

# ORCHIDACEAE TONDUZIANAE: TYPIIFICATION OF COSTA RICAN ORCHIDACEAE DESCRIBED FROM COLLECTIONS OF ADOLPHE TONDUZ

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**Abstract.** The Swiss botanist Adolphe Tonduz worked in Costa Rica from 1889 to 1920. For 20 years he carried out important activities as a plant collector and the curator of the largest Costa Rican herbarium beginning at the Instituto Físico-Geográfico Nacional, and later at the National Museum. A large number of new species of Orchidaceae are found among his collections, most of which were published by the German taxonomist Rudolf Schlechter between 1906 and 1923. The type specimens of most of these species were lost during a fire in the Berlin herbarium in 1943. The typification of the orchid species described on the basis of collections by Tonduz is a fundamental step for correct interpretation of Schlechter's and other authors' taxonomic concepts, and this paper follows the path of similar works aimed at typifying the orchid species originally collected in Costa Rica by M. A. Brenes, R. E. Endrés, and C. Wercklé. Previously lectotypified and neotypified taxa are recorded, including their bibliographical references. Here we formally designate lectotypes for *Brassavola scaposa*, *Bulbophyllum vinosum*, *Camaridium costaricense*, *C. dendrobioides*, *Chysis costaricensis*, *Cranichis nigrescens*, *Elleanthus tonduzii*, *Epidendrum abbreviatum*, *E. cardiophorum*, *E. henrici*, *E. octomerioides*, *E. pachycarpum*, *E. polychlamys*, *Goodyera ovatilabia*, *G. turrialbae*, *Habenaria endresiana*, *H. gymnadenioides*, *Maxillaria microphyton*, *M. pachyacron*, *Microstylis adolphii*, *M. microtoides*, *M. pandurata*, *M. tonduzii*, *Ornithocephalus tonduzii*, *Pittierella calcarata*, *Pleurothallis microtatantha*, *Scaphyglottis brachiata*, *Sobralia amparoeae*, *Spiranthes tonduzii*, *Stelis aemula*, *S. conmixta*, *S. effusa*, *S. longicuspis*, *S. sarcodantha*, *Stenoptera costaricensis*, and *Tetragamestus gracilis*. A new lectotypification is proposed for *Epidendrum adolphii*. Neotypes are designated for *Cynoches tonduzii* and *Epidendrum barbeyanum*, and epitypes are designated for *Pleurothallis microtatantha* and *Stelis aemula*. *Spiranthes tonduzii* is not typified, as we did not have access to any extant materials for study.

**Resumen.** El botánico suizo Adolphe Tonduz trabajó en Costa Rica desde 1889 hasta 1920. Durante 20 años llevó a cabo una importante actividad como recolector de plantas y curador de los mayores herbarios del país, antes en el Instituto Físico-Geográfico Nacional y después en el Museo Nacional. Entre sus recolectas se encuentran un gran número de especies de orquídeas descritas como nuevas para la ciencia, en su mayoría publicadas por el taxónomo alemán Rudolf Schlechter entre 1906 y 1923. Los especímenes tipo de la mayoría de estas especies se perdieron durante el incendio del herbario de Berlín en 1943. La tipificación de las especies de orquídeas descritas con base en recolectas de Tonduz representa un paso fundamental para una interpretación correcta de los conceptos taxonómicos de Schlechter y otros autores, y este artículo sigue la pauta de otras obras similares finalizadas a la tipificación de las especies de orquídeas originalmente recolectadas en Costa Rica por M. A. Brenes, R. E. Endrés y C. Wercklé. En esta contribución se registran los taxones previamente lectotipificados y neotipificados, y se referencian bibliográficas para las designaciones de lectotipos y neotipos. También, designamos formalmente aquí lectotipos para *Brassavola scaposa*, *Bulbophyllum vinosum*, *Camaridium costaricense*, *C. dendrobioides*, *Chysis costaricensis*, *Cranichis nigrescens*, *Elleanthus tonduzii*, *Epidendrum abbreviatum*, *E. cardiophorum*, *E. henrici*, *E. octomerioides*, *E. pachycarpum*, *E. polychlamys*, *Goodyera ovatilabia*, *G. turrialbae*, *Habenaria endresiana*, *H. gymnadenioides*, *Maxillaria microphyton*, *M. pachyacron*, *Microstylis adolphii*, *M. microtoides*, *M. pandurata*, *M. tonduzii*, *Ornithocephalus tonduzii*, *Pittierella calcarata*, *Pleurothallis microtatantha*, *Scaphyglottis brachiata*, *Sobralia amparoeae*, *Spiranthes tonduzii*, *Stelis aemula*, *S. conmixta*, *S. effusa*, *S. longicuspis*, *S. sarcodantha*, *Stenoptera costaricensis* y *Tetragamestus gracilis*. Se propone una nueva lectotipificación para *Epidendrum adolphii*. Se designan neotipos para *Cynoches tonduzii* y *Epidendrum barbeyanum*, así como epitipos para *Pleurothallis microtatantha* y *Stelis aemula*. No se tipificó *Spiranthes tonduzii* porque no tuvimos acceso a los materiales existentes para su estudio.

**Keywords:** Jean François Adolphe Tonduz, Costa Rica, Orchidaceae, typification

While several chapters of the long-term work devoted to the treatment of Orchidaceae for the *Flora Costaricensis* have been completed, or are now close to completion (Atwood and Mora-Retana, 1999; Pupulin, 2010a; Pupulin

and Bogarín, in prep; Pupulin et al., in prep), the need for a solid framework that allows a consistent application of names to the orchid species of our flora, as well as for a critical examination of previously synonymized names and

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their actual taxonomic status, has become more compelling. Large, systematic studies of a country's flora represent a great opportunity for the ultimate understanding of species identities, as they allow incorporation in species circumscriptions of those geographical variations and unique features that characterize local populations as definite taxa. To this extent, the evaluation of scientific names to be permanently associated with local orchid populations is crucial, as it is widely understood and accepted that loose specific circumscriptions and highly variable specific concepts, often used in the past, do not reflect the actual richness and evolutionary hyper-diversification of the family. It is from this perspective that the collation and cataloguing of the information on type designations for Costa Rican orchid names, as well as new designations when appropriate, has become a basic activity for those engaged in the project of producing a modern orchid flora of Costa Rica. This collation and cataloguing is aimed at promoting both firm identification of local species, and nomenclatural stability for the taxa to which the names must apply. This work is particularly important and critical in the case of the orchid species originally described by Rudolf (Friedrich Richard) Schlechter (1872–1925), as the main set of type specimens on which the German taxonomist based his concepts and the associated analytical drawings and notes were destroyed during the bombing of the Berlin herbarium in 1943 (Ames, 1943; Hiepko, 1987). It was fortunate that several of the Costa Rican orchid specimens sent to Schlechter for determination were conserved as duplicates in Costa Rican herbaria, and in some cases widely distributed to other herbaria both in Europe and the United States, making lectotypification possible and reducing the need for neotypification. Conscious of the

taxonomic importance of the analytical drawings prepared by Schlechter of his new species' holotypes that were left unpublished upon his premature death in 1925, the curator at the Botanical Museum in Berlin-Dahlem (and orchid specialist), Rudolf Mansfeld (1901–1960), published a large selection of Schlechter's floral analyses of orchid species between 1929 and 1934 (Mansfeld, 1929, 1930, 1931, 1932, 1934). In a few cases, these illustrations are invaluable in understanding Schlechter's taxonomic concepts, as they comprise the only extant evidence of the original materials. Of further help was the strong interest in the systematics of Central American orchids developed by Professor Oakes Ames (1874–1950) at the Botanical Museum of Harvard University during the first decades of the twentieth century (Sax, 1950; Plimpton and Ames Plimpton, 1979; Ossenbach, 2009). Ames had the opportunity to have the original drawings of Schlechter's holotypes traced under the supervision of the German botanist; he also acquired some isotypes before the incorporation of Schlechter's herbarium into the Botanical Museum of Berlin-Dahlem. Lists of Schlechter's remaining orchid types still conserved in Berlin (as well as those of Kränzlin and Mansfeld) were published by Butzin. However, no Costa Rican specimens survived the destruction of the herbarium during World War II (Butzin, 1978, 1980).

The present paper, dedicated to the typification of the orchid species based on Costa Rican material originally collected by Jean François Adolphe Tonduz (1862–1921; Fig. 1), is a further step towards the complete cataloguing of the orchid names based on Costa Rican material. This paper also follows previous contributions of this nature (Barringer, 1986; Pupulin, 2010b; Pupulin et al., 2011, 2012, 2013).

#### ADOLPHE TONDUZ IN COSTA RICA

During the last decades of nineteenth century, the still young Republic of Costa Rica, which had achieved its independence from Spain in 1821, began a decisive process of modernization and centralization of its education system as part of a general effort to pursue material progress, and to create an informed citizenry that could move the country towards a solid industrial and technological future (Eakin, 1999). To further this end, Costa Rican politicians turned to Europe in search of teachers and scientists to staff the newly designed secondary school system. As early as the 1860s, faculties of foreign teachers were created at the Colegio San Luis Gonzaga in Cartago and, a decade later, at the Instituto Nacional in San José. Eventually, in the late 1880s, the Minister of Education under the liberal government of President Bernardo Soto (1853–1931), the capable Mauro Fernández Acuña (1843–1905), created the Liceo de Costa Rica and the *Colegio Superior de Señoritas* (Fig. 2, A–B) in San José, the capital of the small republic. A group of European academics were hired to organize these institutions, the first two public high schools in Costa Rica. Among the teachers who responded to Fernández's call were several noted scientists, mostly of Swiss origin, who over the next few years not only laid the foundations of a

modern educational system, but also inspired a golden age of Costa Rican science. Between 1886 and 1889 Paul Biolley (1862–1908), who would work on botany and the zoology of invertebrates; the botanist Henri Pittier Dormond (1857–1950; Fig. 3); the chemist Gustav Michaud (1860–1924); the mathematician and astronomer Jean Rudin (1849–1932), Pittier's brother-in-law; the naturalist Adolphe Tonduz; the engineer Gustave Michaud (1860–1904), and Johann Sulliger (1830–?), another mathematician, came to Costa Rica attracted by the educational reforms enacted by Mauro Fernández and Bernardo Soto.

The first group of Swiss educators arrived in Costa Rica in 1886. In this group the name of Pablo Biolley stands out for his important contributions to the development of Costa Rican education. Among other works, Biolley published a Greek grammar and a compendium of natural history (Biolley, 1887, 1898). One year later, in 1887, the second group arrived, of which the great Henri Pittier was part. Mauro Fernández, the Secretary of Education, founded the National Museum by special decree in May of the same year. At Pittier's initiative, the National Meteorological Institute followed in April 1888. Finally, in June 1889, the Instituto Físico-Geográfico Nacional was founded, under



FIGURE 1. Adolphe Tonduz photographed in Costa Rica, *circa* 1895. Photo by Rudd Painter, courtesy of the Archives des Conservatoire et Jardines Botaniques de la Ville de Genève.

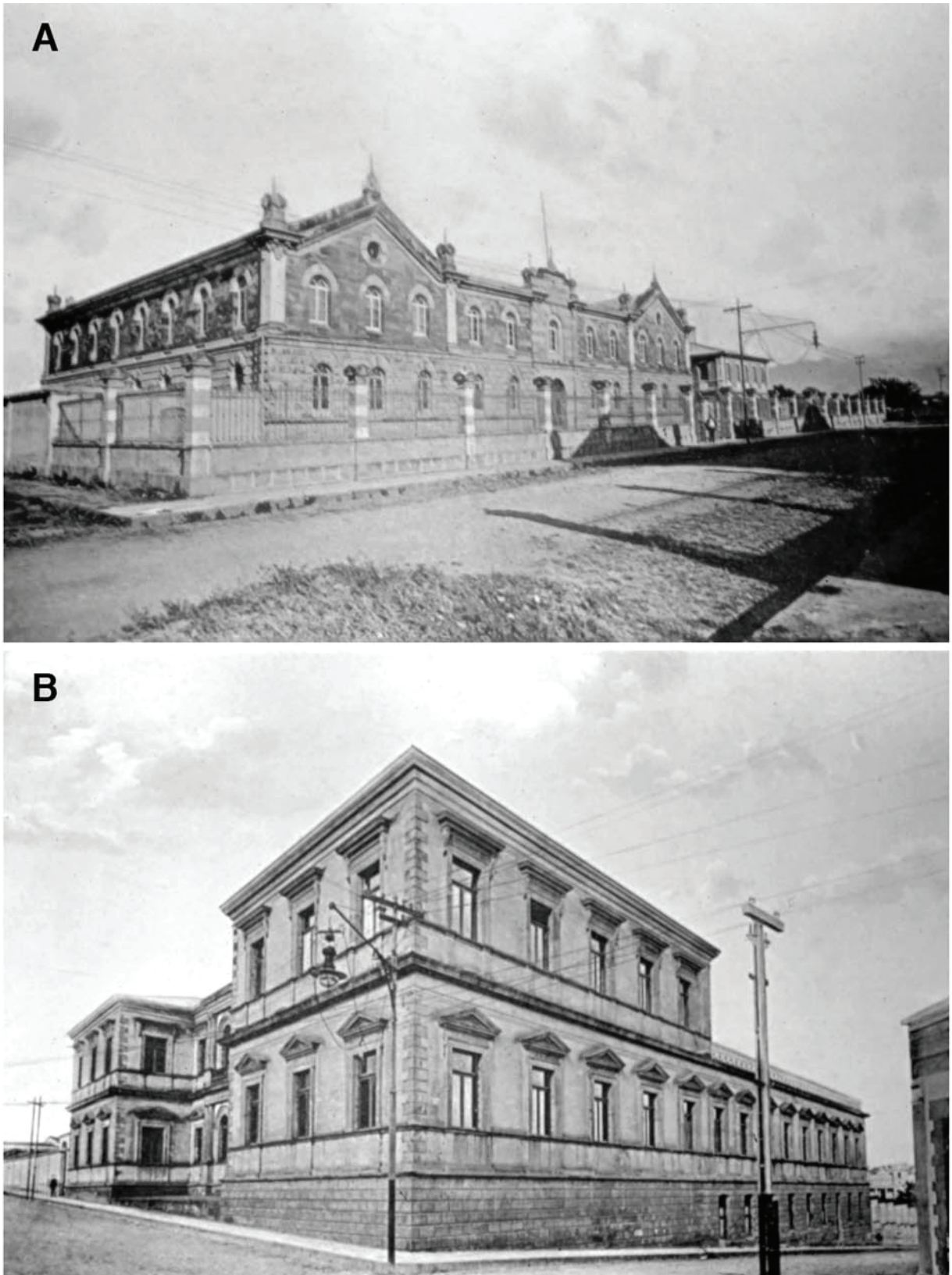


FIGURE 2. A, The installations of Liceo de Costa Rica in 1909; B, The building of Colegio Superior de Señoritas in 1909. Photos from the Album of Fernando Zamora, courtesy of the Centro de Investigaciones Históricas de América Central, Universidad de Costa Rica.

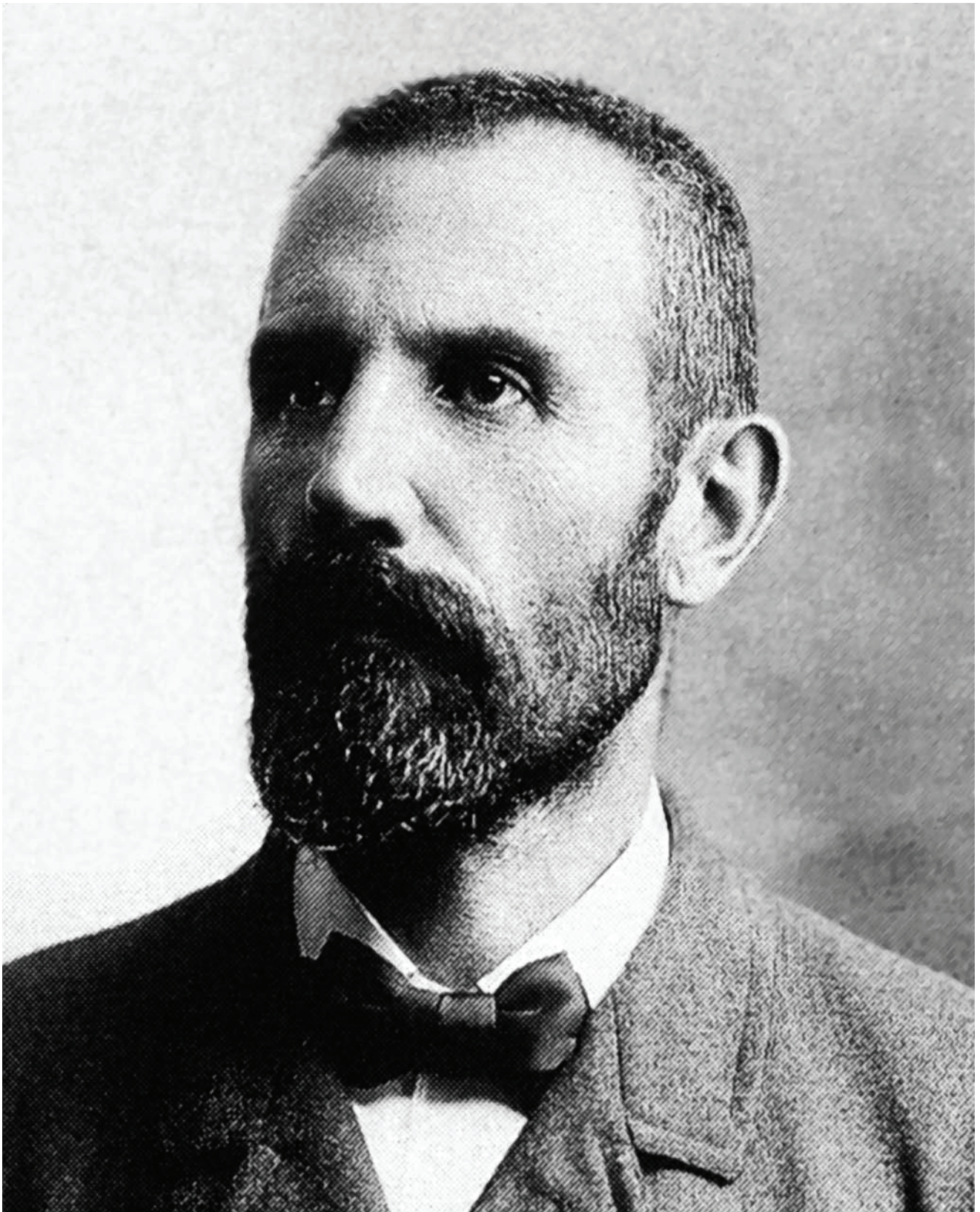


FIGURE 3. Henry Pittier photographed in Costa Rica, 1903. Courtesy of Rudolf Jenny.

the direction of Pittier, into which the National Museum, the Meteorological Institute and the Topographical Office were integrated.

Pittier divided the work of the Institute into three sections: Geography, Meteorology and Botany, reserving for himself the direction of the first and searching for competent persons to direct the other two.

Following the recommendation of one of his former professors, Jean-Balthazar Schnetzer (1823–1896), Pittier promoted Adolphe Tonduz to the staff of the Institute. At the time, Tonduz was working as a preparator at the herbarium in Lausanne, where he had studied but never graduated. Pittier obtained the necessary funding from the government and Tonduz was assigned to the botanical service (Häsler and Baumann, 2000) (Fig. 4). Tonduz, the youngest of the seven children of Paul Gustave Tonduz, was born on September 18, 1862 in Pully, Canton of Vaud. He arrived in Costa Rica on June 17, 1889 and soon became, as collector and preparator, an avid disciple and the right hand of Pittier, who wrote in the Institute's annual report in 1892: "...one arrives easily to the conclusion that the election of this active officer was by all means a happy one."

Tonduz would have liked, undoubtedly, to become more than just a notable collector, but his life turned into a vicious circle that he could never break because of two insurmountable obstacles. The first was his chronic alcoholism, which led him occasionally to abandon his work for days or even weeks. Pittier had to use all of his influence and friendship with the President of the Republic to prevent Tonduz being dismissed from his position. Although he was capable of working for hours on end, Tonduz often succumbed to the old temptation; as Otón Jiménez (1895–1988), his pupil and one of his best friends, recalls, "he would not go back to work, disregarded his personal hygiene and the tidiness of his clothing, did not eat, and his occupation was to roam along the streets, sometimes alone, sometimes in the company of doubtful friends, visiting the bars until his modest financial means and his credit were exhausted" (Jiménez, 1971).

In another sad anecdote, Otón Jiménez (1971: 63) remembers how don Guillermo Acosta (1878–1955) helped him during one of Adolphe Tonduz's "alcoholic journeys:" "Don Anastasio Alfaro, director of the National Museum, asked me to bring back Tonduz [who was in San Ramón], to avoid sanctioning him for abandoning his duties. A Roman enterprise! I had to ask the Political Chief of San Ramón, Guillermo Acosta Piepper, for help, and through his paternal intervention I managed to put him on a horse and in a ten-hour journey, step by step, we reached Grecia and from there, in another similar journey, Alajuela. It was then easy for me to bring him to the house of my neighbor, David Mora." Pittier had to ensure that the Swiss herbaria that bought Tonduz's botanical specimens had payments transferred to his own accounts so that he could administer them for his unfortunate protégé.

The second obstacle for Tonduz was, ironically, Pittier, his master and protector. Tonduz's personal circumstances,

and the despotic character of his mentor, created such a strongly dependent relationship that Tonduz could never escape the shadow of the great Pittier. Thus, the decline of Adolphe Tonduz began when Pittier abandoned the Instituto Físico-Geográfico in 1903 and left Costa Rica for good in 1905. For more than 14 years, Pittier's figure had overshadowed the unstable Tonduz. When Pittier left for Washington, Tonduz was left completely defenseless and would never be able to bring order to his life again without the support and guidance of his compatriot.

Tonduz briefly occupied the position of curator of the National Herbarium in 1904 and worked for the United Fruit Company until 1908. Following this, he managed to support himself thanks to the kindness of a few good friends like Charles Lankester (1879–1969) and Amparo López-Calleja de Zeledón (1863–1957) (Fig. 5), for whom he also collected and whose gardens he looked after for many years (Fig. 6, A–B). Thanks to the orchid specimens prepared by Tonduz for "Doña" Amparo, the great German orchidologist Rudolf Schlechter described an important number of new species for the flora of Costa Rica.

In his later years, Tonduz's life alternated between prosperity and misery, although he would continue collecting plants until shortly before his death. In vain he asked Pittier, already established in Venezuela, to take him to work with him. Pittier refused, knowing that Tonduz would be more of a hindrance than help.

Finally, in the first months of 1921, Adolphe Tonduz migrated to Guatemala, where he took the position of Director of the Section of Phytopathology in the Agricultural Service. A few months later he passed away, on December 20 of the same year, from alcoholic enterocolitis according to his death certificate.

In a letter to the American orchidologist Oakes Ames in 1922, in which he commented on his impressions about Tonduz and Carlos Wercklé, Charles Lankester wrote: "Poor Tonduz was also hopeless in this regard [alcoholism] and the possession of a small sum of money was immediately fatal. I kept him here 10 months during our previous stay in Cóncevas [Lankester's farm in Paraíso, near Cartago] and had him 'dry' the whole time, clothed and fed him... he became a new man, but a salaried position in Guatemala broke him completely."

After receiving news of his death, Pittier, at that time residing in Caracas, Venezuela, published in 1922 an obituary in the *Gazette of Lausanne*, Switzerland, in which he wrote: "...Thanks to his collections, studied by the most eminent specialists of two hemispheres, the vegetation of Costa Rica is today the best known of tropical America and we are greatly in debt to the scientific work of our friend Tonduz... He had the character of a countryman of the Gros de Vaud [a region of the Swiss Canton de Vaud]: sharpness of judgement, much of bonhomie and a heart of gold, somewhat bitter in the last years because of the vicissitudes of life. He has descended to his grave surrounded by the esteem and sorrow of all who knew him."

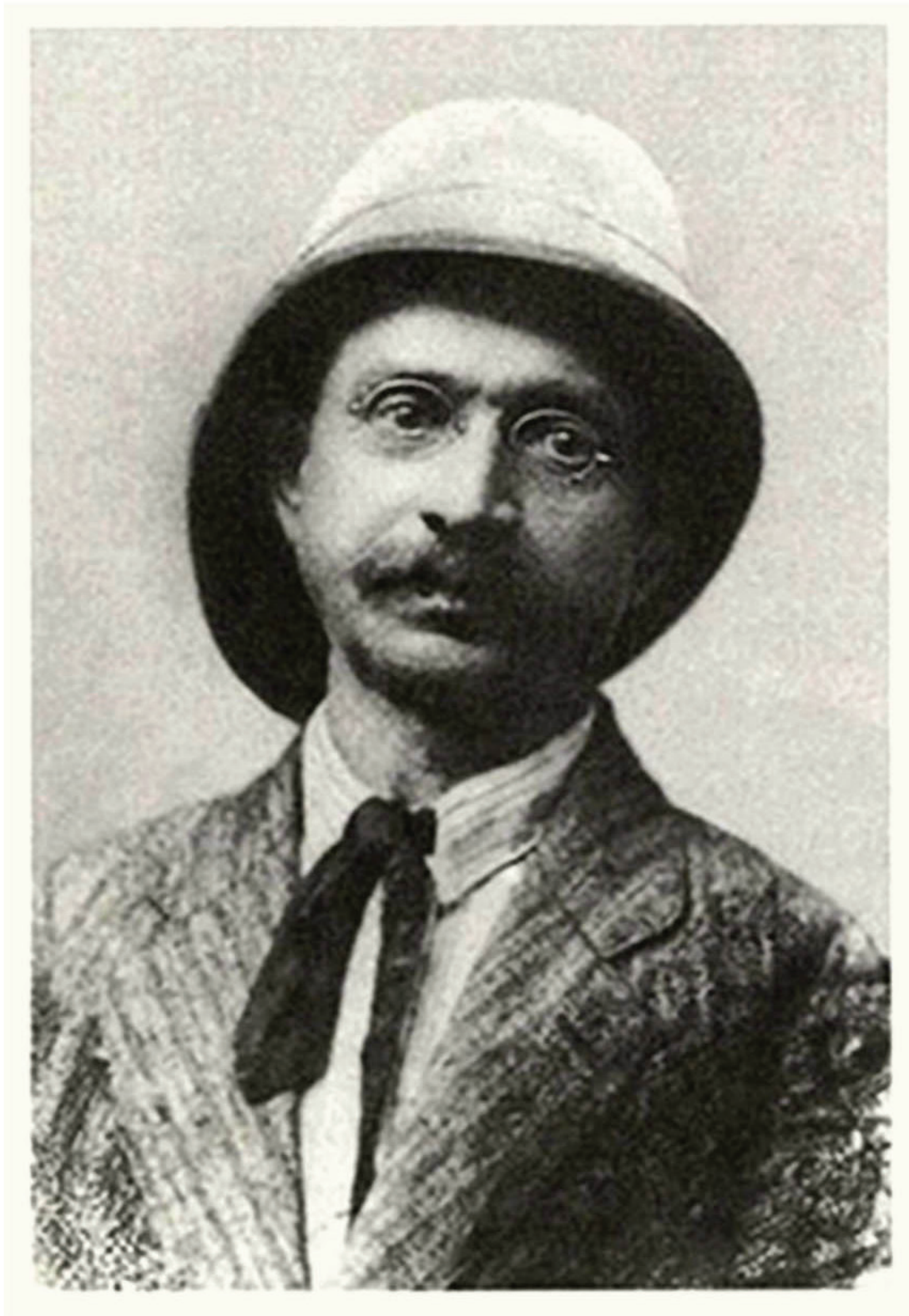


FIGURE 4. Adolphe Tonduz in a photograph from his passport, around 1905. Courtesy of Rudolf Jenny.



FIGURE 5. Amparo López-Calleja Basulto in a photograph of *circa* 1900.





FIGURE 6. The house of Costa Rican ornithologist José Cástulo Zeledón and his wife, Amparo López-Calleja de Zeledón, in San José (today La Sabana neighbor). **A**, View from the house front; **B**, Internal view of a *patio* from the gardens. Courtesy of Jaime García.

## TONDUZ' COSTA RICAN BOTANY

For a young naturalist interested in the study of botany, the Costa Rica of the last two decades of the nineteenth century was probably the best place in the world to be. Not only was the country one of the areas richest in biodiversity on the planet, but there was also an enlightened group of politicians seriously committed to understanding and using the diversity of the country's natural resources to make Costa Rica a modern and developed republic. A year before the arrival of Tonduz at the port of Puntarenas, the government had dispatched Anastasio Alfaro (1865–1951), a young lawyer (and self-taught naturalist and archaeologist), on a mission to the United States to learn about the best museographic techniques, and upon his return funded the creation of the Museo Nacional de Costa Rica. At the beginning of 1889, Pittier supervised the building of the four-story Instituto Meteorológico (Fig. 7), just across the road from the National Theatre, equipped with modern scientific instruments. At Pittier's behest, in the same month as Tonduz reached Costa Rica, the government consolidated the Museum and the Institute into a single scientific centre, the Instituto Físico-Geográfico Nacional (IFGN), of which Pittier assumed the directorship (Eakin, 1999).

Even though the merger of the botanical collections of the Museo Nacional into the newborn IFGN lasted only for a few months before the National Museum regained its full autonomy, it was enough time to create a botanical section within the Institute, and this was in need of a trained curator.

Hired as the head of IFGN's botanical section, Tonduz began his collecting activity almost immediately upon his arrival in his new home. His first documented Costa Rican collection bearing an unequivocal date is a specimen of *Piper* that he gathered in the neighborhood of San José on June 20, 1889, three days after his arrival. This plant eventually served as a syntype for the description of *Piper pseudopsis* C.DC. (Piperaceae, *Tonduz 1088*, G and US), published in 1898 in the *Anales del Instituto Físico-Geográfico y del Museo Nacional de Costa Rica*. His first Costa Rican orchid, a specimen of *Malaxis carnososa* (Kunth) C.Schweinf. (*Tonduz 1243*, US), was collected in August 1889. By December of that year, Tonduz had already prepared over 400 specimens, twenty of which would serve as the types for new plant species; the last collected, on December 28, was an isotype of *Eupatorium pittieri* Klatt (Asteraceae, *Tonduz 1698*, CR and US).



FIGURE 7. The building that hosted the original Instituto Físico-Geográfico Nacional, not far from the National Theater building (the roof of which is visible on the left) in San José.

Over the course of the ensuing decade, Tonduz became the inseparable companion of Pittier in most of his expeditions throughout the country (Fig. 8). He travelled with him, together with Anastasio Alfaro, to the border with Nicaragua, and in 1891, with Pablo Biolley, to the southern regions in the basin of the Río Grande de Térraba. Tonduz left a legacy of fascinating accounts of his explorations of Costa Rica in his publications *Expediciones botánicas efectuadas en la parte meridional de Costa Rica por los años 1891–1892* (Tonduz, 1893), *Exploraciones botánicas en Talamanca* (Tonduz, 1895a) and *Herborisations au Costa Rica* (Tonduz, 1895b, 1896, 1897a). In the foreword to his well-known *Ensayo sobre las plantas usuales de Costa Rica*, Pittier (1908) writes: “..during fourteen years he was my companion during my travels, sharing with me the hardships and dangers that generally are part of the explorations, as well as the delights offered to the naturalist by the marvelous sights of certain scenes hidden in ignored corners of the virgin forests, or in the discovery of new and never dreamed-about forms.” He was an indefatigable collector and a true artist who prepared his specimens with great care and skill (Jiménez, 1971). Tonduz travelled through all accessible regions of the country, from Guanacaste and the border with Nicaragua to the Atlantic and the southern regions. Cerro Tonduz (1930 m), to the North of San Vito de Coto Brus in southern Costa Rica, was named in his honor.

What made his botanical activity distinct from other collectors was the commitment that Tonduz, inspired by Pittier, assumed towards his adopted country. Unlike the foreign naturalists who had visited Costa Rica previously, working for foreign institutions and governments and pursuing their own agenda, Tonduz acted on the behalf of the Costa Rican government and for a Costa Rican institution (MacCook, 2002). During the field expeditions by Tonduz and other collectors of the IFGN, specimens were usually collected at least in duplicates (Eakin, 1999); one to be kept in the collections of the IFGN and the other for study and determination by appropriate specialists. These duplicates were mostly sent to Pittier’s main scientific correspondent, Théophile Durand (1895–1912) of the National Botanic Garden of Belgium in Brussels, who in turn distributed them to recognized specialists at the Boissier Herbarium in Geneva, the United States National Museum, the Botanical Museum Berlin-Dahlem, and the Muséum National d’Histoire Naturelle in Paris, among others. On the basis of the almost 10,000 specimens gathered in the botanical section of IFGN by 1895, and under Pittier’s supervision, these specialists also collaborated in subsequent years to produce the first attempt at a formal flora of Costa Rica, the *Primitiae florum costaricensis*, three volumes of which were published from 1891 to 1905 (Durand and Pittier, 1891, 1896; Pittier, 1898–1900, 1901, 1904, 1905) (Grayum et al., 2004). Unfortunately, the published portions of the *Primitiae* did not cover monocots (with the exception of Araceae and Iridaceae), and the orchid materials collected by Tonduz were not systematically studied.

The magnitude of Tonduz’s work is best expressed in the words of Pittier, who, in a 1915 letter to the botanist and historian John Barnard wrote: “*Adolphe Tonduz has been and is still, a laborious and painstaking collector, responsible for almost 60% of the 20,000 specimens of the Instituto Físico-Geográfico....*” And although Pittier complained that “...his collections contain again and again the same species and comparatively few new things,” the truth is that over 120 species new to science were discovered in Costa Rica by Tonduz and many of them are named after him (see Appendix).

One of Tonduz’s major successes was the rediscovery of *Oreomunnea pterocarpa*, a giant of Costa Rican forests, first discovered by the Dane, Anders Oersted in 1846, but not recorded again until Tonduz collected this species near Juan Viñas in 1914. Important also were his mycological studies. As a trained mycologist he published in 1897, for the types of the Instituto Físico Geográfico, a booklet on the sooty mold disease, or *fumagina*, which inhibits photosynthesis in coffee bushes (Tonduz, 1897b). He collaborated with the Argentinian Carlos Spegazzini in his work *Reliquiae Mycologicae tropicae et fungi costaricensis nonnulli* (1918) and prepared a work with Otón Jiménez entitled *Hongos de Costa Rica*, which he began in 1908 and left unfinished in 1914.

Under Pittier’s untiring and determined leadership of the Institute, field activities and preparation of botanical specimens for the herbarium of the IFGN and for distribution abroad were incessant during the last decade of XIX century. According to a survey of the collections made by Tonduz, deposited in ten of the world’s major herbaria (AMES, BM, BR, CR, F, G, MO, NY, P, US) between 1889 and 1899, he prepared some 10,000 specimens—the years of 1893 and 1898 being the most prolific (with 1075 and 1775 specimens respectively). In 1900 Tonduz’ activity was reduced to the herborization of a little more than 500 specimens. After 1901, the paucity of field activity clearly reflects the political and administrative troubles affecting the leadership of the Institute, which eventually drove Pittier to renounce his directorship in 1903, and the Institute to cease its activities in 1904.

Without the impulse of Pittier’s vision and deprived of the IFGN’s shelter, the first decades on the new century were the poorest for Tonduz in terms of botanical exploration and field collections. In the ten years, between 1902 and the end of 1911, Tonduz collected a little over a hundred specimens. From the last eight years he spent in Costa Rica, only 185 field collections are known to exist. This figure shows a somewhat anomalous and isolated peak of activity in 1913, when Tonduz was briefly hired by the French geographer, archaeologist, and explorer, Count Maurice de Périgny (1877–1935), to botanize during his exploratory trip to the northern Guatuso plains (Taladoire, 1995). Jiménez (1971) categorizes de Périgny’s expedition as “disastrous.” He reports that all the way up to the River San Juan and on the return via the River San Carlos it was impossible to make botanical collections. On the way back



FIGURE 8. Adolphe Tonduz (right) with Henry Pittier (center) and George K. Cherrie (left), taxidermist at the National Museum of Costa Rica. Courtesy of the late Luis Diego Gómez Pignataro.

to the capital, Tonduz decided to make a prolonged stay in the rich botanical area of San Ramón de Alajuela, where he collected specimens from the end of April until the middle of May 1913. He managed to collect 173 plant specimens before the Director of the Museum recalled him to his duties in San José. No collections at all are known by him between 1915 and 1917, or in 1919 (Fig. 9). The last plant he collected in Costa Rica, a specimen of cactus, *Epiphyllum thomsonianum* var. *costaricense* (F.A.C.Weber) Ralf Bauer (*Tonduz 18051*), is dated November 1920, and it was his only collection for that year. His last Costa Rican orchid, a plant of *Lycaste* cf. *brevispatha* (Klotzsch) Lindl. and Paxton, was a collection *sine numero* prepared in January 1914 from a cultivated specimen grown near his home in San Francisco de Guadalupe.

When he eventually left Costa Rica at the beginning of 1921, it was after more than thirty years spent botanizing in the country. A poor man deeply addicted to alcohol, Tonduz left behind an impressive botanical legacy of over 12,000 prepared specimens kept in the herbarium of the Museo Nacional and distributed to another 20 herbaria across the world.

After leaving Costa Rica, Tonduz collected plants again in Guatemala from the end of February until the end of September 1921, three months before his death. His documented collections from Guatemala comprise more than 1,100 specimens, which Tonduz numbered consecutively, beginning again with number 1 (*Cyathea costaricensis* [Mett. ex Kuhn] Domin, Cyatheaceae). Among the Guatemalan collections a few orchids are included

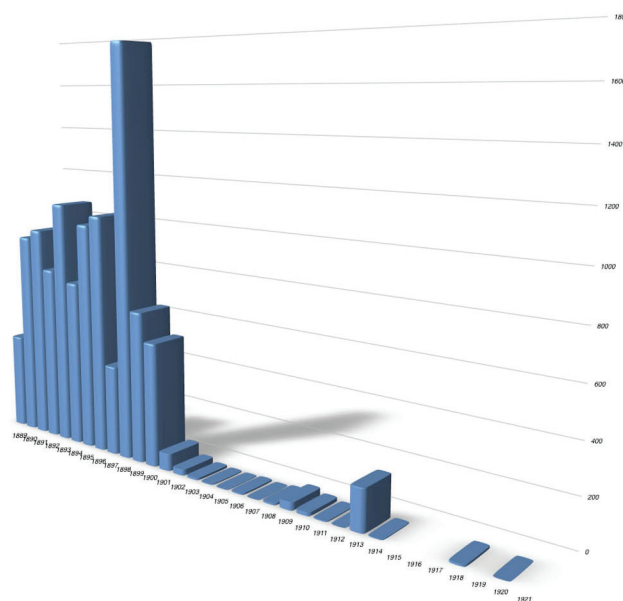


FIGURE 9. Number of Costa Rican collections made by Tonduz, 1889–1921.

[i.e., *Encyclia cordigera* (Kunth) Dressler, *Tonduz 180*; *Lycaste cruenta* (Lindl.) Lindl., *Tonduz 407*; *Cuitlauzina convallarioides* (Schltr.) Dressler and N.H. Williams, *Tonduz 523*; *Malaxis aurea* Ames, *Tonduz 894*], but none of them served as a type and they are of no interest for the purposes of this paper.

#### ORCHIDACEAE TONDUZIANAE

According to the evidence gathered from his extant collections, the orchid family was not one of Tonduz's favorite groups. Whilst roughly one in ten species of the Costa Rican flora is an orchid, and whilst epiphytic orchids represent a very common element in any of the Costa Rican landscapes, only 143 of the 5,100 known collections by Tonduz (or about 2.8%) represent species of Orchidaceae.

The Orchidaceae collected by Tonduz were scientifically described by Rudolf Schlechter, who published 56 species and 1 subspecies; Friedrich (Fritz) Wilhelm Ludwig Kränzlin (1837–1934), who authored 3 species; Oakes Ames (2 species); Alfred Barton Rendle (1865–1938), Alfred Cogniaux (1841–1916) and Florence Helen Woolward (1854–1936), who each authored a single species.

The descriptions by Schlechter, which greatly outnumber those by other authors, belong to four different groups of specimens defined by the periods and the origin of the materials. The first orchid collections by Tonduz to be described as new to science were published by Schlechter from 1906 to 1911, in his series of *Orchidaceae novae et criticae* (Schlechter, 1906, 1907, 1910, 1911). The specimens upon which the 30 new taxa were described were received at the Botanical Museum Berlin-Dahlem, as part of the materials that the IFGN sent for identification to

the National Botanic Garden of Belgium in Brussels, and distributed by them to the specialists of other recognized European botanical institutions. They correspond to plants collected by Tonduz in several Costa Rican localities during his golden age as a botanical collector, between 1890 and 1900, and most bear quite specific collecting data.

A second group of orchids, described from 1918 and 1921, belong to materials received at Berlin from the Herbarium of the Museo Nacional de Costa Rica, where Tonduz deposited his collections after the dissolution of the IFGN in 1904, and where he was briefly hired as director that same year. He worked intermittently as the curator of the herbarium under the directorship of his friend and protector Anastasio Alfaro. These specimens mostly bear no collecting date (Schlechter, 1918, 1921).

The third group of Tonduz's plants upon which Schlechter based his descriptions of new orchid species were received at Berlin shortly after World War I and published in Schlechter's *Additamenta ad Orchideologiam Costaricensem* (1923). Here Schlechter described another 13 new taxa, several of which lack any information about locality. It is noteworthy that Schlechter did not give Adolphe Tonduz the recognition of an eponymous chapter, as he did with Alberto Manuel Brenes (1870–1948) (*Orchidaceae Brenesianae*; Schlechter,

1923) and the brothers Kurt and Alfred Brade (1867–1955 and 1881–1971, respectively) (*Orchidaceae Bradeanae*; Schlechter, 1923). Instead, Tonduz's new orchids were mostly included within the chapter dedicated to the great "patroness" of Costa Rican orchidology, Amparo López-Calleja de Zeledón. In the introduction to his *Orchidaceae Amparoanae*, Schlechter (1923) remembers when, in 1921, Tonduz sent him a first collection of Costa Rican orchids, explaining that they were the result of an initiative by doña Amparo, who had not only had Tonduz pressing specimens from her cultivated plants, but had also sent Karl Wercklé (1860–1924) out to the field to collect new materials for his studies (Pupulin, 2010b). Indeed, the relationship between Schlechter and Amparo López-Calleja had begun in 1919, when, after receiving a letter from Rudolf Schlechter asking for Costa Rican orchid material, doña Amparo reacted with enthusiasm and arranged to hire Tonduz and Wercklé for this purpose. The results were three shipments of herbarium specimens that were received by Schlechter between 1921 and 1923. Among these specimens, Schlechter found three new genera and 62 new species (Schlechter, 1923). Lankester in 1923 wrote with envy: "No wonder Schlechter had a rich CR collection; he had the whole of the orchids from the National Herbarium!" In the few cases when collecting numbers are recorded (i.e., *Isochilus amparoanus* Schltr., Tonduz 32; *Cynoches amparoanum* Schltr., Tonduz 49; *Sobralia amparoae* Schltr., Tonduz 51; *Epidendrum falcatum* var. *zeledoniae* Schltr., Tonduz 132), these should not be confused with actual "field numbers" as Tonduz apparently used—again—his low numbers for the materials pickled in the garden of Amparo López-Calleja. The new orchids described from collections by Tonduz in 1913 were mostly gathered among the hills surrounding the small town of San Ramón, in the northwestern Cordillera de Tilarán. Tonduz lived in San Ramón for a short time after the disastrous expedition to the River San Juan under the patronage of Guillermo Acosta Piepper (1878–1955), mayor of the village, to whom Schlechter (1923) would dedicate his genus *Acostaea* in the Orchidaceae. Acosta was a good friend to Tonduz and helped to rescue him during the tremendous binge that put to an end his last herborization in Costa Rica in 1913 (Jiménez, 1971). Even though the specimens collected in this period and cited by Schlechter in his protologues have no numbers, some of the isotypes that we studied for the present work associate Tonduz's name with herbaria unique numbers; they are mentioned accordingly in this paper.

Finally, there is a fourth, small group of species that were described in Europe from living specimens, sent by Tonduz during his first years of activity in Costa Rica (Kränzlin, 1895a, 1895b; Rendle, 1900; Cogniaux, 1902; Woolward, 1906; Schlechter, 1919). According to Jenny (2013, 2015), Tonduz had been invited in 1889 by M. William Barbey (1842–1914) to assume the curatorship of the Herbarium Boissier in Geneva. Jenny suggests that it was the same Barbey who helped Tonduz in obtaining his position with the Costa Rican government. The Swiss engineer, botanist, philanthropist and founder of the *Bulletin de l'Herbier Boissier*, W. Barbey, married in 1869 Caroline Boissier (née Butini Boissier, 1847–1918), a Swiss botanist, and daughter

of the famous botanist Pierre Edmond Boissier (1810–1885). Throughout an entire life of botanical explorations, Pierre Boissier had assembled a large collection of exotic plants on his land in Valleyres, where more than 3,500 species of plants were grown, and at Rivage, on the shores of Lake Geneva (another 1,500 plus species, as well as an important private herbarium) (Fig. 10). Some of the plants requiring a controlled environment were grown by his daughter, Caroline, in the greenhouse built on one of her father's properties at la Grande Perrière in Chambésy, near Geneva, where all the plants of the collections at Rivage were transferred after Boissier's death in 1885.



FIGURE 10. The building hosting the Herbarium Boissier in Geneva, circa 1890. From Autran, 1896.

Among the tropical epiphytes, Orchidaceae were well represented in Boissier's collection, and by 1885 a total of 772 species and 62 varieties of living orchids, belonging to 122 genera, had been recorded (Autran and Durand, 1896). Whatever the nature of the relationship was between Tonduz and Barbey, he must certainly have had some connection with the Barbey-Boissier family, as several of his fascicles about the botanical exploration of Costa Rica were originally published in the bulletin of the Boissier herbarium (Tonduz, 1895b, 1896, 1897a). It is not known how many living plants Tonduz sent to the collections of Madame Barbey, but according to one of the employees at the Herbarium Boissier, Gustave Beauverd (1867–1942), the shipments from Costa Rica were frequent, particularly of ferns, aroids, orchids, cacti, Piperaceae and bromeliads (Beauverd, 1922). At least six of the specimens under the care of the chief-gardener at La Perrière, M. Paul Simmler, served as the basis for the description of new orchid species or to discuss previously published names (Kränzlin, 1895a, 1895b; Rendle, 1900; Cogniaux, 1902; Woolward, 1906; Schlechter, 1919). The Swiss botanist and entomologist Eugène John Benjamin Autran (1855–1912) was the curator of the Boissier Herbarium at that time. He was responsible for the identification of the Barbey-Boissier living collections and in charge of sending botanical samples of orchids for study by the best specialists of the time, Schlechter and Kränzlin in Berlin-Dahlem, and Cogniaux in Brussels. He was also the editor of the *Bulletin de l'Herbier Boissier*, where most of the new orchid species that Tonduz sent from Costa Rica to Chambésy were described.

## NUMERATION SYSTEM OF TONDUZ' SPECIMENS

The numbers associated with specimens collected by Tonduz have traditionally been regarded as his own collecting numbers and treated as such in both floristic and monographic essays (Cogniaux, 1891; Schlechter, 1906, 1907, 1910, 1911; Britton and Rose, 1928). Strictly speaking, however, they are not collector's field numbers as contemporary botanists use them, but, rather, somewhat similar to the "accession numbers" used in botanical collections. Under Tonduz's curatorship, the herbarium of the IFGN apparently adopted a system of consecutive numeration of the *exsiccata* that was independent of the collector. As Adolphe Tonduz was by far the most active collector at the Institute, followed at a great distance by its director, H. Pittier, most of the numbers assigned to the specimens at the herbarium indeed correspond to Tonduz's collections. They must not, however, be interpreted as a system of consecutive, personal numbers by Tonduz. Once specimens are arranged in ascending order, Tonduz's numeration presents in fact several "gaps." While in some cases this might be the artificial effect of unicate specimens that have been lost or destroyed (and of which we have no trace), in several cases the missing numbers appear instead in their due order in the series of the Institute collections, but associated with the name of a different collector. So, for example, IFGN number 2176 is a specimen of *Prosthechea livida* (Lindl.) W.E. Higgins, collected by Tonduz in San José on March 10, 1890, while number 2177, the type of *Ornithidium costaricense* Schltr., is a collection made by Pittier at Rancho Flores, on the slopes of Barva volcano, in February of the same year. Collections made by Tonduz at Rancho Flores that same month, are recorded at the IFGN under numbers 2147 and 2149. Number 6793, the holotype of *Inga aestuariorum* Pittier (Fabaceae), is based on a collection made by Pittier himself in April 1892, while number 6795 is a specimen of *Senna reticulata* (Willd.) H.S. Irwin & Barneby (Fabaceae), collected by Tonduz in March 1892, and number 6797, is a collection of the same month made by Pittier, (*Piper pseudodilatatum* C.DC., Piperaceae). Number 6593 (*legit* Tonduz) is *Commelina rufipes* Seub. (Commelinaceae), and number 6600 (*legit* Pittier) is the type of *Vanilla pittieri* Schltr., but both the specimens came from the banks of the River Ceibo, near Buenos Aires in southern Costa Rica, where they were both collected in January 1892.

Considering the system of accession numbers used by the employees of the IFGN to identify the specimens, there is no rational reason to believe that the numeration did not start at number one. As we noted previously, the first IFGN number assigned to a specimen of Tonduz's that can with certainty be assigned to a specific date corresponds to a collection of June 20 1889, when the naturalist had just arrived in Costa Rica. This collection, however, bears the number 1088 which would lead to the conclusion that the previous numbers had already been assigned to specimens by other collectors, probably Pittier himself or one of his colleagues. Among the numbers assigned to Tonduz, there are numbers lower than 1088, i.e. 61, an *Olyra latifolia* L.

(Poaceae) from La Guácima, or 182, a specimen of *Pharus* (Poaceae) from Limón on the Atlantic coast, but they have no collecting date. "Accession" numbers from 354 to 693 are collections made between July 1891 and January 1894. Numbers 900–903 correspond to late collections of April–May 1913.

When the National Museum inherited the botanical collections of the IFGN after its dissolution in 1904, the sheet numeration previously in use at the Institute was maintained. It remains unmodified until today, as the old numbers of the IFGN have been incorporated into the barcodes associated with each specimen. So, the plants collected by Tonduz for the herbarium of the Institute bear their original numbers. These were adopted by the herbarium of the National Museum to identify the collection sheets with a number corresponding to that handwritten on the labels of the duplicates sent out from the IFGN, and later from the Museum, to other research centres around the world. As can be seen, these numbers are not Tonduz's own numbers, but they nonetheless unequivocally identify the specimens collected by Tonduz for the Institute. When, in 1904, the Museum took over the management of the IFGN herbarium, the staff continued assigning "accession numbers," or "herbarium numbers," to new collections by Tonduz, but these numbers were diluted among those assigned to the collections of other botanists and collectors working for the Museum, including Carl Wercklé, Alberto M. Brenes, and the brothers Alfred and Alexander Curt Brade, among others.

Because of the numeration system originally adopted by the IFGN, the numbers assigned to the collection sheets at the herbarium were not always arranged chronologically, and it is legitimate to assume that later collections could sometimes receive lower numbers if processed at an earlier stage. This could explain several apparent contradictions in the numeration of Tonduz's materials. So, for example, numbers 1530–1541 belong to collections of September–November 1892, but number 1690 is from 1889, and most of the collections of 1892 have numbers from 6524 onward. Numbers from 7355 through 7463 represent collections of the year 1898, but they are included within the numbers assigned to Tonduz's collections for 1893, which range from 7226 to 8472.

Students of Tonduz's material should be forewarned, as apparently his lowest numbers might have been used for different sets of specimens, i.e. the plants he originally collected in Europe; some of the early collections from Costa Rica (IFGN numbers); the specimens prepared from plants cultivated in the garden of Amparo Calleja de Zeledón; those collected in Guatemala during his last herborizations.

Furthermore, the actual name of the collector (preceded by the word *legit*) was apparently only of accessory importance at the IFGN according to the method of numeration in use at there. For the purpose of specimen accession and filing into the collections, a given number represented, for the curators of the IFGN, simply the result of a "collection act," and was completely unrelated to who collected the plant

or the plants. Any new accession number was assigned to a new specimen or to a group of specimens supposedly belonging to the same taxon. When it/they were extracted from Pittier's field press, they were "assigned" to him (i.e., *legit* Pittier); when coming from the press of Tonduz, they became associated with Tonduz's name (i.e., *leg.* Tonduz).

The method had its shortcomings. When Pittier and Tonduz collected together—and this happened often—they frequently collected the same plants at the same locality and at the same moment. According to the system used by the curators at the IFGN, all the specimens belonging to the same taxon and the product of the same collecting act received the same accession number. This is the reason why we have collections, like those of *Epidendrum cardiophorum* from Tsaki (Apr. 1895, no. 9519), or *E. henrici* from the trees around San José (no. 2176), which have the same accession number but were recorded on some labels as collected (*lecti*) by Pittier, and on others as collections by Tonduz. The "collecting act" could sometimes include up to three different collectors, as is shown in the case of the *Oncidium turrialbae* type collection. The holotype, eventually destroyed in Berlin, was a plant collected by Paul Biotley "auf 'Crescentia'-Bäumen bei Turrialba" (on *Crescentia* trees at Turrialba), to which the Institute assigned the number 8423. This is the information that Schlechter (1910) quoted in the protologue, and the illustrator employed by Professor Ames in Berlin copied from the holotype on

his tracings. However, two other collectors took part to that collection. On the specimen that the IFGN sent to the specialists of the Smithsonian in Washington (US 57719), number 8423 is associated with a collection by A. Tonduz ("Sur les *Crescentia* à Turrialba"), and on the specimen that US received for identification from the Herbarium du Jardin Botanique de l'État in Brussels (US 57718), the same number 8423 is a collection by H. Pittier.

For the purposes of the IFGN this was obviously unimportant, but it became a nomenclatural conundrum when authors of new taxa interpreted the "accession number" of the IFGN as a true "collector number" and quoted it as such in their protologues. How should we treat the duplicates of Pittier 9519 (as it was quoted in the protologue and is written on the labels at CR and US) which are conserved at BR and G but with labels assigning the collections to Tonduz? How to manage the collection of *Epidendrum henrici* made by Tonduz and conserved at CR, which has the same accession number as the simultaneous collection by Pittier, which was eventually used as the holotype and erroneously treated as a Pittier number? In such cases, and in view of the historical and nomenclatural importance of these specimens, we opted for correcting the original error as it appeared in the protologues, quoting [between square brackets] the numbers with the meaning that was originally assigned to them at the IFGN and at CR, and treating all the specimens with the same accession numbers as duplicates.

#### TYPIFICATION OF COSTA RICAN ORCHIDACEAE DESCRIBED FROM COLLECTIONS BY A. TONDUZ

We discuss here those Tonduz' collections that served as the bases for the description of 63 new orchid taxa. They are alphabetically arranged and accordingly numbered in the catalogue from 1 to 63, beginning with *Brassavola scaposa* and ending with *Tetragamestus gracilis*. Some of the concerned species, however, have quite complicated taxonomical histories, and in several cases the same specimens were used to typify new names when the original epithets could not be maintained in the new proposed generic combinations (es. *Camaridium adolphi*, based on *Ornithidium tonduzii*; *Camaridium tonduzii*, based on *C. costaricense*; *Epidendrum boissierianum*, based on *E. biflorum*; *E. palmense*, based on *E. magnibraceatum*). In these cases, for the convenience of the reader we included the replacing names in the alphabetic arrangement of the catalogue, but they were not numbered in order to not inflate the number of taxa originally described on Tonduz' collections. *Epidendrum tonduzii*, a *nomen nudum*, is also listed alphabetically for reasons of completeness, but it is accordingly not numbered as no actual Tonduz' specimen was ever proposed to typify the name.

1. *Brassavola scaposa* Schltr., *Orchis* 13: 77. 1919. TYPE: COSTA RICA. [San José]: Auf Bäumen der Berge und Hügel bei San Jose, A. Tonduz s.n. (holotype: B, destroyed; photograph of the holotype, designated here as the lectotype: AMES 40559, barcode<sup>6</sup>00056718). Fig. 11.

The plant collected by Tonduz, on which the type specimen was prepared, was cultivated at Chambésy near Geneva, where Caroline Boissier maintained a large collection of orchids and other exotic plants in her greenhouses at "La Perrière." The type specimen was sent to the Berlin Museum for study by the orchid specialists working at the center, where it was likely destroyed in the fire of 1943. The type sheet was photographed in 1934 by R. Mansfeld upon request by professor O. Ames for the archives of the Harvard University Herbaria. This photograph is ostensibly the only evidence of the original collection, and the only candidate for the typification of *Brassavola scaposa*, and for this reason we chose it as the lectotype.

The original collecting locality cited by Schlechter in the protologue ("On trees of the mountains and hills in San José") is unlike, as with the exception of the rare and very distinctive *Brassavola acaulis* Lindl. & Paxton, Costa Rican species of *Brassavola* are restricted in distribution to the warm lowlands up to 500 meters of elevation. The unusual elevation of Tonduz' collection data also surprised Schlechter, who in the protologue noted that *B. scaposa* is "of the few species in the genus that occur at a certain altitude above sea level" (Schlechter, 1919). He compared the new species with *B. acaulis* for the short and slender stems and the terete leaves, and with *B. nodosa* Lindl. for the charactersitic of the terminal inflorescence (basal in *B. acaulis*), surpassing the leaves, and the flowers.

<sup>6</sup>Several numbers may appear stamped on sheets from AMES. When we cite a "barcode," we refer to a number given to each specimen and shown on a small label, ca. 1 × 5 cm, with the heading "Harvard University Herbaria."



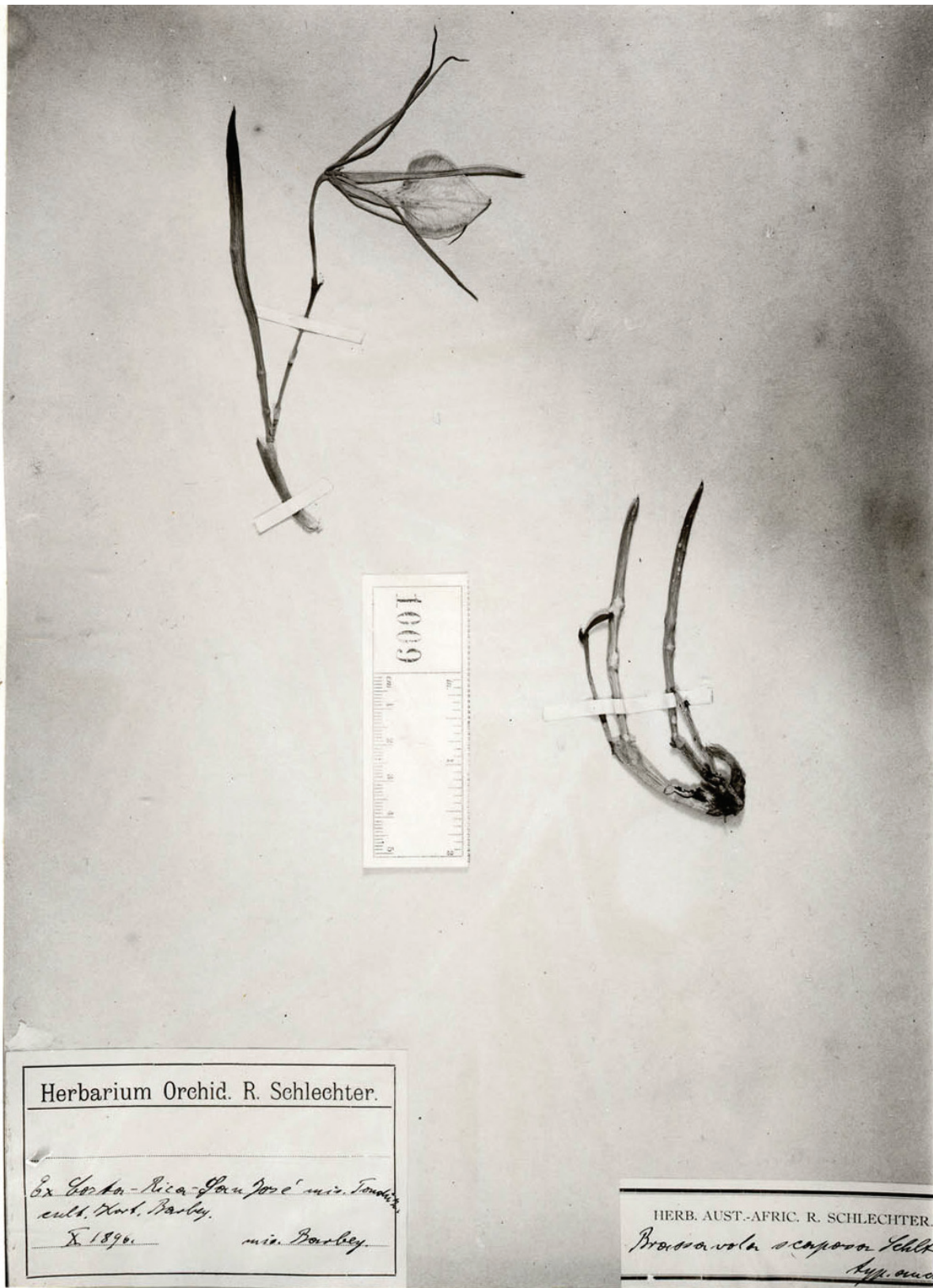


FIGURE 11. Lectotype of *Brassavola scaposa*. Courtesy of the Harvard University Herbaria, reproduced with permission of the President and Fellows of Harvard College.

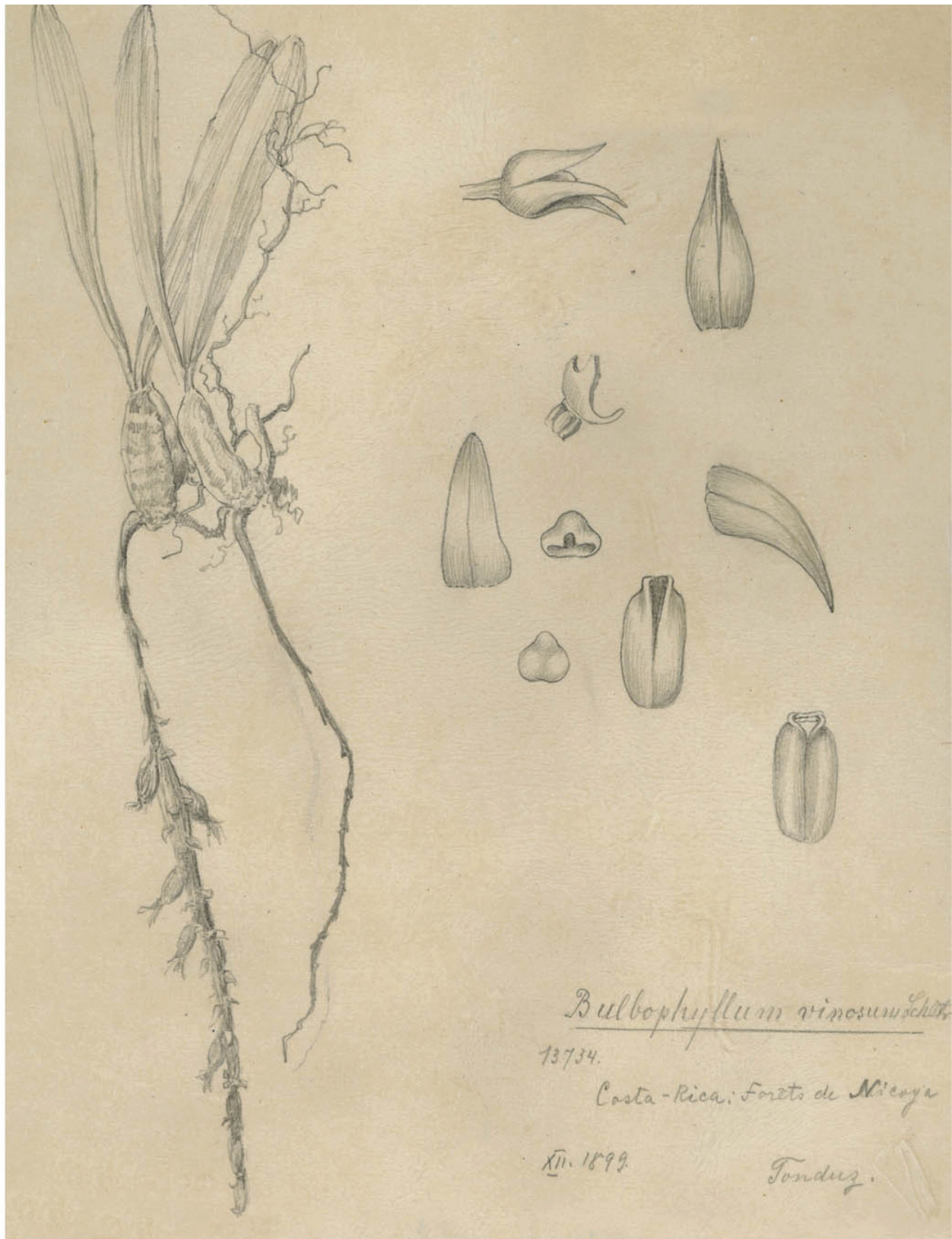


FIGURE 12. Lectotype of *Bulbophyllum vinosum*. Courtesy of the Harvard University Herbaria, reproduced with permission of the President and Fellows of Harvard College.

In Costa Rican populations of *B. nodosa sensu lato* from the Pacific lowlands, the inflorescence is usually distinctly shorter than the leaves, while it is subequal to longer than the leaves in populations from the Caribbean lowlands, which may perhaps be treated as a different taxon. Schlechter (1919) compared *B. scaposa* with a *Brassavola* specimen illustrated by Alphonse Gossens (1866–1944) in the *Dictionnaire iconographique des orchidées* (Cogniaux and Gossens, 1897) and treated as *B. grandiflora* Lindl., which was based on a plant collected at Puntarenas, on the Pacific coast of Costa Rica.

The photograph of the holotype at AMES (Fig. 11) clearly show a specimen that, albeit vegetatively small (leaves vary in length from 6.5 to 9.5 cm), has terete leaves and short inflorescences that barely reach half the length of the subtending leaf. The single flower is comparatively large with respect to the plant, but with sepals 5.5 cm long and a lip 4.5 cm long, it is smaller than flowers of other populations recorded from the Pacific coast (i.e., Pupulin, 1998: 970–971).

The name has been treated as a synonym of *Brassavola nodosa* (L.) Lindl. by Pupulin (2002) and Dressler (2003), and we agree with that interpretation.

2. *Bulbophyllum vinosum* Schltr., Beih. Bot. Centralbl., Abt. 36(2): 411–412. 1918. TYPE: COSTA RICA. [Guanacaste], Forêts de Nicoya, December 1899, A. Tonduz s.n. (*Herb. Inst. Fis.-Geogr. Nac. 13734*) (holotype: B, destroyed; lectotype, selected here: tracings of the original illustration of the holotype made under Schlechter's supervision, AMES 00027795/barcode 0027795; illustration of the flower from the holotype published by Mansfeld, 1931: no. 238). Fig. 12.

No actual type material of the species is known to be in existence. The tracings of Schlechter's drawings made in Berlin under the supervision of Schlechter, chosen here as the species' lectotype, clearly illustrate the habit and the floral details of this relatively common species. The name is a synonym of the widespread *Bulbophyllum pachyrachis* (A.Rich.) Griseb.

*Camaridium adolphi* Schltr., Repert. Spec. Nov. Regni Veg. Beih. 19: 58, 141. 1923. See replaced name: *Ornithidium tonduzii* Schltr.

3. *Camaridium costaricense* Schltr., Repert. Spec. Nov. Regni Veg. 3(42–43): 249. 1907. TYPE: COSTA RICA. Auf einem Baume eines Weideplatzes bei La Palma, ca, 1550 m, blühend im August 1898, A. Tonduz s.n. (*Herb. Instit. physico-geogr. nat. costaricensis 12429*) (holotype: B, destroyed; lectotype, selected here: US 815052/barcode 00393654; isolectotypes: CR 12429; K 000079320; US 577589/barcode 00094068; tracings of the original illustration of the holotype made under Schlechter's supervision: AMES 24146/barcode 00106440). Fig. 13A.

Synonym: *Camaridium tonduzii* Schltr., Repert. Spec. Nov. Regni Veg. 8(191–195): 571. 1910, *nom. illeg.*; *Maxillaria tonduzii* Ames & Correll, Bot. Mus. Leaflet 11(1): 17–18. 1943, replacing name.

The drawings made by John Atwood for his studies in Costa Rican *Maxillaria*, hydrating flowers from the isotypes at US, perfectly match the copy of Schlechter's sketches of the holotype, kept at AMES. While the isotype at CR has no flowers, and US 577789 only has a crushed flower in a pocket, both the isotypes at US (815052) and K are fertile. Even though the fertile plant at US probably represents just a couple of lateral branches of a main stem, we choose to lectotypify the species with this specimen because it was studied and illustrated by Atwood for his detailed monograph of *Maxillaria sensu lato* for the flora of Costa Rica (Atwood, 1999).

Overlooking his previous description of *C. costaricense* of 1907, Schlechter described the same species again three years later with the name *Camaridium tonduzii*, basing it on the same specimen collected by Tonduz under his number 12429 (Schlechter, 1910). Under the provisions of art. 52.1. of the International Code of Nomenclature for algae, fungi, and plants (Melbourne Code) (McNeill et al., 2012), the latter name is therefore illegitimate and to be rejected as nomenclaturally superfluous (the taxon to which it was applied including the type of a name that ought to have been adopted under the rules).

When *Maxillaria* Ruiz & Pav. is treated in its broadest sense, *sensu* Chase et al. (2015), *C. costaricense* must be treated as *M. tonduzii* Ames & Correll, a new name created to circumvent the previous use of the specific epithet *costaricense* in *Maxillaria*, already occupied by *M. costaricensis* Schltr. (1923). If a narrower circumscription of *Maxillaria* is adopted instead, as that proposed by Whitten et al. (2007) and Blanco et al. (2007), the correct name in *Camaridium* is *C. costaricense*.

4. *Camaridium dendrobioides* Schltr., Beih. Bot. Centralbl., Abt. 2 36(2): 415. 1918. TYPE: COSTA RICA. Forêts des collines de San Ramón, 1500–1600 m, May 1913, A. Tonduz s.n. (*herb. Mus. Nation. Costa Rica 17620*) (holotype: B, destroyed; lectotype, selected here, the isotype at US 94065/barcode 1080674; isolectotype: K 000463350; copy of Schlechter's original illustration of the type: AMES 24138/barcode 00106423; illustration of the flower from the holotype published by Mansfeld, 1931: no. 238). Fig. 13B. Synonyms: *Maxillaria dendrobioides* (Schltr.) L.O. Williams, Ann. Missouri Bot. Gard. 8(191–195): 571. 1910. *Adamanthus dendrobioides* (Schltr.) Szlach., Richardiana 7(1): 30. 2007[2006].

Both the isotypes at US and K bear the number 17619, assigned to the specimens by the staff of the Museo Nacional de Costa Rica, while in the protologue Schlechter cited number 17620. The latter number, however, belongs to a collection of *Epidendrum majale* (see above, under this species' entry). As the labels of both the sheets state that they were collected in the "Forêts des collines de San Ramón, 1500–1600 m, 12 May 1913," in accordance with the citation in the protologue, we prefer to treat the number citation in Schlechter (1923) as a *lapsus calami*, and consequently the specimens at US and K as isotypes. The isotype at US, selected here as the lectotype, is fertile



FIGURE 13. **A**, Lectotype of *Camaridium costaricense*; **B**, Lectotype of *Camaridium dendrobioides*; **C**, Lectotype of *Chysis costaricensis*; **D**, Lectotype of *Cranichis nigrescens*. A–C, courtesy of the United States National Herbarium, Smithsonian Institution; D, courtesy of the Harvard University Herbaria, reproduced with permission of the President and Fellows of Harvard College.

and in perfect condition. It was studied and annotated by C. Schweinfurth and by Atwood for his treatment of Costa Rican *Maxillaria* (1999), who hydrated and drew one of the flowers of the type specimen.

Even though in his treatment of *Maxillaria* for the *Flora Costaricensis*, Atwood (1999) cited the holotype of *C. dendrobioides* as conserved at CR, this probability is unlikely, as the original specimens studied by Schlechter were destroyed in Berlin. He was probably misled by Schlechter's citation of the herbarium of the Museo Nacional de Costa Rica in the species' protologue, but this is just the number that the Museum assigned to the collection of Tonduz to uniquely identify it before sending the specimen to Berlin. No specimens of *C. dendrobioides* are actually conserved at CR. Atwood (1999) treated *C. dendrobioides* (under *Maxillaria*) as a complex of species, probably including *C. simile* Schltr., *C. jimenezii* Schltr., and *Maxillaria valerioi* Ames & C. Schweinf.

The copy of Schlechter's original drawing conserved at AMES well illustrate the habit and flower of the species, with the distinctly three-lobed lip, provided with a ligulate midlobe, which characterize *C. dendrobioides* when considered as a distinct species from *C. simile* and *C. jimenezii*.

*Camaridium tonduzii* Schltr. Repert. Spec. Nov. Regni Veg. 8(191–195): 571. 1910. See discussion under *Camaridium costaricense*.

5. *Chysis costaricensis* Schltr., Repert. Sp. Nov. Regni Veg. Beih. 19: 297. 1923. TYPE: COSTA RICA. Forêts de San Ramón, alt. 1500–1600 m, Mai 1913, A. Tonduz s.n. (*Herb. Nat. Costaric. 17631*) (holotype: B, destroyed; isotype, selected here as the lectotype: US 1080685/barcode 00093897). Fig. 13C.

The specimen conserved at US is the only extant evidence of the original material described by Schlechter, and is therefore selected as the species' lectotype. It is, however, a sterile specimen, and the real identity of *C. costaricensis* could therefore remain quite a mystery. The chances to collect the species again in the forests of San Ramón are low, as plants of *Chysis* have been severely collected in the field due to their showy flowers, and several populations in the area of San Ramón are known to have become extinct through overcollection and the impact of coffee plantations.

In 1993, Dressler annotated the isotype specimen with the name *C. tricostata* Schltr., but this taxon of dubious Central American origin has thick pseudobulbs, while according to the protologue, the pseudobulbs of *C. costaricensis* are just about 1 cm in diameter, according with the plant mounted on the sheet at US. For this reason, both Pupulin (2002) and Dressler (2003) treated *C. costaricensis* as a synonym of the narrow, fusiform-stemmed *C. bruennowiana*, even though the latter is based on a Peruvian collection by J. Warczewicz. Dressler (2003) also suggested that the Pacific populations of the Costa Rican *C. bruennowiana*, characterized by pendulous, lax pseudobulbs, could be treated as a distinct taxon, in which case they would correspond to

*C. costaricensis*. It is clear that the identification of the Central American species of *Chysis* is in urgent need of a second taxonomic look (see Fowlie, 1971; Dressler, 2000).

6. *Cranichis nigrescens* Schltr., Repert. Spec. Nov. Regni Veg. 10(263–265): 482. 1912. TYPE: COSTA RICA. Ohne nähere Standortsangabe, A. Tonduz s.n. (holotype: B, destroyed; tracings of the original drawing of the holotype made under Schlechter's supervision, selected here as the lectotype: [AMES 24414/barcode 00098427] [Fig. 13D]; illustration of the flower from the holotype published by Mansfeld, 1931: no. 24).

We were unable to find any specimen belonging to the original collection by Tonduz, and we therefore selected the drawing at AMES as the species' lectotype. The drawing includes floral dissections and the plant habit, the latter of which was not published by Mansfeld (1931). The name is a synonym of *Cranichis diphylla* Sw., a species widespread in the Neotropics from Mexico to Peru and the Antilles, which can be recognized by the entire petals, the concave lip and the inconspicuous bracts of the stem.

7. *Cycnoches amparoanum* Schltr., Repert. Spec. Nov. Regni Veg. Beih. 19: 48. 1923. SYNTYPES: COSTA RICA. San José: Kultiviert im Garten der Mdme. Amparo de Zeledón von El Guayabe [Guayabo] bei Turrialba, im Jahre 1920, A. Tonduz 49 (B, destroyed); blühend in August–September 1921, C. Wercklé 86 (B, destroyed). Lectotype, selected by Pupulin (2010b); tracing of Schlechter's drawings of a syntype: AMES 31562/barcode 00098523.

No extant type material of the species is known to exist. The analytical drawings of the plant and the flower at AMES, based on one of the syntypes, bear no annotation of the collector's name and the plant cannot be assigned with certainty to Tonduz or Wercklé. However, Pupulin (2010b) noted that the description of the plant in the protologue was likely prepared from a cultivated specimen, and this suggests the Tonduz specimen, cultivated in one of the properties of Amparo López-Calleja near Turrialba. A photograph of the lectotype is provided in Pupulin 2010b (Fig. 14A).

8. *Cycnoches tonduzii* Schltr., Repert. Spec. Nov. Regni Veg. Beih. 19: 298. 1923. TYPE: COSTA RICA: San Ramón, im Mai 1913, A. Tonduz s.n. (holotype: B, destroyed; copy of the original drawing of the type, made by Mansfeld in 1934, selected here as the neotype: AMES 40544/barcode 00098544). Fig. 14B.

No actual original material studied by Schlechter remains, and the drawing made by Mansfeld, done nine years after Schlechter's death, is not eligible for lectotypification. However, as the drawing requested by professor Ames to understand the concept of *Cycnoches tonduzii* is the only remaining evidence related to the type material, we propose to neotypify the species with this drawing.

The taxonomy of the genus *Cycnoches* is in great need of clarification about species circumscriptions. Dressler (2003) considered *C. tonduzii* a synonym of *C. warszewiczii* Rchb.f., a species shared by Costa Rica and western



FIGURE 14. **A**, Lectotype of *Cynoches amparoum*; **B**, Neotype of *Cynoches tonduzii*; **C**, Lectotype of *Elleanthus tonduzii*; **D**, Lectotype of *Epidendrum abbreviatum*. A–B, D, courtesy of the Harvard University Herbaria, reproduced with permission of the President and Fellows of Harvard College; C, courtesy of the Museo Nacional de Costa Rica, Departamento de Historia Natural.

Panama, while D'Arcy (1987) treats it as a synonym of *C. ventricosum* Bateman, originally described from Guatemala. Female flowers of other *Cycnoches* species in Costa Rica have general flower morphology quite similar to that drawn by Schlechter in his sketch of the type of *C. tonduzii*, but staminate flowers also have a distinctly shorter column, while the gynostemium drawn by Schlechter belongs without doubts to a pistillate flower, which could only correspond in the concerned region to *C. warscewiczii*.

9. *Elleanthus tonduzii* Schltr., Repert. Spec. Nov. Regni Veg. 8(191–195): 567. 1910. TYPE: COSTA RICA. auf Bäumen bei La Palma, blühend im Jul 1895, A. Tonduz s.n. (*Herb. Instit. physic-geogr. nat. costaricensis* 9689) (holotype: B, destroyed; isotypes: AMES 20858/barcode 00090609; US 815039, BR 0000009895270; CR 9689, selected here as the lectotype [Fig. 14C]; tracing of the original drawing of the holotype made under Schlechter's supervision: AMES 24337/barcode 00099070; flower analysis published by Mansfeld, 1930: no. 18).

The isotype specimen at the herbarium of the Museo Nacional de Costa Rica is complete and fertile, and it is in excellent condition, so we selected it as the species' lectotype. The isotype at AMES, even if smaller than the other isotypes, only including the apical portion of a stem, is particularly useful as one of its flowers was drawn and dissected by Schweinfurth for his studies on Central American orchids. The sheet also includes an ink drawing of the original plant mounted on Schlechter's holotype. On another sheet at AMES, the tracings of Schlechter's original drawing include the dissection of the flower, later published by Mansfeld in his compilation of Schlechter's flower analyses of new orchids (Mansfeld, 1930).

*Elleanthus tonduzii* is endemic to Costa Rica and western Panama, and living plants may exceed three meters in length in their natural habitat. The bright red to orange-red flowers on strongly ramified stems provided with narrow leaves make this species unmistakable.

10. *Encyclia tonduziana* Schltr., Repert. Spec. Nov. Regni Veg. Beih. 19: 132. 1923. SYNTYPES: COSTA RICA. [Alajuela]. Cismo bei San Jeronimo de Grecia, um 2100 m, blühend im April 1910, A. Brade & C. Brade 1274 (syntype: B, destroyed; neotype, chosen by Pupulin and Bogarín (2012): tracing of Schlechter's sketch of the holotype, AMES 31577/barcode 00099108. COSTA RICA. [Alajuela]. Forêts de San Ramón, 1500–1600 m, May 1913, A. Tonduz s.n. [17649 Herb. Costaric.] (syntype: B, destroyed).

Schlechter (1923) dedicated this species to Adolphe Tonduz as he knew that the researcher of the Costa Rican flora had recently passed away. It is a synonym of *Encyclia mooreana* (Rolfe) Schltr., originally described from several plants of cultivated origin, and Schlechter (1923) also described it another time with the name *E. brenesii* on the basis of another Costa Rican collection by Alberto Brenes.

The reflexed, olive-green sepals and petals stained with purple, and the violet-purple lip, with the suborbicular midlobe folding downward laterally and the lateral lobes

that are basally narrow and wider at apex, easily distinguish this species. A photograph of the neotype is provided by Pupulin and Bogarín (2012: Fig. 4, 25).

11. *Epidendrum abbreviatum* Schltr., Repert. Spec. Nov. Regni Veg. 3(33): 107. 1906. TYPE: COSTA RICA. Ohne Nummer und nähere Standortsangabe, 10 May 1913, H. Pittier u A. Tonduz 17618 [correct: A Tonduz s.n. (*Mus. Nac. Costa Rica* 17618)] (holotype: B, destroyed; photo of the holotype, selected here as the lectotype: AMES 39204/barcode 00070025 [Fig. 14D]; illustrations of type: AMES 26028/barcode 70023, AMES-70024; flower analysis published by Mansfeld, 1930: no. 182).

Even though Schlechter (1923) cited the type of *E. abbreviatum* as a collection by Pittier and Tonduz, the number recorded in the protologues, 17618, unequivocally belongs to a collection by Tonduz alone. The photographs of the original sheets of the Botanical Museum of Berlin-Dahlem, conserved at AMES and chosen here as the species' lectotype, clearly show that Schlechter received two specimens of this species from Costa Rica. The first, sent from the Instituto Físico-Geográfico Nacional in the last years of the nineteenth century, is a collection without locality and *sine numero* by Pittier and Tonduz, while the second is a plant collected by Tonduz at San Ramón in 1913, which was sent to the German specialist from the Museo Nacional de Costa Rica under the Museum's number 17618. As the latter is the only number that Schlechter associated with the type in the protologue, it must be regarded as the holotype.

The name is the basionym of *Prosthechea abbreviata* (Schltr.) W.E.Higgins, a species easily recognized by the widely spaced, mostly diphyllous pseudobulbs, the inflorescence produced from a spathe and the almost flat lip.

12. *Epidendrum acrochordonium* Schltr., Beih. Bot. Centralbl., Abt. 2 36(2): 400–401. 1918. TYPE: COSTA RICA. A. Tonduz s.n. [holotype: B, destroyed; lectotype designated by E. Santiago and E. Hágsater (2006): tracing of Schlechter's drawings of the holotype, AMES 26926/barcode 00070028; illustration of the flower from the holotype published by Mansfeld, 1931: no. 184].

Synonym: *Epidendrum pumilum* Rolfe, Bull. Misc. Inform. Kew 1863(79): 171. 1893.

In the absence of any actual specimens or other type material of this species, Santiago and Hágsater (2006) selected the copy of the type drawing at AMES, made under the supervision of Schlechter himself, as the lectotype (Fig. 15).

The name is a synonym of *E. pumilum*, based on a plant imported from Costa Rica and grown by Messrs. F. Sander & Co., of St. Albans. The small plants with verrucose stems and ovate, pustulose leaves, and the pale yellow flowers with a white lip, marked with a single, dark purple fleck, are unmistakable characters of this species.

13. *Epidendrum adolphii* Schltr., Repert. Spec. Nov. Regni Veg. 3(33–34): 108. 1906. TYPE: COSTA RICA. In den

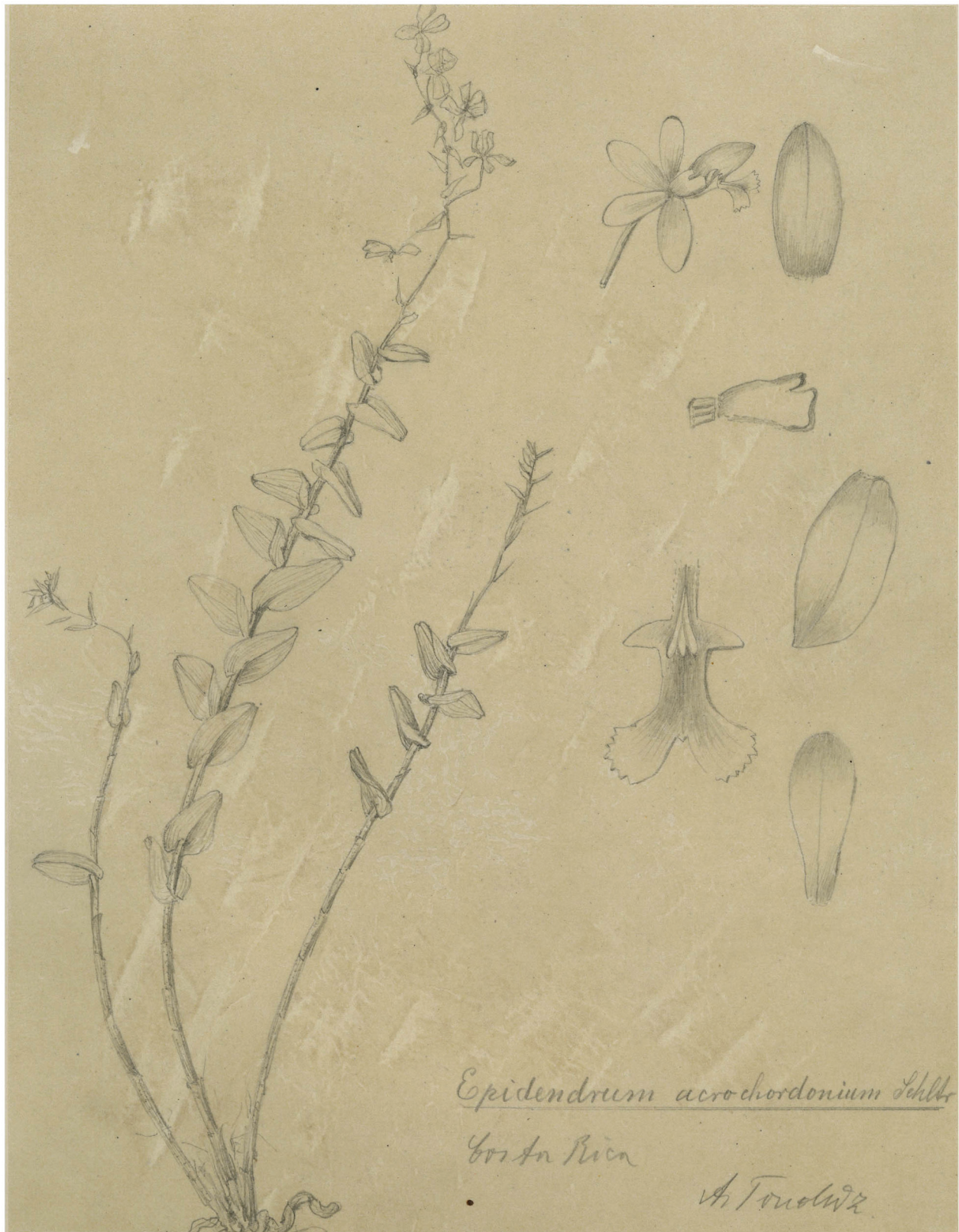


FIGURE 15. Lectotype of *Epidendrum acrochordonium*, selected by Santiago & Hågsater (2006). Courtesy of the Harvard University Herbaria, reproduced with permission of the President and Fellows of Harvard College.



Wäldern von Tablazo, ca. 1800 m, blühend im Apr. 1893, *A. Tonduz s.n.* (*Herb. Instit. Costaric. no. 7950*) (holotype: B, destroyed; isotype, selected here as the lectotype: BR 657366/barcode 00006573669 [Fig. 16A]; copy of Schlechter's drawings of the holotype, AMES barcode 00070042).

Homotypic synonym: *Oerstedella adolphi* (Schltr.) Brieger, *Die Orchideen* 9(33–36): 516. 1977.

Heterotypic synonyms: *Epidendrum endresii* Rchb.f., *Gard. Chron.*, n.s., 19: 432. 1883.

*Epidendrum tonduzii* C.H.Lank., *nom. nud.*

The tracing of Schlechter's drawing of the holotype, which were previously chosen as the species' lectotype (Santiago and Hágsater, 2007), clearly illustrate the verrucose sheaths of the stem, the 4-lobed lip, the dorsally glabrous sepals, and the clinandrium longer than the free portion of the column, which are characteristic of the species. The existence of an isotype in BR, which is complete, fertile and in good condition, makes that lectotypification superfluous and supersedes it.

The name is synonym of *Epidendrum endresii*, originally described on the basis of a number of plants collected in Costa Rica by A. R. Endrés and F. C. Lehmann, and material cultivated by F. Sander.

As previously discussed by Santiago and Hágsater (2007), the name *Epidendrum tonduzii* is nothing more than a simple *lapsus calami* by Charles H. Lankester (1879–1969) who, discussing some of his recent collections of *Epidendrum*, wrote the specific epithet of one of the species as “tonduzii” (surname) instead of “adolphii” (Tonduz' given name, as used by Schlechter), giving in some way the impression of proposing a new species (Lankester, 1924). As Lankester never prepared a type for a plant that he was not willing to describe, and being aware of the identity of this concept with that of *E. adolphi*, Santiago and Hágsater (2007: sub pl. 931) proposed to neotypify *E. tonduzii* with the tracings of Schlechter's original drawing of *E. adolphi*, which they also selected as the lectotype of the latter name (Santiago and Hágsater, 2007: sub pl. 931). This option, however, is expressly contrary to the provisions of art. 61.5 of the Code of Nomenclature (McNeill et al., 2012), which states, “Confusingly similar names based on the same type are treated as orthographical variants.” In Lankester's paper (1924), *Epidendrum tonduzii* was published without any description or diagnosis, and the name is not referred to any former one, and we therefore consider that it should be simply treated as a *nomen nudum*.

14. *Epidendrum barbeyanum* Kraenzl., *Bull. Herb. Boissier* 3(11): 607. 1895. TYPE: COSTA RICA. “Das exemplar, nach welchem ich diese neue Art aufstelle, erhielt ich durch Hrn. Eug. Autran aus der Sammlung der Mad. William Barley-Boissier zu Chambésy bei Genf; es stammt aus Costa Rica. Es wurde durch Herrn Ad. Tonduz, Leiter des Botanischen Instituts in San José gesandt,” *A. Tonduz s.n.* (holotype: B, destroyed; neotype, designated here: a specimen ostensibly prepared from the same plant used for the holotype: COSTA RICA. Bords du Virilla pres de San José. Serres de la Perrière, 10 October 1897, *A. Tonduz s.n.*

[G 00428338] [Fig. 16B]; F negative coll. 25440 [in part]; copies of the photograph: AMES 34975/barcode 00070103; SEL).

Homotypic synonym: *Neolehmannia barbeyana* (Kraenzl.) Garay & Dunst., *Venez. Orchid. Ill.* 6: 38. 1976.

Heterotypic synonym: *Epidendrum amparoanum* Schltr., *Repert. Spec. Nov. Regni Veg. Beih.* 19: 34. 1923. TYPE: COSTA RICA. [San José: Moravia,] San Jerónimo, c. 1350 [m], blühend im Mai 1921, C. Wercklé 10 (holotype: B, destroyed).

*Epidendrum barbeyanum* was described on the basis of a plant originally collected in Costa Rica by A. Tonduz and sent as a living specimen to the Barbey-Boissier conservatory in Chambésy, near Geneva. A portion of the plant was prepared for study by Eugène Autran (1855–1912), a known botanist and entomologist who was the curator and an active collector of the Boissier Herbarium, where he also edited the *Bulletin l'Herbier Boissier*. Among his activities, he was in charge of the taxonomic identification of the large collections of living plants maintained by Pierre Edmond Boissier, his daughter Carolina and his son-in-law William Barbey. The collection had, by 1885, reached the respectable figure of over 4200 species, 772 of which were orchids (Autran and Durand, 1896). After receiving the plant from Autran in Gross-Lichterfelde, near Berlin, Kränzlin described it in September of 1895, mentioning its origin as “Costa Rica,” without specifying a locality and a date referable to the collection (Kränzlin, 1895a). A specimen of the same species, today conserved at the herbarium of National Museum in Costa Rica under the original number 1339 of the IFGN, was collected by Tonduz along the “*haie d'un pâturage près San Juan*” (hedge of a pasture near San Juan [correctly San José]), on September 28, 1889. Considering the times necessary to ship the plant to Switzerland, having it cultivated and flowered, and a dried specimen sent out to a specialist for determination, it is not improbable that the material eventually studied by Kränzlin was part of the same collection as the specimen kept at CR.

Reviewing the taxonomy of *E. barbeyanum*, Sánchez Saldaña and Hágsater (2006) refer to the holotype as a specimen conserved at G, also citing photographs of the type filed in the collections of the Harvard University Herbaria (AMES) and the Marie Selby Botanical Gardens (SEL). The photograph of the specimen was documented by J. Francis Macbride (1892–1976) in the context of his project, funded by the Rockefeller Foundation and based at the Field Museum of Natural History, aimed at photographing European herbarium specimens of nomenclatural types (*F negative collection 25440*). Interestingly, Macbride's negative of *E. barbeyanum* is filed at F under the “Types of the Delessert Herbarium,” where it was probably never included, as the materials of this herbarium were presented to the City of Geneva by Delessert's nieces, the baronesses of Hottinger and Bartholdi, as early as 1869 (Staples and Jacquemoud, 2005), while the herbarium Barbey-Boissier was donated to the Botanical Institute of the University of Geneva only in 1918, and its specimens were gradually incorporated in the Botanical Conservatory of the City from 1943 until 1975 (Jacquemoud, 2011).

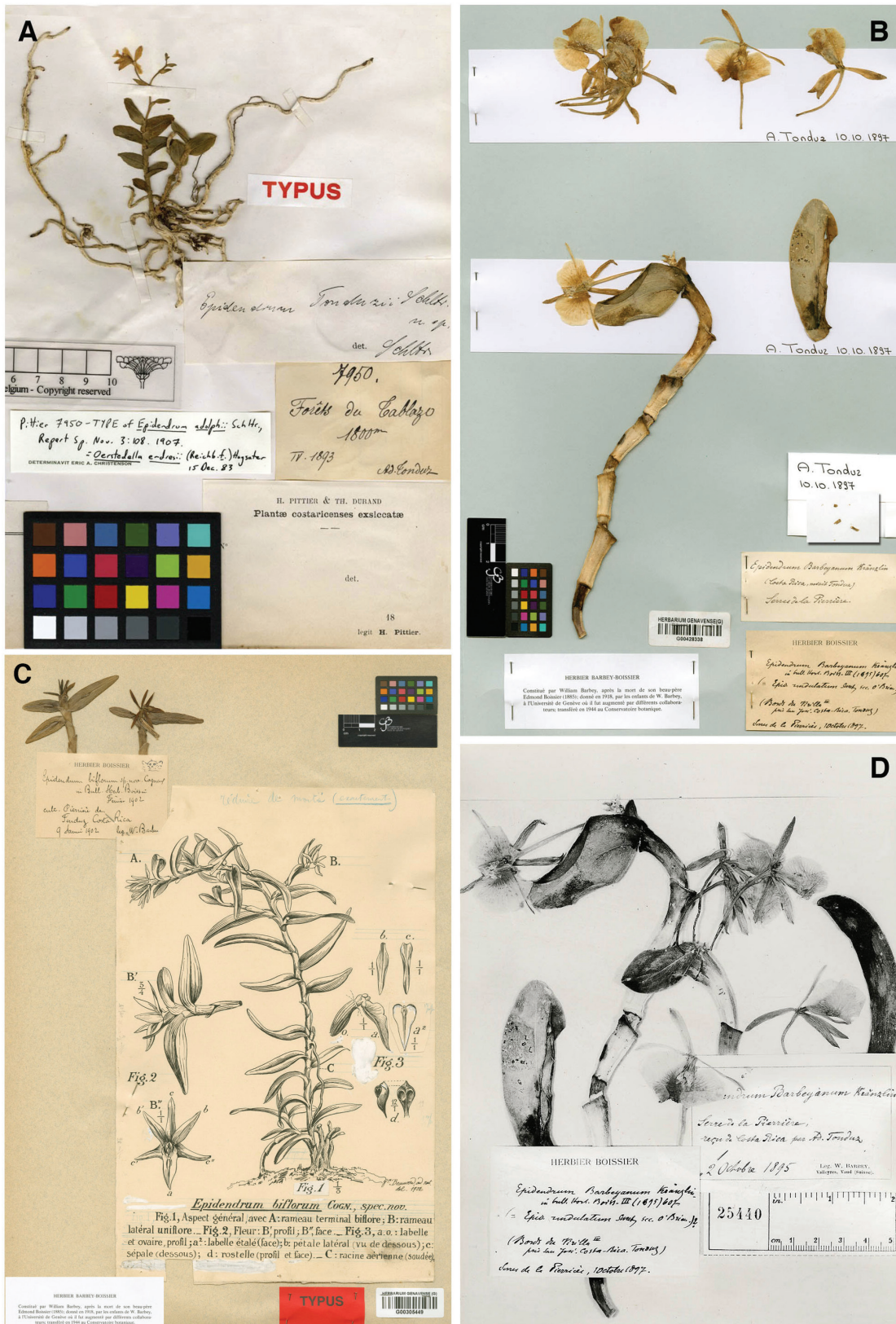


FIGURE 16. A, Lectotype of *Epidendrum adolphii*; B, Neotype of *Epidendrum barbeyanum*; C, Holotype of *Epidendrum biflorum*; D, MacBride's photography of the sheet with specimens of *Epidendrum barbeyanum*, taken at the herbarium of the University of Geneva, ca. 1936–1937. A, courtesy of the Herbarium, Botanic Garden Meise; B–C, courtesy of the Herbarium, Conservatoire et Jardin botaniques de la Ville de Genève; D, courtesy of the Field Museum, Chicago.

The photograph by James Francis Macbride (Fig. 16D), which was taken in late 1936 or early 1937 (Field Museum of Natural History, 1937), when the sheet was still conserved at the University of Geneva, unequivocally shows several specimens mounted on a single sheet, the earlier of which prepared on October 1895, posterior to the date of the original description. A second label on the same sheet provides information about the original collecting locality (“*Bords du Virilla près San José. Costa Rica. Tonduz*”) but it is dated October 1897, and this confirms that the stems with flowers mounted on the sheet were prepared at two different times, albeit from the same living specimen. Evidently, Autran was conscious of the value of the original plant on which Kränzlin based its description of *E. barbeyanum*, and prepared several specimens from what we could today consider the “clonotype,” even though this category has no meaning in botanical nomenclature.

At the herbarium of the Conservatoire et Jardin botaniques de la Ville de Genève, where they are kept today, the specimens are mounted on two sheets, the first one (G00420236) including the parts flowered in October 1895, and the second one (G00428338, Fig. 16B) the gatherings of October 1897. According to the provision of Art. 9.3 of the Code of nomenclature (McNeill et al., 2012), neither the actual specimens nor their photograph are eligible for lectotypification, as for nomenclatural purposes the definition of “original material” is limited to those specimens and illustrations that were unpublished and published either prior to or together with the protologue. The additional fact that the sheet photographed by Macbride is not annotated in Kränzlin’s handwriting, supports our view that these specimens were never seen by the author of the species.

As Tonduz’ specimen at CR is sterile, we choose to neotypify the species with the specimen prepared in Switzerland in October 1897 (Fig. 16B), as it was ostensibly prepared, though at a different date, from the same specimen cultivated in the greenhouses de La Perrière and sent to Kränzlin for determination, on which he described *E. barbeyanum*. The selected neotype is more complete than the specimen prepared on October 1895, as it includes a flattened, ancipitous stem covered by broadly loose leaf-sheaths, narrower at the base and broadening toward the apex, the elliptic leaves and large flowers with a broad, trilobed lip and a reduced clinandrium, which are typical of the species.

*Epidendrum barbeyanum* was also described by Schlechter as *Epidendrum amparoanum*, based on a collection by Karl Wercklé from the heights of San Jerónimo, not far from San José. As discussed by Pupulin (2010b), no specimens or any other material associated with Schlechter’s protologue exist, and the species is awaiting neotypification.

15. *Epidendrum biflorum* Cogn., Bull. Herb. Boissier, sér. 2, 2(4): 337–338, f. 1–3. 1902. TYPE: COSTA RICA. Dans les serres de la Pierrière (Chambésy), sur la fin de Décembre 1901, A. Tonduz & W. Barbey s.n. (holotype: G 00305449 [Fig. 16C]).

Synonym: *Epidendrum boissierianum* Schltr., replacing name.

Alfred Cogniaux described *E. biflorum* on the basis of a plant originally sent by Tonduz from Costa Rica and cultivated in the greenhouse of Madame Barbey at Chambésy, where it flowered for the first time at the end of 1901. Cogniaux’ description was published the following year in the bulletin of the Boissier herbarium (Cogniaux, 1902). At the time of its publication, the name was however predated by *Epidendrum biflorum* Ruiz and Pav. (1798), based on a collection from Tarma, in central Peru. In 1918, Schlechter created for it the substitute name *Epidendrum boissierianum*.

The holotype at G includes the apices of two stems, each with a single flower, plus a copy of the original illustration drawing prepared by Cogniaux and published in the bulletin of the Boissier Herbarium.

The name is a synonym of *Epidendrum sculptum* Rchb. f. (1854), a broadly distributed species ranging from Mexico to Ecuador and the Guyanas, originally based on a collection by C. F. Lehmann from Chagres in Panama. The specimen presented in the lectotype illustration, based on a cultivated plant, is erect, but in its natural habitats *E. sculptum* typically grows as a pendent epiphyte.

*Epidendrum boissierianum* Schltr., Beih. Bot. Centralbl., Abt. 2, 36(2): 459. 1918. See replaced name: *Epidendrum biflorum* Cogn.

16. *Epidendrum cardiophorum* Schltr., Repert. Spec. Nov. Regni Veg. Beih. 9(208–210): 214. 1911. TYPE: COSTA RICA. in dem Wäldern von Tsaki, Talamanca, ca. 200 m, blühend im April 1895, H. Pittier [s.n., (*Herb. instit. physico-geogr. nat. costaricensis*)] 9519 (holotype: B, destroyed; isotype, designated here as the lectotype: CR 9519 [Fig. 17A]; isolectotypes: BR 00000657435; G 00168668; US 815035/00316361; tracings of the original drawing of the holotype, made under Schlechter’s supervision: AMES 00070175).

As we discussed in the introductory chapter on the numeration of Tonduz’ specimens, the quote of Pittier 9519 in the protologue (and, consequently, on the copy of Schlechter’s drawing of the type) represents a misunderstanding of the numeration system used at the IFGN. Even though the duplicates at BR and US bear the name of Tonduz as the collector, they belong to the same type collection and have to be considered as isotypes. The isotype at CR, which we selected as the species lectotype, is complete, fertile, and in excellent condition.

The rhizomatous habit with scandent rhizome and stems produced far apart from each other, the ancipitous, short inflorescence and the small flowers with the part of the perianth less than 1 cm long distinguish this species, broadly distributed from Mexico to the northern portion of the Andes.

17. *Epidendrum chondranthum* Kraenzl., Vierteljahrsschr. Naturf. Ges. Zürich 74: 136–137. 1929. TYPE: COSTA RICA. Forêts des collines de Tremedal près San Ramón

in 1500–1600 m., May 1913, *A. Tonduz s.n.* (*Museo Nacional de Costa Rica 17622*) (holotype: Z. 6823/barcode 000016397, and Z 6823/barcode 000016398 [Fig. 17C]; isotypes: AMES 22101/barcode 00070199; BM 000026897; G 00168665; P 651-123-60/barcode 00438711; US 1080677/barcode 00075623).

The type of *Epidendrum chondranthum* is one the last Costa Rican orchid collected in the field by Tonduz, under the number 17622 of the Museo Nacional de Costa Rica. Even though the labels on the holotype and the isotypes only indicate the month of May 1913 as the collecting date, the type of *Epidendrum majale*, collected in the same locality and with a few numbers lower, was gathered on May 13, 1913.

The holotype at the Zürich herbarium is mounted on two sheets, which received two different barcode assignments, but the original accession number of the herbarium (no. 6823) is the same for the two sheets, which is permissible under the provisions of the Code of nomenclature (Art. 8.3. “A specimen may be mounted as more than one preparation, as long as the parts are clearly labeled as being part of that same specimen”) (McNeill et al., 2012). Both the sheets are annotated by Kränzlin, with the indication “Typus” in his handwriting (Fig. 17C).

The name is a synonym of *Epidendrum exasperatum* Rchb.f., a common epiphyte of the montane forests of Costa Rica, originally based on a plant collected in Costa Rica by H. Wendland in 1857. The species is recognized by its 4-lobed lip and the non-verrucose leaf sheaths (which are quite atypical in the *Oerstedella* group of *Epidendrum*), and the inflorescences produced both apically and laterally.

18. *Epidendrum falcatum* var. *zeledoniae* Schltr., Repert. Spec. Nov. Regni Veg. Beih. 19: 37. 1923. TYPE: COSTA RICA. Auf Magnolia im Garten de Mdme. Amparo de Zeledon; blühend in Januar 1921, *A. Tonduz 132* (holotype: B, destroyed; lectotype designated by Hågsater and Salazar (1990): drawing of type, AMES 39210/barcode 00070339).

Schlechter (1923: 37) distinguished var. *zeledoniae* from the typical form of *E. falcatum* by the slender habit, the longer, narrower and thinner leaves, and the smaller flowers, commenting about the similarity of this taxon with *E. parkinsonianum* Hook. The drawing of the type conserved at AMES (Fig. 17B) well illustrates the habit and flower of the species, which is today treated as a synonym *E. parkinsonianum* Hook., characterized by the pendent habit with slender stems, which are apically provided with a single, succulent leaf, and the large flower with a deeply trilobed lip.

19. *Epidendrum henrici* Schltr., Repert. Spec. Nov. Regni Veg. 3(33–34): 108. 1906. SYNTYPES: COSTA RICA: auf Bäumen bei San José, blühend im März und Juli, *H. Pittier* [*H. PITTIER and TH. DURAND/Plantae costaricensis exsiccatae*] 2176 (holotype: B, destroyed; isosytype, selected here as the lectotype: US 814930/barcode 00093808 [Fig. 18A]; isolectotypes: AMES 24001/barcode 00070412 [including the drawing of a flower and photographs of the specimens at P and US]; BR 988691/

barcode 0000009886919; CR 2176 [“Sur les arbres des haies autour de San José,” *A. Tonduz s.n.*, *Museo Nacional de Costa Rica 2176*]; P 00410693; tracings of the original drawing of the syntype, made under Schlechter’s supervision: AMES 24000/barcode 00070413; illustration of the flower from the holotype published by Mansfeld, 1931: no. 197). COSTA RICA: *A. Tonduz 8204* (B, destroyed; isosyntypes: BR 657195/barcode 0000006571955; BR 657418/barcode 0000006574185).

Both the illustration of the flower from one of the syntypes published by Mansfeld (1931), and the tracings of the same syntype made for Professor Ames under Schlechter’s supervision, are based on *Pittier 2176*, and for this reason we consider it advisable to lectotypify the species with this collection instead of the extant specimens gathered by Tonduz. Among the extant isosyntypes, the specimen at US (Fig. 18A) is complete and fertile, and it was studied and annotated by Ames, Hubbard and Schweinfurth for their monograph on the genus *Epidendrum* (Ames et al., 1936).

Even though in the protologue Schlechter (1906) cited the type as a collection by Pittier number 2176, this number was in fact an herbarium accession number assigned to this collection by the Institute/Museum, which were temporarily merged at that time. Whilst the lectotype sheet, as well as the isolectotypes at BR and P, bear an original label of “H. PITTIER and TH. DURAND/Plantae costaricensis exsiccatae,” where number 2176 is associated with a collection by Pittier, the original label of the sheet at CR belongs to Costa Rican National Museum, where the same number 2176 was associated with a collection of the same species, and made at the same date, by Tonduz.

*Epidendrum henrici* is here considered a synonym of the common and widespread *Prosthechea livida* (Lindl.) W.E.Higgins, based on a Colombian type, distinguished by the trilobed lip with three rows of verrucose and deeply retuse keels, and obtuse lateral lobes.

20. *Epidendrum magnibracteatum* Ames, Schedul. Orch. 1: 16–17. 1922. *nom. illeg. hom.* TYPE: COSTA RICA. Forests of La Palma, Aug 1895, *A. Tonduz s.n.* (*Herb. Instit. physico-geogr. nat. costaricensis 9688*) (holotype: US 815038/barcode 00093789 [Fig. 18B]; isotypes: CR 9688 [sterile], Z 000016403; drawing of type: AMES barcode 00070563).

Synonym: *Epidendrum palmense* Ames., replacing name.

When describing the species, Ames (1922) used the epithet *magnibracteatum*, omitting the fact that Kränzlin had used it before for another *Epidendrum* from Colombia (Kränzlin, 1920). Shortly after, he noticed the error and in the second volume of its *Schedulae Orchidianae* for 1923 he proposed for the species the new name *Epidendrum palmense* (Ames, 1923). The specimen at AMES was mistakenly labeled with a collection date “VII.1885,” a date that precedes by four years the arrival of Tonduz in Costa Rica.

*Epidendrum palmense* belongs to a taxonomically difficult group of species characterized by the strongly





FIGURE 18. **A**, Lectotype of *Epidendrum henrici*; **B**, Holotype of *Epidendrum magnibracteatum*; **C**, Lectotype of *Epidendrum majale*; **D**, Lectotype of *Epidendrum octomerioides*. A–C, courtesy of the United States National Herbarium, Smithsonian Institution; D, courtesy of the National Botanic Garden of Belgium Herbarium.

flattened stems, prominent flower bracts, and very fleshy, green to purple-flushed flowers. Among the taxa of this group, *E. palmense* may be distinguished by the long, acuminate floral bracts, the petals connate to the upper margin of the lateral sepals, and the rheniform lip.

21. *Epidendrum majale* Schltr., Beih. Bot. Centralbl., Abt. 2 36(2): 406. 1918. TYPE: COSTA RICA. Forêts des collines de San Ramón, 1500–1600 m, 12 May 1913, A. Tonduz s.n. (*Museo Nacional de Costa Rica 17620*) (holotype: B, destroyed; lectotype, designated by Sánchez and Hágsater (2007): US 861807/barcode 00075647; isolectotypes: AMES 21993/barcode 00070570, BM 000026899, G 00168862, K 000583761, LE 00001442, P 653-123-60/barcode 00477943, P 654 123-60/barcode 00477948, Z 000016404; tracing of the type, made under supervision of R. Schlechter: AMES 26886/barcode 00070571; drawing of type: AMO; illustration of the flower from the holotype published by Mansfeld, 1931: no. 209).

Collected on the way back from the expedition of Maurice de Périgny to the northern plains draining toward the Río San Juan, at the border between Costa Rica and Nicaragua, the type of *E. majale* belongs to the last group of Costa Rican orchids collected in the field by Tonduz. The lectotype at US (Fig. 18C) illustrates well the characteristics of the species, with rather small habit compared to other species of the *Epidendrum difforme* complex, the apical, subsessile and non-spathaceous inflorescence, the filiform petals and the entire lip.

*Epidendrum majale* is a synonym of *Epidendrum firnum* Rchb.f., a common species in Central America from Nicaragua to Panama, originally described on the basis of a plant collected in Costa Rica by H. Wendland in 1857.

22. *Epidendrum octomerioides* Schltr., Repert. Spec. Nov. Regni Veg. 3: 248. 1907. TYPE: COSTA RICA: In Wäldern bei Teus (Taus), c. 650 m ü. d. M., blühend im November 1897, A. Tonduz s.n. (*Herb. Institut. physico-geogr. nat. costaricensis 11378*) (holotype: B, destroyed; isotype, selected here as the lectotype: BR barcode 0000016153516 [Fig. 18D]; tracings of the original illustration of the holotype made under Schlechter's supervision: AMES barcode 00070636; illustration of the flower from the holotype published by Mansfeld, 1931: no. 211).

The isotype at BR that we selected as the species' lectotype, is complete and fertile, and it well illustrates the repent habit with the new, cylindrical stem coming from the middle of the last stem, the roots coming from the basal nodes, and the small, apical flowers produced on a very short inflorescence. The sheet of the isotype is annotated in Schlechter's handwriting, with the intended name "*Epidendrum leptotifolium*," evidently in allusion to the shape of the leaves reminding those of the orchid genus *Leptotes*.

Two copies of Schlechter's original drawing of the type of *E. octomerioides* were made: one published by Mansfeld (1931), and another one requested by Oakes Ames and made under Schlechter's direct supervision, now saved at

the Harvard University Herbaria. Both illustrations include a floral analysis, but the latter also presents the unmistakable plant habit that is very characteristic of *E. octomerioides*. *Epidendrum octomerioides* is widely distributed in both the Caribbean and the Pacific watershed of the Costa Rican cordilleras, from low to mid elevations.

23. *Epidendrum pachycarpum* Schltr., Repert. Spec. Nov. Regni Veg. 3(33–34): 109. 1906. TYPE: COSTA RICA: in den Wäldern von Nicoya, blühend im Mai 1900, A. Tonduz [*Museo Nacional de Costa Rica 13976*] (holotype: B, destroyed; isotype, selected here as the lectotype: US 577920/barcode 00025106 [Fig. 19A]; isolectotype: US 577921/barcode 00025107; traces of the original drawings of the holotype, made under Schlechter's supervision: AMES 25248/barcode 00070654; illustration of the flower from the holotype published by Mansfeld, 1931: no. 212).

The specimens at US are sterile, and only a few broken fragments of the flowers are conserved into the pocket of the sheet that we selected as the species' lectotype. The characteristics of the perianth were recorded by Schlechter in his drawing of the holotype, a copy of which was prepared in Berlin for Professor O. Ames and is now conserved at the Harvard University Herbaria.

Originally collected in the strongly seasonal regions of the Nicoya peninsula, this widespread species is the only large-flowered *Prosthechea* forming natural populations in the dry, semi-deciduous forests of northern Pacific Costa Rica. The ovoid pseudobulbs, the partially ringent flowers, and the subacute lip with plain margins, which are well illustrated in the copy of Schlechter's drawing of the holotype (AMES), easily distinguish the species from its closest relatives (Pupulin and Karremans, 2007).

The name is a synonym of *Prosthechea chacaoensis* (Rchb.f.) W.E.Higgins.

*Epidendrum palmense* Ames., Schedul. Orchid. 2: 33. 1923. See replaced name: *Epidendrum magnibracteatum* Ames.

24. *Epidendrum polychlamys* Schltr., Repert. Spec. Nov. Regni Veg. 3(33–34): 109. 1906. TYPE: COSTA RICA: auf den Bäumen der Weideplätze von La Palma, blühend am 24 Aug 1898, A. Tonduz s.n. (*Herb. Institut. costaric. 12492*) (holotype: B, destroyed; isotype, selected here as the lectotype: K 000463408 [Fig. 19B]; isolectotypes: AMES 22675/barcode 00070721, US 579474/barcode 00093833; illustration of the flower from the holotype published by Mansfeld, 1931: no. 215).

The isotype specimen at US, of which that at AMES is a fragment, bears a label with the number 12492 of the "Herb. H. Pittier, Costa Rica" which is not cited in the protologue, while the isotype at K has a label with the correct number of the IFGN, as quoted by Schlechter in the original description. It is obvious that all three specimens are part of the same Tonduz' collection of August 24, 1898 from La Palma, but we choose to lectotypify the species with the specimen at Kew as it better corresponds to the citation of the type by Schlechter.



FIGURE 19. **A**, Lectotype of *Epidendrum pachycarpum*; **B**, Lectotype of *Epidendrum polychlamys*; **C**, Holotype of *Epidendrum sancti-ramoni*; **D**, Analytical drawing of *Epidendrum trachythecae*, traced by Mansfeld (from Mansfeld 1931). A, courtesy of the United States National Herbarium, Smithsonian Institution; B, courtesy of the Board of Trustees, Royal Botanical Gardens, Kew; C, courtesy of the Zürcher Herbarien, University of Zurich.



Endemic to Costa Rica and Panama, *E. polychlamys* is recognized by the rhizomatous plants with narrow stems provided with two to three apical leaves, the very short inflorescence with broadly ovate bracts, and the broadly oblong, apiculate lip, which can be observed in the specimen that we selected as the lectotype.

25. *Epidendrum sancti-ramoni* Kraenzl., Vierteljahrsschr. Naturf. Ges. Zürich 74: 137–138. 1929. TYPE: COSTA RICA. Collines de Tremedal près San Ramón, 1500–1600 m., 10 May 1913, A. Tonduz [s.n. (Museo Nacional de Costa Rica 17617)] (holotype: Z 000016394; isotypes: AMES 22654/barcode 00070839; AMES 22205/barcode 00070840; P 00484726; Z 000016395; US 1080672/00023322; LE 00006552).

Barringer (1991) lectotypified *E. sancti-ramoni* with a specimen kept at the Oakes Ames Herbarium at the Harvard University Herbaria (specimen number 22654), in the belief that the actual holotype was destroyed in Berlin together with most of Kränzlin's types. However, Kränzlin studied the type specimen of this species in the herbarium of the University of Zürich, where it is still conserved and annotated as "Typus" in Kränzlin's handwriting (Fig. 19C). Kränzlin published the new species he studied in Zürich in the *Vierteljahrsschrift der Naturforschenden Gesellschaft in Zürich*, the quarterly journal of the Zurich Natural History Society (Kränzlin, 1929), together with another *Epidendrum* species whose type is kept in the same herbarium, *E. chondrantum* (see above). As Tonduz' specimen in Zurich is ostensibly that on which Kränzlin based his description, it has to be considered the holotype, and the lectotypification proposed by Barringer is here superseded. In the collections of Zurich herbarium another Tonduz' specimen of the same species is conserved (Z 000016395), but this was not annotated by Kränzlin.

*Epidendrum sancti-ramoni* belongs to the *Epidanthus* group of *Epidendrum* (Barringer, 1991), characterized by the small plants with narrow leaves less than 3 mm broad and small flowers produced on a comparatively long inflorescence without a basal spathe. Within this group, *E. sancti-ramoni* is distinguished by the acicular leaves and the three-lobed, very small lip, not exceeding 2 mm in length.

*Epidendrum tonduzii* C.H.Lank., Orchid Rev. 32(372): 163. 1924. See under *Epidendrum adolphii* Schltr.

26. *Epidendrum trachythece* Schltr., Repert. Spec. Nov. Regni Veg. 3(42–43): 249. 1907. TYPE: COSTA RICA. in den Wäldern von Tablazo, ca. 1800 m, blühend im April 1883, A. Tonduz 7941 (holotype: B, destroyed; neotype designated by Sánchez and Hágsater (2008): COSTA RICA. [San José; Carraigres,] Tablazo, 1900 m, 30 XI 1960, C. Horich s.n., MO; illustration of the flower from the holotype published by Mansfeld, 1931: no. 230).

Schlechter (1907) described *E. trachythece* on the basis of a plant collected by Tonduz in the mountains that divide San José from the plains of the old capital city, Cartago. As no dried material referable to this collection has been

conserved, Sánchez and Hágsater (2008) neotypified the species with a modern collection from the type locality. We think, however, that the illustration published by Mansfeld (1931) (Fig. 19D), being an exact tracing of Schlechter's original analysis of a flower from the holotype, would have been a firmer choice for neotypification.

Broadly distributed in Central America from Mexico to Panama, *E. trachythece* is a small epiphyte having many-branched, diphyllous stems and few-flowered, terminal inflorescences; the small, greenish-white flowers have a characteristic transversely elliptic-subrhreniform lip, provided with a bi-partite, obtuse callus at the base.

27. *Goodyera ovatilabia* Schltr., Repert. Spec. Nov. Regni Veg. Beih. 19: 274. 1923. TYPE: COSTA RICA. Auf dem Turrialba, im August, A. Tonduz s.n. (holotype: B, destroyed; lectotype, selected here: tracings of Schlechter's original drawing of the holotype, AMES 31635/barcode 00099598). Fig. 20.

The drawing of the type specimen, showing the long inflorescence typical of the genus and the dissected perianth, is chosen here as the lectotype, as no other type material of *Goodyera ovatilabia* was found. Originally collected in the surroundings of the county of Turrialba, *Goodyera ovatilabia* is one of the few species of *Goodyera* known to occur in Costa Rica, and most probably the only one to be found growing in the oak tree forests as high as 3,000 m on the Caribbean slopes. The species is also known from western Panama.

As mentioned by Dressler (2003), *G. ovatilabia* resembles the Mesoamerican *G. striata* Rchb.f. by the similar minute pale flowers with a deeply concave lip. Nevertheless, the plants of *G. ovatilabia* are much smaller (3–5 cm vs. up to 35 cm long) and distinguished by the acute entire lip.

28. *Goodyera turrialbae* Schltr., Repert. Spec. Nov. Regni Veg. Beih. 19: 275. 1923. TYPE: COSTA RICA: Volcan de Turrialba, 2000 m, im August, A. Tonduz s.n. (holotype: B, destroyed; lectotype, selected here: tracings of the original drawing of the holotype, AMES 31633/barcode 00099603). Fig. 21.

No other type material of the species than the holotype destroyed in Berlin is known to exist. The tracings of the original drawings by Schlechter illustrate the habit well with an inflorescence and the details of the perianth, and they are therefore chosen here as the lectotype. *Goodyera turrialbae* was originally collected in the Turrialba volcano and is known only from Costa Rica.

The species is similar to *G. micrantha* but is distinguished from it for the bigger flowers; the broadly cuneate leaves, not rounded at the base and the glabrous ovary.

29. *Habenaria costaricensis* Schltr., Repert. Spec. Nov. Regni Veg. 17(481/485): 138. 1921. TYPE: COSTA RICA. Bords gazonnés de la voie ferrée entre San José et San Juan, 1100 m, Sept 1913, A. Tonduz 17652 (holotype: B, destroyed; lectotype, designated by Christenson [1996]: US 93266/barcode 1080689; tracings of the original drawing of



FIGURE 20. Lectotype of *Goodyera ovatilabia*. Courtesy of the Harvard University Herbaria, reproduced with permission of the President and Fellows of Harvard College.



FIGURE 21. Lectotype of *Goodyera turrialbae*. Courtesy of the Harvard University Herbaria, reproduced with permission of the President and Fellows of Harvard College.

the holotype, made under Schlechter's supervision: AMES 00024305/barcode 0099764; illustration of the flower from the holotype published by Mansfeld, 1931: no. 2).

Christenson (1996) selected the specimen at US over the one supposedly kept at CR because the former was studied, illustrated and annotated by Oakes Ames for his monographic study of *Habenaria* (Ames, 1920, 1943). Nevertheless, we were unable to find any reference to a collection by Tonduz in the Herbarium of the Museo Nacional de Costa Rica and the associate databases. The lectotype (Fig. 22A) is complete and fertile, and well exemplifies the plant with a foliaceous stem, flower provided with a relatively short, upwarding spur, which are characteristic of the species.

*Habenaria costaricensis* is endemic to the Pacific watershed of the main Costa Rican cordilleras.

30. *Habenaria endresiana* Schltr., Repert. Spec. Nov. Regni Veg. Beih. 19: 272. 1923. TYPE: COSTA RICA. Ohne nähere Standortsangabe, A. Tonduz s.n. (holotype: B, destroyed; lectotype, selected here: tracings of the drawings of the holotype, AMES 31631/barcode 00099838 [Fig. 22B]).

No actual specimens of the original collection have been found. The copy of Schlechter's original drawings of the holotype are selected as the lectotype as they well illustrate the plant with slender, foliaceous stem and narrow, erect leaves, bearing a few flowers with deeply trilobed labellum, provided on the rear with a long spur.

The species is usually treated as a synonym of *Habenaria trifida* Kunth, widespread throughout the entire Neotropical region, from Mexico to Brazil and Argentina.

31. *Habenaria gymnadenioides* Schltr., Repert. Spec. Nov. Regni Veg. Beih. 19: 271. 1923. TYPE: COSTA RICA. ohne nähere Standortsangabe, A. Tonduz s.n. (holotype: B, destroyed; tracings of the drawings of the holotype, selected here as the lectotype: AMES 31632/barcode 00099863 [Fig. 22C]).

In the absence of any specimens referable to the type collection, we selected here as the species' lectotype the tracings of Schlechter's original drawings of the holotype. The relatively small plants (to 25 cm tall), with the upper part of the stem bearing a few leaves, the densely many-flowered inflorescence, and the deeply tri-lobed labellum, with the lateral lobes subequal to the midlobe, which Schlechter (1923) considered characteristic of the species, are well illustrated in the lectotype drawings.

The species has been treated by Dressler (1999, 2003) and Pupulin (2002) as a synonym of *Habenaria wercklei* Schltr., a species ranging from Honduras to Costa Rica.

32. *Isochilus amparoanus* Schltr., Repert. Spec. Nov. Regni Veg. Beih. 19: 27. 1923. SYNTYPES: COSTA RICA. San José, im Garten de Mdme. Amparo de Zeledon, 1920, A. Tonduz 32 (B, destroyed). COSTA RICA. 1921, C. Wercklé 83 (B, destroyed). Lectotype, selected by Pupulin [2010b: fig. 13D]: tracings of Schlechter's drawings of a syntype, AMES 31625/barcode 00100365).

Synonym: *Isochilus major* var. *amparoanus* (Schltr.) Correll, Bot. Mus. Leaflet. 10(1): 11–12. 1941.

In the protologue, Schlechter (1923) cited Tonduz 32 and Wercklé 83, without expressly indicating the type. No original material of these collections is known to exist, and the copies of Schlechter's drawings of the type kept at AMES have no indication about the collector. However, as these drawings were ostensibly prepared from one of the syntypes and are annotated as "type," they were selected as the species' lectotype (Pupulin, 2010b). The name is probably a synonym of *Isochilus chiriquensis* Schltr.

33. *Lepanthes fimbriata* Ames, Sched. Orch. 3: 11–12. 1923. TYPE: COSTA RICA. Alto de Ochomogo, alt 1550 m, Dec. 1896, A. Tonduz s.n. (*Herb. Instit. physico-geogr. nat. costaricensis* 10387) (holotype: US 815046; isotypes, AMES 22851/barcode 00064918 [including a drawing of type], CR 10387).

On the holotype sheet at US, which bears the original label of the IFGN herbarium, are mounted three specimens, only one of which still has a single bud (Fig. 22D). The isotype at AMES (Fig. 23A) is sterile, but nonetheless it has an original drawing by Ames showing the long-ciliate-pubescent petals and labellum, and the long, bilobed appendix of the lip, which distinguish the species.

34. *Masdevallia tonduzii* Woolward, Bull. Herb. Boissier, sér. 2, 6(1): 82. 1906. TYPE: COSTA RICA ["Hab. Costa Rica"]. 1894. In hortum Chambesiensis (Helvetia), quotannis floret, A. Tonduz s.n. (holotype: BM000084394 (?); isotype: G 005915-000346/barcode 00168757 [Fig. 23C]).

The plant that served as the type for *Masdevallia tonduzii* was collected in 1894, during the herborizations carried out along the basin of the Reventazón river, on the Caribbean watershed of the Cordillera de Talamanca, which Tonduz explored down to the outpost of the Angostura, where the path reached its end point in the impenetrable vegetation of the Atlantic rainforest (Tonduz, 1896). *Masdevallia tonduzii* can be still observed as a rare epiphyte endemic to this region, down to the warm, Caribbean forest of western Panama. It was not until 1900 when a specimen prepared at La Perrière from the plant received from Costa Rica was sent to Florence Woolward (1854–1936) for her studies on *Masdevallia*. The last part of Woolward's *magnum opus* on the genus had been published just a few years before (Woolward, 1896), and no illustration of the species was included with the original description of *M. tonduzii* (Woolward, 1906). As noted by Mrs. Woolward, *M. tonduzii* flowered "every year" in the Barbey-Boissier greenhouse at Chambésy (Woolward, 1906), and according to Jenny (2015) the type plant remained in cultivation in Switzerland at least until 1910.

Beginning in 1890, F. Woolward spent some ten years on visits to Newbattle Abbey, in Scotland, painting orchid flowers from the extensive collection of Schomberg Kerr, Marquess of Lothian. Here the illustrator depicted more



FIGURE 22. **A**, Lectotype of *Habenaria costaricensis*; **B**, Lectotype of *Habenaria endresiana*; **C**, Lectotype of *Habenaria gymnadenioides*; **D**, Holotype of *Lepanthes fimbriata*. A, D, courtesy of the United States National Herbarium, Smithsonian Institution; B, C, courtesy of the Harvard University Herbaria, reproduced with permission of the President and Fellows of Harvard College.



FIGURE 23. **A**, Isotype of *Lepanthes fimbriata*; **B**, Lectotype of *Maxillaria microphyton*; **C**, Isotype of *Masdevallia tonduzii*; **D**, Possible holotype of *Masdevallia tonduzii*. A, B, courtesy of the Harvard University Herbaria, reproduced with permission of the President and Fellows of Harvard College; C, courtesy of the Conservatoire et Jardin botaniques de la Ville de Genève; D, courtesy of the Natural History Museum, London.

than 350 orchids, of which 85 were species of *Masdevallia*. These latter were published in parts between 1891 and 1896 as “*The Genus Masdevallia*.” The pressed flowers from Newbattle Abbey are preserved at the Natural History Museum in London, where Woolward worked on completion of the project for Schomberg. Interestingly, in the herbarium collections of the Natural History Museum (BM) is conserved a specimen of *M. tonduzii*, gathered on November 11, 1905, just a year before the publication of the new species in the bulletin of the Boissier herbarium. The specimen at BM (000084394; Fig. 23D) is recorded as a collection *sine numero* by J. O’Brien (1842–1930), a renown orchid specialists of the time and secretary of the Orchid Committee of the Royal Horticultural Society (Natural History Museum, 2014). As it is doubtful that living plants of the rare *M. tonduzii* were in cultivation in England at that time, it might well be that the specimen deposited by O’Brien was indeed the true plant studied by F. Woolward upon the request by G. Beauverd.

The type specimen at G consists of just a leaf and an inflorescence with a flower. It has no handwritten annotations by Miss Woolward, so it could hardly be considered the exact specimen on which the author prepared her description, and it is quite improbable that Woolward would have sent back to Geneva her specimen from London, where she worked, or from Belton, in Lincolnshire, where she lived. According to the original label affixed to the sheet, however, G. Beauverd prepared it at the same time (December 7, 1900) of the specimen sent to Miss Woolward for determination, and it can therefore considered as an isotype (and eventually selected for species lectotypification if the BM specimen was not suitable for this purpose).

The thick, oblong-lanceolate leaves, the erect, single-flowered inflorescence, and the pubescent, white flower with a lemon-yellow gorge and bright yellow tails, all characters noted in the protologue, made this species unmistakable among Costa Rican *Masdevallia*.

35. *Maxillaria microphyton* Schltr., Repert. Spec. Nov. Regni Veg. 8(182/184): 457. 1910. TYPE: COSTA RICA. In Wäldern von La Palma, c. 1700–2000 m, blühend im Jul 1895, A. Tonduz [s.n., *Herb. Instit. physico-geogr. nat. costaricensis*] 9670 (holotype: B, destroyed; isotype, selected here as the lectotype: US 577269/barcode 00094043). Fig. 23B.

Homotypic synonyms: *Camaridium microphyton* (Schltr.) M.A. Blanco, Lankesteriana, 7(3): 520. 2007. *Chaseopsis microphyton* (Schltr.) Szlach. and Sitko, Biodivers. Res. Conservation 25: 25. 2012. *Ornithidium parvulum* Schltr., Repert. Spec. Nov. Regni Veg. 9(214/216): 292. 1911, *nom. illeg. superfl.*

Heterotypic synonyms: *Ornithidium pallidiflavum* Schltr., Repert. Spec. Nov. Regni Veg. Beih. 19: 143, 242. 1923. *Maxillaria pallidiflava* (Schltr.) Senghas, Orchideen (ed. 3) 1/B(28): 1751. 1993. TYPE: COSTA RICA. Arbres des paturages à San Pedro de San Ramón, 1075 m, Sept. 1921, A.M. Brenes 135 (holotype: B, destroyed; lectotype, designated by Barringer [1986]: CR 26021).

The isotype at US, selected here to lectotypify the species, includes a fertile plant and the sketch of a rehydrated flower, made by J. T. Atwood during the preparation of his treatment of Costa Rican *Maxillaria* for the *Flora Costaricensis* (Atwood, 1999).

The species, endemic to Costa Rica, is easily distinguished from its relatives by the non-reflexed lip, provided with lateral lobes that exceed in length the extension of the central callus. The description of *Ornithidium parvulum* made by Schlechter (1923) is based on the same type collection of *Maxillaria microphyton*, which made it a superfluous, illegitimate name.

36. *Maxillaria pachyacron* Schltr., Repert. Spec. Nov. Regni Veg. 9(205–207): 165. 1911. TYPE: COSTA RICA. in den Wäldern von La Palma, 1700–2000 m, blühend im Juli 1895, A. Tonduz 9681 (holotype: B, destroyed; tracings of Schlechter’s drawings of the type, designated here as the lectotype: AMES 24781/barcode 00101468, in part [Fig. 24A]; epitype, designated by Atwood (1999): COSTA RICA. La Palma, S. Ingram & K. Ferrell 770 [SEL]).

The collections of the Smithsonian host a specimen of *Maxillaria* (577273/barcode 00094047) that bear a label of Tonduz 9681, but Atwood showed that the mounted plant is not in agreement with the original protologue, having a rhizomatous habit and much smaller flowers, with a very different lip (Atwood, 1999).

As typified by Atwood, *M. pachyacron* is distinguished by the presence of foliaceous sheaths subtending the pseudobulbs, the green (non-spotted) leaves, the floral bract shorter than the ovary, the long column foot, and the long sepals up to 5 cm in length.

37. *Maxillaria piestopus* Schltr., Repert. Spec. Nov. Regni Veg. Beih. 19: 302–303. 1923. TYPE: COSTA RICA. Alajuela: San Ramón, May 1913, A. Tonduz s.n. (holotype: B, destroyed; neotype designated by Atwood (1999): COSTA RICA. Cartago: Orosi, C.H. Lankester 1213, AMES 34211/barcode 00045361; photo of holotype, including a floral analysis: AMES 40549/barcode 00045360).

John T. Atwood typified *M. piestopus* in his treatment of *Maxillaria* for *Flora Costaricensis* (Atwood, 1999). In absence of actual material of this taxon, Atwood chose to neotypify with a collection by Lankester kept at AMES (Fig. 24C). According to the label of the Ames herbarium, the plant was collected at Orosi, but probably it was just cultivated there. On the sheet of the neotype there is another label in Lankester’s handwriting that apparently quotes the name of Brenes, which led us to suppose that the specimen was originally collected in one of the typical Brenesian localities around San Ramón, the type locality for the species. Even though Atwood did not cite it, at the AMES herbarium is also conserved a photograph of the holotype taken in Berlin, which clearly shows the habit of the plant with a single flower, and also includes the original sketch of the flower and its dissection prepared by Schlechter (Fig. 24B).

*Maxillaria piestopus* belongs to a group of species with pseudobulbs subtended by non-foliaceous sheaths, and



FIGURE 24. **A**, Lectotype of *Maxillaria pachyacron*; **B**, Photo of the holotype of *Maxillaria piestopus*; **C**, Neotype of *Maxillaria piestopus*. All by courtesy of the Harvard University Herbaria, reproduced with permission of the President and Fellows of Harvard College.



is distinguished by the oblanceolate leaf, the large floral bracts, the triquetrous ovary, and the oblanceolate petals. Atwood (2003) considers *M. piestopus* as a little known and possibly extinct species.

38. *Microstylis adolphi* Schltr., Beih. Bot. Centralbl., Abt. 2 36(2): 380–381. 1918. TYPE: COSTA RICA. Alto de la Cruz, A. *Tonduz s.n.* (holotype: B destroyed; illustration of type, made under Schlechter's supervision, and selected here as the lectotype: AMES 24378/barcode 00101595 [Fig. 25A]; illustration of the flower from the holotype published by Mansfeld, 1931: no. 53).

No actual material referable to the type of *M. adolphi* is known to exist. We chose to typify the species with the drawing conserved at AMES over the floral analysis published by Mansfeld (1931), as it includes also the plant habit, which is characteristic of the species.

The species, known exclusively by the type and from a rather cryptic locality, is distinguished by the pseudobulbous stems, apically two-leaved, and the truncate to slightly retuse apex of the lip.

The name is the basionym of *Malaxis adolphi* (Schltr.) Ames (Orchidaceae 7: 158. 1922).

39. *Microstylis microtoides* Schltr., Beih. Bot. Centralbl., Abt. 2 36(2): 381–382. 1918. TYPE: COSTA RICA, A. *Tonduz s.n.* (holotype: B, destroyed; lectotype, selected here: tracings of the original drawing of the holotype, made under Schlechter's supervision, AMES 24381/barcode 00101714; illustration of type, AMES; illustration of the flower from the holotype: Mansfeld 1931: no. 58 [Fig. 25B]).

*Microstylis microtoides* is known exclusively from the tracings of Schlechter's original drawing of the flower from the type, published by Mansfeld in 1931, that we selected to neotypify the species.

According to the floral analysis, *M. microtoides* is similar to the widespread *M. carnososa* (Kunth) C.Schweinf., which presents a clearly three-lobed, concave lip, provided with rounded, thickened lateral lobes. The inflorescence of the latter species is commonly described as spicate, even though the flowers are born on short pedicels. Schlechter described the inflorescence of *M. microtoides* as an elongate raceme, but characterized it as densely many-flowered, and gave the length of the pedicel plus ovary as 1.7 mm. It is unfortunate that the drawing published by Mansfeld does not show the vegetative habit of *M. microtoides* to interpret Schlechter's observation, but a dense inflorescence with short-pedicelled flowers must be difficult to distinguish from "spicate" inflorescence of *M. carnososa*, and we agree with Schweinfurth (1941) in considering the two taxa conspecific. The lack of any specific locality quoted in the protologue makes the chances to search for other specimens of this elusive taxon quite feeble. Schlechter compared it with *M. gracilis* (= *Malaxis cogniauxiana* [Schltr.] Pabst), but the latter species, endemic to Brazil, has bifoliate stems and subcapitate inflorescence.

40. *Microstylis pandurata* Schltr., Repert. Spec. Nov. Regni Veg. 3(31–32): 77. 1906. TYPE: COSTA RICA.

in den Wäldern bei La Palma, ca. 1450 m, blühend am 31 Aug 1898, A. *Tonduz 12508* (holotype: B, destroyed; isotype selected here as the lectotype, a flower conserved in glycerine: AMES barcode 00083007; tracings of the original drawings of the type, made under Schlechter's supervision: AMES 24148/barcode 00101732; illustration of the flower from the holotype published by Mansfeld, 1931: no. 60).

The flower conserved in glycerine at AMES is the only known actual specimen belonging to the original collections, and for this reason we designated it as the species' lectotype. *Microstylis pandurata* is unmistakable for the subquadrate lip of the flower, broader at apex than at the base. The copy of Schlechter's original drawing of the type also illustrates the characteristic, monophyllous habit of the species (Fig. 25C).

The name is the basionym of *Malaxis pandurata* (Schltr.) Ames (Proc. Biol. Soc. Wash. 35: 84. 1922).

41. *Microstylis tonduzii* Schltr., Repert. Spec. Nov. Regni Veg. 3(33–34): 106. 1906. TYPE: COSTA RICA. in den Wäldern des Barba, blühend am 6 Feb 1890, A. *Tonduz 1946* (holotype: B, destroyed; illustration of type, selected here as the lectotype: AMES 24159/barcode 00101764 [Fig. 25D]; illustration of the flower from the holotype published by Mansfeld, 1931: no. 63).

No material referable to the type of *M. tonduzii* has been located. A tracing of Schlechter's floral analysis was published by Mansfeld (1931), but the drawing conserved at AMES also includes the plant habit, and therefore we chose it to lectotypify the species.

The leaf petioles embracing the base of the inflorescence distinguish this species among the rhizomatous *Malaxis* in Costa Rica, where it is endemic. The name is the basionym of *Malaxis tonduzii* (Schltr.) Ames (Proc. Biol. Soc. Wash. 35: 85. 1922).

42. *Oncidium tonduzii* Schltr., Repert. Spec. Nov. Regni Veg. 9(196–198): 31. 1910. TYPE: COSTA RICA. in den Wäldern von Santo Domingo de Golfo Dulce, blühend im März 1896, A. *Tonduz [s.n. (Herb. Instit. physico-geogr. nat. costaricensis)] 9891* (holotype: B, destroyed; lectotype, designated by Christenson (1996): US 577283/barcode 00094118 [Fig. 26A]; isolectotypes: US 795707/barcode 00025928, US 00795708/barcode 00025926, US 00815040/barcode 00025927, US 00815041/barcode 00025925, AMES 5386/barcode 00064915, CR; tracings of Schlechter's original drawing of the type, AMES 31601/barcode 00102562 and AMES 24203/barcode 00102563; illustration of the flower from the holotype published by Mansfeld, 1931: no. 297).

The large plants with paniculate inflorescences bearing short, few flowered branches, and the relatively small flowers with subquadrate wings of the column distinguish the species.

The name is a synonym of *Oncidium polycladium* Rchb.f. ex Lindl., endemic to the Pacific regions of central and southern Costa Rica and western Panama.

43. *Oncidium turialbae* Schltr., Repert. Spec. Nov. Regni Veg. 9(196–198): 32. 1910. TYPE: COSTA RICA. Auf

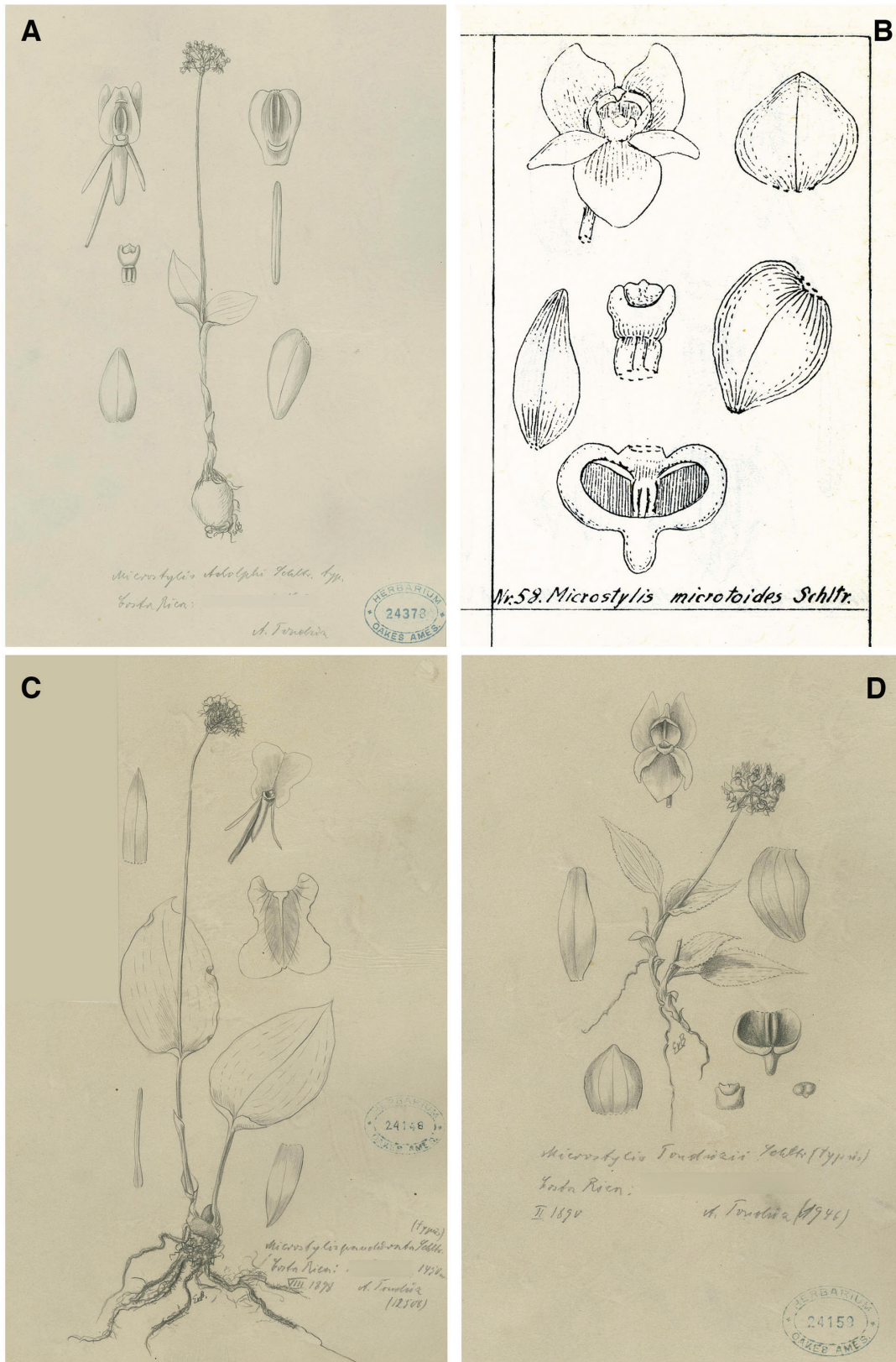


FIGURE 25. **A**, Lectotype of *Microstylis adolphii*; **B**, Neotype of *Microstylis microtooides*; **C**, Tracings of the original drawing of type of *Microstylis pandurata*; **D**, Lectotype of *Microstylis tonduzii*. All by courtesy of the Harvard University Herbaria, reproduced with permission of the President and Fellows of Harvard College.

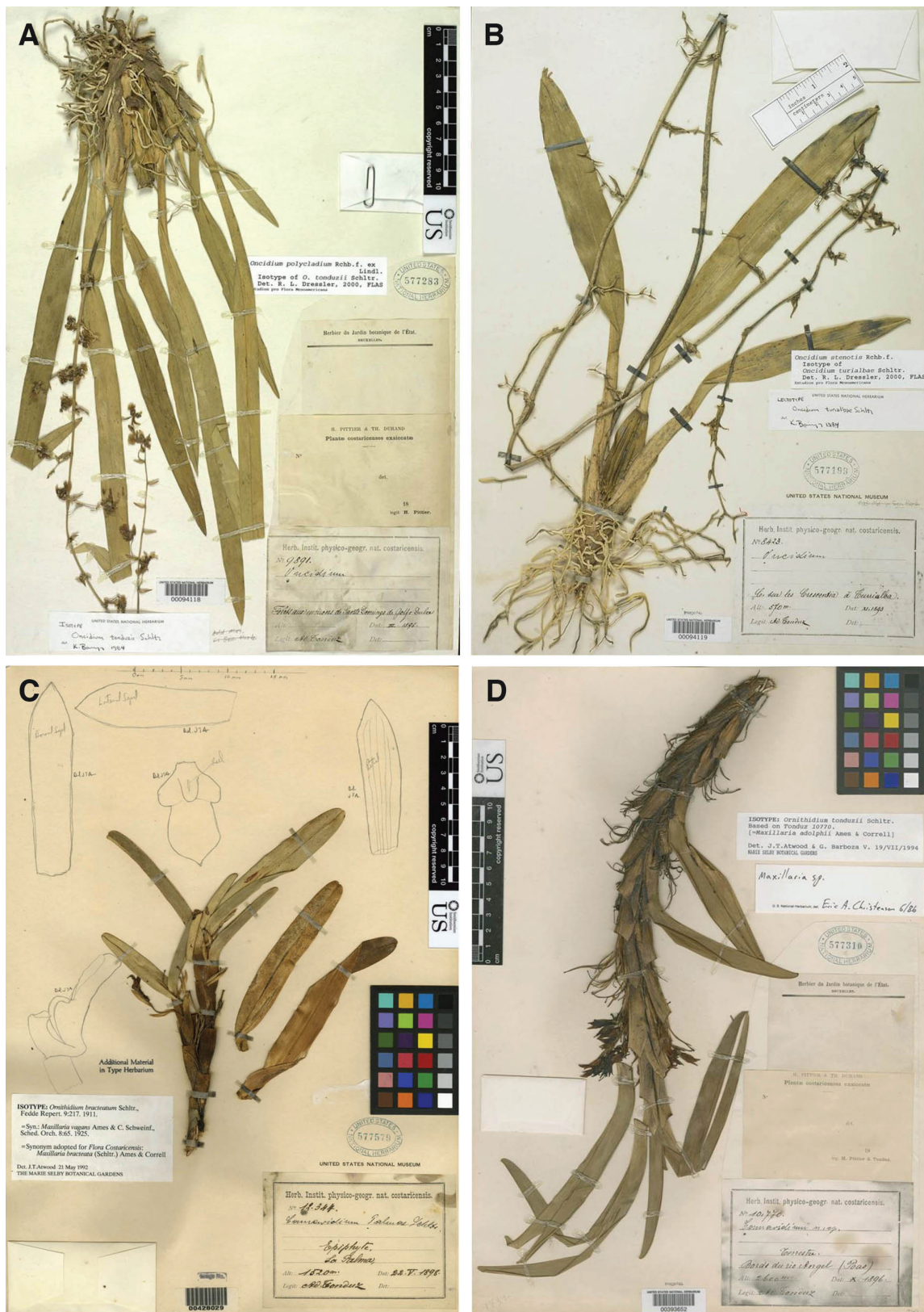


FIGURE 26. **A**, Lectotype of *Oncidium tonduzii* selected by Christenson (1996); **B**, Lectotype of *Oncidium turalbae* selected by Christenson (1996); **C**, Lectotype of *Ornithidium bracteatum* selected by Atwood (1994); **D**, Lectotype of *Ornithidium tonduzii* selected by Atwood (1999). All by courtesy of the United States National Herbarium, Smithsonian Institution.

“Crescentia”-Bäumen bei Turialba, 570 m, blühend im Nov 1893, *P. Biolley 8423* (holotype: B, destroyed; lectotype, designated by Christenson (1996): US 577199/barcode 00094119 [*legit* A. Tonduz]); isolectotype: US 577198/barcode 00025930 [*legit* H. Pittier]; tracings of Schlechter’s drawing of the holotype: AMES 24204/barcode 102572 [*legit* P. Biolley]); illustration of the flower from the holotype published by Mansfeld, 1931: no. 298).

The lectotype selected by Christenson (1996) is complete, and it still has a few remaining flowers in the mid portion of the inflorescence (Fig. 26B). It is not in perfect agreement with the protologue (Schlechter, 1910), which quotes the collector as P. Biolley, but according to our understanding of the IFGN system of specimens’ accession (see the introductory chapter on the numeration of Tonduz’ specimens), both “Herb. Instit. physic-geogr. nat. costaricensis/N<sup>o</sup>. 8423/Legit A Tonduz,” and “N<sup>o</sup> 8423/legit H. Pittier,” have to be considered as isotypes, even though the names of Tonduz and Pittier are not quoted as such in the original description.

The analyses of the flowers mounted on the specimen “N<sup>o</sup> 8423/legit H. Pittier” (US), drawn by J. T. Atwood in preparation of the *Oncidium* treatment for *Flora Costaricensis* (Atwood and Mora-Retana, 1999), perfectly correspond with the floral analyses prepared by Schlechter and traced for Professor Ames (AMES), as well as those published by Mansfeld (1931).

Mora-Retana (1999) treated *O. turialbae* as a synonym of *O. stenotis* Rchb.f., a broadly distributed species from Honduras to Ecuador and Peru, common in the Atlantic lowland forests of Costa Rica.

44. *Ornithidium bracteatum* Schltr., Repert. Spec. Nov. Regni Veg. 9(208–210): 217–218. 1911. TYPE: COSTA RICA. bei La Palma, ca. 1520 m, blühend am 22 Mai 1898, *A. Tonduz* [*s.n.* (*Herb. Instit. physic-geogr. nac. Costaricensis*)] 12344 (holotype: B, destroyed; isotype, designated by Atwood (1994) as the lectotype: US 577579/barcode 00428029; isolectotype: US 815051/barcode 00386000; tracings of Schlechter’s original drawings of the holotype: AMES 24136/barcode 00102671; illustration of the flower from the holotype published by Mansfeld, 1931: no. 277).

The isotype selected by Atwood (1994) as the species’ lectotype is an apical portion of an adult plant, and it is fertile. The lectotype sheet also bears Atwood’s analysis of a rehydrated flower from the isotype (Fig. 26C) for his studies on Costa Rican *Maxillaria*. The other isotype at US, which include several fertile cane-like stems, has a label bearing an intended name by Schlechter, and never published, “*Camaridium palmae*,” named from the type locality.

The species, endemic to Costa Rica and Panama, is easily distinguished from other taxa of the *Camaridium* group by the foliaceous bracts subtending the pseudobulbs, the short column (<6 mm long), and the terete ovary.

When *Maxillaria* is considered in its broad sense, the species has to be treated as *M. bracteata* (Schltr.) Ames & Correll (Bot. Mus. Leaf. 11(1): 14–15. 1943). When

a narrower circumscription of *Maxillaria* is favored, *Ornithidium bracteatum* correctly belongs to the genus *Camaridium* Lindl. (see Blanco et al., 2007) and should be treated as *C. bracteatum* (Schltr.) Schltr. (Repert. Spec. Nov. Regni Veg. Beih.19: 57. 1923).

45. *Ornithidium tonduzii* Schltr., Repert. Spec. Nov. Regni Veg. 3(42–43): 250–251. 1907. TYPE: COSTA RICA. an den Ufern des Río Angel (Poás), ca. 2600 m, blühend im Oktober 1896, *A. Tonduz* [*s.n.* (*Herb. Instit. physic-geogr. nat. costraicensis*)] 10770 (lectotype designated by Atwood [1999]: US 938677; isolectotype, US 577310; tracings of Schlechter’s drawing of the holotype: AMES 24216/barcode 0045385; photos of the holotype in Schlechter’s herbarium: AMES 24216/barcode 0045385).

Synonym: *Camaridium adolphi* Schltr., Repert. Spec. Nov. Regni Veg. 19: 58, 141. 1923; *Maxillaria adolphi* (Schltr.) Ames & Correll, Bot. Mus. Leaf. 11(1): 18–19. 1943; *Adamanthus tonduzii* (Schltr.) Szlach. & Sitko, Biodivers. Res. Conservation 25: 22. 2012.

When accepting a narrower circumscription of *Maxillaria* and the closely related genera, as proposed by Whitten et al. (2007) and Blanco et al. (2007), the species described by Schlechter belongs to *Camaridium*, a genus of some 80 taxa characterized by floral bracts longer than the pedicel and ovary, which overlap with the base of the dorsal sepal, and sepals and petals without fiber bundles. Schlechter (1923) first recognized the affinities of his *O. tonduzii* with *Camaridium*, and created the new name *Camaridium adolphi* to accommodate it, as the specific epithet *tonduzii* was already occupied in *Camaridium* by *C. tonduzii* Schltr. (Schlechter, 1910), an illegitimate name based on the same type as *C. costaricense* Schltr. (1907). *Adamanthus tonduzii* (Schltr.) Szlach. & Sitko and *Maxillaria adolphi* (Schltr.) Ames & Correll are both based on *Tonduz 10770*, and they must not to be confused with *M. tonduzii* Ames & Correll, which is a replacing name for *Camaridium costaricense* Schltr. instead.

Atwood (1999) designated the specimen at US (Fig. 26D), which is complete and fertile, as the species’ lectotype. Interestingly, it bears both the IFGN label that ascribes the collection to Tonduz, and another label indicating that the collections was made by “H. Pittier & Tonduz.” At the Herbarium of the Museo Nacional de Costa Rica is kept another specimen of this species collected by Tonduz on the Pacific slopes of the Barva volcano in February 1890 (*Tonduz s.n.*, CR 2083).

46. *Ornithocephalus tonduzii* Schltr., Beih. Bot. Centralbl., Abt. 2 36(2): 420. 1918. TYPE: COSTA RICA. *A. Tonduz s.n.* (holotype: B, destroyed; isotype, selected here as the lectotype: US 938677; isolectotype: US 577310; tracings of Schlechter’s original drawings of the holotype: AMES 24167/barcode 00102717 (Fig. 27A); illustration of the flower from the holotype published by Mansfeld, 1931: no. 306).

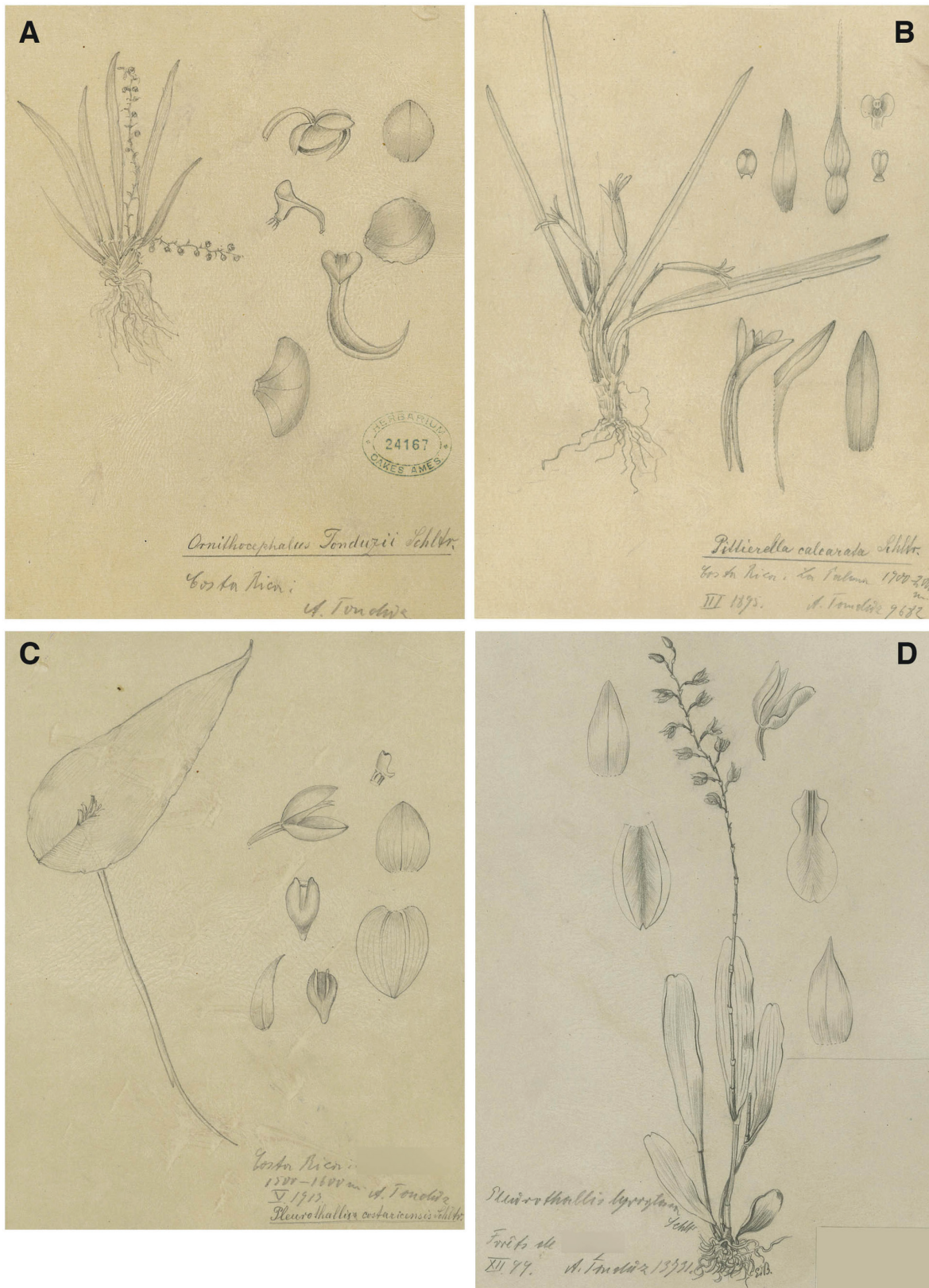


FIGURE 27. **A**, Tracings of the original drawing of the holotype of *Ornithocephalus tonduzii*; **B**, Lectotype of *Pittierella calcarata*; **C**, Lectotype of *Pleurothallis costaricensis*; **D**, Lectotype of *Pleurothallis lyroglossa* designated by Luer (2000). All by courtesy of the Harvard University Herbaria, reproduced with permission of the President and Fellows of Harvard College.

Charles Schweinfurth (manuscript note at AMES, 1934) considered *O. tonduzii* closely allied to *O. elephas* Rchb.f., but in the latter species (according to Reichenbach's drawing of the type), the lobes of the basal callus are erect, instead of spreading as in *O. tonduzii*. It is probably near, if not conspecific with, *Ornithocephalus inflexus* Lindl., with which it shares a broadly cordate callus at the base of the lip, but with a proportionately longer blade, that is distinctly upcurved-hooked apically. Several authors, however, treat *O. inflexus* (based on a Mexican collection by Hartweg) as a synonym of *O. gladius* Hook., whose type is a collection by H. Crueger from Trinidad. Toscano de Brito and Dressler (2000) considered *O. tonduzii* a good species, endemic to Costa Rica and Panama, and distinct from their *O. numenius*, only known from Nicaragua and Honduras; they offer, however, no information on how to distinguish these closely related taxa.

47. *Pittierella calcarata* Schltr., Repert. Spec. Nov. Regni Veg. 3(31–32): 81. 1906. TYPE: COSTA RICA. in den Wäldern von La Palma, 1700–2000 m, blühend im März 1895, A. Tonduz 9682 (holotype: B, destroyed; lectotype, designated here: tracings of Schlechter's original drawings of the holotype, AMES 24793/barcode 00103194). Fig. 27B.

The tracings of the holotype made in Berlin, which we choose to lectotypify the species, well illustrate the unequal apical leaf lobes, the inflorescences of few internodes with tubular bracts that characterize the species.

Schlechter (1906) described *P. calcarata* as the type species of his genus *Pittierella*, which he considered a "singular," ebulbose plant to be compared with *Phreatia* Lindl., an unrelated orchid group native of Southeast Asia. A few years later, in describing *Cryptocentrum minus*, Schlechter (1912) intended publishing a new combination in *Cryptocentrum* Benth. & Hook. for his *Pittierella*, but he involuntarily referred to it as *Pittierella costaricensis*, a name never published (*nomen nudum*), and therefore also his *combinatio nova*, *Cryptocentrum costaricense*, has to be treated as a *nomen nudum* without botanical standing.

The name is the basionym of *Cryptocentrum calcaratum* (Schltr.) Schltr. (Repert. Spec. Nov. Regni Veg. 12(322–324): 214. 1913) or the alternative *Maxillaria calcarata* (Schltr.) Molinari (Richardiana 15: 296. 2015), when the genus *Cryptocentrum* is considered as part of a broad *Maxillaria*.

48. *Pleurothallis costaricensis* Schltr., Beih. Bot. Centralbl. 36(2): 395–396. 1918. *nom. illeg. hom.* TYPE: COSTA RICA. Forêts de San Ramón, 1500–1600 m, May 1913, A. Tonduz (CR-17647) (holotype: B, destroyed; lectotype, designated here: tracings of the original drawing of the holotype, made under Schlechter's supervision, AMES 23674/barcode 00074180 [Fig. 27C]).

Synonym: *Pleurothallis schlechteriana* Ames, Schedul. Orch. 2: 24. 1923. *nom. nov.* (earlier name: *Pleurothallis costaricensis* Rolfe, Bull. Misc. Inform. Kew 1917(2): 80. 1917).

The name *Pleurothallis costaricensis*, which Schlechter chose to describe one of the collections made by Tonduz at San Ramón in 1913, had been used the year before by Robert A. Rolfe (in the Bulletin of Miscellaneous Information Kew, 1917[2], 80) in describing another collection made by Lankester in Costa Rica and it was, therefore, illegitimate at the time of its publication. Renaming the species as *P. schlechteriana* in honor to its author, Ames (1923) suggested a close relationship of *P. costaricensis* Schltr. with *P. cardiothallis* Rchb.f. (the type, a cultivated specimen without known origin), an interpretation followed, among others, by Stevens and collaborators (2001), Pupulin (2002), and CONABIO (2009).

*Pleurothallis schlechteriana* surely belongs to the *P. cardiothallis* group, characterized by large plants with deeply cordate, soft leaves and delicate, bilabiate, large flowers with a distinct temporal activity, which in Costa Rica includes *P. oncoglossa* Luer and another four, probably undescribed taxa. The species of this group, however, are characterized by a subrectangular to triangular lip, variously thickened at the apex, and with the base provided with a small glenion, which is quite distinct from the ovate-oblong lip, provided with two adaxial, short keels, which Schlechter (1918) mentioned in the protologue and that are well illustrate in the lectotype drawing (Fig. 59).

49. *Pleurothallis lyroglossa* Schltr., Repert. Spec. Nov. Regni Veg. 8(191–195): 566. 1910. TYPE: COSTA RICA. [Guanacaste]: in den Wäldern von Nicoya, blühend im Dez 1899, A. Tonduz [s.n. (Museo Nacional de Costa Rica)] 13731 (holotype: B, destroyed; lectotype, designated by Luer (Monogr. Syst. Bot. Missouri Bot. Gard. 79: 80. 2000): tracings of the original drawing of the holotype made under Schlechter's supervision, AMES 23649/barcode 00074425; illustration of the flower from the holotype published by Mansfeld, 1931: no. 128).

The original drawing of the holotype (Fig. 27D), selected as lectotype by Luer (2000), well illustrates the sessile, oblong leaves; the glabrous, connate sepals and the lobed lip with the apex broadly rounded, which distinguish the species.

The name is a synonym of *Stelis quadrifida* (La Llave & Lex.) R. Solano & Soto Arenas, which was originally described as *Dendrobium quadrifidum* La Llave & Lex. from a plant collected by J. J. M. Lexarza in Valladolid (present day Morelia), Mexico. The species has a wide distribution from Mexico to Colombia, Venezuela, and the Greater Antilles (Luer, 2003).

50. *Pleurothallis microtatantha* Schltr., Repert. Spec. Nov. Regni Veg. 3(44–45): 276. 1907. TYPE: COSTA RICA. In den Wäldern von Rancho Flores, ca. 2040 m, blühend am 22 Feb 1890, A. Tonduz 2156 (holotype: B, destroyed; isotype, designated here as the lectotype: US 577083/barcode 00093661 [Fig. 28A]; tracings of the original drawings of the holotype made under Schlechter's supervision, designated here as the epitype: AMES 23651/barcode 00074439 [Fig. 28B]; drawing of the flower from the holotype published by Mansfeld, 1931: no. 129).



FIGURE 28. **A**, Lectotype of *Pleurothallis microtatantha*; **B**, Tracings of the original drawing of the holotype of *Pleurothallis microtatantha*; **C**, Holotype of *Pleurothallis simmleriana*; **D**, Lectotype of *Pleurothallis tonduzii*. A, courtesy of the United States National Herbarium, Smithsonian Institution; B–D, courtesy of the Harvard University Herbaria, reproduced with permission of the President and Fellows of Harvard College; C, courtesy of the Herbarium of the British Museum of Natural History.

The only known specimen referable to the original collection, kept at US, which we chose as the species lectotype, is sterile. The copy of Schlechter's original drawings of the holotype illustrates—albeit not perfectly—the floral details and we proposed it as an epitype to help understand Schlechter's concept. The illustration shows its characteristic very small habit with small flowers, successive inflorescence exceeding the leaf size, and the lip provided with a distinct basal callus, unique in the genus.

The species, which Schlechter indicated as “one of the smallest *Pleurothallis* I have ever seen” (Schlechter, 1907), belongs to the genus *Platystele*, which indeed includes some of the smallest orchid species in the world; even within the Lilliputian genus *Platystele*, *P. microtatantha* has very small flowers (Fernández et al., 2014). The name is the basionym of *Platystele microtatantha* (Schltr.) Garay (Bot. Mus. Leaflet 21: 251. 1967).

51. *Pleurothallis simmleriana* Rendle, J. Bot. 38(451): 274–275. 1900. TYPE: COSTA RICA. Flowered by M.W. Barbey at Chambésy, near Geneva, A. Tonduz s.n. (holotype: BM000082204 [Fig. 28C]; tracings of the original drawing of the holotype: AMES 23676/ barcode 00104089).

Homotypic synonyms: *Specklinia simmleriana* (Rendle) Luer, Monogr. Syst. Bot. Missouri Bot. Gard. 95: 263. 2004. *Sarcinula simmleriana* (Rendle) Luer, Monogr. Syst. Bot. Missouri Bot. Gard. 105: 218. 2006.

*Pleurothallis simmleriana* was described on the basis of a plant originally collected in Costa Rica by A. Tonduz and sent as a living specimen to the Barbey-Boissier conservatory in Chambésy. Being a mecca for plant taxonomists and enthusiasts, especially European, the greenhouses at Chambésy served as an invaluable source for rarities and novelties. During a trip that included Geneva around April of 1900, Alfred Barton Rendle (1865–1938), an avid English botanist, made a mandatory visit to William Barbey and his collections, where his attention was brought to two small, delicate Costa Rican species that were flowering at that moment. Rendle, who worked for the Department of Botany of the British Museum (where he would occupy the chair of Keeper of Botany from 1906 to 1930), took dried specimens back to London, where he classified them as new to science. He published both species in the “Journal of Botany, British and Foreign,” as *Pleurothallis simmleriana* and *Physosiphon minor*, in July of the same year. The first was dedicated by request (most probably of Mr. Barbey) to Paul Simmler, chief gardener of the Bossier Collections, whose ability to cultivate tropical plants in that Swiss environment were more than appreciated.

The specimen saved at BM consists of a single leaf and a flowered inflorescence, with a sketch of the dissected perianth. The original label in Rendle's handwriting clearly indicates that the specimen was collected in Costa Rica by Tonduz, and therefore should be considered as the holotype. The drawing of the type at AMES was undoubtedly traced on the BM's material.

The species belongs to the group of *Specklinia brighamii/condylata* (sensu Bogarín et al., 2014), mainly characterized by the caespitose plants less than 10 cm tall, the elongated

peduncles with a succession of overlapping floral bracts, and a “fascicle” of pedicels forming an extremely congested raceme. The flowers are mostly speckled, maculate or stained, with entire, smooth sepals and petals, the petals widen towards the middle and an oblong to spatulate lip. Within this taxonomically difficult group, the separation among species is largely based on subtle floral characters and/or the sum of a set of differences in both vegetative and floral morphology. *Specklinia simmleriana* has been traditionally treated as a widespread species, ranging from Guatemala to Colombia, and several authors also include the Costa Rican *Pleurothallis periodica* Ames in its synonymy (Stevens et al., 2001; Luer, 2002, 2003; Pupulin, 2002; among others). In this interpretation, *S. simmleriana* includes plants with an oblong lip, provided with two distinct, triangular, obtuse projections along the proximal margins, but the drawing of the type at BM simply shows an elliptic lip with no lateral projections, which in Costa Rica are restricted to the Caribbean slopes of the Central and Talamanca mountain ranges. As Tonduz provided no locality data for his collection of the type specimen of *Pleurothallis simmleriana*, the true identity of this species has to be carefully assessed to correctly interpret its taxonomic status.

52. *Pleurothallis tonduzii* Schltr., Beih. Bot. Centralbl., Abt. 2 36(2): 397. 1918. TYPE: COSTA RICA. Forêts de San Ramón, 1500–1600 m, May 1913, A. Tonduz s.n. (*herb. Nac. Costa Rica 17646*) (holotype: B, destroyed; lectotype, designated here: tracings of the original drawing of the holotype, made under Schlechter's supervision, AMES 23680/barcode 00074808 [Fig. 28D]; illustration of the flower from the holotype published by Mansfeld, 1931: no. 144).

Synonyms: *Acronia tonduzii* (Schltr.) Luer, Monogr. Syst. Bot. Missouri Bot. Gard. 103: 199, f. 200. 2005. *Zosterophyllanthos tonduzii* (Schltr.) Szlach. & Kulak, Richardiana 6(4): 193. 2006.

No actual material of the original collection by Tonduz has been located, and for this reason we designate as the species' lectotype the tracings made in Berlin of the original drawings of the holotype prepared by Schlechter, made under his supervision. The tracings clearly show the characteristic, tall habit of the plant with narrow, erect leaves, slightly cordate at the base. The sketches of the flower illustrate the denticulate petals and the lip with strongly revolute margins, appearing pandurate in outline, that Schlechter mentioned in the protologue.

Endemic to Costa Rica and western Panama, *P. tonduzii* is a widespread but uncommon epiphyte of the premontane and montane forests on both watersheds of the continental divide.

53. *Restrepia tonduzii* Schltr., Repert. Spec. Nov. Regni Veg. Beih. 19: 291. 1923. TYPE: COSTA RICA. La Palma, im Jahre 1912, A. Tonduz s.n. (holotype: B, destroyed; lectotype, designated by Luer (Monogr. Syst. Bot. Missouri Bot. Gard. 59: 106. 1996): tracings of Schlechter's original drawings of the holotype, AMES 24512/barcode 00103799). Fig. 29A.



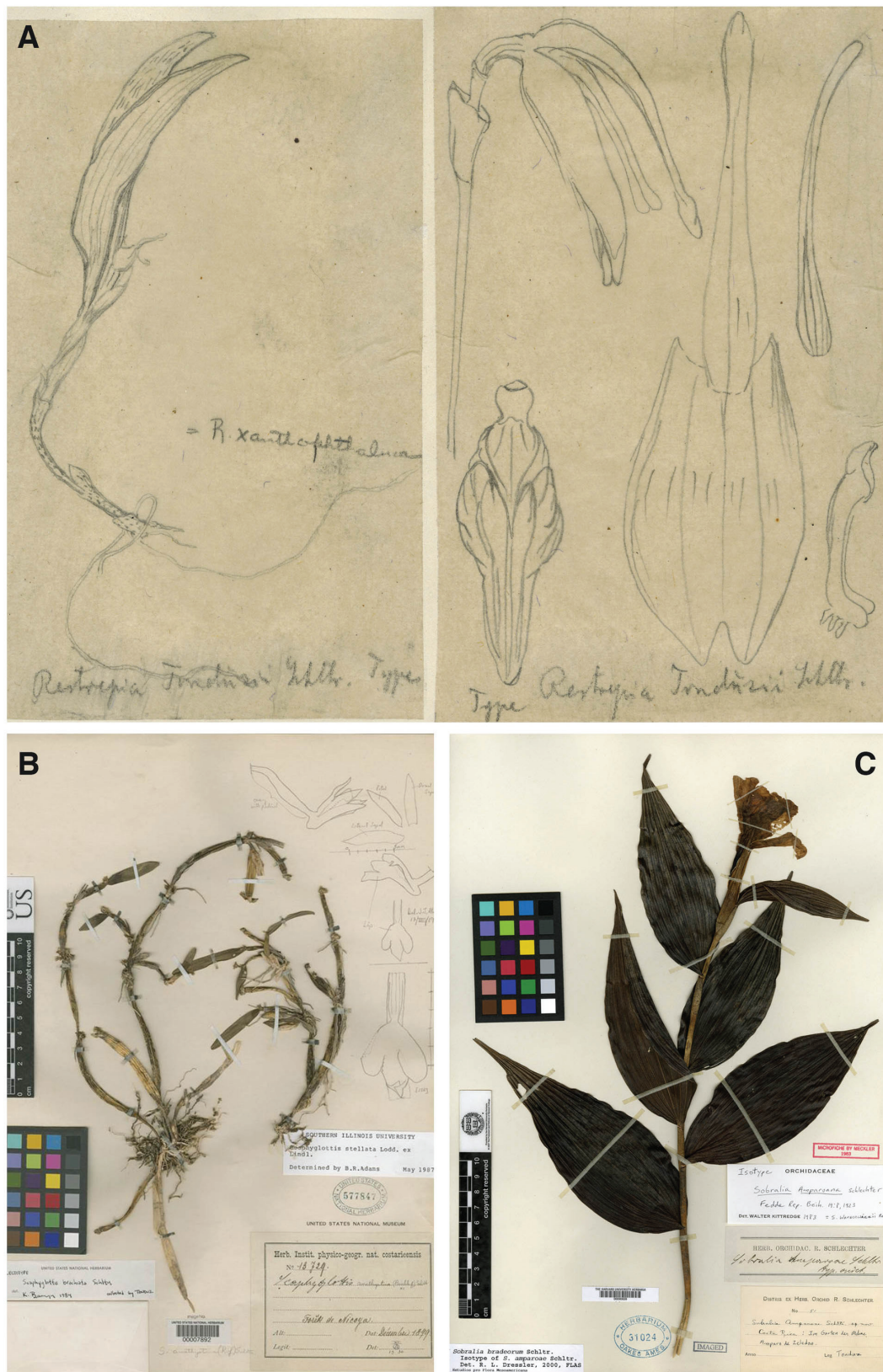


FIGURE 29. **A**, Lectotype of *Restrepia tonduzii* designated by Luer (1996); **B**, Lectotype of *Scaphyglottis brachiata*; **C**, Lectotype of *Sobralia amparaoe*. **A**, **C**, courtesy of the Harvard University Herbaria, reproduced with permission of the President and Fellows of Harvard College; **B**, courtesy of the United States National Herbarium, Smithsonian Institution.

The drawings of the type at AMES, selected by Luer (1996) as the species' lectotype, clearly show the habit of the plant with the characteristic position of the flower, growing near the base of the dorsal side of the leaf. They also show the details of the dissected parts of the flower.

Most authors treat *R. tonduzii* as a synonym of *Restrepia muscifera* (Lindl.) Rchb.f. ex Lindl. (Jørgensen et al., 1999; Luer and Escobar Restrepo, 1996; Hågsater and Salazar, 1990; Pupulin, 2002; CONABIO, 2009; among others), a species widely distributed from Mexico to Colombia, originally described from a plant collected in Guatemala by G. Skinner.

54. *Scaphyglottis brachiata* Schltr., Repert. Spec. Nov. Regni Veg. 9: 432. 1911. TYPE: COSTA RICA. [Guanacaste]. In den Wäldern von Nicoya, blühend in Dezember 1899, A. Tonduz [s.n. (*Herb. Instit. physico-geogr. nat. costaricensis*) 13729 (holotype: B, destroyed; isotype, designated here as the lectotype: US 577847 [Fig. 29B]; tracings of the original drawings of the holotype, made under Schlechter's supervision: AMES 24598/barcode 00104153; illustration of the flower from the holotype published by Mansfeld, 1931: no. 169).

The isotype at US, designated as the species' lectotype, is complete and fertile, and it also bears floral analysis prepared by J. T. Atwood for his studies on Costa Rican orchids. The notably thickened pseudobulbs and the flowers with the column provided with stigmatic, long dentiform wings, easily distinguish the species.

The name is a synonym of *S. stellata* Lodd. Ex Lindl., based on a Guyanese specimen from Demerara, a broadly distributed species ranging from Costa Rica southward to Bolivia, the Guyanas and Brazil.

55. *Sobralia amparoae* Schltr., Repert. Sp. Nov. Regni Veg. Beih. 19: 8. 1923. TYPE: COSTA RICA. Im Garten der Mdme. Amparo de Zeledon, A. Tonduz 51. (holotype: B, destroyed; isotype, designated here as the lectotype: AMES 31024/barcode 00090628 [Fig. 29C]).

*Sobralia amparoae* is one of the species that Schlechter described from dried materials prepared by Tonduz in the garden of Mme. Amparo López-Calleja in San José. The original collecting locality of the specimen, if known at the time of its preparation, was not recorded. The isotype at AMES is the only known evidence of the original collection: it is made by the foliaceous apex of a stem and a flower on a short, conic inflorescence. The flower, however, was gummed on the sheet and is very brittle, so its rehydration would probably be impossible. Unfortunately, no drawing of the type specimen is conserved.

*Sobralia amparoana* is probably a good species. Robert Dressler and the senior author are working at an attempt to reconstruct the identity of this elusive species, trying to match its salient characters, as Schlechter stated them in the protologue, with those of living *Sobralia* specimens with known provenance. When this patient work has concluded, perhaps it could be possible to designate an epitype based on a modern collection with geographic identity. *Sobralia amparoae* is apparently characterized by the tall plants (up

to two meters high) with glabrous stems and large flowers pale rose in color, with a yellow blotch in the throat of the lip, a quite unusual combination of features among Costa Rican species of *Sobralia*.

56. *Spiranthes tonduzii* Schltr., Repert. Spec. Nov. Regni Veg. 9(196–198): 26. 1910. TYPE: COSTA RICA: in den Wäldern von Boruca, blühend im Dez 1891, A. Tonduz s.n. [*Herb. Instit. physico-geogr. nat. costaricensis*] 4645 (holotype: B, destroyed; isotype: US 579418/barcode 00093367 [not seen]; tracings of the original drawings of the holotype, made under Schlechter's supervision: AMES 23177/barcode 00104551 [Fig. 30A]; drawings of the isotype made by O. Ames: AMES 24482/barcode 00104553).

Homotypic synonyms: *Stenorrhynchos tonduzii* (Schltr.) Schltr., Beih. Bot. Centralbl. 37(2): 448. 1920. *Mesadenella tonduzii* (Schltr.) Pabst & Garay, Arch. Jard. Bot. Rio de Janeiro 12: 209. 1953.

The specimen recorded in the type database of the Herbarium at the Smithsonian Institution is the only known isotype, and therefore it would be the best candidate for lectotypification. We do not formally designate it here as such because we were unable to see it or to obtain a digital reproduction of the specimen.

The Ames herbarium at Harvard own a copy of the original drawing of the holotype, made in Berlin under the supervision of Schlechter (Fig. 30A), as well as a drawing of the isotype specimen kept at the Smithsonian. On the latter sheet, Ames himself drew a flower and its dissection during a visit to US.

The name is treated as the basionym of *Mesadenella tonduzii* by Stevens and co-workers (2001), Pupulin (2002), and Dressler (2003), an uncommon species distributed from Mexico to Costa Rica, also doubtfully recorded from Brazil (Forzza et al., 2014).

The only known species of the genus *Mesadenella* in Costa Rica, *M. tonduzii* is recognized by the broadly elliptic, non-articulate leaves forming a basal rosette and the long, lax inflorescence of resupinate flowers, with a distinct mentum produced by the connate base of the lateral sepals.

57. *Stelis aemula* Schltr., Beih. Bot. Centralbl., Abt. 2 36(2): 385. 1918. TYPE: COSTA RICA. Forêts de San Ramón, 1500–1600 m, A. Tonduz s.n. (*Museo Nacional de Costa Rica 17632b*) (holotype: B, destroyed; isotype, designated here as the lectotype: US 1080686/barcode 00093535; epitype, designated here, tracings of the original drawings of the holotype, made under Schlechter's supervision: AMES 23691/barcodes 00090504 [Fig. 30B]).

The isotype at US is the only known extant material of the original collection and is therefore designated as the lectotype. The specimen, however, is sterile, and for this reason we also propose as an epitype the sheet at AMES that includes tracings of Schlechter's analyses, and a sketch with comments by O. Ames.

The epitype sheet, with tracings of Schlechter's original analyses, also includes a sketch made by Oakes Ames of a flower from the isotype at US, but the studied specimen had the lip missing and the petals much damaged. From

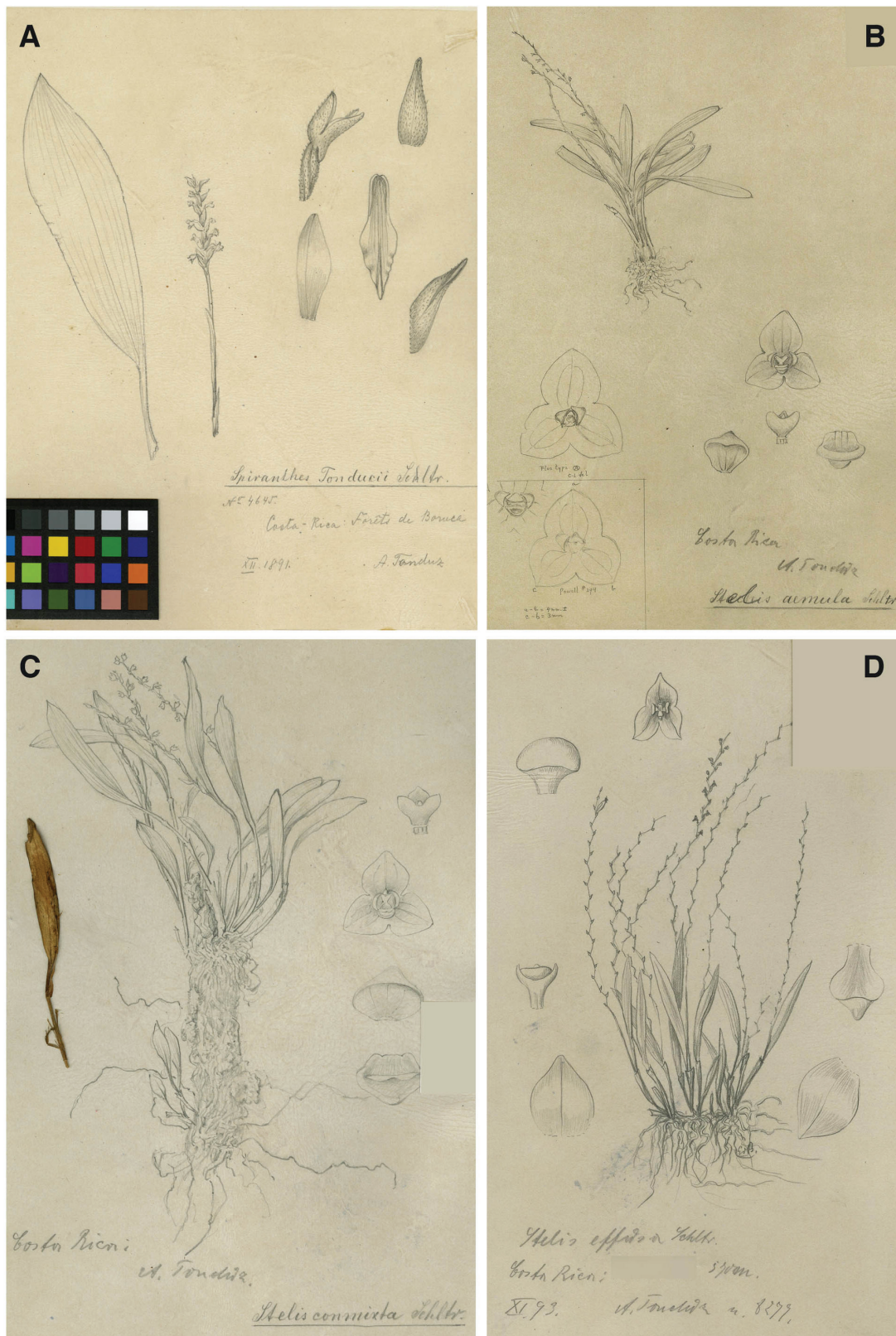


FIGURE 30. **A**, Tracings of the original drawing of holotype of *Spiranthes tonduzii*; **B**, Epitype of *Stelis aemula*; **C**, Tracings of the original drawing of holotype of *Stelis connixta*; **D**, Tracings of the original drawing of holotype of *Stelis connixta*. All by courtesy of the Harvard University Herbaria, reproduced with permission of the President and Fellows of Harvard College.

his observations of the type materials Ames (manuscript notes, 1927) considered that *S. aemula* and *S. sarcodantha* (see below) are difficult to set apart, and probably conspecific. Indeed, the Museo Nacional de Costa Rica sent the specimens of the plants that served Schlechter for describing both new species as a sole collection by Tonduz, filed under the Museum number 17632. Schlechter interpreted one of the specimens as *S. sarcodantha*, and added a “b” to the other one to distinguish it as the type of *S. aemula*. He distinguished *S. sarcodantha* from *S. aemula* by the thinner leaves, the more slender inflorescence and the more membranous flowers. However, from the tracings of the original drawings of both species, the floral details are “inconsiderably” different, as stated by Ames in his note on the epitype sheet.

The ramicaul shorter than the leaf, the subcongested inflorescence, the sepals only partially fused, the three-veined dorsal sepal, and the lip without an apical apicule, distinguish the species among Costa Rican relatives.

58. *Stelis conmixta* Schltr., Beih. Bot. Centralbl., Abt. 2 36(2): 387–388. 1918. TYPE: COSTA RICA. Forêts de San Ramón, 1500–1600 m, A. Tonduz s.n. (*Museo Nacional de Costa Rica 17632a*) (holotype: B, destroyed; isotype, selected here as the lectotype: AMES 23707/barcode 00084129 [the flower preserved in glycerine]; tracings of the original drawings of the holotype, made under Schlechter’s supervision: AMES 23707/barcode 00104691 [Fig. 30C]; illustration of the flower from the holotype published by Mansfeld, 1931: no. 85).

*Stelis conmixta* is the second taxon that Schlechter described on the basis of a collection made by Tonduz at San Ramón, which the staff at the Museo Nacional considered a unique collection, filed under the Museum number 17632. Schlechter interpreted one of the specimens as *S. sarcodantha*, added a letter “a” to one of the others to distinguish it as the type of *S. conmixta*, and marked with “b” the plant that he treated as the type of his *S. aemula*. Schlechter (1918) compared it with *S. sarcodantha*, from which he mainly distinguished it by the thinner stems and leaves and the more delicate, almost twice larger flowers, provided with a rhombic lip. The drawing selected as the lectotype well illustrates these characters. The sheet of the lectotype also has a photograph of the holotype, taken in Berlin prior to its destruction.

The relatively large plant with narrow leaves and congested inflorescences that barely surpass the leaf, and the large flowers with the lateral sepals connate almost to the mid-length and the dorsal sepal five-veined distinguish *S. conmixta*, known only from Costa Rica.

59. *Stelis effusa* Schltr., Repert. Spec. Nov. Regni Veg. 3(42–43): 247. 1906. TYPE: COSTA RICA. epiphytisch auf Bäumen bei Turrialba, ca. 570 m, blühend im Nov 1893, A. Tonduz [s.n. (*Herb. Instit. physico-geogr. nat. costaricensis*) 8279 (holotype: B, destroyed; isotypes: AMES 23717/barcode 00084176, designated here as the lectotype; AMES 21921/barcode 00104739; CR 8279; US

577191; Z 00066959; photograph of the holotype taken in Berlin: AMES 21921/barcode 00104739; tracings of the original drawings of the holotype, made under Schlechter’s supervision: AMES 23717/barcode 00104740 [Fig. 30D]).

The isotypes at AMES (×2), US, and Z are fertile, while the isotype at CR is sterile. AMES 23717/barcode 00084176 is chosen as the lectotype as the sheet on which it is mounted also bears the tracings of Schlechter’s analyses, which are crucial for the understanding of the taxonomic concept.

The lax, zig-zag inflorescence much larger than the leaf, the circular, apiculate sepals and the lip provided with a cavity extending to the apex, distinguish the species, which is endemic to Costa Rica.

60. *Stelis longicuspis* Schltr., Repert. Spec. Nov. Regni Veg. 9(196–198): 28. 1910. TYPE: COSTA RICA. in den Wäldern von La Palma, ca. 1459 m, blühend im Nov 1898, A. Tonduz [s.n. (*Herb. Instit. physico-geogr. nat. costaricensis*) 12650 (holotype: B, destroyed; lectotype, designated here: tracings of the original drawings of the holotype, made under Schlechter’s supervision, AMES 55250/barcode 00104825 [Fig. 31A]; photograph of the holotype taken in Berlin: AMES 55250/barcode 00104825).

The lectotype drawing well illustrates the lax inflorescence, the acuminate petals, and the long-acuminate lip characterizing the species. The sheet also includes a photograph of the holotype taken in Berlin, where the original floral analysis by Schlechter was affixed.

Luer (2009) treated the name as a synonym of *Stelis pardipes* Rehb. f., based on plant collected by H. Wendland in Costa Rica at Desengaño, approximately at the same type locality of *S. longicuspis*. This interpretation was originally suggested by Schlechter himself, who annotated the tracings of his drawings of the type with this synonymy (Fig. 31A).

61. *Stelis sarcodantha* Schltr., Beih. Bot. Centralbl., Abt. 2 36(2): 392–393. 1918. TYPE: COSTA RICA. Forêts de San Ramón, 1500–1600 m, A. Tonduz s.n. (*Museo Nacional de Costa Rica 17632*) (holotype: B, destroyed; isotypes: AMES 24935/barcode 00104976 [the fragments of the flower stored in glycerine], designated here as the lectotype, with sketches by O. Ames of a flower from the type and photographs of the holotype at Berlin [barcode 00084411] and the isotype at US [barcode 00084412] [Fig. 31B]; US 1080686; tracings of the original drawings of the holotype, made under Schlechter’s supervision, AMES 24934/barcode 00104975; analytical drawings by O. Ames of a flower from the type: AMES 33368/barcode 00104977; illustration of the flower from the holotype published by Mansfeld, 1931: no. 106).

The isotype sheet at US, which has four specimens mounted, is sterile, and for this reason we selected to lectotypify the species with the sheet at AMES, which has a flower conserved in glycerine, and analytical drawings made from the type.

The plants with narrowly elliptic leaves surpassing in length the ramicaul, the sepals obtuse, and the ovoid lip with a small callus on the back distinguish the species. D’Arcy

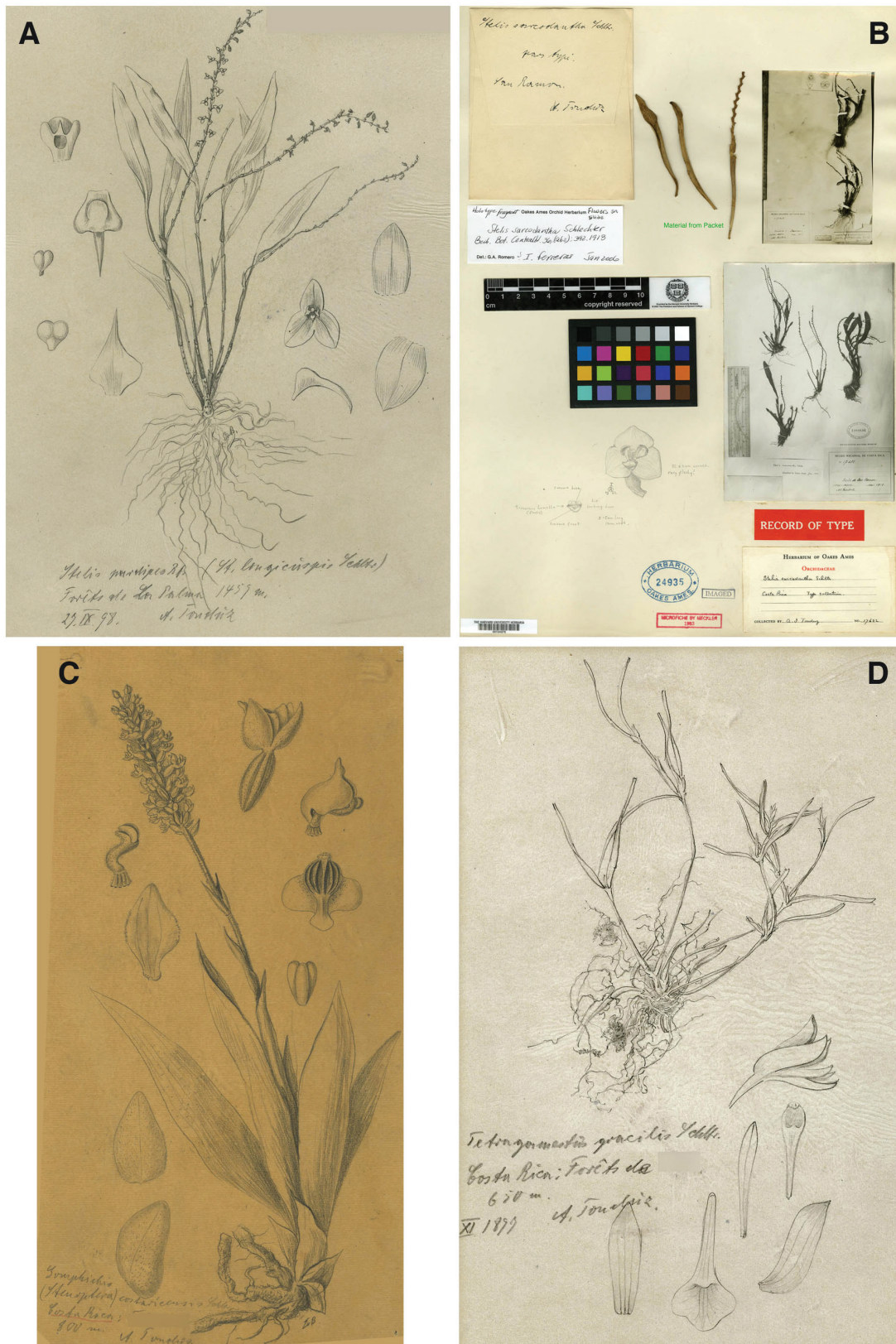


FIGURE 31. **A**, Lectotype of *Stelis longicuspis*; **B**, Lectotype of *Stelis sarcodantha*; **C**, Lectotype of *Stenoptera costaricensis*; **D**, Lectotype of *Tetragamestus gracilis*. All by courtesy of the Harvard University Herbaria, reproduced with permission of the President and Fellows of Harvard College.

(1987) and Stevens and co-workers (2001) treat the name as a synonym of *Stelis aemula* Schltr., a broadly distributed species ranging from Mexico to Costa Rica, described from a simultaneous collection by Tonduz that originally bore the same accession number at the Museo Nacional de Costa Rica (see above).

62. *Stenoptera costaricensis* Schltr., Beih. Bot. Centralbl. 36(2): 375. 1918. TYPE: COSTA RICA. Turrialba. A Tonduz s.n. (holotype: B, destroyed; lectotype, designated here: tracings of the original drawings of the holotype, made under Schlechter's supervision, AMES 24338/barcode 00105055 [Fig. 31C]; illustration of the flower from the holotype published by Mansfeld, 1931: no. 22).

No material of the original collection is known to be in existence, and we are lectotypifying the species with the tracings of the original analytical drawings of the holotype, made in Berlin for the herbarium of Professor O. Ames at Harvard University. *Stenoptera costaricensis* may be recognized by the bracts of the inflorescence shorter than the subtending flowers, the thickened lip with the side lobes erect, flanking the column, and the S-shaped column, which are well illustrated in the lectotype drawings.

The name is the basionym of *Gomphichis costaricensis* (Schltr.) Ames, F.T.Hubb. & C.Schweinf. (Bot. Mus. Leaflet 3: 37. 1934), and the species has been treated under this name in Pupulin (2002) and Salazar (2005, with photograph).

*Rodriguezia inconspicua* Kraenzl., Bull. Herb. Boissier 3(12): 630–631. 1895, replacing name for *Trichocentrum candidum* Lindl.

Synonym: *Hybochilus inconspicuus* (Kraenzl.) Schltr., Repert. Spec. Nov. Regni Veg. 16(468/473): 430. 1920. *Leochilus inconspicuus* (Kraenzl.) M.W.Chase & N.H.Williams, Lindleyana 21(3): 21. 2008.

As Kränzlin received from E. Autran a specimen of a small-flowered Oncidiinae species collected by Tonduz in Costa Rica and grown in the greenhouse of Mme. Barbey at Chambésy, he erroneously believed that it corresponded to the species described almost sixty years before by John Lindley as *Trichocentrum candidum*. The similarity between the two species, if any, is however, superficial at most and

Dressler (2003) considered it a synonym of *Gomphichis adnata* (Ridl.) Schltr. (based on *Stenoptera adnata* Ridl.), but the type of this species was originally collected at Roraima, in Venezuelan Guayana.

63. *Tetragamestus gracilis* Schltr., Beih. Bot. Centralbl. 36(2): 400. 1918. TYPE: COSTA RICA: [Cartago: Turrialba]. Forêts de Tuis, 650 m, Nov. 1897, A. Tonduz [s.n., Herb. Inst. Phys. Geogr. Costar.] 11588 (holotype: B, destroyed; lectotype, selected here: tracings of the original drawings of the holotype, made under Schlechter's supervision, AMES 24591/barcode 00105243 [Fig. 31D]; illustration of the flower from the holotype published by Mansfeld, 1931: no. 168).

In the absence of any actual material referable to the type collection, we have chosen to lectotypify *T. gracilis* with the tracings made in Berlin of the original drawing of the holotype. The drawings well illustrate the habit of the species, with the new pseudobulbs produced at the top of the oldest ones, forming chains, and the 3-lobed, almost rhombic lip, which characterize the taxon.

The name is the basionym of *Scaphyglottis gracilis* (Schltr.) Schltr. (Repert. Spec. Nov. Regni Veg. Beih. 19: 28. 1923), which most authors (see, for example, D'Arcy, 1987; Brako and Zarucchi, 1993; Stevens et al., 2001; Pupulin, 2002; Dressler, 2003; Jørgensen et al., 2014; among others) treat as a synonym of *S. prolifera* Cogn.

#### EXCLUDED NAMES

the two taxa have no relationship. Even though subsequent authors treated the substitute name *R. inconspicua* as that of a new species (i.e., Schlechter, 1920; Chase, 1986; Chase et al., 2008), considering it typified by *Tonduz s.n.*, the name was explicitly proposed as an avowed substitute for *T. candidum*, due to Kränzlin's erroneously belief that the epithet "candida" was already occupied in *Rodriguezia*. As a substitute name is typified by the type of the name that it replaces, *R. inconspicua* is typified by the type of *T. candidum*, a true species of *Trichocentrum* based on a Guatemalan collection by G. Skinner, and is therefore a synonym of the latter species. Tonduz' collection, of which duplicates exist at CR, HBG, and G, has therefore no nomenclatural standing.

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## APPENDIX

## PLANTS DEDICATED TO ADOLPHE TONDUZ

## Acanthaceae

- Aphelandra tonduzii* Leonard  
*Chamaeranthemum tonduzii* Lindau  
*Justicia tonduzii* Lindau  
*Mendoncia tonduzii* Turrill  
*Ruellia tonduzii* Lindau

## Annonaceae

- Guatteria tonduzii* Diels

## Apocynaceae

- Tonduzia* Pittier (genus)  
*Tonduzia longifolia* (A. DC.) Markgr.  
*Tonduzia macrantha* Woodson  
*Tonduzia macrophylla* Kuhlmann  
*Tonduzia parvifolia* Pittier  
*Tonduzia pittieri* Donn.Sm.  
*Tonduzia stenophylla* Pittier

## Araceae

- Anthurium tonduzii* Engl.  
*Dieffenbachia tonduzii* Croat & Grayum  
*Urospatha tonduzii* Engl.

## Aristolochiaceae

- Aristolochia tonduzii* Schmidt

## Aspidiaceae

- Aspidium tonduzii* H.Christ  
*Dryopteris tonduzii* C.Christ

## Asteraceae

- Eupatorium tonduzii* Klatt  
*Liabum tonduzii* B.L.Rob.  
*Mikania tonduzii* B.L.Rob.  
*Senecio tonduzii* Greenm.  
*Sinclairia tonduzii* Rydb.  
*Verbesina tonduzii* Greenm.

## Begoniaceae

- Begonia tonduzii* C.DC. ex Durand & Pittier

## Bignoniaceae

- Anemopaegma tonduzianum* Kranz. l.  
*Petastoma tonduzianum* Kraenzl.

## Bromeliaceae

- Aechmea tonduzii* Mez & Pittier  
*Tillandsia tonduziana* Mez  
*Vriesea tonduziana* L.B.Sm.

## Cactaceae

- Cereus tonduzii* A.Weber  
*Rhipsalis tonduzii* F.A.C.Weber  
*Werckleocereus tonduzii* Britton & Rose

## Capparaceae

- Capparis tonduzii* Briq.  
*Cleome tonduzii* Briq.

## Celastraceae

- Gyminda tonduzii* Loes.

## Cucurbitaceae

- Anguria tonduzii* Cogn.  
*Cyclanthera tonduzii* Cogn. ex Th.Dur.et Pitt.  
*Gurania tonduziana* Donn.Sm.  
*Weinmannia tonduzii* Engl.

## Cunoniaceae

- Weinmannia tonduzii* Engl. & Prantl

## Cyperaceae

- Cyperus tonduzianus* Boeck.  
*Scleria tonduzi* Boeck.

## Euphorbiaceae

- Croton tonduzii* Pax

## Fabaceae

- Anneslia tonduzii* Britton & Rose  
*Cassia tonduzii* Standl.  
*Chamaecrista tonduzii* Britton & Rose  
*Cojoba tonduzii* Britton & Rose  
*Inga tonduzii* Donn.Sm.

## Fagaceae

- Quercus tonduzii* Seem.

## Guttiferae

- Rheedia tonduziana* Engl.

## Lamiaceae

- Salvia tonduzii* Briq.

## Lauraceae

- Ocotea tonduzii* Standl.  
*Phoebe tonduzii* Mex

## Lomariopsidaceae

- Elaphoglossum tonduzii* H.Christ

## Malpighiaceae

- Stigmaphyllon tonduzii* C.E.Anderson

## Marcgraviaceae

- Marcgravia tonduzii* Gilg

## Melastomataceae

- Acinodendron tonduzii* Kuntze  
*Clidemia tonduzii* Gleason  
*Miconia tonduzii* Cogn.

## Meliaceae

- Cedrela tonduzii* C.DC.  
*Guarea tonduzii* C.DC.  
*Trichilia tonduzii* C.DC.

## Menispermaceae

- Hyperbaena tonduzii* Diels

## Monimiaceae

- Siparuna tonduziana* Perkins

## Moraceae

- Ficus tonduzii* Standl.

## Myrtaceae

- Calyptranthes tonduzii* Donn.Sm.

## Orchidaceae

- Camaridium tonduzii* Schltr.  
*Cycnoches tonduzii* Schltr.  
*Elleanthus tonduzii* Schltr.  
*Encyclia tonduziana* Schltr.  
*Lepanthes tonduziana* Schltr.  
*Masdevallia tonduzii* Woolward  
*Microstylis tonduzii* Schltr.  
*Oncidium tonduzii* Schltr.  
*Ornithocephalus tonduzii* Schltr.  
*Pleurothallis tonduzii* Schltr.  
*Spiranthes tonduzii* Schltr.  
*Stelis tonduziana* Schltr.

## Piperaceae

- Peperomia tonduzii* C.DC.  
*Piper tonduzii* C.DC. ex Pittier

## Poaceae

- Chusquea tonduzii* Hack.  
*Paspalum tonduzii* Mez  
*Trisetum tonduzii* Hitchc.

## Pteridophyta

- Acrostichum tonduzii* Christ  
*Aspidium tonduzii* Christ

## Rosaceae

- Lachemilla tonduzii* Dammer

## Rubiaceae

- Cephaelis tonduzii* K.Krause  
*Gonzalagunia tonduzii* K.Krause  
*Hoffmannia tonduzii* Standl.

## Sabiaceae

- Meliosma tonduzii* Donn.Sm.

## Smilacaceae

- Smilax tonduzii* Apt

## Verbenaceae

- Avicennia tonduzii* Moldenke

## Viscaceae

- Phoradendron tonduzii* Trel.