equestri, Bellicosaque Paraquariae Natione*" (Dobrizhoffer, 1784) wrote about the presence of petrified wood in the coast of the Paraná and Uruguay rivers. What is more, Gaspar Juares (1731–1804), born in Santiago del Estero Province, was another member of the Society who referred to the presence of vegetal petrifactions in the Río de la Plata but, unfortunately, his manuscripts have been lost (Furlong, 1954). Interestingly, Jesuits mostly believed, as Pliny the Elder and Albert the Great, that rivers could transform wood, but also bone, into stone (Ottone, 2008a, 2008b).

Another scholar who referred to the presence of several elements as flesh-like stones and fragments of logs in Argentine rivers was the Tyrolean Antonii Sepp (1655–1733), who published "*Reisebeschreibung wie dieselbe aus Hispanien in Paraquarian kommen*" with his colleague Anthonii Böhm. In Sepp & Böhm (1696, p. 171–172), he called his findings in the Uruguay river "*halb holz/ halb Stein*" (half wood/ half stone). Sepp stood out from the rest of the Jesuits because he had doubts in relating the origin of

petrifactions to the river water: "*Ob das Basser diese krafft oder wo diese Beränderung herkomme/ können wir nicht issen/ ift doch alles fehr curios zu fehen*" (Whether the water is responsible for this or where this change comes from/ we cannot say/ but it is all very curious to see). He located his findings near Salto Grande (Santa Fe Province), where a unit that is rich in fossil woods, the Pliocene Salto Chico Formation, crops out. Sepp's unearthing of petrified wood could be the first reliable record of plant fossils in the region (Ottone, 2008a).

ON THE EVE OF MAY

Besides the Jesuits, a few other authors referred to the presence of vegetal petrifactions in the Argentine territory before the displacement of the Spaniards from power in 1810. One example of this could be the English captain Woodes Rogers (*ca.* 1679–1732), the future governor of Bahamas, who cited in his 1708 memoirs Alonso de Ovalle's references on the power the Paraná's water had to petrify wood (Ottone, 2008a).

Similarly, Félix de Azara (1742–1821) traversed the eastern border of the Viceroyalty of the Río de la Plata between 1781 and 1801 as a negotiator in the territorial dispute between the Portuguese and the Spanish colonies. In his "*Voyages dans l'Amérique méridionale*", Azara (1809) mentioned petrified wood in the mouth of the Negro river on the Uruguay stream (Ottone, 2005). In this area, the Pleistocene El Palmar Formation, a unit rich in permineralized wood with silica, crops out (Ramos *et al.*, 2012).

Likewise, Luis de la Cruz (1768–1828) traveled from the Fuerte del Ballenar in Chile to Buenos Aires in 1806, looking for new and safe routes for crossing the Pampas. In his 1806 journal, this author (1835, p. 66) mentioned the presence of: "*árboles petrificados, aun estando en su misma situación*" (*in situ* petrified trees) near Rahuecó, *ca.* 15 km SE of Chos Malal, in Neuquén Province. The fossiliferous outcrops correspond to the Lower Cretaceous Mulichinco Formation (Aguirre-Urreta & Ramos, 2016). This finding constitutes the first *in situ* fossil plants discovered in the Argentine territory.

Notably, as well as the Jesuits, Rogers, Azara, and de la Cruz did not recognize petrifactions as fossil plants.

NATURALISTS-EXPLORERS

The second half of the 18th century and the beginning of the 19th was a time for the flourishing and institutionalization of the Natural Sciences, a period when exploration travels reached their peak. Naturalists-explorers trying to empirically describe the landscape and all natural objects they found, drastically changed the widespread idea that Europeans had about the Earth. For instance, the English expedition of Joseph Banks (1743–1820) and James Cook (1728–1779); the French expeditions of Philibert Commerson (1727–1773) and Louis Antoine Comte de Bougainville (1729–1811); the Spanish expedition of Alessandro Malaspina (1754–1810) and Taddeous Haenke (1761–1817) together with the voyages of Alexandre von Humboldt (1769–1859) and Aimé Bonpland (1773–1858); and in our country Alcide d'Orbigny (1802–1857) and Charles Darwin (1809–1882). These expeditions are capital milestones in this epic history.

D'Orbigny traveled as naturalist-explorer to South America between the years 1826 to 1833 with the support of the Muséum National d'Histoire Naturelle of Paris. He arrived in Argentina in 1827 and left the country in 1829. D'Orbigny (1835, p. 104) referred to the findings of Cenozoic fossil petrifactions at the banks of the Paraná river near La Bajada, now Paraná, in Entre Ríos Province: "*de gros tronçons de bois fossile, dont l'intérieur est agatisé; ce qui a fait croire aux habitans que le Parana, comme le dit Falconer, pétrifie les arbres qui tombent dans son lit; idée entièrement dénuée de fondement*" (of big pieces of fossil wood, whose interior is agatized, which made the inhabitants believe that the Paraná, as Falkner says, petrifies the trees which fall in its bed, an idea that is entirely unfounded). To clarify, the Jesuit Thomas Falkner (1702–1784) was the author of "A Description of Patagonia and the Adjoining Parts of South America", a book that had been published in 1774 in London.

D'Orbigny also referred to the presence of petrified wood in Cenozoic horizons from Cavallú Cuatiá, now La Paz, Entre Ríos Province, and northern Patagonia. D'Orbigny was thus the first author to recognize the fossil character of the petrified logs from Entre Ríos and Patagonia and to formally refer to the presence of fossil plants in Argentina (Ottone, 2005).

Darwin circumnavigated the world between 1831 and 1836 as a naturalist-explorer on the HMS Beagle commanded by Captain Robert Fitz Roy (1805–1865). He arrived in Argentina in 1833 and left the country in 1835. He mentioned silicified dicotyledonous wood in the Cenozoic of La Bajada and equivalent strata on the banks of the Uruguay river; coniferous and dicotyledonous wood in Cenozoic strata of the Santa Cruz river cliffs in Patagonia; and, finally, *in situ* gymnosperm silicified logs at Agua de la Zorra, near Uspallata, in Mendoza Province (Ottone, 2005, 2011). The latter, located in outcrops of the Triassic Paramillos Formation, is nowadays known as Darwin's Petrified Forest and is one of the most famous fossil localities of the country (Brea *et al.*, 2008, 2009). Fossil wood recovered by Darwin in Argentina was preliminarily classified by the botanist Robert Brown (1773–1858) in England (Lister, 2018).

ADVENTURERS AND SCIENTISTS

In the 19th century, a pleiad of European, but also American, adventurers and scientists traversed the Argentine territory, a land ravaged by the wars of independence and civil strife, and the territorial dispute against indigenous ethnicities. Most eventually returned to their countries, but a few became settlers and ended their days under the Southern Cross.

Among these was Bonpland, a French botanist and physician who accompanied von Humboldt on his scientific trip across tropical America between 1799 and 1804. In 1817 he moved to Buenos Aires. Then, in 1821 he was taken prisoner by Paraguayan troops while developing a farm in Misiones Province and forced to stay in the neighboring country for ten years. Later, he lived in Säo Borja, Brazil, and Santa Ana, Corrientes Province, where he finished his days in 1858. Bonpland collected petrified wood in Entre Ríos and the south of Corrientes and sent the material to the Muséum National d'Histoire Naturelle in Paris (Ottone, 2002, 2005).

It is worth mentioning in this context the activity developed by Woodbine Parish (1796–1882), the British ambassador at Buenos Aires from 1824 to 1832. He was an experienced politician but also deeply interested in natural sciences. In "Buenos Ayres and the Provinces of the Rio de La Plata", Parish gave a detailed description of the country and referred to the presence of petrified wood in the Uruguay river (Parish, 1852).

Likewise, Thomas Jefferson Page (1808–1899) was an American marine, engineer, and diplomatic who traveled around the country and Paraguay between 1853 and 1856 by orders of the United States government. He was received by President Justo José de Urquiza (1801–1870) and Manuel Taboada (1817–1871), the governor of Santiago del Estero Province. Page returned twice to the Río de la Plata region and left the country for good in 1858. In "La Plata, the Argentine Confederation and Paraguay" (Page, 1859), he mentioned the presence of petrified wood, probably Cenozoic in age, in Gualeguaychú, Entre Ríos Province (Ottone, 2011).

Similarly, Georges Claraz (1832–1930), a Swiss naturalist who arrived in the country with his colleague Jakob Christen Heusser (1826–1909) from Brazil to run a farm near Bahía Blanca in 1863. They later published in Europe the geological descriptions of Brazil and Argentina. In a diary of their trip to northern Patagonia, which remained unpublished during Claraz's lifetime, he referred to the presence of fossil wood, probably Late Cretaceous in age, in the central section of the Chubut river and near Maquinchao, Río Negro Province (Ottone, 2011).

Another of these explorers was Georges Chaworth Musters (1841–1879), an English officer of the British Army. In April 1869, he traveled from Punta Arenas, Chile, to Carmen de Patagones, reaching the south of Buenos Aires Province in May 1870. He mainly interacted with the Tehuelche tribe, but he also met with the last great Mapuche chief Valentín Sayhueque (*ca.* 1818–1903) in Neuquén Province. In "At home with the Patagonians" (Musters, 1871), he referred silicified wood in the sources of the Chico river, Santa Cruz Province (Ottone, 2005).

Also, the Italian Francesco Pietrobelli (1858–1916) came to Argentina in 1888 and was a pioneer in the Patagonia region, where he founded the Phoenix Patagonian Mining & Land Company. This enterprise promoted the opening of roads and the construction of the first buildings in what today is the city of Comodoro Rivadavia (Chubut Province). In his travel diary of 1897, he referred to the findings of great logs of *ca.* 6 m long near Tecka, Chubut Province (Ottone, 2011).

Finally, the American John Bell Hatcher (1861–1904) graduated from Yale in 1884 and worked with the famous paleontologist Othniel Charles Marsh (1831–1899). As curator of fossil vertebrates from Princeton, he traveled three times to Patagonia between 1869 and 1899. In his "Reports" (Hatcher, 1903), he recorded the presence of abundant fossil wood towards the headwaters of the Chico river, Santa Cruz Province (Ottone, 2011).

GOVERNMENT OFFICIALS AND MILITARY MEN

The defeat of the strong man of the country, Juan Manuel de Rosas (1793–1877), in 1852 led to a decade of political instability with two rulers struggling to overcome each other: the president of the Argentine Confederation Urquiza and the then governor of the Buenos Aires Province Mitre, who would later become the president of the country. The aftermath of the unification of the country by President Mitre in 1862 was marked by two military events: The War of the Triple Alliance against Paraguay, which finished in 1870, and the Conquest of the Desert campaign against the Indigenous people of the Pampas and northern Patagonia, which ended toward the mid-1880s. Vast territories from the Patagonia and Misiones regions were incorporated to the domain of the central government. Argentine presidents, well aware of the strategic importance of these areas, sent scientists to explore the territory. Meanwhile, the Sociedad Científica Argentina was created in 1872 and a few years later the Instituto Geográfico Argentino and the Sociedad Geográfica Argentina. In this context, military and government employees referred to fossil plants found in the country in books, letters or reports.

One of these was the French Victor Martin de Moussy (1810–1869), who settled in Argentina from 1841 to 1859 and worked for the government of Urquiza. In "*Description géographique et statistique de la Confédration Argentine*" (Martin de Moussy, 1860), he mentioned the presence of fossil wood near Concordia, Entre Ríos Province, in horizons referred to the Cenozoic (Ottone, 2005). On his return to France, President Mitre charged him with the representation of Argentina at the International Exposition of 1867 in Paris.

Interestingly, the catalogs of the exhibition in Paris were written by the English mining engineer Francis Ignacio Rickard (1837–1906) and some petrified trees discovered by Darwin in Paramillos de Uspallata, Mendoza Province, stand out among the material listed in these catalogs. Rickard had arrived in the country from Chile engaged by the then governor of San Juan Province, Domingo Faustino Sarmiento (1811–1888). Afterward, when Sarmiento was elected president in 1868, Rickard was appointed General Mine Inspector. In his 1868–1869 reports on mines, Rickard indirectly referred to plant fossils in the coal layers of the Andean foothills in the San Juan and La Rioja provinces (Ottone, 2011). Rickard also promoted the enactment of Act 8198, which established strong incentives for coal exploitation (Ottone, 2014). This new legal framework led to the exploration of coal-bearing strata and the discovery of fossil plants these horizons commonly yielded.

In turn, the Genoese engineer and topographer Nicola Grondona (1826–1878) surveyed Paso del Higo, Corrientes Province, a place which was in those days occupied by just a few families. Grondona's 1853 report to Governor Juan Pujol highlighted the beauty of the spot and its strategic emplacement near the Brazilian and Uruguayan borders, fostering the re-foundation of the village, today known as Monte Caseros. Grondona mentioned the presence of petrified wood in the area, probably Cenozoic in age (Ottone, 2011).

Another example is Benjamin Canard (1844–1903), who was born in Buenos Aires to a French father and an Argentine mother, studied pharmacy and law at the Universidad de Buenos Aires and participated as a pharmacist in the military health service during the War of the Triple Alliance. In his letters to a friend in Buenos Aires, which remained unpublished until 1972, he mentioned petrified wood at Ayuí Grande and Gualeguaicito, Entre Ríos Province, in an area of Cenozoic outcrops (Ottone, 2011).

Similarly, Franz Latzina (1845–1922), a Moravian mathematician, astronomer, and meteorologist who taught in Catamarca and Córdoba provinces, was appointed as head of the Oficina Nacional de Estadística in 1881. After that, he published a series of titles, among which his "*Geografía de la República Argentina*" stands out. In this book, he referred to Triassic fossil plants at Sierra de la Huerta, San Juan Province (Ottone, 2011).

Also, Francisco P. Moreno, a very important figure in Argentine social imagery (Fasano, 2002), should be mentioned. He was born in Buenos Aires and became a collector of fossils and natural artifacts from his early youth. He made several exploratory trips to Patagonia before being appointed Head of the Museo de La Plata in 1884. During one of his exploration journeys, he became a prisoner of the Indigenous people in Neuquén Province, escaping from captivity in a raft made from logs downstream the Limay river. In 1896, he led the Comisión de Límites entre la Argentina y Chile (Argentina-Chile Boundaries Commission), for what he is currently known as "*Perito* Moreno" in Argentina, as *perito* means "expert". Besides, he was a congressman and worked at the Ministerio de Educación. In his "*Viaje a la Patagonia Austral*" (Moreno, 1879), he mentioned petrified wood in the Cenozoic of Santa Cruz Province (Ottone, 2005).

In turn, Ramón Lista (1856–1897) studied in Europe and then in Argentina with the Head of the Museo Público de Buenos Aires, Hermann Burmeister (1807–1892). Lista was the governor of Santa Cruz Province between 1887 and 1892 and the author of books on Geography, Linguistics, and Natural Sciences. He mentioned the presence of Cenozoic petrified wood at El Gualichu, near Gastre, Chubut Province, in a note to the Revista de la Sociedad Geográfica Argentina in 1884 (Ottone, 2005).

Another significant name is Luis Jorge Fontana (1846–1920), a retired military man who became the first governor of Chubut Province in 1884. As Lista, Fontana had been born in Buenos Aires and studied Natural Sciences with Burmeister. He mentioned petrified wood in the immediacies of Colhue Huapi and Musters lakes, Chubut Province, in "*Viaje de Exploración en la Patagonia Austral*", published in 1886 (Ottone, 2005).

Notably, Sarmiento, as the governor of San Juan Province or the president of Argentina, advocated for the progress of education and the development of sciences. Among his numerous publications, "*Civilización i barbarie: vida de Juan Facundo Quiroga i aspecto físico, costumbres i abitos de la Republica Arjentina*" stands out. The book, published in 1845 while the author was exiled in Santiago de Chile, is currently known as "*Facundo*" and has become a seminal title in Argentine literature. In 1885, Sarmiento wrote a biography of the physician and paleontologist Francisco Javier Muñiz (1795–1871). He attributed to Muñiz the finding of petrified wood samples in the Pampas and compared them with those discovered by Darwin near Uspallata, Mendoza Province (Ottone, 2011).

In 1895, Moreno appointed Kaspar Jacob Roth (1850–1924) as head of the Paleontological Section of the Museo de La Plata. He had been born in Switzerland and arrived in Argentina in 1866. He also worked with Moreno in the Argentina-Chile Boundaries Commission. Roth referred to the presence of silicified wood in the horizons known as "*estratos con dinosaurios*" (strata with dinosaurs), which correspond to the Upper Cretaceous Neuquén Group (Ottone, 2011).

Other significant names worth mentioning are the Argentine Eduardo Aguirre (1857–1923), a professor of Geology and Mineralogy, the Spanish Miguel Puiggari (1827–1889), and the Scottish John Joseph Jolly Kyle (1838–1922)—the latter two were Chemistry professors—, who taught at the Facultad de Ciencias Exactas y Naturales, the school of sciences that was created in 1865 at the Universidad de Buenos Aires. Aguirre, seconded by his colleagues, published in the 1883 Anales de la Sociedad Científica Argentina, the study of Triassic coal from the Mendoza river and mentioned Stelzner's discoveries of fossil plants in equivalent horizons in Marayes, San Juan Province (Ottone, 2005).

Lastly, Manuel José Olascoaga (1835–1911) was the first governor of Neuquén Province and founder of the first capital of the territory, Chos Malal—placed in the confluence of the Neuquén and the Curileuvú rivers—. He published several texts on geography and maps, among which the mapping and description of northern Neuquén stands out. In 1908, he referred to the presence of great silicified logs on the banks of the Neuquén river, downstream Chos Malal, which probably correspond to the horizons of the Mulichinco Formation, discovered by Luis de la Cruz at the beginning of the 19th century (Ottone, 2011, 2014).

A GERMANIC SCHOOL OF SCIENCES

In 1862, Burmeister was appointed as director of the Museo Público de Buenos Aires, becoming an outstanding

figure in Argentine science. At this time, President Sarmiento, seconded by his minister of education and future President Nicolás Avellaneda (1837–1885), was carrying out a program to promote education at all levels. Then, in 1869, the central government asked Burmeister to reorganize the School of Sciences at the Universidad Nacional de Córdoba, for which he hired a selected group of German scientists. The Academia Nacional de Ciencias was founded in 1873 and, some years later, this institution began to publish the Boletín and the Actas de la Academia Nacional de Ciencias.

Burmeister had traveled across Argentina and Brazil between 1857 and 1860 with the support of his friend, the German geologist and naturalist von Humboldt. On his return to Germany in 1861, he published in Halle "*Reise durch die La Plata-Staaten*". Once back in Argentina, he published "*Description physique de la République Argentine*" in 1876. In this book, Burmeister mentioned the petrified *in situ* logs discovered by Darwin at Paramillos de Uspallata and fossil plants from several localities with Triassic outcrops, such as Casa de Piedra and Cacheuta, Mendoza Province, and Marayes, San Juan Province. He also mentioned the presence of petrified wood on the banks of the Uruguay river (Ottone, 2005).

Another important name to highlight is Alfred Wilhelm Stelzner (1840–1895), who was the first professor of Mineralogy at the Academia Nacional de Ciencias in 1871. Between 1872 and 1873, he collected fossil plants in the Carboniferous of Famatina, La Rioja Province, in the Triassic of Marayes, San Juan Province, and El Challao-Agua de la Zorra, Mendoza Province. Then, Hans Bruno Geinitz (1814–1900), a Mineralogy and Geology professor in Dresden, Germany, studied the material collected by Stelzner and published their description and illustration.

Classical fossil species, such as the Triassic *Thinnfeldia* (now *Dicroidium*) *crassinervis* from Marayes, and the Carboniferous *Otopteris* (now *Nothorhacopteris*) *argentinica* from Famatina, were described by Geinitz (1876). Geinitz's publication constitutes the first systematic study of fossil plants in Argentina (Ottone, 2005) (Fig. 1.2–3).

The second professor of Mineralogy at the Academia Nacional de Ciencias in 1874, and the second dean of the School of Sciences in 1880 was Ludwig Brackebusch. In 1875, Brackebush published the discovery of fossil plants in the Bajo de Véliz, San Luis Province, a Permian site that stands out by the fine preservation of its vegetal and invertebrate remains. A year later, when President Avellaneda visited the Academia on the inauguration of the

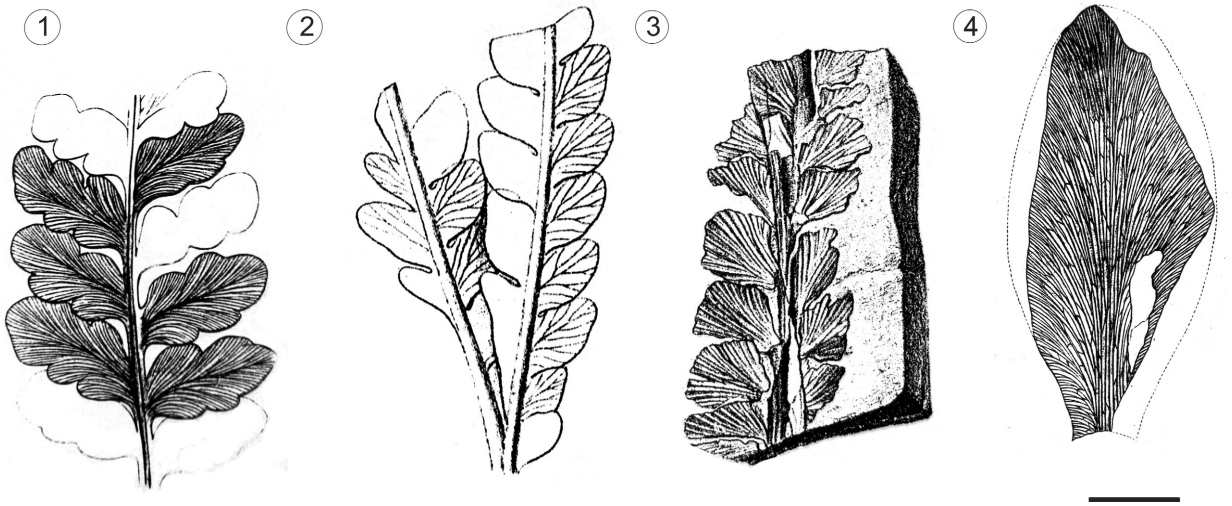

Figure 1.1, "*Neuropteridium validum*" Feistmantel, now ***Botrychiopsis plantiana*** (Carruthers) Archangelsky & Arrondo, in: Kurtz (1895b: pl. 1, fig. 2), Permian of Bajo de Véliz, San Luis Province; **2, "*Thinnfeldia crassinervis*"** Geinitz, now ***Dicroidium crassinervis*** (Geinitz) Anderson & Anderson, in: Geinitz (1876: pl. 1, fig. 13a), Triassic of Marayes, San Juan Province; **3, "*Otopteris Argentinica*"** Geinitz, now ***Nothorhacopteris argentinica*** (Geinitz) Archangelsky, in: Geinitz (1876: pl. 2, fig. 5), Carboniferous of Famatina, La Rioja Province; **4, "*Gangamopteris cyclopteroides*"** Feistmantel, now ***Gangamopteris*** sp., in: Kurtz (1895b: pl. 2, fig. 1), Permian of Bajo de Véliz, San Luis Province. Scale bar= 2 cm (**1**, **4**), 1 cm (**2**, **3**).

Córdoba-Tucumán railway, Brackebusch referred in a talk to the fossil plants horizons of the Carboniferous of Huaco and the Triassic of Marayes, San Juan Province. He also cited Stelzner's fossil findings in a report to the government of the Mendoza Province on the coal of La Reta in 1878 (Ottone, 2005, 2011, 2014).

In 1879, the Argentine army commanded by Julio Argentino Roca (1843–1914), who was Avellaneda's minister of war and the future president of the country, started the Conquest of the Desert campaign against the Indigenous peoples of the Pampas region. Roca and his troops reached the Negro river in northern Patagonia accompanied by priests and scientists associated to the Academia Nacional de Ciencias. The German Adolf Doering (1848–1925), who would later become a Chemistry professor at the Academia, was one of these men. In the 1882 Scientific Commission's official report, Doering cited the presence of petrified wood that had mostly been collected by Conrado Excelso Villegas (1841–1884) and Jorge J. Rhode (1854–1903), both high-ranking officers in the army commanded by Roca, in Upper Cretaceous or Cenozoic horizons at the proximities of Villa Roca, Río Negro Province (Ottone, 2005).

In addition, in 1884, Hugo Wilhelm Conwentz (1855–1922)—who had been born in Danzig, now Poland, and was in those days the head of the Westpreußischen Provinzialmuseum, an institution located in his hometown—, studied the material sent by Doering and published its description at the Boletín de la Academia de Ciencias. Cowentz's publication constitutes the first systematic study of fossil wood in Argentina (Ottone, 2005).

Moreover, Villegas—who was known as "*toro*" (bull) by the Indigenous people because of his strength and courage, and famous in the Pampas because of having the "*blancos de Villegas*" (a troop of white horses)—mentioned the presence of petrified wood in his book "*Espedición al Gran Lago Nahuel Huapí*" (Villegas, 1881). In the same way, Rhode mentioned his findings of vegetal petrifactions in "*Descripción de las Gobernaciones Nacionales de La Pampa, del Río Negro y del Neuquén*", a book published in 1889 (Ottone, 2011).

Another name worth mentioning is Rudolf Zuber (1858–1920), a Polish geologist who arrived in Argentina in 1886 to work in the oil industry in the Mendoza Province. He made the first geological map of the Cerro Cacheuta, a classical Triassic locality. Also, he recovered fossil plants from these strata and published his findings in the Boletín de la Academia Nacional de Ciencias in 1887 and in El Ingeniero Civil in 1888 (Ottone, 2005).

Then, Ladislaus (Wladyslaw in Polish) Szajnocha (1857–1928)—a Geology and Paleontology professor at the Universytet w Krakowie who was born in Lwowie (Austro-Hungarian Empire, now Poland)—studied the material collected by Zuber and published his work in Wien (Ottone, 2005). Szajnocha (1888, 1889) described two species of *Thinnfeldia* (now *Dicroidium*), *T. odontopteroides* and *T. lancifolia*, *Cardiopteris* (now *Zuberia*) *zuberi*, and *Sphenopteris elongata* (now *Xilopteris rigida*) and compared them to the Triassic fossil plants of Ipswich and Tivoli, Queensland, Australia.

The Triassic plant fossils described by Szajnocha were cited in 1889 by European scientists such as the Swedish Alfred Gabriel Nathorst (1850–1921) and the German Johann Heinrich Rudolf Schenck (1860–1927). The importance of fossils recovered at Cacheuta has had its echo among us. In this regard, the especial issue of January 1st 1890 of La Prensa, a journal published in Buenos Aires, also commented the findings (Ottone, 2005).

Sometime before this, in 1873, the Latvian Friedrich Wilhelm Karl Berg (1843–1902) arrived in the country invited by Burmeister. Then, following Burmeister's death in 1892, he became the second Head of the Museo Público de Buenos Aires and a Zoology professor at the Universidad de Buenos Aires. A priest from San Juan Province sent him plant fossils from the Carboniferous of Retamito and in 1891, Berg mentioned these fossils in two papers in the Anales de la Sociedad Científica Argentina (Berg 1981a, 1891b). Afterward, he sent the material to Szajnocha (1891), who determined the presence of Lycopsida and Equisetopsida remains.

Another significant scholar for our study is Hermann Avé-Lallemant (1835–1910), born in Lübeck, Germany. His father, Robert, was a physician who lived for several years in Brazil. Avé-Lallemant studied mining engineering in Europe and by the end of the 1860s he visited Argentina. In Buenos Aires, he met Burmeister and, under his influence,

he settled in the country, where he worked as a land surveyor and in the mining and oil industries. Avé-Lallemant mentioned the presence of Triassic fossil plants in El Challao and Cerro Blanco, Mendoza Province, and placed *in situ* fossil logs discovered by Darwin near Uspallata on a map for the first time in an 1891 paper in the Boletín de la Academia de Ciencias (Ottone, 2005).

Rudolf Hautal (1854–1928) was also born in Hamburg, Germany. He was a Botany and Geology professor at the Museo de La Plata and worked with Moreno in the Argentina-Chile Boundaries Commission. Hautal (1892) described and sketched a Triassic fossil fern leaf fragment recovered by Moreno at El Challao, Mendoza Province, in the Revista del Museo de La Plata. In 1898, he referred to fossil angiosperms in the Cenozoic of the Cerro Guido, Santa Cruz Province. Fritz Kurtz (1902) would study this material a few years later (Ottone, 2005).

Kurtz (1854–1920) was also born in Germany (Berlin). He obtained his Philosophischen Doctorwürde in 1879 in Berlin. In 1884, he replaced Georg Hieronymus (1845–1921) as a Botany professor at the Academia de Ciencias in Córdoba, holding this position until his retirement in 1915. Kurtz published five papers on Paleobotany in the 1890s. Among them, he described the genus *Botrychiopsis* and its type species, *B. weissiana*, which he published in the Revista del Museo de La Plata based on material from the Carboniferous of Retamito, San Juan Province (Kurtz, 1895a). Then, also in the Revista del Museo de La Plata, he carried out the first systematic study of the Permian flora of Bajo de Véliz, San Luis Province (Kurtz, 1895b) (Fig. 1.1 and 1.4). Much of his work remained unpublished and would become known after his death (Kurtz, 1921). The recent republication and careful revision of most of his articles (Kurtz, 1996; Archangelsky *et al.*, 1996) shows that Kurtz's work undoubtedly stands out from the rest of his contemporaries (Ottone, 2005).

Another German who would be important for these studies was Wilhelm Bodenbender (1857–1941), a geologist who studied at the Bergakademie Clausthal and at the Georg-August-Universität Göttingen. He arrived in Argentina in 1885 to replace Brackebusch as a Geology and Mineralogy professor in Córdoba. He also worked at the Servicio Geológico, Dirección de Minas, Geología e Hidrología de la Nación in Buenos Aires city. Bodenbender was mainly interested in studying the Precordillera and the Pampean mountain range. He mentioned fossil plants in the Carboniferous of Trapiche and Mina Retamito, San Juan Province and Paganzo, La Rioja Province; in the Permian of Bajo de Vé1iz, San Luis Province and Sierra de Los Llanos, La Rioja Province; and in the Triassic of Cacheuta, Mendoza Province. He also cited petrified wood in the probably Jurassic strata of Neuquén Province (Ottone, 2005, 2011).

Also, among this group of outstanding Germans for Argentine paleobotany was Jean Valentin (1867–1897), who was born in Frankfurt am Main and did his studies in Strasbourg. He traveled to Argentina and was involved with the Sociedad Científica Argentina and the Museo de Buenos Aires and Museo de La Plata. Unfortunately, his prolific activity was interrupted by his early death. He cited fossil plants recovered from the Carboniferous of Retamito, Cerro El Fuerte de Jáchal, and Trapiche, San Juan Province; the Permian of Bajo de Véliz, San Luis Province; and the Triassic of Challao, Paramillos de Uspallata, and Cacheuta, Mendoza Province and Marayes, San Juan Province (Ottone, 2011).

The importance of Argentine-reported findings of fossil plants, from Darwin to German scholars, was enhanced in the late 19th century by renowned foreign scientists such as the French René Charles Zeiller (1847–1915), a professor of the École de Mines of Paris, and the American Frank Lester Ward (1841–1913), a researcher of the United States Geological Survey (Ottone, 2005).

TIERRA DEL FUEGO

A 'Land of Fire' that haunted the imagination of navigators who approached its shores since the 16th century, the homeland of Selk'nam (Ona) and Haush hunters and Yamana and Alacaluf canoeists, Tierra del Fuego had been a scarcely explored territory before the foundation of Punta Arenas in 1848 and Ushuaia in 1884, at the place first occupied in 1869 by the Anglican mission station of the Patagonian Missionary Society. Tierra del Fuego was visited by the end of the 19th century by explorers and scientists, but also by adventurers who felt drawn by the discovery of placer gold deposits.

Among these was Giacomo Bove (1852–1887), an Italian naval officer who participated in the renowned Arctic

expedition of 1778–1880 commanded by Adolf Erik Nordenskjöld (1832–1901). He was called by the Argentine Government to lead an expedition to the southern seas. The expedition explored Tierra del Fuego and the Isla de los Estados between 1880 and 1881. In a preliminary report of results, the geologist in charge, Domenico Lovisato (1842–1916), referred to the findings of fossil plants by d'Orbigny in Patagonia and regretted the fact that he hadn't had the same luck in this regard (Ottone, 2011).

Another explorer who visited the island was Lulius Popper (1857–1893), a Romanian who studied engineering in Paris. After traveling around the world for several years, he arrived in Argentina in 1884 attracted by the gold rush. He exploited alluvial gold in El Páramo, north of San Sebastian Bay. Popper mentioned Cenozoic fossil logs of Fagaceae on the southern cliff of the Espíritu Santo Cape, Tierra del Fuego Province, Argentina (Ottone, 2005).

Then the last five years of the 19th century were marked by the arrival of the 1895–1897 Swedish Expedition at the Strait of Magellan, commanded by Otto Nordenskjöld (1869–1928). As a member of this expedition, Per Karl Hjalmar Dusén (1855–1926), a Swedish botanist who was originally a civil engineer, described and sketched a great number of fossil plants (mostly Fagaceae) recovered from the Sierra de Carmen Silva, Tierra del Fuego Province, and from southern Chile in "*Wissenschaftliche Ergebnisse der Swedischen Expetition*" in 1899 (Ottone, 2005).

A COUNTRY ON DISPLAY

In the second half of the 19th century, several European countries, the United States, and Argentina aspired to show their economic potential to the world, as well as spread their cultural legacy. In a world that increasingly became interconnected by sea, international exhibitions emerged as ideal meeting places for doing business and having cultural exchanges. Therefore, as part of the international exhibitions held in Paris in 1867, 1878, and 1889, in Philadelphia in 1875, the national exhibition of Córdoba in 1871, and the continental exhibition organized in 1871 by the Club Industrial Argentino at Buenos Aires, several publications were released, mainly catalogs of exhibits, which included fossil plants. The catalogs included references to fossil plants recovered from the Cenozoic strata of Corrientes and Entre Ríos, but also from San Juan and Santiago del Estero provinces. References to petrifactions in Sierra de la Huerta, San Juan Province, and fossil plant remains from the Triassic of Marayes, San Juan Province and El Challao, Mendoza Province, were also present. However, the site mentioned the most in different catalogs was undoubtedly the Triassic fossil forest discovered by Darwin in 1839 at Paramillos de Uspallata, Mendoza Province. 'Darwin's Petrified Forest' was an icon of Argentine heritage in 19th century international exhibitions (Ottone, 2011).

PATAGONIA REVISITED

In the first half of the 20th century, two authors made capital works on Paleobotany in Patagonia: The American Edward Wilber Berry (1875–1945) and the Italian Egidio Feruglio (1897–1954). Berry was a Paleontology Professor at John Hopkins University and also worked in the United States Geological Survey. He participated in different trips to the northwestern Andean region of South America collecting fossil plants (Reeside, 1945) and also studied material from Patagonia. He wrote about twenty—mostly systematic—papers on Cretaceous and Cenozoic taphofloras from Río Turbio, Santa Cruz Province; Pichileufú, Río Negro Province; and other Patagonian localities (Archangelsky *et al.*, 2000).

Yacimientos Petrolíferos Fiscales, known as YPF, was created in 1922 under the presidency of Hipólito Yrigoyen (1852–1933). The company's first director, Enrique Mosconi (1877–1940), promoted the exploration and discovery of new oil-producing wells. He provided YPF with the best laboratory equipment, staffed by highly qualified experts, and he hired renowned technicians and geologists to work in the field. Feruglio was one of them. Feruglio joined YPF in 1925, remaining inconsistently in the company until the 1940s. He produced around 60 works on Argentine Geology and Paleontology. His "*Descripción Geológica de la Patagonia*", in three tomes from 1949 to 1950, stands out as a foundational work in the region. Feruglio published several contributions on fossil ferns, ginkgophytes, and conifers (Archangelsky *et al.*, 2000; Spalletti, 2008). The Museo Paleontológico Egidio Feruglio in Trelew, Chubut Province, was named after him.

ACADEMICS AND SCHOLARS IN THE 20TH CENTURY

The 20th century was the moment for the definite institutionalization of science teaching in Argentina, focused on four institutions: The Instituto Miguel Lillo and the Universidad Nacional de Tucumán, the Museo and Universidad Nacional de La Plata, the Facultad de Ciencias Exactas, Físicas y Naturales, Universidad Nacional de Córdoba, and the Facultad de Ciencias Exactas y Naturales, Universidad de Buenos Aires. In 1958, the creation of the Consejo Nacional de Investigaciones Científicas y Técnicas (CONICET), would tend to rule scientific activities until today in the country.

Some important leading figures from this period of time should be mentioned:

Miguel Lillo (1862–1931) was an Argentine naturalist and the author of "*Genera et Species Plantarum Argentinarum*", a comprehensive catalog of Argentine flora published after his death. The project of its publication was bolstered by a foundation named after him, which functioned in the Instituto Miguel Lillo, an institution created in 1933, closely linked to the Universidad Nacional de Tucumán (Lois, 2021).

Carlos Alberto O'Donell (1912–1954) was born in Buenos Aires. He moved to Tucumán after graduating as a pharmacist at the Universidad de Buenos Aires. He was the curator of the herbarium of the Instituto Miguel Lillo and taught Botany at the Universidad Nacional de Tucumán (Descole, 1954). O'Donell (1938) published a paper in the first issue of Cuadernos de Mineralogía y Geología which had the following title: "*Troncos y ramas fósiles de dicotiledóneas en el Araucaniano de Tiopunco (departamento de Tafí, provincia de Tucumán)*". Although O'Donell's analysis of fossil wood is schematic regarding current standards, this contribution stands out because it constitutes the first attempt by an Argentine to study fossil plants.

Sergio Archangelsky (1931–2022) was born in Casablanca, French Morocco, and graduated from Universidad de Buenos Aires. He was a professor in Tucumán from 1955 to the first years of the 1960s, beginning an outstanding career as a paleobotanist (Archangelsky, 2014). Archangelsky was undoubtedly the best paleobotanist of all time in Argentina (Archangelsky *et al.*, 2000).

Rafael Herbst (1936–2017) was the first graduate in Geology at the Universidad Nacional de Tucumán and the first graduate student under Archangelsky's tutorship. Herbst was born in Hannover, Germany, but, as his mentor, he lived in Argentina since childhood. Herbst taught Paleontology at the Universidad Nacional del Nordeste in Corrientes Province from 1967 until his retirement in 1998; following Archangelsky's footsteps, he was also an outstanding paleobotanist (Ottone, 2018).

Joaquim Frenguelli (1883–1958) was born in Rome, Italy, and got his medical degree in the same city. Invited by relatives, he traveled to Argentina in 1911 and worked as a physician in Santa Fe and Córdoba provinces. He was a professor at the Universidad Nacional del Litoral in 1920. In those years, he was concerned in the geology and geomorphology of northeastern Argentina and the study of silica microfossils, especially diatoms. He was the director of the Museo de La Plata between 1934 and 1946, and then again from 1953 to 1955. In his new position, he was devoted to Paleobotany, producing more than 30 papers on Paleozoic, Mesozoic, and Cenozoic fossil plants (Teruggi, 1986; Riccardi, 2013). Frenguelli's paleobotanical studies were continued by different scholars, such as Bruno Petriella, Oscar Arrondo, and Analía Artabe.

The teaching of Paleontology at the Universidad de Buenos Aires began in 1921 with the courses taught by Martín Doello Jurado (1884–1948) and after his death by Armando Federico Leanza (1919–1975) and Horacio Homero Camacho (1922–2015) (Aguirre-Urreta, 2016), who took his place. Although the teaching of Paleontology was then mainly focused on Invertebrate Paleontology, in those years a group of students felt interested in fossil plants because of the influence of Alfredo Castellanos (1893–1975), a former disciple of Kurtz and a Botany Professor at this university in the 1950s.

One who followed these inclinations was Pedro Stipanicic (1921–2008), a graduate student under the direction of Pablo Groeber (1885–1964), who was a Geology professor between 1933 and 1952 (Ramos, 2016). Stipanicic, together with his wife María Bonetti (deceased 2015), one of the first women devoted to Paleobotany in the country, worked in the Triassic of San Juan Province and made important contributions to the knowledge of this paleoflora (Archangelsky, 2009).

Castellanos influenced not only Stipanicic but also Archangelsky and paleobotanist Carlos Alberto Menéndez (1921–1976) (Archangelsky, 1970, 2009; Archangelsky *et al.*, 2000). Significantly, the latter would be the first Palynology Professor at the Universidad de Buenos Aires in the 1970s. Palynology, a new discipline to the country at the time, would progress at the institution from the 1980s led by former Menéndez's graduate student Carlos Azcuy, and then Archangelsky's doctoral student Edgardo Romero.

Moreover, Héctor Antonio Orlando, Frenguelli's graduate student at the Universidad Nacional de La Plata, published the first palynological work in the 1950s (Orlando, 1954). Nevertheless, it was in 1965 that Archangelsky, in co-authorship with Juan Carlos Gamerro (1923–2013), Herbst, and Menéndez, would begin to produce substantial contributions to the discipline according to current international standards (Archangelsky & Gamerro, 1965; Herbst, 1965; Menéndez, 1965a, 1965b).

Last but not least, Argentine women had a late arrival to Paleobotany in Argentina. The pioneer was María Bonetti. She was followed in the 1970s by Hetty Bertoldi (1924–2020), who studied phytoliths at the Universidad Nacional del Litoral, Alicia Baldoni and Analía Artabe at the Universidad Nacional de La Plata, and Josefina Durango at the Universidad Nacional de Tucumán, who studied the megascopic remains of fossil plants (Archangelsky *et al.*, 2000).

AN UNFINISHED STORY

Today, researchers in Argentina have innumerable resources to achieve their work: optical instruments, technical devices, and online specialized libraries are within reach. However, there are also economic problems, and the science budget falls short of what is required in the country. So, in this context, why write a history of Paleobotany?

History collects, analyzes, and puts events of the past in context. As a social science, but also deeply rooted in the humanities, history is "*cuando se escribe apasionadamente, una exegesis poética del tiempo*" (if passionately written, a poetic exegesis of time) (Lojo, 1987, p. 72).

The history of Paleobotany is an unfinished yarn that women and men weave daily. The story of a Jesuit priest going up the Uruguay river on a wooden boat, afraid of being attacked by a jaguar when—curious about a petrified log seen on the banks—he approached the coast. The tale of a young man traveling across a mountain range on the back of a mule, impressed to see a stone forest emerging to the sky from the hillside. A narrative depicting a woman in a dark room, her gaze caught by a scanning electron microscope scan, aware of the relationships between bracts and ovuliferous scales in a fossil cone. This is the history of Paleobotany, an unfinished yarn of searching, findings, and passion.

ACKNOWLEDGEMENTS

I express my gratitude to the editors, Juan Carlos Fernícola, Carola Castiñeira Latorre, Darío Lazo, and Bárbara Cariglino, and the two reviewers, who helped improve the quality of this article. This research was partially supported by the grant PIP 112202001018670 (Consejo Nacional de Investigaciones Científicas y Técnicas). This is the contribution R-438 of the Instituto de Estudios Andinos Don Pablo Groeber. This article is dedicated to the memory of the recently deceased Paleobotanist Sergio Archangelsky, exemplary teacher and researcher.

REFERENCES

Aguirre-Urreta, M. B. (2016). La Paleontología presente en la enseñanza desde el nacimiento de Exactas. In V. A. Ramos (Ed.), *150 años de Exactas* (pp. 258–289). Eudeba.

Aguirre-Urreta, B. & Ramos, V. A. (2016). Los primeros registros geológicos y paleontológicos del Neuquén: la expedición de Luis de la Cruz y Goyeneche en 1806. *Revista del Museo de La Plata*, *1* (Número Especial), 17–26. https://doi.org/10.24215/25456377e014

Archangelsky, S. (1970). Evolución de los estudios paleobotánicos en Argentina desde sus orígenes hasta nuestros días. *Boletín de la Academia Nacional de Ciencias*, *48*, 551–557.

Archangelsky, S. (2009). Pedro N. Stipanicic (1921–2008). *Ameghiniana*, *46*(1), 221–222. https://www.ameghiniana.org.ar/index.php/ameghiniana/article/view/191

Archangelsky, S. (2014). Paleobotánica y arte: experiencia de una vida. *Ciencia e Investigación, Reseñas*, *2*(3), 6–19.

Archangelsky, S. & Gamerro, J. C. (1965). Estudio palinológico de la Formación Baqueró (Cretácico), provincia de Santa Cruz – I –. *Ameghiniana*, *4*(5), 159–170. https://www.ameghiniana.org.ar/index.php/ameghiniana/article/view/1189

Archangelsky, S., Arrondo, O. G., Bonetti, M. I., Herbst, R. R., Hünicken, M., Leguizamón, R., & Stipanicic, P. (1996). Revisión y actualización de la obra paleobotánica de Kurtz en la República Argentina. *Actas de la Academia Nacional de Ciencias*, *11*, 83–259.

Archangelsky, S., Lezama, L., & Archangelsky, A. (2000). *Bibliografía paleobotánica argentina*. Publicación Especial MEF 1. Museo Egidio Feruglio.

Azara, F. de (1809). *Voyages dans l'Amérique Méridionale. Depuis 1781 jusqu'en 1801. Contenant la description géographique, politique et civile du Paraguay et de la rivière de La Plata; l'histoire de la découverte et de la conquête de ces contrées; des détails nombreux sur leur histoire naturelle, et sur les peuples sauvages qui les habitent ; les récits des moyens employés par les Jésuites pour assujétir et civiliser les indigènes, etc. Tome Premier*. Dentu.

Berg, C. (1891a). La Formación Carbonífera de la República Argentina. *Anales de la Sociedad Científica Argentina*, *31*, 209–212.

Berg, C. (1891b). Nuevos datos sobre la Formaci6n Carbonífera de la Repúlblica Argentina. *Anales de la Sociedad Científica Argentina*, *32*, 68–71.

Brea, M., Artabe, A., & Spalletti, L. A. (2008). Ecological reconstruction of a mixed Middle Triassic forest from Argentina, *Alcheringa*, *32*(4), 365–393. http://dx.doi.org/10.1080/03115510802417760

Brea, M., Artabe, A. E., & Spalletti, L. A. (2009). Darwin Forest at Agua de la Zorra: the first in situ forest discovered in South America by Darwin in 1835. *Revista de la Asociación Geológica Argentina*, *64*(1), 21–31. https://revista.geologica.org.ar/raga/article/view/1291

Cleal, C. J., Lazarus, M., & Townsend, A. (2005). Illustrations and illustrators during the 'Golden Age' of palaeobotany: 1800–1840. In A. J. Bowden, C. V. Burek, & R. Wilding (Eds.), *History of Palaeobotany: Selected Essays* (pp. 41–61). Geological Society Special Publications, 241. Geological Society of London. http://dx.doi.org/10.1144/GSL.SP.2003.207.01.05

de la Cruz, L. (1835). *Viage a su costa, del Alcalde provincial del muy ilustre Cabildo De la Concepción de Chile, D. Luis de la Cruz, Desde el Fuerte de Ballenar, Frontera de dicha Concepción, por tierras desconocidas, y habitadas de indios barbaros, hasta la ciudad de Buenos Aires; auxiliado por parte de S. M. de un agrimensor, del practico D. Justo Molina, de dos asociados, tenientes de milicias, D. Ángel y D. Joaquín Prieto, de dos dragones, un intérprete, y siete peones para el servicio y conducción de víveres, en 27 cargas. Primera Edición*. Imprenta del Estado.

Descole, H. R. (1954). Carlos Alberto O'Donell. *Boletín de la Sociedad Argentina de Botánica*, *5*(3), 160–165.

d'Orbigny, A. (1835). *Voyage dans l'Amérique méridionale (le Brésil, la République Orientale de l'Uruguay, la République Argentine, la Patagonie, la République du Chili, la République de Bolivia, la République du Pérou), exécuté pendant les années 1826, 1827, 1828, 1829, 1830, 1831, 1832 et 1833. Tome Premier. Partie Historique*. Pitois-Levrault et C.^{e} & V. Levrault.

Dobrizhoffer, M. (1784). *Historia de Abiponibus equestri bellicosaque Paraquariae natione : locupletata copiosis barbararum gentium, urbium, fluminum, ferarum, amphibiorum, insectorum, serpentium praecipuorum, piscium, avium, arborum, plantarum, aliarumque eiusdem provinciae, proprietatum observationibus*. Josephi Nob. de Kurzbek.

du Toit, N. (1673). *Historia Provinciae Paraquariae Societatis Jesv*. Officina Typographica Joannis Mathiae Hovii.

Fasano, H. L. (2002). *Perito Francisco Pascasio Moreno. Un héroe civil*. Fundación Museo de La Plata 'Francisco Pascasio Moreno'.

Furlong, G. (1954). *Gaspar Juares, S. J. y sus "Noticias Fitológicas" (1789)*. Librería del Plata.

Geinitz, H. B. (1876). Ueber Rhätische Pflanzen - und Thierreste in den argentinischen Provinzen La Rioja, San Juan und Mendoza. In A. Stelzner (Ed.), Beiträge zur Geologie und Palaeontologie der Argentinischen Republik, 2. Paläontologischer Theil. *Palaeonotographica, Supplementbände*, *3*, 1–14.

Hatcher, J. B. (1903). *Reports of the Princeton University Expeditions to Patagonia 1896-1899. Volume I. Narrative of the expeditions, geography of southern Patagonia*. Schweizerbart'sche Verlagshandlung (E. Nägele).

Hautal, R. (1892). Nota sobre un nuevo género de Filíceos de la Formación Rhetica del Challao (provincia de Mendoza). *Revista del Museo de La Plata*, *4*, 221–223.

Herbst, R. (1965). Algunos esporomorfos del Triásico de Argentina. *Ameghiniana*, *4*(5), 141–155. https://www.ameghiniana.org.ar/index.php/ameghiniana/article/view/1187

Kurtz, F. (1895a). Contribuciones a la Palaeophytologia Argentina. I. *Botrychiopsis*. Un género nuevo de las Cardiopterídeas. *Revista del Museo de La Plata*, *6*, 119–124.

Kurtz, F. (1895b). Contribuciones a la Palaeophytologia Argentina. II. Sobre la existencia del Gondwana Inferior en la República Argentina (Plantas fósiles del Bajo de Vélis, provincia de San Luis). *Revista del Museo de La Plata*, *6*, 126–139.

Kurtz, F. (1902). Contribuciones a la Palaeophytologia Argentina. III. Sobre la existencia de una Dakota-Flora en la Patagonia austro-occidental (Cerro Guido, gobernación de Santa Cruz). Informe preliminar. *Revista del Museo de la Plata*, *10*, 45–60.

Kurtz, F. (1921). Atlas de plantas fósiles de la República Argentina. *Actas de la Academia Nacional de Ciencias, Córdoba*, *7*, 129–153.

Kurtz, F. (1996). Contribuciones a la Palaeophytologia Argentina (I, II, III, IV, V, VI y VII). *Actas de la Academia Nacional de Ciencias, Córdoba*, *11*, 29–82.

Lister, A. (2018). *Darwin's Fossils: Discoveries that shaped the theory of the evolution*. Natural History Museum.

Lois, C. (2021). *Atlas de botánica argentina. La ilustración científica en el Genera et Species Plantarum Argentinarum*. Ampersand.

Lojo, M. R. (1987). *Canción perdida en Buenos Aires al oeste*. Torres Agüero.

Lozano, P. (1733). *Descripción Chorographica del Terreno, Rios y Animales de las dilatadifsimas Provincias del gran Chaco, Gualamba: y de los Ritos y Costumbres de las innumerables Naciones barbaras, è infieles, que la habitan: con una cabal Relacion Historica de lo que en ellas han obrado para conquiftarlas algunos Governadores, y Miniftros Reales: y los Miffioneros Jefuitas para reducirlas a la Fé del verdadero Dios*. Colegio de la Affumcion, Joseph Santos Balbàs.

Martin de Moussy, V. (1860.) *Description géographique et statistique de la Confédération Argentine. Tome Premier*. Firmin Didot.

Menéndez, C. A. (1965a). Contenido palinológico de sedimentos con *Rhacopteris ovata* (Mc Coy) Walk. de la Sierra de Famatina, La Rioja. *Revista del Museo Argentino de Ciencias Naturales "Bernardino Rivadavia", Paleontología*, *1*(3), 45–80.

Menéndez, C. A. (1965b). Microplancton fósil de sedimentos terciarios y cretácicos del norte de Tierra del Fuego (Argentina). *Ameghiniana*, *4*(1), 7–18. https://www.ameghiniana.org.ar/index.php/ameghiniana/article/view/1172

Moreno, F. P. (1879). *Viaje à la Patagonia Austral. Emprendido bajo los auspicios del Gobierno Nacional 1876-1877. Tomo Primero*. Imprenta de la Nación.

Musters, G. C. (1871). *At home with the Patagonians. A year's wanderings over untrodden ground from the Straits of Magellan to the Rio Negro*. John Murray.

O'Donell, C. (1938). Troncos y ramas fósiles de dicotiledóneas en el Araucaniano de Tiopunco (departamento de Tafí, provincia de Tucumán). *Cuadernos de Mineralogía y Geología*, *1*(1), 26–29.

Orlando, H. A. (1954). Acerca de la presencia de esporomorfos fósiles en los ''Estratos de *Eustheria*'', del Triásico de Cacheuta (Mendoza). *Notas del Museo de La Plata*, *27*, (*Paleontología*, *101*), 107–156.

Ottone, E. G. (2002). The French botanist Aimé Bonpland and paleontology at Cuenca del Plata. *Earth Sciences History*, *21*(2), 150–165. https://doi.org/10.17704/eshi.21.2.x70n185583681706

Ottone, E. G. (2005). The history of palaeobotany in Argentina during the 19th century. In A. J. Bowden, C. V. Burek, & R. Wilding (Eds.),

History of Palaeobotany: Selected Essays (pp. 281–294). Geological Society Special Publications, 241. Geological Society of London. http://dx.doi.org/10.1144/GSL.SP.2003.207.01.18

Ottone, E. G. (2008a). Jesuitas y fósiles en la Cuenca del Plata. In F. G. Aceñolaza (Ed.), *Los geólogos y la geología en la historia argentina* (pp. 9–20) Serie Correlación Geológica, 24. INSUGEO.

Ottone, E. G. (2008b). José Sánchez Labrador (1717–1798) y la geología del Paraguay Natural. In F. G. Aceñolaza (Ed.), *Los geólogos y la geología en la historia argentina* (pp. 43–54), Serie Correlación Geológica, 24. INSUGEO.

Ottone, E. G. (2011). Historia de la paleobotánica en la Argentina durante el siglo XIX: científicos, exploradores y el país en exposición. *Revista de la Asociación Geológica Argentina*, *68*(3), 370–379. https://revista.geologica.org.ar/raga/article/view/578

Ottone, E. G. (2014). *Arrancando de las sombras la dilatada extensión del territorio: la geología de Olascoaga*. Asociación Geológica Argentina, Serie ¨B´ (Didáctica y Complementaria), 31.

Ottone, E. G. (2018). Rafael Herbst (1936–2017). *Revista de la Asociación Geológica Argentina*, *75*(2), 296–302. https://revista.geologica.org.ar/raga/article/view/182

Ovalle, A. de (1646). *Historica Relacion Del Reyno de Chile Y las mifiones y minifterios que exercita en la Compañia de Jesus*. Francisco Caballo.

Page, T. J. (1859). *La Plata, the Argentine Confederation, and Paraguay. Being a narrative of the explorations of the tributaries of the River La Plata and adjacent countries during the years 1853, '54, '55, and '56, under the orders of the United States Government*. Harper & Brothers

Parish, W. (1852). *Buenos Ayres and the Provinces of the Rio de La Plata: from their discovery and conquest by the Spaniards to the establishment of their political independence. With some account of their present state, trade, debt, etc.; an appendix of historical and statistical documents; and descriptions of the geology and fossil monsters of the Pampas*. John Murray.

Ramos, R. S., Brea, M., & Kröhling, D. M. (2012). Leños fósiles de la Formación El Palmar (Pleistoceno tardío) en el Parque Nacional El Palmar, Entre Ríos, Argentina. *Ameghiniana*, *49*(4), 606–622. https://doi.org/10.5710/AMGH.17.5.29012.561

Ramos, V. A. (2016). La primera clase de Exactas y el inicio de la enseñanza de la Geología. In V. A. Ramos (Ed.), *150 años de Exactas* (pp. 13–61). Eudeba.

Reeside Jr., J. B. (1945). Edward Wilber Berry: February 10, 1875-September 20, 1945. *Science*, *102*(2655), 498–499.

Riccardi, A. C. (2013). Joaquín Frenguelli: vida y obra científica. In R. N. Alonso (Ed.), *III Congreso Argentino de Historia de la Geología* (pp. 169–219). Mundo Editorial.

Sepp, A. & Böhm, A. (1696). *Reisebeschreibung wie dieselbe aus Hispanien in Paraquarian kommen. Und kurtzer Bericht der denckwürdigsten Sachen selbiger Landschafft, Völckern und Arbeitung der sich alldort befindenten PP Missionarium*. Joh. Hoffmanns.

Spalletti, L. A. (2008). Notas sobre la vida y obra del Dr. Egidio Feruglio. In F. G. Aceñolaza (Ed.), *Los geólogos y la geología en la historia argentina* (pp. 179–193), Serie Correlación Geológica, 24. INSUGEO.

Szajnocha, L. (1888). Ueber die von Dr. Rudolf Zuber in Süd-Argentina und Patagonien gesammelten Fossilien. *Verhandlungen der Kaiserlich-koeniglich geologischen Reichanstalt*, *Jahrgang 1888*, 146–151.

Szajnocha, L. (1889). Über fossile Pflanzereste aus Cacheuta in der Argentinischen Republik. *Sitzungsberichte der Kaiserlichen Akademie der Wissenschaften, Mathematisch-Naturwissenschaftliche Classe*, *Jahrgang 1888*, 219–245.

Szajnocha, L. (1891). Über einige carbone Pflanzereste aus der Argentinischen Republik. *Sitzungsberichte der Kaiserlichen Akademie der Wissenschaften, Mathethematisch-Naturwissenschafiliche Classe*, *100*, 203–213.

Teruggi, M. E. (1986). *Joaquín Frenguelli. Vida y obra de un naturalista completo. Segunda Edición*. Asociación Dante Alighieri.

Tognetti, L. & Page, C. (2000). *La Academia Nacional de Ciencias. Etapa fundacional – siglo XIX*. Academia Nacional de Ciencias.

Verne, J. (2003). *Voyage au centre de la Terre*. Le Livre de Poche.

Villegas, C. E. (1881). *Espedición al Gran lago Nahuel-Huapí. Partes y documentos relativos. Anexo a la Memoria de Guerra 1881*. Establecimiento Tipográfico La Pampa.

Wilding, R. (2005). From the rise of Enlightenment to the beginnings of Romanticism (Robert Plot, Edward Lhwyd and Richard Brookes, MD). In A. J. Bowden, C. V. Burek, & R. Wilding (Eds.), *History of Palaeobotany: Selected Essays* (pp. 5–12). Geological Society Special Publications, 241. Geological Society of London. http://dx.doi.org/10.1144/GSL.SP.2003.207.01.02

doi: 10.5710/PEAPA.21.07.2023.434

Recibido: 04 de julio 2022
Aceptado: 21 de julio 2023
Publicado: 25 de Junio 2025