

Prefácios - Prefaces

Adolpho Lutz's work in mycology

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Adolpho Lutz's Work in Mycology

Adolpho Lutz (1855-1940) played a major role in the development of science in Brazil, especially in medical mycology, where his greatest contribution was the description of the world's first two cases of paracoccidioidomycosis, in São Paulo in 1908.

Mycology is the science that studies fungi, living beings of *polyphyletic* origin lying somewhere between plants and animals whose cellular organization and DNA are limited by a double membrane (eukaryotic). Found in a large variety of forms, functions, and habitats, fungi display extraordinary plasticity, are cosmopolitan and heterotrophic (i.e., they require food sources since they do not photosynthesize), and include both macroscopic representatives, such as mushrooms and shelf fungi, as well as microscopic ones, like yeasts and filamentous fungi.

Their functions vary greatly across different environments. They can be saprophytes, participating in the degradation of natural organic matter and thereby guaranteeing nutrient cycling in soil and water. They also take part in mutual symbiosis (mycorrhizal fungi associated with plant roots) and, with different degrees of intensity and specificity, have parasitic relations with plants, animals, people, and other hosts.

Fungi classification is extremely complex and quite often controversial. Some researchers classify these organisms in a single kingdom: Fungi.¹ Others, based on phylogenetic studies, place them in three kingdoms: Fungi, Stramenopila, and Protista.²

It is worth noting that because of their metabolic potential – their production of a broad spectrum of enzymes and antibiotics, their biodegradative ability,

¹ LACAZ, C. da S., PORTO, E., MARTINS, J. E. C., HEINS-VACCARI, E. M., MELO, N. T. de. *Tratado de micologia médica*. 9.ed. São Paulo: Sarvier, 2002.

² ALEXOPOULOS, C. J., MIMS, C. W., BLACKWELL, M. *Introductory Mycology*. 4.ed. New York: John Wiley & Sons, 1996.

and their resistance to environmental stress – fungi can be characterized as both “heroes” and “villains,” as Milanez has shown.³

We can better understand Adolpho Lutz’s crucial contribution to science if we focus on some of his works involving these intriguing organisms, conducted during 1885-1920. Our sources are Fidalgo’s extensive review of the history of general mycology, Lacaz’s specific review of the history of medical mycology, and the valuable information found in Almeida.⁴

Brazilian mycology developed largely thanks to foreign researchers who explored native mycota (Fidalgo, 1968). At the close of the eighteenth century, Europe was growing ever more interested in the flora and fauna of non-European continents, especially the Americas. Numerous trips were financed and a remarkable quantity and variety of biological material was described, catalogued, herborized, and, primarily, preserved by these naturalists in collections held in their home countries. Fidalgo (1968) characterized Brazil’s first stage in the study of fungi as that of the “traveling botanists,” which included such renowned scientists as Link, Ehrenberg, von Martius, and others.

During the reign of D. Pedro II, because Brazil lacked schools of higher education and specialized professionals, foreign specialists from diverse fields were invited here to work, and their knowledge was gradually transferred to Brazilian scholars, collectors, and specialists. Examples include Glaziou and Juan Ignacio Puiggari, who not only collected many macroscopic fungi but also devoted themselves to studying their systematics.

Between 1883 and 1900, a number of European researchers turned their attention to Brazilian macroscopic fungi. Special mention should be made of Georg Winter, Ernst Heinrich Ule, and Pazschke, who prepared important collections of exsiccati and published many articles in journals like *Hedwigia* and *Annales Mycologici*. The collected material came from all over Brazil, encompassing the states of Rio de Janeiro, São Paulo, Minas Gerais, Amazonas, Goiás, Bahia, Piauí, Santa Catarina, Pernambuco, Pará, and Mato Grosso.

Father Johannes Rick (1896-1946) can be considered the father of Brazilian mycology. At Anchieta School in Porto Alegre, Rio Grande do Sul, he organized

³ MILANEZ, A. I. Fungos: heróis ou vilões? Paper read at the 14th Meeting of Biologists Paper read at the 14th MEETING OF BIOLOGISTS, Cuiabá, Mato Grosso. *Livro de resumos*, 2003. p.43.

⁴ FIDALGO, O. *Introdução à história da micologia brasileira*. São Paulo: Rickia, 1968. v.3, p.1-44. LACAZ, C. da S. História da micologia médica no Brasil. *Ciência e Cultura*, v.35, n.11, p.1599-1607, nov. 1983. ALMEIDA, F. P. *Mycologia Medica*. Estudo das mycoses humanas e de seus cogumelos. São Paulo: Melhoramentos, 1939.

a collection of 12,000 to 15,000 fungal exsiccati and began publishing their systematics in Portuguese (Fidalgo, 1968; Lacaz, 2002). This moment inaugurated concern with preservation of specimens within Brazil itself for the purposes of documenting biological diversity.

The era in which Adolpho Lutz lived and worked was marked by such historic events as the abolition of slavery (1888), the end of the Empire, and the beginning of Brazil's republican period (1889).

In the article “Über die Ätiologie der Pityriasis”, published in *Monatshefte für Praktische Dermatologie*, Lutz reviews a paper on different types of pityriasis presented by Primo Ferrari to the Academia Gioenia di Scienze Naturali in Catania. Lutz emphasizes that Ferrari believed the organisms described by Malassez, Bizzozero, and Rivolta – designated *Saccharomyces furfur* – were identical. They produced pityriasis in such areas of the human body as the scalp and other places where hair was present, while *Mikrosporon anomaeon* Vidal stood apart in that it caused dermatosis in glabrous areas.

Concerning taxonomy, *Saccharomyces furfur* and *Saccharomyces sphaericus* Bizzozero (1884) are currently considered synonymous with the lypolytic yeast *Malassezia furfur* (Robin) Baillon (1889).

That same year, Lutz (1886) described a new disease observed in Brazil, in the region of Limeira, São Paulo state. Its cause was tentatively attributed to the consumption of spoiled corn and to the poor nutrition of those afflicted, who displayed symptoms of acrodynia and pellagra. The article did not mention any possible etiological agents.

In “Sobre um epífito esquizomiceto da pele humana (*Mikrosporon anomaeon* Vidal)” [On a schizomycetes epiphyte of the human skin], Lutz (1886) offers observations obtained in conjunction with Dr. Unna on the isolation of a fungus he considered identical to Prof. Primo Ferrari's *Mikrosporon anomoeon*, mentioned in Lutz's earlier article. However, Lutz's negative results with self-inoculation call into question the microorganism's pathological significance.

The age of the cited literature makes comparison of yeast species difficult but the information in Lutz's description is compatible with information on the species *M. furfur*, as per Lacaz et al. (2002).

In 1887, Lutz published an article on *Lichen ruber, obtusus et planus*, with a detailed description of Brazil's first cases.

He later published articles on case records of rhinoscleroma (1890) and on the treatment of atheromas (1891), with no specifics regarding the microorganisms that might be associated with these health problems.

The articles mentioned earlier contain an impressive wealth of detail regarding disease symptoms, patient conditions, and treatment. The copious information on the composition and dosage of medication (then based on salves, solutions, and ointments), along with the information on patient reactions to these medications, were surely invaluable to the medical community.

Lacaz (1983, 2002) and Olympio da Fonseca⁵ consider Silva Araújo the pioneer in Brazilian studies of medical mycology. They also mention Pedro Severiano de Magalhães, professor at Rio de Janeiro’s School of Medicine. Research conducted by Adolpho Lutz around the same time brought significant advances in this vital area of mycology.

The article “Über eine bei Menschen und Ratten beobachtete Mykose” stands as one of the most interesting and historically valuable reports in the field of mycology. Written by Adolpho Lutz and Affonso Splendore (1907), the paper tells of a mycosis observed in humans and rats, designated sporotricosis. The authors explained their delay in publishing because of problems encountered in identifying the disease’s causal organism.

This richly detailed article provides the first description of *Sporotrichum* in Brazil, a fact of major mycological relevance. The observation of *Sporotrichum schenki*’s microscopic structures is still of immense taxonomic value. The authors’ minute description of microscopic characteristics contributed substantially to certification of the organism’s Brazilian lineage.

Lutz and Splendore’s work was quite advanced for the time. In 1905, when Lutz was in Europe reporting on his cases (with the aid of preparations and photographs), no one at Pasteur Institute and no renowned researchers from other institutions knew of the fungus or of the disease in detail.

Not only would this fungus have been hard to identify. Other pertinent problems would surely have been the scarcity of specialized literature and the absence of culture collections that could provide certified material for use in confirming and identifying the isolates.

It should be remembered that only some years before (1885-6), Pier Andrea Saccardo had begun publishing his great *Syllogue Fungorum: omnium hucusque cognitorum* (Padua, 1882-1931), which in fact included descriptions of Brazilian material collected in the cities of Santos and São Paulo by B. J. Balansa and in Rio Grande do Sul by Father Rick. These fungi were parasites on orchid leaves.

⁵ FONSECA FILHO, O. da. *A Escola de Mangueiras: contribuição para o estudo do desenvolvimento da medicina experimental no Brasil.* (Oswaldo Cruz – Monumenta Histórica). Insert to vol. 2. São Paulo: s.n., 1974.

One of Saccardo's most significant contributions was his proposal to classify fungi known only in the asexual state as imperfect fungi, now called anamorphic or mitosporic fungi. Known also as Deuteromycetes, Deuteromycota, and Deuteromycotina, depending upon the classification system, this group encompasses the largest quantity and diversity of fungi pathogenic to humans. In his articles, Adolpho Lutz based himself on the Saccardo system when attempting to identify the etiological agents of the mycosis under study.

Following Lutz and Splendore's groundbreaking work on sporotrichosis, a number of studies were presented in Rio de Janeiro, São Paulo, Minas Gerais, Rio Grande do Sul, Bahia, Pernambuco, and even by Oswaldo Cruz in Acre, in the city of Rio Branco (Almeida, 1939).

In an article originally published in Portuguese, "Uma micose pseudococcídica localizada na boca e observada no Brasil. Contribuição ao conhecimento das hifoblastomicoses americanas" [A pseudococcidic mycosis located in the mouth and observed in Brazil. Contribution to our knowledge of American hyphoblastomycosis], Lutz (1908) explored fungi classification in greater breadth, including the agent of blastomycosis. He used the term "hyphoblastomycosis" to designate mycosis caused by *Pseudococcidia*. He once again presented painstaking descriptions of the fungi, disease symptoms, and treatment results. He also stressed the importance of mode of infection, the pathogenic agent's means of entry, its virulence within the patient organism, and patient resistance, all critical to understanding the dynamics of systemic mycosis.

This study is a fine illustration of how imperative it is to understand not only the symptomatology but also the taxonomic characteristics of causal agents. As Almeida stated (1939): "It is not only because it is the first that this work by Lutz is of great scientific value, for, with his knowledge of cases of coccidioid granuloma and systemic blastomycosis, he did not hesitate to consider his cases different, in an intermediary position, as he wrote."

In 1912, Alfonso Splendore (1871-1953) was to isolate the same fungus, classifying it as *Zymonema brasiliensis*. It was later designated *Paracoccidioides brasiliensis*.

The pioneer work mentioned earlier inspired various researchers to study this mycosis. J. Castro Carvalho (1911), Pedro Dias da Silva (1912, 1914), Gomes Cruz (1913), Oswaldo Portugal (1913), Renato Kehl (1915), and Carini (1915) are important references found in Almeida (1939).

Lacaz (1983, 2002) deems Adolpho Lutz’s 1908 discovery of South American blastomycosis, currently known as paracoccidioidomycosis, a key contribution to medical mycology, not to mention the significance of his research on sporotrichosis, transmitted by rat bites.

Lacaz (2002) also underscores Alfonso Splendore’s contributions and the works of Ernesto de Souza Campos and Floriano Paulo de Almeida in differentiating *Paracoccidioides* and *Coccidioides immitis*.

In “Contribuições à História da Medicina no Brasil. Reminiscências Dermatológicas” [Contributions to the history of medicine in Brazil. Dermatological Reminiscences], Lutz (1921) offers a forty-year retrospective look at his observations of skin diseases, with superb case descriptions.

Lacaz (1983) cites references and information on studies being performed by other scientists from Manguinhos’ Mycology School in Rio de Janeiro back when Adolpho Lutz was conducting his research, including therein Ezequiel Caetano Dias (1914-1917), who was in Belo Horizonte investigating endemic adenomycosis, later recognized as a ganglion form of paracoccidioidomycosis.

In addition to the groups of mycologists in Brazil’s Southeastern states, Lacaz mentions Gonçalo Moniz and Prado Valladares, then studying ascosporic piedra; Cerqueira Pinto, who was finishing his dissertation on *Tinea palmaris*; Octavio Torres and his work on actinomycosis; and, lastly, Pirajá da Silva, author of a dissertation on fungi-caused mycetoma, all in Bahia.

These authors expressed certain doubts, especially regarding identification of causal agents. It should be kept in mind that even with today’s advances in morphological, genetic, and biochemical techniques, fungi systematics remains a complex area, and any uncertainties concerning microorganism identification at that time are wholly comprehensible.

Adolpho Lutz’s research was a milestone in the history of basic and medical mycology. His work served to guide important lines of research, and his comprehensive fungi descriptions helped broaden the gamut of species, thereby promoting their rapid recognition, whether or not associated with clinical cases.

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