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Typification of Costa Rican Orchidaceae described by Rudolf Schlechter. *Species variorum collectorum*

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Abstract. The typification of 53 orchid species described by Rudolf Schlechter based on specimens gathered in Costa Rica by Paul (Pablo) Biolley, Juan José Cooper Sandoval, Auguste R. Endrés, Carl Hoffmann, Emel Jiménez Segura, Otón Jiménez, Friedrich Carl Lehmann, Ferdinand Nevermann, Richard Pfau, and Henry Pittier in the late 19th and early 20th centuries is discussed, and lectotypes are designated when necessary. Short biographical notes are provided for the main collectors whose Costa Rican orchid gatherings are presented here. Taxonomical and historical backgrounds are presented for the concerned taxa, and the rationale for their typifications is discussed. Lectotypes are proposed for *Epidendrum dolichostachyum*, *E. selaginella, Habenaria jimenezii*, *Hexadesmia jimenezii*, *Masdevallia reflexa*, *Microstylis carpinterae*, *Notylia pittieri*, *Oncidium cabagrae*, *O. costaricense*, *Ornithidium biolleyi*, *Ornithocephalus xiphochilus*, *Physurus lehmannii*, *Platystele bulbinella*, *Pleurothallis pittieri*, *P. sororia*, *Sauroglossum nigricans*, *Scaphyglottis pauciflora*, *S. subulata, Sobralia pfavii*, *Solenocentrum costaricense*, *Stelis coiloglossa*, *S. cooperi, S. cyclopetala*, *S. despectans,* and *S. tonduziana*. An epitype is designated for *Gongora unicolor*.

Keywords: epitypification, flora of Costa Rica, history of botany, lectotypification, nomenclature, Orchidaceae.

INTRODUCTION

Rudolf Schlechter (1872–1925) (Figure 1) was arguably the most proficient orchid taxonomist of the 20th century. With over 5,000 orchid taxa

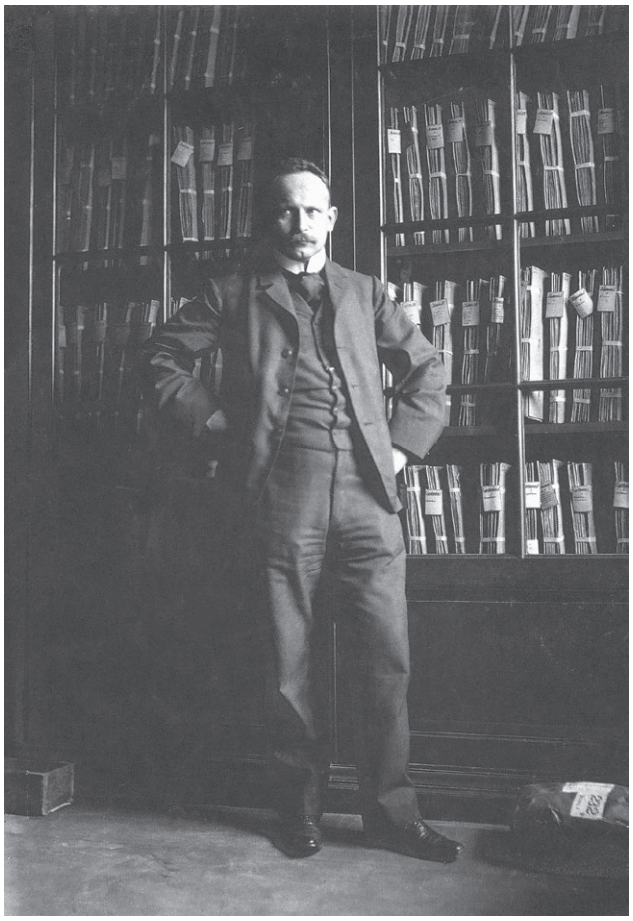

Figure 1. Friedrich Wilhelm Rudolf Schlechter (1872–1925) in the Herbarium of the Botanical Museum in Berlin, 1909. Archives of Rudolf Jenny and courtesy of Dr. N. Kilian, Archives BGBM Berlin-Dahlem.

described before his premature death, he proposed the largest number of new orchid genera and species among his contemporaries and gave birth to monographic revisions of genera and subtribes, as well as national and regional orchid floras. His interest in giving shape to orchid diversity spanned the entire world's tropical floras, from Africa to New Guinea, from Indonesia to South America, from Madagascar to China, from Central America to Japan, from the West Indies to Australia. In 1914 at the age of 42, and many years before ending his botanical activity, he produced an "encyclopedia" of the Orchidaceae, with notes on taxonomy and culture, under the title *Orchideen, ihre Beschreibung, Kultur und Züchtung; Handbuch für Orchideenliebhaber, Züchter und Botaniker* ("Orchids, their description, culture and breeding; manual for orchid lovers, breeders and botanists", Schlechter 1914), a work that Senghas (2002) considered the crowning moment of his career.

From 1899, when he published his first orchid species from Guatemala and Mexico, based on plants collected by Georg Eduard Seler (1849–1922) and his wife Caecilie Seler-Sachs (1855–1933) and received for identification at the Botanical Museum of Berlin-Dahlem (Schlechter 1899), he devoted a considerable part of his work to the study of the Orchidaceae from the American isthmus (for a geographic definition of the region, see discussion in Ossenbach et al. 2007). In the next 25 years, he proposed new genera and species of orchids from Guatemala (Schlechter 1906a, 1906c, 1916, 1918a, 1920, 1921b, 1925), Mexico (Schlechter 1906c, 1914, 1915, 1916, 1918b, 1918c, 1925), Costa Rica (1906a, 1907a, 1907b, 1913a, 1920, 1921a, 1921b, 1923a, 1923b, 1923c, 1923d), Panama (Schlechter 1913a, 1921b, 1922), El Salvador (1913b), and Honduras (Schlechter 1918a). During the 1910's and 1920's, Schlechter was particularly fond of the orchid flora from Mesoamerica, a subject on which he maintained for a long time a fair academic competition with his North American colleague, Prof. Oakes Ames (1874–1950) of Harvard University, who in that same period also devoted himself to a fervent study of the orchid flora of the American isthmus.

It was Costa Rica, however, that truly represented that orchid "El Dorado" (Schlechter 1923c) that he needed to complete his ambitious project of describing a new species of orchid every day of his life (Reinikka 1995). Eventually, he came to describe from the small Central American republic almost four hundred taxa new to science, including 23 new genera, 382 new species, and five subspecific taxa.

Without doubt, a combination of various factors contributed to this prodigious result. The position of Costa Rica in the central portion of the isthmus between two continents, in an area small enough to be affected by the climatic effects of both oceans, but large enough to host a complex system of mountain ranges of different origins that form a defined continental spine, is reflected in a particular number of different life zones and favors the maintenance of an extraordinarily diverse flora. In terms of orchid diversity, Costa Rica has the highest index in the American continent and possibly the highest globally (Karremans and Bogarín 2013), and the recent biogeographical assessment by Crain and Fernández (2020) indicated the unique attributes underpinning diversity patterns and the occurrence of orchid hotspots.

Furthermore, during the last decade of 19th century, Costa Rica saw the birth of a national science as the direct result of the educational reform inaugurated by President Bernardo Soto (1885–1889), who hired a group of European academics to staff the two new public high schools in the capital (Ossenbach 2009) (Figure 2). The

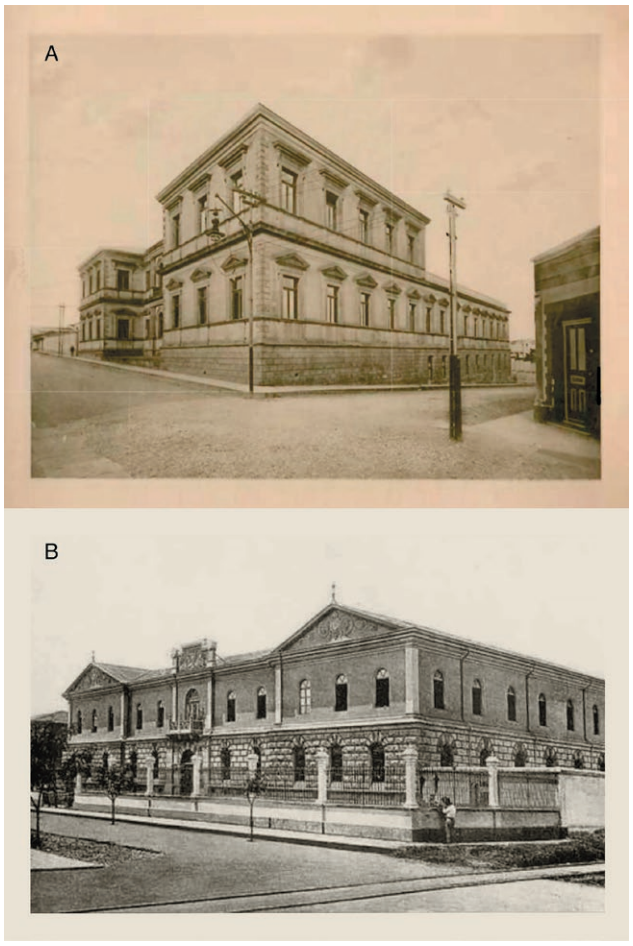

Figure 2. A, Building of the Colegio Superior de Señoritas for girls in 1909. By Vistas de Costa Rica. B, Building of the Liceo de Costa Rica for boys in 1922. By Manuel Gómez Miralles, Documental Patrimonio Arquitectónico.

foundation of the National Museum in 1887 and the Instituto Físico-Geográfico in 1889 symbolized this scientific renaissance. With active botanical institutions and enthusiastic young botanists, early 20th century Costa Rica was in the perfect situation to begin the systematic exploration of its natural resources, and orchids were no exception. The work carried out by the staff of the Museo Nacional, with figures such as the Swiss Henri Francois Pittier (1857-1950), Paul Biolley (1861-1908), and Adolphe Tonduz (1862–1921), the Alsatian Karl Wercklé (1860–1924) and the German brothers Alfred Brade (1867–1955) and Alexander Curt Brade (1881–1971), as well as those of national scholars such as Alberto M. Brenes (1870–1948) and Otón Jiménez Luthmer (1895–1988) among others, had no equal in other Central American countries (Standley 1937; Barringer 1986; Pupulin 2010a; Pupulin et al. 2016; Bogarín et al. in prep).

Finally, it is worth mentioning the personal interest shown by the Cuban Amparo López-Calleja (1870-1951), wife of the notable Costa Rican ornithologist José Cástulo Zeledón (1846–1923), for the flora of her adoptive country, and in particular for orchids, which she cultivated in her large garden in San José. Doña Amparo de Zeledón, as she was respectfully called, supported with her funds many of the field activities carried out by Tonduz and Wercklé (who together collected almost 15,000 specimens of plants for the National Museum) (Ossenbach 2009). Schlechter requested that she expressly arrange for Tonduz to press plants from her orchid garden and send out Wercklé on new collecting excursions, resulting in three shipments of orchid *exsiccata* sent to Schlechter between 1921 and 1923. Schlechter opportunely acknowledged her commitment to creating in her honor the genus *Amparoa* Schltr. (= *Rhynchostele* Rchb.f.), baptizing several orchid species for her name, and dedicating to Doña Amparo a large chapter of his *Beiträge zur Orchideenkunde von Zentralamerika, II. Additamenta ad Orchideologiam Costaricensem*, under the title *Orchidaceae Amparoanae* (Schlechter 1923a).

However, Schlechter's love affair with the orchids of Costa Rica did not depend exclusively on the plants he received for identification from the National Museum, those provided through the interest of Doña Amparo, or the two later mailings by Guillermo Acosta (Schlechter 1923d). He maintained an active collaboration with the Boissier Herbarium, where the orchids that Adolphe Tonduz sent, alive from Costa Rica and subsequently cultivated in the Barbey-Boissier greenhouse Rivage (on the shores of Lake Geneva), were pressed (Pupulin et al. 2016). Furthermore, he visited the famous herbarium of Heinrich Gustav Reichenbach (1823–1889) in Vienna shortly after it was made available again for study, where he studied the early Costa Rican collections by Karl Hoffmann Brehmer (1823–1859), August R. Endrés (1838–1874) Richard Pfau (1856–1897), and Friedrich G. Lehmann (1850–1903), among others, from which he eventually described several new orchid species.

The interpretation of the outstanding work carried out by Schlechter on the orchid flora of Costa Rica has been greatly hampered by the fire of the herbarium at the Botanical Museum of Berlin during an Allied bombing raid in 1943 (Ames 1944, Hiepko 1987) because most of the orchid types, together with Schlechter's analytical sketches, were destroyed (Figure 3). Only those specimens that were moved to the Museum's basements or were on loan to other institutions escaped the fire. Even though some of the orchid types from other regions of the world survived (Butzin 1978), all the type specimens of Orchidaceae from the Neotropics, including the spe-

Figure 3. Part of the Berlin Herbarium destroyed during WWII, March 1943. Archives of Rudolf Jenny and courtesy of Dr. N. Kilian, Archives BGBM Berlin-Dahlem.

cies described by Schlechter, Fritz Kränzlin (1847–1934), and Rudolf Mansfeld (1901–1960) were lost (Butzin 1980). The only known exceptions are a syntype of *Spiranthes goodyeroides* Schltr. from Bolivia (Butzin 1978) and an isotype of *Quekettia australis* Kraenzl., collected in Brazil (Butzin 1980).

It was undoubtedly a fortunate circumstance that the National Museum of Costa Rica kept duplicates of many of the collections made by its scientific staff, which were sent to Schlechter for determination. The German botanist used them as a basis for his descriptions of new Costa Rican orchid species. Many of these isotypes have served to typify the names of Schlechter's orchids, whose original types have been lost (Barringer 1986; Lobo 2004; Pupulin 2010; Pupulin et al. 2016). But even more providential was the fact that during the two decades during which Schlechter devoted himself to describing the orchids that came to him from his correspondents in Costa Rica, his colleague Oakes Ames (Figure 4), who had already developed a reputation of his own in orchidology working on the floras of Malaysia, Indonesia, and the Philippine, directed his attention, with particular emphasis, to the orchids of Mesoamerica. Ames (1908a) described his first orchids of the Central American isthmus only two years after Schlechter, with his second *Decas* of new and critical orchids from Guatemala (Schlechter 1906c), had begun his prolific series of scientific works on the Mesoamerican orchidaceous flora, which would have ended only at his death in 1925. Ames survived Schlechter and continued his work of elucidating Central American orchid flora, albeit with less emphasis, until the mid-1930s. The intense relationship between the two taxonomists was explored by Ossenbach (2009), who highlighted their scientific rivalries and the deeply human aspects of solidarity and friendship that bound them. Not only did Ames contribute financially to the publication of part of Schlechter's work on the orchid flora of the Andean countries after the German botanist had run out of funds for the remaining volumes, but he also supported Schlechter's wife in paying the hospital bills during her husband's illness (Ossenbach 2009). The amount of first-hand information that Schlechter had accumulated in his herbarium during the years of his relationships with the botanists of the Museo Nacional and the group sponsored by Doña Amparo de Zeledón was so fundamental to the understanding of the rich flora of Costa Rica that Ames had several artists at once employed in Berlin to copy (under Schlechter's supervision) the analytical sketches of new species made by the German taxonomist. In a few cases, the tracing was complemented with fragments of the holotype that Schlechter, and later his wife, made available to Ames for the Herbarium of the Botanical Museum at Harvard. After the loss of Schlechter's types in the fire

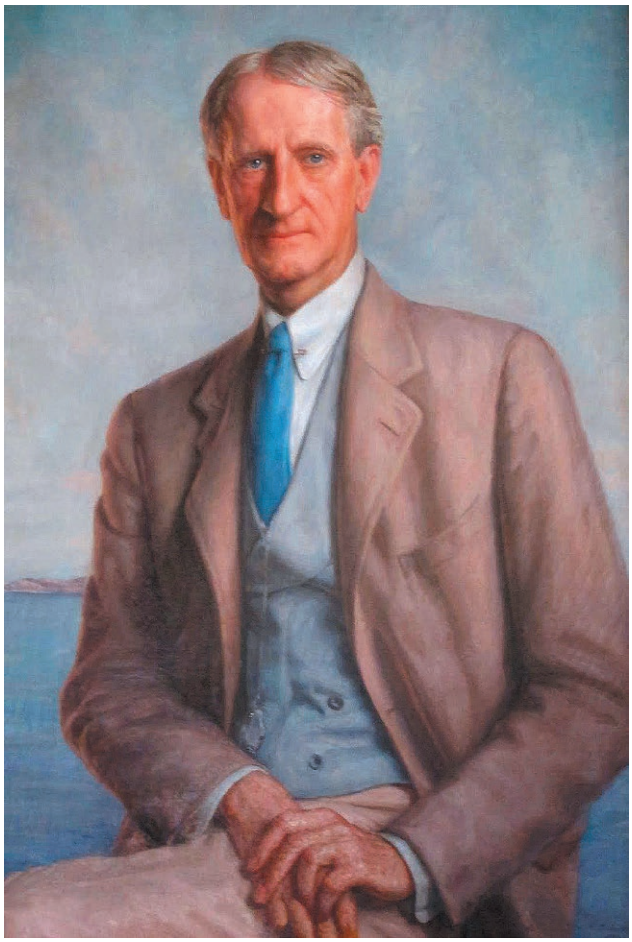

Figure 4. Oakes Ames (1874–1950). Portrait by his wife, Blanche Ames.

of the Berlin Botanical Museum, these materials represent the most precious source available today for scholars to give a face to the descriptions of the new orchid species published by Schlechter in over twenty years of activity, as they make up the only extant evidence of the original materials.

The need for a solid framework that allows a consistent application of species' names relative to the orchid flora of Costa Rica, as well as a critical examination of the taxonomic status of previously synonymized names, has become more and more compelling as the works devoted to the treatment of Orchidaceae for *Flora Costaricensis* are nearing completion. Cataloguing the information on type designations for Costa Rican orchid names and designating new types when appropriate has been particularly important and critical in the orchid species originally described by Schlechter due to the destruction of the main set of type specimens and the associated analytical drawings and notes.

This patient work was inaugurated by Barringer, who in 1986 published a comprehensive paper on the typification of the Costa Rican orchids species described by Schlechter based on the extensive collections by Alberto M. Brenes (Barringer 1986). Pupulin (2010a) faced another large group of orchids described by R. Schlechter from plants collected in Costa Rica by Karl Wercklé, presenting a catalogue of 84 species and providing lectotypification for 60 of them. Another important step was made in 2016, when Pupulin and collaborators typified the over 60 orchid names based on collections carried out by Adolphe Tonduz, proposing 36 lectotypes and two neotypes (Pupulin et al. 2016). Bogarín et al. (in prep) devoted their attention to the orchids sent to Schlechter in 1921 by G. Acosta, upon which the taxonomist described 22 new species in 1923; they designated 13 lectotypes and three neotypes.

The present paper follows previous contributions of this nature. It is dedicated to the typification of orchid species based on Costa Rican material originally gathered by several different collectors and described by Schlechter between 1907 and 1923.

The selection of the floral analyses made by Schlechter for lectotypification purposes, which has been adopted in previous papers (Barringer 1986; Mora and Atwood 1992, 1993; Atwood 1999; Pupulin 2010a; Pupulin et al. 2016), has been questioned by some authors, reviewers or online databases (i.e. Tropicos 2021) based on a supposed "posteriority" of the illustrations compared to the time in which the original materials were prepared (Hermans et al. 2020) or because these drawings are not considered original material and therefore it is an error to be corrected to neotype, Article 9.10 the Shenzhen code (Turland et al. 2018). This is a very strict interpretation of the Article 9.4 that defines original material as the material that "comprises the following elements: (a) those specimens and illustrations (both unpublished and published before the publication of the protologue) that the author associated with the taxon, and that were available to the author prior to, or at the time of, preparation of the description, diagnosis, or illustration with analysis (Articles 38.7 and 38.8) validating the name. However, Article 9.4 *per se* does not delegitimize the reproductions of original material since they are copies of the type material, and therefore, they are unequivocally original material.

Indeed, the fact that Mansfeld published Schlechter's drawings in 1931, five years after the death of the German taxonomist, is certainly undeniable. Likewise, it is unquestionable that the drawings traced by the artists hired by Prof. Ames, and made under the direct supervision of Schlechter, were executed several years after Schlechter had prepared the original materials for the descriptions of his new species. Even more certain is that the negatives exposed in 1929 by J. Francis Macbride in the herbarium of the Berlin Botanical Museum and the pictures taken by Ames were actually printed on photographic paper only years later and that Schlechter never even saw these "photographs". However, no one should doubt that these materials are reproductions of the original material that Schlechter kept in his herbarium and subsequently deposited in the Berlin herbarium. The original drawings affixed to Schlechter's herbarium sheets, immortalized by the negatives of Macbride and Ames, are indistinguishable from those published by Mansfeld (1931) and from the drawings traced for the herbarium of the Botanical Museum of Harvard University (Figure 5). Questioning the conformity of these reproductions to the original materials, that is, questioning their "veracity", simply raises a long-standing and complex problem relating to the technical reproducibility of illustrations, a technological and engineering issue that has continuously evolved and changed over time, to bring today to the apotheosis of electronic image and absolute reproducibility. We believe that no one would question the conformity to the "original" of an image taken today with a mobile phone camera, and the possibility of using it in a publication indicating it as a "lectotype", even if an expert photographer would not miss the possible inconsistencies in the geometry and colors introduced into the image by the perspective, as well as the type of lens, sensor, and software used. The floral analyses published by Mansfeld are in no way "similar" or "inspired" to Schlechter's originals, but their faithful reproduction according to the technical possibilities

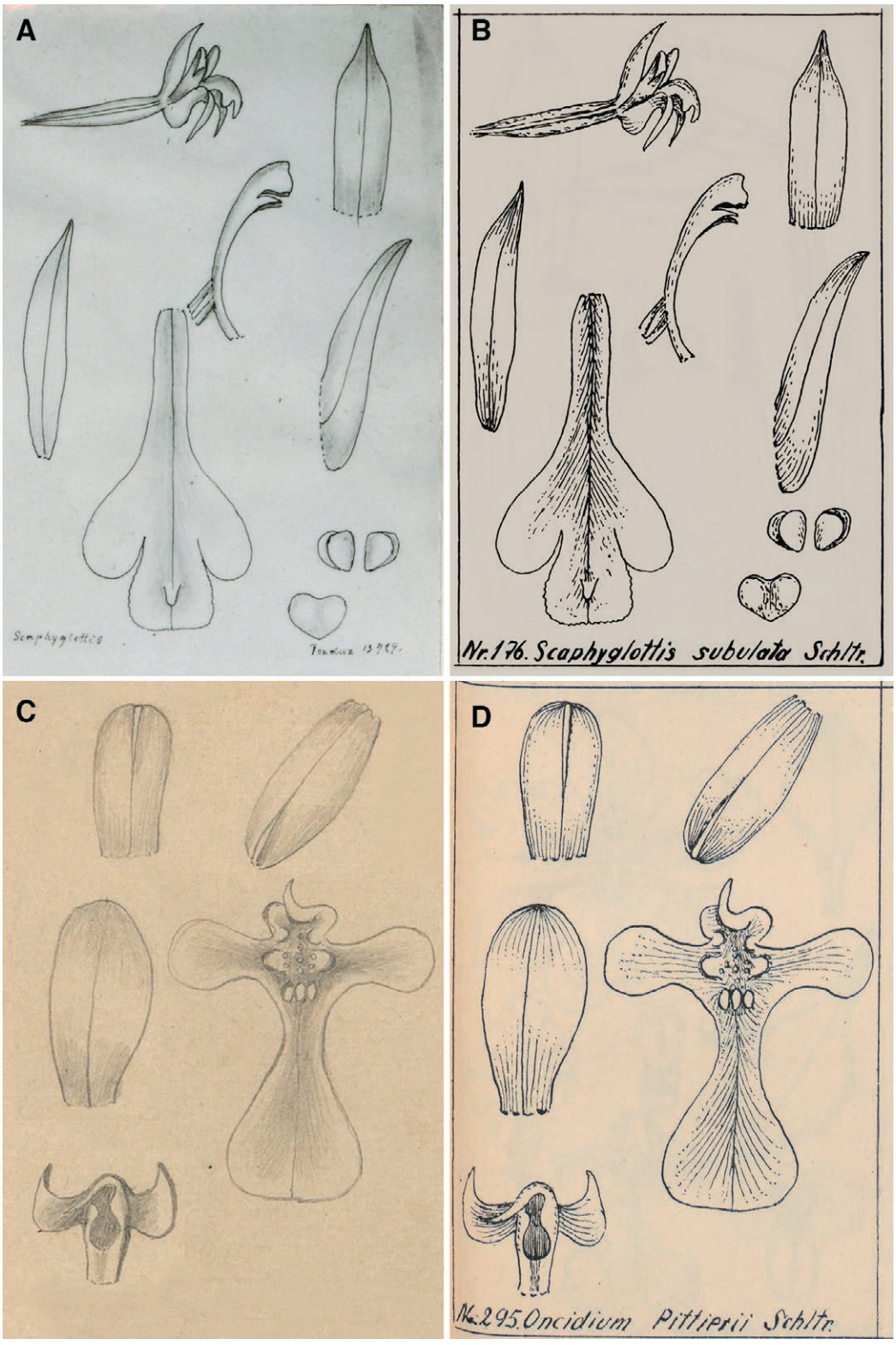

Figure 5. A, Drawing of *Scaphyglottis subulata* from the photo of the holotype taken in the Berlin Botanical Museum and printed in photographic paper kept at AMES 39613. **B**, Drawings based on the type of *S. subulata* published by Mansfeld, 1931: Pl. 44, No. 176. **C**, drawings traced by the artists hired by Prof. Ames, and made under the direct supervision of Schlechter of *Oncidium pittieri* kept at AMES 24264. **D**, Drawings of the type of *Oncidium pittieri* published by Mansfeld, 1931: Pl. 74, No. 295.

allowed by the printing advances of those times (Figure 5B). The artists employed by Ames to work in Schlechter's herbarium did not "imitate" his floral analyses but traced them under the watchful eye of the German botanist. These reproductions were indeed technically closer to the originals than were the engravings made for de Sancha's press concerning the paintings originally made in Peru by the draughtsman of the botanical expedition of Ruiz and Pavón (1794, 1798), or the illustrations of Plumier's Antillean collections published by Burman (in Plumier and Burman 1755), which were themselves copied from what was already a hand-made copy (the *Codex Boerhaavianus*) of Plumier's original drawings (Goethart 1910; Ossenbach 2016), and were used nonetheless to lectotypify Linnaeus's (1759) orchid species (e.g. McLeish et al. 1995). Plumier himself never saw the materials with which the species were lectotypified, for the simple reason that when Burman's work was published in Amsterdam, he had been dead for nearly fifty years. And as for the quality of Burman's copies compared to the original drawings made by Plumier, it might be useful to quote the opinion of John Lindley, who, in addition to being one of the greatest orchidologists of all time, was also an excellent illustrator: "Plumier's Mss. appear, from the copy in Mr. Lambert's Herbarium, to give a very clear account of this beautiful species [*Epidendrum atropurpureum*]; yet Burman, with his usual skill, converted the figure into a caricature […]" (Lindley 1830–1840, p. 100).

Some authors seem to favor using these same materials – which are nothing but reproductions of the original analyses made by Schlechter – under a different type category, selecting them as neotypes rather than lectotypes or just using them as a reference for selecting a neotype (Hermans et al. 2020). However subtle, the difference is certainly more than semantic. As it must be done among the materials that the original author knew and referred to in the description of a new taxon, the designation of a lectotype does not introduce any element of subjective judgment by subsequent authors on the identity of the taxon, except for the verification that the elements chosen for that purpose are in agreement with the protologue (because even the original authors may have made mistakes). On the contrary, the designation of a neotype virtually represents an entirely subjective interpretation of the original authors' ideas and concepts because it uses materials that the author has never known or referred to it. There is undoubtedly a gradient of "certainty" in the various type categories that the Code visualizes to give stability to plant names. All the materials that can be selected to lectotypify a name (e.g. isotypes, syntypes, paratypes, original drawings and illustrations of the type, etc.) have in common the fact that the author of the name has identified them, and therefore adhere to "his" concept of species. Neotypifications and epitypifications, on the other hand, must be viewed with greater caution since they make use of materials that were not identified by the original author and which correspond to the concept of the species according to "someone else", however experienced.

Also, the Tropicos database (https://www.tropicos.org) treated the lectotypifications based on the copy of Schlechter's sketch of the holotype in Pupulin (2010a) and Pupulin et al. (2016) as neotypifications, erroneously stating that "corrected here to neotype because a depiction of the specimen is not considered original material" (Tropicos 2021). However, the Article 9.3 of the Shenzhen code (Turland et al. 2018) states that "a lectotype is one specimen or illustration designated from the original material". Also, Art. 9.12 states that "in lectotype designation… if no isotype, syntype or isosyntype is extant… the lectotype must be chosen from among the uncited specimens and cited and uncited illustrations that comprise the remaining original material". Therefore, if an illustration meets the above requirements, it can be considered original material and thus selected as a lectotype.

For this reason, we choose, in the past, to use these reproductions to lectotypify the species described by Schlechter, and for the same reason, we keep this choice here. Also, other authors favored this view and selected the illustrations of the flower analysis made by Schlechter and posthumously published by Mansfeld (1931) as lectotypes (Guimarães et al. 2019). When none of the syntypes or isotypes has been preserved, these materials must, in our opinion, be considered an integral part of the original materials as Schlechter knew them. They are technically reliable reproductions and certainly incomparably closer to his concepts than any "new" material we might select for typification purposes. It may be that a more orthodox application of the provisions of the Code – but also objectively less sensitive to the essential elements of botany – convinces readers that our lectotypifications must be "corrected" to neotypifications. The Shenzhen code (Art. 9.10) (Turland et al. 2018) admits this possibility, recognizing the value of the conceptual discussion concerning typification and considering our proposals as correctable errors without affecting the validity of the relative interpretations and choices. From our point of view, the choice of lectotypification is undoubtedly more consistent with the taxonomic story of the species discussed in this paper and preferable for nomenclatorial stability.

Schlechter organized his *magnum opus* on the flora of Costa Rican orchids in various chapters, dedicated to those botanists, collectors, and patrons who provided the

most significant contributions, in terms of quantity and variety of materials, to his studies. "*Orchidaceae Amparoanae*", "*Orchidaceae Bradeanae Costaricenses*", "*Orchidaceae Brenesianae*" commemorate some of these important figures (Schlechter 1923a, 1923b, 1923c). The names of other important figures of Costa Rican botany at the turn of the century, such as Tonduz and Wercklé, were recognized in the chapter dedicated to the "patroness" of their activities, Doña Amparo (Pupulin 2010a; Pupulin et al. 2016). The case of Guillermo Acosta, author of two important orchid shipments to Berlin in 1921, has been discussed by Bogarín et al. (in prep), highlighting his close and, in part, unrecognized relationship with Tonduz. The contributions of other collectors, smaller in quantity and perhaps less systematic in intentions, although not less botanically important, were gathered by Schlechter in a particular chapter dedicated to "Various collectors" (Schlechter 1923d). This chapter includes, as its main content in numerical terms, the collections that Guillermo Acosta sent to Schlechter in 1921, whose typification was dealt with by Bogarín and colleagues (in press). Alongside the Acosta orchids, however, there are numerous species of other botanists and naturalists active in Costa Rica at the beginning of the 20th century, whose collections reached Schlechter's desk through the shipments to European specialists made by the curators of the Museo Nacional. For the sake of completeness, we have included in this paper of typification of the orchids *collectorum variorum* also those of some species that did not reach Schlechter's hands directly, since they were not collected during the period of his botanical activity, but rather date back to the second half of the nineteenth century. Schlechter had the opportunity to study them in Vienna when the herbarium of Reichenbach was newly made accessible to the public after it had been closed for 25 years by the will of his testament. Between 1907 and 1923, he described a dozen new species based on the collections that these early travelers and explorers made in Costa Rica from 1857 to 1888 (Schlechter 1907a, 1907b, 1918a, 1920, 1921b, 1923d).

But let us now have a closer look at the different figures, in chronological order and importance, who make up the cast of the "various collectors" of Schlechter's Costa Rican orchids.

COLLECTORES VARII ORCHIDACEARUM COSTARICAE AB R. SCHLECHTER DESCRIPTAE

Karl Hoffmann

The Germans Karl Hoffmann (1833–1859) (Figure 6) and Alexander von Frantzius (1821–1877) came to Costa Rica in 1853, bearing letters of recommendation from Nees von Esenbeck, President of the German Academy, and Alexander von Humboldt for President Juan Rafael Mora. They arrived at Greytown (San Juan del Norte) as passengers of the brig *Antoinette*, together with a group of German immigrants, and continued to Costa Rica along the road of Sarapiquí (Hilje 2007). Frantzius was a professor at the Physiological Institute in Breslau, and Hoffmann was well-known for his practical and literary works during the cholera epidemics in Berlin during the years of 1848 and 1849. Soon they began to explore the country and collect specimens, mainly botanical.

Figure 6. Karl Hoffmann (1823–1859). Courtesy of Luko Hilje.

Hoffmann was later a physician in the Costa Rican army during the war against pro-slavery activist W. Walker. At the same time, Frantzius soon became a successful businessman and owner of a pharmacy. Hoffmann and Frantzius spent their leisure time, the first dedicated to collecting plants and studying their natural distribution, the second to similar studies in mammals and birds. Hoffmann climbed two of Costa Rica's most

important volcanoes: on May 5, 1855, Irazú near Cartago, and in August of the same year, Barva in the province of Heredia.

Hoffmann intended to write a book with the title *Flora and Fauna of Costa Rica*, but he had to abort this idea because of the war and his illness. After the war against Walker, Hoffmann retired to Puntarenas, where he died in 1859. His mortal remains were brought to San José in 1929, where they were buried with military honors.

Hoffmann sent his collections to the herbarium of Berlin, to the renowned botanist Johann F. Klotzsch. They were later described by Reichenbach in 1866 in his *Orchideae Hoffmannianae* (Reichenbach 1866). One can find among them the types for three new species: *Pelexia hoffmannii* Rchb.f., *Epidendrum* (= *Prosthechea*) *ionophlebium* Rchb.f. and *Ponera albida* Rchb.f.

Schlechter described an additional new orchid species collected by Hoffmann as *Epidendrum hoffmannii* (= Prosthechea ionophlebia (Rchb.f.) W.E. Higgins) after he was able to visit Reichenbach's herbarium in Vienna after World War I. Hoffmann collected it in the small village of Curridabat, to the east of San José (misspelled by Schlechter as 'Curidabal') (Pupulin and Karremans 2007).

Auguste R. Endrés

Auguste R. Endrés (1838–1875) was perhaps the most proficient and dedicated botanist who ever studied the orchid flora of Costa Rica. His name appeared sporadically in the *Gardener's Chronicle* since 1871, associated with orchid novelties described by Reichenbach in Hamburg. But unfortunately, we have no portrait of Endrés.

He was born in Herbitzheim, a village in the department of Bas-Rhin in Alsace, France, of a German family, and the roots of his culture were German. In 1855, Endrés moved to New York with his grandfather Auguste Reeb, where he was joined by the rest of the family two years later. Here he made the acquaintance of Isaac Buchanan, a well-known horticulturist, who introduced Endrés to several of the most famous names in orchidology of that time, such as William Hooker, George U. Skinner, James Bateman, Hugh Low, John Day, and Capt. John Dow, probably Endrés' best friend during the years of his Costa Rican adventure. Skinner and Bateman decided to employ Endrés to collect orchids in Costa Rica, following a recommendation by Buchanan.

In 1866, with a commission to collect for Bateman and for Professor Reichenbach, Endrés arrived in Greytown, Nicaragua. He traveled along the San Juan River to neighboring Costa Rica by canoe. His first known orchid, *Dichaea trulla*, was collected and illustrated that same year. During the next seven years spent searching for orchids, Endrés explored all corners of Costa Rica known (Ossenbach et al. 2010; Ossenbach 2013; Ossenbach and Pupulin 2013). Economic constraints forced him to collect orchids for horticultural purposes and even work as the superintendent of the construction of a new road, but he never stopped collecting for science. The Pleurothallid orchids were his main scientific interest, particularly the genus *Lepanthes*, of which Endrés discovered, described, and illustrated, over two-thirds of all the species known from Costa Rica.

Endrés traveled to Europe in 1874 to discuss with Reichenbach – with whom he had a contrasting human and scientific relationship – the future of his research and the use of his materials. During their meeting in Hamburg, Endrés made the acquaintance with the great Czech collector Benedikt Roezl. It was likely on his suggestion that he eventually sailed to Colombia, where he fell ill from pleurisy while traveling toward the highlands of the Cordillera de Santa Marta and died in November of 1874.

What remains of his work shows that Endrés was planning a formal treatment of the orchids of Costa Rica, something to resemble a modern orchid flora. To this aim, he committed himself to explore, collect and prepare specimens, write descriptions, and made botanical illustrations of all the orchid species of Costa Rica he could observe (Pupulin 2013). However, with thousands of botanical drawings, accurate descriptions, and references to the collecting localities ready for the press, plus all the relative dried materials at hand, Reichenbach ended up publishing just a few of them, mainly in his own cryptic descriptive style.

After the death of Reichenbach in 1889, his herbarium, including all Endrés' unpublished work, was bequeathed to the Natural History Museum of Vienna. There, it remained closed for study for another 25 years because of the clauses of his will. Finally, however, Schlechter could study the immense labor left behind by Endrés in the recently opened orchid collection at the Hof Imperial Museum in Vienna during his visit around 1915 (Jenny, pers, comm. 2011), a few months before the beginning of the First World War. Here, among the plants collected 40 years before by Endrés, he described three as new to science (Schlechter 1921a). Schlechter named *Chondrorhyncha endresii* in honor of the great explorer and botanist.

Friedrich Carl Lehmann

As a collector for Hugh Low & Co. of London, Friedrich Carl Lehmann (1850–1903) (Figure 7) went to South America in the late 1870s. Around 1878 he settled

Figure 7. Friedrich Carl Lehmann (1850–1903). Unknown artist.

in Popayán, Colombia, where he held the position of the consul of Germany until his death. He made significant discoveries of new Colombian orchids, especially in the genus *Masdevallia*, which was his favorite. In 1883 he was described as "the most important traveler and collector in the United States of Colombia and neighboring territories of our time" (Regel 1883). In 1878, Reichenbach had published his *Orchidaceae F. C. Lehmannianae ecuadorenses,* where he described Lehmann's collections in Ecuador from the year 1876.

At the beginning of the 1880s, Lehmann traveled to Costa Rica, Panama, and Guatemala. Although his journey's exact dates are not known, the first dated collection from our area is the type specimen of *Catasetum blepharochilum* (=*Catasetum maculatum*) (*Lehmann 1061*, Costa Rica), in December 1881. In a short time, he discovered numerous new Central American species, described later by Schlechter and Kränzlin.

An important number of the orchids collected by Lehmann were described by him and F. Kränzlin in 1899 under the latter's *Orchidaceae Lehmannianae in Guatemala, Costarica, Columbia et Ecuador collectae, quas determinavit et descripsit* (Kränzlin 1899).

Lehmann liked to say: "I attribute my good health, and even my life mainly to two things: First, when in danger either from natives or, worse still, from lawless white men, I never produce a revolver or other weapon… Secondly, I never drink water without first boiling it" (Taylor 1974, p. 176). His precautions did not help him. He shared the fate of many other explorers of these regions and died by drowning in 1903 while trying to cross the Timbiquí River to visit a gold mine in which he had interests. His widow sold his herbarium and his drawings to the herbarium at Kew.

Lehmann was also an excellent illustrator. Many of the pencil drawings with which he accompanied his herbarium specimens are preserved at the herbarium at Kew (Cribb 2010). He also wrote the notes for the geographical descriptions in the monograph of *Masdevallia* edited by the Marquis de Lothian and illustrated by Miss Woolward, where his extensive knowledge about the plants in their native habitats can be appreciated. A new genus was dedicated to him by Kränzlin: *Neolehmannia*.

Lehmann was quite generous in distributing his materials to several botanists and institutions, mostly in Europe. Notable among these were H. G. Reichenbach in Hamburg, R. A. Rolfe in Kew, H. N. Ridley at the British Museum, F. Kränzlin in Berlin (who eventually sold his materials to Hamburg) among others. Even though the largest part of Lehmann's personal herbarium, together with his plant illustrations, were acquired by Kew from his widow in 1903 (Cribb 2010) and are now hosted at the Herbarium of the Royal Botanic Gardens, Kew, UK (K), we are aware of Costa Rican orchid specimens collected by Lehmann in several other herbaria, both in Europe and in the United States.

Interestingly, although the types of some orchid species collected by Lehmann and later described by Schlechter were regarded as destroyed in the herbarium fire of the Berlin-Dahlem Botanical Museum (i.e. Garay 1978; Guimarães et al. 2019; Hágsater 2009; Luer 2017, 2018; Ormerod 2002, 2008), the presence of these specimens at B is highly doubtful. Lehmann used to court his contemporary botanists, sending them plants to provide names for his collections. Certainly, he could not have had a relationship with Schlechter, who was a generation younger, and whose interest in American orchids did not begin until the second decade of 1900, when Lehmann had been dead for over ten years. We know that during the last decade of the 19th century, Lehmann sent material to Fritz Kränzlin, then in Berlin, who in 1899 dedicated a long article to him in which he determined the collections received from Lehmann and described 107 new species, most of them under Lehmann's joint

authorship. This material was probably lent by Kränzlin to the Herbarium of the Berlin-Dahlem Botanical Museum. Still, after 1903 it had to be returned to Kew, which had acquired ownership of Lehmann's collections (Cribb 2010). As to the materials of his private herbarium, probably due to Kränzlin's rivalry with Schlechter, these were eventually not bequeathed to the Berlin-Dahlem Museum, as it might have been expected, but were sold instead to the Herbarium Hamburgense, where they are still held today. In any case, since the article that Kränzlin dedicated to Lehmann includes not only the description of the new species, but also the identification of the remaining material received in Berlin, it is important to note that there is no mention of any of the species collected in Costa Rica and later described by Schlechter. For this reason, it seems reasonable to believe that it was not in Berlin where Schlechter studied Lehmann's material but elsewhere.

Although we have tried to answer the question concerning where Schlechter may have studied Lehmann's Costa Rican plants, we have not reached an obvious conclusion. We have been able to observe specimens of the relatively few orchids collected by Lehmann in Costa Rica between 1881 and 1882 in the herbaria of the Natural History Museum in London (BM), Meise Botanic Garden, Belgium (BR), Geneva, Switzerland (G), the Herbarium Hamburgense, Germany (HBG), the United States National Herbarium at the Smithsonian Institution, Washington, U.S.A. (US), and the Natural History Museum in Vienna, Austria (W) (herbaria acronyms according to Index Herbariorum). None of the specimens we studied, however, are annotated and determined in Schlechter's unmistakable handwriting. We know with certainty that he used to annotate the samples that were sent to him for determination because the National Museum of Costa Rica has a rich series of duplicates of collections made by the scientific staff of the Museum, on which Schlechter affixed his own labels before returning the sheets. This leads us to believe that none of the surviving specimens, among those we have been able to trace, represent the holotype used by Schlechter for his descriptions or, even more so, to make his precise drawings of the plants and their floral analyses.

Even though we cannot state this with absolute certainty, the possibility exists that the holotypes of these species described by Schlechter nevertheless exist in some herbarium, public or private, that we have not had the opportunity to examine. For this reason, in the paragraphs dedicated to the few Lehmannian orchids described by Schlechter, we preferred to indicate that the holotype has not been located. Even if, in the absence of specimens that can be unequivocally interpreted as holotypes, we have designated the relative lectotypes for reasons of nomenclatorial stability, we maintain the hope that such specimens may be found in the future making our lectotypifications superfluous.

Richard Pfau

A Swiss, Richard Pfau (1856–1897) founded a nursery in San José, Costa Rica, in the final years of the XIX century, that sold a great variety of ornamental plants. He also collected native plants for export. Through his collections, we know that he was also in Panama and Colombia, and at least one of the new species described from plants sent to Europe by Pfau came from Mexico: *Vanilla pfaviana* Rchb.f.

Pfau wrote the first work published in Costa Rica about the orchids of this country: *New, Rare and Beautiful Orchids of Costa Rica* (ca. 1895), of greater interest for horticulture than for botany. In this work, Pfau advises on how to grow and pack orchids for exportation and included a list of the species he had for sale in his nursery (Figure 8).

But Pfau's voice was also one of the first to address the rising concern about the destruction of our nature when he describes one of our most beautiful orchids: "Cattleya skinneri, some ten years ago, was a common Orchid all over Central America; but in the last few years it has been exported by shiploads; and to-day – at least in Costa Rica – it has almost become rare" (Pfau ca. 1895).

Pfau also wrote several articles about Central America and its orchids, such as "The climate of Central America, Orchid culture" (Pfau 1883), "Notes on the fertilization of Orchids in the Tropics" (Pfau 1894), and "Costa Rica and its Orchids" (Pfau 1896). As did Roezl and Wallis, Pfau sold his plants in Europe through the agency of Eduard Ortgies in Zurich.

Schlechter described several orchids collected by Pfau in Costa Rica, such as *Sobralia pfavii* and *Telipogon pfavii*. Previously, Reichenbach had described other specimens collected by Pfau in Panamá (*Pleurothallis pfavii* and *Trichocentrum pfavii*), and Rolfe described from Costa Rica *Epidendrum pfavii*, of which a colored illustration by Pfau is preserved on the same sheet as the type specimen in Kew (Figure 9).

Juan José Cooper Sandoval

Henry Cooper, a British mining engineer, came to Costa Rica in 1825, under a contract with the government to survey agricultural lands, claimed by the wealthy landowner Victoriano Fernández, in the north-

Figure 8. Cover of Richard Pfau's book on the orchids of Costa Rica. Printed by the author, San José, ca. 1895.

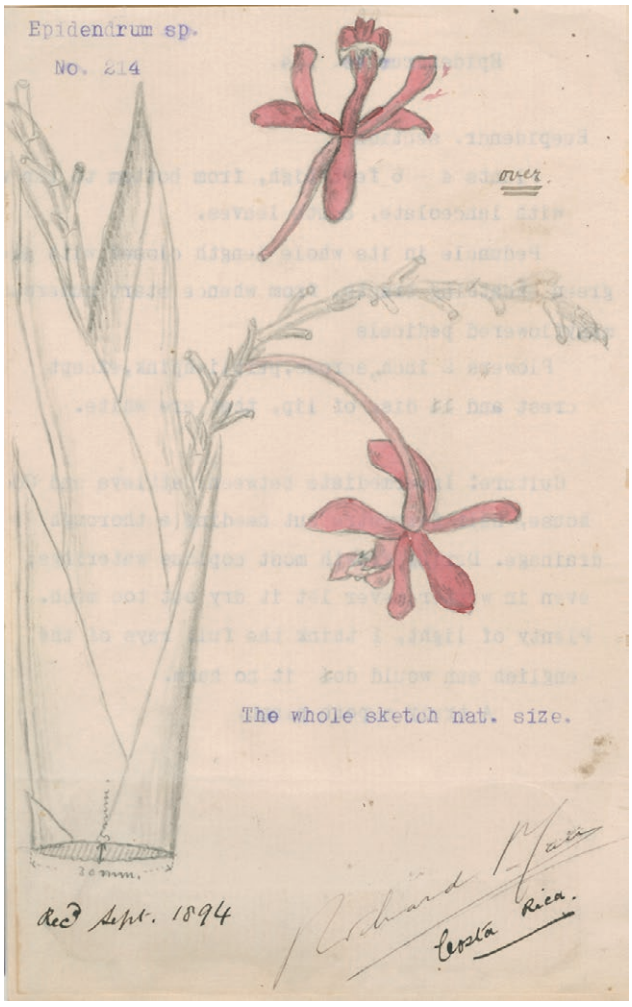

Figure 9. *Epidendrum pfavii*. Coloured illustration by Pfau on the same sheet of type specimen (K000463409).

ern plains of San Carlos bordering a river that has been since then known as Río Cooper. A small hamlet in the same area is also known under the toponym of Cooper. However, it is often misspelled as Kopper, after a German family who settled in the region some thirty years later. Cooper then remained in the country, working in several mines in the hills of Aguacate. He eventually married a Costa Rican girl named Margarita Sandoval, and Juan José Cooper (1843-1911) (Figure 10A), their second son, was born in 1843 (Hilje 2014).

Juan José Cooper was strongly drawn to the natural sciences. Early in his life, he began to work as an assistant to Alexander von Frantzius at his pharmacy in San José. Several young men made their first experiences at von Frantzius' pharmacy, such as Ernesto Rohrmoser, Gerhard Jäger, Manuel Carranza, and Juan José Cooper. They assisted von Frantzius and learned soon to prepare bird skins. Still, their enthusiasm soon diminished, to the point that von Frantzius complained in a letter to Wilhelm Peters, at the Zoology Museum in Berlin: "they behave like small children"! Things changed when young José Cástulo Zeledón (1846–1923) (Figure 10B), rightly called Costa Rica's first naturalist, became his pupil. Through von Frantzius's recommendations, Zeledón was admitted to the Smithsonian Institute in Washington, where he spent several years before returning to Costa Rica as a qualified ornithologist (Hilje 2018).

Zeledón went in 1872 as a zoologist with William Gabb's expedition to Talamanca, and Juan José Cooper went with him as his assistant. They returned to San José with an extensive collection of birds (May 2016). A few years later, when Robert Ridgway described and named the Pacific screech-owl as *Megascops cooperi*, he wrote, "I have named this species at the request of Mr. Zeledón, the collector of the type-specimens, after Mr. Juan Cooper, of Cartago, Costa Rica, a particular friend

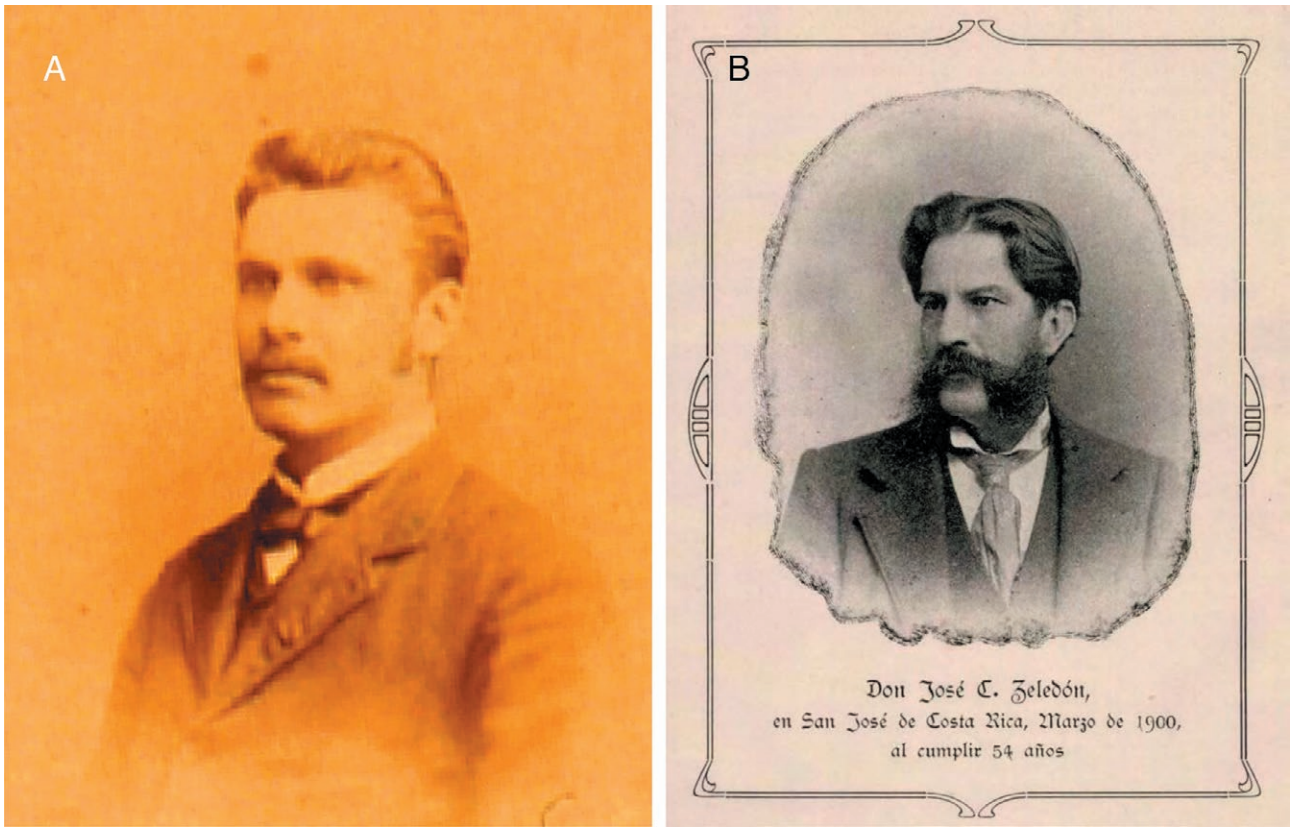

Figure 10. A, Juan José Cooper Sandoval (1843–1811). Courtesy of Luko Hilje. **B**, José Cástulo Zeledón (1846–1923). Unknown photographer.

of his, to whom he is much indebted for many interesting contributions to his collection."

In the early 1890s, Cooper was hired by the recently founded National Museum of Costa Rica as a botanist and taxidermist. Although he collected some 200 species of birds, in his older years, he dedicated himself more to botany, collecting mainly in the vicinity of Cartago, his city of residence. Schlechter named *Stelis cooperi* (collected in 1888) and *Pleurothallis cooperi* (collection date unknown) after him.

Henri Pittier

As part of an educational reform aimed at secularizing public education, the government of President Bernardo Soto (1885–1889) hired a group of European academics to staff the two new public high schools in the capital, San José. The arrival of these academics marks the beginning of a small scientific renaissance in Costa Rica. Two institutions symbolize this renaissance: the National Museum and the Instituto Físico-Geográfico (IFG), founded in 1887 and 1889, respectively.

Among the hired teachers were Pablo Biolley (1861–1908) and Henri Francois Pittier (1857-1950) (Figure 11), who respectively arrived in 1886 and 1887. Pittier lived in Costa Rica until 1905 and, during these years, conducted a systematic exploration of the Costa Rican flora that had no equal in his time in any country of tropical America.

These efforts resulted in the publication of the *Primitiae Florae Costaricensis*, the first flora of Costa Rica, a work that unfortunately was not concluded. It was published in conjunction with a Belgian colleague, Téophile Alexis Durand (1855–1912), and appeared in three volumes and 12 fascicles, published from 1891 to 1905. According to Paul C. Standley (1937: 49), in his introduction to the *Flora of Costa Rica*, "Henri Pittier has undoubtedly gained a more intimate knowledge of the natural history and especially the botany of Central America and northwestern South America than has ever been possessed by any single person."

Although hired to teach at secondary schools, Pittier had more ambitious ideas. After he arrived in Costa Rica, he started to fight to form a meteorological observatory and an institute. The Meteorological Institute was

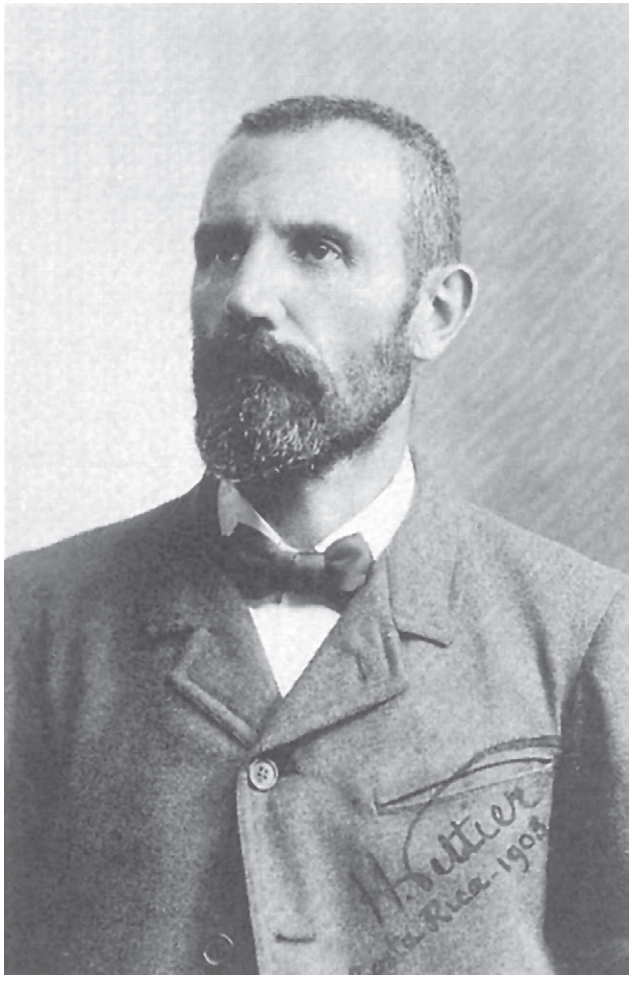

Figure 11. Henri Pittier (1857–1950) in 1903. Unknown photographer.

founded in April 1888 under the direction of Pittier. Pittier's work at the Institute went parallel to the foundation of the National Museum, of which Anastasio Alfaro was named the first director. Pittier, who had been in Costa Rica for only two months, was named on the Board of Directors of the Museum, together with Pablo Biolley and José Cástulo Zeledón. The combined efforts of Pittier, Alfaro, Tonduz, Biolley, Wercklé, Brenes, and the Brade brothers resulted in the formation of the National Herbarium that counted initially with more than 5,000 species and "was unequaled below the Río Grande del Norte" (Standley 1937).

Unfortunately, Alfaro and Pittier, the two prominent scientific entrepreneurs in the small country, never could agree on how to organize their operations. In 1889 the government consolidated the Museum and the Meteorological Institute into one center, the 'Instituto Físico-Geográfico Nacional de Costa Rica'. This was a temporary triumph for Pittier, who was named director. However, integration only lasted a few months, and the Museum was again separated from the rest of the Institute. The inevitable outcome was that constant intrigues and lack of funds led to Pittier's final falling out with the government. In 1905 he left the country to work in the United States and Panama and a long and distinguished career in Venezuela until he died in 1950. The Instituto lost its creator and engine, and Costa Rica a dynamic and prolific scientist with his departure.

Henri Pittier was always interested in orchids. While working on his *Primitiae Flora Costaricensis,* he sent a significant number of specimens to his friend Théophile Durand in Brussels, who passed them on to Schlechter in Berlin for identification. The orchids collected in Panama during his work for the United States government went the same way. After initial differences (Schlechter, for some time refused to return the material sent by Pittier), Pittier worked together with Schlechter until the death of the German scientist in 1925. In 1906, Schlechter dedicated a new genus of orchid to Pittier: *Pittierella* (today a synonym of *Cryptocentrum* or *Maxillaria s.l.*) and several new orchid species, among them *Cranichis pittieri, Epidendrum henrici, Lockhartia pittieri, Notylia pittieri, Oncidium pittieri, Scaphosepalum pittieri*, and *Vanilla pittieri*.

Paul (Pablo) Biolley

Pablo Biolley (1862-1908) (Figure 12) was born in the Swiss town of Neuchâtel in 1862. He obtained his degree in natural sciences there and continued his studies in the Netherlands and Germany. Biolley formed part of the first group of Swiss teachers hired by the government of Bernardo Soto and was appointed as professor of the recently founded 'Liceo de Costa Rica', where he began teaching in 1877. He established himself permanently in Costa Rica, obtaining Costa Rican nationality and marrying a Costa Rican. He died in 1908 at the age of forty-six. His sister Stella arrived in 1889 and was a teacher at the 'Colegio Superior de Señoritas' for many years. In Pablo Biolley's honor, a village and a district in Costa Rica's southern region were named 'Biolley'. Also, an important height in the cordillera of Talamanca carries the name 'Cerro Biolley'.

Immediately after he arrived in Costa Rica, he became one of the scientists who gave generous impulse to the foundation and development of Costa Rica's first scientific institutions and was named naturalist of the National Museum also occupying a chair on the Board of Directors (Díaz and Solano 2009).

Figure 12. Paul Biolley (1862–1908). Unknown photographer.

Biolley accompanied Pittier during many of his explorations, often in the company of Adolphe Tonduz, and was, for a short period (1904) director of the Instituto Físico-Geográfico. He also went on botanical excursions with Charles H. Lankester to the Atlantic region, collecting in Turrialba and Peralta's vicinity.

Although Paul Biolley's primary interest was in entomology, he made important contributions to the knowledge of the Costa Rican flora. To him, we owe, among others, the discovery of the types of *Maxillaria biolleyi* (Schltr.) L.O.Williams) and *Telipogon biolleyi* Schltr. An interesting species of the Costa Rican orchid flora, *Epidendrum insulanum*, was described by Schlechter from a collection by Pittier during an expedition in 1902 with Biolley to Cocos Island.

Emel Jiménez Segura

During the government of President Rafael Yglesias Castro, between 1894 and 1902, several young Costa Rican teachers were sent to complete their education at Santiago de Chile's Pedagogical Institute. Among those who returned to Costa Rica at the turn of the century

Figure 13. Emel Jiménez Segura (1881–ca. 1960) with wife Telma Royo. Courtesy of his grandson Gerardo Mora Jiménez.

were several prominent educators such as José Fidel Tristán, Miguel Obregón Lizano, and Roberto Brenes Mesén. Miguel Obregón was named Consul of Costa Rica in Santiago in 1899, and received the commission of selecting a Chilean professor to take over as director of the Liceo de Costa Rica, founded three years earlier in the aftermath of the educational reform of President Bernardo Soto Alfaro. Doctor Zacarías Salinas was selected and arrived in San José in 1900. He immediately went to work, beginning a profound reform of the school's curricular system.

Salinas hired several of the teachers that had trained in Chile, such as José Fidel Tristán and Roberto Brenes Mesén, and was instrumental in selecting a new group of students that was sent to Santiago in 1901, among them Joaquín García Monge, Alberto Rudín (younger brother of Juan Rudín, brother-in-law of Henri Pittier) and Emel Jiménez Segura (1881–ca. 1960) (Figure 13), who returned from Chile in 1904 and formed part of the new staff of the Liceo. Emel Jiménez was put in charge of the Department of Natural Sciences.

Botanist Otón Jimenéz Luthmer, who studied at the Liceo de Costa Rica and was a pupil of Emel Jiménez, described him as demanding and of strong character but praised his humanity and sense of justice. Jiménez taught his botany classes using live material whenever possible, and for this, he counted on the friendship he had established with Alfredo Brade, a German gardener who had a plant nursery in San José and supplied him with the necessary specimens (Jiménez 1959).

Emel Jiménez continued at the Liceo de Costa Rica until well into the 1940s. In his last active years, between 1938 and 1946, he was joined at the Liceo by another renowned Costa Rican botanist, Rafael Lucas Rodrígues

Figure 14. Wilhelm Heinrich Ferdinand Nevermann (1881–1938). Courtesy of his granddaughter Helga Nevermann.

Caballero. Emel Jiménez and his generation of Costa Rican educators formed in Chile had a strong influence on Costa Rica's educational system in the first half of the XX century.

Schlechter described *Epidendrum urostachyum* from a collection by Emel Jiménez in 1913, in the hills of El Tablazo, to the south of San José.

Ferdinand Nevermann

Wilhelm Heinrich Ferdinand Nevermann (1881–1938) (Figure 14) was born in Hamburg and arrived in October 1909, having graduated with honors as a mechanical engineer a few years earlier. After exploring the whole country and having started a family, in 1918 Nevermann acquired a farm which he called 'Hamburgo', in El Cairo de Siquirres, in the Atlantic region of Costa Rica. While investigating the insects that attacked his banana plantations, Nevermann began an interest that led him to become one of Costa Rica's most important entomologists but a world authority on this subject.

After World War I, the call by the German government to all its citizens living abroad to help refurbish the collections of the German museums that had been destroyed led to Nevermann, sending insect collections to Germany with increasing frequency. In these years, he established close relations with Berlin's Museum and Botanical Garden. Nevermann also sent plants. There is a beautiful white orchid, *Coryanthes nevermannii*, which we owe to him" (Apuntes… 1938: 341). This reference is curious because there is no record of an orchid with the epithet 'nevermannii' in the international registers of botanical nomenclature. The answer to this riddle can be found in a letter by Rudolf Schlechter to Nevermann dated May 8, 1925: "The two orchids which were sent to me interested me vividly. The double inflorescence with the big pendant flowers is a new species of *Coryanthes*, which I will soon describe as *Coryanthes nevermannii* Schltr. It is the first species of *Coryanthes* that until now I have known from Costa Rica. It is for me a special pleasure to dedicate this plant to you. Not smaller interest raised the slender-leaved *Vanilla*. This one also has not yet received a name. It will carry your name as *Vanilla nevermannii* Schltr." (1925 May 8 letter from Schlechter to Nevermann). Schlechter died six months later, in November 1925, and the species dedicated to Nevermann were never published. When in 1943 Schlechter's herbarium was destroyed, all evidence of Nevermann's collections disappeared. Thus, we will never know for sure which species correspond to *Coryanthes nevermannii* and *Vanilla nevermannii*.

In 1936 he took over the Chair of Entomology at the National School of Agriculture, but died shortly afterwards in an unfortunate accident. During the night of June 30, 1938, while studying the nocturnal behavior of a species of ant, he was shot by the son of a neighbor who mistook him for an intruder.

Paul C. Standley visited Nevermann at his farm, where he collected several species of orchids, wrote in his *Flora of Costa Rica*: "To Mr. Ferdinand Nevermann there are special obligations for a most pleasant and profitable visit to his fincas in the lowlands along the Reventazón River. Enviable is the botanist who receives a welcome from so considerate a host, or visits the forest with so competent a guide" (Standley 1937: 59).

Otón Jiménez

Schlechter (1918a, p. 371) wrote: "a young collector stands out lately in Costa Rica, O. Jiménez, who in a short period of activity has already found a series of new species and, through his efforts, promises to enrich significantly our knowledge about the flora of that country, especially of the Orchidaceae." Otón Jiménez (1895–1988) (Figure 15) had the good fortune to study at the Liceo de Costa Rica in its golden age, with teachers like Emel Jiménez, Dr. Michaud, and Paul Biolley. Of a precocious intelligence, he was only 17 years of age when he was appointed as director of the Herbarium of the National Museum, a position he held until 1914. He remembered his first encounter with Charles H. Lankester in 1911: "I still remember his smile while shaking hands with me, observing my youngster-look due to the short trousers, long socks and occasionally a sailor-type blouse, the usual attire of the students of those years […]" (Jiménez, 1967: 248).

Figure 15. Otón Jiménez (1895–1988). Courtesy of Silvia Troyo.

His friendship with Lankester, which lasted throughout their lives, converted him into a lover of orchids, accompanying the great Englishman on many of his collecting trips. Jiménez had the privilege to grow up during a period when the botanical exploration of Costa Rica was in full effervescence. "By 1914, Costa Rica had become the center of scientific research in tropical America" (Evans 1999, p. 20). Jiménez knew the great botanists of his time: Wercklé, Pittier, Tonduz, the Brade brothers, Donnell Smith, Pittier, Britton, Dr. Patiño (Colombia), Wilson Popenoe, Maxon, Standley, Williams, and Allen, and married a daughter of Anastasio Alfaro. Louis O. Williams, who went on a few excursions with Jiménez, described him as "one of the most vivacious and enjoyable gentlemen (and botanists) to be met anywhere" (Williams 1972: 206). In 1915, in a letter to J. Barnhart, Pittier described him as follows: "… a disciple of Tonduz and a pharmacy student, who has already done a large amount of collecting and may yet surpass his master."

Silvia Troyo, a granddaughter of Otón Jiménez, wrote in a personal letter of September 2003: "Because of the ups and downs of the Museum after the departure of Pittier, and because of his studies in Pharmacy, 'Oto' could not continue with the botany, as he wished. However, during the remaining years of his life, he dedicated to botany as much time as he could (which unfortunately was not much). After this period, since the collections at the Museum were not well organized and sometimes were lost, he started to send his collections abroad, I believe for the rest of his lifetime. I know that in the process, many got lost, especially those destined to Europe… his later work, besides collecting and taxonomy, was oriented to the investigation of the nourishing properties of certain plants, or to the study of certain drugs."

Together with Lankester, he had to suffer Oakes Ames' impatience: "When may I expect the specimens that Jimenez has in hand? Now is the time to get this material under the lens." "Otón' has not sent me a scrap. I think it will be wise if you remind him of my needs and accompany him to the post office with the package." (1923 August 24 and December 18 letters from Oakes Ames to Charles H. Lankester). But it was not Ames but Schlechter and several other scientists who really valued Jiménez' work, naming in his honor a series of new species: *Epidendrum jimenezii* Hágsater, *Epilyna jimenezii* Schltr., *Habenaria jimenezii* Schltr., *Lepanthes jimenezii* Schltr., *Pachystele jimenezii* Schltr., *Scaphyglottis jimenezii* Schltr., and *Stelis jimenezii* Schltr.

In addition to being an excellent botanist, Jiménez was a prolific writer, who left interesting articles about

Von Frantzius, Humboldt, Wercklé, Tonduz, Brade, and Lankester; an important bibliographical source for the study of scientific life in Costa Rica during the XIX and the first half of the XX century. "It is much to be regretted that the demands of business affairs have precluded a greater amount of personal fieldwork on the part of one who has such a keen perception of facts and the ability to discover them in strange places." (Standley 1937: 53).

TYPIFICATION OF COSTA RICAN ORCHIDACEAE DESCRIBED BY RUDOLF SCHLECHTER

Species collectoribus variis lectae

1. *Catasetum blepharochilum* Schltr., Repert. Spec. Nov. Regni Veg. Beih. 7: 158. 1920

Type: Cuenca? [(Costa Rica.) "An Rio Toro Amarillo in dichten feuchten Wäldern in der Ebene. Costa Rica. 20 Dezbr. 1881" / "Dans les forets touffues et humides de la plaine sur le Rio Toro Amarillo, 20 Décb. 1881"], *F. C. Lehmann 1061*. Holotype, not found. Isotype, designated as lectotype by Romero and Jenny (1993), G 00168805! (Figure 16). Schlechter's floral analysis published in Mansfeld (1929: Pl. 56, No. 216!). Figure 17.

Catasetum blepharochilum is seldom recorded among the orchids of Costa Rica, even as a synonym of the widespread *C. maculatum*, despite the type specimen having been collected along the Toro Amarillo River on the Caribbean plains east to the Central Volcanic Cordillera in Costa Rica. It was cited neither in Pupulin's catalogue of Costa Rican Orchidaceae (Pupulin 2002) nor in Dressler's treatment of *Catasetum* for the *Manual de plantas de Costa Rica* (Dressler 2003). The reason for this was an error made by Schlechter (1920), who dubiously assigned the type specimen to "Cauca?" (Colombia) and treated the species as an Andean member of the genus. It is regarded as a Colombian conspecific with *C. maculatum* in Ulloa Ulloa et al. (2017), as well as in the major taxonomic databases available on the net [e.g., the Global Biodiversity Information Facility (Döring 2017), Tropicos 2021, WCSP 2021]. The type locality is, however, correctly cited as Costa Rica by IPNI (2020). The isotype at G, that Romero and Jenny (1993) designated as the lectotype, bears two original labels by Lehmann, in German and French, which clearly state that the type specimen was collected in the Caribbean plains of Costa Rica in December 1881, a date that coincides with the visit of Lehmann to the country from December 1881 to May 1882.

The analytical sketch prepared by Schlechter (in Mansfeld 1929) shows the oblong opening (or "mouth") of the deeply saccate, conical lip, provided with delicate hairs along the lateral margins, which is typical of the species and distinguishes it from the similar *C. integerrimum* Hook.

The illustration in Hoehne's (1945, p. 79, No. II) *Flora Brasilica*, which extends the occurrence of *C. blepharochilum* to Brazil, is simply a rearrangement of Schlechter's original sketch posthumously published in the series of his analytical drawings of new orchid species from the Andean countries, edited by Mansfeld in 1929.

2. *Chondrorhyncha endresii* Schltr., Repert. Sp. Nov. Regni Veg. 17: 14. 1921

Type: Costa Rica. "Ohne nähere Standortsangabe", *A. R. Endrés 166*. Holotype, W 0018830!; drawings of the type and descriptions (W 0018831!); drawings of the flower and details (W 0018833!); Endrés' original description of his collection no. 166 (W 0018832!); copy of Schlechter's sketch of the holotype, with a drawing of the plant habit and analysis of the flower (AMES 00106743!) (Figure 18).

This name is a synonym of *Chondrorhyncha bicolor* Rolfe [≡ *Chondroscaphe bicolor* (Rolfe) Dressler] (Pupulin et al. 2009), a concept based on a Costa Rican collection by Richard Pfau (Type: Costa Rica. Without specific locality, *R. Pfau s.n.*, K). For other synonyms of the species see Pupulin (2010b). Dressler (2001, p. 47) considered *C. bicolor* a "lost species," not corresponding to any other Central American species of *Chondroscaphe*, but several of the anomalous features of this species noted in the protologue are attributable to Rolfe's interpretation of the poorly preserved type specimen, which is indistinguishable from Costa Rican populations treated as *C. endresii* (Pupulin 2010b). When Schlechter (1921a) described the forgotten collection kept in Reichenbach's herbarium, together with Endrés' drawings of the plant habit, the flower, and floral details, he did not suspect that it corresponded with the schematic description of *C. bicolor* provided by Rolfe. The shape of the lip, with its oblong, thick, apically bilobed callus, which Schlechter used to characterize *C. endresii*, is nonetheless identical to that of *C. bicolor*, and the drawing of the rostellum of this species, made by Endrés, clearly illustrates the characteristically ligulate, abruptly introrse stigmatic arms that are typical of *C. bicolor* (Pupulin et al. 2009). Among the materials referable to the type at W is a manuscript name by Reichenbach, who intended to publish the species with the name "*Chondrorhyncha umbonata*", and the name "umbonata", in Reichenbach's handwriting, is noted on an envelope mounted on the type sheet (Pupulin et al. 2011, 2013).

Figure 16. Lectotype of *Catasetum blepharochilum* (G 00168805). Reproduced with the kind permission of the Director, Conservatoire et Jardin botaniques de la Ville de Genève.

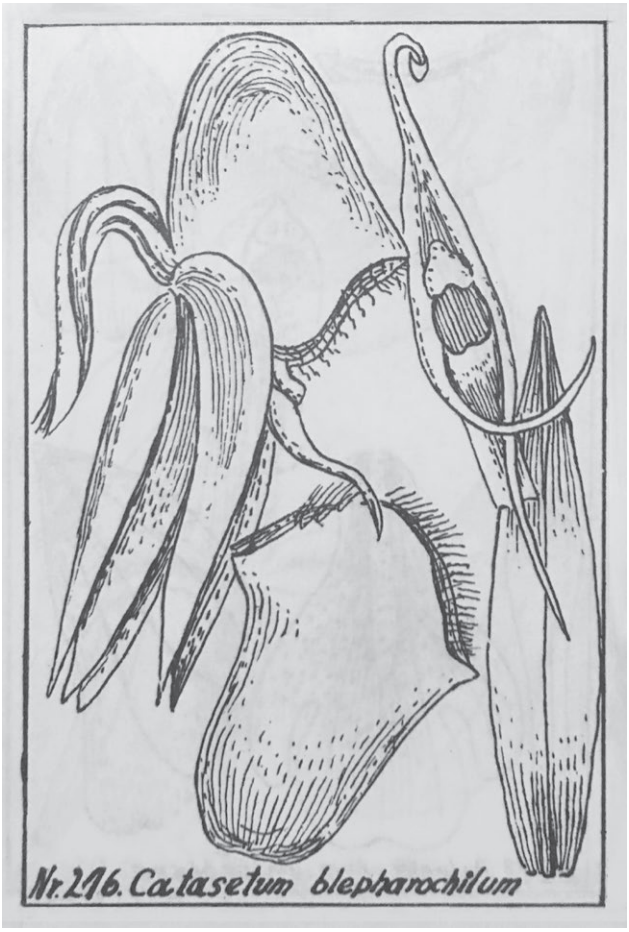

Figure 17. Schlechter's floral analysis of *Catasetum blepharochilum* (in Masfeld 1929: Pl. 56, No. 216).

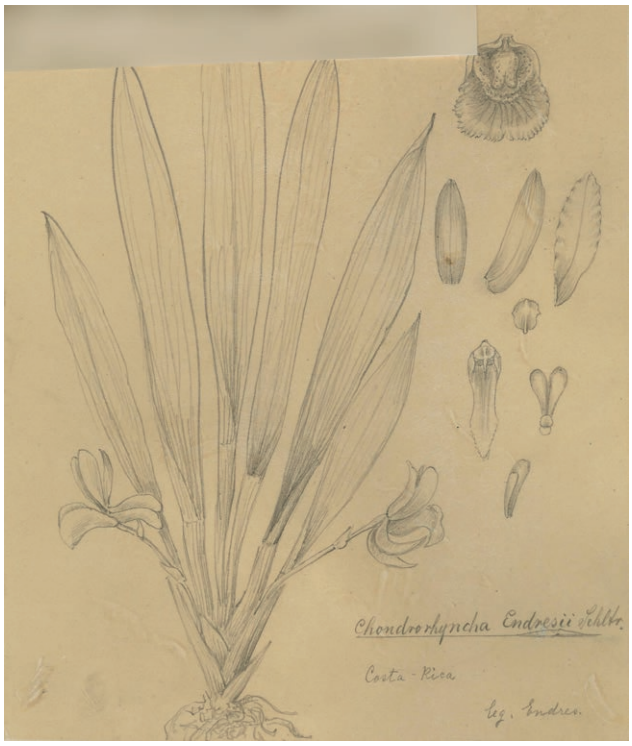

Figure 18. *Chondrorhyncha endresii*, plant habit and analysis of the flower, traced from Schlechter's sketch of the holotype (AMES 00106743). Courtesy of the Harvard University Herbaria, reproduced with permission of the President and Fellows of Harvard College.

3. *Chondrorhyncha reichenbachiana* Schltr., Repert. Spec. Nov. Regni Veg. 17: 15. 1921

Type: Costa Rica. "Cataratas, blühend Marz-August", *A.R. Endrés 557*. Holotype, W 0018829 / Rchb.Orch. 49753!; Endrés' drawings of the type and descriptions, W 0018826 / Rchb.Orch. 28550!; floral analysis of the type, originally prepared by Schlechter, published by Mansfeld (1931: Pl. 63, No. 252!); tracing of Schlechter's sketch of the holotype, with drawing of the plant habit and analysis of the flower, AMES 00106751! (Figure 19).

Among the materials that Endrés sent to Reichenbach from Costa Rica was a specimen of an unknown "*Zygopetalum*" with a characteristic dark grey-green foliage and a solitary flower born above the pendent leaves. Reichenbach knew it was a new species, and he annotated the correspondent sheet with the intended name of "*Chondrorhyncha lamellata*", in allusion to the lamellate callus of the lip. He also used Endrés' accurate sketches to prepare two botanical plates for his *Xenia Orchidacea* (published between 1858 and 1874, and then continued by Fritz Kränzlin until 1900), with the intended names "*Chondrorhyncha lamellata*" and "*Zygopetalum lamellatum*". However, they were never published, and like many other discoveries by Endrés, remained hidden in Reichenbach's herbarium after his death in 1889 (Pupulin 2009). It was only around 1915, just a few months before the beginning of the First World War's hostilities, when Schlechter visited the recently opened orchid collection at the Hof Imperial Museum in Vienna. Here, he found the plant collected 40 years before by Endrés, describing it in 1921 as *Chondrorhyncha reichenbachiana* in honour of his great predecessor.

The large callus that occupies the whole centre of the lip from side to side, noted by Schlechter (1921) in the protologue and his drawing of the type, is diagnostic of the species, which has no close relatives in Central America. The name is the basionym of *Benzingia reichenbachiana* (Schltr.) Dressler.

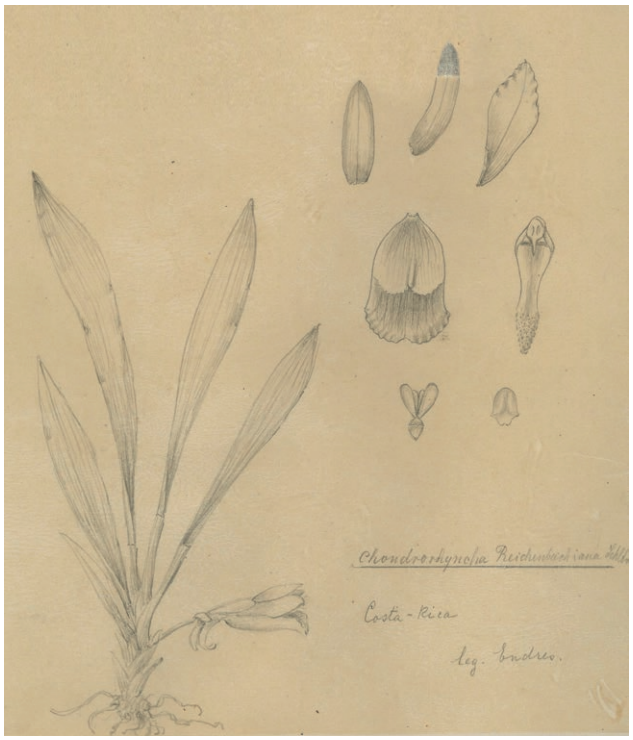

Figure 19. Tracings of Schlechter's original sketch from the holotype of *Chondrorhyncha reichenbachiana* (AMES 00106751). Courtesy of the Harvard University Herbaria, reproduced with permission of the President and Fellows of Harvard College.

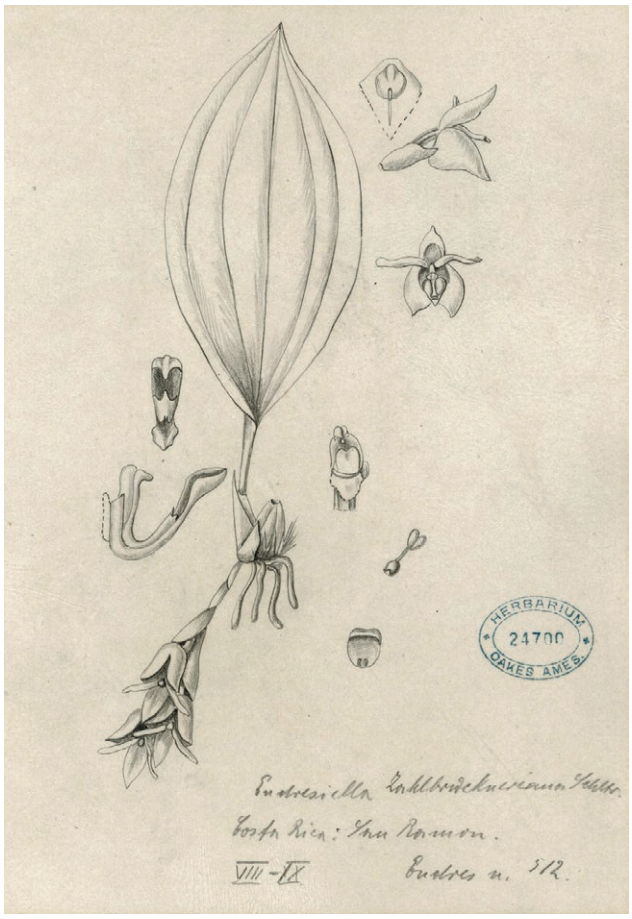

Figure 20. Copy of Schlechter's sketch of *Endresiella zahlbruckneriana* holotype, prepared under his supervision (AMES 99111). Courtesy of the Harvard University Herbaria, reproduced with permission of the President and Fellows of Harvard College.

4. *Endresiella zahlbruckneriana* Schltr., Repert. Spec. Nov. Regni Veg. 17: 14. 1921

Type: "Costa Rica. an der Strasse von San Ramon nach San Carlos, Legua. Blühend im September", *A.R. Endrés 512*. Holotype, W 0019449 / Rchb.f. Orch. 43634!; sketches of the type specimen by Endrés, W 0020711 / Rchb.Orch. 37186!; copy of Schlechter's sketch of the holotype (largely traced on Endrés' drawings), with plant habit and analysis of the flower, prepared under his supervision, AMES 0099111! (Figure 20).

Schlechter created the genus *Endresiella* in 1921 to accommodate a species with the habit similar to a small *Stanhopea* Frost ex Hook., and flowers similar to those of the genus *Schlimmia* Planch. & Linden ex Linden, but smaller. He dedicated the "very excellent new orchid genus to the well-known researcher of the orchid flora of Costa Rica, Endres", noting that his vast collections, together with "marvelously executed drawings", were still largely unpublished in the herbarium of Reichenbach (Schlechter 1921). Schlechter found the imperfect specimen in Reichenbach's Herbarium filed under the genus *Sievekingia* Rchb.f., fortunately, accompanied by excellent and detailed drawings (reproduced in Ossenbach et al. 2013: 316, Figure 316). He dedicated the type species to the Austrian botanist Dr. Alexander Zahlbruckner (1860–1938), curator of the herbarium at the Naturhistorisches Museum in Vienna, then director of the museum's botany department.

The densely packed inflorescence, the white flowers with yellow mesochile and the lateral sepals connate to the middle distinguish the species. This name is the basionym of *Trevoria zahlbruckneriana* (Schltr.) Garay.

5. *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.*

Figure 21. Isolectotype of *Epidendrum cardiophorum* (BR 00000657435). Courtesy of the Meise Botanic Garden Herbarium.

instit. physicgeogr. nat. costaricensis, IFGN)] *9519*. Holotype, B, destroyed; lectotype, designated by Pupulin et al. (2016): CR 9519!; isolectotypes: BR 000006574351 (Figure 21); G 00168668!; US 815035 / 00316361!; copy of Schlechter's drawing of the holotype, made under Schlechter's supervision, AMES (HUH-00070175!).

Pupulin et al. (2016) selected an isotype at CR, which is a complete and fertile specimen in excellent condition, as lectotype (Pupulin et al. 2016 : 289, Figure 17A). As Pupulin et al. (2016) noted, the quote of *Pittier 9519* in the protologue and on the copy of Schlechter's drawing of the type represents a misunderstanding of the numeration system used at the IFGN. 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. *Epidendrum cardiophorum* ranges from Mexico to the northern Andes.

6. *Epidendrum dolichostachyum* Schltr., Repert. Spec. Nov. Regni Veg. 3: 79. 1906

Type: Costa Rica. [San José:] Bei La Palma [1550 m]; blühend im Sep 1896, *H. Pittier* (*10311 Herb. Institut. Costaric.* [Herb. Nac. Costa Rica]). Holotype, B, destroyed [tracing of Schlechter's drawing of the holotype, AMES 00070288! (Figure 22)]. Isotypes: BR 0000006574550!, designated here as the lectotype (Figure 23) (drawing of a flower, AMO, not seen; floral analysis from the type, prepared by Eric Hágsater, CR, two sheets with the same drawings); isolectotype: US, not seen; floral analysis from the holotype, reproduced in Mansfeld (1931: Pl. 49, No. 194!).

Atwood (1989) indicated that the "holotype" of *Epidendrum dolichostachyum* is conserved at CR, but we have not located it. According to Lobo (2003), it was probably never deposited at this herbarium. We found two sheets with copies of a floral analysis of the type of *E. dolichostachyum* prepared by Hágsater; these were probably the materials examined by Atwood (1989).

According to the protologue, *E. dolichostachyum* is morphologically similar to *E. laucheanum* Rolfe, both having narrowly lanceolate, acuminate leaves, a terminal, pendent, many-flowered, racemose inflorescence with ancipitous peduncle, flowers of similar dimensions, with sepals and petals ocher-brown to purplish brown and lime-colored lip, the lip cordate to reniform with incurved sides and recurved at the apex, and the disc with a fleshy costa. Rolfe (1893) described the lip of *E. laucheanum* as having entire margins, while Schlechter (1906b) characterized the lip of *E. dolichostachyum* with subcrenulate margins. However, the flowers on the holotype specimen of *E. laucheanum* (K-000463483) show a lip with minutely erose margins, as previously reported by Santiago and Hágsater (2010). We did not find evidence to separate these taxa, and therefore consider them as conspecific in agreement with Atwood (1989).

Figure 22. *Epidendrum dolichostachyum*, tracing of Schlechter's drawing of the holotype (AMES 70288). Courtesy of the Harvard University Herbaria, reproduced with permission of the President and Fellows of Harvard College.

A specimen collected by A. Tonduz [*10388 Herb. Inst. Fis.-Geogr. Nac.* (BR 0000006573195)] in December 1986, in Alto de Ochomogo (Cartago), Costa Rica, carries an envelope with the annotation: "*H. Pittier 10311* (BR 0000006601348) *Epidendrum dolichostachyum*" (BR-0000006573195), which coincides with the type collection number of *E. dolichostachyum*. Unfortunately, we could not verify that the material contained in this envelope is part of the type of *E. dolichostachyum*.

Figure 23. Lectotype of *Epidendrum dolichostachyum* (BR 0000006574550). Courtesy of the Meise Botanic Garden Herbarium.

7. *Epidendrum hoffmannii* Schltr., Repert. Spec. Nov. Regni Veg. 16: 444. 1920

Type: Costa Rica, [San José:] Curidabal [Curridabat], Mai 1857, *C. Hoffmann 570*. Holotype, W-Rchb.Orch. 51054! (Figure 24); tracing of Schlechter's drawing of the holotype, AMES 70416! (Figure 25).

The comprehensive work by Pupulin and Karremans (2007) revealed a series of details about the history of *E. hoffmannii* that illustrates the taxonomical conundrum in which this species is involved. During his expeditions across Costa Rica, the German physician Karl Hoffmann Brehmer collected two *Epidendrum* plants from the area of "Curidabal" [Curridabat], just a few kilometers outside of the capital city of San José. Deliberately or not, one of the plants was assigned with the collection number *Hoffmann 570*, while the other was left *sine numero*. The plants were sent to Heinrich Gustav Reichenbach, professor of botany and director of the Botanic Gardens at Hamburg University, who probably considered the individuals as belonging to the same species, as he described only one species under the name *Epidendrum ionophlebium*, based on *Hoffmann sine numero* (Reichenbach 1866). The other plant, under field number *Hoffmann 570*, was left to oblivion, until Schlechter had access to the materials sometime around 1915. His eye captured subtle differences between the two individuals and described a new species, *Epidendrum hoffmannii*, based on *Hoffmann 570* (Schlechter 1920). Furthermore, the analysis carried out by Pupulin and Karremans (2007) also revealed that the specimen collected by Hoffmann under his field number 570 and saved at W was mistakenly annotated as *E. ionophlebium*, when it is actually the holotype of *E. hoffmannii*. Apparently, "this specimen is not annotated in Reichenbach's handwriting, and the identification as '*Epidendrum ionophlebium*' was affixed to it when the specimen was mounted in Vienna" (Pupulin and Karremans 2007: 456).

While studying Reichenbach's materials, Schlechter also prepared illustrations of the two *Epidendrum*. Both of these original drawings were destroyed during WWII, but copies prepared under Schlechter's supervision are saved at AMES. This illustration of *E. hoffmannii* distinctly shows a slender plant with ovoid pseudobulbs and narrowly elliptic leaves bearing a short inflorescence with two flowers, characters also seen in the dried specimen. The dissection of the flower displays lanceolate sepals, elliptic petals with acuminate apices, and a lip with a broadly ovate lamina and acuminate apex. These characters, along with the ornate, velvety lip described in the protologue, largely agree with the concept of the widely distributed *Prosthechea chacaoensis* (Rchb.f.) W.E.Higgins and is considered a synonym of the latter.

8. *Epidendrum insulanum* Schltr., Beih. Bot. Centralbl., Abt. 2 36(2): 404. 1918

Type: Costa Rica, [Puntarenas:] Cordon littoral à Wafer Bay, Cocos Island (Pacific Ocean), Jan 1902, *H. Pittier* (*16350 Herb. Nac. Costa Rica*). Holotype, B, destroyed [Schlechter's drawing of the holotype, reproduced in Mansfeld, 1931: Pl. 50, No. 199!; tracing at AMES (HUH 70447!) (Figure 26)]. Isotypes: GR 3580!, selected by Trusty and Blanco (2005) as the lectotype, AMES 73449!; GR 3579! (AMES 73450 / HUH-70446), isolectotype, fruiting (Figure 27); GR 3581! (AMES 73448 / HUH 70445), isolectotype, sterile; CR 16350! (2 sheets), isolectotypes.

Epidendrum insulanum is endemic to Cocos Island, an Oceanic Island situated more than 500 kilometers from the nearest continental point at Cabo Blanco, Península de Nicoya, Costa Rica. On the Island, the species is a common epiphyte in premontane rainforest, where the plants grow on exposed or shady conditions in both shrubs and trees, intermixed with *E. cocoense* (Bogarín et al. 2011). The copy of Schlechter drawing of the holotype well illustrates the single-flowered inflorescences, the erose apex of column lacking the two teeth present in other species of the *Epidendrum ramosum* group, the lateral lobes of the lip that do not cover the apex of column in lateral view, and the triangular callus that runs through the entire lip to form an apical mucro, which are described in the protologue (Schlechter 1918a) and are diagnostic of the species. A modern botanical illustration of *E. insulanum*, based on a living specimen from the island, is provided in Bogarín et al. (2011). Schlechter compared it with *E. repens* Cogn., a species of broad distribution from Mexico to Venezuela and Colombia, and down to Bolivia along the Andes, which also belongs to the *Epidendrum ramosum* group.

9. *Epidendrum paucifolium* Schltr., Repert. Spec. Nov. Regni Veg. 3: 248–249. 1907

Type: Costa Rica. Bei Cuera de Tigre, blühened im Januar 1897, *H. Pittier 10515*. Holotype, B, destroyed. Isotypes: BR 0000006573546!, selected by Santiago and Hágsater (2008) as lectotype (Figure 28); isolectotype: M-0226680!.

Figure 24. Holotype of *Epidendrum hoffmannii* (W-Rchb. Orch. 51054). Courtesy of the Naturhistorisches Museum Wien.

Figure 25. Tracing of Schlechter's drawing from the holotype of *Epidendrum hoffmannii* (AMES 70416). Courtesy of the Harvard University Herbaria, reproduced with permission of the President and Fellows of Harvard College.

Figure 26. *Epidendrum insulanum*, tracing of Schlechter's drawing of the holotype at AMES (HUH 70447). Courtesy of the Harvard University Herbaria, reproduced with permission of the President and Fellows of Harvard College.

According to the protologue and type material, *Epidendrum paucifolium* can be distinguished by the combination of non-pseudobulbous stems, 1–2 apical, erect, leaves, oblong to elliptic leaf blades; the apical inflorescence, with ancipitous peduncle, longer than rachis, with 2 tubular, acuminate bracts approximately the same length as the internodes, ancipitous rachis, with concave, lanceolate, perfoliate, acuminate floral bracts, longer than ovary; few-flowered, with 3–4 flowers opened simultaneously, clustered near the inflorescence apex, the slightly extended oblong, acute sepals, recurved margins, obliquely subspatulate, obtuse petals, lip with the ovate, cordate, obtuse, short apiculate, blade; disc with 3 vertical keels extended to near the apex of the lip; the apex of the column with a pair of prominent digitate teeth on the back, and clinandrium with denticulate margins (Schlechter 1907a). It also has fuchsia or magenta flowers with a column basally white (Santiago and Hágsater 2008). *Epidendrum paucifolium* ranges from Costa Rica to the western Panama.

We were unfortunately unable to locate the type locality, "Cuera de Tigre" (or "Cuero de Tigre") on a modern Costa Rican map.

10. *Epidendrum selaginella* Schltr., Repert. Spec. Nov. Regni Veg. 3: 48. 1906

Type: Costa Rica. [San José:] An feuchten Felsen auf dem Recreo, am Wege von Carillo, c. 1200 m, blühend im Juli 1888, *J. Cooper 523*. Holotype, B. destroyed [tracing of Schlechter's drawing of the holotype, AMES 00070862! (Figure 29)]. Isotype: US 579506 / barcode 00093842!, designated here as the lectotype (Figure 30); floral analysis from the holotype reproduced in Mansfeld (1931: Pl. 57, No. 225!).

Epidendrum selaginella belongs to the *Epidanthus* Group characterized by flat leaves, a tiny ligule opposite to the blade, entire lip, and the anther with four poles. The species is distinguished by having thin and apically laterally compressed stems, oblong to ovate, emarginate leaves, flowers congested in the apical third of the inflorescence, papillose ovary, abaxially papillose sepals, and unguiculate lip, with the subdeltate, subcordate and obtuse, blade without a keel. *Epidendrum selaginella* ranges from Costa Rica to central Panama.

Figure 27. Isolectotype of *Epidendrum insulanum* [GR 3581 (AMES 73448)]. Courtesy of the Harvard University Herbaria, reproduced with permission of the President and Fellows of Harvard College.

Figure 28. Lectotype of *Epidendrum paucifolium* (BR 0000006573546). Courtesy of the Meise Botanic Garden Herbarium.

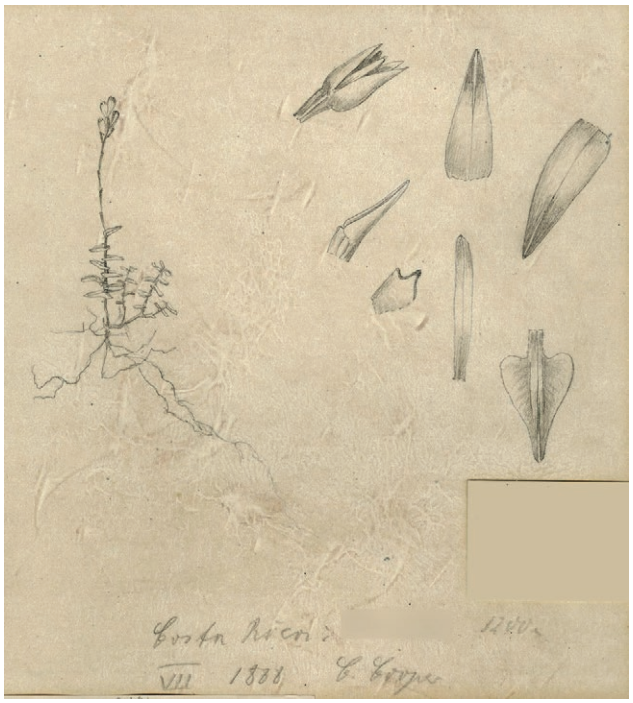

Figure 29. Tracing of Schlechter's drawing from the holotype of *Epidendrum selaginella* (AMES 00070862). Courtesy of the Harvard University Herbaria, reproduced with permission of the President and Fellows of Harvard College.

The sketch of the holotype prepared under Schlechter's supervision includes the plant habit and a floral analysis (Figure 29), the latter reproduced by Mansfeld (1931), clearly showing the diagnostic characters of *E. selaginella*. Three floral drawings that do not belong to the type collection but are instead associated with a collection by Maxon (no. *467*) are placed on the lower-left corner of the sheet of the holotype drawing (AMES 00070862). Schlechter (1906a) stated that the vegetative appearance of this species resembles *Selaginella* P. Beauv., a genus of lithophytic plants, hence its specific epithet.

11. *Epidendrum tenuiflorum* Schltr., Repert. Spec. Nov. Regni Veg. 3: 49. 1906

Type: Costa-Rica. [Cartago:] Bei Aguacaliente, ca. 1300 m; blühend am 2 Jan 1888, *H. Pittier 38*. Holotype, B, destroyed; tracing of Schlechter's drawing of the holotype, AMES 24105 / barcode 00070928!, selected by Mora and Atwood (1992) as lectotype (Figure 31); Schlechter's floral analysis reproduced in Mansfeld (1931: Pl. 58, No. 229!).

Mora and Atwood (1992, t. 1457) designated the tracings of Schlechter's drawing of the holotype (AMES 24105) as the lectotype (cited originally as "type"). This is regarded as a formal lectotypification because the authors indicated by direct citation the term "type" (Art. 7.11) and specified the herbarium where the specimen is kept (Art. 40 note 1). Also, before 1 January 2001, it was not mandatory to include the typification statement phrase "designated here" (*hic designatus)* or an equivalent (Art. 7.11) and "lectotypus", its abbreviation, or its equivalent in a modern language (Art. 9.23) (Turland et al. 2018). Thus, the lectotypification proposed by Santiago and Hágsater (2006) is a superfluous type designation (Art. 10.5). Together with the floral analysis published by Mansfeld (1931), this drawing is the only copy of the original material associated with the protologue of this species. It also includes a sketch of the plant habit that was not included in Mansfeld's compilation. The drawing shows a combination of diagnostic characters consistent with the protologue of *E. tenuiflorum* (Schlechter 1906a), such as the linear leaves and short inflorescence, the trilobed lip provided with short, lanceolate, acute lateral lobes, and a broadly obcuneate, deeply bilobed middle lobe with a tiny apicule, the elongate, shallowly trilobed clinandrium exceeding the column length, with minute lateral lobes and a widely ovate, apiculate middle lobe. It is noteworthy that the lip's lateral lobes were drawn recurved when they are incurved in living flowers, but this is probably because rehydrated material was used to prepare the sketches.

Schlechter (1906a) suggested that *E. tenuiflorum* is morphologically similar to *Epidendrum centropetalum* Rchb.f. (Reichenbach 1852) but differs from the latter by the mostly trilobed clinandrium. However, the two taxa are indistinguishable when comparing the protologues. Therefore, Santiago and Hágsater (2006) consider them conspecific.

12. *Epidendrum urostachyum* Schltr., Beih. Bot. Centralbl., Abt. 2. 36(3): 409-410. 1918

Type: Costa Rica. El Tablazo, près San José, 1900 m, Sept 1913, *E. Jiménez s.n. (n. herb. Nac. Costa Rica 17651)*. Holotype, B, destroyed; traces of the original drawing of the holotype made under Schlechter's supervision, an envelope putatively containing fragments of the holotype, and flowers saved in glycerin, AMES 82254 / barcode 00070965, designated here as the lectotype (Figure 32). Schlechter's drawing of the holotype published in Mansfeld (1931: Pl. 58, No. 231!).

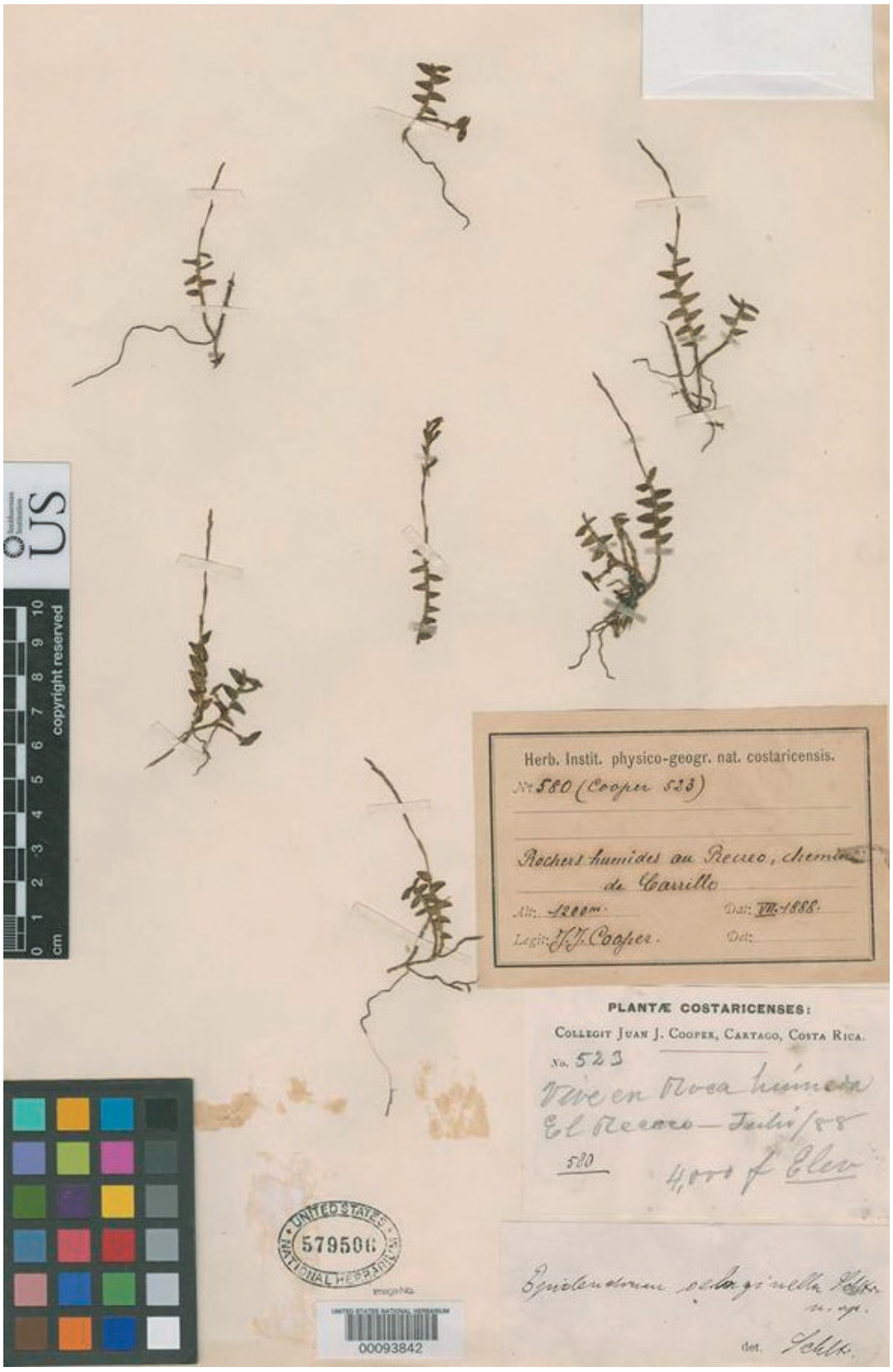

Figure 30. Lectotype of *Epidendrum selaginella* (US 579506). Courtesy of the United States National Herbarium, Smithsonian Institution.

Figure 31. Lectotype of *Epidendrum tenuiflorum* (AMES 24105). Courtesy of the Harvard University Herbaria, reproduced with permission of the President and Fellows of Harvard College.

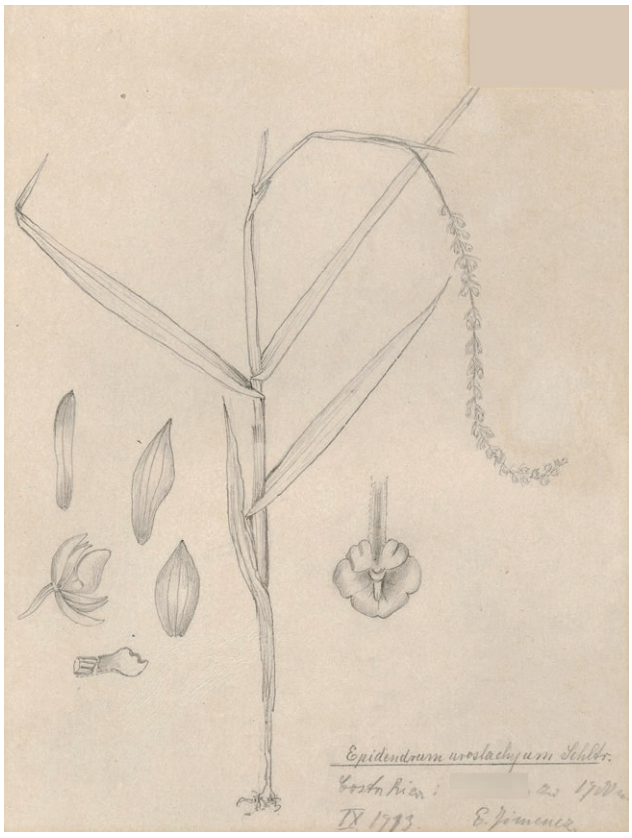

Figure 32. Lectotype of *Epidendrum urostachyum* (AMES 82254). Courtesy of the Harvard University Herbaria, reproduced with permission of the President and Fellows of Harvard College.

The herbarium specimen AMES 82254 is a mixed collection, comprising the tracings of the holotype drawing made under Schlechter's supervision, an envelope supposedly containing "fragments of holotype", and flowers preserved in a separate glycerin collection identified with the same accession number. Since restrictions associated to the COVID-19 pandemic limited our possibilities to confirm and study the contents in the envelope and the glycerin material, we are basing our selection of the lectotype on the tracings of the holotype drawing. The tracings show a slender plant of narrow leaves and hanging inflorescence, which bears flowers with oblong sepals, oblique petals and orbiculate lips. The base of the lip is adnate to the column, while the lamina shows wavy margins and a callus extending to the middle.

Schlechter distinguished *E. urostachyum* from the two morphologically similar species *E. laucheanum* and *E. dolichostachyum* by the smaller flowers and the shape of the lip (Schlechter 1918a). Later, several authors have considered the concept described by Schlechter as *Epidendrum urostachyum* under the synonymy of *Epidendrum laucheanum* (Pupulin 2002, Hágsater 2010, Bogarín et al. 2014), a variable species first found in Popayán, Colombia (Rolfe 1893). *Epidendrum laucheanum* is recognized by a long, hanging inflorescence that arches towards the floor, with ocher-brown flowers and a green to orange or purple lip (Dressler 2003), which largely agrees with the original description and tracings of *E. urostachyum*.

13. *Gongora unicolor* Schltr., Repert. Spec. Nov. Regni Veg. Beih. 19: 299. 1923

Syntypes: Costa Rica. Ohne nähere Standortsangabe (kultiviert im Garten von Mr. C.W. Powell, Panama), *C. H. Lankester s.n.* (B, destroyed). Costa Rica. [Limón:] Las Mercedes, Ebene von Limon, Nov 1921, *F. Nevermann s.n.* (B, destroyed); Schlechter´s floral analysis of the holotype, reproduced in Mansfeld (1931: Pl. 62, No. 248!), designated here as lectotype (Figure 33).

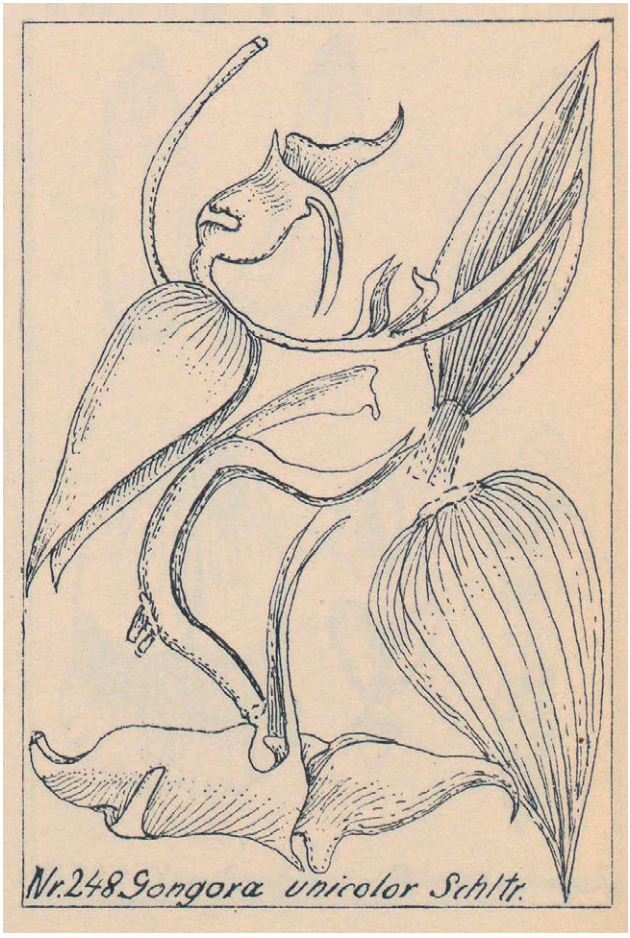

Figure 33. Lectotype of *Gongora unicolor*, in Mansfeld 1931: pl. 62, No. 248.

Epitype, designated here (Figures 34–35): Costa Rica. Heredia: Sarapiquí, Horquetas, road to Rara Avis, deviation point to El Manú, ca. 1 km, 10°19'40" N 83°58'29" W, 120–170 m, tropical rain forest, secondary vegetation and scattered trees along a small river, 27 September 2003. Flowered in cultivation at Lankester Botanical Garden, 16 May 2014, *F. Pupulin, H. León-Páez, C. Ossenbach & B. Arias 4954* (JBL-spirit D0992!); isoepitype: JBL-spirit D0153!.

When publishing *Gongora unicolor*, Schlechter cited two specimens from Costa Rica. One of them was collected by Charles Lankester with no specific locality and cultivated by Powell in Panama. The second one was found by Ferdinand Nevermann, who collected the specimen in the plains of Limón in an area called "Las Mercedes" in the lowlands of the Caribbean watershed. At present, this locality refers to the town of Hamburgo de la Rita, Pococi, Limon, at approximately 50 m in elevation. In the original description, Schlechter failed to declare which of these materials was chosen as the type specimen, and the two specimens must be considered syntypes of *G. unicolor*. Unfortunately, both specimens were lost after the destruction of the Berlin herbarium, and no isosyntypes or other type materials are known. In his "Monograph of the genus *Gongora*", Jenny (1993) cited the drawing reproduced in Mansfeld as an iconotype, but this term is not recognized by the International Code of Nomenclature. In the absence of other materials that can serve for lectotypification, the analytical sketch prepared by Schlechter and reproduced in Mansfeld (1931) is chosen as lectotype. *Gongora unicolor* is a complex species difficult to identify from herbarium materials as the main differences are based on flower color and scent. The immaculate flesh-colored to pale tan flowers with a particular strong scent of either fresh cornmeal (Dressler 1966, 2003) or "unpleasant odour" (Atwood 1987) are the main identifying characteristics of this species. Although not diagnostic, other characters as the distinctively concave base of the lip and the presence of a narrow groove running dorsally from near the base of the lip, are useful to distinguish this species in herbarium material.

The lectotype of *G. unicolor* only shows some floral characters and is taxonomically ambiguous, as it does not allow unequivocal interpretation of the features which are diagnostic of this taxon. Therefore, to favor the interpretation of the lectotype in accordance with Art. 9.9 of the International Code (Turland et al., 2018), we designated as epitype a specimen that was collected in the vicinity of the type locality of *Gongora unicolor*.

14. *Habenaria jimenezii* Schltr., Beih. Bot. Centralbl., Abt. 2. 36(2): 372. 1918

Type: Costa Rica: Río Virilla, Nov. 1912, *O. Jiménez 631*. Holotype: B, destroyed; copy of Schlechter's sketch of the holotype, with a drawing of the plant habit and analysis of the flower, designated here as lectotype, AMES 24314! (Figure 36); Schlechter´s floral analysis of the holotype, reproduced in Mansfeld (1931: Pl. 3, No. 10!).

Schlechter´s floral analysis of the holotype reproduced in Mansfeld (1931), and the copy of Schlechter's sketch of the holotype with the drawing of the plant habit at AMES, are the only original material associated with *Habenaria jimenezii*.

According to Pupulin (2002), *H. jimenezii* is a synonym of *Habenaria eustachya* Rchb.f., a species described by Reichenbach in 1885 and distinguished by the oblong

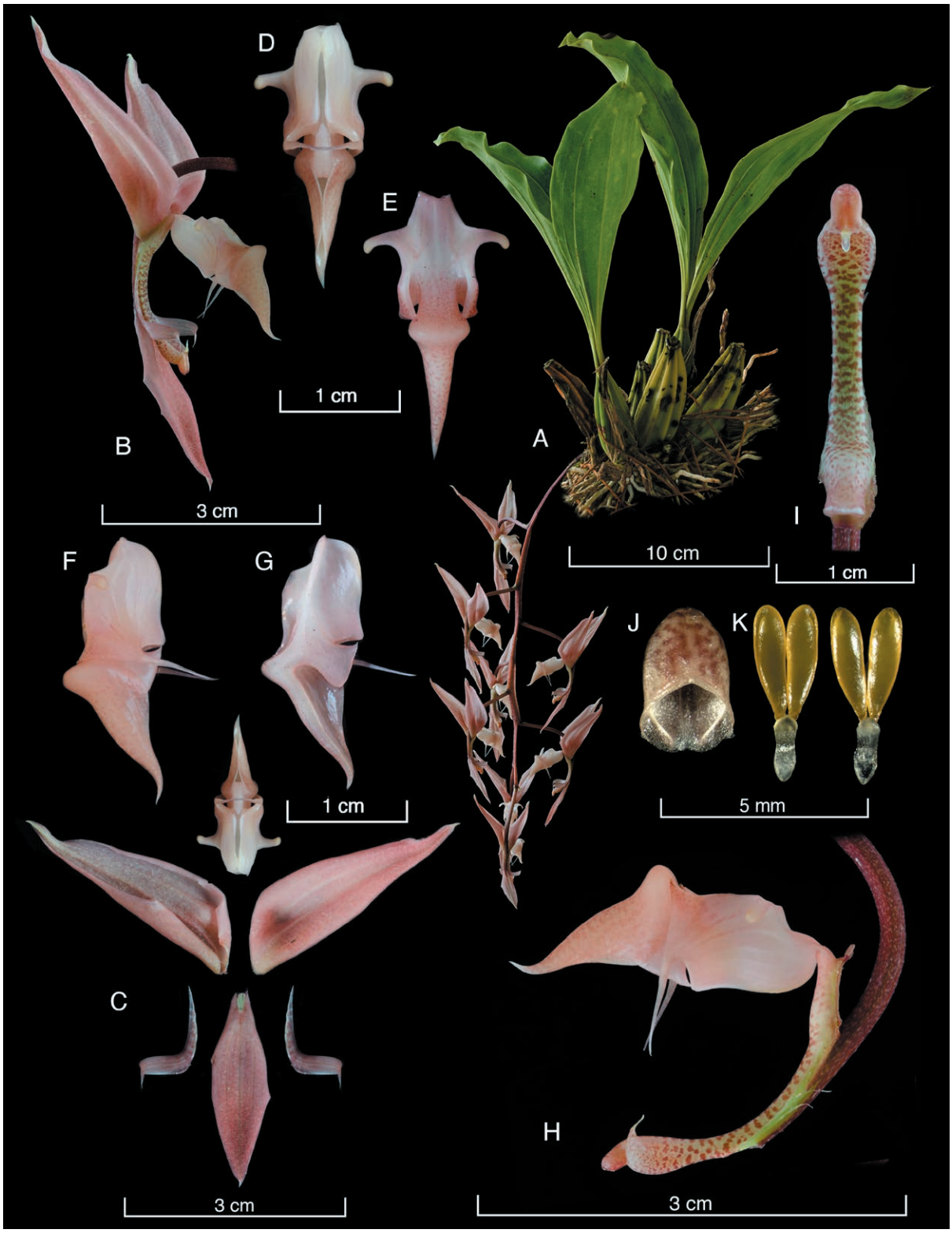

Figure 34. Lankester Composite Dissection Plate of the epitype of *Gongora unicolor* (JBL-spirit D0992). **A**, habit. **B**, flower. **C**, Dissected perianth. **D**, lip, ventral view. **E**, lip, dorsal view. **F**, lip, lateral view. **G**, lip, longitudinal section. **H**, ovary, column and lip, lateral view. **I**, column, ventral view. **J**, anther cap. **K**, pollinarium, ventral and dorsal views. Digital composition by D. Bogarín and F. Pupulin, Lankester Botanical Garden.

Figure 35. *Gongora unicolor*. Photograph of a flower from the epitype (JBL-spirit D0992). Photo by F. Pupulin, Lankester Botanical Garden.

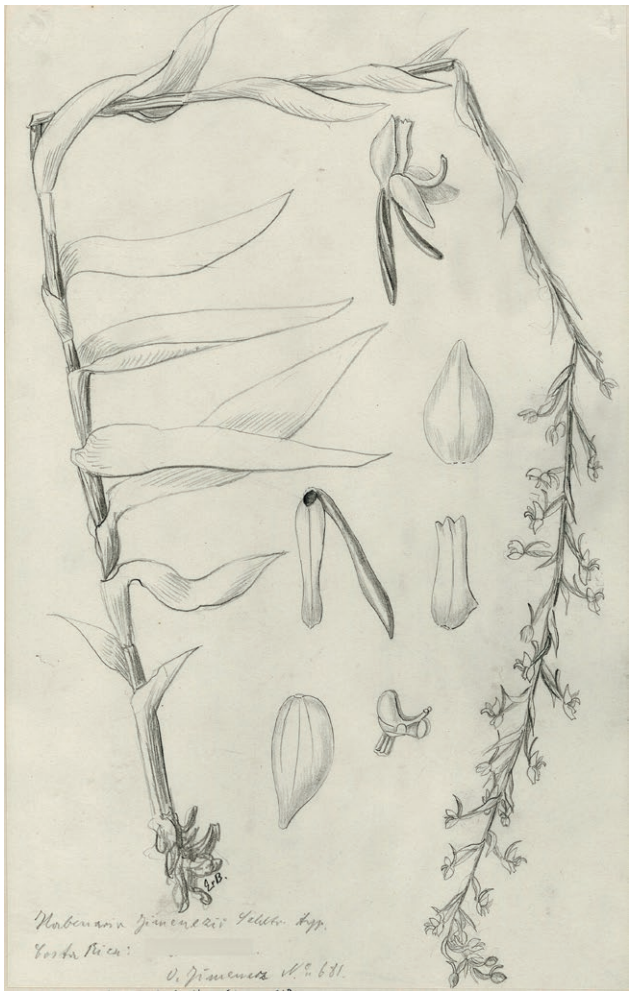

Figure 36. Lectotype of *Habenaria jimenezii* (AMES 24314). Courtesy of the Harvard University Herbaria, reproduced with permission of the President and Fellows of Harvard College.

petals with a bi- or tri-dentate apex and the entire and ligulate lip. *Habenaria jimenezii* was described as similar to *Habenaria odontopetala*, a species with a tri-dentate apex, but according to the author, it differs from the latter by having a vigorous habit, longer flowers, and tridentate petals with an angled margin at the base. The previously mentioned characters of the petals of *H. jimenezii* are well illustrated in the floral analysis of the holotype reproduced in Mansfeld (1931).

15. *Hexadesmia jimenezii* Schltr., Repert. Spec. Nov. Regni Veg. Beih. 19: 293. 1923

Type: Costa Rica. Ohne nähere Standortsangabe, *O. Jiménez s.n. (com. Tonduz)*. Holotype, B, destroyed; photo of the holotype sheet with Schlechter's floral analysis, designated here as lectotype, AMES 00100294! (Figure 37A–B).

(≡) *Scaphyglottis spathulata* C. Schweinf., Bot. Mus. Leafl. 10(2): 28. 1941, *nom. subst., non Scaphyglottis jimenezii* Schltr. 1918.

The photograph of the type sheet that we choose as lectotype specimen did not bear the "Herbarium Berolinensis" stamp. It was taken in Rudolf Schlechter's herbarium before it was deposited at the Botanical Museum of Berlin-Dahlem, where it was eventually destroyed. The type sheet did include four stems, three of which had leaves and one was fertile. It also included the floral analysis made by Schlechter of the flower used for the original description. The plants with a small habit, provided with stipitate pseudobulbs and elliptic-ovate leaves (unique in the species of the genus in Costa Rica) are unmistakable. The drawing made by Schlechter illus-

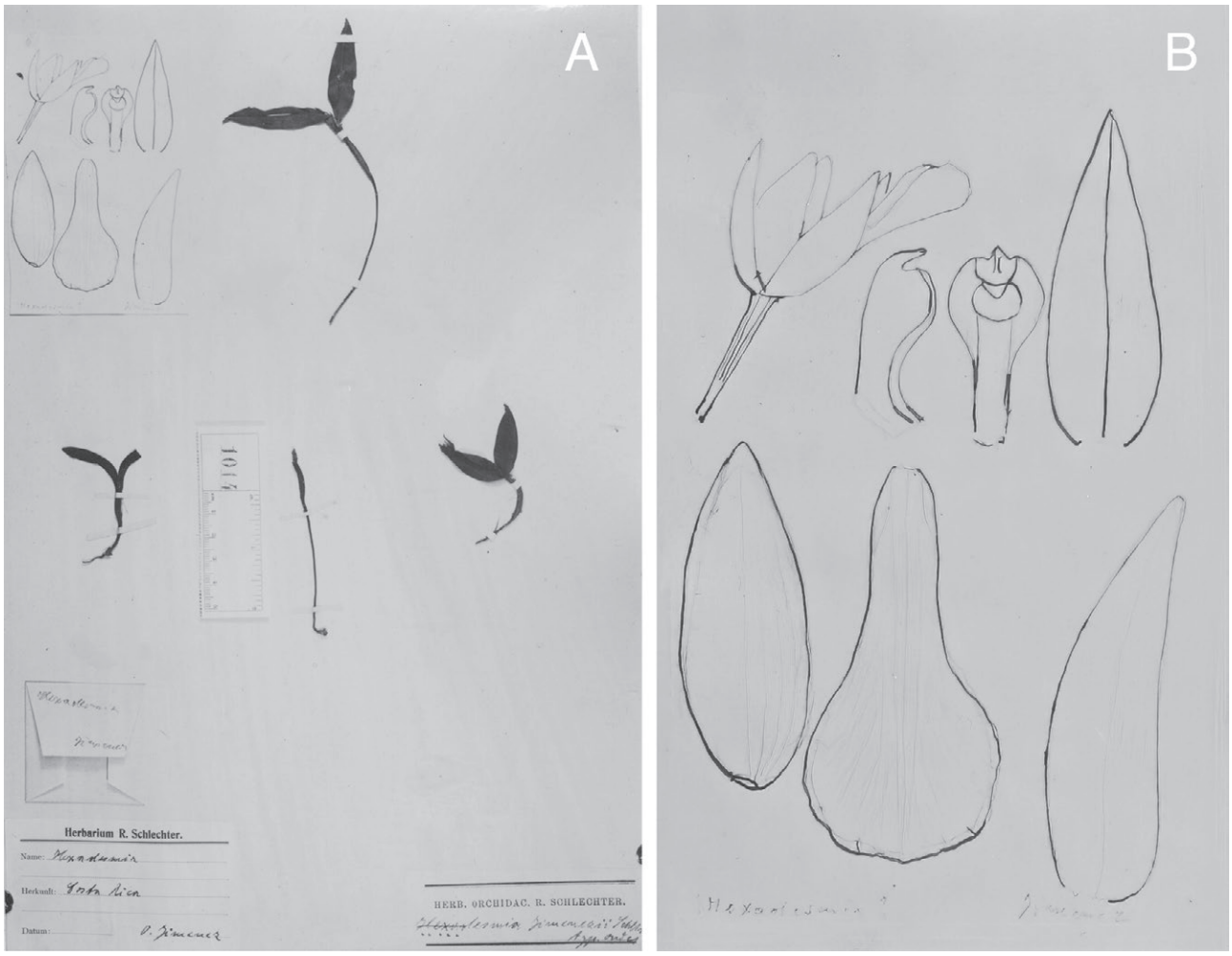

Figure 37. Lectotype of *Hexadesmia jimenezii*. **A**, photograph of the holotype sheet in Schlechter's herbarium, Berlin. **B**, detail of Schlechter's analytical sketch.

trates the cuneate-obovate (spathulate) lip with its long claw and the suborbicular blade, which are described in the protologue (Figure 37B).

Besides the photograph of the type specimen in Schlechter's herbarium, the sheet at AMES also includes a Panamanian collection allegedly from the Panama Canal Zone and flowered in the Botanical Garden of Montreal. It is not part of the type material and is therefore excluded by the lectotype as here selected.

When the species is treated as a member of the genus *Scaphyglottis*, the name is blocked by *Scaphyglottis jimenezii* Schltr. [Beih. Bot. Centralbl., Abt. 2. 36(3): 399. 1918. Type: Costa Rica. La Palma, near San José, 1700 m, Apr 1910, *C. Wercklé 682* (holotype at B, destroyed; lectotype designated by Pupulin 2010a, p. 147)]. For this reason, Schweinfurth (1941) created the new substitute name (*nomen novum*) *Scaphyglottis spathulata*. He compared it with *Scaphyglottis lindeniana* Lindl., doubting that it could even be conspecific (Schweinfurth 1941). The plants of that species are much larger (approx. 10 cm vs. 30 cm), with long pseudobulbs which are distinctly thickened in the terminal third. The inflorescence usually bears several (5–10) flowers at once (vs. 1–3 in *S. spathulata*).

16. *Kefersteinia costaricensis* Schltr., Beih. Bot. Centralbl. 36: 413. 1918

Type: Costa Rica: colline vers le Rio Chirripó, 300 m, Jan. 1900, *H. Pittier 16058* (Holotype, B, destroyed; lectotype, designated by Mora and Atwood (1993), copy of Schlechter's drawing of the holotype at AMES 24761! (HUH 100386) (Figure 38); tracing reproduced in Mansfeld (1931: Pl. 63, No. 250!).

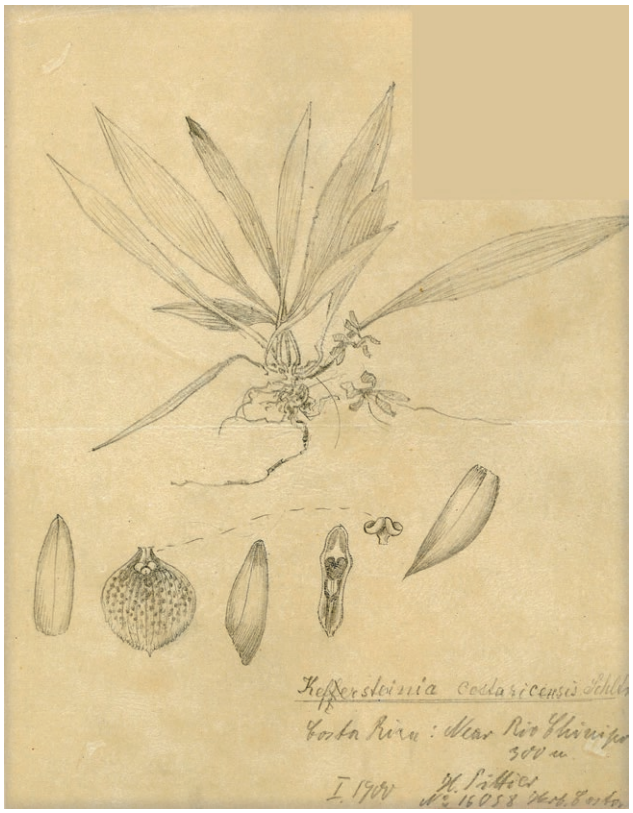

Figure 38. Lectotype of *Kefersteinia costaricensis* (AMES 24761). Courtesy of the Harvard University Herbaria, reproduced with permission of the President and Fellows of Harvard College.

No extant type material of the species is known to exist. Mora and Atwood (1993: 1359) selected the copy of Schlechter's drawing of the holotype at AMES as the lectotype. This designation was achieved before 1 January 2001 (Art. 7.11, of the Shenzhen Code (Turland et al. 2018) in a "non-explicit manner" (Prado et al. 2020; see above the discussion on *Epidendrum tenuiflorum*). The drawing consists of a plant habit, a dissection of the perianth, a detail of the callus, and a front view of the column. In the protologue, Schlechter (1923) described the species with spotted flowers, the stipitate, 3-scutellate callus on the lip, and the column with a high keel, which is consistent with the lectotype. The adaxial view shows a 3-scutellate callus, but the same organ's frontal view agrees with Costa Rican material of this species as discussed by Pupulin (2010b).

Kefersteinia costaricensis differs from other Mesoamerican species by the fleshy, flat, obovate-subquadrate lip with slightly undulate margins and the short tooth well apart from the stigma formed by the keel under the column. The species is restricted to the Caribbean watershed of Nicaragua, Costa Rica, and Panama. It is similar to *Kefersteinia orbicularis* Pupulin, which is limited to the Pacific watershed of Costa Rica, but differs in the orbicular lip, folded down at middle (vs. obovate lip, not folded down at middle in *K. costaricensis*). *Kefersteinia saccata* Pupulin is also similar, but can be distinguished by the saccate lip (vs. flat) (Pupulin 2010b). *Kefersteinia costaricensis* is the basionym of *Chondrorhyncha costaricensis* (Schltr.) Allen.

17. *Lepanthes jimenezii* Schltr., Repert. Spec. Nov. Regni Veg. Beih. 19: 281. 1923

Type: Costa Rica. Ohne nähere Standortsangabe, *O. Jiménez s.n.* Holotype, B, destroyed; tracings of Schlechter's drawing of the holotype, AMES 31565!, based on *O. Jiménez s.n.*, annotated as lectotype by C. Luer on the herbarium sheet and effectively designated by Pupulin and Bogarín 2010 (excluding the specimen *A. Brenes 306* mounted on the same sheet; photo therein). Figure 39.

The drawings designated as lectotype are the only known material referable to this species that can be associated with the protologue after the destruction of Schlechter's material. The flower analysis clearly shows the sepals provided with ciliate margins and short apical tails, the connectives of the lip bearing the blades no higher than the column, and the narrowly oblong upper lobe of the petals, which are typical of the species. Other diagnostic features of *L. jimenezii* are the glabrous inflorescence, the ciliate petals, and the connectives of the lip that embrace the column, hidden by the blades.

Lepanthes jimenezii belongs to a small group of species distinguished by the plants with hispid ramicauls

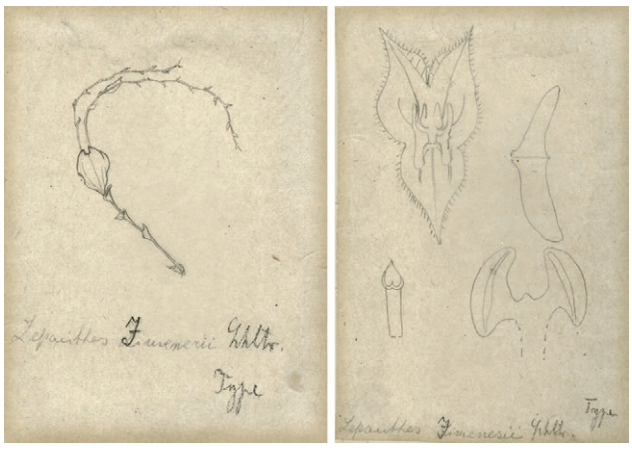

Figure 39. Lectotype of *Lepanthes jimenezii* (AMES 31565). Courtesy of the Harvard University Herbaria, reproduced with permission of the President and Fellows of Harvard College.

and suborbicular leaves, the inflorescences much larger than the leaves and provided with ciliate bracts, the muriculate ovary, the suborbicular to orbicular, ciliate blades of the lip, and the column with distinct apical arms. Species of this group have so far been found only in Costa Rica and Panama. The three species recorded for the flora of Costa Rica have been revised and illustrated by Pupulin and Bogarín (2010).

Due to a mistake in the protologue, *Lepanthes crossota* Luer (1987) is indistinguishable from the copy of Schlechter's drawing of the type of *L. jimenezii*, while the species from Panama that Luer originally intended to describe with the name *L. crossota* (*Luer* 11630, MO!) was eventually described as *Lepanthes caroli-lueri* Bogarín and Pupulin (2010).

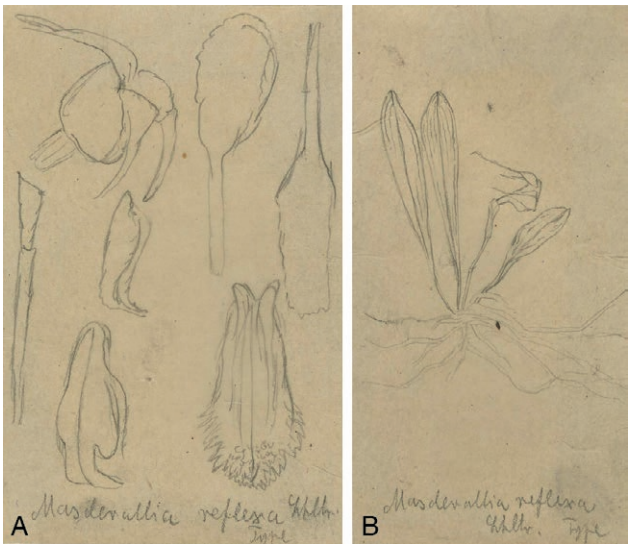

Figure 40. Lectotype of *Masdevallia reflexa* (AMES 31612). **A**, floral analysis. **B**, plant habit. Courtesy of the Harvard University Herbaria, reproduced with permission of the President and Fellows of Harvard College.

18. *Masdevallia reflexa* Schltr., Repert. Spec. Nov. Regni Veg. Beih. 19: 276. 1923

[non *Masdevallia reflexa* Misas (1977) = *Masdevallia misasii* Braas (1982)].

Type: Costa Rica. [Heredia]: Forêts de Rancho Flores, 2000 m. Février, 1891, *H. Pittier, 2011*. Holotype, B, destroyed; tracing of Schlechter's drawings of the holotype, designated here as lectotype, AMES 31612 / HUH 00101299! (Figure 40A–B).

The drawing based on the holotype, prepared under Schlechter's supervision (Figure 40), shows a combination of diagnostic characters that are consistent with the protologue of *M. reflexa* (Schlechter 1923d), including the narrow, oblanceolate, and obtuse leaves, the narrow petals towards the base and apex, and the oblong outline of the lip, which is gradually wider towards the apex, 2-keeled in the lower half, the margins deeply lacerate to dentate in the apical third, and the apex verrucose.

Schlechter (1923d) suggested that *M. reflexa* is morphologically similar to *M. cupularis* Rchb.f., but *M. reflexa* is distinguished by having narrower and thicker leaves, shorter ramicauls, smaller flowers, apically narrower petals, and the margins of lip deeply lacerate to dentate in the apical third. Nevertheless, Mora and Atwood (1993) and Luer (2000), considered *M. reflexa* conspecific with *M. cupularis*. When comparing the protologues (Schlechter 1923d; Reichenbach 1866), these taxa seem indeed different, as stated by Schlechter (1923d), because in *M. reflexa* the petals are narrow at both ends, acute (vs. obtuse, emarginate at the apex), and the lip is wider apically, with spreading margins, deeply lacerate to dentate in the apical third (vs. narrower, due to the incurved margins, fimbriate in the apical third), and with two basal keels (vs. ecarinate). However, these differences could be an artifact of the dehydrated flower tissue studied by Schlechter when preparing the description and drawing of the type of *M. reflexa*.

According to their protologues, *Masdevallia odontochila* Schltr. (1910c) and *M. reflexa* (Schlechter 1923d) have the same collecting data, both coming from the Rancho Flores Forest (on the southern slope of the Barva Volcano) and attributed to *Pittier 2011*. The references to the two collections differ in the collecting dates and elevations, as the type of *Masdevallia odontochila* was collected in February 1890, at 2043 m elevation, whereas the type of *M. reflexa* was collected in February 1891, at 2000 m elevation (Schlechter 1910c, 1923d). Even though at first glance it seems that *M. reflexa* was described based on the type of *M. odontochila*, the different collecting dates prevent considering the two names homotypic as stated by Mora and Atwood (1993).

The specimen associated with *Pittier 2011* at the National Museum of Costa Rica (CR 2011) is effectively an isotype of *M. odontochila*. The drawings based on the holotypes of *M. odontochila* (AMES 00101287) and *M. reflexa* (AMES 00101299), prepared under Schlechter's supervision, do not have annotations or any reference to vouchers suggesting that they come from the same collection. Undoubtedly, the illustrator that Rudolf Schlechter hired on request by Oakes Ames to trace his type drawings (Ames 1944) had access to the holo-

types of both *M. odontochila* and *M. reflexa*, as he prepared traces of the two specimens. We must not forget that the IFGN used to assign the same number to what they considered specimens belonging to the same taxon and the result of the same collecting "act". The similarity between the two species of *Masdevallia* and the near-identity of the collecting locality, conspired to assign the same *Pittier 2011* number to specimens that in reality belong to two different collections.

19. *Maxillaria stenostele* Schltr., Beih. Bot. Centralbl., Abt. 2, 36(2): 414. 1918

Type: Costa Rica [Heredia]: río Sucio, 300 m, Mar 1882, *F. C. Lehmann 1236*. Holotype, not found; tracing of Schlechter's drawing of the holotype (AMES-24786 / HUH 00101518!), designated here as lectotype (Figure 41); Schlechter's drawing of the holotype, reproduced in Mansfeld (1931: Pl. 65, No. 261!).

Maxillaria stenostele was collected by Lehmann at the beginning of 1882 on the Atlantic lowlands surrounding the Río Sucio, one of Costa Rica's largest rivers. Unfortunately, the holotype of *M. stenostele* was not located in any of the herbaria that may have historically served as the type repository, and no other type materials are known. The copy of the Schlechter's sketch of the holotype preserved at AMES is here chosen as the best reference material to represent the concept of this species. The drawing includes a detailed portrait of the plant's main stem covered with long bracts, as well as a complete dissection of the flower showing the distinctively long column. In fact, *Maxillaria stenostele* was recognized as a new species based on the narrow lip and the slender column. It was later included under the concept of the common and variable *Maxillaria uncata* Lindl. by Atwood and Mora (1999). This is a species recognized by fleshy leaves, whitish to lavender flowers with purple nerve lines and comparatively long column-feet, as well as large pollinaria with long stipes, all characters in accordance with the original description of *M. stenostele*. Szlachetko et al. (2006) proposed the segregation of *Maxillaria* Ruiz & Pavón section *Urceolatae* Christ. into a new generic concept, *Christensonella* Szlach., Mytnik, Górniak & Śmiszek, in which *Maxillaria uncata* was included. The proposal was based on a series of morphological features that include scale-covered, fusiform pseudobulbs, short inflorescences bearing one flower, and a massive, short column-foot (Szlachetko et al. 2006), with which features *M. uncata* agrees.

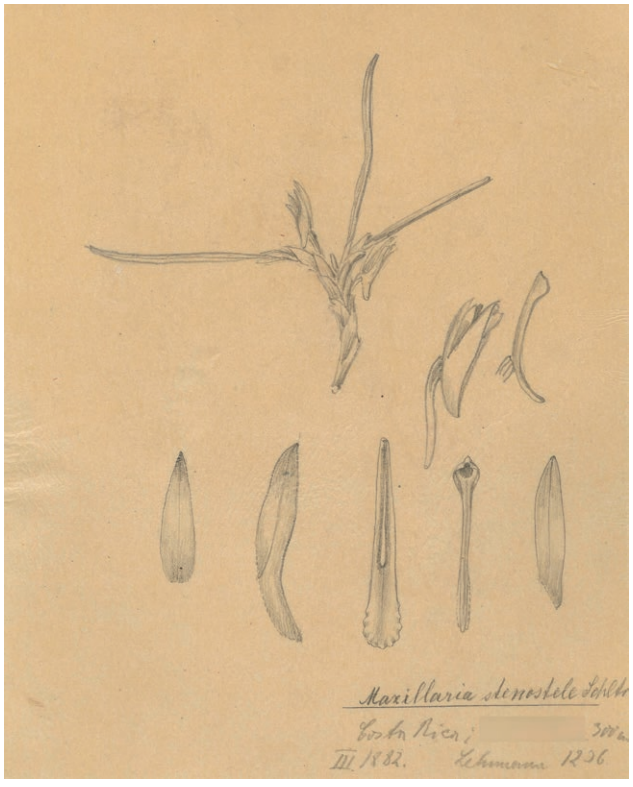

Figure 41. Lectotype of *Maxillaria stenostele* (AMES 24786). Courtesy of the Harvard University Herbaria, reproduced with permission of the President and Fellows of Harvard College.

20. *Maxillaria turialbae* Schltr., Beih. Bot. Centralbl. 36(2): 414–415. 1918

Type: Costa Rica. [Cartago]: Im Turialba-Tal, Jan 1882, *F.C. Lehmann 1098*. Holotype, not found, indicated by Atwood (1989) as destroyed in B; lectotype (first-step), designated by Blanco (2013); lectotype designated here (second-step), G 00414322! (Figure 42); isolectotypes, two without catalogue number, G!; US 00457209!; drawing of the plant habit and floral analysis based on the holotype, AMES 24789!.

When Schlechter described *Maxillaria turialbae* in 1918, he compared it to *Maxillaria aciantha* Rchb.f. However, the first is easily distinguished by the greenish to whitish flowers (*vs.* sepals and petals reddish to orange, and lip dark red). Schlechter (1923d) subsequently realized that *Maxillaria turialbae* is a conspecific with *M. friedrichsthalii* Rchb.f., or *Rhetinantha friedrichsthalii* (Rchb.f.) M.A.Blanco *sensu* Blanco et al. (2007). As is common in *Rhetinantha*, plants of this species have oblong, ridged, bi-, or tri-foliate pseudobulbs separated

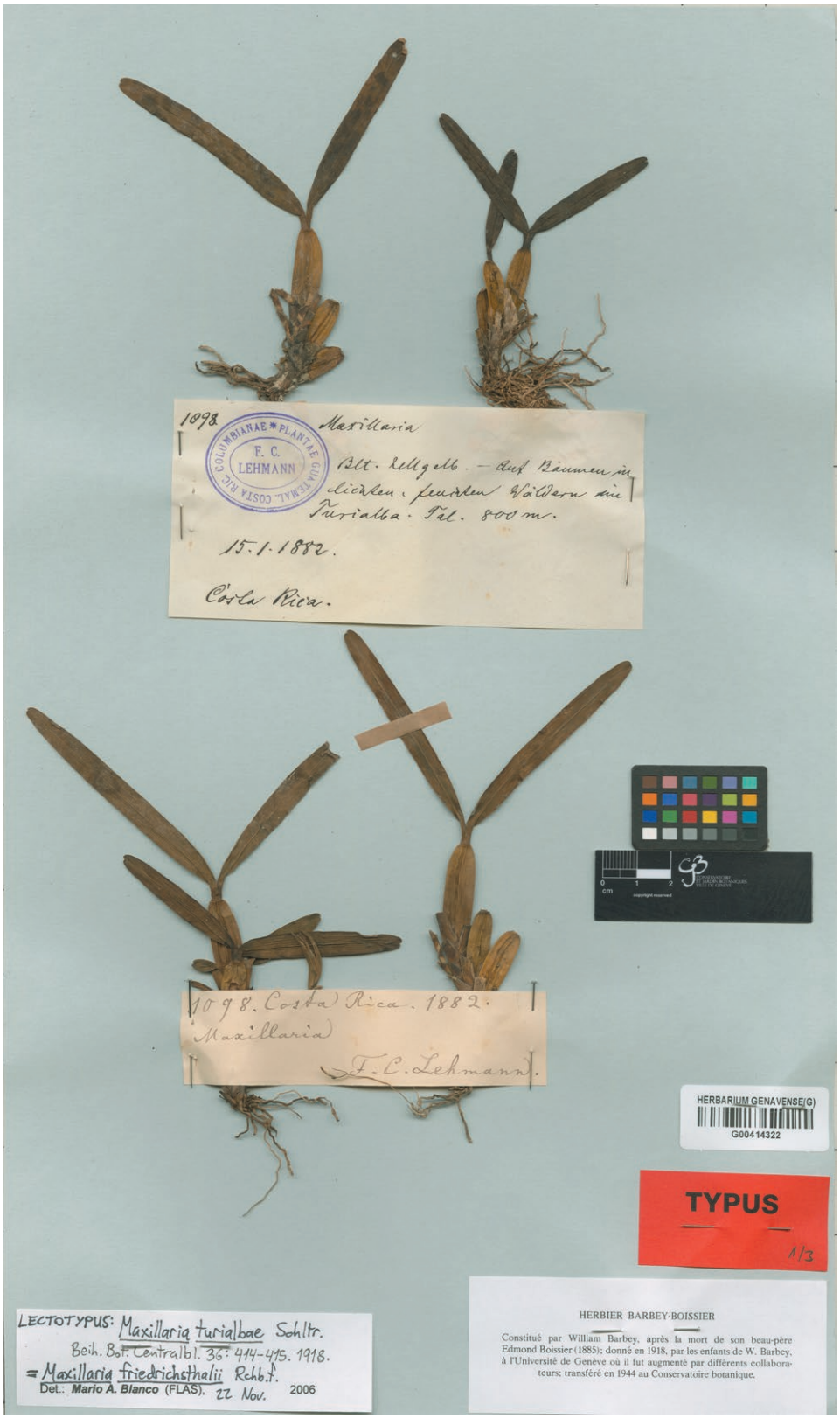

Figure 42. Lectotype of *Maxillaria turialbae* (G 00414322). Reproduced with the kind permission of the Director, Conservatoire et Jardin botaniques de la Ville de Genève.

by an elongated rhizome covered by overlapping scarious bracts. *Maxillaria turialbae* is also similar to *M. scorpioidea* Kraenzl. Both have greenish flowers and often present a lip with maculate margins, but the latter has distinctly larger plants and flowers (Atwood 2003).

In 1989, Atwood cited the holotype of *M. turialbae* as having been destroyed in B and the drawing of the holotype preserved at AMES, which may be considered a "non-explicit designation" of a lectotype. Later, Blanco (2013) found part of the original material of this species at Geneva herbarium and designated a lectotype. Blanco (2013) did not mention any article of the ICN in his discussion of the designation, but probably did it following Art. 9.12 and 9.19 (ICN; Turland et al. 2018). After studying the material at G, three isotypes of F.C. Lehmann 1098 were found, but two of them are currently labeled as "Lectotypus", and only one bears an herbarium code (G00414322, Figure 40). Since the collection of *F.C Lehmann 1098* at G currently corresponds to more than one specimen, besides that two of them are indicated as lectotype, a second-step lectotypification is proposed here to specifically designated one of them as lectotype based on Art. 9.17 (ICN; Turland et al. 2018).

21. *Microstylis carpinterae* Schltr., Beih. Bot. Centralbl., Abt. 2, 36(3): 381. 1918

Type: Costa Rica: Forêts de la Carpintera, Aug. 1891, *H. Pittier & A. Tonduz* (*4394 Herb. Institut. physico-geogr, nat. costaric.* [Herb. Nac. Costa Rica]). Holotype, B, destroyed; isotype, US (814603 / 00093456!), annotated on the sheet by I. F. Chinchilla, 2019, and designated here as lectotype (Figure 43); Schlechter's drawing of the holotype, reproduced in Mansfeld (1931: Pl. 14, No. 55). Figure 44.

The species is distinguished, among other pseudobulbous *Malaxis* with bifoliate pseudobulbs, by the sagittate, apically three-toothed lip with short, triangular, rounded lateral lobes, and the lip cavity with a low, thick keel. The sketch based on the holotype prepared by Schlechter and posthumously published in Mansfeld (1931) clearly illustrates the critical characters of the species (Figure 44). Schlechter (1918a) compared *M. carpinterae* with *M. hastilabia* Rchb.f., but the lip of the latter is hastate, with recurved, uncinate lateral lobes, and a much larger cavity. The name is the basionym of *Malaxis carpinterae* (Schltr.) Ames (Orchidaceae 7: 157. 1922).

22. *Mormodes lobulata* Schltr., Repert. Spec. Nov. Regni Veg. 8: 456. 1910

Type: Costa Rica. Bei Cañas Gordas, blühend im Februar 1897, *H. Pittier 11147* (Holotype, B, destroyed; isotypes, US 577405 / barcode 00036958!; US 815002 / Barcode 00023496, not seen; BR, not seen; CR, barcode CR 11147!; copy of Schlechter's drawing of the holotype at AMES 24414 / HUH 101809!). Figure 45.

We located two possible isotypes of *M. lobulata* in the electronic databases of the US herbarium and one at BR (cited in Tropicos database www.tropicos.com but not in BR database http://www.botanicalcollections.be) which would be good candidates for lectotypification. Another isotype was located at CR and consists of a small pseudobulb without flowers (CR 11147). Therefore, we do not formally designate a lectotype for *M. lobulata* because we have been unable to access three isotypes (BR and US) and the one at CR is sterile. According to the Tropicos database, the name will be lectotypified by Salazar (ined.) in *Flora Mesoamericana* with the specimen at BR.

In addition, a tracing of Schlechter's sketch from the holotype is kept at AMES 24414 / barcode HUH 101809. It shows the dissected perianth, the front view of the column, and the pollinarium and anther cap (Figure 45). Schlechter (1910a) described the species with lanceolate-ligulate, acute, glabrous sepals and petals, the lip as basally unguiculate, widely cuneate-subreniform, truncate with an ovate, shortly acuminate middle lobe, the column with an acuminate clinandrium, and the pollinarium with a wide oblong-subquadrate stipe and cucullate, subcaudate-acuminate anther cap. These features agree with the copy of Schlechter's drawing of the type.

Mormodes lobulata differs from other Central American species of the genus by the glabrous, clearly 3-lobed lip, broad lateral lobes, and a narrower, acute midlobe with an incurved apex. It is restricted to the Pacific watershed of Costa Rica and western Panama (Dressler 2003).

23. *Notylia pittieri* Schltr., Beih. Bot. Centralbl., Abt. 2. 36(3): 418 (1918)

Type: Costa Rica. [Puntarenas:] Sur les *Crescentia* à Boruca, [466 m] III. 1892, *H. Pittier* (*6850* [*Herb. Instit. physico-geogr. nat. costaricensis*; currently Herb. Nac. Costa Rica]). Holotype, B, destroyed [tracing of Schlechter's drawing of the holotype, AMES 24886 / HUH 00101923! (Figure 46)]. Isotypes: AMES 00083037, a flower conserved in glycerine; BR 0000006572525!, designated here as lectotype (Figure 47); Schlechter's draw-

Figure 43. Lectotype of *Microstylis carpinterae* (US 814603). Courtesy of the United States National Herbarium, Smithsonian Institution.

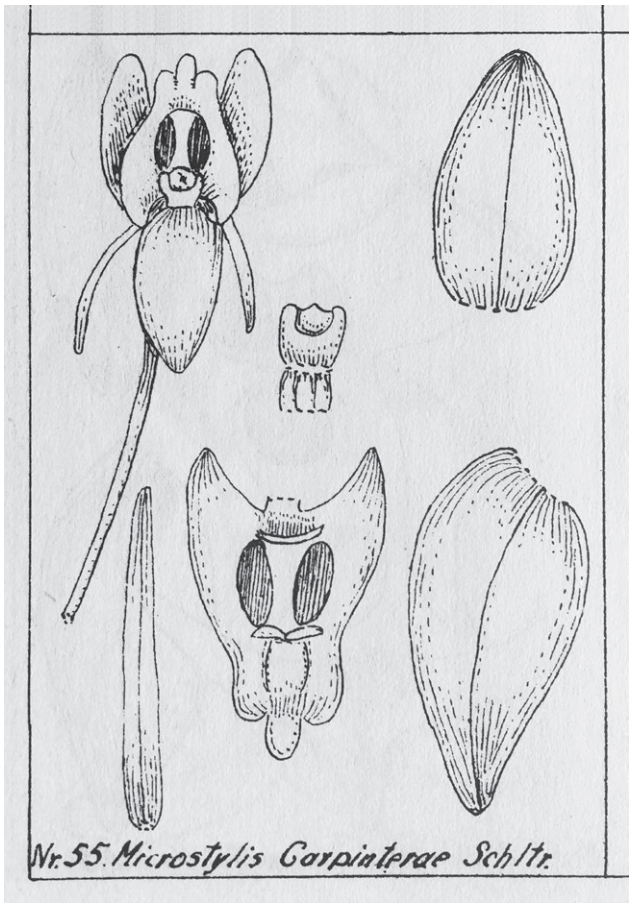

Figure 44. Schlechter's drawing from the holotype of *Microstylis carpinterae*, reproduced in Mansfeld (1931: Pl. 14, No. 55).

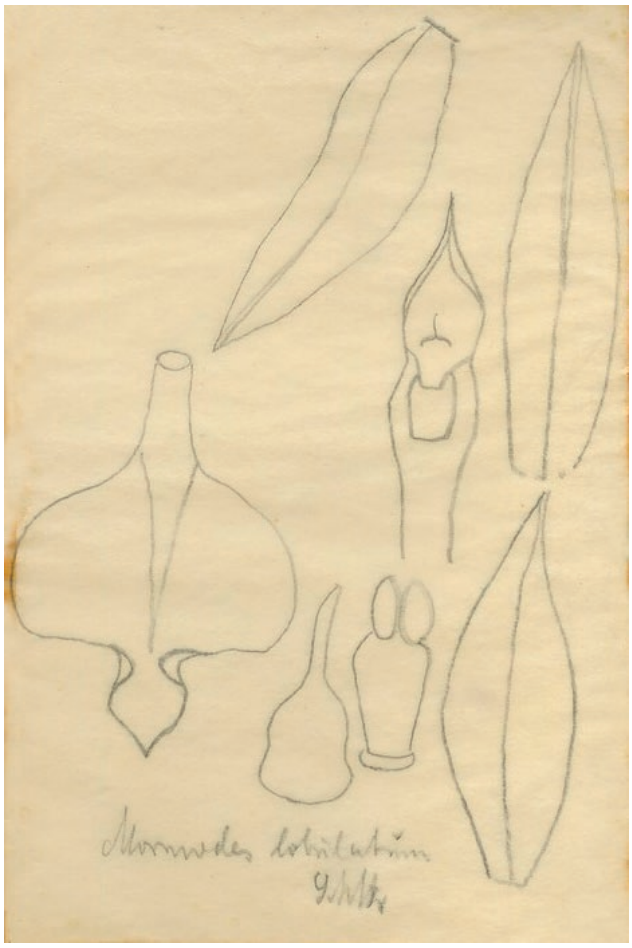

Figure 45. Copy of Schlechter's drawing from the holotype of *Mormodes lobulata* (AMES 24414). Courtesy of the Harvard University Herbaria, reproduced with permission of the President and Fellows of Harvard College.

ing of the holotype, reproduced in Mansfeld (1931: Pl. 81, No. 323).

Notylia pittieri is distinguished by the greenish white lateral sepals, connate above the middle, the white petals, with up to 3 orange blots in the proximal half, and the white and shortly clawed lip, with the blade subdeltate, caudate, acuminate, and a basal thickened keel, extended to near the blade middle. The drawing of the holotype prepared under Schlechter's supervision includes the plant habit and a floral analysis (Figure 46); the latter was reproduced by Mansfeld (1931). These materials consistently represent the diagnostic characters of *N. pittieri*, such as the typical morphology of the lateral sepals and lip.

The isotype (BR 0000006572525), designated here as lectotype, bears the annotation "*Ad. Tonduz 6850*". Thus, despite the locality and collection date being exactly the same of that in the protologue, it gives the impression that Tonduz collected the specimen and that it does not correspond to the type specimen of *N. pittieri*. However, 6850 is the consecutive collection number assigned by the Instituto Físico-Geográfico Nacional Herbarium (IFGN; now the National of Costa Rica Herbarium) to the specimens of the type collection of *N. pittieri*. The IFGN assigned a unique access number to specimens from what was considered a single gathering, whether it was an unicate or consisted of duplicates, and regardless of who collected them (Pupulin et al. 2016, p. 278). Following art. 9.2 (ICN; Turland et al. 2018) it is an error that can be corrected, so the collector's name remains as in the protologue, and the type collection number is attributed to the IFGN.

Schlechter (1918a) compared *N. pittieri* with *N. huegelii* Fenzl, but the latter has fully connate lateral sepals, a shorter and ecarinate lip, and a thicker column. A detailed description of *N. pittieri*, and a modern botanical illustra-

Figure 46. Tracing of Schlechter's drawing from the holotype of *Notylia pittieri* (AMES 24886). Courtesy of the Harvard University Herbaria, reproduced with permission of the President and Fellows of Harvard College.

tion, based on fresh material from a specimen collected in Manuel Antonio National Park, is provided by Pupulin (1998). *Notylia pittieri* ranges from Costa Rica to Panama.

24. *Oncidium cabagrae* Schltr. Repert. Spec. Nov. Regni Veg. 9(214–216): 292. 1911

Type: Costa Rica. In den Wäldern von Cabagra bei Buenos-Aires, ca. 450 m, blühend im März 1892, *H. Pittier 6589*. Holotype, B, destroyed; isotypes, HBG 501825!, selected here as lectotype (Figure 48); AMES 83079, a flower in a microscope slide saved in glycerine, not seen; tracing of Schlechter's drawings of the holotype, HUH 00102386! (Figure 49); Schlechter's floral analysis of the holotype, reproduced in Mansfeld (1931: Pl. 72, No. 288).

Henry Pittier collected the type material in Costa Rica in the southern Pacific foothills of the Cordillera de Talamanca in the area of Cabagra, close to Buenos Aires. Given that the holotype specimen was destroyed in the Berlin herbarium fire, Königer and Pongratz (1999) selected a specimen apparently collected by the first author at the *locus typicus* as the lectotype. However, the specimen evidently is not part of the original materials and is therefore not eligible for lectotypification purposes. Königer and Pongratz's designation should rather be interpreted as a neotypification. Furthermore, the mentioned specimen was not located at the Botanische Staatssammlung München by the curators in charge of the collections of that herbarium. However, the selection of a neotype is superfluous, as there are two isotypes of *Pittier 6589* still in existence, one in the University of Hamburg (HBG 501825), and one in the glycerin collection at AMES.

The isotype at Hamburg, originally belonging to Kränzlin private herbarium, is stamped as "Holotypus – fragment", thus implying that it was part of the original specimen studied by Schlechter. It does not bear any annotations in Schlechter's handwriting, but the original label by Kränzlin states that the fragment came directly from the Berlin herbarium, and so it is likely that it was effectively separated from the holotype specimen before its destruction. Notwithstanding its extremely fragmentary conditions, we select it here as lectotype. We refrain from designating an epitype for this taxon because the tracings of Schlechter's analysis at AMES illustrate in sufficient detail the diagnostic features of the species, with its narrow pseudobulbs and basally narrow leaves, the long, multi-flowered inflorescences, the petals distinctly wider than the sepals, the lip with an elliptic callus and rounded apical lobes, and the column with ample wings.

The name *Oncidium cabagrae* is treated by Atwood and Mora (1999), Pupulin (2002), Bogarín et al. (2014), and Kolanowska (2014) as a synonym of *Oncidium dichromaticum* Rchb.f., a species ranging from Costa Rica to Colombia.

25. *Oncidium costaricense* Schltr., Repert. Spec. Nov. Regni Veg. 9(196–198): 30. 1910

Type: Costa-Rica. [Puntarenas]: in den Wäldern von Térraba, ca. 260 m, blühend im März 1891, *H. Pittier 3859*. Holotype, B, destroyed; isotype, designated here as lectotype, US 577125! (Figure 50); isolectotype, US 577126!; tracing of Schlechter's sketch of the holotype, with drawing of the plant habit and analysis of the flower, AMES 24240!; Schlechter's floral analysis of the holotype, reproduced in Mansfeld (1931: Pl. 73, No. 289!).

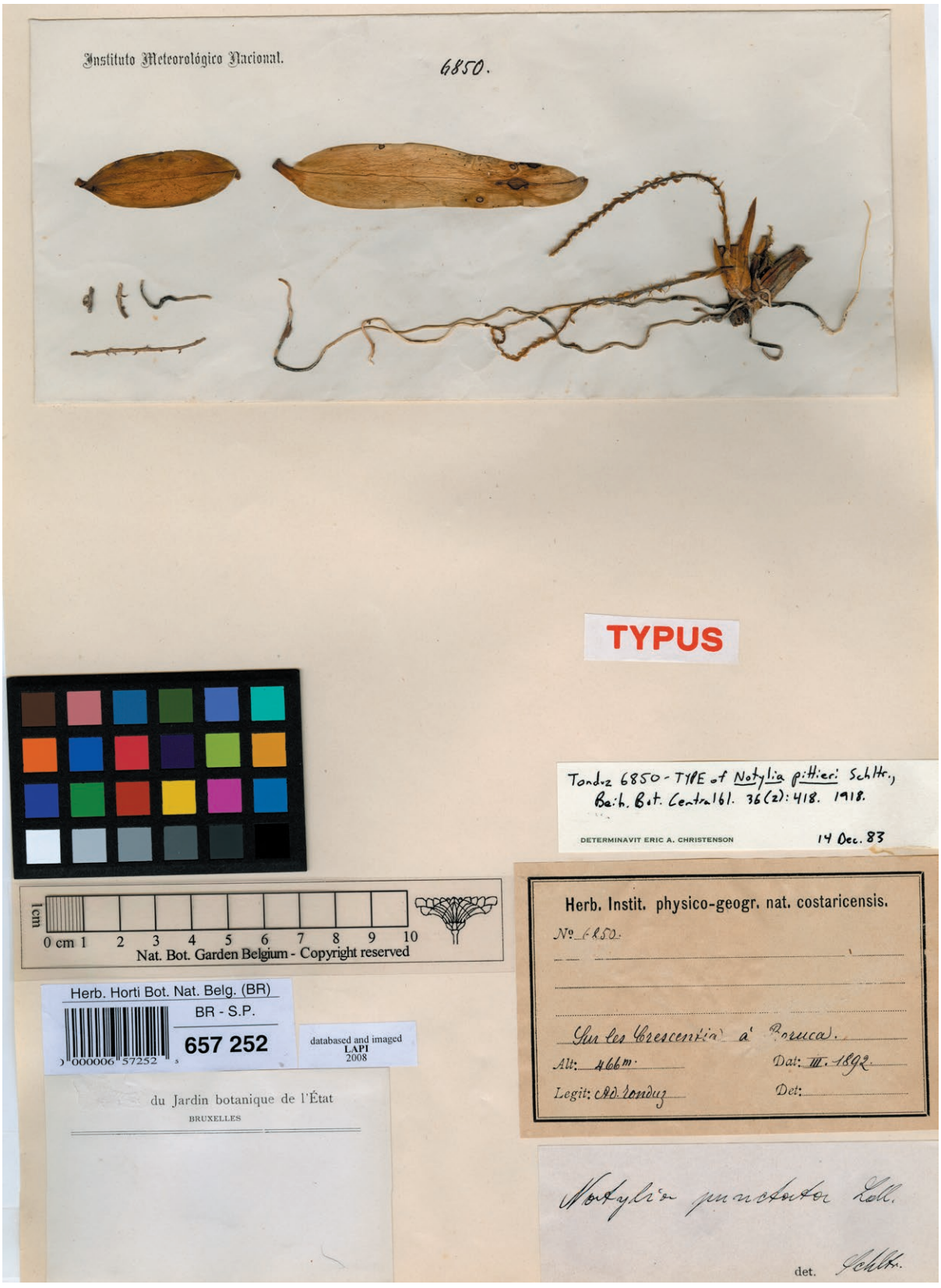

Figure 47. Lectotype of *Notylia pittieri* (BR 0000006572525). Courtesy of the Meise Botanic Garden Herbarium.

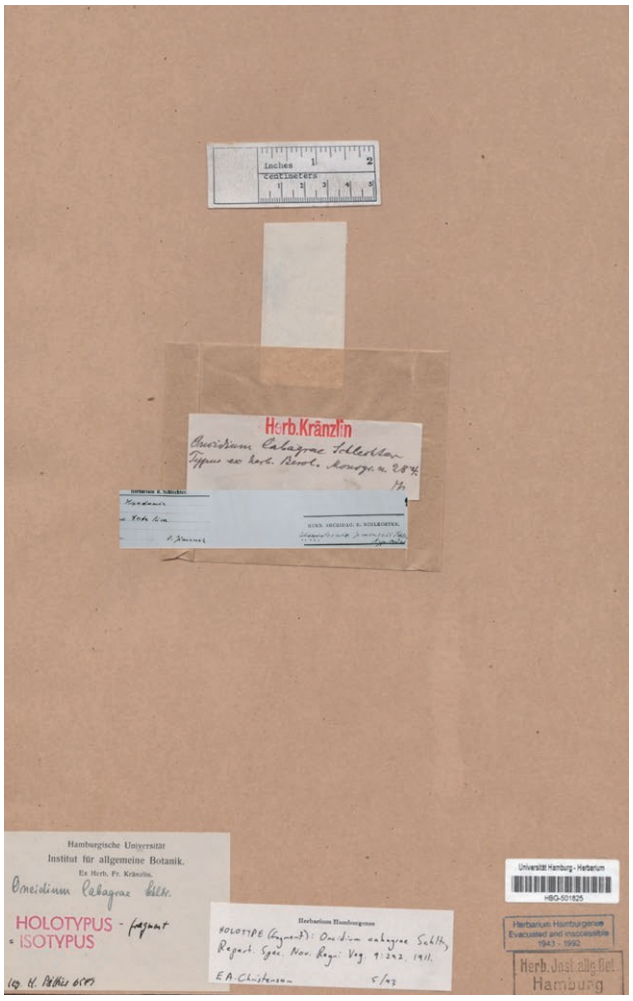

Figure 48. Lectotype of *Oncidium cabagrae* (HBG 501825). Courtesy of the University of Hamburg (HBG).

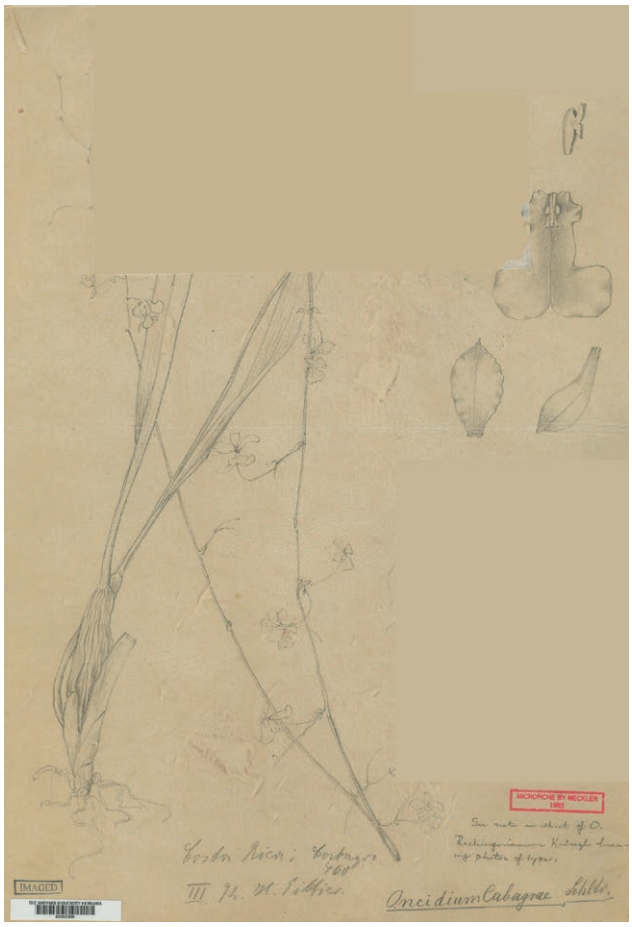

Figure 49. Tracing of Schlechter's drawings from the holotype of *Oncidium cabagrae* (HUH 00102386). Courtesy of the Harvard University Herbaria, reproduced with permission of the President and Fellows of Harvard College.

Among his multiple novelties discovered during his time exploring Costa Rica, Pittier collected the type specimen of *Oncidium costaricense* in Térraba, a lowland region in the southern Pacific side of Costa Rica. The holotype of *O. costaricense* was destroyed in Berlin, but two isotypes are preserved at US; one of them is designated here as lectotype.

According to protologue of *O. costaricense* the type was collected in the "*forest of Térraba, c. 2600 m of elevation*" (Schlechter 1910c), and this geographic indication is also annotated on the copy of Schlechter's sketch of the holotype at AMES. However, Schlechter misinterpreted Pittier's writing because the collection data handwritten by Pittier on the isotype specimens at US are spelled as "*dans la forêt a Térraba, 260 m* (in the forest of Térraba, 260 m)".

Oncidium costaricense is considered a synonym of *Oncidium polycladium* Rchb.f. ex Lindl. by Dressler (2003) and Bogarín *et al.* (2014). The shape of the floral parts of the holotype of *O. costaricense* reproduced in Mansfeld (1931) fits those of *O. polycladium* (K 000079559!), which was described in 1855 from a plant collected "*wild in Costa Rica, Veragua, Chiriquí*" (currently Panama). This species is characterized by the large inflorescence (up to 1.5 m long), the wings of the column sub-quadrate, and the midlobe of the lip up to 1 cm wide. *Oncidium costaricense* is also similar to *O. isthmi* Schltr., but the latter has inflorescences with longer primary branches, brighter yellow flowers, and a much wider midlobe of the lip (up to 2 cm) with, consequently, a more conspicuously narrow isthmus. Another very similar species is *O. stenotis* Rchb.f., but the column wings are rudimentary in the latter.

Figure 50. Lectotype of *Oncidium costaricense* (US 577125). Courtesy of the United States National Herbarium (US).

26. *Oncidium megalous* Schltr., Repert. Spec. Nov. Regni Veg. 9: 30–31. 1911

Type: Costa-Rica. In den Wäldern von Esmeralda, Barba-Massif, blühend im Nov 1892, *P. Biolley 7256*. Holotype, B, destroyed; isotype, designated as the lectotype by Christenson (1996: 21, as *O. megalotus*), US (579459 / barcode 00094129!); Schlechter's drawing of the holotype published by Mansfeld (1931: Pl. 74, No. 293!) (Figure 51).

The specimen in the Herbarium at the Smithsonian Institution is the only known isotype. Therefore, Kerry Barringer annotated the sheet proposing this specimen as the lectotype before Christenson (1996) formally published it. The flower analysis drawn by Schlechter (in Mansfeld 1931) clearly illustrates the pandurate-trilobed lip with semi-ovate basal lobes provided with a median, double wart, and a broadly reniform, excise apical lobe, as well as the very large, oblong, entire wings of the column, which distinctly surpasses the androclinium (Figure 51). These features are typical of *O. megalous* and were recorded in the protologue (Schlechter 1911).

According to Atwood and Mora (1999) the name is a synonym of *Oncidium bryolophotum* Rchb.f., also from Costa Rica or Panama. It is a member of the *Oncidium* sect. *Heteranthae* characterized by the paniculate inflorescences of polymorphic flowers, with the branches bearing only a few perfect flowers, the other being reduced to small stars made up of 3–5 greenish needles. Photographs of the species are provided by Pupulin and Dalström (2020: 768–769).

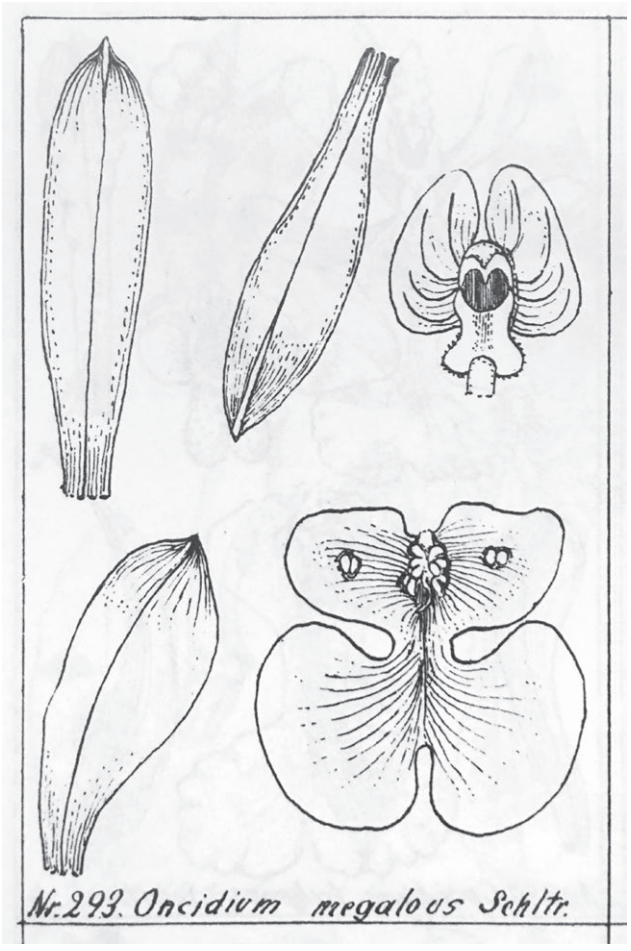

Figure 51. Schlechter's floral analysis from the holotype of *Oncidium megalous*, published by Mansfeld (1931: Pl. 74, No. 293).

27. *Oncidium pittieri* Schltr., Repert. Spec. Nov. Regni Veg. 9(196-198): 31. 1910

Type: Costa Rica. bei La Palma, ca. 1550 m, blühend im September 1896, *H. Pittier 10310*. Holotype, B, destroyed; lectotype designated by Mora and Atwood (1993: 1572), copy of Schlechter's drawing of the holotype at AMES 24264 / HUH 00102528! (Figure 52); reproduced in Mansfeld (1931: Pl. 74, No. 295!).

Figure 52. Lectotype of *Oncidium pittieri* (AMES 24264). Courtesy of the Harvard University Herbaria, reproduced with permission of the President and Fellows of Harvard College.

No extant type material of this species is known to exist. Mora and Atwood (1993: 1572) selected the copy of Schlechter's drawing of the type at AMES as lectotype. The drawing includes the plant habit showing the fan-like arrangement of leaves and floral dissections showing a front view of the sepals, petals, lip, and column. Schlechter (1910c) described the species as having small, compressed, unifoliate pseudobulbs, oblong-ligulate, erect leaves, paniculate inflorescences, yellow flowers with a trilobate lip with divaricate lateral lobes and oblong, subtruncate midlobe, and a column with ample, patent, oblong-falcate wings. These features are shown in the copy of Schlechter's drawing of the type.

Oncidium pittieri is recognized by the wide (up to 8 cm) leaves arranged in a fan and concealing the pseudobulb, the paniculate inflorescence and the yellow, unspotted flowers with subequal lobes of the lip. Atwood and Mora (1999) treated it as an heterotypic synonym of *Oncidium luteum* Rolfe, a species described from a plant without collecting data. The type specimen at K shows a plant with a naked, two-leaved pseudobulb (vs. the characteristic fan of leaves concealing the unifoliate pseudobulb in *O. pittieri*). The species is endemic to Costa Rica and Panama (Atwood and Mora 1999; Dressler 2003).

Figure 53. Lectotype of *Ornithidium biolleyi* (AMES 24137). Courtesy of the Harvard University Herbaria, reproduced with permission of the President and Fellows of Harvard College.

28. *Ornithidium biolleyi* Schltr., Repert. Spec. Nov. Regni Veg. 9: 29–30. 1910

Type: Costa Rica. [San José:] Auf Bergen in der Umgebung von San Jose, *P. Biolley 1052*. Holotype, B, destroyed; tracing of Schlechter's drawing of the holotype, designated here as lectotype, AMES 24137 / HUH 00102669! (Figure 53); Schlechter's floral analysis of the holotype, reproduced in Mansfeld (1931: Pl. 58, No. 229).

According to the protologue, *Ornithidium biolleyi* is distinguished among *Ornithidium* species by its long stems, two or more inflorescence per axil, the white flowers, and a column up to 4 mm long, the shortly unguiculate, inconspicuously trilobed lip with an oblong, round midlobe and a reniform callus at the base, and the lateral lobes obtuse, erect, incurved (Schlechter 1910c). The sketch of the holotype prepared under Schlechter's supervision includes the plant habit and a floral analysis (Figure 53), the latter reproduced in Mansfeld (1931), and clearly shows the diagnostic characters described by Schlechter (1910c). The name is considered a synonym of *Camaridium biolleyi* (Schltr.) Schltr. (Bogarín et al. 2014), a species ranging from Costa Rica to Panama.

29. *Ornithidium costaricense* Schltr., Repert. Spec. Nov. Regni Veg. Beih. 8(182/184): 456. 1910

Type: Costa Rica. [Heredia]: In Wäldern bei Rancho-Flores, c. 2040 m, blühend im Feb 1890, *H. Pittier 2177*. Holotype, B, destroyed; lectotype, designated by Atwood and Mora (1999), a copy of Schlechter's sketch of the holotype, AMES-24213! (Figure 54); Schlechter's flower analysis of the holotype, reproduced in Mansfeld (1931: Pl. 70, No. 278) (Figure 55).

Henry Pittier collected the type material in the area of Rancho Flores in the province of Heredia, Costa Rica, but no other original material of the species is known to exist. Atwood and Mora (1999) selected the copy of Schlechter's drawing of the type at AMES-24213 (HUH-102675) as lectotype. The drawing includes a portion of the plant habit depicting the erect stem concealed by multiple leaves, with flowers produced from several leaf axils, and floral dissections showing a front view of the sepals, petals and lip, a side view of the column, and a scheme of the pollinarium. Schlechter (1910a) described

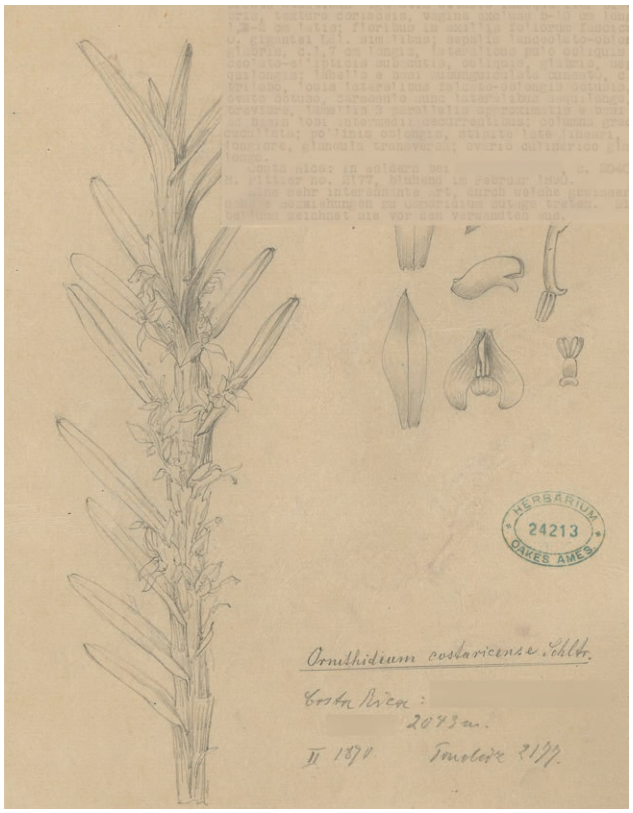

Figure 54. Lectotype of *Ornithidium costaricense* (AMES 24213). Courtesy of the Harvard University Herbaria, reproduced with permission of the President and Fellows of Harvard College.

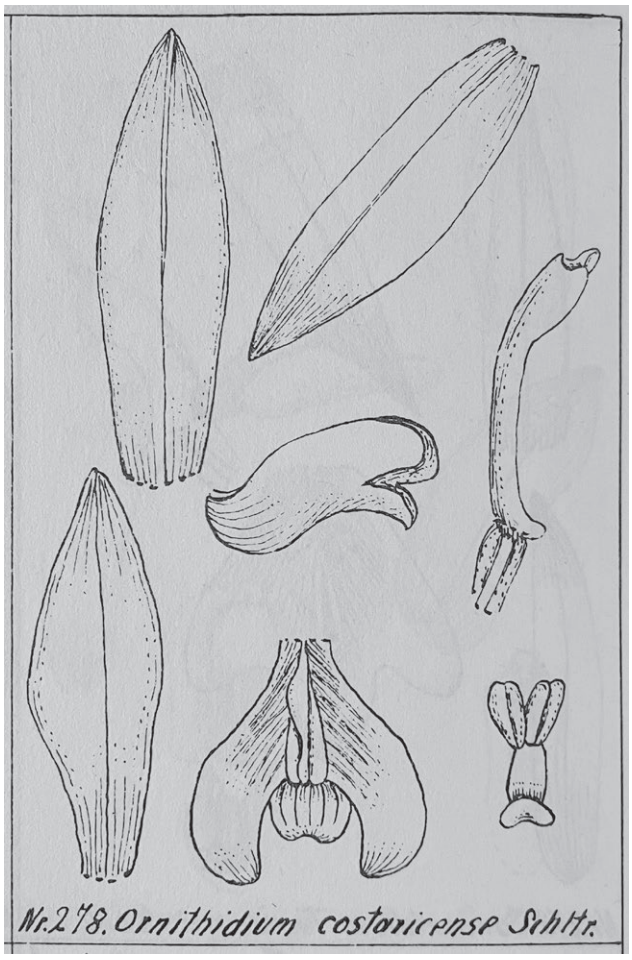

Figure 55. Schlechter's flower analysis from the holotype of *Ornithidium costaricense*, reproduced in Mansfeld (1931: Pl. 70, No. 278). Courtesy of the Harvard University Herbaria, reproduced with permission of the President and Fellows of Harvard College.

the species as having a plant bearing fasciculate inflorescences borne from the leaf axil, lanceolate-oblong, glabrous sepals, lanceolate-elliptic petals, and a three-lobed lip with a cuneate, subunguiculate base. These morphological features are consistent with the copy of Schlechter's drawing of the type that was selected by Atwood and Mora (1999) as lectotype.

Ornithidium costaricense was placed under the synonymy of *Maxillaria falcata* Ames & Correll (Atwood and Mora 1999), a species that was later transferred to *Camaridium* by Blanco et al. (2007). In fact, Schlechter had recognized the resemblance of *O. costaricense* to the *Camaridium* complex in the original description, adducing a difference of this *Ornithidium* from the *Camaridium* group in the shape of the lip.

30. *Ornithocephalus xiphochilus* Schltr., Repert. Spec. Nov. Regni Veg. 3(42–43): 251. 1907

Type: Costa Rica: auf Hügeln in der Nähe des Río Chinipo [Chirripó], ca. 300 m, blühend im 1900, *H. Pittier 16509*. Holotype, B, destroyed; tracing of Schlechter's sketch of the holotype, with drawing of the plant habit and analysis of the flower, designated here as lectotype, AMES 24168! (Figure 56); Schlechter´s floral analysis of the holotype, reproduced in Mansfeld (1931: Pl. 77, No. 307!).

The name is considered a synonym of *Ornithocephalus bicornis* Lindl. ex Benth. by Stevens et al. (2001), Pupulin (2002), and Bogarín et al. (2014). Ames also suspected the synonymy, and annotated the herbarium sheet that includes a drawing of the type (AMES 24168) with a label: "*Is this O. bicornis Lindl.?*". The original description and the illustration of the flower of *O. bicornis* preserved at K fits perfectly with *O. xiphochilus*; however, Schlechter compared his species with *O. choroleucus* Rchb.f. The holotype of *O. xiphochilus* was destroyed; therefore, the copy of the floral analysis with

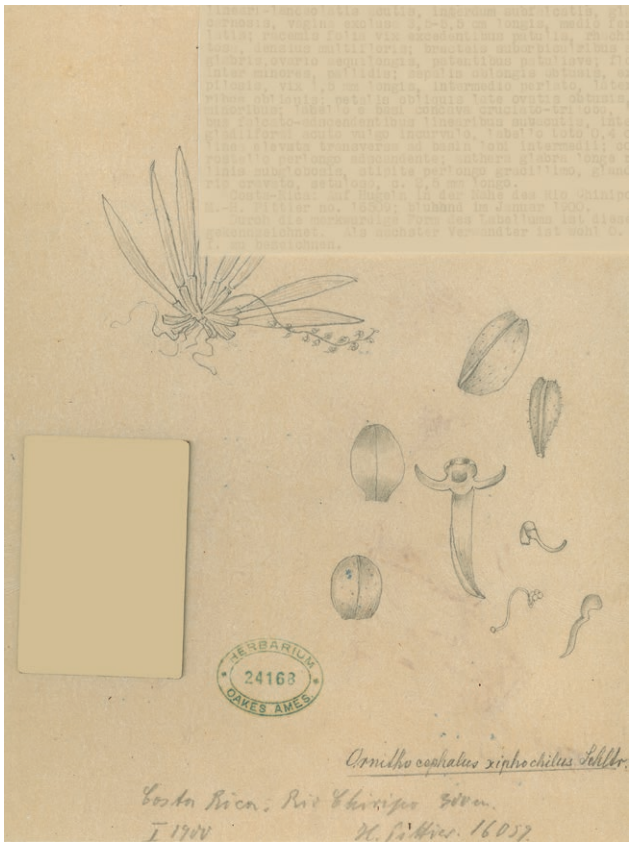

Figure 56. Lectotype of *Ornithocephalus xiphochilus* (AMES 24168). Courtesy of the Harvard University Herbaria, reproduced with permission of the President and Fellows of Harvard College.

the drawing of the habit by Schlechter (AMES 24168), is here designated as lectotype. *Ornithocephalus bicornis* is widely distributed, from Mexico to Peru, Venezuela and French Guyana. Among the species of the genus with hispidulous inflorescences, *O. xiphochilus* is characterized by the greenish-orange sepals with the abaxial surface hispid, and the linear incurved acute lip with a horn-like callus at the base on each side. In Costa Rica, the species is most similar to *O. castelfrancoi* Pupulin, but distinguished by the lip without lateral horn-like calli.

31. *Physurus lehmannii* Schltr., Beih. Bot. Centralbl., Abt. 2, 36(3): 379–380. 1918

Type: Costa Rica. [(San José: Caraigres,) Auf den Tablazo, 9 Feb.] 1882, *F.C. Lehmann 1757*. Holotype, not located. Isotypes: BM 00077967!, two fertile specimens, designated here as lectotype (Figure 57), and US 826005 / barcode 00093390!, two fertile specimens, and photo at AMES 24490 / HUH 00103132!; tracing of Schlechter's drawings of the holotype, AMES 24490 / HUH 00103132! (Figure 58).

Both the isotypes at the herbaria of the British Museum and the Smithsonian Institution are made up of two fertile specimens in perfect condition and represent excellent candidates for lectotypification. The drawing of the type made by Schlechter does not correspond exactly with any of the four extant specimens, although it is very similar to the plant kept on the right of the US sheet. We choose to lectotypify with the sheet at BM as there is a possibility that Schlechter actually saw it during one of his visits to London, whilst this is not possible for the specimen conserved in Washington. The tracings of Schlechter's floral analysis and drawing of the holotype plant at AMES clearly illustrate the habit of the species with slender, relatively short stems and narrow leaf petioles, and the bilobed epichile of the lip transversely oblong and apiculate, which are diagnostic of the species.

As many of the genera in the Goodyerinae closely related to genus *Erythrodes* Blume *s.l.*, *Physurus* Rich. ex Lindl. has a complicated taxonomic history because the characters used to circumscribe the genera in this heterogeneous group of plants are mostly challenging, if not impossible, to observe if not in fresh material. Neotropical *Physurus* species are usually treated under the generic names *Aspidogyne* Garay, *Microchilus* C.Presl, and *Platythelys* Garay.

The name *Physurus lehmannii* is treated by Pupulin (2002), Bogarín et al. (2014), and Kolanowska (2014) as a synonym of the widespread *Physurus vesicifer* Rchb.f. [≡ *Microchilus vesicifer* (Rchb.f.) Ormerod], ranging from Mexico to Panama.

32. *Physurus nigrescens* Schltr., Beih. Bot. Centralbl., Abt. 2 36(2): 380. 1918

Type: Costa Rica. *F. C. Lehmann s.n.* (holotype, not found; lectotype, designated here, copy of Schlechter's drawing of the holotype at AMES 24496 / HUH 103146! (Figure 59), reproduced in Mansfeld (1931: Pl. 13, No. 49!).

Lehmann collected the type material in Costa Rica but without specific locality data, and no extant original material of the species is known to exist. We select the copy of Schlechter's drawing based on the holotype at AMES 24496 (HUH 103146) as lectotype. The drawing includes a portion of the plant habit with five leaves,

Figure 57. Lectotype of *Physurus lehmannii* (BM 00077967). Courtesy of the Natural History Museum (BM).

Figure 58. Tracing of Schlechter's drawings from the holotype of *Physurus lehmannii* (AMES 24490). Courtesy of the Harvard University Herbaria, reproduced with permission of the President and Fellows of Harvard College.

an erect inflorescence, a side view of a flower, and floral dissections showing a front view of the sepals, petals, lip, and column. Schlechter (1918a) described the species as terrestrial with a narrow stem, five leaves, a multiflowered inflorescence, glandulose-pilose outer surface of sepals, and the ligulate petals, the oblong lip with transverse semilunate lobes at the apex, and the glandulose-puberulent, fusiform ovary. These morphological features are consistent with the copy of Schlechter's drawing of the type selected as lectotype.

Physurus nigrescens Schltr. is the basionym of *Erythrodes nigrescens* (Schltr.) Ames and *Microchilus nigrescens* (Schltr.) Ormerod.

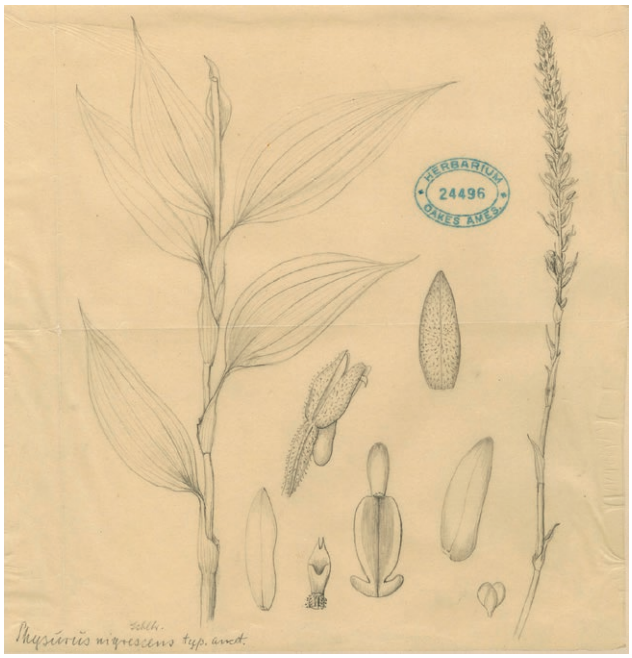

Figure 59. Lectotype of *Physurus nigrescens* (AMES 24496). Courtesy of the Harvard University Herbaria, reproduced with permission of the President and Fellows of Harvard College.

33. *Platystele bulbinella* Schltr., Repert. Spec. Nov. Regni Veg. 8: 565–566. 1910

Type: Costa Rica. [Heredia:] In den Wäldern des Rancho Flores, bei 2043 m, blühend im Februar 1890, *H. Pittier 2013*. Holotype, B, destroyed. Isotypes: US 579445 / barcode 00093718!, designated here as lectotype (Figure 60); AMES 00103247!, sheet with two photographs of the lectotype specimen, and a copy of Schlechter's floral analysis of the holotype; Schlechter's floral analysis of the holotype, reproduced in Mansfeld (1931: Pl. 41, No. 164) (Figure 61).

According to the protologue, *Platystele bulbinella* is distinguished among other *Platystele* by the caespitose habit linear to ligulate leaves, the erect, long, densely flowered raceme with 3 or more flowers opened simultaneously, the oblong, obtuse subfalcate lateral sepals and petals, and the subreniform to orbicular and shortly acuminate lip (Schlechter 1910b). The floral analysis based on the holotype of *P. bulbinella* clearly shows these diagnostic floral characters (Figure 60).

Luer (1990) included *P. bulbinella* as a synonym of *Platystele compacta* (Ames) Ames. However, a comparison of the protologues of both taxa reveals that *P. compacta* has oblanceolate leaves (vs. linear to ligulate in *P. bulbinella*), ovate (vs. oblong) and shorter (1 mm long

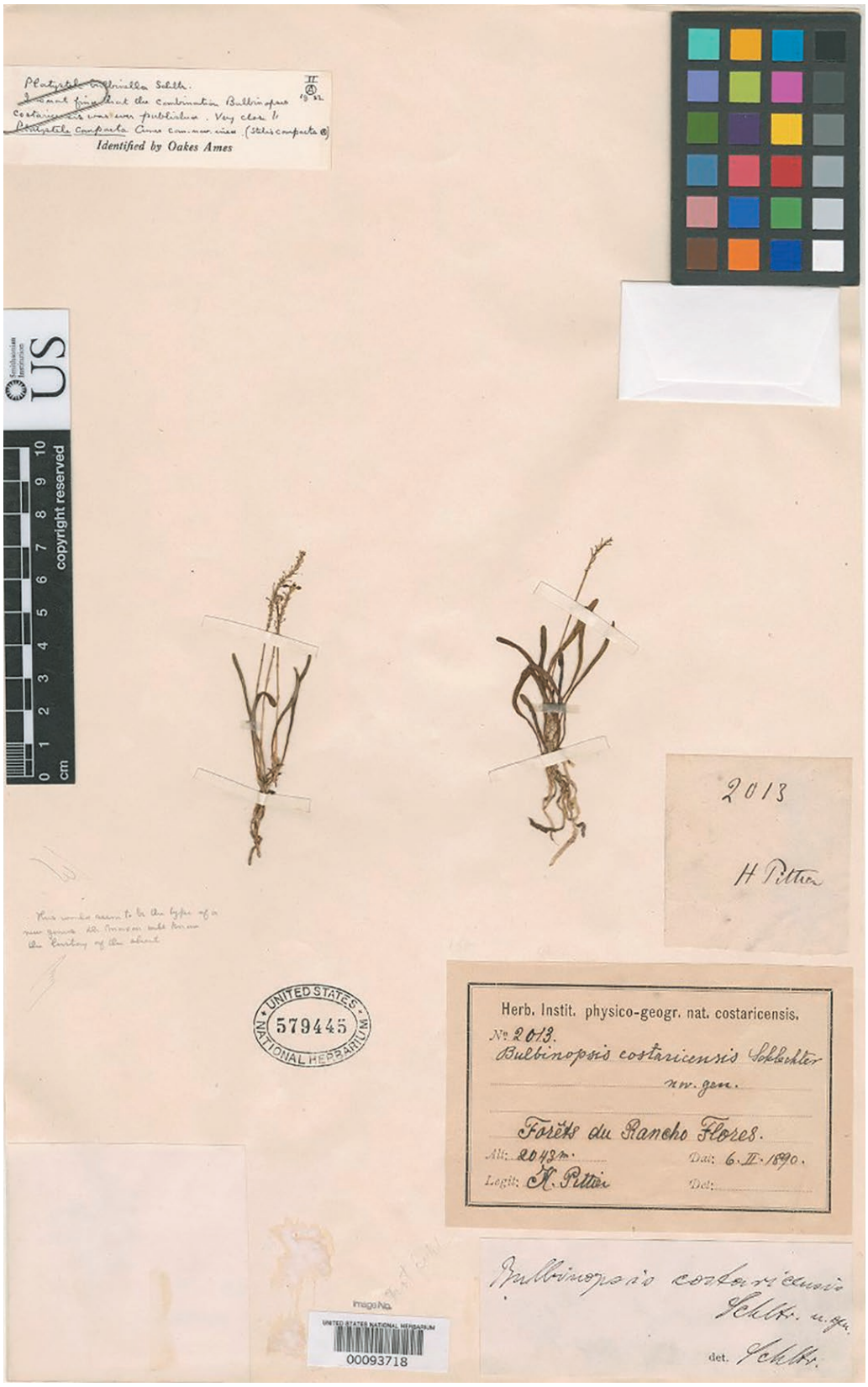

Figure 60. Lectotype of *Platystele bulbinella* (US 579445). Courtesy of the United States National Herbarium, Smithsonian Institution.

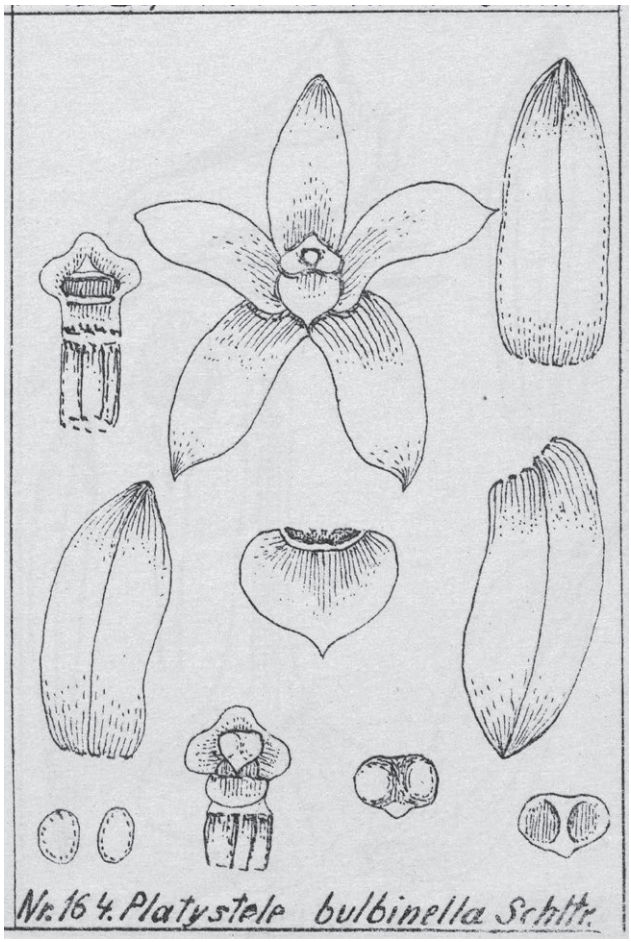

Figure 61. Schlechter's floral analysis from the holotype of *Platystele bulbinella*, reproduced in Mansfeld (1931: t. 41, no. 164).

vs. 2 mm long) sepals, oblanceolate to spathulate petals (vs. oblong, subfalcate), and ovate to lanceolate, apically pointed lip (vs. subreniform to orbicular, shortly acuminate). Also, the types of the two taxa come from ecologically different locations, the type of *P. compacta* having been collected at 350 m altitude in the tropical wet forests of Alta Verapaz, Guatemala, whilst the type of *P. bulbinella* was found in the montane forest of the southern slope of the Barva Volcano, Costa Rica, at over 2000 m in elevation (Ames 1908b; Schlechter 1910b).

At the Harvard University Herbaria, the barcode AMES 00103247 is associated with two sheets. One sheet includes two photographs of the lectotype (US 579445) and a copy of Schlechter's floral analysis of the holotype; plus, two specimens of *Platystele* (*P. C. Standley 38510* and *M. Valerio 78*) collected in Costa Rica, which are not part of the type collection of *P. bulbinella*, and a drawing of a flower that surely illustrates one of the latter specimens. The other sheet contains inflorescence fragments of the two non-type specimens mentioned above.

34. *Pleurothallis cooperi* Schltr., Repert. Spec. Nov. Regni Veg. Beih. 19: 286. 1923.

Type: Costa Rica. Umgebung von Cartago, *J. J. Cooper s.n*. Holotype, B, destroyed. Isotype, selected by C. Luer (1998) as lectotype, AMES 31255 / HUH 00074176!, a fragment of the type specimen (Figure 62); tracings of Schlechter's analytical drawings of the species, same sheet (Figure 63A–B).

Pleurothallis cooperi was collected by Juan José Cooper in the surroundings of Cartago. A fragment of the type specimen was sent to AMES along with a detailed illustration based on the holotype (AMES 31255). Luer (1998) chose the specimen at AMES as lec-

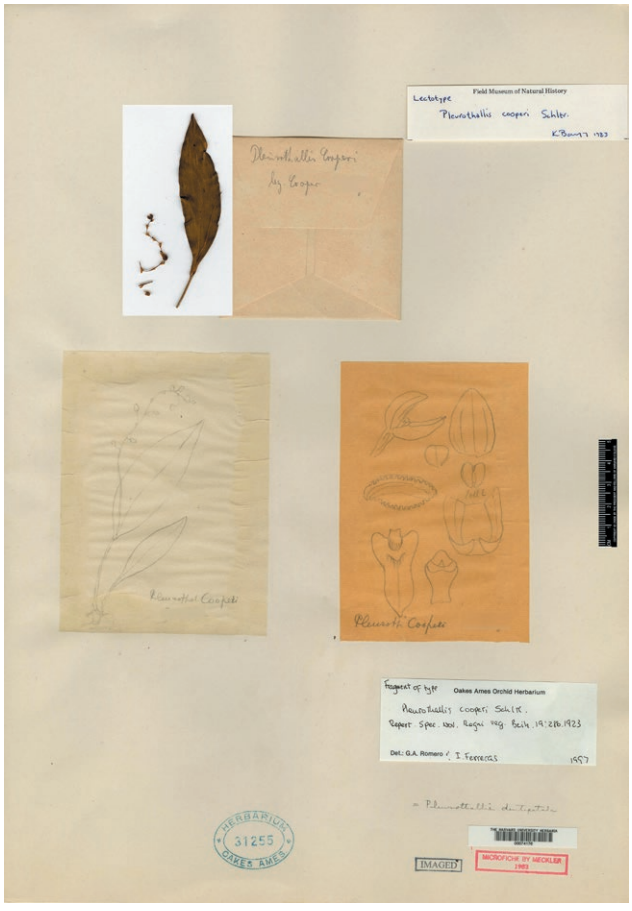

Figure 62. Lectotype of *Pleurothallis cooperi* (AMES 31255). Courtesy of the Harvard University Herbaria, reproduced with permission of the President and Fellows of Harvard College.

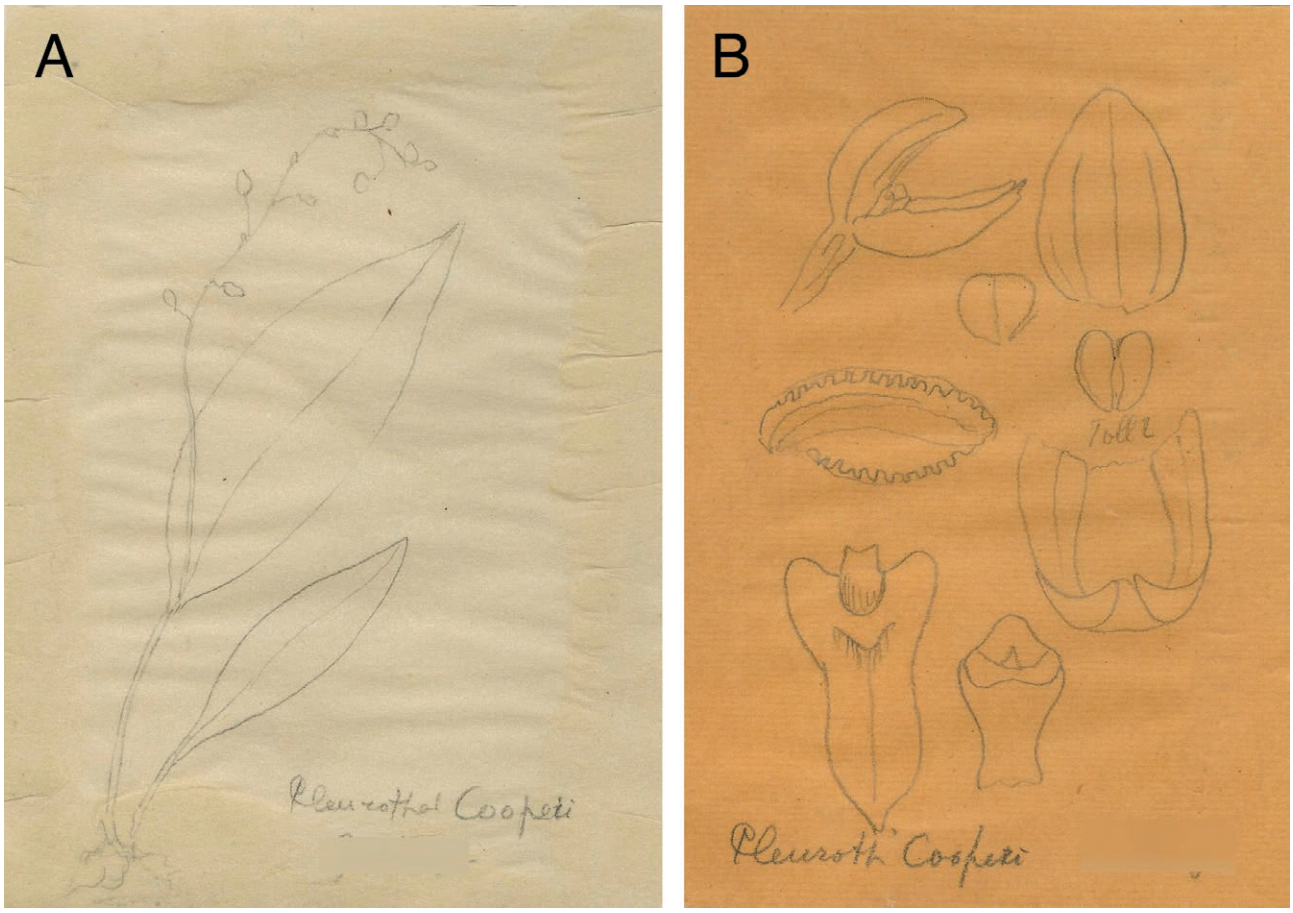

Figure 63. Tracings of Schlechter's analytical drawings from the holotype of *Pleurothallis cooperi* (AMES 31255). **A**, plant habit. **B**, floral analysis. Courtesy of the Harvard University Herbaria, reproduced with permission of the President and Fellows of Harvard College.

totype and no other type material is known. The fragment includes a leaf and a section of the inflorescence bearing a couple of flowers. Along with this specimen, an illustration depicting the plant habit with two ramicauls with their leaves, and the erect inflorescence borne at the base of the leaf is included, as well as a lateral view of the flower, and a floral dissection showing the ventral view of the synsepal, petals, lip and column. These details are consistent with the description of the protologue.

Pleurothallis cooperi has been included under the concept of *P. dentipetala* Rolfe ex Ames by several authors including Luer (1998), Pupulin (2002) and Bogarín et al. (2014). *Pleurothallis dentipetala* is endemic to the mid-elevation forests of Costa Rica and Panama. The drawing of *P. cooperi*, present on the lectotype, clearly illustrates the erect, cordate leaf, the congested, simultaneously multi-flowered racemes born from behind a spathe, and the flowers with minutely dentate to denticulate (sometimes fimbriate) petal margins and triangular lip with erect basal sides, all features agreeing with the diagnostic characters of *P. dentipetala*.

35. *Pleurothallis listerophora* Schltr., Repert. Spec. Nov. Regni Veg. 3(33–34): 107. 1906

Type: Costa-Rica: bei La Uruca, blühend im Jul 1890, *P. Biolley 2986* [*H. Pittier* 2986]. Holotype, B, destroyed; lectotype, designated by Luer (2000), US 577103! (Figure 64); isolectotype, CR 2986!; tracing of Schlechter's sketch of the holotype, with drawing of the plant habit and analysis of the flower, AMES 00074416!; Schlechter´s floral analysis of the holotype, reproduced in Mansfeld (1931: Pl. 32, No. 127!) (Figure 65).

Pleurothallis listerophora, currently only known from Costa Rica and Panama, was described and illustrated by Schlechter as having glabrous sepals (see Mansfeld 1931: pl. 32, No. 127) (Figure 65). However,

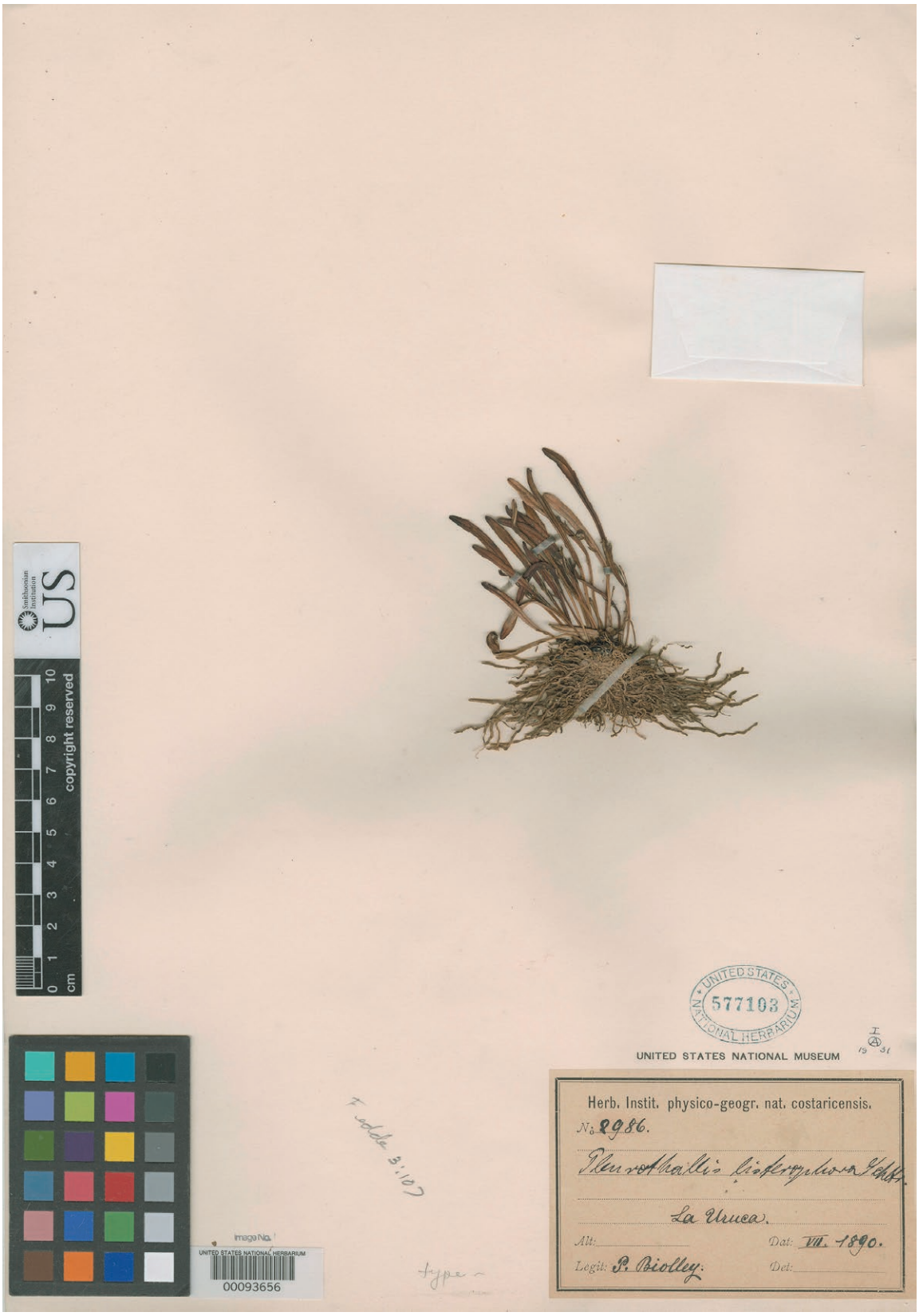

Figure 64. Lectotype of *Pleurothallis listerophora* (US 577103). Courtesy of the United States National Herbarium (US).

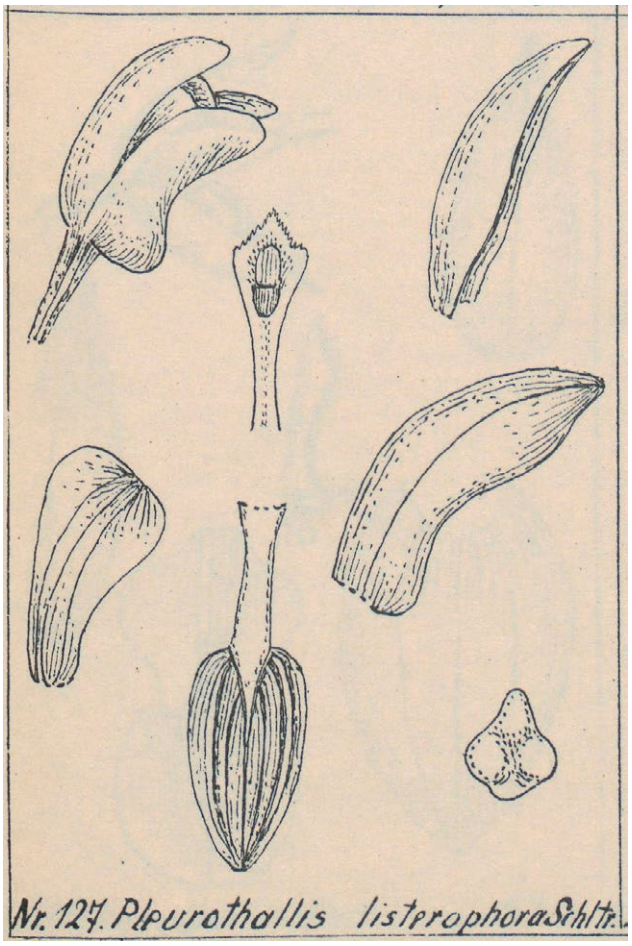

Figure 65. Schlechter´s floral analysis from the holotype of *Pleurothallis listerophora*, reproduced in Mansfeld (1931: pl. 32, No. 127).

Luer (2000) noted that while the morphology of the plant and the shape of the other structures correspond well with the original description, upon rehydrating a flower of the isotype at US (US 577103), the sepals of the flowers are long-pubescent on the adaxial surface (Luer 2000, pl. 24). The protologue of *P. listerophora* cites Pittier as the collector of the type specimen. However, based on the collection data of the label of the lectotype at US and the isolectotype at CR herbaria (not cited by Luer 2000), the main collector Figures as Paul Biolley.

According to the most recent infra-generic classification of *Stelis, P. listerophora* is placed under *Stelis* subgen. *Unciferia* (Luer) Karremans (2019), where it is treated as *S. listerophora* (Schltr.) Pridgeon & M.W.Chase (2001). Among the species of this group, it is recognized by the narrow ovate leaves subequal or shorter than the ramicaul, the inflorescence shorter than the leaves producing one or two flowers simultaneously, the lateral sepals connate to near the apex, and the narrow elliptical lip with a pair of central carinae, marginal angles bellow the middle and unguiculate basally. *Stelis listerophora* is most similar to *Stelis villosa* (Knowles & Westc.) Pridgeon & M.W.Chase, but the latter has inflorescences longer than the leaves, longer pedicels, and the abruptly ungiculate lip oblong above the second third (Luer 2000).

36. *Pleurothallis pittieri* Schltr., Repert. Spec. Nov. Regni Veg. 3(42-43): 247. 1907

Type: Costa Rica [Heredia]: An den Ufern des Río Manewan [Río Macarrón], ca. 2100 m, blühend im 15 Februar 1890, *H. Pittier 2023* (*2067*). Holotype, B, destroyed; lectotype designated here, copy of Schlechter's drawing of the holotype at AMES 23666 / HUH 00074626! (Figure 66), reproduced in Mansfeld (1931: Pl. 34, No. 136!).

The type material was collected by H. Pittier in Costa Rica along the shores of Río Macarrón on the slopes of Barba massif. Schlechter (1907a) cited *Pittier 2067* in the protologue; however, the type illustration bears the number *Pittier 2023*. No extant original material of the species is known to exist. Therefore, we selected the copy of Schlechter's drawing based on the holotype at AMES 23666 as lectotype. The drawing includes the plant habit with three ramicauls bearing several inflorescences, a side view of a flower, and floral dissections showing a frontal view of the spreading sepals and petals, and side view of the lip, front view of the column, pollinarium, and anther cap. Schlechter (1907a) described it as having terete stems with 2–3 amplectent bracts, oblong-elliptic leaves, multiflorous inflorescences developed from a spathe, lanceolate-ligulate sepals, oblique ligulate petals, and a rhomboid, obscurely trilobate lip. These morphological features match the copy of Schlechter's drawing of the type selected as lectotype.

Pleurothallis pittieri Schltr. is considered a synonym of *Crocodeilanthe floribunda* (Poepp. & Endl.) Luer (=*Pleurothallis floribunda* Poepp. & Endl.) and it is the basionym of *Stelis pittieri* (Schltr.) Rojas-Alv. & Karremans when treated in *Stelis* s.l.

37. *Pleurothallis sororia* Schltr., Repert. Spec. Nov. Regni Veg. 10: 294. 1912

[non *Pleurothallis sororia* Schltr. 1920 = *Kraenzlinella erinacea* (Rchb.f.) Solano].

Figure 66. Lectotype of *Pleurothallis pittieri* (AMES 23666). Courtesy of the Harvard University Herbaria, reproduced with permission of the President and Fellows of Harvard College.

Figure 67. Tracing of Schlechter's drawing from the holotype of *Pleurothallis sororia* (AMES 00074760). Courtesy of the Harvard University Herbaria, reproduced with permission of the President and Fellows of Harvard College.

Type: Costa Rica. [Heredia:] In den Wäldern von Rancho-Flores, ca. 2043 m, blühend im Februar [15] 1890, *H. Pittier 2157*. Holotype, B, destroyed [tracing of Schlechter's drawing of the holotype, AMES 00074760! (Figure 67)]. Isotypes: AMES 00083467, a flower conserved in glycerine; BR 00000065718!, designated here as lectotype (Figure 68); US577084 / barcode 00093697!; Schlechter's floral analysis of the holotype, reproduced in Mansfeld (1931: Pl. 36, No. 143!).

According to the protologue, *Pleurothallis sororia* can be distinguished by the combination of terete, thick ramicauls shorter than leaves, covered by a tubular sheath on the lower 3/4; oblong to elliptic, obtuse, thick leaves; long, thick, erect inflorescences with the peduncle covered with 3–4 bracts; ovate, obtuse, compressed, abaxially carinate and apically falcate, incurved floral bracts; muricate ovary; sepals abaxially carinate at the apex; petals bilobed at the base; lip unguiculate and bilobed at the base, with minute, serrulate, incurved lobes and the disc papillose (Schlechter 1912). The above characteristics coincide with the types examined.

Luer (1994) reduced *P. sororia* under the synonymy of *Pleurothallis erinacea* Rchb.f., a species described originally from Ocaña, Colombia (Reichenbach 1885) and recently transferred to *Acianthera* (Doucette et al. 2016). However, Reichenbach (1855, p. 294) characterized the lip blade of *P. erinacea* as serrulate along the margins, whilst in *P. sororia* only the lateral lobes of the lip are serrulate. To assess whether the two names are conspecific, it would be advisable to document variation in

Figure 68. Lectotype of *Pleurothallis sororia* (BR 00000065718). Courtesy of the Meise Botanic Garden Herbarium.

fresh material of specimens from both type localities. Photographs showing morphological and color variations of *P. erinacea* are presented in Karremans and Vieira-Uribe (2020).

38. *Sauroglossum nigricans* Schltr., Beih. Bot. Centralbl. 36(2): 379. 1918

Type: Costa Rica. *H. Pittier s.n.* Holotype, B, destroyed; lectotype designated here, copy of Schlechter's drawing of the holotype at AMES-24450 / HUH-00104123!. Figure 69.

We were unable to locate extant specimens that could be considered original material collected by H. Pittier. Therefore, we select the copy of Schlechter's drawing of the type at AMES as lectotype. The drawing includes a plant habit with fleshy pilose roots, four basal, rosulate, ovate-elliptic leaves, and one erect inflorescence bearing five flowers, a side view of a flower, and a dissection of the perianth, and two views of the column. Schlechter (1918a) described the lip as oblong with basal, hastate angles and a contracted apex and the morphological details illustrated in the lectotype match the protologue.

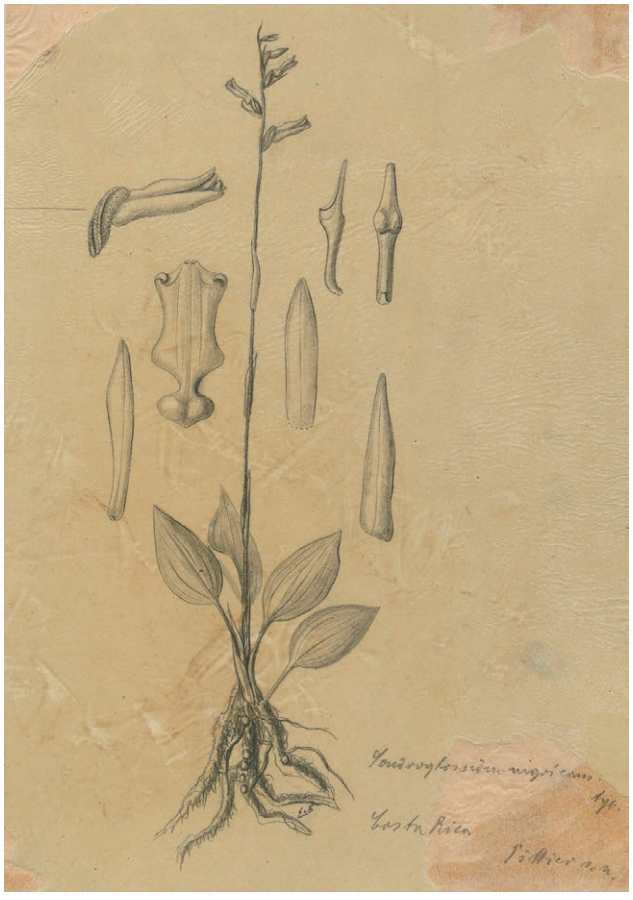

Figure 69. Lectotype of *Sauroglossum nigricans* (AMES-24450). Courtesy of the Harvard University Herbaria, reproduced with permission of the President and Fellows of Harvard College.

Sauroglossum nigricans Schltr. is the basionym of *Cyclopogon nigricans* (Schltr.) Schltr. and it is considered an heterotypic synonym of *Cyclopogon cranichoides* (Griseb.) Schltr. This species should be treated as a member of *Cyclopogon* s.l., the most taxonomically challenging genus of the Spiranthinae (Salazar et al. 2018). According to phylogenetic studies by Salazar et al. (2018), *C. cranichoides* is sister to the rest of the species of *Cyclopogon*. In contrast, the genus *Sauroglossum* is polyphyletic as currently defined, with the type species, *Sauroglossum elatum* Lindl., and its close relatives likely being restricted to south-eastern Brazil and Argentina.

39. *Scaphosepalum pittieri* Schltr., Repert. Spec. Nov. Regni Veg. 3: 78. 1906

Type: Costa-Rica [Puntarenas]: im Tale von Agua Buena (Cañas Gordas), ca. 1100 m, blühend im Februar 1897, *H. Pittier* (*11143 Herb. Institut. costaric.* [Herb. Nac. Costa Rica]). Holotype, B, destroyed [drawing by C. Schweinfurth of a flower from the holotype, along with a picture of the isotype saved at US and a copy of the floral analysis from the holotype published in Mansfeld (1931: Pl. 17, No. 67), AMES barcode 00104147! (Figure 70)]. Isotypes: US 815001 / barcode 00447416!, designated here as lectotype (Figure 71); US 577403 / barcode 00093610!

In his monograph of the genus *Scaphosepalum*, Luer (1988) cited the type of *S. pittieri* (*Pittier s.n.*, without further indications) as conserved at the herbarium of the National Museum in Costa Rica. We were unable to retrieve this specimen, and apparently no other specimens of *Scaphosepalum* collected by Pittier are in existence at CR.

Two isotypes of *Scaphosepalum pittieri* are conserved at US. Unlike AMES 577403, the specimen selected here as lectotype includes a fertile plant with remains of the inflorescence, a couple of flowers, and a few fruits. Although the contents of an accompanying envelope are not accessible at the moment due to the restrictions associated with the COVID-19 pandemic, it may contain floral materials useful for further studies. The species was collected from the area of Agua Buena-Cañas Gordas, located in the south Pacific of Costa Rica, close to the border with Panama (Schlechter 1906b).

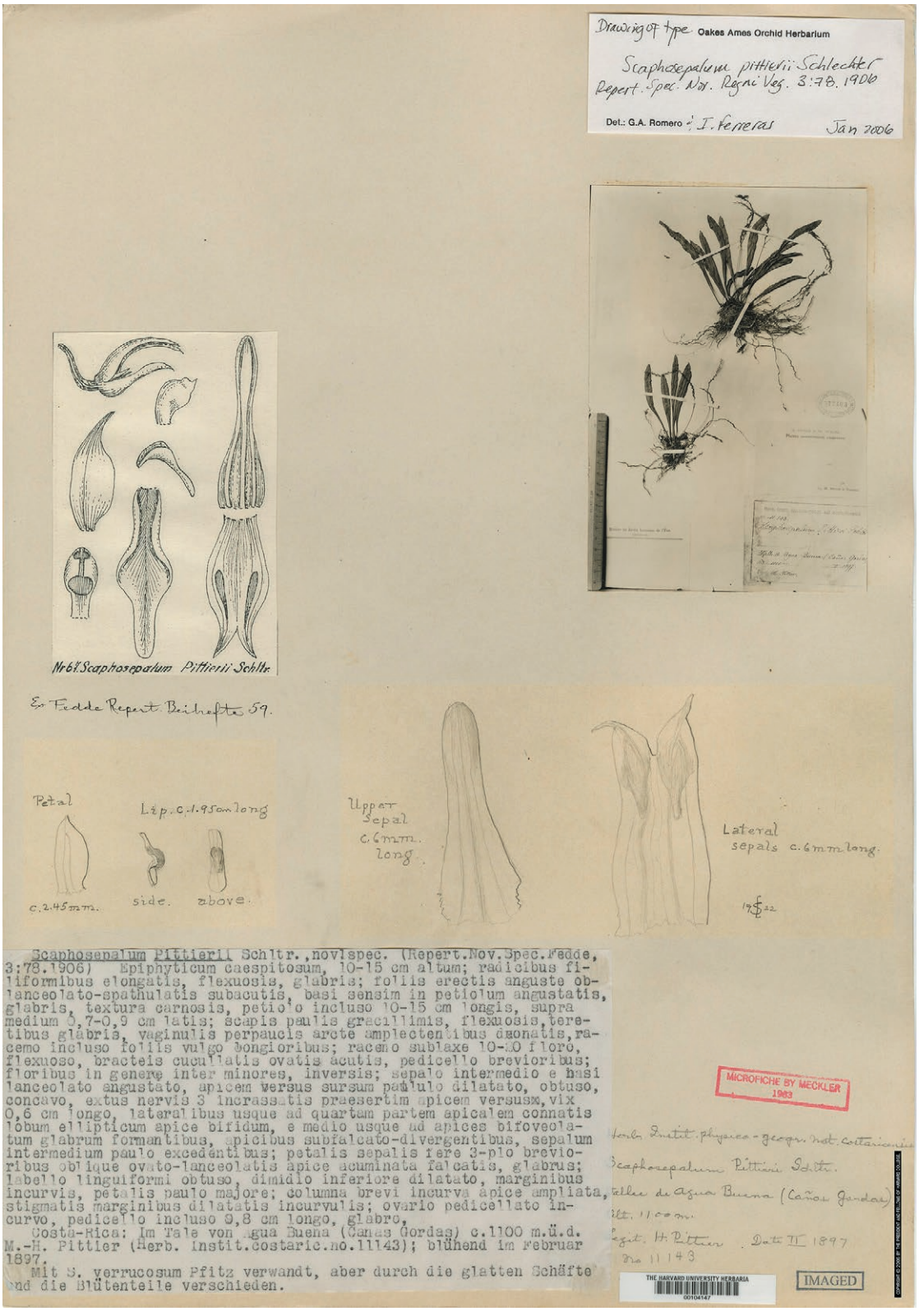

Figure 70. Drawing by C. Schweinfurth of a flower from the holotype of *Scaphosepalum pittieri*, along with a picture of the isotype saved at US and a copy of the floral analysis from the holotype published by Mansfeld (1931: t. 17, no. 67) (AMES barcode 00104147). Courtesy of the Harvard University Herbaria, reproduced with permission of the President and Fellows of Harvard College.

Figure 71. Lectotype of *Scaphosepalum pittieri* (US 815001). Courtesy of the United States National Herbarium (US).

Although originally compared to the Colombian *Scaphosepalum verrucosum* (Rchb.f.) Pfitzer, most authors place *S. pittieri* within the highly variable *Scaphosepalum microdactylum* Rolfe concept (i.e., Luer 1988, Mora and Atwood 1993, Pupulin 2002, Dressler 2003). The latter is characterized by the slender and glabrous stems, the long, consecutively multi-flowered racemes, and the flowers with short and wide sepals with morphologically variable apical calli.

40. *Scaphyglottis pauciflora* Schltr., Repert. Spec. Nov. Regni Veg. 3(29–30): 47. 1906

Type: Costa Rica: Ujarrás de Buenos Ayres [Aires], blühend im Februar 1897, *H. Pittier 10627*. Holotype, B, destroyed; isotype, designated here as lectotype, BR 0000006589165! (Figure 72); copy of Schlechter's sketch of the holotype, with drawing of the plant habit and analysis of the flower, AMES 24610!; Schlechter´s floral analysis of the holotype reproduced in Mansfeld (1931: Pl. 43, No. 172!).

Since the holotype of this species was destroyed at B, an isotype found at BR herbarium is designated here as lectotype. This name is considered a synonym of *Scaphyglottis behrii* (Rchb.f.) Benth. & Hook.f. ex Hemls. by Stevens et al. (2001) and Bogarín et al. (2014). Schweinfurth was probably the first to consider these two names conspecific, as he wrote "= *S. behrii* (Rchb.f.) Benth. & Hook.f. ex Hemls" on the herbarium sheet at AMES (24610), which is a copy of Schlechter's sketch of the type.

Scaphyglottis behrii was first described under genus *Ponera* Lindl. in 1855. The original description by Reichenbach is ambiguous, but the shape of the lip as noted in the protologue corresponds well with the tracing of the holotype of *S. pauciflora* by Schlechter, and we agree with Stevens et al. (2001) and Bogarín et al. (2014) in considering the two taxa conspecific.

The species is characterized by the small plants with proliferous fusiform and shortly stipitate pseudobulbs bearing two narrow leaves at the apex and producing an inflorescence with multiple congested white flowers. The sepals and petals are oblong and acute, and the lip is cuneate at the base, with rounded lateral margins above the middle, and the apex sub quadrate and retuse. Small plants with fusiform and narrow herbaceous leaves are also typical of *Scaphyglottis acostae* (Schltr.) C.Schweinf. and *Scaphyglottis crurigera* (Lindl.) Ames & Correll, however, the latter have long-stipitate and not proliferous pseudobulbs.

41. *Scaphyglottis subulata* Schltr., Repert. Spec. Nov. Regni Veg. 8(185/187): 454. 1910

Type: Costa Rica. Bei Carthago [Cartago], blühend im Sept 1889, *A. Biolley 1367*. Holotype, B, destroyed; isotype, BR 0000006590437!, designated here as lectotype (Figure 73); photo of type, AMES 39613 / HUH 00104170! (Figure 74); copy of Schlechter's drawing of the holotype, reproduced in Mansfeld (1931: Pl. 44, No. 176!).

An isotype located at BR-0000006590437, and a photograph of the holotype at AMES 39613, are the only extant specimen from the original material collected by A. Biolley in Cartago, Costa Rica. Therefore, we select the isotype as lectotype. It consists of a plant with three stems, each with one terete leaf. A flower is observed at the apex of the stem placed in the middle. There is also a photograph of the holotype (destroyed at B) kept at AMES 39613 / HUH-00104170 that consists of two stems of a plant with flowers and a sketch showing a side view of a flower, a dissection of the flower, a side view of the column and pollinarium with anther cap. The sketch is placed on the upper right corner of the sheet. Schlechter (1910a) described the plant with cylindric stems, linear-subulate, acute leaves, and flowers developed from the apex of the stem. The sepals are oblong-ligulate, the petals oblique lanceolate-ligulate, acute, and the lip is unguiculate, trilobed with oblong, obtuse lateral lobes and a quadrate, truncate midlobe. These features match the type drawing in the upper-right corner of the photograph of the holotype (AMES 39613).

Scaphyglottis subulata Schltr. is the basionym of *Reichenbachanthus subulatus* (Schltr.) Dressler. The name *Reichenbachanthus lankesteri* (Ames) Mora-Ret. & García-Castro, based on *Hexisea lankesteri* Ames, is a heterotypic synonym of *S. subulata*. *Reichenbachanthus* Barb.Rodr. and *Hexisea* Lindl. are currently treated as synonyms of *Scaphyglottis* Poepp. & Endl.

42. *Sobralia pfavii* Schltr., Repert. Spec. Nov. Regni Veg. Beih. 19: 272–273. 1923

Type: Costa Rica. Ohne nähere Standortsangabe, *Pfau 80*. Holotype, not located [tracing of Schlechter's drawing of the holotype, AMES 31594 / HUH 00104322!]. Isotype: W-Rchb.Orch. 2122!, designated here as lectotype (Figure 75).

The holotype of *Sobralia pfavii* has been traditionally considered as lost in the bombing of the Berlin-

Figure 72. Lectotype of *Scaphyglottis pauciflora* (BR 0000006589165). Courtesy of the Meise Botanic Garden Herbarium.

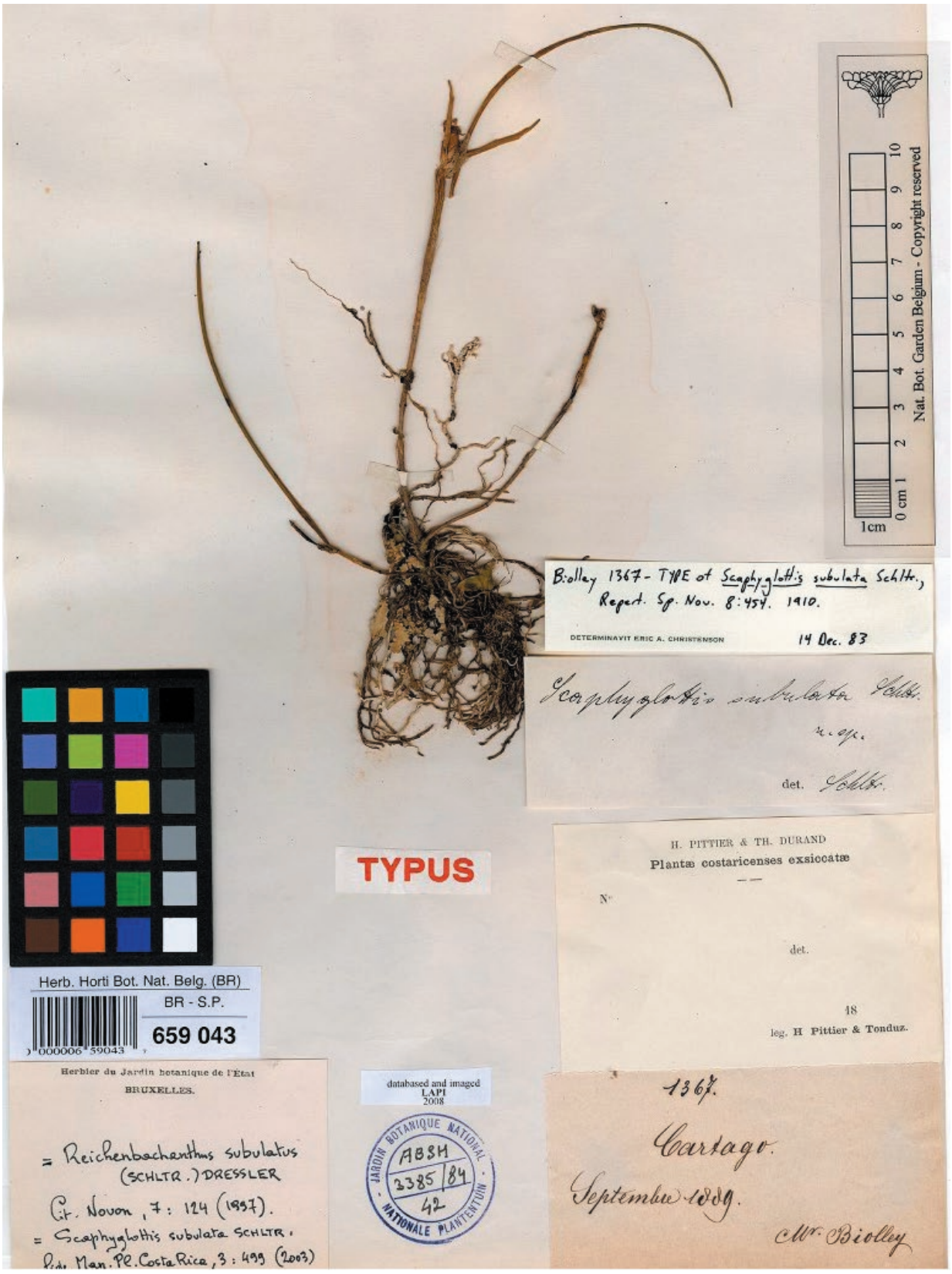

Figure 73. Lectotype of *Scaphyglottis subulata* (BR 0000006590437). Courtesy of the Meise Botanic Garden Herbarium.

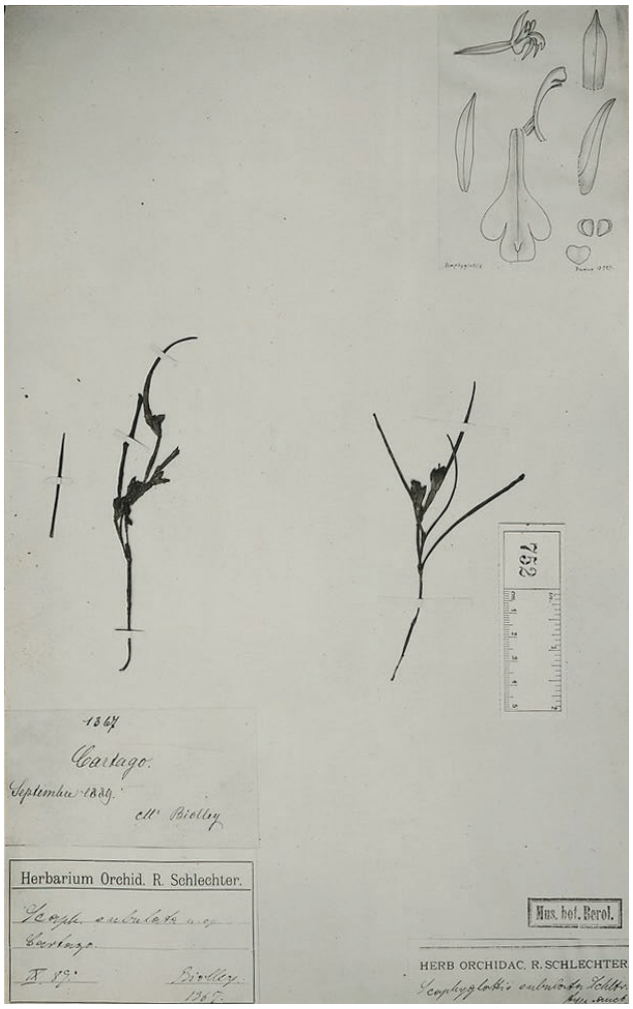

Figure 74. Photo of the holotype of *Scaphyglottis subulata* (AMES barcode 0104170). Courtesy of the Harvard University Herbaria, reproduced with permission of the President and Fellows of Harvard College.

Dahlem herbarium in 1943, but this idea is at most a labile hypothesis. The collector of the type specimen, the Swiss Richard Pfau, could not have had any direct contact with Schlechter, as he died in 1897. We know for sure that he sent materials for study (including pressed specimens and quite detailed watercolored drawings) to Reichenbach in Hamburg and to Rolfe at the Royal Botanic Gardens, Kew, but we have no direct evidence of any contact of Pfau with botanists in Berlin.

Reichenbach's herbarium in Vienna kept a sheet of *Sobralia pfavii* sent by Pfau himself, under his field number 80, and Christina M. Smith annotated this specimen as the species holotype. It bears the name, "Sob. Pfavii", in Reichenbach's handwriting, but Reichenbach himself never published the intended name.

The species was effectively described by Schlechter only in 1923, together with another collection of Pfau, *Telipogon pfavii* (Schlechter 1923d), for which a holotype has not been located (see below). This raises the question if Schlechter studied the type material of *Sobralia pfavii* during his visit to the Reichenbach Herbarium. If so, the type sheet at W should be considered as the actual holotype.

The sheets that Schlechter studied in Vienna, and which he selected as types for some of his new species, are usually annotated in his characteristic handwriting, i.e., *Chondrorhyncha endresii* (W-Rchb.Orch. 49751 / W 0018830), *Chondrorhyncha reichenbachiana* (W-Rchb. Orch. 4795 / W 0018829), *Endresiella zahlbruckneriana* (W-Rchb.Orch. 43634 / W 0019449) (Figure 76). In the same way, the drawings that he made of the type specimens of these species – now known through the tracing of his sketches conserved at AMES – were largely copied from the original drawings that Endrés sent to Reichenbach, and which were conserved in his herbarium at the time of Schlechter's visit. Compare, for example, Endrés' illustration of the type specimen of *Endresiella zahlbruckneriana* in Vienna (W-Rchb.Orch. 36018 / W 00209589) with the copy of Schlechter's analysis of the same species at AMES (24700 / HUH 00099111) (Figure 77).

In the case of *Sobralia pfavii*, however, the drawings made by Schlechter of the plant habit and his analysis of the flower (AMES 31594 / HUH 00104322) (Figure 78) only partially corresponded to the specimen conserved in Vienna and annotated as the holotype (Figure 75). There are obvious similarities between the actual specimens kept on the sheet, as well as Pfau's sketch mounted with them, and the sketches made by Schlechter, and it is also noteworthy that Reichenbach annotated the specimen with the intended name of "Sob. Pfavii" – the same eventually adopted by Schlechter – but the sheet at W has no labels with Schlechter's determination and his manuscript indication of "typus". This could suggest that he may have studied another set of the collection made by R. Pfau. For this reason, we prefer, conservatively, to consider that we were unable to locate the holotype of *Sobralia pfavii*, and to treat the specimen at W as an isotype, which we designated here as the species' lectotype.

According to the protologue, *Sobralia pfavii* can be distinguished by the combination of a short, creeping rhizome; stems up to 26 cm tall, with narrow, lingulate, obtuse or bidentate, erect, leaf blades; the sessile, abbreviated inflorescence with floral bracts shorter than the ovary; the sepals, petals and lip yellow, the lip with yellowish-orange throat, the oblong sepals and narrowly oblong, oblique, petals, with wavy margins; and the elliptic lip, apically trilobed, fimbriate to dentate in the distal half, with two ridges extended from the base to

Figure 75. Lectotype of *Sobralia pfavii* (W-2122). Courtesy of the Naturhistorisches Museum Wien.

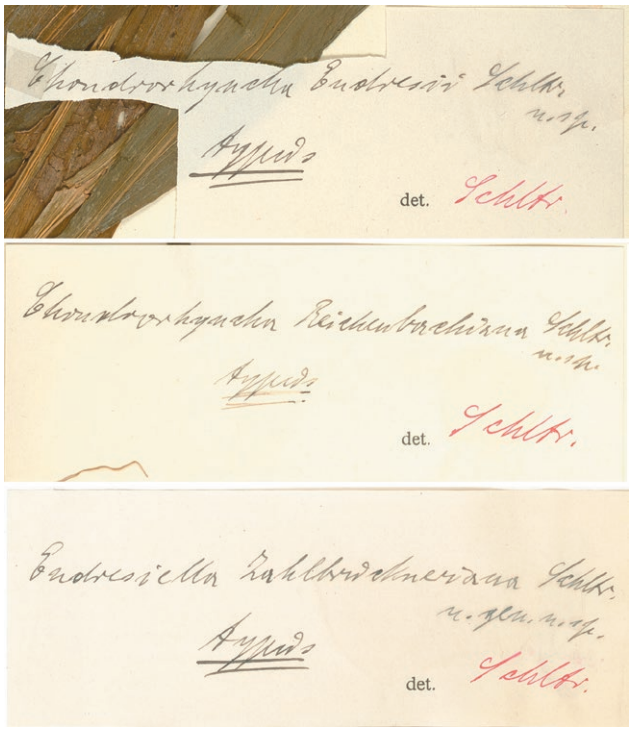

Figure 76. Correction labels by Rudolf Schlechter affixed to the holotypes of *Chondrorhyncha endresii* (W-Rchb.Orch. 49751) (A), *Chondrorhyncha reichenbachiana* (W-Rchb.Orch. 4795) (B), and *Endresiella zahlbruckneriana* (W-Rchb.Orch. 43634) (C). Courtesy of the Naturhistorisches Museum Wien.

the apex, the short, rounded lateral lobes, and the subquadrate, rounded to subtruncate midlobe (Schlechter 1923d). *Sobralia pfavii* is known only from Costa Rica.

43. *Sobralia pleiantha* Schltr., Repert. Sp. Nov. Regni Veg. 3(31-32): 79. 1906

Type: Costa Rica [Puntarenas]: in dem Walde bei Boruca, ca. 450 m, blühend im Feb 1891, *H. Pittier 3855*. Holotype, B, destroyed. Isotypes: BR 0000006589844!, designated here as lectotype (Figure 79); CR 3855!; US-814994 / barcode 00093886!; Z 000068540!. Sheet with two photographs of the isotype saved at US, AMES 24355 / HUH 00104324! (Figure 80A). Tracings of Schlechter's drawing of the holotype, AMES 224354 / HUH 00104323! (Figure 80B). Floral analysis of the holotype, originally prepared by Schlechter and reproduced in Mansfeld (1931: Pl. 4, No. 13!).

Although the holotype specimen of *Sobralia pleiantha* was destroyed, at least three isotypes and two drawings of the holotype are preserved in herbaria across the world. The isotype at CR is sterile and no reproductive organs are preserved in the accompanying envelope, while the isotypes at US and Z show a few flower buds. Therefore, we choose to lectotypify *S. pleiantha* with the type material saved at the herbarium of the Meise Botanic Garden (BR) in Belgium, based on the fertile stem provided with various flowers and flower buds, with an envelope containing more well-conserved dissected flowers. *Sobralia pleiantha* was distinguished as a new species by the multi-flowered, shortened inflorescences, contrasting with the usual single- or few-flowered inflorescences of resembling species of *Sobralia*.

Sobralia pleiantha is considered a synonym of *S. luteola* Rolfe. According to the original description (Rolfe 1898) of *S. luteola*, the plant came from "Tropical America", and flowered in the collection of Pantia [Pandia] Ralli, a well-known businessman and orchid gardener of Greek ascendence. *Sobralia luteola* is only known from Costa Rica and Nicaragua. It is recognized by the pale to creamy yellow flowers with an apically ciliate lip marked with orange along the throat. Individuals often produce more than two flowers simultaneously in a shortened raceme, characteristics that coincide with the original description of *S. pleiantha*.

44. *Solenocentrum costaricense* Schltr., Repert. Spec. Nov. Regni Veg. (205-207): 163. 1911

Type: Costa-Rica: San Isidro de La Arenilla, ca. 1400 m, blühend in August 1903, *H. Pittier 16723*. Holotype, B, destroyed; isotype, CR 16723!, designated here as lectotype (Figure 81); Schlechter's floral analysis of the holotype, reproduced in Mansfeld (1931: Pl. 5, No. 20); drawing of Schlechter's sketch of the holotype, with drawing of the plant habit and analysis of the flower, AMES 24437! (Figure 82).

Solenocentrum costaricense Schltr. (1911), the type species of the genus, was described from a plant collected by H. Pittier in central Costa Rica, around San Isidro, Vázquez de Coronado. The holotype of *S. costaricense* was destroyed, but an isotype is preserved at CR, and it is selected here as lectotype. The isotype at CR only holds fragments of the elliptic, long-petiolate leaves; however, the illustrations of the flower based on the holotype at AMES 24437 and reproduced in Mansfeld (1931, pl. 5, No. 20; Figure 77) show the diagnostic characters of the species, including the pilose ovary, the bilobate sepals and petals, and the lunate shape of the lip.

Solenocentrum includes four species distributed from Costa Rica to Bolivia, characterized by its rosette of 3–5

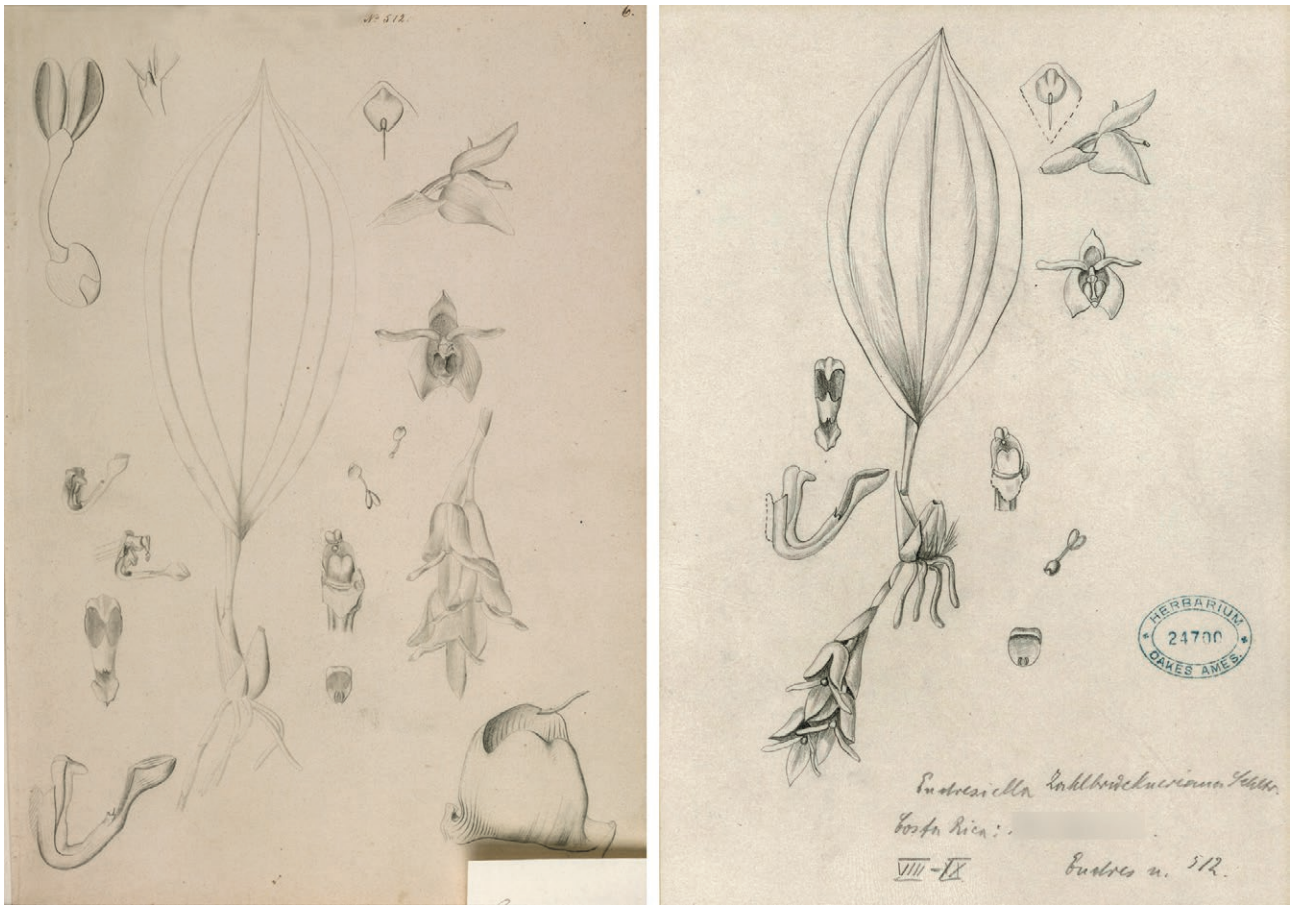

Figure 77. Comparison of the drawings of *Endresiella zahlbruckneriana* made by Endrés (W-Rchb.Orch. 36018) (A) and by Schlechter (AMES) (B). A, courtesy of the Naturhistorisches Museum Wien; B, courtesy of the Harvard University Herbaria, reproduced with permission of the President and Fellows of Harvard College.

long-petiolate leaves with elliptic, slightly asymmetrical, acuminate blades; non-resupinate flowers; free sepals; asymmetric, two-lobed petals; and a lip provided with a long, somewhat clavate spur at the base (Dodson 2004, Damián et al. 2020). Among the few species of the genus, *S. costaricense* differs in the bilobate lateral sepals, spur of the lip longer than the column, the lunate lip with a basal lobe at each side, and the glandular-pilose ovary (Dressler 2003, Damián et al. 2020). Its most similar species is *S. maasii* Dressler, but it is easily distinguished from the latter by the glandular-pilose ovary (*vs.* glabrous) and the basal lobes of the lip (*vs.* elobulate).

45. *Stelis coiloglossa* Schltr., Repert. Spec. Nov. Regni Veg. 8(185-187): 453. 1910

Type: Costa Rica. Im Tale des Río Poás, c. 650 m, blühend im April 1890, *H. Pittier 2444*. Holotype, B, destroyed; isotype, US 00093548!, designated here as lectotype (Figure 83); isolectotype, US 000447497!; tracings of the original illustration of the holotype made under Schlechter's supervision at AMES 23704 / HUH 00104682! (Figure 84), reproduced in Mansfeld (1931: Tab. 21, No. 82).

The extant original material collected by H. Pittier along Río Poás, Costa Rica consists of two isotypes at US and the tracings of the original illustration of the holotype made under Schlechter's supervision kept at AMES and published in Mansfeld (1931). One isotype (US 000447497) shows a single stem with an inflorescence, whereas the other isotype (US 00093548) consists of two plants, one with roots and the other with an inflorescence. Therefore, we selected the latter as the lectotype. The tracings of the original illustration of the holotype made under Schlechter's supervision at AMES-23704 show a drawing of a stem with an inflorescence,

Figure 78. Tracings of the drawings of *Sobralia pfavii* made by Schlechter from the plant habit and his analysis of the flower (AMES 31594 / HUH 00104322). Courtesy of the Naturhistorisches Museum Wien; B, courtesy of the Harvard University Herbaria, reproduced with permission of the President and Fellows of Harvard College.

a front view of a flower, and a dissection of the flower. Pupulin (2002) considered the species a synonym of *Stelis thecoglossa* Rchb.f.

46. *Stelis cooperi* Schltr., Repert. Spec. Nov. Regni Veg. 3: 276. 1907

Type: Costa Rica. [Cartago:] bei Carthago, ca. 1300 m, blühend im Juli 1888, *Cooper 562*. Holotype, B, destroyed [tracing of Schlechter's drawing of the holotype, AMES 23708 / HUH 00104694! (Figure 85)]. Isotypes: BR 0000006594138!, designated here as lectotype (Figure 86); isolectotypes: AMES 22593 / HUH 00104695!; US 577051 / barcode 00093552!; US 579430 / barcode 00449515!; Schlechter's floral analysis of the holotype, reproduced in Mansfeld (1931: Pl. 22, No. 86!).

According to the protologue, *Stelis cooperi* can be distinguished by the combination of erect leaves, short ramicauls, covered by a long, tubular, acute sheath on the lower 3/4; petiolate, elliptical, acute leaves; loosely flowered, unilateral racemes that exceed the length of the leaves, the peduncle with up to three ovate, acuminate bracts, distant from each other; spreading flowers with ovate, obtuse sepals, minute, fleshy, suborbicular and glabrous petals, and a fleshy, glabrous, suborbicular, truncate, emarginate lip, apiculate at the apex (Schlechter 1907b). A sketch based on the holotype made under Schlechter's supervision includes the plant habit and a floral analysis (Figure 85), the latter reproduced in Mansfeld (1931), showing the diagnostic characters described in the protologue. The specimen at AMES (22593 / HUH 00104695) contains a photograph of the isotype that is conserved at US (577051 /

Figure 79. Lectotype of *Sobralia pleiantha* (BR 0000006589844). Courtesy of the Meise Botanic Garden Herbarium.

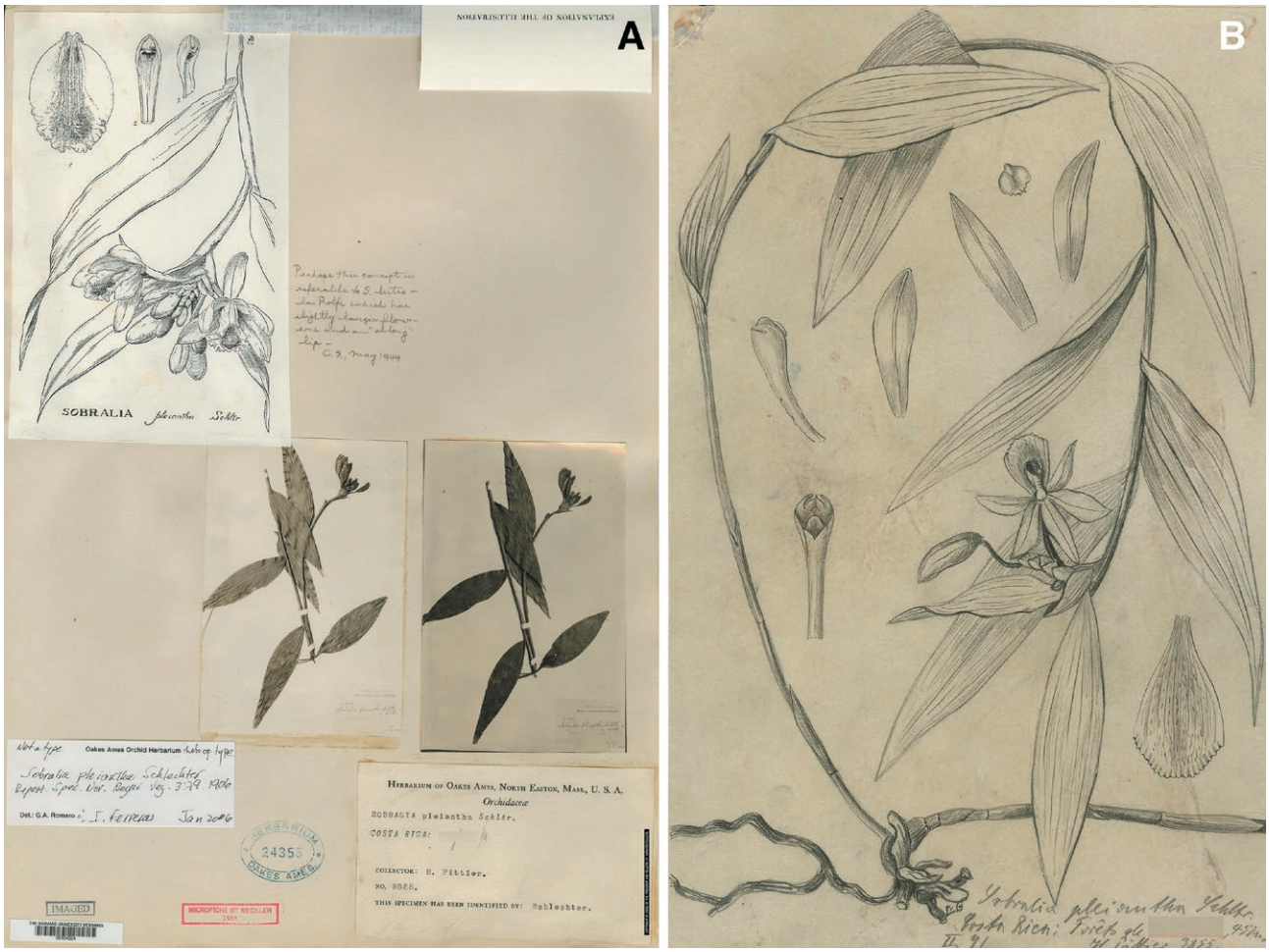

Figure 80. Photographs of the isotypes and tracings of Schlechter's analytical drawings from the holotype of *Sobralia pleiantha*. **A**, sheet with two photographs of the isotype saved at US (AMES 24355). **B**, copy of Schlechter's analyses (AMES 24354). Both courtesy of the Harvard University Herbaria, reproduced with permission of the President and Fellows of Harvard College.

barcode 00093552). *Stelis cooperi* is only known from Costa Rica.

47. *Stelis cyclopetala* Schltr., Repert. Spec. Nov. Regni Veg. Beih. 19: 279. 1923

Type: Costa Rica: Ohne nähere Standortsangabe (comm. A. Tonduz), *H. Pittier s.n.* Holotype, B, destroyed; a photo of the holotype, a drawing of a plant, a drawing of a flower, lip and petal, a floral analysis drawn with camera lucida and a description, all based on the holotype, AMES 30423!, designated here as lectotype (Figure 87); photo of the holotype, AMES 33556!.

Schlechter described *Stelis cyclopetala* from a plant collected in Costa Rica (without exact locality), characterized by the length of the column twice longer than the petals. In 1935, Ames included *S. cyclopetala* under the synonymy of *S. ovatilabia* Schltr., a species also described by Schlechter (1918c) from a plant collected in Guatemala. As noted by Ames, Schlechter did not compare his *S. cyclopetala* with *S. ovatilabia*, which also has a column twice as long as the petals, and whose original description fits *S. cyclopetala*. In his discussion of *S. ovatilabia*, Ames argued that the differences, chiefly the more membranous petals in *S. cyclopetala*, are not enough to consider them different species.

The holotype of *S. cyclopetala* at B was destroyed. However, there is material at AMES, including a photo of the holotype (AMES 33556) showing five dried plants and an almost invisible sketch of a flower by Schlechter on the left, just above the label of the "Herbarium R. Schlechter". There is also another sheet (AMES 30423),

Figure 81. Lectotype of *Solenocentrum costaricense* (CR 16723). Courtesy of the Herbario Nacional de Costa Rica.

Figure 82. Copy of Schlechter's sketch from the holotype of *Solenocentrum costaricense* (AMES 24437). Courtesy of the Harvard University Herbaria, reproduced with permission of the President and Fellows of Harvard College.

including the same photo of the holotype of *S. cyclopetala* (top right), next to a copy of Schlechter's sketch of the flower (top center), a drawing of a plant from the holotype (top left), a floral analysis by Blanche Ames, based on a flower from the type (middle right), and a description with an illustration of the flower, lip, and petal, made by Ames from the holotype (center). The photo of the type sheet at AMES does not bear the stamp of the "Herbarium Berolinensis" and was probably taken in the herbarium of Rudolf Schlechter before it was deposited at the Botanical Museum of Berlin-Dahlem. The photo has no authority, but since the sheet of *S. ovatilabia* at AMES 27942 also includes a photo of the holotype taken in Schlechter´s herbarium, with a footnote "photograph of type sheet by AMES", it is probable that also the photo of *S. cyclopetala* was taken by Ames during his visit to Berlin in 1922. The illustrations of *S. cyclopetala* and *S. ovatilabia* made from the types with the aid of camera lucida, were probably prepared by Blanche Ames during her visit to Berlin with Oakes Ames in 1922 (Angell and Romero 2011).

48. *Stelis despectans* Schltr., Repert. Spec. Nov. Regni Veg. 8(185-187): 453-454. 1910

Type: Costa Rica. Bei La Palma, c. 1500 m, Jul 1888, *J.J. Cooper 507*, *IFG-594* (cited in the protologue as *H. Pittier 594*). Holotype, B, destroyed; isotype, US-577054 / barcode 0093557!, designated here as lectotype (Figure 88); isolectotype, AMES 23714! (fragment of a plant in the envelope); copy of Schlechter's drawing of the holotype at AMES 23714 / HUH-00104724! (Figure 89), reproduced in Mansfeld (1931: Pl. 23, No. 89!).

Schlechter (1910a) described the species with terete, unifoliate stems, narrowly oblong-ligulate, coriaceous leaves, lax inflorescences with despectant flowers, oblong-ligulate sepals, connate lateral sepals, obliquely ovate, obtuse petals and the fleshy, ovate, obtuse, obscurely three-lobulate lip. The copy of Schlechter's drawing of the holotype at AMES 23714 shows a plant with four stems and three inflorescences, a front view of a flower, and a floral dissection. Also, the envelope at the upper right corner contains an isotype consisting of a stem without the leaf and two pieces of an inflorescence, and three buds or flowers. In the protologue, Schlechter (1910a) cited *Pittier 594*, but this is a number assigned by the IFG, and the original collection was made by J.J. Cooper under his number *507*. The isotype specimen at US (577054 / barcode 0093557), selected here as the lectotype, shows the number *Cooper 507* right after number *594* on the label of the IFG. The label on the left bottom corner of the sheet at US-577054 shows the original label by J.J. Cooper with the number 507 and the locality "Vive sobre árboles, atmósfera húmeda, La Palma, Julio/88, 6000 f. elevation". This specimen contains three pieces of plants, each with one leaf and inflorescences. This specimen at US 577054 is more complete than that at AMES 23714 and is therefore selected as lectotype.

49. *Stelis jimenezii* Schltr., Beih. Bot. Centralbl., Abt. 2 36(2): 389. 1918.

Type: Costa Rica. [San José]: Ladertena, Hajuelito [La Verbena, Alajuelita, orillas del Río Tiribí], Feb 1912, *O.*

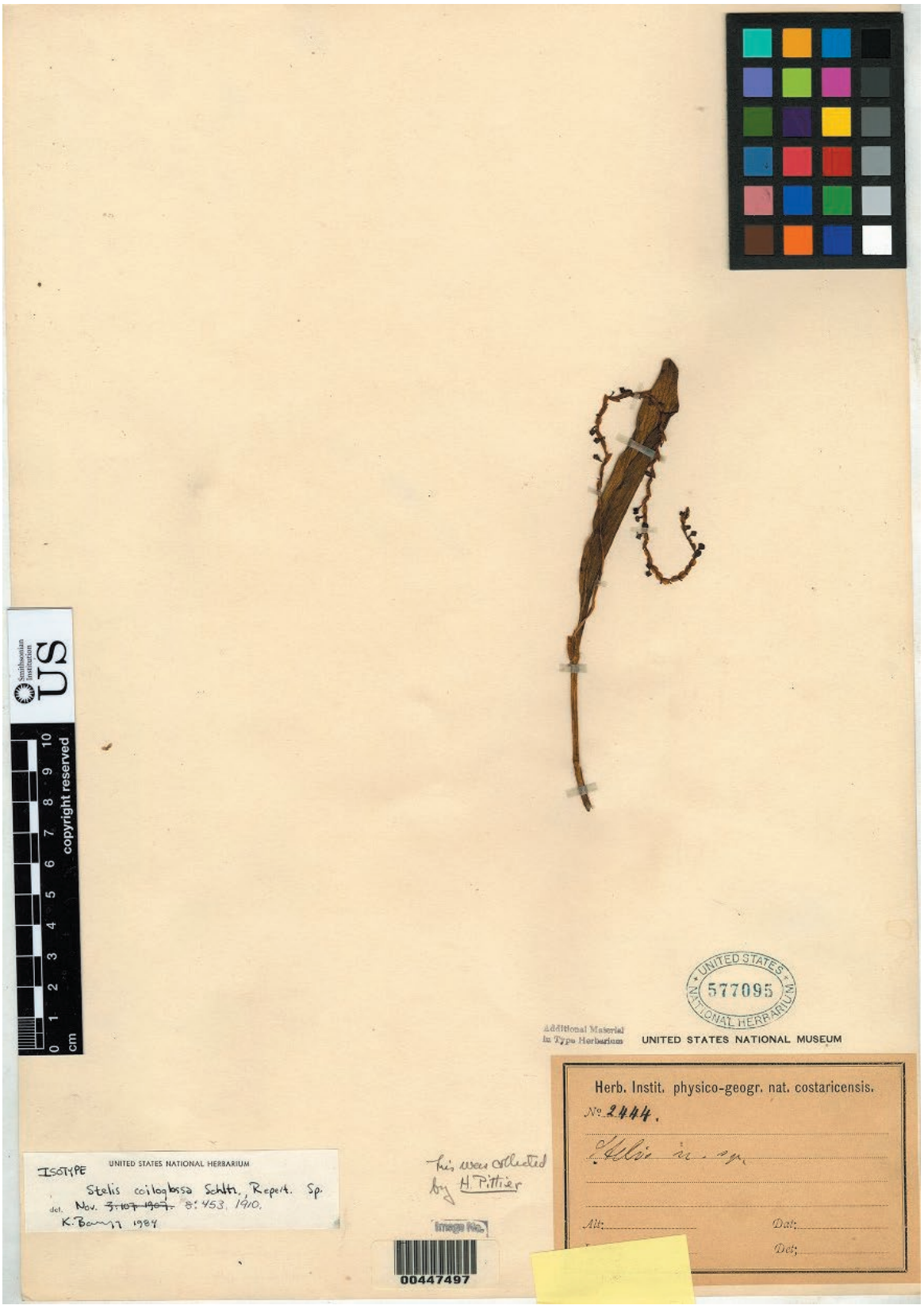

Figure 83. Lectotype of *Stelis coiloglossa* (US 00093548). Courtesy of the United States National Herbarium (US).

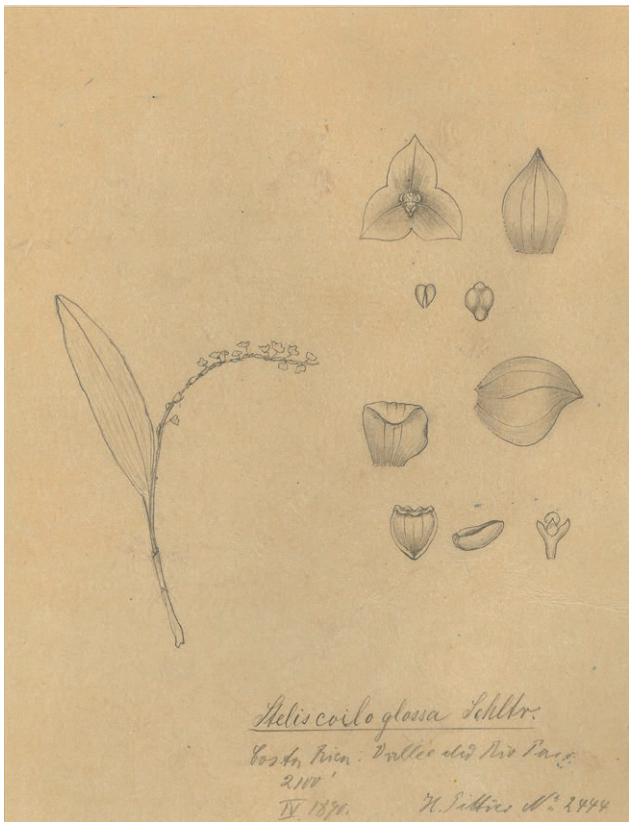

Figure 84. Tracings of Schlechter's original illustration from the holotype of *Stelis coiloglossa*, made under Schlechter's supervision (AMES 23704). Courtesy of the Harvard University Herbaria, reproduced with permission of the President and Fellows of Harvard College.

Figure 85. Tracing of Schlechter's drawing from the holotype of *Stelis cooperi* (AMES 23708). Courtesy of the Harvard University Herbaria, reproduced with permission of the President and Fellows of Harvard College.

Jiménez 621. Holotype, B, destroyed; lectotype, designated by Luer (2009), CR 34100! (Figure 90); isolectotype, a dried leaf, photo of the holotype, illustration, and flower preserved on glycerin slide, AMES 55235; Schlechter´s floral analysis of the holotype, reproduced in Mansfeld (1931: Pl. 24, No. 94!).

Since the holotype of *S. jimenezii* was destroyed during the bombing of Berlin-Dahlem herbarium, Ignowski et al. (2015) designated an isotype deposited at AMES herbarium as lectotype (AMES 5523). However, the lectotypification was superfluous since a lectotype was already designated by Luer (2009) using an isotype deposited at CR herbarium (Figure 90).

Stelis jimenezii has been considered as synonym of *Stelis ciliaris* Lindl. by Ames (1935), Luer (2009), Bogarín et al. (2014), and Ignowski et al. (2015). When described, no indumentum was mentioned for the perianth of *S. jimenezii*; however, the flowers from the holotype illustrated by Ames (1935) have short and long trichomes on the adaxial surface, with remains of the broken marginal trichomes. This character is diagnostic of *S. ciliaris*, which has sepals with margins ciliate to the apex.

According to Luer (2009), *S. ciliaris* has considerable variation in its wide distribution, with sepals about two millimeters long and broad, but large flowers with sepals up to five millimeters long occur. The sepals long-ciliate up to the apex are also variable, and trichomes are challenging to observe and may get lost on dry specimens. This variation was discussed by Ignowski et al. (2015) for the Brazilian material of *S. ciliaris* together with the variation in the color of sepals: trichomes may be present only on the tip of one of the sepals, completely absent in flowers of some population, or caducous in some individuals, where they fall off with flower aging. The color of the perianth ranges from rose to red-purple, purple-green, green, and greenish-yellow; a variation that led to the description of several taxa now included under the synonymy of *S. ciliaris* (Ignowski et al. 2015).

Figure 86. Lectotype of *Stelis cooperi* (BR 0000006594138). Courtesy of the Meise Botanic Garden Herbarium.

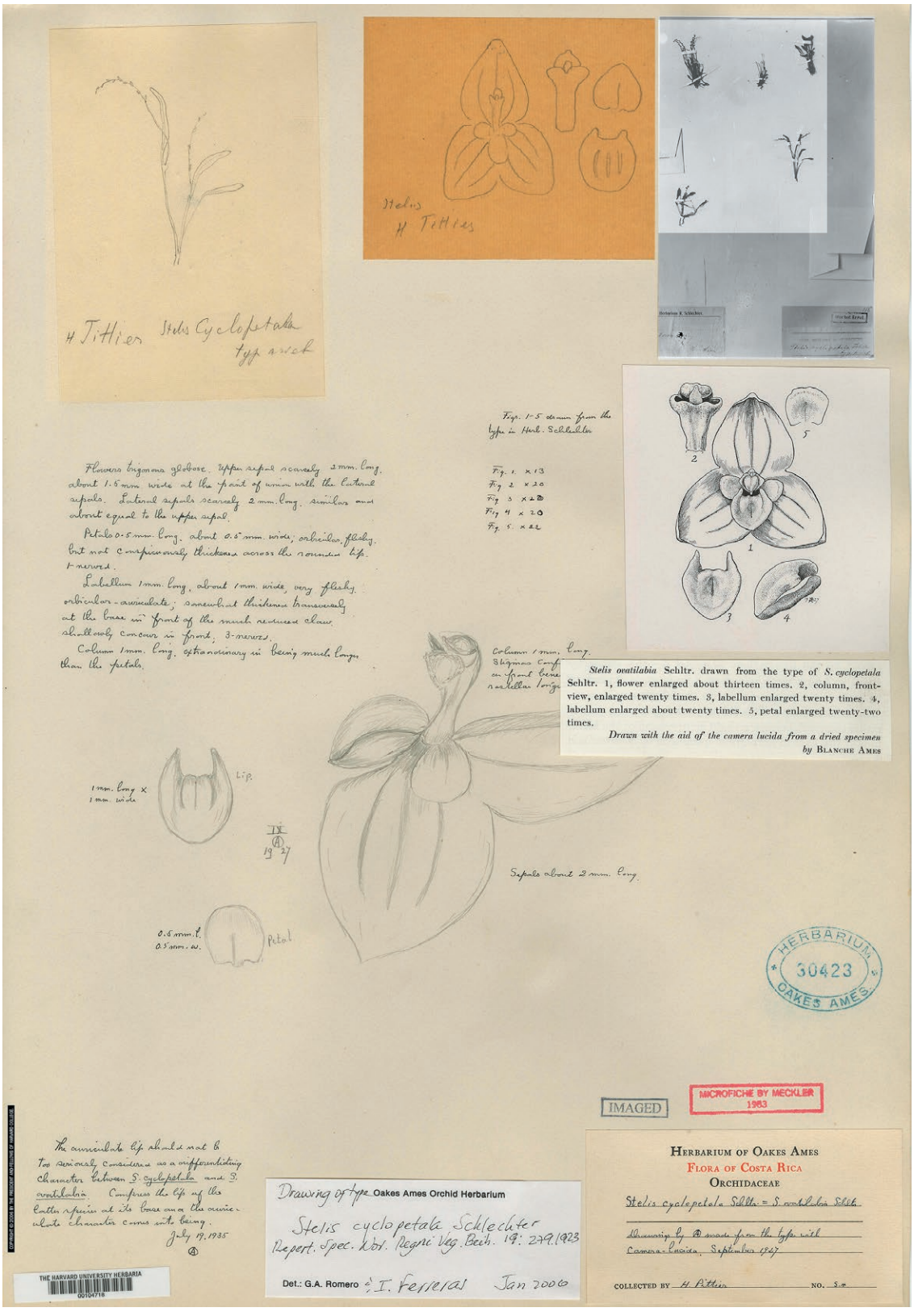

Figure 87. Lectotype of *Stelis cyclopetala* (AMES 30423). Courtesy of the Harvard University Herbaria, reproduced with permission of the President and Fellows of Harvard College.

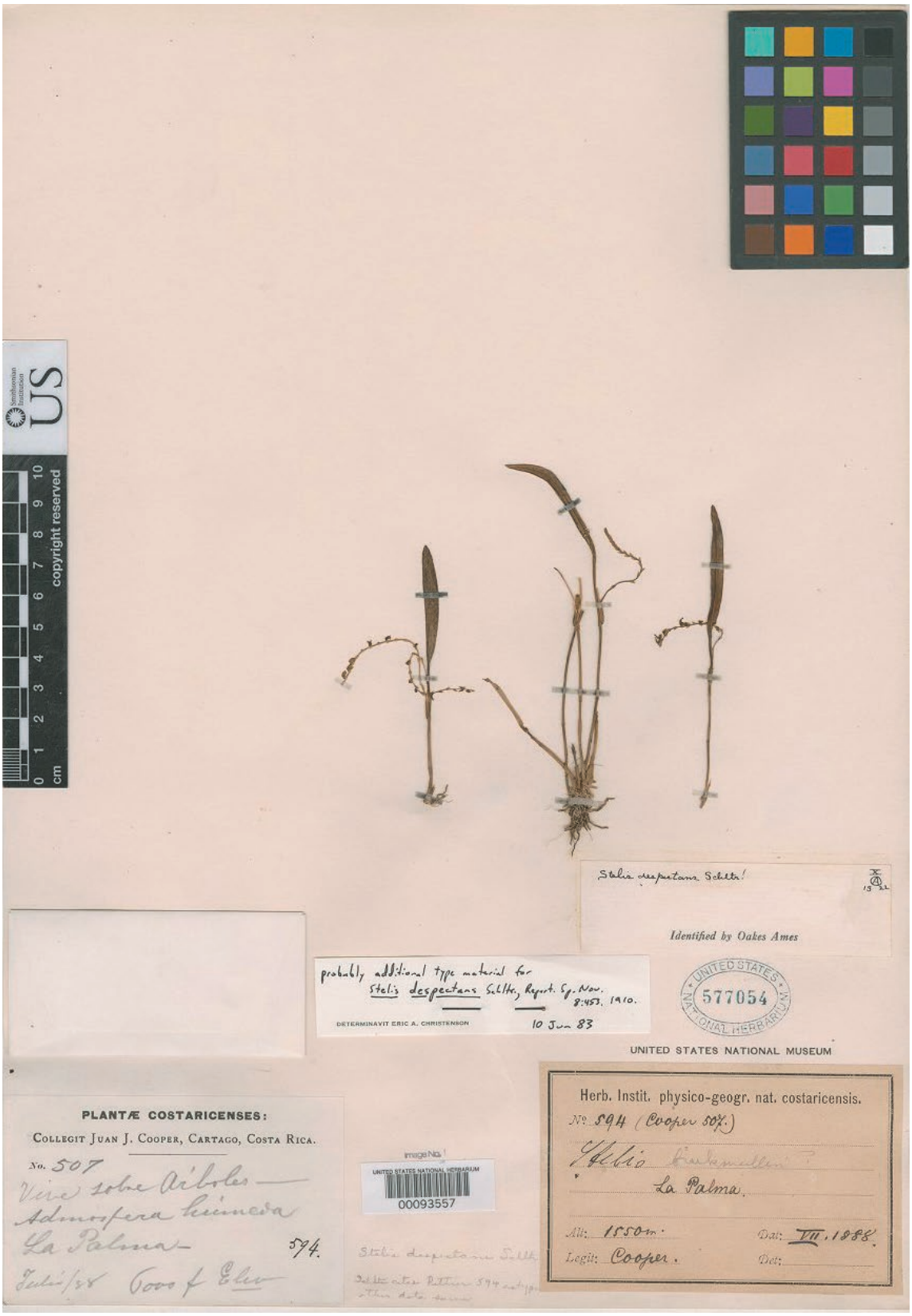

Figure 88. Lectotype of *Stelis despectans* (US 577054). Courtesy of the United States National Herbarium (US).

Figure 89. Copy of Schlechter's drawing from the holotype of *Stelis despectans* (AMES 23714). Courtesy of the Harvard University Herbaria, reproduced with permission of the President and Fellows of Harvard College.

50. *Stelis tonduziana* Schltr., Beih. Bot. Centralbl., Abt. 2 36(2): 393. 1918

Type: [Costa Rica.] La Hondura, La Palma, 2500 m, May 1912, *O. Jiménez 618* (Holotype, B, destroyed; copy of Schlechter's drawing of the holotype, AMES (24938 / HUH-00105009!), designated here as lectotype (Figure 91), reproduced in Mansfeld (1931: Pl. 27, No. 108!).

We were unable to locate extant specimens that could be considered original material collected by O. Jiménez referable to *S. tonduziana*. Therefore, we select the copy of Schlechter's drawing of the holotype at AMES as lectotype. The drawing includes a plant habit with two ramicauls and one inflorescence in each stem, and a front view of a flower with a dissection. Schlechter (1918a) described the species with unifoliate stems, anguste-ligulate, obtuse leaves, racemose inflorescences surpassing the leaves, subnutant flowers with ovate, subacute, 5-nerved sepals, obtrapezoid petals, and a quadrate, fleshy lip. These features match with Schlechter's drawing of the holotype at AMES (24938).

Stelis tonduziana Schltr. is the basionym of *Apatostelis tonduziana* (Schltr.) Garay. The name *Stelis mirabilis* Schltr. has been considered a synonym of *S. tonduziana*.

51. *Telipogon biolleyi* Schltr., Repert. Spec. Nov. Regni Veg. 9(214–216): 293. 1911

Type: Costa Rica: sur un tronc dans les forêts du Barba, 31.VIII.1889 (in den Wäldern des Vulcan Barba, blühend im August 1889), *P. Biolley 1340*. Holotype, B, destroyed; lectotype, designated by Dodson and Escobar (1987), US 577067! (Figure 92); copy of Schlechter's sketch of the holotype, with a drawing of the plant habit and analysis of the flower, AMES 24892! (Figure 93); Schlechter´s floral analysis of the holotype reproduced in Mansfeld (1931: Pl. 78, No. 309!).

Telipogon biolleyi is found in Panama and Costa Rica. In the latter it is found from 1300 to 2000 meters in elevation and is one of the most common and widely distributed species in the genus. The species was named in honor of P. Biolley, who collected the species around the Barba Volcano in Heredia, Costa Rica. Since the holotype of *T. biolleyi* was destroyed at Berlin-Dahlem herbarium, Dodson and Escobar (1987) designated the isotype US 577067, which comprised a dried plant with the inflorescence lacking flowers, as lectotype.

Among the species found in Costa Rica and Panama, *T. biolleyi* is characterized by the small habit, up to 5 cm tall, with the inflorescence longer than the leaves, up to 20 cm long, and flowers yellowish with the base of the petals and lip dark-red to brownish, and a conspicuous, thick, elevated, circular to ovate, hispidulous callus occupying 1/3 of the lip surface at the base. The callus of the lip is well illustrated in the copy of the sketch of the holotype made by Schlechter, reproduced in Mansfeld (1931) and traced for the herbarium of Oakes Ames (Figure 93).

Dodson and Escobar (1987) considered *Telipogon endresianus* Kraenzl. an heterotypic synonym of *T. biolleyi*.

52. *Telipogon pfavii* Schltr., Repert. Spec. Nov. Regni Veg. 17: 143-144. 1921

Type: Costa Rica. Ohne genauere Standortsangabe [without exact location], *R. Pfau 9301*. Holotype, not located; tracings of Schlechter's drawing of the holotype,

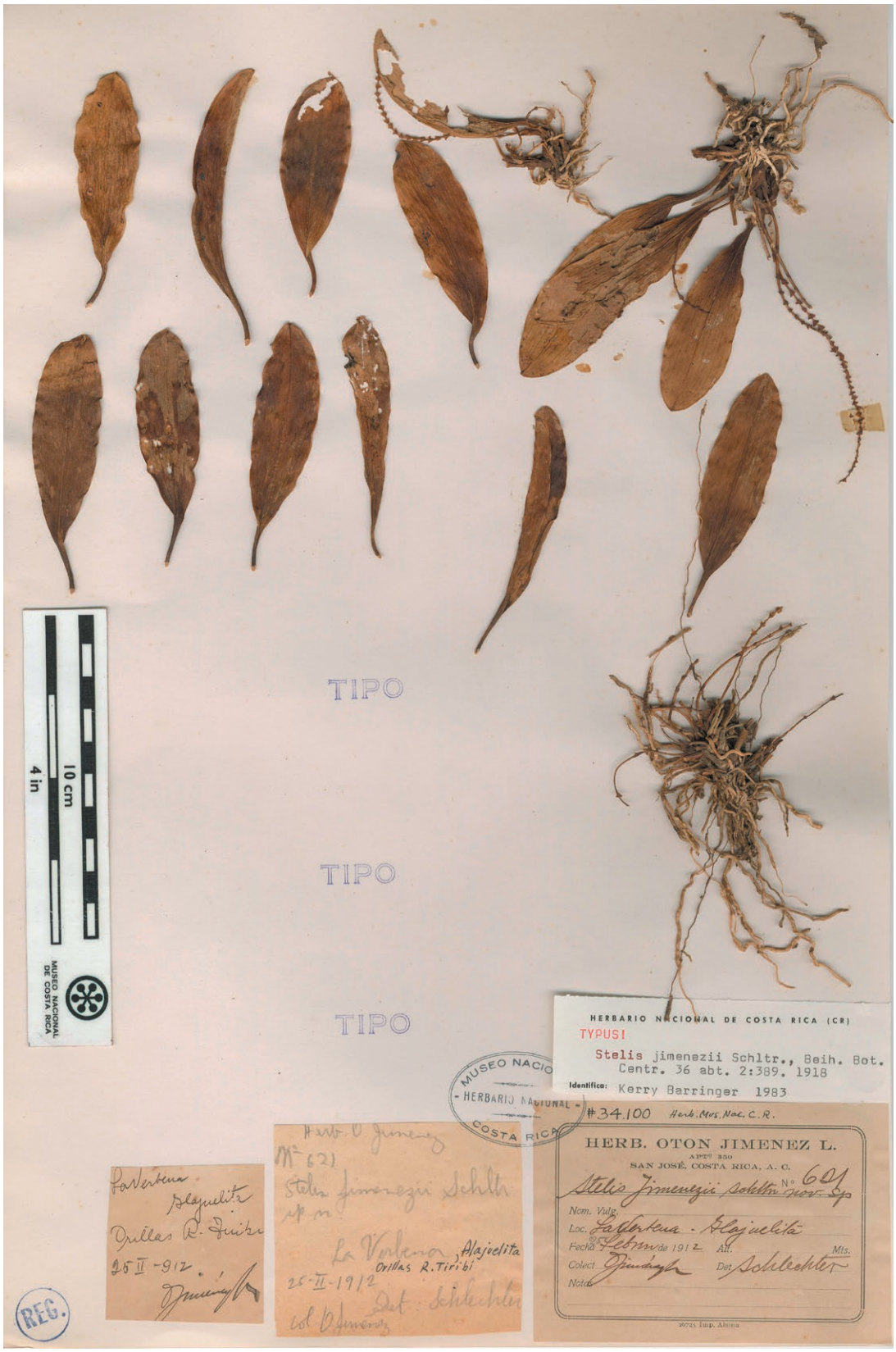

Figure 90. Lectotype of *Stelis jimenezii* (CR 34100). Courtesy of the Herbario Nacional de Costa Rica.

Figure 91. Lectotype of *Stelis tonduziana* (AMES 24938). Courtesy of the Harvard University Herbaria, reproduced with permission of the President and Fellows of Harvard College.

AMES 24894 / HUH 00105221!, designated here as lectotype (Figure 94); floral analysis from the holotype reproduced in Mansfeld (1931: Pl. 78, No. 311!).

The tracings of the type's original illustration, designated here as lectotype, are the only known original material of *Telipogon pfavii*. The flower tracings show the reticulate to nervose flowers with wide petals and the lip with a pink callus that does not surround the column, unlike similar *Telipogon* species like *Telipogon ballesteroi* Dodson & R.Escobar and *Telipogon cascajalensis* Dodson & R.Escobar. In addition, the column shows a short fascicule of spines on each side of the anther, difficult to detect at sight.

In their treatment of the Costa Rican species of *Telipogon*, Dodson and Escobar (1987) included a copy from the tracings of *T. pfavii* saved at AMES (00105221), accompanied by two images of a plant of *T. pfavii* collected by Calaway Dodson and Clarence Horich in Costa Rica in 1962 (*s.n.*, "Costa Rica: El Cedral, Jul-Aug 1962"). The plant, photographed by Leon Glicenstein 15 years later (images saved at JAUM and RPSC), is the only record of *T. pfavii* that we have seen. Unfortunately, no specimens from this collection were prepared at the time.

53. *Vanilla pompona* subsp. *pittieri* (Schltr.) Dressler, Lankesteriana 9: 341. 2010

Type: Costa Rica. [Puntarenas:] In der Wäldern an Ufern des Rio Ceibo bei Buenos Aires, c. 200 m [1892]; blühend im Januar 1890, *H. Pittier 6600* (holotype, B, destroyed; drawing of the holotype, AMES 24329 / HUH 00090744!); lectotype designated by Karremans et al. 2020, BR 642325 / barcode 0000006423254! (Figure 95); isolectotypes, US 579442 / barcode 00319514!; US 814996 / barcode 00093334!

Vanilla pittieri Schltr. in the basionym of *Vanilla pompona* subsp. *pittieri*. Dressler created the latter to categorize a population of *Vanilla pompona* Schiede in the Costa Rican southern Pacific slope, which apparently is distinguished from the typical *V. pompona* by having elliptical (vs. oblong) leaf blades and the simple lip with entire margin (vs. simple, with undulate, apically denticulate to dentate, recurved margin) (Soto Arenas and Dressler 2010).

Schlechter (1906d) described *Vanilla pittieri* with long, voluble, smooth, foliate stems, shortly petiolate, oblong, acuminate, fleshy-textured leaves, axillary inflorescences bearing to 10 flowers, floral bracts shorter than the ovary, lingulate, obtuse, subfalcate, pluri-veined sepals 7.5 mm long, oblique lateral sepals, petals similar to sepals, pluri-veined, with sinuous and parallel veins, lip shorter than sepals, obovate-spatulate, linear-unguiculate, obtuse, pluri-veined, with sinuous and parallel veins, a penicillate callus in the third apical, made up by flabelliform, laciniate, congested, retrorse scales, thin column 5.5 cm long, widening towards the apex, subquadrate, cucullate anther cap, and cylindrical ovary 3 cm long. Schlechter indicated that *V. pittieri* is well distinguished from other species of *Vanilla* by floral morphology, but above all, by the strange veins of the petals and lip, and that it has large flowers, similar to the flowers of *V. pompona*, but he did not discuss how to separate them. The characters mentioned by Schlechter are consistent with the type specimens and the drawing of the holotype at AMES.

Figure 92. Lectotype of *Telipogon biolleyi* (US 577067). Courtesy of the United States National Herbarium (US).

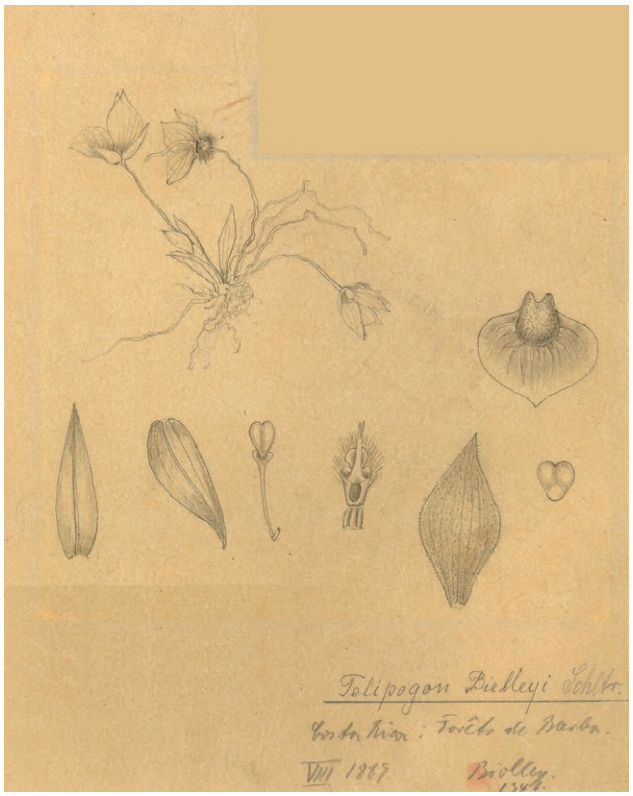

Figure 93. Tracings of Schlechter's sketch of the plant habit and analysis of the flower from the holotype of *Telipogon biolleyi* (AMES 24892). Courtesy of the Harvard University Herbaria, reproduced with permission of the President and Fellows of Harvard College.

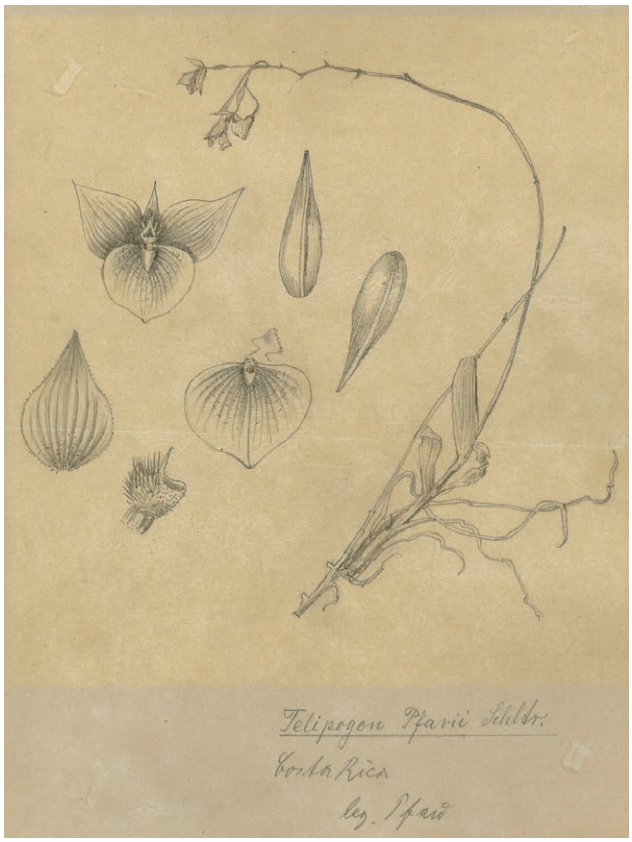

Figure 94. Tracings of Schlechter's drawing from the holotype of *Telipogon pfavii* (AMES 24894). Courtesy of the Harvard University Herbaria, reproduced with permission of the President and Fellows of Harvard College.

Nevertheless, *V. pittieri* or *V. pompona* subsp. *pittieri* cannot be distinguished from the widely distributed *V. pompona*. The distinctive characters that Schlechter diagnosed are due to an artifact of the drying of the type material. Karremans et al. (2020) studied specimens from the type locality of *V. pittieri* and provided a modern illustration of a specimen collected there. They concluded that *V. pittieri* is indistinguishable from *V. pompona*, and therefore conspecific.

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Figure 95. Lectotype of *Vanilla pittieri* (BR 0000006423254). Courtesy of the Meise Botanic Garden Herbarium.

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