



# Orchidaceae werckleanae: typification of Costa Rican orchid species described from collections by K. Wercklé

FRANCO PUPULIN\*

*Jardín Botánico Lankester, Universidad de Costa Rica.. P.O. Box 302-7050 Cartago, Costa Rica, A.C. Harvard University Herbaria. 22 Divinity Avenue, Cambridge, MA, USA*

*Received 29 January 2010; reaccepted for publication 26 March 2010*

A catalogue of 84 orchid species described by R. Schlechter from plants collected in Costa Rica by Karl Wercklé is presented. Lectotypification is provided for 60 of the 84 species. Previously lectotypified species, based on syntypes, including collections by Wercklé, and neotypified taxa, are recorded, and bibliographical references to the designations of lectotypes and neotypes are provided. Neotypes are selected for eight species, for which no isotypes, paratypes or other material associated with the protologue are known to exist. Illustrations of most of the lectotypes are provided. *Epidendrum amparoanum*, *Pachystele densa* and *Trigonidium amparoanum* are not typified because of lack of appropriate material and because of taxonomic uncertainties. © 2010 The Linnean Society of London, *Botanical Journal of the Linnean Society*, 2010, **163**, 111–154.

ADDITIONAL KEYWORDS: Costa Rica – Schlechter.

## INTRODUCTION

Karl (Carlos) Wercklé is perhaps best known to botanists for his outstanding work on pteridology and Hermann Christ (1910) noted that Wercklé's contributions to the knowledge of the Costa Rican fern flora were unsurpassed. Less known is the importance of Wercklé in the development of the orchidology of this Central American country during the first quarter of the last century. According to the enlightening biographical sketch by Gómez Pignataro (1978), K. Wercklé was a cultured, romantic, reserved and melancholically solitary man. French by nationality but German in culture and education, he was born in Alsace in 1860. Wercklé completed secondary school in Nancy and had a wide general education (Gómez Pignataro, 1978); he was fluent in many classic and modern languages, knowledgeable in the classics and geography and deeply interested in the natural sciences and philosophy. A prolific author (for a complete bibliography of Wercklé, see Gómez Pignataro, 1978), not only did he write the first essay on Costa Rica

phytogeography (Wercklé, 1909) and the first scientific article ever written in Costa Rica about the orchids of this country (Wercklé, 1913), but he also prepared a manuscript on the 'Philosophy of the Absolute', which was eventually lost after his death (Gómez Pignataro, 1978).

Wercklé travelled to Costa Rica for the first time c. 1897, sponsored by the seed and bulb firm of John Lewis Childs (1856–1921) of Long Island, New York, where he worked for some time. At least three orchid collections by Wercklé from La Palma, in the saddle between Volcán Barva and Volcán Irazú in the Cordillera Central of Costa Rica [*Camaridium imbricatum* Schltr., *C. minus* Schltr. and *Masdevallia ecaudata* Schltr. (= *M. tubuliflora* Ames)], are dated November 1897. In 1899, Joseph Dalton Hooker (1817–1911) (Hooker, 1899) described *Hidalgoa wercklei* Hook.f. (Asteraceae) from a plant received at Kew from Childs (1899) and originally collected by Wercklé 'in the mountains of Costa Rica' (Childs, 1899). In 1898, Wercklé returned to the USA, where he was employed by the horticultural and gardening firm of Siebrecht and Wadley of New Rochelle, near New York, which specialized in orchids, palms and ferns. After unsuccessful attempts to obtain

\*E-mail: fpupulin@cariari.ucr.ac.cr

sponsorships for his next Costa Rican trip from the firm and from Nathaniel Lord Britton, then Director of the New York Botanical Garden (Gómez Pignataro, 1978), Wercklé went back to Costa Rica in July 1902 using his own resources and he eventually stayed in the country until his death in 1924 (Ossenbach, 2009). Here, he maintained sporadic relationships with the Instituto Físico Geográfico (he had met Henry Pittier during his first trip) and the recently founded Museo Nacional, where he was employed at the Herbarium for a few months in 1911. He worked as a gardener in the famous garden of Amparo López-Calleja (1870–1951), born in Cuba and married in Costa Rica to the first trained national scientist, José Cástulo Zeledón, who became personally involved in collecting native plants, especially orchids, and in sponsoring the collecting excursions of the Swiss Adolphe Tonduz (1862–1921) and Wercklé himself. In the first two decades of the 20<sup>th</sup> century, Wercklé and Tonduz were responsible for the collection of almost 15 000 specimens for the National Herbarium of Costa Rica. Contacted by the great German orchidologist Friedrich Richard Rudolf Schlechter (1872–1925) to obtain Costa Rican orchid material, Amparo de Zeledón sent Wercklé on new botanical expeditions and used her orchid garden as a repository for living plants, where they were pressed by Tonduz and later on by Otón Jiménez (1895–1988) once in flower.

Wercklé's herbarium specimens were not always of the highest quality, because of his 'favorite way of preserving them rolled into a bundle and stuffed in a pocket, where they remained indefinitely' (Standley, 1926), but, from his collections, four orchid genera and more than 80 species were eventually described as new to science by Schlechter (Schlechter, 1906, 1911, 1912a, b, 1918, 1920, 1923). Considering the relatively low number of documented orchid collections made by Wercklé, it is evident he had an exceptional 'coup d'oeil' for floristic novelties. From the correspondence between Professor Oakes Ames at the Botanical Museum of the Harvard University and the British naturalist and Costa Rican resident, Charles H. Lankester, we know that Ames wanted to hire him as a collector (Ossenbach, 2009), but the few actual specimens collected by Wercklé and preserved at AMES (i.e. *Epidendrum obesum* Ames, Wercklé 64; *E. myodes* Rchb.f., Wercklé 52) were received at Harvard as duplicates from the herbarium of Schlechter in Berlin. During his last years in Costa Rica, Wercklé lost all moderation in the consumption of alcohol and, according to Gómez Pignataro (1978), he 'roamed through the city, in rags and without a place to live'. Wercklé eventually died in 1924, victim of alcoholism, and was buried by Doña Amparo de Zeledón in the family mausoleum (Gómez Pignataro, 1978).

The collecting numbers of Wercklé specimens, as they are cited in the protologues and notes prepared by Schlechter, are somewhat confusing because of the frequent occurrence of duplications. Schlechter's treatments of Orchidaceae collected by Wercklé (Schlechter, 1906, 1911, 1912a, b, 1918, 1920, 1923) account for collecting numbers included between 1 and 155, plus two anomalous numbers (16173 and 16419) representing early collections made by Wercklé in 1901 and 1902, which correspond to the system used by the Instituto Físico-Geográfico Costarricense, precursor of the National Museum, for accessioning specimens to the herbarium (Table 1). Among these 155 numbers, at least 30 are duplicated. However, duplicate numbers are always associated with citations of localities and collecting dates and they likely correspond to different numbering systems. There are some obvious mistakes, like duplication of number 82 for two specimens (*Epidendrum leprosum* Schltr. and *Stelis bryophila* Schltr.), which flowered in cultivation at the same time (November 1920) and were originally collected at the same locality, on the Pacific side of San Jerónimo, at 1400 m elevation, number 127 for two collections (*Epidendrum oxyglossum* Schltr. and *Oncidium bryolophotum* Rchb.f.), both made at La Palma in January 1922, or number 153 for two different plants (*Epidendrum difforme* Jacq. and *Xylobium stachyobiorum* Hemsl.), both collected at San Jerónimo in November 1922. Number 64 was assigned twice to the same cultivated specimen, *Epidendrum wercklei* Schltr. from La Palma, flowered in August and in September of 1921. In most of the other cases, duplicate numbers were probably intentionally assigned according to different schemes and they include field numbers and a sort of 'accession numbers' for specimens which flowered in cultivation at different times. So, we have two sets of numbers 1, 2, 3, 7 and 9, the first set probably corresponding to field numbers by Wercklé and representing collections made by him at San Cristobal in January 1910, and the second one assigned to specimens of different species, which flowered in cultivation in the garden of Amparo de Zeledón in May and June 1921. Duplicate sets of numbers 40, 59, 60, 61, 63, 71, 72, 73, 74, 83, 85 and 86 probably correspond to a system of yearly numbering used to prepare herbarium specimens from the living collection of Ms Amparo de Zeledón. In this case, the first set of numbers represent plants collected by Wercklé on the Pacific side of the Cordillera Central, probably in November 1920, and the second set was assigned in 1921 to specimens mostly collected at San Jerónimo and flowered in cultivation at San José during the months of June to September. Nevertheless, among duplicate numbers from 1921 there are also specimens originally collected by Wercklé at Carrillo and

**Table 1.** Numbers of Wercklé's collections cited by Schlechter

Number*	Species†	Locality/elevation	Date
s.n.	<i>Camaridium imbricatum</i> Schltr.	La Palma, 1500 m	November 1897
s.n.	<i>Camaridium minus</i> Schltr.	La Palma, 1500 m	November 1897
s.n.	<i>Masdevallia tubuliflora</i> Ames	La Palma, 1500 m	November 1897
1	<i>Epidendrum confertum</i> Ames & C.Schweinf.	San Cristobal, 1700 m	January 1910
1	<i>Stelis tonduziana</i> Schltr.	San Jerónimo	May 1921
2	<i>Epidendrum paranthicum</i> Rchb.f.	San Cristobal	January 1910
2	<i>Masdevallia picturata</i> Rchb.f.	San Jerónimo	Flowered May 1921
3	<i>Masdevallia picturata</i> Rchb.f.	San Cristobal	s.d.
3	<i>Epidendrum exasperatum</i> Rchb.f.	San Jerónimo, 1350 m	Flowered May 1921
5	<i>Camaridium vaginale</i> (Rchb.f.) M.A.Blanco	San Cristobal	January 1910
6	<i>Arpophyllum giganteum</i> Hartw. ex Lindl.	San Jerónimo	Flowered May 1921
7	<i>Epidendrum pumilum</i> Rolfe	San Cristobal	January 1910
7	<i>Maxillaria ringens</i> Rchb.f.	Carrillo	Flowered May–June 1921
8	<i>Camaridium microphyton</i> (Schltr.) M.A.Blanco	San Jerónimo	Flowered May–June 1921
9	<i>Epidendrum pentadactylum</i> Rchb.f.	San Cristobal	January 1910
9	<i>Camaridium bradeorum</i> Schltr.	San Jerónimo	Flowered May 1921
10	<i>Epidendrum barbeyanum</i> Kraenzl.	San Jerónimo, 1350 m	Flowered May 1921
11	<i>Elleanthus tonduzii</i> Schltr.	San Jerónimo	Flowered June–July 1921
12	<i>Elleanthus tonduzii</i> Schltr.	La Palma, 1350 m	Flowered July 1921
13	<i>Sobralia amabilis</i> (Rchb.f.) L.O.Williams	La Palma, 1350 m	Flowered June 1921
14	<i>Stelis parvula</i> Lindl.	San Jerónimo	Flowered May 1921
15	<i>Stelis wercklei</i> Schltr.	San Jerónimo	Flowered May 1921
16	<i>Epidendrum selaginella</i> Schltr.	San Jerónimo	Flowered May 1921
17	<i>Acostaea costaricensis</i> Schltr.	San Jerónimo	May 1921
17	<i>Epidendrum miserrimum</i> Rchb.f.	San Jerónimo	Flowered May 1921
18	<i>Masdevallia molossoides</i> Kraenzl.	San Jerónimo	Flowered May 1921
20	<i>Epidendrum platytilum</i> Schltr.	San Jerónimo	Flowered May 1921
22	<i>Dichaea acroblephara</i> Schltr.	San Jerónimo	Flowered May 1921
23	<i>Maxillaria brachybulbon</i> Schltr.	San Jerónimo	Flowered May 1921
24	<i>Camaridium bracteatum</i> (Schltr.) Schltr.	San Jerónimo, 1400 m	Flowered May 1921
26	<i>Trigonidium lankesteri</i> Ames	Carrillo	Flowered June 1921
27	<i>Huntleya burtii</i> Endrés & Rchb.f.	Carrillo	Flowered June 1921
29	<i>Vanilla</i> sp.	Pacific side	Flowered June 1921
30	<i>Aspasia epidendroides</i> Lindl.	San Jerónimo	Flowered June 1921
31	<i>Scaphyglottis micrantha</i> (Lindl.) Ames & Correll	San José	Flowered May 1921
32	<i>Dichaea poicillantha</i> Schltr.	San Jerónimo	January 1921
33	<i>Epidendrum paranthicum</i> Rchb.f.	La Palma	Flowered June 1921
34	<i>Elleanthus lancifolius</i> C.Presl	La Palma	Flowered June 1921
36	<i>Catasetum maculatum</i> Kunth (female flower)	Pacific side	Flowered June 1921
37	<i>Epidendrum polychlamys</i> Schltr.	La Palma	Flowered July 1921
38	<i>Epidendrum leprosum</i> Schltr.	La Palma	Flowered July–August 1921
39	<i>Dichaea costaricensis</i> Schltr.	La Palma	Flowered June 1921
40	<i>Stelis spatulata</i> Poepp. & Endl.	San Jerónimo, Pacific side, 1400 m	November 1920
40	<i>Epidendrum magnibracteatum</i> Ames	San Jerónimo, 1350 m	Flowered June 1921
41	<i>Camaridium minus</i> Schltr.	La Palma	Flowered June–July 1921–1922
42	<i>Stanhopea costaricensis</i> Rchb.f.	Without locality	January 1921
43	<i>Camaridium tonduzii</i> Schltr.	La Palma	Flowered June 1921
44	<i>Pleurothallis melicoides</i> Schltr.	La Palma	Flowered May 1921
45	<i>Catasetum maculatum</i> Kunth (male flower)	Pacific side	Flowered June 1921
46	<i>Otoglossum globuliferum</i> (Kunth) N.H.Williams & M.W.Chase	San Jerónimo	Flowered June 1922
47	<i>Encyclia ceratistes</i> (Lindl.) Schltr.	La Palma	Flowered June 1920
49	<i>Camaridium minus</i> Schltr.	San Jerónimo	Flowered June–July 1921
50	<i>Stelis despectans</i> Schltr.	San Jerónimo	Flowered June 1921
51	<i>Stelis obscurata</i> Rchb.f.	San Jerónimo	Flowered June 1921
52	<i>Masdevallia nidifica</i> Rchb.f.	San Jerónimo	Flowered May–June 1921
53	<i>Epidendrum myodes</i> Rchb.f.	San Jerónimo	Flowered May–June 1921
54	<i>Masdevallia chontalensis</i> Rchb.f.	San Jerónimo	Flowered June 1921
55	<i>Camaridium tonduzii</i> Schltr.	San Jerónimo	Flowered June–July 1921
56	<i>Stelis hymenantha</i> Schltr.	San Jerónimo	Flowered June 1921
57	<i>Epidendrum piliferum</i> Rchb.f.	San Jerónimo, 1350 m	Flowered June 1921

Table 1. Continued

Number*	Species†	Locality/elevation	Date
58	<i>Ornithidium microphyton</i> (Schltr.) M.A.Blanco	San Jerónimo	Flowered May–June 1921
59	<i>Stelis spathulata</i> Poepp. & Endl.	San Jerónimo, Pacific side, 1400 m	November 1920
59	<i>Camaridium minus</i> Schltr.	San Jerónimo	Flowered June–July 1921
60	<i>Maxillaria cf. porrecta</i> Lindl.	San Jerónimo, 1400 m	Flowered November 1920
60	<i>Sobralia amabilis</i> (Rchb.f.) L.O.Williams	San Jerónimo, 1350 m	Flowered June 1921
61	<i>Camaridium pygmaeum</i> M.A.Blanco	San Jerónimo, Pacific side, 1400 m	November 1920
61	<i>Epidendrum schumannianum</i> Schltr.	Carrillo	Flowered June–July 1921.
63	<i>Epidendrum wercklei</i> Schltr.	San Jerónimo, Pacific side, 1400 m	Flowered November 1920
63	<i>Erycina pumilio</i> (Rchb.f.) N.H.Williams & M.W.Chase	Carrillo	Flowered July 1921
64	<i>Epidendrum wercklei</i> Schltr.	La Palma	Flowered August 1921
64	<i>Epidendrum wercklei</i> Schltr.	La Palma	Flowered September 1921
65	<i>Epidendrum pfavii</i> Rchb.f.	Candelaria, terrestrial	Flowered August–September 1921
66	<i>Epidendrum nocturnum</i> Jacq.	Carrillo	Flowered July 1921
67	<i>Epidendrum magnibracteatum</i> Ames	La Palma	Flowered July 1921
68	<i>Epidendrum coriifolium</i> var. <i>purpurascens</i> Schltr.	La Palma	Flowered August 1921
71	<i>Pleurothallis ruscifolia</i> (Jacq.) R.Br.	San Jerónimo, 1350–1400 m	Flowered November 1920
71	<i>Scaphyglottis densa</i> (Schltr.) B.R.Adams	La Palma	Flowered September 1921
72	<i>Nidema boothii</i> (Lindl.) Schltr.	Flowered in San José, Mme Amparo de Zeledón garden	January 1920
72	<i>Pleurothallis homalantha</i> Schltr.	San Jerónimo, Pacific side, 1400 m	November 1920
73	<i>Acostaea costaricensis</i> Schltr.	La Palma	Flowered September 1921
73	<i>Epidendrum laucheum</i> Bonhof ex Rolfe	San Jerónimo, Pacific side, 1400 m	s.d.
74	<i>Stelis pardipes</i> Rchb.f.	San Jerónimo, Pacific side, 1400 m	Flowered November 1920
74	<i>Masdevallia nidifica</i> Rchb.f.	La Palma	Flowered August 1921
75	<i>Elleanthus wercklei</i> Schltr.	San Jerónimo, Pacific side, 1400 m	Flowered November 1920
76	<i>Scaphyglottis jimenezii</i> Schltr.	San Jerónimo, Pacific side, 1400 m	Flowered November 1920
76	<i>Masdevallia molossoides</i> Kraenzl.	La Palma, 2500 m	Flowered September 1921
77	<i>Dichaea costaricensis</i> Schltr.	La Palma	Flowered September 1921
78	<i>Dichaea hystericina</i> Rchb.f.	San Jerónimo	Flowered August 1921
79	<i>Dichaea wercklei</i> Schltr.	La Palma	Flowered June 1921
80	<i>Masdevallia nidifica</i> Rchb.f.	La Palma	Flowered September 1921
81	<i>Epidendrum schumannianum</i> Schltr.	Carrillo	Flowered June–July 1921.
82	<i>Epidendrum leprosum</i> Schltr.	San Jerónimo, Pacific side, 1400 m	Flowered November 1920
82	<i>Stelis microchila</i> Schltr.	San Jerónimo, Pacific side, 1400 m	Flowered November 1920
83	<i>Scaphyglottis cuniculata</i> (Schltr.) Dressler	San Jerónimo, Pacific side, 1400 m	Flowered November 1920
83	<i>Isochilus chiriquiensis</i> Schltr.	Flowered in San José, Mme Amparo de Zeledón garden	January 1921
84	<i>Masdevallia picturata</i> Rchb.f.	San Jerónimo	Flowered November 1920
85	<i>Lepanthes eximia</i> Ames	San Jerónimo, Pacific side, 1400 m	Flowered November 1920
85	<i>Stanhopea warszewicziana</i> Klotzsch	Flowered in San José, Mme Amparo de Zeledón garden	August 1921
86	<i>Stelis amparoana</i> Schltr.	San Jerónimo, Pacific side, 1400 m	Flowered November 1920
86	<i>Cynoches amparoanum</i> Schltr.	flowered in San José, Mme Amparo de Zeledón garden	August–September 1921
89	<i>Jacquinella teretifolia</i> (Sw.) Britton & P.Wilson	San Jerónimo, 1400 m	Flowered November 1920
90	<i>Masdevallia picturata</i> Rchb.f.	San Jerónimo	Flowered November 1920
91	<i>Scaphyglottis jimenezii</i> Schltr.	San Jerónimo, Pacific side, 1400 m	Flowered November 1920
94	<i>Homalopetalum costaricense</i>	La Palma	January 1922
95	<i>Epidendrum centradenia</i> Rchb.f.	San Jerónimo, Pacific side, 1400 m	Flowered November 1920
97	<i>Lockhartia amoena</i> Endrés & Rchb.f.	La Palma	January 1922
98	<i>Pleurothallopsis reichenbachiana</i> (Endrés ex Rchb.f.) Pridgeon & M.W.Chase	San Jerónimo	January 1922
100	<i>Pleurothallis ruscifolia</i> (Jacq.) R.Br.	San Jerónimo, 1350–1400 m	Flowered May 1921
101	<i>Epidendrum caroli</i> Schltr.	San Jerónimo, Pacific side, 1400 m	Flowered November 1920
102	<i>Stelis pardipes</i> Rchb.f.	San Jerónimo, Pacific side, 1400 m	Flowered November 1920
102	<i>Lockhartia dipleura</i> Schltr.	San Jerónimo, 1350 m	January 1922
103	<i>Scaphyglottis jimenezii</i> Schltr.	San Jerónimo, Pacific side, 1400 m	Flowered November 1920
103	<i>Dichaea amparoana</i> Schltr.	San Jerónimo, 1400 m	January 1922
105	<i>Scaphyglottis wercklei</i> Schltr.	San Jerónimo, 1350 m	January 1922



Table 1. Continued

Number*	Species†	Locality/elevation	Date
106	<i>Erycina pusilla</i> (L.) N.H.Williams & M.W.Chase	El Coyolar, Orotina	January 1920
106	<i>Scaphyglottis acostaei</i> (Schltr.) C.Schweinf.	La Palma	January 1922
107	<i>Scaphyglottis wercklei</i> Schltr.	San Jerónimo, 1350 m	January 1922
108	<i>Lockhartia oerstedii</i> Rchb.f.	La Palma	January 1922
109	<i>Camaridium stenophyllum</i> (Schltr.) M.A.Blanco	San Jerónimo	Flowered June 1922
110	<i>Maxillaria ramonensis</i> Schltr.	La Palma	January 1921
110	<i>Platystele minimiflora</i> (Schltr.) Garay	La Palma	January 1922
111	<i>Epidendrum microcardium</i> Schltr.	Tablazo	Flowered January 1921
112	<i>Epidendrum lockhartioides</i> Schltr.	La Palma	January 1922
113	<i>Epilyna jimenezii</i> Schltr.	San Jerónimo	s.d.
114	<i>Epidendrum serruliferum</i> Schltr.	La Palma	January 1922
115	<i>Epidendrum lancilabium</i> Schltr.	La Palma	January 1922
116	<i>Kefersteinia parvilabris</i> Schltr.	San Jerónimo	January 1922
117	<i>Specklinia glandulosa</i> (Ames) Pridgeon & M.W.Chase	San Jerónimo, 1350 m	Flowered June 1921
120	<i>Kefersteinia wercklei</i> Schltr.	La Palma	June 1921
122	<i>Camaridium amparoanum</i> Schltr.	San Jerónimo, 1400 m	Flowered July 1921
123	<i>Chondroscaphe bicolor</i> (Rolfe) Dressler	La Palma	January 1922
124	<i>Dichaea dammeriana</i> Kraenzl.	Carrillo	January 1922
125	<i>Oncidium schroederianum</i> (O'Brien) Garay & Stacy	La Palma	January 1922
126	<i>Scaphyglottis amparoana</i> (Schltr.) Dressler	La Palma	Flowered June 1921
127	<i>Epidendrum oxyglossum</i> Schltr.	La Palma	January 1922
127	<i>Oncidium bryolophotum</i> Rchb.f.	La Palma	January 1922
128	<i>Sigmatostalix macrobulbon</i> Kraenzl.	La Palma	January 1922
129	<i>Rhynchostele beloglossa</i> (Rchb.f.) Dressler & N.H.Williams	La Palma	January 1922
130	<i>Lepanthes costaricensis</i> Schltr.	La Palma	s.d.
131	<i>Lepanthes horrida</i> Rchb.f.	San Jerónimo	Flowered June 1921
132	<i>Sigmatostalix macrobulbon</i> Schltr.	La Palma	January 1922
133	<i>Sigmatostalix guatemalensis</i> Schltr.	La Palma	January 1922
134	<i>Cranichis wagneri</i> Rchb.f.	La Palma	s.d.
135	<i>Ponthieva formosa</i> Schltr.	San Jerónimo	s.d.
136	<i>Platythelys vaginata</i> (Hook.) Garay	San Jerónimo	s.d.
137	<i>Ornithocephalus bicornis</i> Lindl.	La Palma	January 1922
138	<i>Habenaria distans</i> Griseb.	Without locality	s.d.
139	<i>Trichocentrum pfavii</i> Rchb.f.	La Palma	January 1922
140	<i>Aspasia principissa</i> Rchb.f. [?]	Without locality	January 1922
141	<i>Habenaria wercklei</i> Schltr.	Without locality	s.d.
143	<i>Elleanthus muscicola</i> Schltr.	Without locality	s.d.
144	<i>Habenaria wercklei</i> Schltr.	Without locality	s.d.
146	<i>Trichocentrum pfavii</i> Rchb.f.	La Palma	January 1922
147	<i>Acineta gymnosteale</i> Schltr.	La Palma	January 1922
147	<i>Stelis platycardia</i> Schltr.	La Palma	s.d.
148	<i>Specklinia calyptrostele</i> (Schltr.) Pridgeon & M.W.Chase	San Jerónimo, 1350 m	Flowered May 1920
149	<i>Stelis floribunda</i> (Poepp. & Endl.) Pridgeon & M.W.Chase	La Palma	Flowered June 1921
150	<i>Trichosalpinx cedralensis</i> (Ames) Luer	San Jerónimo	January 1922
153	<i>Epidendrum</i> cf. <i>difforme</i> Jacq.	San Jerónimo	January 1922
153	<i>Xylobium foveatum</i> (Lindl.) G.Nicholson	San Jerónimo	January 1922
154	<i>Camaridium jimenezii</i> Schltr.	La Palma	Flowered May 1921
154	<i>Camaridium biolleyi</i> (Schltr.) Schltr.	La Palma	January 1922
155	<i>Camaridium imbricatum</i> Schltr.	La Palma	January 1922
155	<i>Camaridium minus</i> Schltr.	La Palma	Flowered June–July 1921–1922
16173	<i>Lepanthes wercklei</i> Schltr.	Pacayas, 2000 m	Flowered May 1901
16419	<i>Epidendrum wercklei</i> Schltr.	La Palma	October 1902

\*Numbers in italics are repeated and apparently pertain to different series.

†Scientific names are in modern usage, as accepted by the author. s.d. = sine die (without date).

La Palma. The second set of duplicate numbers 102 and 103 was prepared in January 1922. For this reason, sets of numbers assigned to Wercklé's collections must be used in permanent association with the collecting date indicated by Schlechter. Thus, for instance, both *Wercklé 60*, flowered June 1921, and *Wercklé 60*, flowered November 1920, were collected at San Jerónimo, but the former is the type of *Fregea wercklei* Schltr., whereas the latter is a specimen of *Maxillaria brunnea* Linden & Rchb.f.

Another point is the presence in the herbarium of the National Museum of Costa Rica (CR) of Wercklé's specimens from the Herbarium of Otón Jiménez that bear the same accession numbers of the holotypes cited by Schlechter in the original protologues. This leads some authors to consider the sheets at CR as the actual holotypes (e.g. Lobo, 2003). Schlechter usually annotated the specimens of his personal herbarium on printed labels with the words 'HERB. ORCHIDAC. R. SCHLECHTER'. After the death of the German botanist, when his herbarium was incorporated by the Herbarium of Berlin-Dahlem, the stamp 'Mus. bot. Berol.' (*Museum botanicum Berolinense*) was added to the sheets. Although the use by O. Jiménez of duplicate accession numbers for different herbarium sheets seems unlikely, the historical 'scenario' in which the interchange of material between Costa Rica and Germany was carried out, mostly during the first two decades of the past century, made improbable the hypothesis of devolution of type specimens to the herbarium of Costa Rican National Museum. Fortunately, during his visit to Berlin-Dahlem museum in 1927, Professor Oakes Ames took photographs of some specimens from Schlechter's herbarium, mostly of species of the genus *Stelis* Sw. These photographs are now kept at the Orchid Herbarium of Oakes Ames, Harvard University Herbaria. Among them, there are two photographs of specimens of *Stelis rhodochila* Schltr., described by Schlechter from material collected by Wercklé and prepared by Jiménez, probably from cultivated plants. The herbarium numbers assigned by Jiménez to these collections (839 and 845) agree with the syntypes cited by Schlechter in the protologue (Schlechter, 1918: 392); both the sheets were annotated by Schlechter as types on his personal labels and have the stamp of the Botanical Museum of Berlin-Dahlem. Sheets with the same accession numbers, assigned by Jiménez to Wercklé's specimens intended for his herbarium, are kept at the herbarium of the Museo Nacional de Costa Rica. The handwritten numbers on the labels of Jiménez herbarium are those of *Stelis rhodochila* syntypes and the specimens agree with Schlechter's description. However, the material at CR was not annotated by Schlechter and it does not have the stamp of the Botanical Museum of Berlin (Fig. 1).

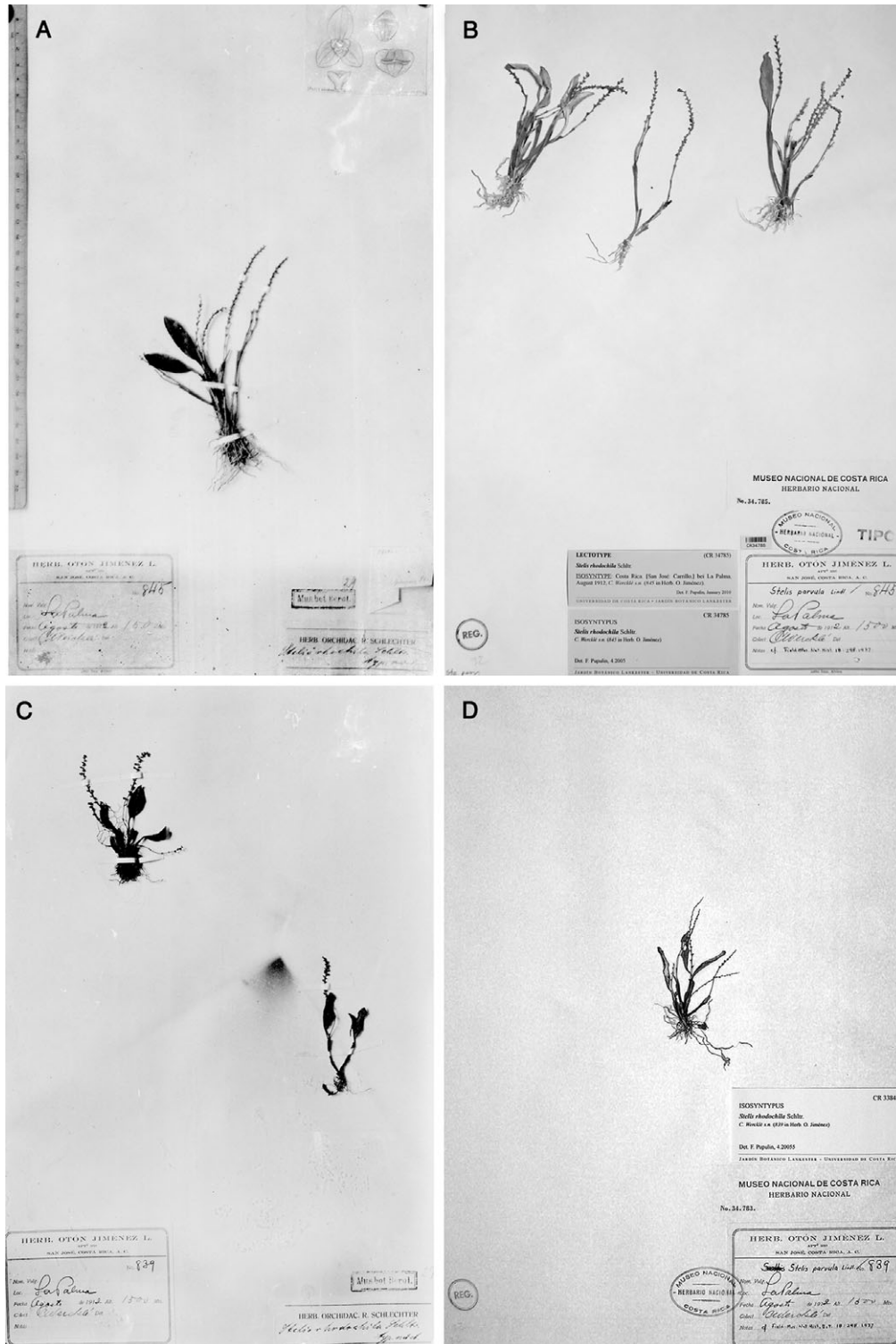
This provides proof that Otón Jiménez prepared sets of duplicates from the plants collected by Wercklé and grown in the garden of Amparo de Zeledón at San José, assigning to the duplicates the same accession number. One set of duplicates was then sent to Schlechter in Berlin, from which the German botanist prepared his descriptions of new taxa. These specimens, now destroyed, were the primary set of types and many of them were holotypes. The second set at CR was prepared from the same specimens, but these sheets never left Costa Rica and Schlechter never saw them (and for this reason they are not annotated by him). Among them, there are several isotypes and isosyntypes (some of them selected here for lectotypification), but the evidence prevents them being considered as holotypes.

Schlechter described the first species of Orchidaceae based on a collection by Wercklé (*Epidendrum wercklei*, *Wercklé 16419*) in 1906 and added some 20 new taxa between 1911 and 1918. From the orchid materials he received from Amparo de Zeledón in three shipments between 1921 and 1923, Schlechter prepared his monumental *Additamenta ad Orchidologiam Costaricensem*, published in 1923 (Schlechter, 1923). Here, he honoured Amparo de Zeledón for her unselfish support with an entire chapter entitled 'Orchidaceae Amparoanae' and he dedicated 11 new orchid species to Wercklé.

#### TYPIFICATION OF COSTA RICAN ORCHIDACEAE DESCRIBED FROM COLLECTIONS BY C. WERCKLÉ

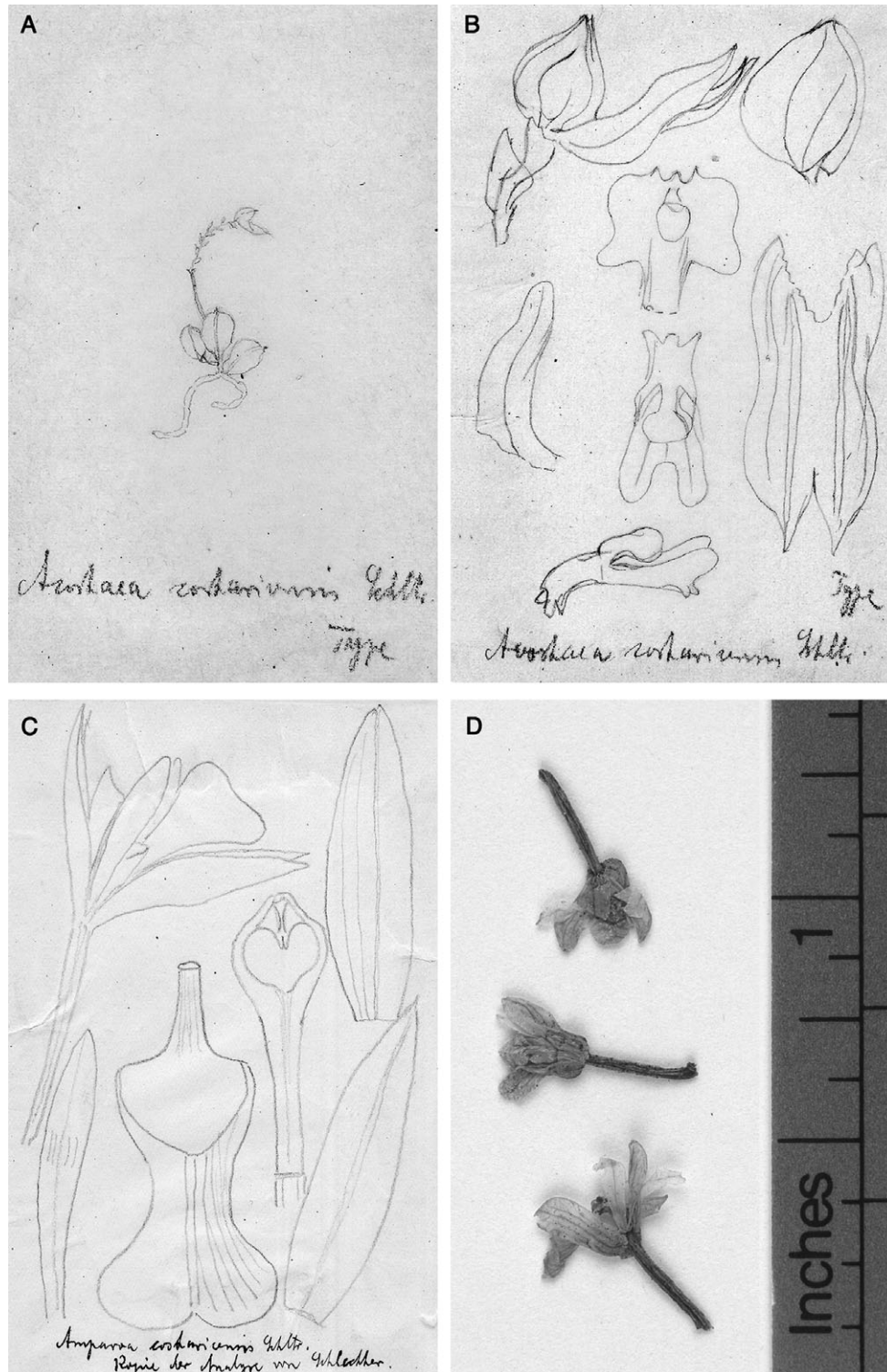
1. *Acostaea costaricensis* Schltr., Repert. Spec. Nov. Regni Veg. Beih. 19: 284. 1923. SYNTYPES: Costa Rica. [Alajuela]: Umgebung von San Ramón, im Jahre 1921, *G. Acosta s.n.* (B, destroyed). [San José: Moravia,] San Jerónimo, im Mai 1921, *C. Wercklé 17* (B, destroyed). Lectotype, designated here, drawings of a syntype, AMES 29708!, drawings at top left and bottom right (Fig. 2A, B).

In the short note following the protologue, Schlechter (1923: 285) mentions two other collections referable to this species: *Wercklé 73*, flowered in September 1921 (Schlechter, 1923: 22), and *Brade 1119*, both from La Palma. No isotypes of the collections mentioned by Schlechter in the protologue are known to exist. Wercklé's collecting number 17 is the same as that assigned to the type of *Epidendrum poaeforme* Schltr. A sheet at AMES (29708) bears four tracings of analytical drawings of the plant and the flower, made under the supervision of Schlechter, plus three specimens collected at one of the type localities by P. C. Standley (La Palma, *Standley 38304!*). The analytical drawings were probably based on the two syntypes



**Figure 1.** Syntypes and isosyntypes of *Stelis rhodochila*. A–B, Wercklé s.n. (845 in Herb. O. Jiménez). C–D, Wercklé s.n. (839 in Herb. O. Jiménez). A, C, now destroyed; from the Herbarium of the Botanical Museum, Berlin-Dahlem. B, D, from the Herbario Nacional de Costa Rica. Note that, in (B) and (D), the personal, annotated label by Schlechter and the stamp of the Berlin Museum are absent. Reproduced with the kind permission of the Harvard University Herbaria and the Museo Nacional de Costa Rica.





**Figure 2.** A, *Acostaea costaricensis*. Tracing of Schlechter's drawing of the plant habit from a syntype (AMES 29708). Reproduced with the kind permission of the Harvard University Herbaria. B, *Acostaea costaricensis* Schltr. Tracing of Schlechter's analysis of the flower from a syntype (AMES 29708). C, *Amparoa costaricensis*. Tracing of Schlechter's analysis of the flower from the holotype (AMES 34249). D, *Arpophyllum stenostachyum*. Flowers from the isotype (AMES bar code 261). All reproduced with the kind permission of the Harvard University Herbaria.



and they are annotated as types. However, no mention of the collector is made on the drawings and they cannot be assigned with certainty to Acosta or Wercklé. The sketch on the upper right illustrates a sterile plant, whereas the plant depicted on the left is fertile. Both of the lower drawings, with analytical sections of the flower, correspond well to the details given in the protologue. However, the drawing on the right seems to be closer to the characters stated by Schlechter, particularly with respect to the bifid synsepal, with shortly acuminate apices and the sinuate margin of the column wings. For this reason, this drawing and the drawing of the fertile plant are selected here as the lectotype. Luer (1987) treated typical *A. costaricensis* as ssp. *costaricensis*, to distinguish it from populations from eastern Panama and Colombia. On the basis of phylogenetic studies based on molecular data sets (Pridgeon & Chase, 2001), the species was transferred to the genus *Specklinia* Lindl., with the new name *Specklinia mirifica* Pridgeon & M.W.Chase.

2. *Amparoa costaricensis* Schltr., Repert. Spec. Nov. Regni Veg. Beih. 19: 65. 1923. TYPE: Costa Rica. [San José: Carrillo,] La Palma, im Jahre 1922, *C. Wercklé 129* (holotype, B, destroyed; isotype, designated here as the lectotype, AMES 34249!; drawing of the type, AMES 34249!) (Fig. 2C).

The lectotype, consisting of a flower fragment, is the only extant isotype. The analytical drawing of the flower, made under the supervision of Schlechter, shows the characteristic pandurate lamina of the lip and the broad basal callus that are consistent with the protologue. Schlechter (1923) compared his *A. costaricensis* with *Odontoglossum beloglossum* Rchb.f., described from Mexico, from which it differs by the smaller lip and the more slender column. However, examination of the type of *O. beloglossum* (W-R!) shows that the two are synonymous. Comparison of DNA sequences (Williams *et al.*, 2001) have shown that *Amparoa* is a member of the *Rhynchoatele* Rchb.f. clade, and a new combination of *O. beloglossum* under the latter genus was proposed by Dressler and Williams (in Hágsater & Soto, 2002). However, because of the incorrect reference to the basionym, the name *Rhynchoatele beloglossa* Dressler & N.H.Williams was not validly published.

3. *Arpophyllum stenostachyum* Schltr., Repert. Spec. Nov. Regni Veg. Beih. 19: 32. 1923. TYPE: Costa Rica. [San José: Moravia,] San Jerónimo, blühend im Mai 1921, *C. Wercklé 6* (holotype, B, destroyed; isotype, selected here as the lectotype, AMES bar code 261!; the sheet also includes a photograph of the holotype, with a drawing of the holotype) (Figs 2D, 3A).

The flowers at AMES, selected as the lectotype, are the only extant isotype. The sheet at AMES also bears

a black and white photograph of the holotype at B, including a pseudobulb, a leaf, the inflorescence and the analytical drawing of the flower made by Schlechter. The name is a synonym of *Arpophyllum giganteum* Hartw. ex Lindl.

4. *Camaridium amparoanum* Schltr., Repert. Spec. Nov. Regni Veg. Beih. 19: 56. 1923. TYPE: Costa Rica. [San José: Moravia,] San Jerónimo, 1400 m, blühend im Juli 1921, *C. Wercklé 122* (holotype, B, destroyed; lectotype, designated here, tracing of Schlechter's drawings of the holotype, AMES 31554!) (Fig. 3B).

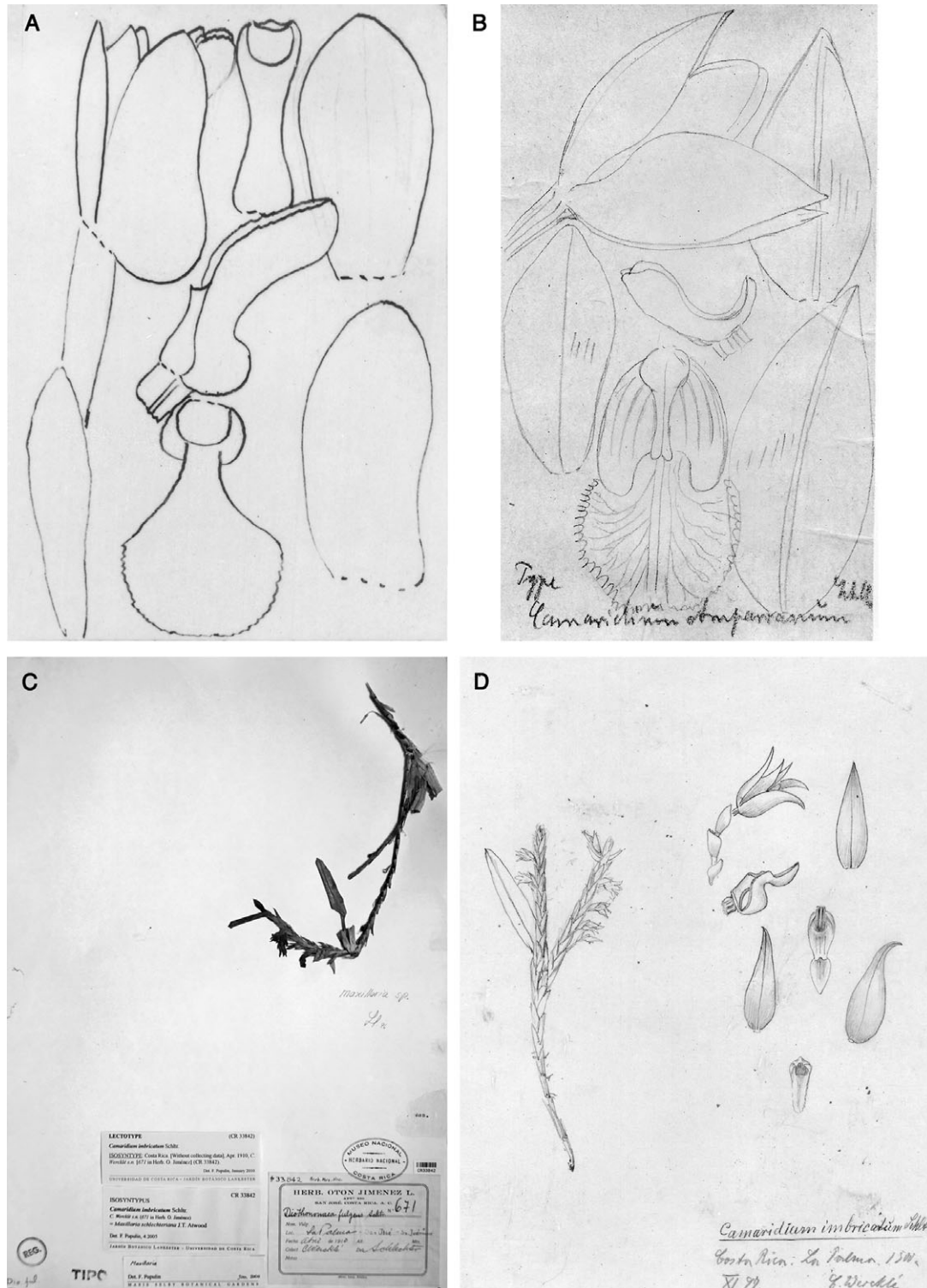
In absence of any known isotypes or paratypes of this species, the tracings of Schlechter's drawings of the plant and dissection of the flower are chosen as the lectotype. The peculiar shape of the lip as shown in the drawing, with obliquely oblong lateral lobes and a suborbicular midlobe, is consistent with the protologue. In the genus *Maxillaria* Ruiz & Pav., the name is predated by *M. amparoana* Schltr. (1923) and the species was renamed *M. serrulata* Ames & Correll.

5. *Camaridium imbricatum* Schltr., Beih. Bot. Centralbl. 36(2): 415. 1918. SYNTYPES: Costa Rica. [San José: Carrillo,] La Palma, 1500 m, November 1897, *C. Wercklé s.n.* (B, destroyed; tracing of Schlechter's drawings of the syntype, AMES 24140!); April 1910, *C. Wercklé s.n.* [671 in Herb. O. Jiménez] (B, destroyed; isosyntype, selected here as the lectotype, CR 33842!) (Fig. 3C, D).

The isosyntype at CR is the only extant specimen; it is fertile and in good condition and it is selected here as the isotype. Its presence at CR was not recorded by Lobo (2003) in her catalogue of type material at the herbarium of the National Museum of Costa Rica. The drawings of a syntype at AMES, based on *Wercklé s.n.* (November 1897), show the habit of the plant and analysis of a flower. The characters of the sigmoid lip, provided with a concave hypochile and a small, ovate epichile corresponds to those in the protologue. In *Maxillaria*, the epithet is predated by *M. imbricata* Barb. Rodr. (1877) and the new name proposed for the taxon was *M. schlechteriana* J.T.Atwood (1994). *Camaridium imbricatum* (Barb. Rodr.) Hohene (1947) is an illegitimate name based on *M. imbricata* Barb. Rodr.

6. *Camaridium jimenezii* Schltr., Beih. Bot. Centralbl. 36(2): 416. 1918. TYPE: Costa Rica. [San José: Carrillo,] La Palma, 1500 m, February 1913, *C. Wercklé s.n.* [855 in Herb. O. Jiménez] (holotype, B, destroyed; isotype, selected here as the lectotype, CR 33816!) (Fig. 4A).

Lobo (2003) cited *Wercklé 855* among the type specimen material kept at CR, but this number was assigned by Otón Jiménez to a collection *sine numero*



**Figure 3.** A, *Arpophyllum stenostachyum*. Photograph of Schlechter's analysis of the flower from the holotype (AMES bar code 261). B, *Camaridium amparoanum*. Tracing of Schlechter's analysis of the flower from the holotype (AMES 31554). C, *Camaridium imbricatum*. Isosyntype [April 1910, C. Wercklé s.n. (671 in Herb. O. Jiménez)] (CR 33842). D, *Camaridium imbricatum*. Tracing of Schlechter's drawings of the plant habit and the flower from a syntype (La Palma, 1500 m, November 1897, C. Wercklé s.n.) (AMES 24140). A, B, D, reproduced with the kind permission of the Harvard University Herbaria. C, reproduced with the kind permission of the Museo Nacional de Costa Rica.



**Figure 4.** A, *Camaridium jimenezii*. Isotype (CR 33816). B, *Camaridium minus*. Tracing of Schlechter’s drawings of the plant habit and the flower from the holotype (AMES 24142). C, *Camaridium nutantiflorum*. Isotype (CR 33814). D, *Camaridium nutantiflorum*. Tracing of Schlechter’s drawings of the plant habit and the flower from the holotype (AMES 24143). A, C, reproduced with the kind permission of the Museo Nacional de Costa Rica. B, D, reproduced with the kind permission of the Harvard University Herbaria.



by Wercklé in preparing dried specimens for his herbarium. As discussed in the introduction, Jiménez prepared duplicates of the plants collected by Wercklé, assigning them the same number in his herbarium. One of the sheets of his herbarium number 855 was sent to Berlin and this was the holotype (now destroyed) on which Schlechter prepared his description of *C. wercklei*. The sheet at CR was not annotated by Schlechter and it does not have the stamp of the Berlin Herbarium. This isotype is sterile but otherwise in excellent condition and it is selected here as the lectotype. Atwood & Mora-Retana (1999) reduced *C. jimenezii* in synonymy under *Maxillaria dendrobioides* (Schltr.) L.O. Williams (1940), based on *Camaridium dendrobioides* Schltr. (1918).

7. *Camaridium minus* Schltr., Beih. Bot. Centralbl. 36(2): 417. 1918. TYPE: Costa Rica. [San José: Carrillo,] La Palma, November 1897, *C. Wercklé s.n.* [11563 in Herb. Institute. physico-geogr. Nat. costaric.] (holotype, B, destroyed; lectotype, designated here, tracing of Schlechter's drawings of the holotype, AMES 24142!) (Fig. 4B).

In the absence of any isotypes of this species, the tracing of Schlechter's drawing of the plant and dissection of the flower is chosen as the lectotype. The name is the basionym of *Maxillaria minor* (Schltr.) L.O. Williams, originally published with the epithet 'minus' (Williams, 1942).

8. *Camaridium nutantiflorum* Schltr., Beih. Bot. Centralbl. 36(2): 417. 1918. TYPE: Costa Rica. [San José: Carrillo,] La Palma, 1500 m, [February 1913], *C. Wercklé s.n.* [859 in Herb. O. Jiménez] (holotype, B, destroyed; isotype, annotated by J. T. Atwood, 1995 and selected here as the lectotype, CR 33814!; drawings of the holotype, AMES 24143!) (Fig. 4C, D).

The isotype at CR has no flower, but it is otherwise well preserved and it is selected here as the lectotype. Although number 859 has been referred to as a collecting number by Wercklé (Lobo, 2003), it is actually an accession number assigned by Otón Jiménez to a sheet intended for his herbarium. At AMES, a copy of the analytical sketch of the holotype prepared by Schlechter is conserved; it shows the plant habit and details of the flower; the deeply 3-lobed lip, with triangular-ovate lateral lobes and a widely ovate midlobe, as well as the small pandurate callus at the base of the lip, illustrate well Schlechter's concept of the species. The drawing of the type at AMES also bears the indication of the date of the original collection, not stated in the protologue. The transfer of the name to *Maxillaria* is blocked by *M. nutantiflora* Schltr. (1921), described from material collected in Ecuador by Sodiro. The new name proposed for the species is *Maxillaria umbratilis* L.O. Williams (Atwood & Mora-Retana, 1999).

9. *Camaridium wercklei* Schltr., Repert. Spec. Nov. Regni Veg. Beih. 19: 58. 1923. SYNTYPES: Costa Rica. [San José: Caraigres]: San Cristobal, im Jahre 1910, *C. Wercklé 5* (B, destroyed); [San José: Carrillo,] La Palma, 1750 m, blühend im April 1910, *C. Wercklé s.n.* [686 in Herb. O. Jiménez] (B, destroyed; isosyn-type, selected here as the lectotype, CR 34012!; tracings of Schlechter's drawings of a syntype, AMES 31553!) (Fig. 5A, B).

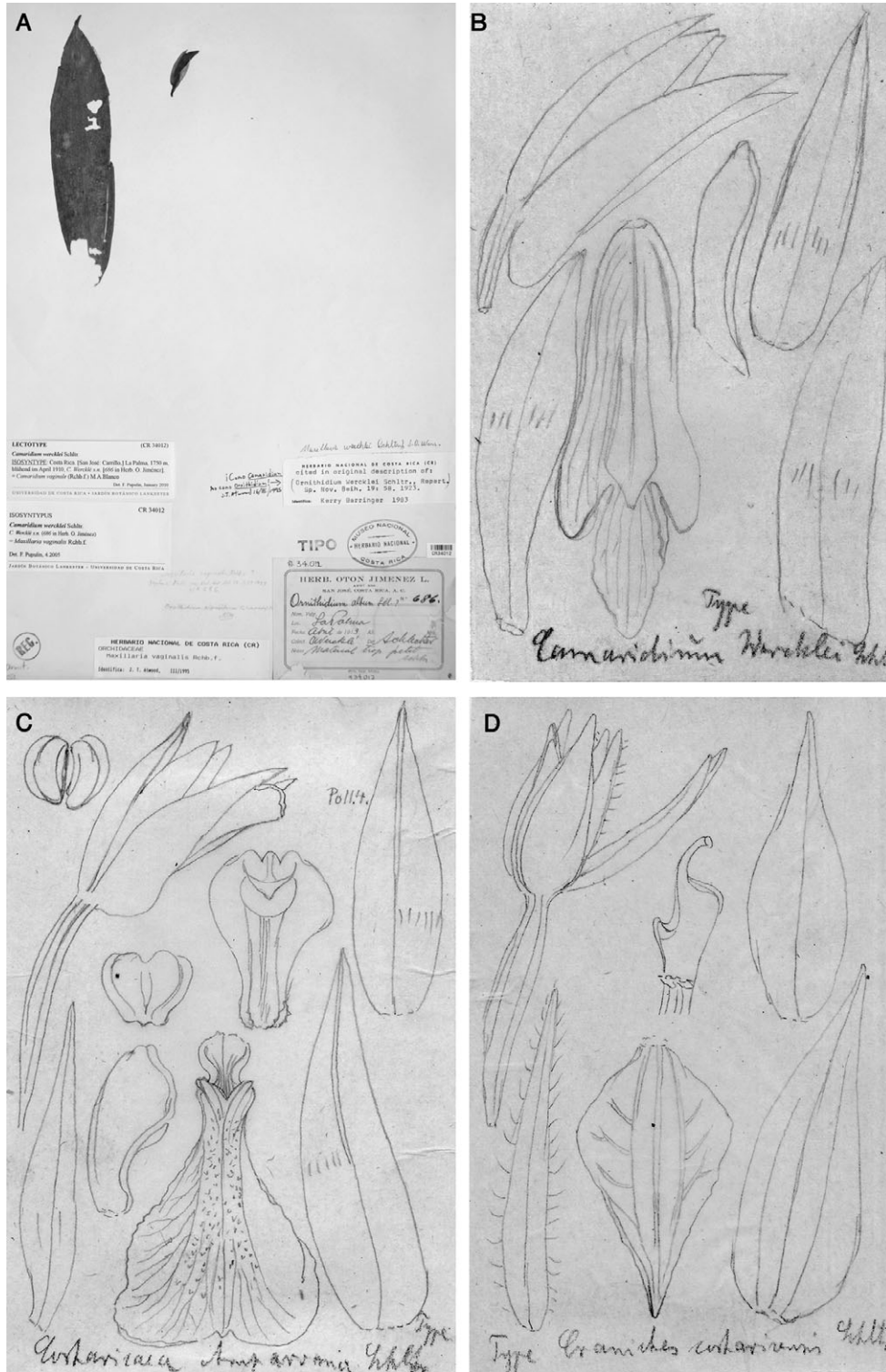
In the protologue, Schlechter cited two collections by Wercklé, without designating a type. Material of one of the syntypes is in existence at CR and it is selected here as the lectotype. According to the label of the Herbarium Jiménez sheet at CR, the specimen was doubtfully identified by Schlechter as *Ornithidium album* Lindl. Because of the poor condition of the material. In fact, the specimen at CR only consists of the fragment of a leaf and an immature flower. The tracings of the holotype at AMES show the plant habit, with a long rhizome covered by papyraceous bracts and remote, monophyllous pseudobulbs covered at the base by a foliaceous bract, and the analysis of the flower with the characteristic, not sygmoid lip. The name is a synonym of *Camaridium vaginale* (Rchb.f.) M.A. Blanco (bas. *Maxillaria vaginalis* Rchb.f.), not to be confused with *Ornithidium wercklei* Schltr. (1923), syn. *Maxillaria wercklei* (Schltr.) L.O. Williams.

10. *Costaricaea amparoana* Schltr., Repert. Spec. Nov. Regni Veg. Beih. 19: 31. 1923. TYPE: Costa Rica. [San José: Carrillo,] La Palma, blühend im Juni 1921, *C. Wercklé 126* (holotype, B, destroyed; lectotype, designated here, tracing of Schlechter's drawings of the holotype, AMES 31265!) (Fig. 5C).

No isotypes of this species are known to exist, so the tracing of Schlechter's drawings of the plant and dissection of the flower are chosen as the lectotype. The sketch of the flower depicts the characteristic short, contracted, concave claw of the lip and the two V-shaped, small keels at the base of the lamina, which are consistent with the protologue. The name is the basionym of *Scaphyglottis amparoana* (Schltr.) Dressler.

11. *Cranichis costaricensis* Schltr., Repert. Spec. Nov. Regni Veg. Beih. 19: 12. 1923. TYPE: Costa Rica. [San José: Carrillo,] La Palma, *C. Wercklé 134* (holotype, B, destroyed; lectotype, designated here, tracing of Schlechter's drawings of the holotype, AMES bar code 98394!) (Fig. 5D).

No isotypes, syntypes or paratypes for this species exist. The drawings of the holotype at AMES, illustrating the habit of the plant and analytical sections of the flower, are detailed and are chosen as the lectotype. The name is a synonym of *Cranichis wagneri* Rchb.f.



**Figure 5.** A, *Camaridium wercklei*. Isosyntype [La Palma, 1750 m, blühend im April 1910, C. Wercklé s.n. (686 in Herb. O. Jiménez)] (CR 34012). B, *Camaridium wercklei*. Tracing of Schlechter's analysis of the flower from a syntype (AMES 31553). C, *Costaricea amparoana*. Tracing of Schlechter's drawings of the holotype (AMES 31265). D, *Cranichis costaricensis*. Tracing of Schlechter's drawings of the holotype (AMES bar code 98394). A, reproduced with the kind permission of the Museo Nacional de Costa Rica. B–D, reproduced with the kind permission of the Harvard University Herbaria.

12. *Cynoches amparoanum* Schltr., Repert. Spec. Nov. Regni Veg. Beih. 19: 48. 1923. SYNTYPES: Costa Rica. San José: Kultiviert im Garten der Mdme. Amparo de Zeledón von El Guayabo [Guayabo] bei Turrialba, im Jahre 1920, A. Tonduz 49 (B, destroyed); blühend in August–September 1921, C. Wercklé 86 (B, destroyed). Lectotype, selected here, tracing of Schlechter's drawings of a syntype, AMES 31562!) (Fig. 6A).

The analytical drawings of the plant habit and the dissection of the flower at AMES are based on one of the syntypes and they are annotated as types. Schlechter did not mention on the drawings the name of the collector and the illustrated plant cannot be assigned with certainty to Tonduz or Wercklé. However, the description of the plant in the protologue seems to have been prepared from a cultivated specimen, of which only a single pseudobulb without roots was pressed for the herbarium: it is likely that it was based on the Tonduz specimen, cultivated in San José by Amparo de Zeledón. In the absence of any known isotype, the tracings of Schlechter's drawings at AMES are selected as the lectotype. The species is a synonym of *C. egertonianum* Batem.

13. *Dichaea acrolephara* Schltr., Repert. Spec. Nov. Regni Veg. Beih. 19: 71. 1923. Lectotype, designated by Pupulin (2007), tracing of Schlechter's drawings of a syntype, AMES 31565!. SYNTYPES: Costa Rica. [San José: Moravia,] San Jerónimo, blühend im Mai 1921, C. Wercklé 22 (B, destroyed). Carrillo [Carrillo], c. 400 m, blühend im Juni 1909, A. Brade & C. Brade 1173 (B, destroyed; copy of the collector drawing, AMES!) (Fig. 6B).

In the protologue, Schlechter cited both Wercklé 22 and Brade & Brade 1173, without designating the type. In the absence of any known isotypes or paratypes of this species, the tracings of Schlechter's drawings of the plant and dissection of the flower of a syntype were chosen as the lectotype. No collector data are included in the analytical drawings, so we cannot assign them with certainty to any of the syntypes. The sheet at AMES also bears a copy of a small watercoloured drawing prepared by one of the Brade brothers from their collection n. 1173 (see Schlechter, 1923: 154). From the coloured sketch, we know that the flowers of *D. acrolephara* have sepals and petals strongly blotched with violet, the blotches being restricted to the the external half of the lateral sepals, and a white lip. The shape of the lip and the rather thick infrastigmatic ligule shown in the analytical drawings agree with the characters stated in the protologue. In the note to the protologue, Schlechter compared *D. acrolephara* with *D. brachypoda* Rchb.f., but the latter has a glabrous ovary that prevents such an interpretation. The name of *D.*

*acrolephara* is the oldest name for the species also known as *D. standleyi* Ames (1925) (Pupulin, 2007).

14. *Dichaea amparoana* Schltr., Repert. Spec. Nov. Regni Veg. Beih. 19: 71. 1923. TYPE: Costa Rica. [San José: Moravia,] San Jerónimo, 1400 m, im Jahre 1922, C. Wercklé 103 [holotype, B, destroyed; lectotype designated by Pupulin (2007), tracings of Schlechter's drawings of the holotype, AMES 31566!] (Fig. 6C).

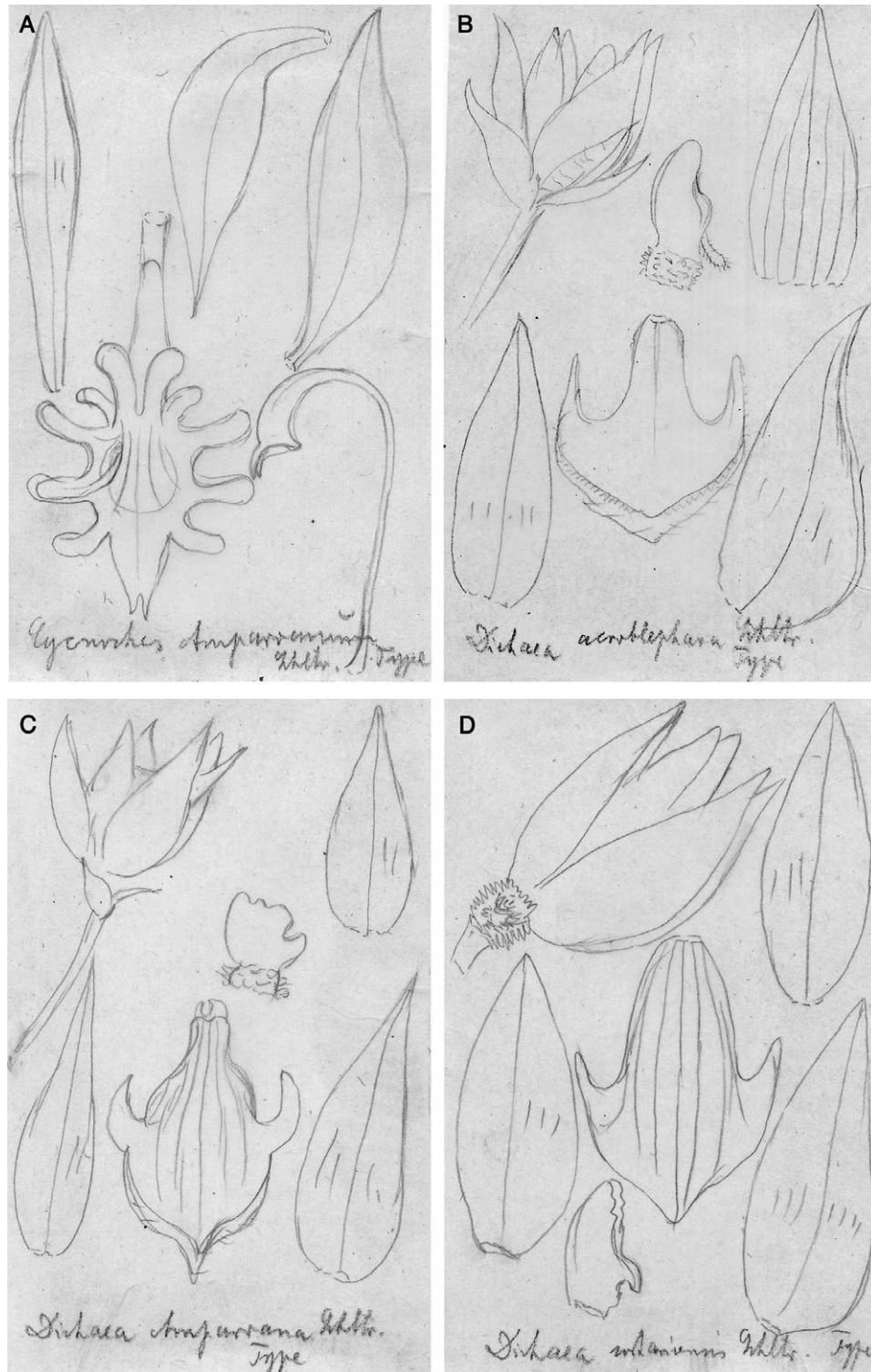
No isotypes or paratypes of this species are known to exist, so the tracings of Schlechter's drawings of the plant and dissection of the flower were chosen as the lectotype. Because of the aversion of taxonomists to published taxa with little or no material available for study, *D. amparoana* fell into botanical oblivion after its description. It has been considered a synonym of *D. lankesteri* Ames (Pupulin, 2002; Dressler, 2003), to which it is closely related, but the drawings at AMES clearly show the erect habit, the stem provided with rather short leaves, the lip with falcate–retrorse apical lobes and the column with a glabrous, obtuse ligule, which distinguish this species and are consistent with the protologue. Wercklé's specimens bear no indication of flower colour, but specimens of this species recently collected in Costa Rica, one of which not far from the type locality of *D. amparoana* (*D. Bogarín* 679, JBL; *F. Pupulin* 5501, CR), have pale rose flowers, the base of sepals and petals spotted with purple, the lip pink and a dark violet rim around the stigmatic cavity (Pupulin, 2007).

15. *Dichaea costaricensis* Schltr., Repert. Spec. Nov. Regni Veg. Beih. 19: 73. 1923. Lectotype, designated by Pupulin (2007), tracing of Schlechter's drawing of a syntype, collection data not noted, AMES 31569! SYNTYPES: Costa Rica. [San José: Carrillo,] La Palma (?), blühend im September 1921, C. Wercklé 77 (B, destroyed); Carrillo, blühend im Juni 1921, C. Wercklé 39 (B, destroyed); [Moravia,] San Jerónimo, 14 000 [1400] m, auf der pazifischen Seite, im Jahre 1920, C. Wercklé s.n. (B, destroyed) (Fig. 6D).

In the protologue, Schlechter (1923) cited Wercklé 77, 39 and a Wercklé's collection without number from a different locality, without designating the type. No isosyntypes for this species or any material annotated by Schlechter are known to exist. The drawing at AMES (31569!) shows the short, subquadrate ligule and the characteristic outline of the lip cited in the protologue.

16. *Dichaea poicillantha* Schltr., Repert. Spec. Nov. Regni Veg. Beih. 19: 73. 1923. TYPE: Costa Rica. [San José: Moravia,] San Jerónimo, im Jahre 1921, C. Wercklé 32 [holotype, B, destroyed; lectotype, desig-





**Figure 6.** A, *Cynoches amparoanum*. Tracing of Schlechter's analysis of the flower from a syntype (AMES 31562). B, *Dichaea acrolephara*. Tracing of Schlechter's analysis of the flower from a syntype (AMES 31565). C, *Dichaea amparoana*. Tracing of Schlechter's analysis of the flower from the holotype (AMES 31566). D, *Dichaea costaricensis*. Tracing of Schlechter's analysis of the flower from a syntype (AMES 31569). All reproduced with the kind permission of the Harvard University Herbaria.

nated by Pupulin (2007), tracing of Schlechter's drawing of the type, AMES 31572!) (Fig. 7A).

No isotypes, syntypes or paratypes for this species exist. The drawing at AMES (31572!) designated as the type shows the broad ligule and the labellar outline that are diagnostic characters. Nonetheless, material currently assigned to this taxon differ in many ways from the sketch prepared from the holotype, particularly in the shape of the hypochile and the lateral lobes of the lip. As the oldest name of a complex of Mesoamerican *Dichaea* spp., the concept of *D. poicillantha* is crucial to the understanding of the taxonomy of the genus in that region (Pupulin, 2007).

17. *Dichaea wercklei* Schltr., Repert. Spec. Nov. Regni Veg. Beih. 19: 74. 1923. Lectotype, selected by Pupulin (2007), tracing of Schlechter's drawing of the type, AMES 31573! SYNTYPES: Costa Rica. [San José: Carrillo,] La Palma, fruchtend im Juni 1921, *C. Wercklé 79* (B, destroyed); ebendort, 1400 m, ohne Blüten im März 1908, *A. Brade & C. Brade 1300* (B, destroyed) (Fig. 7B).

The protologue cited *Wercklé 79*, a plant with fruits, and a sterile collection *sine numero* from the same locality by the brothers Brade. No isotypes are known to exist. The tracings of Schlechter's sketches at AMES show a fruiting specimen and analytical drawings of the perianth, prepared from a faded flower (Schlechter, 1923: 74). In selecting them as the lectotype, Pupulin (2007) assumed they were prepared from Wercklé's specimen, hence the specific epithet. The name is a synonym of *Dichaea tuerckheimii* Schltr.

18. *Elleanthus muscicola* Schltr., Repert. Spec. Nov. Regni Veg. Beih. 19: 10. 1923. TYPE: Costa Rica. Ohne nähere Standortsangabe, *C. Wercklé 143* (holotype, B, destroyed). Neotype, selected here: Costa Rica. [Alajuela]: Los Angeles de San Ramón, 1050 m, July 1921, *A.M. Brenes s.n.* [43 in Herb. Brenes] (CR 18427!).

No isotypes or any other material associated with the protologue are known to exist. The collection by A. M. Brenes at CR selected here as the neotype was identified by Schlechter and is in good condition. The short stems provided with acicular leaves and the 3-lobed lip with the midlobe subulate-lanceolate are diagnostic of this species.

19. *Elleanthus wercklei* Schltr., Repert. Spec. Nov. Regni Veg. Beih. 19: 9. 1923. TYPE: Costa Rica. [San José: Moravia,] San Jerónimo, auf der pazifischen Seite, c. 1400 m, blühend im November 1920, *C. Wercklé 75* (holotype, B, destroyed; isotype, selected here as the lectotype, AMES 31023!) (Fig. 7C).

The sheet at AMES was received through a distribution of duplicates from Schlechter's herbarium. It is

annotated as type and it included five specimens, two of which are fertile.

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

Apparently, no specimens referable to *Wercklé 10* or any other material associated with the protologue exist. Among material kept at CR there is a collection by A. M. Brenes identified by Schlechter as *E. amparoanum*. Nevertheless, the specimen is sterile and in bad condition, only consisting of a short stem and a few separate leaves, and it is not a good candidate for neotypification. A neotype should be designated in the future from material strictly collected at the type locality, taking into account that a similar but distinct species is also found in the same region (Pupulin & Karremans, in press). The name is a synonym of *E. barbeyanum* Kraenzl.

21. *Epidendrum caroli* Schltr., Repert. Spec. Nov. Regni Veg. Beih. 19: 35. 1923. TYPE: Costa Rica. [San José: Moravia,] San Jerónimo, auf der pazifischen Seite, 1400 m, blühend im November 1920, *C. Wercklé 101* (holotype, B, destroyed; isotype, selected here as the lectotype, AMES 22704!) (Fig. 7D).

The isotype at AMES was received through a distribution of duplicates from Schlechter's herbarium. It is fertile and well preserved.

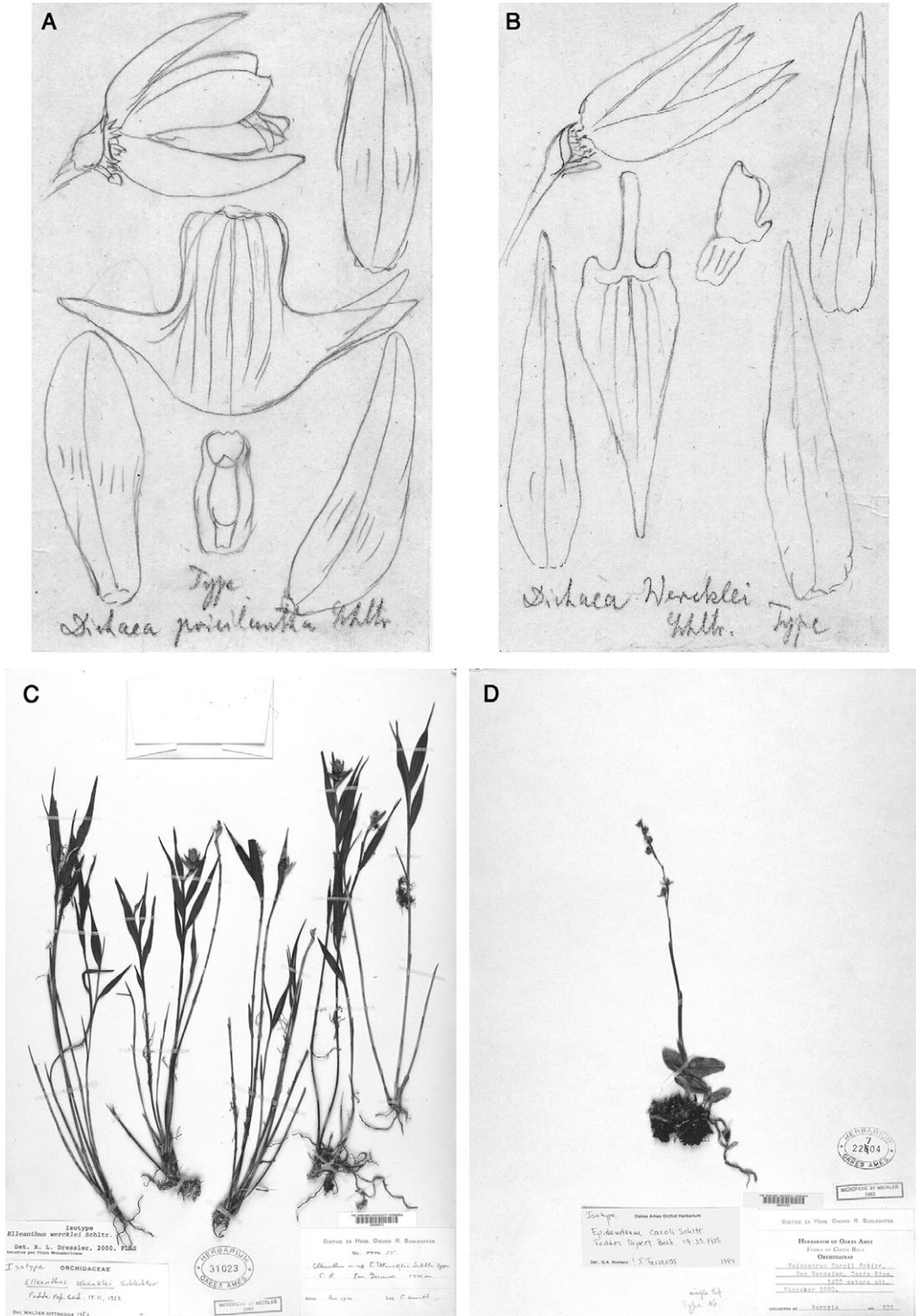
22. *Epidendrum flexicaule* Schltr., Beih. Bot. Centralbl. 36(2): 403. 1918. TYPE: Costa Rica. [San José: Carrillo,] La Palma, 1500 m, *C. Wercklé s.n.* [holotype, B, destroyed; lectotype, designated by Hágsater (1992), tracing of Schlechter's drawing of the holotype, AMES bar code 70352!] (Fig. 8A).

In the absence of any known isotype for this species, the drawing of the holotype at AMES, illustrating the habit of the plant and analytical sections of the flower, was selected as the lectotype. The narrow, linear-elliptic leaves illustrated in the drawings and the ovate-cordate lamina of the lip, slightly contracted in the middle portion, are diagnostic for the species and agree with the protologue.

23. *Epidendrum lancilabium* Schltr., Repert. Spec. Nov. Regni Veg. Beih. 19: 38. 1923. TYPE: Costa Rica. [San José: Carrillo,] La Palma, im Jahre 1922, *C. Wercklé 115* (holotype, B, destroyed; lectotype, designated here, photograph of the holotype and associate drawing, AMES 39891!) (Fig. 8B).

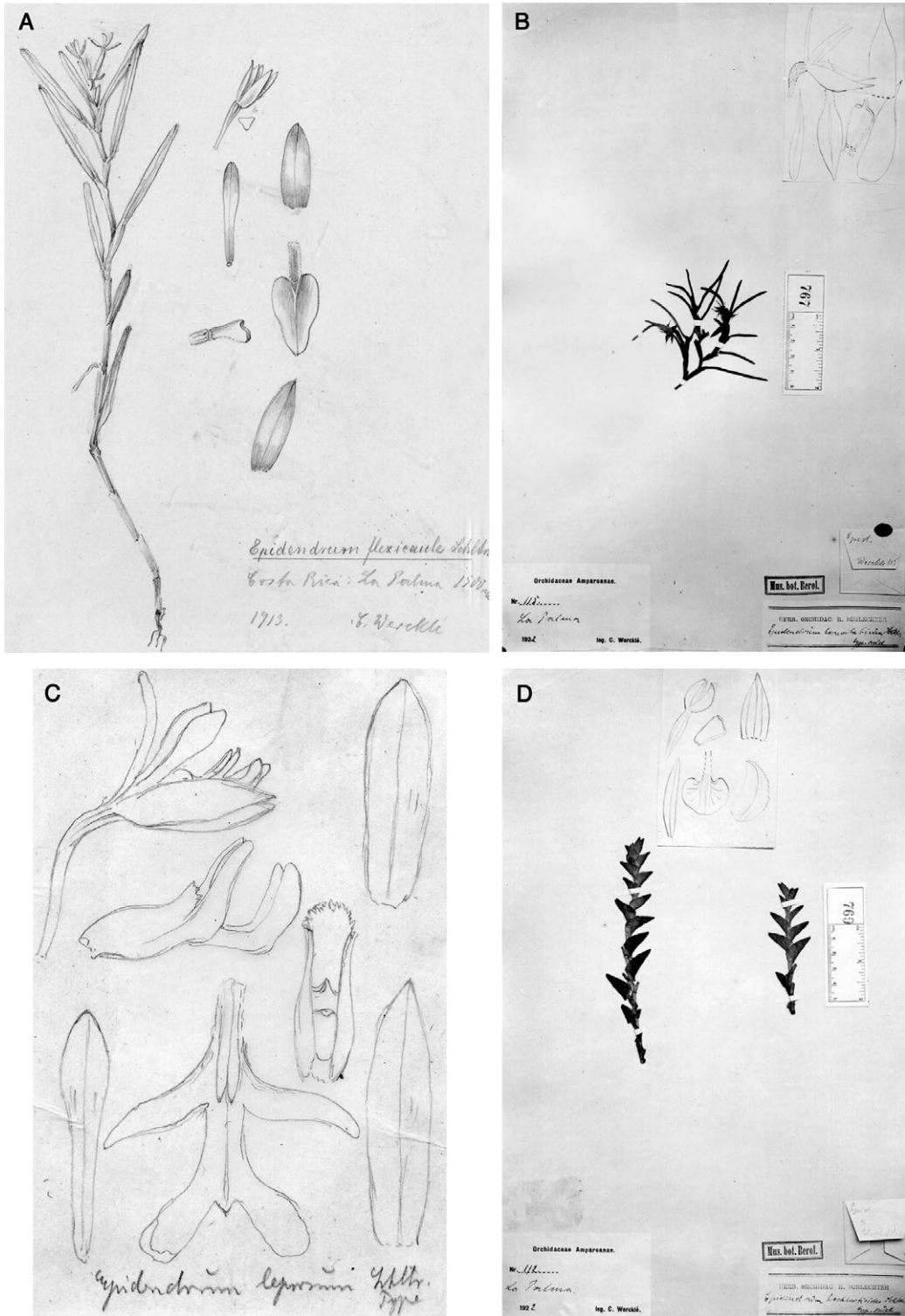
No isotypes or paratypes for this species are known to exist. The sheet at AMES designated as the type includes a photograph of the holotype and of Schlechter's diagnostic sketch, taken at the her-





**Figure 7.** A, *Dichaea poicillantha*. Tracing of Schlechter's drawing of the flower from the holotype (AMES 31572). B, *Dichaea wercklei*. Tracing of Schlechter's analysis of the flower from a syntype (*Wercklé* 79) (AMES 31573). C, *Eileanthes wercklei*. Isotype (AMES 31023). D, *Epidendrum caroli*. Isotype (AMES 22704). All reproduced with the kind permission of the Harvard University Herbaria.





**Figure 8.** A, *Epidendrum flexicaule*. Tracing of Schlechter's drawings of the plant habit and the flower from the holotype (AMES bar code 70352). B, *Epidendrum lancilabium*. Photograph of the holotype and flower analysis by Schlechter (AMES 39891). C, *Epidendrum leprosum*. Tracing of Schlechter's analysis of the flower from a syntype (AMES 31585). D, *Epidendrum lockhartioides*. Photograph of the holotype and flower analysis by Schlechter (AMES 39890). All reproduced with the kind permission of the Harvard University Herbaria.

barium of Berlin before its destruction. The photographed plant is fertile and the drawing shows the lanceolate lip and verrucose ovary, forming an angle of 90° with the column, which are diagnostic characters. The label is annotated by Schlechter with the intended name *Epidendrum lancilabiatum*.

24. *Epidendrum leprosum* Schltr., Repert. Spec. Nov. Regni Veg. Beih. 19: 38. 1923. SYNTYPES: Costa Rica. [San José: Carrillo,] La Palma, blühend im Juli–August 1921, *C. Wercklé* 38 (B, destroyed); *C. Wercklé* 82 (B, destroyed). Lectotype, selected here, tracings of Schlechter's drawings of a syntype, AMES 31585!) (Fig. 8C).

The protologue cited *Wercklé* 38 and *Wercklé* 82, both collected at La Palma. No isotypes are known to exist. The drawings chosen as the lectotype show the characteristic habit of the plant, with ramified, verrucose stems and the short calli of the lip not reaching the isthmus, which are diagnostic for the species. The name is a synonym of *Epidendrum aberrans* Schltr.

25. *Epidendrum lockhartioides* Schltr., Repert. Spec. Nov. Regni Veg. Beih. 19: 39. 1923. TYPE: Costa Rica. [San José: Carrillo,] La Palma, im Jahre 1922, *C. Wercklé* 112 (holotype, B, destroyed; lectotype, designated here, photograph of the holotype and associate drawing, AMES 39890!) (Fig. 8D).

No isotypes for this species are known to exist. The sheet at AMES designated as the lectotype has a photograph of the holotype and the diagnostic sketch prepared by Schlechter, taken at the herbarium of Berlin before its destruction. One of the photographed stems is fertile and the drawing shows the strongly carinate lateral sepals and the reniform lip provided with a central, prominent keel, which are diagnostic for the species.

26. *Epidendrum microcardium* Schltr., Repert. Spec. Nov. Regni Veg. Beih. 19: 39. 1923. TYPE: Costa Rica. [San José:] Tablazo, blühend im Jahre 1921, *C. Wercklé* 111 (holotype, B, destroyed; isotype, selected here as the lectotype, AMES 39893!) (Fig. 9A).

The isotype at AMES is fertile and well preserved. The sinuous stem, the oblong–elliptic leaves with verrucose sheaths, the flowers spaced on the rachis and the ovate–cordate lamina of the lip distinguish this species.

27. *Epidendrum oxyglossum* Schltr., Repert. Spec. Nov. Regni Veg. Beih. 19: 40. 1923. TYPE: Costa Rica. [San José: Carrillo,] La Palma, im Jahre 1922, *C. Wercklé* 127 [holotype, B, destroyed; lectotype, designated here, tracings of Schlechter's drawings of the holotype, AMES 31584!] (Fig. 9B).

In the absence of any known isotype, the tracings of Schlechter's drawings of the plant and flower analysis at AMES are selected as the lectotype. The sketch of the plant and the analytical drawing of the flower show the diagnostic characters of the species: the sinuous, many-branched stem provided with apical, single-flowered inflorescences and the ovate, acuminate lamina of the lip, subcordate at the base.

28. *Epidendrum platytilum* Schltr., Repert. Spec. Nov. Regni Veg. Beih. 19: 42. 1923, *nom. illeg.* non Schltr. (1921). TYPE: Costa Rica. [San José: Moravia,] San Jerónimo, blühend im Mai 1921, *C. Wercklé* 20 (holotype, B, destroyed; lectotype, designated here, tracings of Schlechter's drawings of the holotype, AMES 31583!) (Fig. 9C).

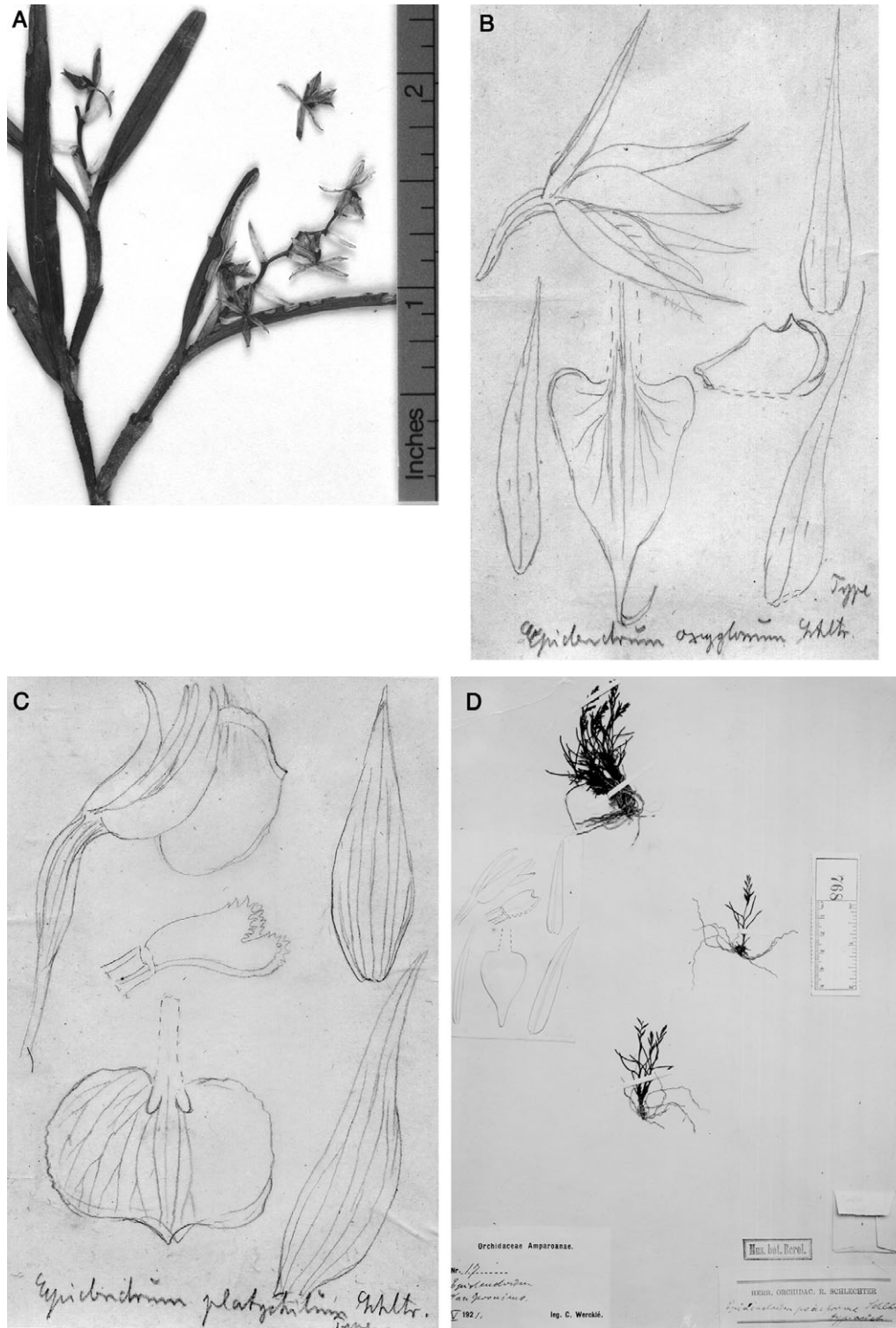
No isotypes for this species are known to exist, so the tracings of Schlechter's drawings of the plant and flower sent at AMES sent by Prof. Mansfeld (G. A. Romero, annotation on the type sheet) are selected as the lectotype. The small plant illustrated in the drawing of the habit and the transversely elliptic lamina of the lip, abruptly mucronate at apex, as shown in the floral analysis, are diagnostic. The name is a synonym of *Epidendrum dentiferum* Ames & C. Schweinf.

29. *Epidendrum poiforme* Schltr., Repert. Spec. Nov. Regni Veg. Beih. 19: 43. 1923 [as *poaeforme*]. TYPE: Costa Rica. [San José: Moravia,] San Jerónimo, c. 1400 m, blühend im Mai 1921, *C. Wercklé* 17 (holotype, B, destroyed; lectotype, designated here, photograph of the holotype and associate drawing, AMES 39892!) (Fig. 9D).

No isotypes for this species are known to exist. The photograph at AMES, taken at the herbarium of Berlin before its destruction, shows the holotype specimens and an analytical sketch of the flower prepared by Schlechter, so it is selected as the lectotype. The short stems with filiform, linear leaves and the ovate lamina of the lip widely rounded at the base and acute at apex are diagnostic characters for the species. *Wercklé* collecting number 17 is the same assigned to a syntype of *Acostaea costaricensis*. The name is a synonym of *Epidendrum miserrimum* Rchb.f.

30. *Epidendrum prostratum* Schltr., Beih. Bot. Centralbl. 36(2): 407. 1918, *nom. illeg.* TYPE: Costa Rica. [San José: Carrillo,] La Palma, 1750 m, *C. Wercklé* s.n. [683 in Herb. O. Jiménez] (holotype, B, destroyed; isotype, selected here as the lectotype, CR 33904!; tracing of Schlechter's drawing of the type, AMES 26919!) (Fig. 10A, B).

The specimen at CR is the only known extant isotype. It is sterile but in good condition. The label of O. Jiménez Herbarium is annotated as *E. repens*



**Figure 9.** A, *Epidendrum microcardium*. Isotype (AMES 39893). B, *Epidendrum oxyglossum*. Tracing of Schlechter's drawings of the holotype (AMES 31584). C, *Epidendrum platyphillum*. Tracing of Schlechter's drawings of the holotype (AMES 31583). D, *Epidendrum poiforme*. Photograph of the holotype and flower analysis by Schlechter (AMES 39892). All reproduced with the kind permission of the Harvard University Herbaria.





**Figure 10.** A, *Epidendrum prostratum*. Isotype (CR 33904). B, *Epidendrum prostratum*. Tracing of Schlechter's drawings of the plant habit and the flower from the holotype (AMES 26919). C, *Epidendrum schumannianum*. Tracing of Schlechter's drawings of the plant habit and the flower from the holotype (AMES bar code 70853). D, *Epidendrum serruliferum*. Tracing of Schlechter's drawings of the holotype (AMES 31580). A, reproduced with the kind permission of the Museo Nacional de Costa Rica. B–D, reproduced with the kind permission of the Harvard University Herbaria.

Cogn., apparently identified by Schlechter. The drawing at AMES shows the habit and diagnostic details of the flower. At the time of Schlechter's description, the name *Epidendrum prostratum* was already occupied by *E. prostratum* (Lindl.) Cogn. (1898), based on *Physinga prostrata* Lindl. The new name of the species is *Epidendrum confertum* Ames & C. Schweinf.

31. *Epidendrum schumannianum* Schltr., Repert. Spec. Nov. Regni Veg. 9: 215. 1911. TYPE: Costa Rica. Ohne genaue Standersangabe, com. K. Schuman, 1903, *C. Wercklé s.n.* [holotype, B, destroyed; neotype, designated by Fowlie (1969): Alajuela: Sarapiquí, between Cariblanco and San Miguel, 500–800 m, C.H. Horich 61P1531 (UCLA)].

No isotypes or paratypes of this species are known to exist and Fowlie (1969) designated a neotype based on a modern collection by the German orchid hunter, Clarence H. Horich. However, at AMES (bar code 70853!) there is the copy of Schlechter's drawing of the plant habit and the analysis of the flower (Fig. 10C), showing the unmistakable lax, paniculate inflorescence and the large flower of the species. The drawing is accurate and a good candidate for lectotypification. Schlechter (1923: 44) cited two other collections made by Wercklé (61 and 81) at Curillo (Carrillo, on the lower Caribbean slopes of Costa Rican Central Volcanic range) in 1921.

32. *Epidendrum serruliferum* Schltr., Repert. Spec. Nov. Regni Veg. Beih. 19: 44. 1923. TYPE: Costa Rica. [San José: Carrillo,] La Palma, im Jahre 1922, *C. Wercklé 114* [holotype, B, destroyed; lectotype, designated by Santiago Ayala & Hágsater (2007), tracings of Schlechter's drawings of the holotype, AMES 31580!] (Fig. 10D).

In the absence of any isotype of this species, the drawings at AMES were selected as the lectotype. They show the habit of the plant, characterized by small, caespitose stems with five to seven tightly imbricating leaves, the ovate lip with entire margins, subcordate at the base, and the column provided with entire clinandrium, which are distinctive of the species.

33. *Epidendrum wercklei* Schltr., Repert. Spec. Nov. Regni Veg. 3: 48. 1906. TYPE: Costa Rica. [San José: Carrillo,] Bei La Palma, c. 1500 m ü.d.M., blühend im Oktober 1902, *C. Wercklé 16419* [holotype, B, destroyed; drawings, based on Schlechter's analysis of type, published by Mansfeld (1931: pl. 59, fig. 234)]. Neotype, selected here: Costa Rica. [San José]: San Isidro de Coronado, 'Las Nubes', 10 November 1932, *A.M. Brenes s.n.* [153 Serie de varios colectores] (CR 18627!).

The deeply lobed lip, with the lateral lobes strongly lacinate and the midlobe lanceolate, acute, as defined in the protologue, characterize this species well. No isotypes are known to exist and the date of publication by Mansfeld (1931) of the copy of Schlechter's analytical drawing prevents its use for lectotypification purposes. In his *Orchidaceae Amparoanae*, Schlechter (1923: 45) cited two other collections by Wercklé referable to this species, probably prepared from the same cultivated specimen, but no extant material of these paratypes is known. The specimen designated here as the neotype is fertile and in excellent condition. It was annotated and determined by P. C. Standley.

34. *Epilyna jimenezii* Schltr., Beih. Bot. Centralbl. 36(2): 375. 1918. TYPE: Costa Rica. [San José: Carrillo,] La Palma, April 1910, *C. Wercklé s.n.* [670 in Herb. O. Jiménez] (holotype, B, destroyed; isotype, selected here as the lectotype, CR 33872!; tracing of Schlechter's drawing of the holotype, AMES 24326!) (Fig. 11A, B).

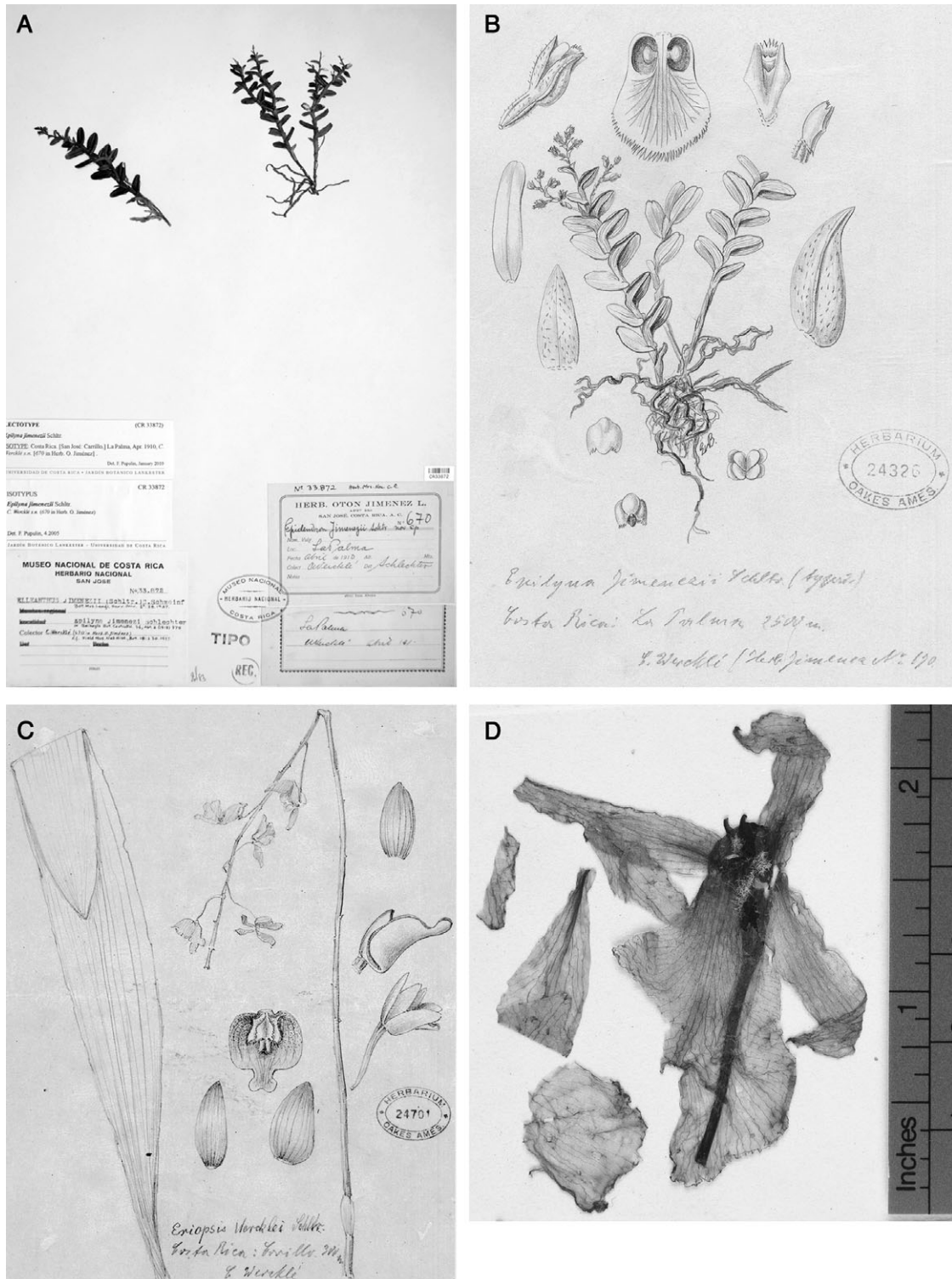
The isotype at CR is fertile and in good condition. The drawing at AMES is accurate and illustrates the plant habit and dissections of the flower. At AMES (22327!) there is another collection by Wercklé (without locality data, 1922, *C. Wercklé 113*), received from the Schlechter herbarium. It is fertile and in good condition, but the date of collection prevents its use for lectotypification purposes.

35. *Eriopsis wercklei* Schltr., Repert. Spec. Nov. Regni Veg. 16: 447. 1920. TYPE: Costa Rica. [San José:] Corillo [Carrillo], 300 m, *C. Wercklé s.n.* (holotype, B, destroyed; lectotype, designated here, tracing of Schlechter's drawing of the holotype, AMES 24701!) (Fig. 11C).

No isotypes of this species are known to exist. The copy of Schlechter's drawing of the plant habit and the analytical sketch of the flower at AMES, illustrating the complex callus of the lip, is accurate and it is selected as the lectotype. Although usually considered a later synonym of *Eriopsis biloba* Lindl., *E. wercklei* is probably the correct name to apply to Central American populations, which consistently differ from their South American counterparts in the much larger size of the floral segments.

36. *Fractiunguis cuniculatus* Schltr., Repert. Spec. Nov. Regni Veg. Beih. 19: 31. 1923. TYPE: Costa Rica. [San José: Moravia,] San Jerónimo, auf der pazifischen Seite, 1400 m, blühend im November 1920, *C. Wercklé 83* (B, destroyed). Bei Cartago, ohne Blüten, *Oersted 47* (B, destroyed). Neotype, designated here: Costa Rica. [Alajuela]: San Pedro de San Ramón, 1050 m, 22 January 1924, *A.M. Brenes 223* [835 in Herb. Brenes] (CR 25887!).





**Figure 11.** A, *Epilyna jimenezii*. Isotype (CR 33872). B, *Epilyna jimenezii*. Tracing of Schlechter's drawings of the plant habit and the flower from the holotype (AMES 24326). C, *Eriopsis wercklei*. Tracing of Schlechter's drawings of the plant habit and the flower from the holotype (AMES 24701). D, *Fregea wercklei*. Isotype (AMES 27472). A, reproduced with the kind permission of the Museo Nacional de Costa Rica. B–D, reproduced with the kind permission of the Harvard University Herbaria.



In the protologue, Schlechter cited a collection by Wercklé and another collection by Oersted, without specific locality, without designating the type. No isotypes of this species or any material associated with the syntypes are known to exist. The neotype selected here is fertile and in good condition and it was determined as *F. cuniculatus* by Schlechter. In the same year of the publication of *F. cuniculatus*, Schlechter described var. *gracilis* Schltr. from another collection by A. M. Brenes from San Pedro de San Ramón (Schlechter, 1923: 204–205). The latter was lectotypified by Barringer (1986). The name is the basionym of *Scaphyglottis cuniculata* (Schltr.) Dressler.

37. *Fregea wercklei* Schltr., Repert. Spec. Nov. Regni Veg. Beih. 19: 9. 1923. TYPE: Costa Rica. [San José: Moravia,] San Jerónimo, 1350 m, blühend Juni 1921, *C. Wercklé 60* (holotype, B, destroyed; isotype, selected here as the lectotype, AMES 27472!; tracings of Schlechter's drawings of the holotype, AMES 31637!) (Figs 11D, 12A).

The isotype at AMES, obtained through a distribution from the orchid herbarium of R. Schlechter, consists only of a partly damaged single flower. The drawings at AMES show the plant habit and details of the flower and the column. The name is a synonym of *Sobralia amabilis* (Rchb.f.) L.O. Williams.

38. *Habenaria amparoana* Schltr., Repert. Spec. Nov. Regni Veg. Beih. 19: 6. 1923. TYPE: Costa Rica. Ohne nähere Standortsangabe, *C. Wercklé 138* (holotype, B, destroyed; lectotype, selected here, tracings of Schlechter's drawings of the holotype, AMES 31628!) (Fig. 12B).

No isotypes of this species are known to exist. The deeply bilobed petals, with the outer lobe ligulate, and the three-lobed lip, provided with divaricate, subulate lobes, are shown in the sketch of the flower selected as the lectotype and agree with the protologue. The name is probably a synonym of *Habenaria distans* Griseb.

39. *Habenaria platantheroides* Schltr., Beih. Bot. Centralbl. 36(2): 372. 1918. TYPE: Costa Rica. [San José: Carrillo,] La Palma, 1913, *C. Wercklé s.n.* (holotype, B, destroyed; lectotype, selected here, drawing of the holotype made under Schlechter's supervision, AMES 24318!) (Fig. 12C).

The annotation by Schlechter on the drawing is contradictory. After the name of the species, he noted the word 'typ', and the locality is the same given in the protologue. Notwithstanding, instead of Wercklé's name, Schlechter annotated the name of O. Jiménez. It is likely the new species was received, like many others, as a dried specimen prepared by Otón Jiménez for his herbarium. No isotypes of this species are known to exist. The simple petals and lip, with

the pendent spur longer than the lamina, distinguish the species and are accurately illustrated in the drawing at AMES selected as the lectotype.

40. *Habenaria verecunda* Schltr., Repert. Spec. Nov. Regni Veg. Beih. 19: 6. 1923. TYPE: Costa Rica. Ohne nähere Standortsangabe, *C. Wercklé 144* (holotype, B, destroyed; lectotype, selected here, tracings of Schlechter's drawings of the holotype, AMES 31627!) (Fig. 12D).

No isotypes of this species are known to exist. The drawings at AMES, showing the habit of the plant and a dissection of the flower, are chosen as the lectotype. The deeply bilobed petals and the three-lobed lip, with the subulate lateral lobes shorter than the midlobe and slightly divaricate, as shown in the drawing, agree with the protologue. According to Dressler (1999), the name is synonym of *H. wercklei* Schltr.

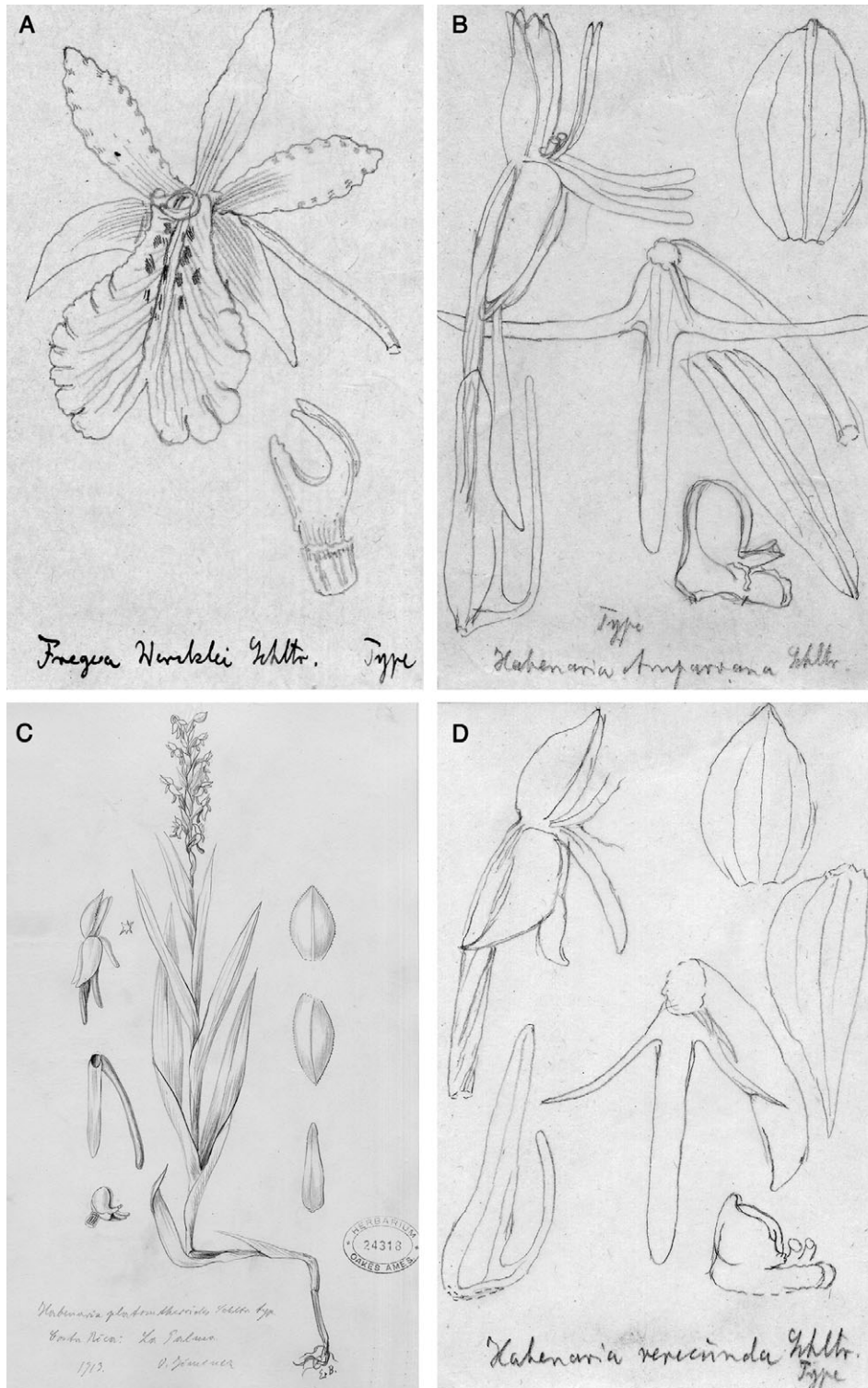
41. *Habenaria wercklei* Schltr., Repert. Spec. Nov. Regni Veg. Beih. 19: 7. 1923. TYPE: Costa Rica. Ohne nähere Standortsangabe, *C. Wercklé 141* (holotype, B, destroyed; lectotype, selected here, tracings of Schlechter's drawings of the holotype, AMES 31629!) (Fig. 13A).

In the absence of any isotypes of this species, the drawings at AMES, showing the habit of the plant and a dissection of the flower, are selected as the lectotype. The deeply bilobed petals, with the outer lobe filiform and longer than the inner lobe, and the three-lobed lip, with the filiform, deflexed lateral lobes, distinguish the species and agree with the protologue.

42. *Homalopetalum costaricense* Schltr., Repert. Spec. Nov. Regni Veg. Beih. 19: 47. 1923. TYPE: Costa Rica. [San José: Carrillo,] La Palma, im Jahre 1922, *C. Wercklé 94* (holotype, B, destroyed; lectotype, selected here, tracings of Schlechter's drawings of the holotype, AMES 28729!) (Fig. 13B).

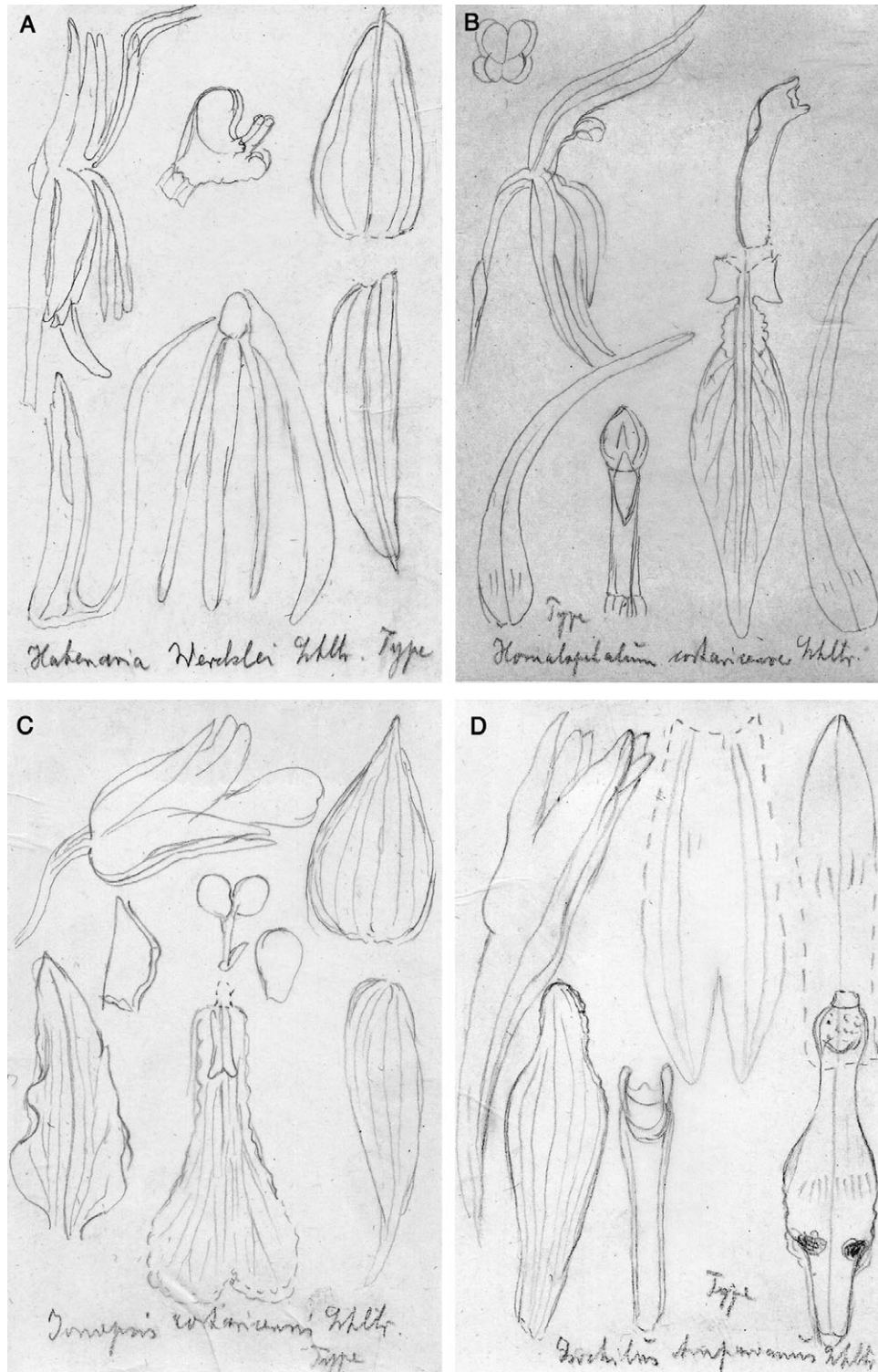
No isotypes of this species are known to exist and the drawings of the holotype at AMES, showing the habit of the plant and the analytical sketch of a flower, are chosen as the lectotype. They are mounted on the same sheet as a specimen collected by M. A. Brenes at San Pedro de San Ramón in 1921, but both the drawings are annotated by Schlechter as types. The two quadrate auricles at the base of the lip, described in the prologue and shown in the floral dissection, are undoubtedly part of the column. The name is a synonym of *Homalopetalum pumilio* (Rchb.f.) Schltr.

43. *Ionopsis costaricensis* Schltr., Repert. Spec. Nov. Regni Veg. Beih. 19: 62. 1923. TYPE: Costa Rica. [San José:] Carrillo [Carrillo], blühend im Juni 1921, *C.*



**Figure 12.** A, *Fregea wercklei*. Tracing of Schlechter's drawings of the holotype (AMES 31637). B, *Habenaria amparoana*. Tracing of Schlechter's drawings of the holotype (AMES 31628). C, *Habenaria platantheroides*. Tracing of Schlechter's drawings of the plant habit and the flower from the holotype (AMES 24318). D, *Habenaria verecunda*. Tracing of Schlechter's drawings of the holotype (AMES 31627). All reproduced with the kind permission of the Harvard University Herbaria.





**Figure 13.** A, *Habenaria wercklei*. Tracing of Schlechter's drawings of the holotype (AMES 31629). B, *Homalopetalum costaricense*. Tracing of Schlechter's drawings of the holotype (AMES 28729). C, *Ionopsis costaricensis*. Tracing of Schlechter's drawings of the holotype (AMES 31626). D, *Isochilus amparoanus*. Tracing of Schlechter's drawings of a syntype (AMES 31625). All reproduced with the kind permission of the Harvard University Herbaria.



*Wercklé 25* (holotype, B, destroyed; lectotype, selected here, tracings of Schlechter's drawings of the holotype, AMES 31626!) (Fig. 13C).

In the absence of any isotypes of this species, the drawings of the holotype at AMES are chosen as the lectotype. The sketch of the plant habit is rather summary, but the analytical sketch of the flower is accurate and agrees with the protologue. The name is a synonym of *Ionopsis satyrioides* (Sw.) Rchb.f.

44. *Isochilus amparoanus* Schltr., Repert. Spec. Nov. Regni Veg. Beih. 19: 27. 1923. SYNTYPES: Costa Rica. San José: im Garten der Mdme. Amparo de Zeledón, im Jahre 1920, A. *Tonduz 32* (B, destroyed); ebendort, im Jahre 1921, C. *Wercklé 83* (B, destroyed). Lectotype, selected here, tracings of Schlechter's drawings of a syntype, AMES 31625!) (Fig. 13D).

In the protologue, Schlechter cited *Tonduz 32* and *Wercklé s.n.*, without indicating the type. No isotypes of this species are known to exist. The copies of Schlechter's drawings of the type at AMES selected as the lectotype bear no indication of the collector, but they were apparently prepared from one of the syntypes and are annotated as type. The name is probably a synonym of *Isochilus chiriquensis* Schltr.

45. *Kefersteinia parvilabris* Schltr., Repert. Spec. Nov. Regni Veg. Beih. 19: 52. 1923. TYPE: Costa Rica. [San José: Moravia,] San Jerónimo, im Jahre 1922, C. *Wercklé 116* [holotype, B, destroyed; lectotype, selected by Pupulin (2001), drawings of the holotype, AMES 31623!] (Fig. 14A).

Even although the lip of *K. parvilabris* is rather variable in general outline and in the presence of keels on the lamina, the drawings of the type at AMES leave no doubt about the identity of this species.

46. *Kefersteinia wercklei* Schltr., Repert. Spec. Nov. Regni Veg. Beih. 19: 53. 1923. TYPE: Costa Rica. [San José: Carrillo,] La Palma, im Juni 1921, C. *Wercklé 120* (holotype, B, destroyed; lectotype, designated here, drawings of the holotype, AMES 31622!) (Fig. 14B).

Gerlach (1994) presented scanning electron microscope (SEM) photographs showing details of the lip and column of this species. The analytical drawing of the flower at AMES illustrates a particularly small lip callus compared with living specimens and it is probably an artefact of drying, but otherwise the sketches are accurate in showing diagnostic characters of the species.

47. *Lepanthes abnormis* Schltr., Repert. Spec. Nov. Regni Veg. Beih. 19: 21. 1923. TYPE: Costa Rica. [San José: Moravia,] San Jerónimo, auf der pazifischen

Seite, 1400 m, blühend und fruchtend im November 1920, C. *Wercklé 85* (holotype, B, destroyed; lectotype, drawings of the holotype, annotated by C. A. Luer, May 1998 and selected here, AMES 31621!) (Fig. 14C).

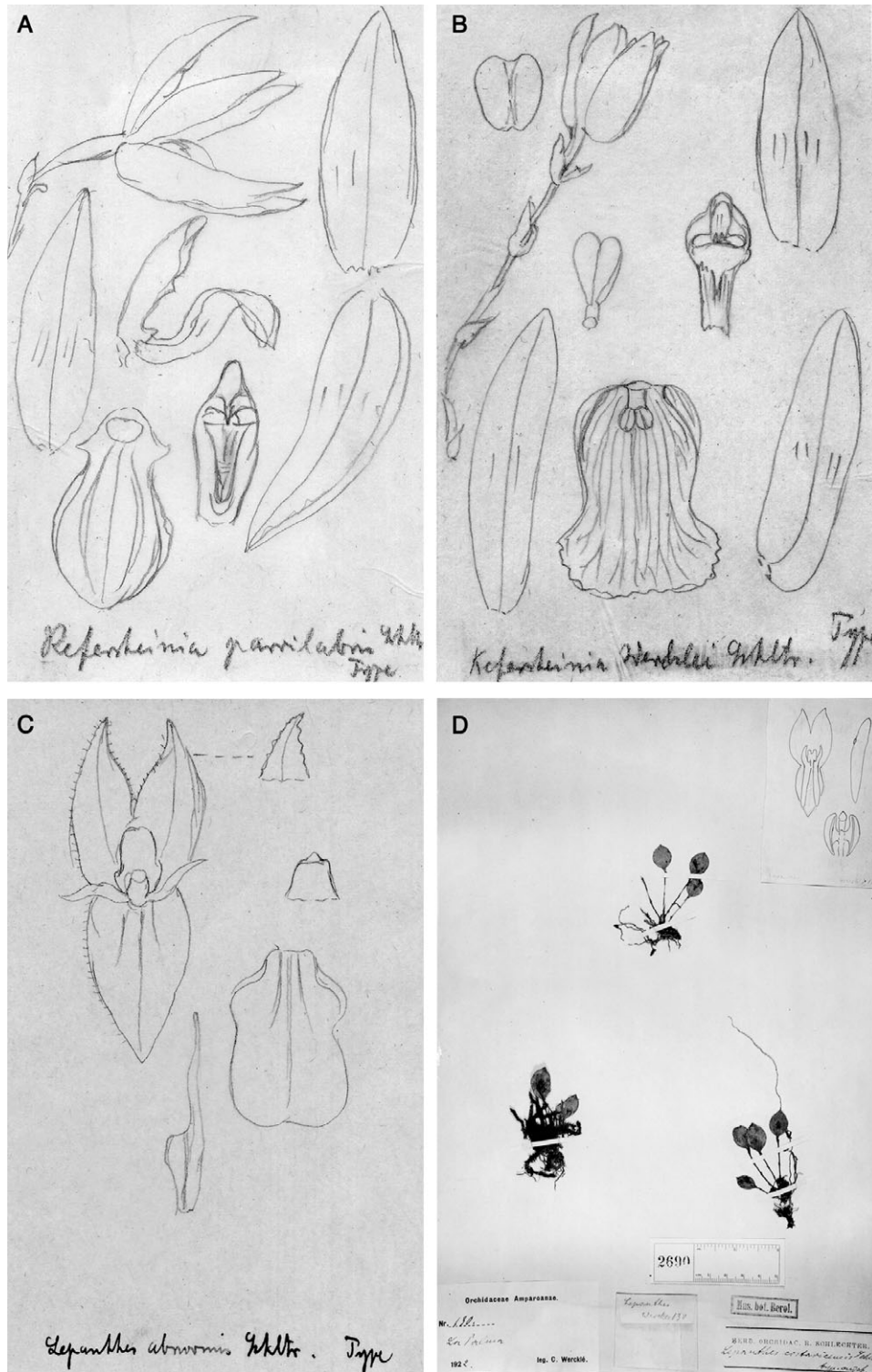
The drawings of the holotype at AMES well illustrate the subpandurate lip and the narrow petals that are diagnostic of the species. The species is closely related and probably conspecific, with *Lepanthes eximia* Ames (the type; Costa Rica. La Estrella, Lankester & Sancho 437, AMES 24409!). A drawing at AMES of a *Lepanthes* identified as *L. eximia* (Maxon & Harvey 8186!) and mounted on the type sheet of *L. eximia* is almost indistinguishable from the sketches of *L. abnormis* prepared under Schlechter's supervision.

48. *Lepanthes costaricensis* Schltr., Repert. Spec. Nov. Regni Veg. Beih. 19: 22. 1923. TYPE: Costa Rica. [San José: Carrillo,] La Palma, C. *Wercklé 130* (holotype, B, destroyed; lectotype, designated here, photograph of the holotype and associate drawing, AMES 34682!) (Fig. 14D).

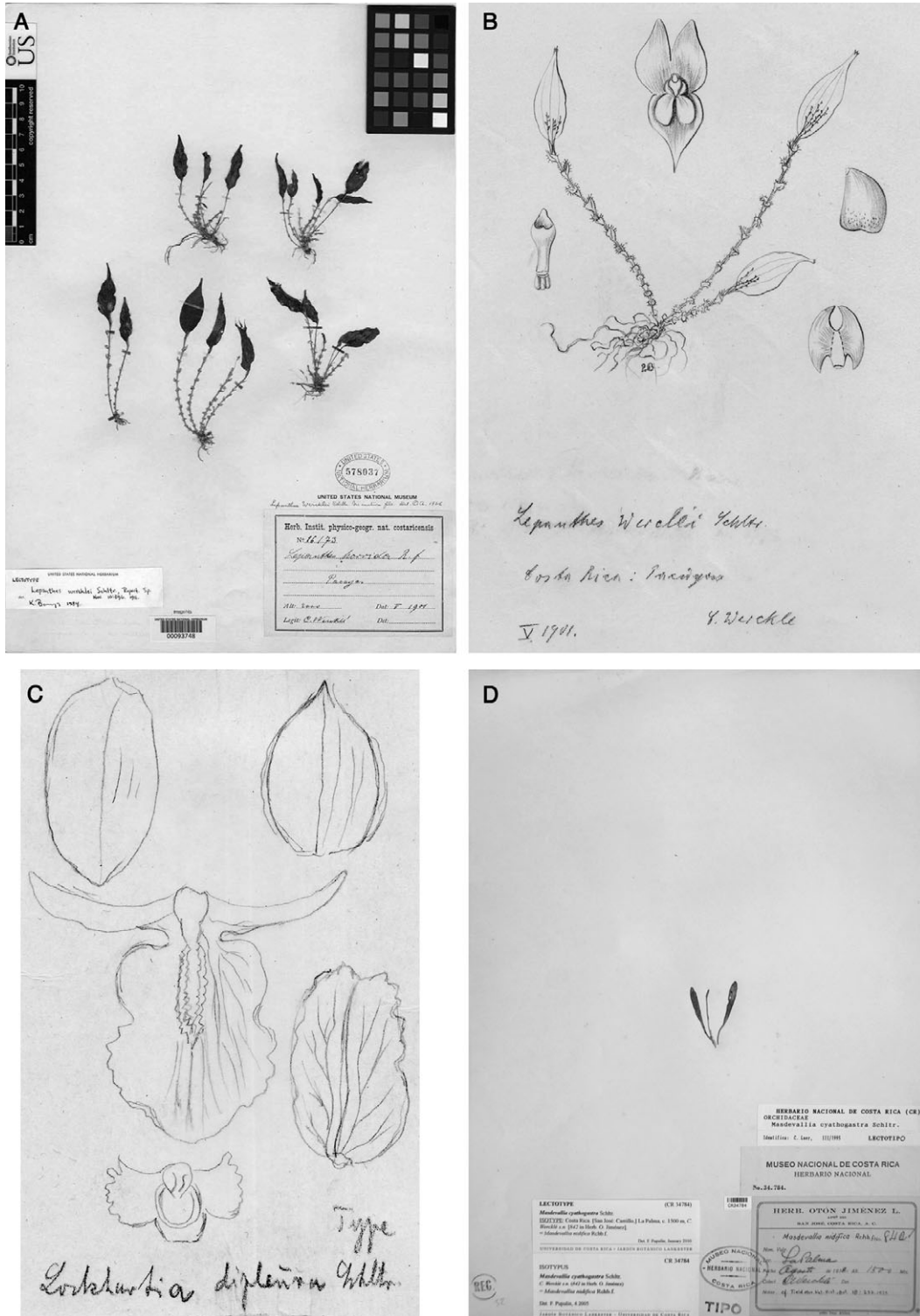
No isotypes or paratypes for this species are known to exist. The sheet at AMES designated as the type includes a photograph of the holotype and of Schlechter's analytical analysis of the flower, taken at the herbarium of Berlin before its destruction. The drawing shows the petals with the upper lobe almost as long as the dorsal sepal and the reduced lower lobe, which are diagnostic characters. The sheet also has a copy of Schlechter's drawing, probably prepared under the supervision of Mansfeld.

49. *Lepanthes wercklei* Schltr., Repert. Spec. Nov. Regni Veg. 10: 396. 1912. TYPE: Costa Rica. Bei Pacugao [Pacayas], c. 2000 m, blühend im Mai 1901, C. *Wercklé 16173* (holotype, B, destroyed; lectotype, annotated by Barringer in 1984 and designated here, US 578037, digital photograph!; drawing of type, AMES bar code 100728!) (Fig. 15A, B).

The type at US is the only extant isotype and it is in good condition, although it lacks flowers. It was identified by Oakes Ames in 1926 and Barringer annotated it as lectotype in 1984. The drawing of the type at AMES, made under the supervision of Schlechter, is detailed and shows the critical characters of the flower and the lip. It was annotated by C. Luer in 1995 as the lectotype of *L. wercklei*, but the existence of the isotype at US made this decision uneven. The number 16173, given by Schlechter (1912) as the collecting number of Wercklé, actually corresponds to the accession number of the herbarium at Costa Rican Instituto Physico-Geographico, precursor of the National Museum. The name is a synonym of *Lepanthes erinacea* Rchb.f.



**Figure 14.** A, *Kefersteinia parvilabris*. Tracing of Schlechter's drawings of the holotype (AMES 31623). B, *Kefersteinia wercklei*. Tracing of Schlechter's drawings of the holotype (AMES 31622). C, *Lepanthes abnormis*. Tracing of Schlechter's drawings of the holotype (AMES 31621). D, *Lepanthes costaricensis*. Photograph of the holotype and flower analysis by Schlechter (AMES 34682). All reproduced with the kind permission of the Harvard University Herbaria.



**Figure 15.** A, *Lepanthes wercklei*. Isotype (US 578037). B, *Lepanthes wercklei*. Tracing of Schlechter's drawings of the plant habit and the flower from the holotype (AMES bar code 100728). C, *Lockhartia diplexia*. Tracing of Schlechter's drawings of the holotype (AMES 31614). D, *Masdevallia cyathogastra*. Isotype (CR 34784). A, reproduced with the kind permission of the US National Herbarium. B, C, reproduced with the kind permission of the Harvard University Herbaria. D, reproduced with the kind permission of the Museo Nacional de Costa Rica.



50. *Lockhartia dipleura* Schltr., Repert. Spec. Nov. Regni Veg. Beih. 19: 69. 1923. TYPE: Costa Rica. [San José: Moravia,] San Jerónimo, c. 1350 m, im Jahre 1922, *C. Wercklé 102* (holotype, B, destroyed; lectotype, selected here, tracings of Schlechter's drawings of the holotype, AMES 31614!) (Fig. 15C).

No isotypes of this species are known to exist and the drawings of the holotype at AMES, showing the plant habit and the flower analysis, are chosen as the lectotype. The obtuse leaves and the three-lobed lip with subpandurate lamina and a verrucose callus running to the middle of the lip distinguish the species. The species was considered a synonym of *Lockhartia micrantha* Rchb.f. (Dressler, 2003), but the type locality stated in the protologue is very high for this species, otherwise usually restricted to < 800 m of elevation. Furthermore, the lip midlobe is shown as obtuse (vs. retuse in *L. micrantha*) and the column wings are crenulated–subdentate (vs. entire in *L. micrantha*).

51. *Masdevallia cyathogastra* Schltr., Beih. Bot. Centralbl. 36: 383. 1918. TYPE: Costa Rica. [San José: Carrillo,] La Palma, c. 1500 m, *C. Wercklé s.n.* [842 in Herb. O. Jiménez] (isotype, annotated by C. Luer, 1995 and selected here as the lectotype, CR 34784!, sterile; tracings of Schlechter's drawings of the holotype, AMES 24278!) (Figs 15D, 16A).

The sheet at CR is not annotated by Schlechter. The isotype at CR is the only known extant specimen associated with the protologue. It consists only of two separate stems with leaves, one of which bears a sterile inflorescence. The tracings at AMES, prepared on Schlechter's drawings of the holotype, illustrate the habit of the plant and the flower with analysis. The small, caespitose habit, the sepaline tube inflated at the base and the long tails of the sepals characterize the species well. *Masdevallia cyathogastra* is a synonym of *M. nidifica* Rchb.f.

52. *Masdevallia diantha* Schltr., Beih. Bot. Centralbl. 36: 384. 1918. SYNTYPES: Costa Rica. [Alajuela:] Cerro de San Isidro, près San Ramon, 1300 m, juin 1901, *A.M. Brenes s.n.* (B, destroyed; lectotype, US, designated by Barringer, 1986; AMES 21752!; tracings of Schlechter's drawings, AMES 24282!); [San José: Carrillo,] La Palma, 1500 m, im August 1912, *C. Wercklé s.n.* [843 in Herb. O. Jiménez] (B, destroyed; isosynotype, CR 33961!); 2500 m, im April 1910, *C. Wercklé s.n.* [673 in Herb. O. Jiménez] [B, destroyed; material at CR (33960!) under this number a mixed collection not referable to the type].

In the protologue, Schlechter cited three collections without designating a type. Barringer (1986) selected as the lectotype *Brenes s.n.* (June 1901), of which two isotypes exist at US and AMES, as well as the trac-

ings of Schlechter's analytical sketches at AMES (later published by Mansfeld, 1931), which are annotated by Schlechter as the type and were drawn from Brenes' specimen. The specimen at AMES is fertile and well preserved and an analysis of the flower was prepared by C. Schweinfurth in 1922. The narrow leaves with the blade subequal to the peduncle, the large, scarious, somewhat inflated sheaths that cover the ramicaul, the two-flowered inflorescences and the flowers with short tails are characteristic of the species. At CR, two previously unrecorded sheets (Lobo, 2003), supposedly referable to type material cited by Schlechter, are in existence. However, sheet 33960 has, under *Wercklé in Herb. O. Jiménez 673*, a mixed collection of *Masdevallia*, including flowers of *M. picturata* Rchb.f., *M. nidifica* Rchb.f. and *M. cf. rafaeliana* Luer. The single plant included in the collection is probably a specimen of *M. picturata* Rchb.f. The name is a synonym of *M. chontalensis* Rchb.f.

53. *Masdevallia ecaudata* Schltr., Beih. Bot. Centralbl. 36: 384. 1918. SYNTYPES: Costa Rica. Environs de San José, 1135 m, November 1890, *P. Biolley 3127* (B, destroyed; isosyntypes, CR 3127!, selected here as the lectotype; US 577106, photograph, AMES 24285! ex US; tracings of Schlechter's drawings, AMES 24284!); [San José: Carrillo,] La Palma, 1500 m, November 1897, *C. Wercklé s.n.* (B, destroyed) (Fig. 16B, C).

In the protologue, Schlechter cited two collections, without designating a type. The only extant material is *Biolley 3127*. The specimen at CR is fertile and in good condition and it is selected as the lectotype. The tracings at AMES are copied from Schlechter's drawings of the Biolley specimen and they are annotated as type by Schlechter. The sheet at AMES with the photograph of the US specimen also includes analytical drawings prepared by C. Schweinfurth in 1922, probably from a flower at US. The long, cylindrical sepaline tube, the short tails of the sepals and the subfalcate lateral sepals are characteristic of the species. The name is a synonym of *M. tubuliflora* Ames.

54. *Masdevallia rhopalura* Schltr., Repert. Spec. Nov. Regni Veg. Beih. 19: 14. 1923. SYNTYPES: Costa Rica. [San José: Carrillo,] La Palma, 2500 m, blühend im September 1921, *C. Wercklé 76* (B, destroyed); same locality, blühend im April 1910, *C. Wercklé s.n.* [677 in Herb. O. Jiménez] (B, destroyed; isosynotype, designated here as the lectotype, CR 33969!); [San José: Moravia,] San Jerónimo, blühend im Mai 1921, *C. Wercklé 18* (B, destroyed) (Fig. 16D).

In the protologue, Schlechter cited three collections, without designating a type. The only extant material



**Figure 16.** A, *Masdevallia cyathogastra*. Tracing of Schlechter’s drawings of the plant habit and the flower from the holotype (AMES 24278). B, *Masdevallia ecaudata*. Isotype (CR 3127). C, *Masdevallia ecaudata*. Tracing of Schlechter’s drawings of the plant habit and the flower from the holotype (AMES 24281). D, *Masdevallia rhopalura*. Isosyntyple [Wercklé s.n. (677 in Herb. O. Jiménez)] (CR 33969). A, C, reproduced with the kind permission of the Harvard University Herbaria. B, D, reproduced with the kind permission of the Museo Nacional de Costa Rica.

is a collection by Wercklé *sine numero* at CR, from which O. Jiménez prepared material for his herbarium under number 677. This isosytype is fertile and in good condition and it is selected here as the lectotype. The name is a synonym of *Masdevallia molossoides* Kraenzl.

55. *Masdevallia tenuicauda* Schltr., Repert. Spec. Nov. Regni Veg. Beih. 19: 15. 1923. TYPE: Costa Rica. [San José: Carrillo,] La Palma, blühend im September 1921, *C. Wercklé 80* (holotype, B, destroyed). Neotype, designated here: Costa Rica. Alajuela: Los Angeles de San Ramón, 1050 m, VII-1921, *A.M. Brenes s.n.* (42 in Herb. Brenes), CR 25950! isoneotype, AMES 28814!

No isotypes, paratypes or any material associated with the type of *M. tenuicauda* are known to exist. Both the specimens at CR, selected as the neotype, and at AMES were identified as *M. tenuicauda* by R. Schlechter, are fertile and in good condition. The small habit and flowers, the sepals with long and slender tails and the sepaline tube inflated at the base are diagnostic of the species. The name is a synonym of *Masdevallia nidifica* Rchb.f.

56. *Maxillaria amparoana* Schltr., Repert. Spec. Nov. Regni Veg. Beih. 19: 54. 1923. TYPE: Costa Rica. San José: Carillo [Carrillo], blühend im Mai-Juni 1921, *C. Wercklé 7* (holotype, B, destroyed; lectotype, selected here, tracings of Schlechter's drawings of the holotype, AMES 31609!) (Fig. 17A).

No isotypes of this species are known to exist and the drawings of the holotype at AMES, showing the plant habit and the flower analysis, are chosen as the lectotype. The caespitose plant with long, distinctly petiolate leaves, the flowers with narrow segments and the elliptic, 3-lobed lip with a long pubescent callus distinguish the species. The name is a synonym of *M. ringens* Rchb.f., not of *Camaridium amparoanum* Schltr. (= *Maxillaria serrulata* Ames & Correll; see discussion here under *Camaridium amparoanum*).

57. *Maxillaria brachybulbon* Schltr., Repert. Spec. Nov. Regni Veg. Beih. 19: 55. 1923. TYPE: Costa Rica. [San José: Moravia,] San Jerónimo, blühend im Mai 1921, *C. Wercklé 23* (holotype, B, destroyed; lectotype, selected here, tracings of Schlechter's drawings of the holotype, AMES 30080!) (Fig. 17B).

In the absence of any isotypes of this species, the drawings of the holotype at AMES, showing the plant habit and the analysis of the flower, are selected as the lectotype. The small, caespitose plant with the inflorescence produced from the immature growth and the elliptic, 3-lobed lip with a long and fleshy midlobe are illustrated well in the tracings of Schlechter drawings and are characteristic of the species.

58. *Maxillaria brevipes* Schltr., Repert. Spec. Nov. Regni Veg. Beih. 19: 302. 1923. TYPE: Costa Rica. [San José: Carrillo,] bei La Palma, im Jahre 1921, *C. Wercklé 110* (holotype, B, destroyed; lectotype, designated here, photograph of the holotype and associate drawing, AMES 40548!) (Fig. 17C).

No isotypes or paratypes for this species are known to exist, so the sheet at AMES with a photograph of the holotype and Schlechter's analysis of the flower, taken at the herbarium of Berlin before its destruction, is selected as the lectotype. The photographed plant is sterile, but the small plant habit with ovoid pseudobulbs subtended by non-foliaceous sheaths and the terminal petiolate leaf and shallowly 3-lobed lip shown in the sketch are diagnostic of the species. Wercklé's collection cited by Schlechter bears the same collecting number of *Pleurothallis minimiflora*. The name is a synonym of *Maxillaria ramonensis* Schltr.

59. *Microstylis wercklei* Schltr., Beih. Bot. Centralbl. 36(2): 382. 1918. TYPE: Costa Rica, *C. Wercklé s.n.* (holotype, B, destroyed; lectotype, selected here, drawing of the holotype made under the supervision of Schlechter, AMES 24161!) (Fig. 17D).

In the absence of any known isotypes of this species, the drawing of the holotype at AMES is selected as the lectotype. The widely oblong lip, erose-denticulate at the margins and deeply concave at the base, shown in the excellent drawing, are diagnostic of the species. The name is the basionym of *Malaxis wercklei* (Schltr.) Ames.

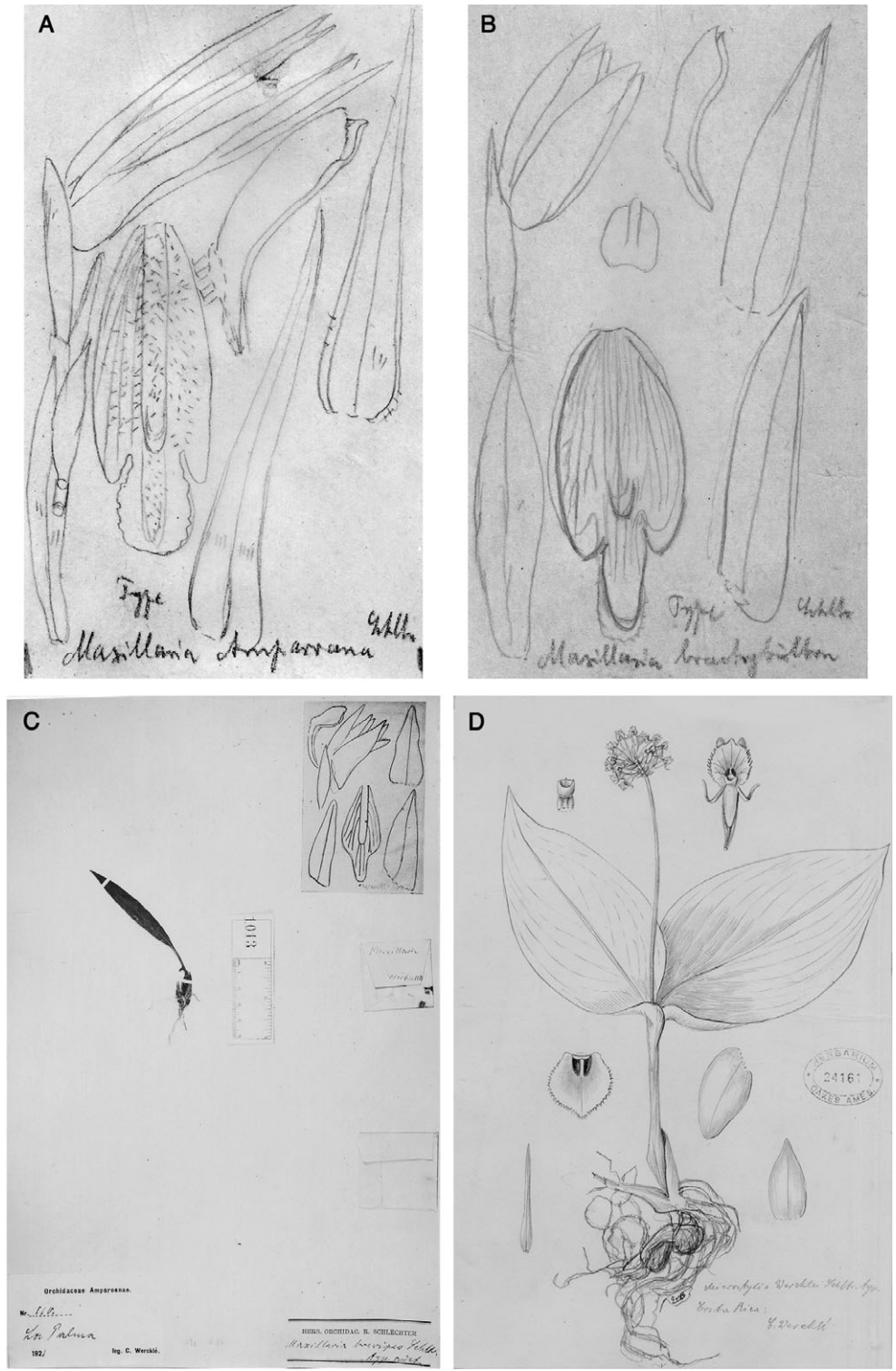
60. *Oncidium titania* Schltr., Repert. Spec. Nov. Regni Veg. Beih. 19: 67. 1923. TYPE: Costa Rica. San José: Auf *Psidium guayava* bei Carillo [Carrillo], blühend im Juli 1921, *C. Wercklé 63* (holotype, B, lectotype, selected here, tracings of Schlechter's drawings of the holotype, AMES 31588!) (Fig. 18A).

The tracings of the holotype at AMES selected as the lectotype illustrate well the psygmoid habit of the plant and the characteristic structure of the labellum with its fimbriate callus, as stated by Schlechter in the protologue. The name is a synonym of *Erycina pumilio* (Rchb.f.) N.H.Williams & M.W.Chase.

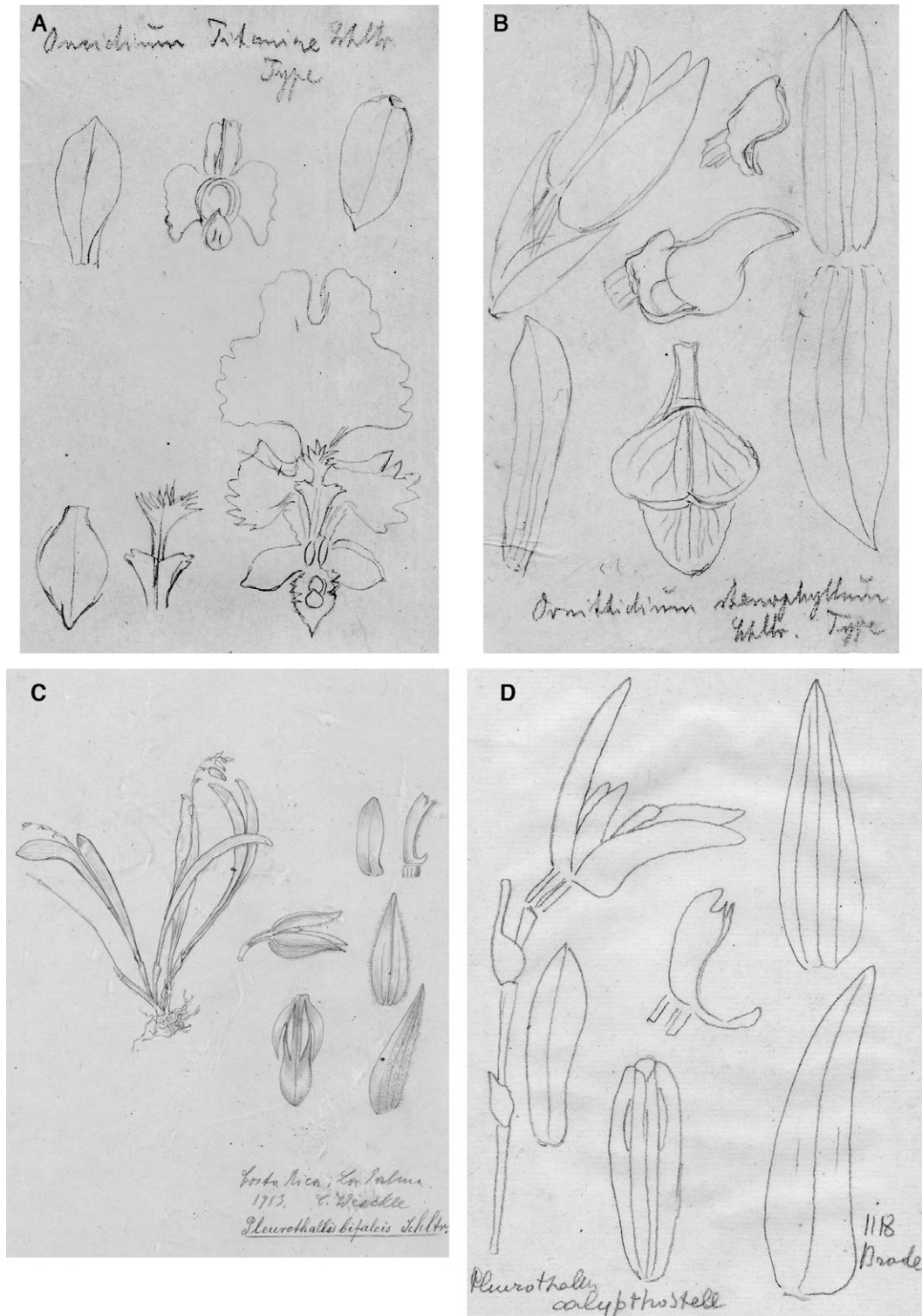
61. *Oncidium wercklei* Schltr., Repert. Spec. Nov. Regni Veg. Beih. 19: 68. 1923. TYPE: Costa Rica. [San José: Moravia,] San Jerónimo, blühend im Juni 1922, *C. Wercklé 46* (holotype, B, destroyed). Neotype, designated here: Costa Rica: [Alajuela:] La Balsa de San Ramón, 17-VII-1926, *A.M. Brenes 32* [1512 in Herb. Brenes] (CR 26058!).

No isotypes, paratypes or any other material associated with the type of *O. wercklei* are known to exist. The neotype at CR is in good condition and is fertile. It was first determined by Brenes with the intended





**Figure 17.** A, *Maxillaria amparoana*. Tracing of Schlechter's drawings of the holotype (AMES 31609). B, *Maxillaria brachybulbon*. Tracing of Schlechter's drawings of the holotype (AMES 30080). C, *Maxillaria brevipes*. Photograph of the holotype and flower analysis by Schlechter (AMES 40548). D, *Microstylis wercklei*. Tracing of Schlechter's drawings of the plant habit and the flower from the holotype (AMES 24161). All reproduced with the kind permission of the Harvard University Herbaria.



**Figure 18.** A, *Oncidium titania*. Tracing of Schlechter's drawings of the holotype (AMES 31588). B, *Oncidium stenophyllum*. Tracing of Schlechter's drawings of the holotype (AMES 31598). C, *Pleurothallis bifalcis*. Tracing of Schlechter's drawings of the plant habit and the flower from the holotype (AMES 23611). D, *Pleurothallis calyptrastele*. Tracing of Schlechter's drawings, based on *Brade 1118* (AMES 31278). All reproduced with the kind permission of the Harvard University Herbaria.

name of *O. scandes* Brenes, then by the same collector as *O. wercklei*. The specimen was later studied by O. Ames, who determined it as *O. globuliferum*. The name is a synonym of *Otoglossum globuliferum* (Kunth) N.H. Williams & M.W. Chase.

62. *Ornithidium stenophyllum* Schltr., Repert. Spec. Nov. Regni Veg. Beih. 19: 59. 1923. TYPE: Costa Rica. [San José: Moravia,] San Jerónimo, blühend im Juni 1922, *C. Wercklé 109* (holotype, B, destroyed; lectotype, selected here, tracings of Schlechter's drawings of the holotype, AMES 31598!) (Fig. 18B).

No isotypes of this species are known to exist. The tracings of the plant habit and the analysis of the flower at AMES are accurate and they are selected as the lectotype. The name is the basionym of *Camaridium stenophyllum* (Schltr.) M.A. Blanco (syn. *Maxillaria concavilabia* Ames & Correll), not to be confused with *Maxillaria stenophylla* Rchb.f. (1854), nec *M. stenophylla* F. Lehm. & Kraenzl. (1899).

63. *Ornithidium wercklei* Schltr., Repert. Spec. Nov. Regni Veg. Beih. 19: 60. 1923. SYNTYPES: Costa Rica. [San José: Moravia,] San Jerónimo, auf der pazifischen Seite, c. 1400 m, im November 1920, *C. Wercklé 61* (B, destroyed); im Jahre 1922, *C. Wercklé 123* (B, destroyed). Neotype, selected here: Costa Rica: [Alajuela:] San Pedro de San Ramón, 1050 m, VII-1921, *A.M. Brenes 10* [622 in Herb. Brenes] (CR 26085!).

In the protologue, Schlechter cited two collections by Wercklé, without designating a type. No material of the two syntypes or isosyntypes or other material associated with the type of *O. wercklei* is known to exist. The neotype selected here is fertile and in good condition and it was determined by Schlechter. The plant with long rhizome and the scattered pseudobulb, the proportionately wide leaves and the sessile, suborbicular lip distinguish this species. In transferring it to the genus *Camaridium* (Blanco *et al.*, 2007), the specific epithet is predated by *C. wercklei* Schltr. (1923) and the new proposed name is *C. pygmaeum* M.A. Blanco. The name is also the basionym of *Maxillaria wercklei* (Schltr.) L.O. Williams.

64. *Pachystele densa* Schltr., Repert. Spec. Nov. Regni Veg. Beih. 19: 29. 1923. TYPE: Costa Rica. [San José: Carrillo,] La Palma, blühend im September 1921, *C. Wercklé 71* (holotype, B, destroyed). Neotype, designated by Adams, 1987: Costa Rica. San José: La Hondura, 1300–1700 m, March 2–4, 1924, *P.C. Standley 36519*, AMES 29764!.

No material associated with the protologue is known to exist. The name is the basionym of *Scaphyglottis densa* (Schltr.) B.R. Adams.

65. *Pleurothallis bifalcis* Schltr., Beih. Bot. Centralbl. 36(2): 395. 1918. TYPE: Costa Rica. [San José: Car-

rillo,] La Palma, 1913 *C. Wercklé s.n.* (holotype, B, destroyed; lectotype, selected here, drawing of the holotype made under the supervision of Schlechter, AMES 23611!) (Fig. 18C).

No isotypes of this species are known to exist, so the drawing of the holotype at AMES is selected as the lectotype. The second inflorescence and the introrse, narrowly oblong lateral lobes of the lip, shown in the drawing, are diagnostic of the species. The name is the basionym of *Stelis bifalcis* (Schltr.) Pridgeon & M.W. Chase.

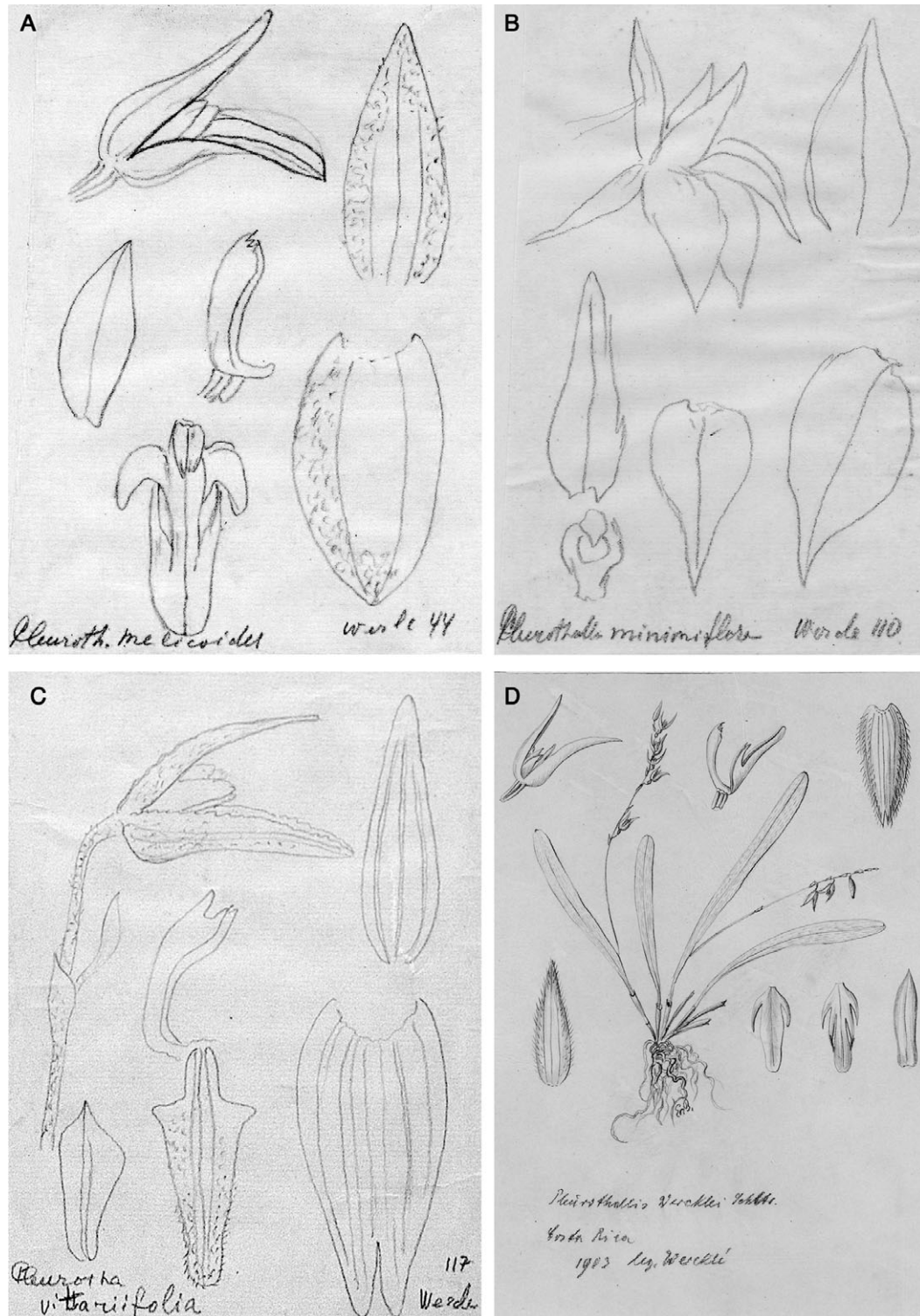
66. *Pleurothallis calypstrostele* Schltr., Repert. Spec. Nov. Regni Veg. Beih. 19: 23. 1923. TYPE: Costa Rica. [San José: Moravia,] San Jerónimo, 1350 m, blühend im Mai 1920, *C. Wercklé 148* (holotype, B, destroyed). Neotype, designated here, tracings of Schlechter's drawings of *Pleurothallis calypstrostele*, Costa Rica, *Brade 1118*, AMES 31278! (Fig. 18D).

No syntypes or other material associated with the type of *P. calypstrostele* are known to exist. The tracings of the plant and the analysis of the flower at AMES, selected as the neotype, were prepared on a specimen collected in Costa Rica by one of the Brade brothers and were annotated by Schlechter as *P. calypstrostele*. The small, creeping habit of the plant with reduced, elliptic leaves and the oblong, slightly sulcate lip readily distinguish this species. The name is the basionym of *Specklinia calypstrostele* (Schltr.) Pridgeon & M.W. Chase.

67. *Pleurothallis melicoides* Schltr., Repert. Spec. Nov. Regni Veg. Beih. 19: 24. 1923. TYPE: Costa Rica. [San José: Carrillo,] La Palma, blühend im Mai 1921, *C. Wercklé 44* [holotype, B, destroyed; isotype, AMES 26831!, probably selected by Luer (1998: 96) as the lectotype]; tracings of Schlechter's drawings of the holotype, AMES 26831! (Fig. 19A).

The only extant specimen associated with the protologue is the isotype at AMES, which was probably selected as the lectotype. Luer (1998) only referred to the left half of an unnumbered sheet at AMES, but the actual isotype bears AMES number 26831. The isotype fragment is mounted together with tracings of Schlechter's drawings of the holotype of *P. melicoides* and *P. johannis* Schltr., the latter from Guatemala. Schlechter compared *P. melicoides* with his *P. wercklei* (see discussion under the latter taxon) and characterized it by the short ramicauls with an erect, ligulate leaf, the many-flowered inflorescence, the flowers with adaxially papillose sepals and the 3-lobed lip, with the lateral lobes uncinately and the midlobe oblong, with two short keels and two basal calli. The illustrations at AMES, copied from Schlechter's diagnostic drawings, are consistent with the protologue. On the basis of vegetative and floral characters, *P.*





**Figure 19.** A, *Pleurothallis melicoides*. Tracing of Schlechter's drawings of the holotype (AMES 26831). B, *Pleurothallis minimiflora*. Tracing of Schlechter's drawings of the holotype (AMES 28565). C, *Pleurothallis vittariifolia*. Tracing of Schlechter's drawings of the holotype (AMES 28807). D, *Pleurothallis wercklei*. Tracing of Schlechter's drawings of the plant habit and the flower from the holotype (AMES 23689). All reproduced with the kind permission of the Harvard University Herbaria.

*melicoides* is member of a taxonomically difficult complex of species related to *Stelis segoviensis* (Rchb.f.) Pridgeon & M.W.Chase. The type collection cited by Schlechter has the same Wercklé's number of *Maxillaria brevipes*.

68. *Pleurothallis minimiflora* Schltr., Repert. Spec. Nov. Regni Veg. Beih. 19: 288. 1923. TYPE: Costa Rica. [San José: Carrillo,] bei La Palma, im Jahre 1922, *C. Wercklé 110* (holotype, B, destroyed; lectotype, selected here, tracings of Schlechter's drawings of the holotype, AMES 28565!) (Fig. 19B).

In the absence of any known isotypes of this species, the drawings at AMES, showing the habit of the plant and an analysis of the flower, are selected as the lectotype. The species is characterized by the shortly creeping habit, the elliptic-ovate petals and the ovate, shortly acuminate lip. These characters are illustrated in detail in the drawings at AMES. The name is the basionym of *Platystele minimiflora* (Schltr.) Garay.

69. *Pleurothallis vittariifolia* Schltr., Repert. Spec. Nov. Regni Veg. Beih. 19: 26. 1923. TYPE: Costa Rica. [San José: Moravia,] San Jerónimo, 1350 m, blühend im Juni 1921, *C. Wercklé 117* (holotype, B, destroyed; isotype, selected here as the lectotype, AMES 28807!; tracings of Schlechter's drawings of the holotype, AMES 28807!) (Fig. 19C).

The isotype at AMES, a fragment, is the only extant isotype of this species and it is selected here as the lectotype. On the same sheet at AMES are mounted copies of the drawings of the holotype made by Schlechter, together with three specimens collected by A. M. Brenes (37 in Herb. Brenes) in 1921 and identified by Schlechter as *P. vittariifolia*. The glandular peduncle, floral bract, pedicel, sepals and lip, and the oblong lip with basal, acute auricles are diagnostic of this species. The name is a synonym of *Specklinia glandulosa* (Ames) Pridgeon & M.W.Chase.

70. *Pleurothallis wercklei* Schltr., Repert. Spec. Nov. Regni Veg. 9: 213. 1911. TYPE: Costa Rica. Ohne genaue Standersangabe, com. K. Schuman, 1903, *C. Wercklé s.n.* (holotype, B, destroyed; lectotype, selected here, drawing of the holotype made under the supervision of Schlechter, AMES 23689!) (Fig. 19D).

In the absence of any known isotypes of this species, the drawing of the holotype at AMES, prepared under Schlechter's supervision, is selected as the lectotype. The internally pubescent sepals and the 3-lobed lip, with the lateral lobes uncinately and the midlobe oblong, entire, are diagnostic of the species and are illustrated in detail in the drawing at AMES. The name is probably a synonym of *Stelis segoviensis* (Rchb.f.) Pidgeon & M.W.Chase.

71. *Ponthieva formosa* Schltr., Repert. Spec. Nov. Regni Veg. Beih. 19: 12. 1923. TYPE: Costa Rica. [San José: Moravia,] San Jerónimo, *C. Wercklé 135* (holotype, B, destroyed; lectotype, selected here, tracings of Schlechter's drawings of the holotype, AMES 31596!) (Fig. 20A).

In the absence of any known isotypes of this species, the drawings of the holotype at AMES are selected as the lectotype. The drawing of the plant habit shows the inflorescence much longer than the leaves and the analysis of the flower illustrates the hairs on the adaxial surface of the sepals that are diagnostic of the species.

72. *Scaphyglottis jimenezii* Schltr., Beih. Bot. Centralbl. 36(2): 399. 1918. TYPE: Costa Rica. La Palma, near San José, 1700 m, April 1910, *C. Wercklé s.n.* [682 in Herb. O. Jiménez] (holotype, B, destroyed; isotype, selected here as the lectotype, CR 34078!; drawing of the holotype made under the supervision of Schlechter, AMES 24606!) (Fig. 20B, C).

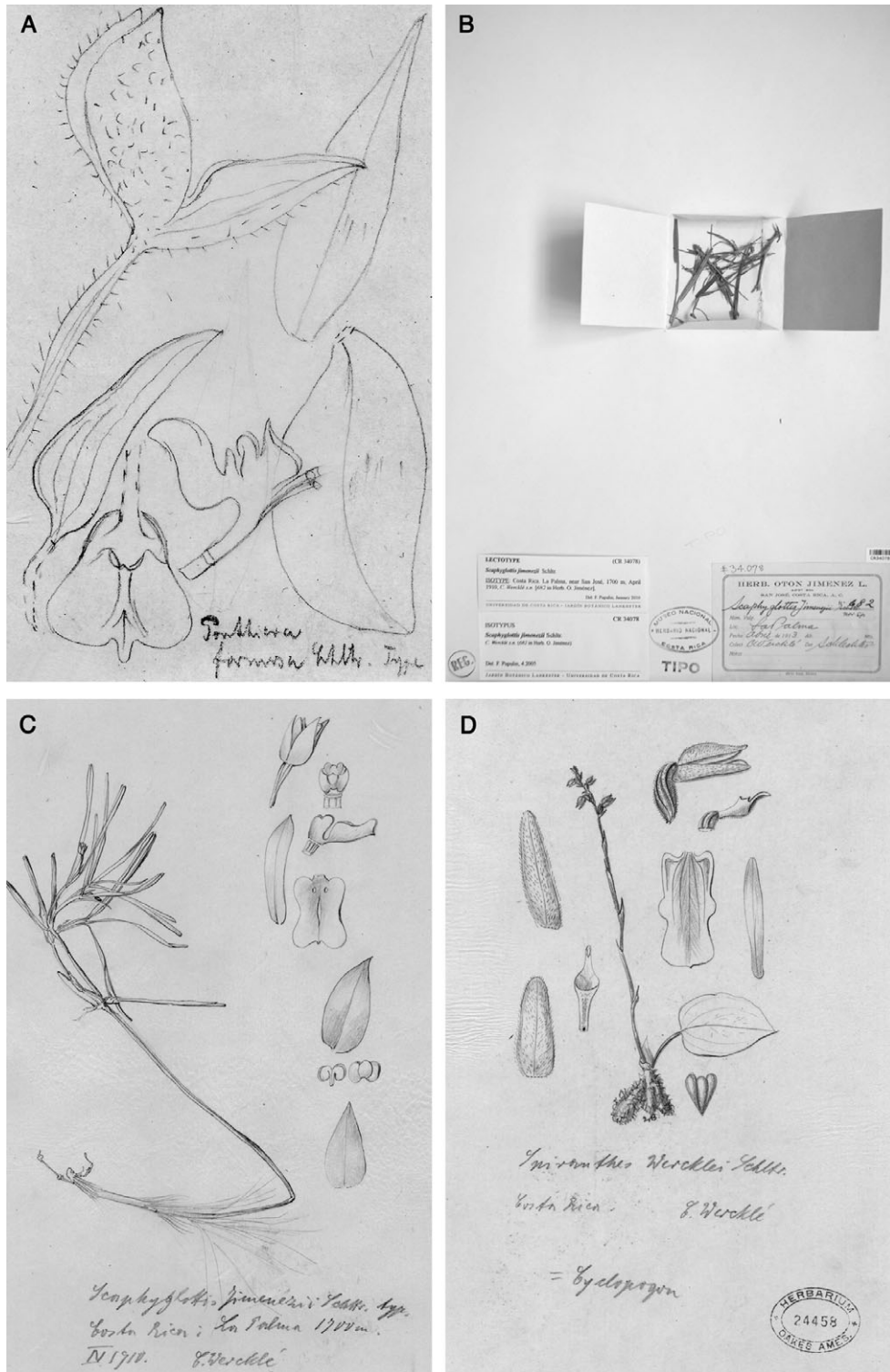
The isotype at CR is the only extant specimen associated with the protologue and it is selected here as the lectotype. It is in fragmentary conditions and it has no flowers. The freely branching stems with verrucose sheaths, the pandurate lamina of the lip and the short column are distinctive of this species. Although Lobo (2003) cited *Wercklé 682* among the type specimens kept at CR, this number corresponds to a collection by Wercklé *sine numero*, prepared by Otón Jiménez for his herbarium.

73. *Scaphyglottis wercklei* Schltr., Repert. Spec. Nov. Regni Veg. Beih. 19: 28. 1923. TYPE: Costa Rica. [San José: Moravia,] San Jerónimo, 1350 [1350 m], im Jahre 1922, *C. Wercklé 105* (holotype, B, destroyed). Neotype, selected here; Costa Rica, Santiago de San Ramón, 1075 m, November 1921, *A.M. Brenes s.n.* (152 in Herb. Brenes), CR 26266!; isoneotype, AMES 28835!.

No isotypes or other material associated with the protologue of *S. jimenezii* are known to exist. *Brenes 152* is cited as *Scaphyglottis jimenezii* by Schlechter (Repert. Spec. Nov. Regni Veg. Beih. 19: 204. 1923). The specimens at CR, designated here as the neotype, and at AMES, are fertile and in excellent condition. The name is a synonym of *Scaphyglottis prolifera* (R.Br.) Cogn.

74. *Sigmatostalix hymenantha* Schltr., Beih. Bot. Centralbl. 36(2): 419. 1918, et Repert. Spec. Nov. Regni Veg. 15: 143. 1919, *nomen*. TYPE: Costa Rica. Curillo [Carrillo], 300 m, *C. Wercklé s.n.* [holotype, B, destroyed; lectotype, designated by Pupulin, 2003 (illustration, *ibid.*), tracings of Schlechter drawing of the holotype, AMES 24866!]. Floral analysis published by Mansfeld (1930).





**Figure 20.** A, *Ponthieva formosa*. Tracing of Schlechter's drawings of the holotype (AMES 31596). B, *Scaphyglottis jimenezii*. Isotype (CR 34078). C, *Scaphyglottis jimenezii*. Tracing of Schlechter's drawings of the plant habit and the flower from the holotype (AMES 24606). D, *Spiranthes wercklei*. Tracing of Schlechter's drawings of the plant habit and the flower from the holotype (AMES 24458). A, C, D, reproduced with the kind permission of the Harvard University Herbaria. B, reproduced with the kind permission of the Museo Nacional de Costa Rica.



The type sheet at AMES includes the sketch made under the supervision of Schlechter's wife, in which the plant habit and floral dissections are illustrated. The sheet also includes a tracing of the holotype made by Mansfeld in 1928 at the request of C. Schweinfurth. The unguiculate and clearly 3-lobed lip with suborbicular, subcrenulate lobes distinguish this species.

75. *Spiranthes wercklei* Schltr., Repert. Spec. Nov. Regni Veg. 10: 482. 1912. TYPE: Costa Rica. Ohne nähere Standersangabe, com. K. Schuman, leg. C. Wercklé s.n. (holotype, B, destroyed; lectotype, selected here, drawing of the holotype made under the supervision of Schlechter, AMES 24458!) (Fig. 20D).

In the absence of any known isotypes of this species, the drawing of the holotype at AMES, prepared under Schlechter's supervision, is selected as the lectotype. The drawing shows the wide, subcordate leaf and the subquadrate lip that are diagnostic of the species. The name is the basionym of *Schiedeella wercklei* (Schltr.) Garay.

76. *Stelis amparoana* Schltr., Repert. Spec. Nov. Regni Veg. Beih. 19: 16. 1923. TYPE: Costa Rica. [San José, Moravia], San Jerónimo, an der pazifischen Seite, 1400 m, blühend im November 1920, C. Wercklé 86 (holotype, B, destroyed; isotype, designated here as the lectotype, AMES 30436!, a fragment; tracings of Schlechter's drawings of the holotype, AMES 30436!; photograph of the holotype, ex B, AMES 30436!; drawings by O. Ames of the holotype, AMES 30436!) (Fig. 21A, B).

The isotype at AMES is the only known specimen associated with the prologue and it is selected here as the lectotype. Although sterile, the fragment of specimen is in good condition. Also included on the sheet at AMES are copies of Schlechter's drawings of the holotype, showing the habit of the plant and the analysis of the flower, and a photograph of the holotype taken in Berlin before the destruction of Schlechter's herbarium. The characters of the flower were also detailed by O. Ames in 1927 on a sketch drawn from the holotype in Schlechter's herbarium. The caespitose plant with the ramicaul subequal to the leaf, the erect, lax inflorescence and the thick, ovoid lip provided with a large glenion (a central longitudinal structure of soft tissue, possibly a nectary) distinguish this species. *Stelis amparoana* is likely a first name for *S. wercklei* Schltr.

77. *Stelis bryophila* Schltr., Repert. Spec. Nov. Regni Veg. Beih. 19: 16. 1923. TYPE: Costa Rica. [San José: Moravia,] San Jerónimo, an der pazifischen Seite, 1400 m, blühend im November 1920, C. Wercklé 82 (holotype, B, destroyed; lectotype, selected here, trac-

ings of Schlechter's drawings of the holotype, AMES 30421!; photograph of the holotype, ex B, AMES 30421!; drawings by O. Ames of the holotype, AMES 30421!) (Fig. 21C).

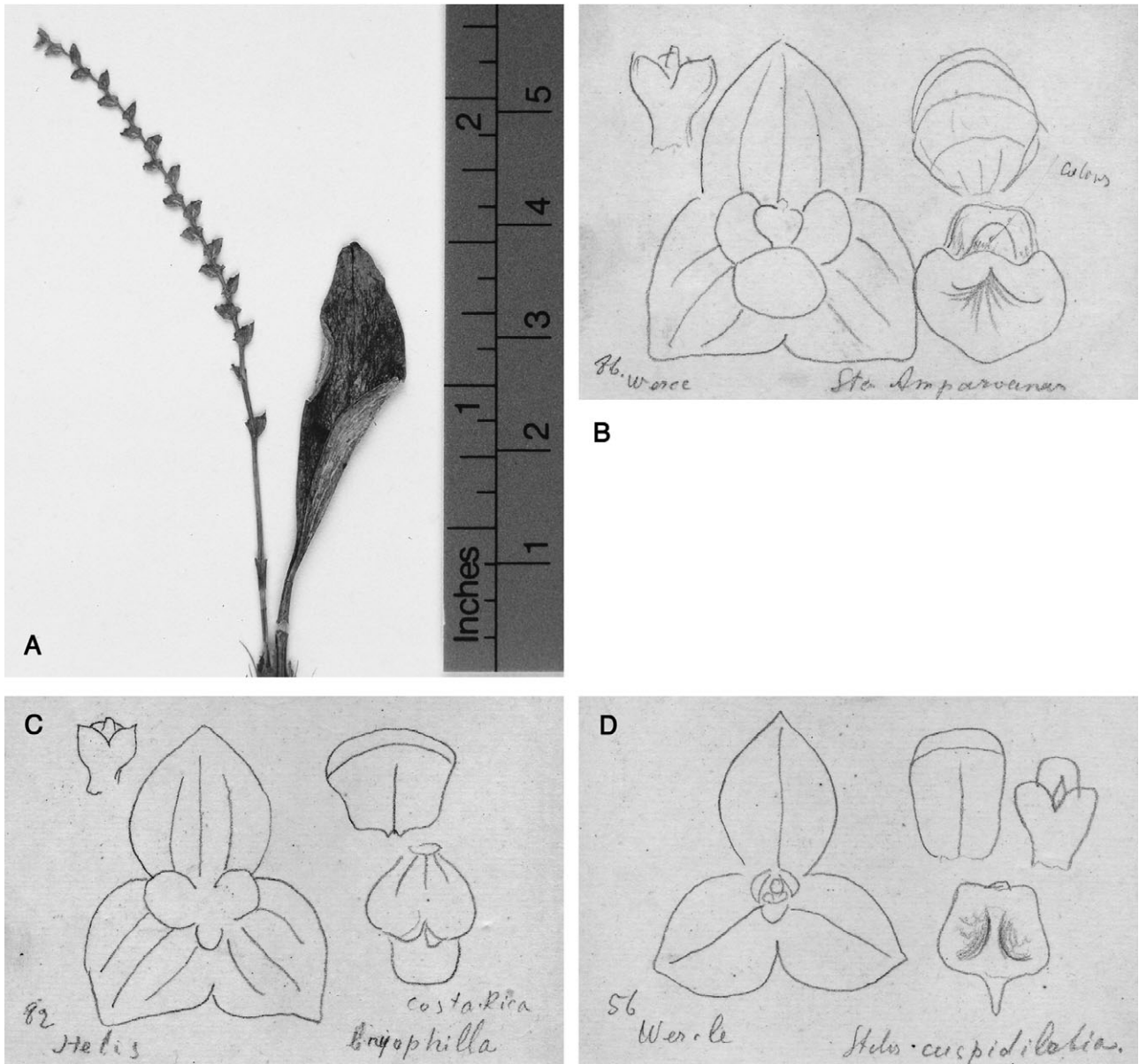
In the absence of any isotypes or other specimens associated with the protologue, the tracings of Schlechter's drawings of the holotype at AMES are designated as the lectotype. The sheet at AMES also includes a sketch of the plant and a lateral view of the lip drawn by O. Ames from the holotype and a photograph of the holotype taken in Berlin before the destruction of Schlechter's herbarium. The small plant habit and the 3-lobed lip, with the lateral lobes erect, are diagnostic of the species. The name is probably a synonym of *Stelis microchila* Schltr.

78. *Stelis cuspidilabia* Schltr., Repert. Spec. Nov. Regni Veg. Beih. 19: 17. 1923. TYPE: Costa Rica. [San José: Moravia,] San Jerónimo, blühend im Juni 1921, C. Wercklé 56 (holotype, B, destroyed; lectotype, designated here, tracings of Schlechter's drawings of the holotype, AMES 30422!; photograph of the holotype ex B, AMES 30422!; drawings by O. Ames of the holotype, AMES 30422!) (Fig. 21D).

No isotypes of this species are known to exist, so the tracings of Schlechter's drawings of the holotype are selected as the lectotype. The sheet at AMES also includes a photograph of the holotype taken in Berlin before the destruction of Schlechter's herbarium and the analysis of a flower from the holotype prepared by O. Ames in 1927. The small habit, with the leaf slightly longer than the ramicaul and the subquadrate-ovate lip, provided with a distinct apicule on the obtuse apex, distinguish this species. The name is a synonym of *Stelis hymenantha* Schltr.

79. *Stelis nutantiflora* Schltr., Beih. Bot. Centralbl. 36(2): 390. 1918. TYPE: Costa Rica. [San Jos' Carrillo,] La Palma, 1500 m, August 1910, C. Wercklé s.n. [840 in Herb. O. Jiménez] (holotype, B, destroyed; lectotype, designated here, drawing of the holotype made under the supervision of Schlechter, AMES 23716!; photograph of the holotype ex B, AMES 23716!) (Fig. 22A).

In the absence of any isotypes of this species, the drawing of the holotype at AMES, prepared under Schlechter's supervision, is selected as the lectotype. The sheet at AMES also includes a photograph of the holotype taken in Berlin before the destruction of Schlechter's herbarium. The narrow leaves subequal to the ramicauls, the long inflorescence with pendent flowers, the flowers with the lateral sepals connate into a synsepal and the ovate, subobtusate lip are diagnostic of this species. According to Duque (2008), the name is a synonym of *S. despectans* Schltr.

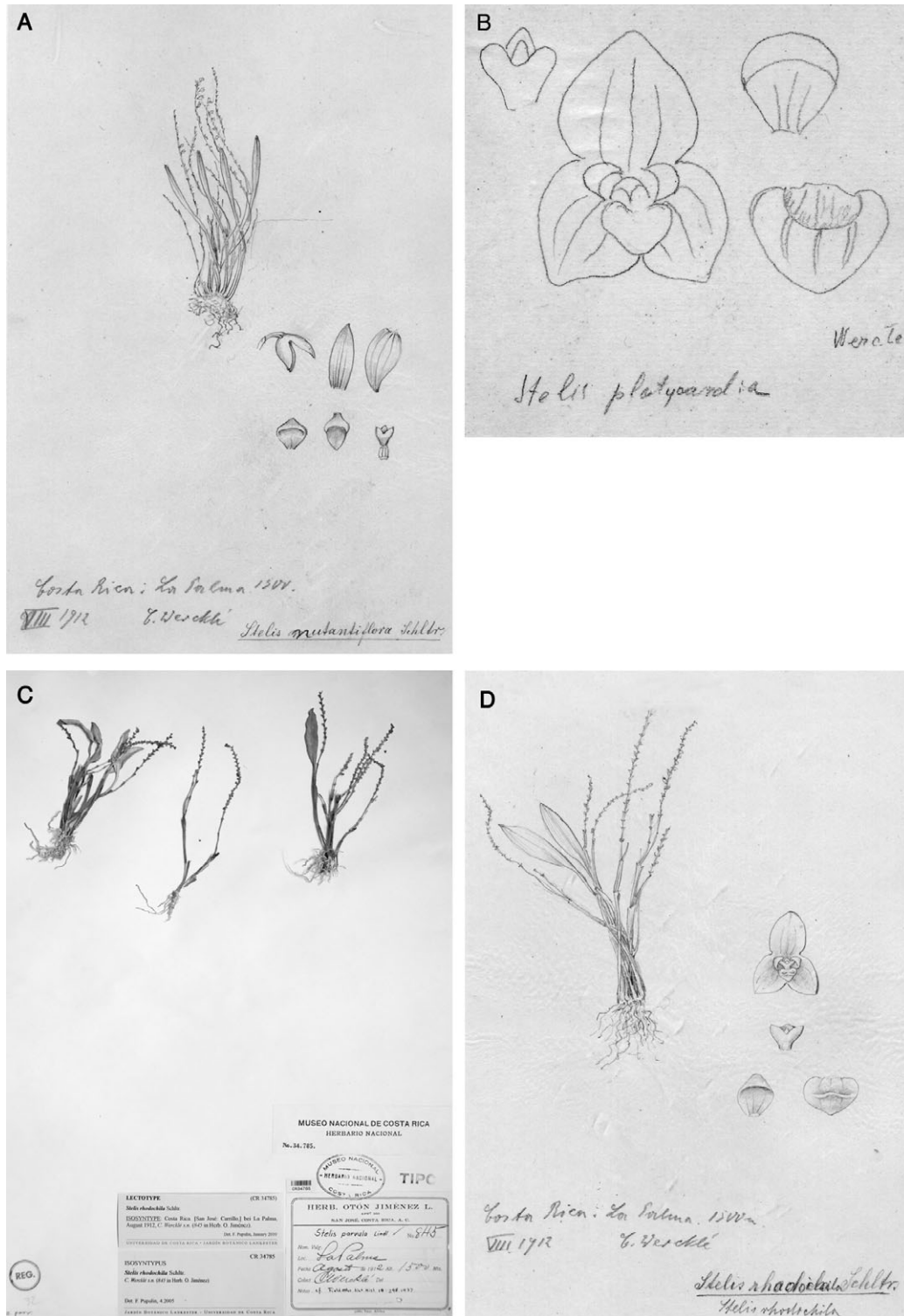


**Figure 21.** A, *Stelis amparoana*. Isotype (AMES 30436). B, *Stelis amparoana*. Tracing of Schlechter's drawings of the holotype (AMES 30436). C, *Stelis bryophila*. Tracing of Schlechter's drawings of the holotype (AMES 30421). D, *Stelis cuspidilabia*. Tracing of Schlechter's drawings of the holotype (AMES 30422). All reproduced with the kind permission of the Harvard University Herbaria.

80. *Stelis platycardia* Schltr., Repert. Spec. Nov. Regni Veg. Beih. 19: 18. 1923. TYPE: Costa Rica. San José: La Palma, C. Wercklé 147 (holotype, B, destroyed; lectotype, designated here, tracings of Schlechter's drawings of the holotype, AMES 30440!; photograph of the holotype ex B, AMES 30440!; drawing by O. Ames of the holotype, AMES 30440!) (Fig. 22B).

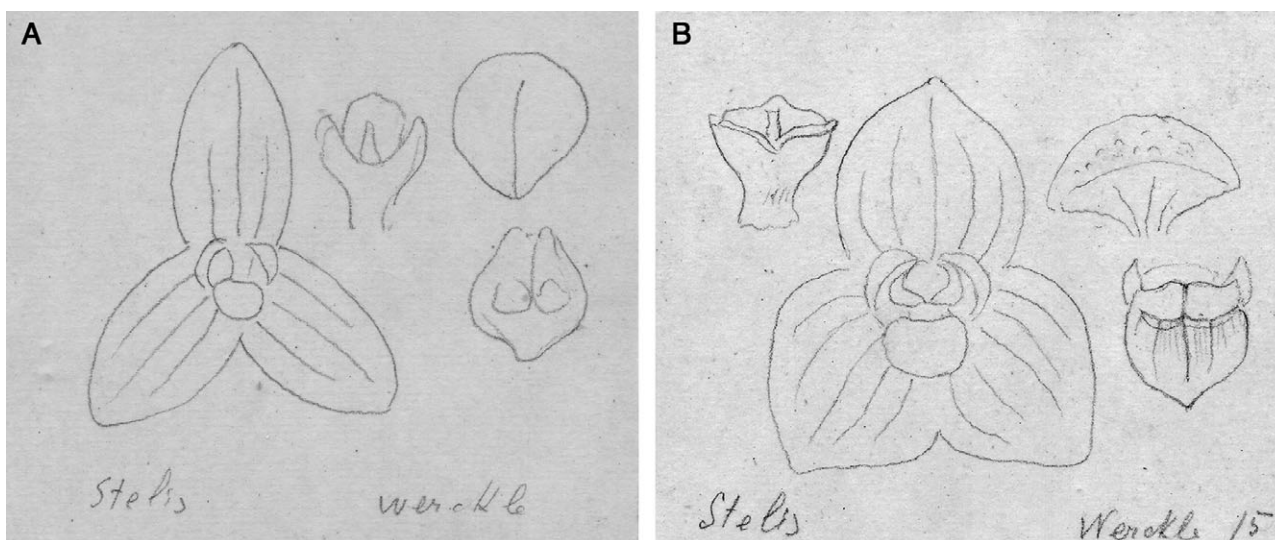
In the absence of any known isotypes of this species, the tracings of Schlechter's drawings of the

holotype are selected as the lectotype. The sheet at AMES also includes a photograph of the holotype taken in Berlin before the destruction of Schlechter's herbarium and the drawing of the lip from the holotype prepared by O. Ames in 1927. The short ramicaul with an elliptic leaf and the widely ovate, rounded lip with a transversal callus at the base and a small glenion are diagnostic of this species. The name is a synonym of *Stelis costaricensis* Rchb.f.



**Figure 22.** A, *Stelis nutantiflora*. Tracing of Schlechter’s drawings of the plant habit and the flower from the holotype (AMES 23716). B, *Stelis platycardia*. Tracing of Schlechter’s drawings of the holotype (AMES 30440). C, *Stelis rhodochila*. Isosyntype [Wercklé s.n. (845 in Herb. O. Jiménez)] (CR 34785). D, *Stelis rhodochila*. Tracing of Schlechter’s drawings of the plant habit and the flower from the holotype (AMES 24932). A, B, D, reproduced with the kind permission of the Harvard University Herbaria. C, reproduced with the kind permission of the Museo Nacional de Costa Rica.





**Figure 23.** A, *Stelis subinconspicua*. Tracing of Schlechter's drawings of the holotype (AMES 30424). B, *Stelis wercklei*. Tracing of Schlechter's drawings of the holotype (AMES 30439). All reproduced with the kind permission of the Harvard University Herbaria.

81. *Stelis rhodochila* Schltr., Beih. Bot. Centralbl. 36(2): 392. 1918. SYNTYPES: Costa Rica. [San José: Carrillo,] bei La Palma, August 1912, C. Wercklé s.n. [845 in Herb. O. Jiménez] (B, destroyed; photograph ex B, with floral analysis by Schlechter, AMES 24932! and AMES 33371!; isosyntype, selected here as the lectotype, CR 34785!; drawing of the holotype made under the supervision of Schlechter, AMES 24932!; floral analysis by O. Ames from the syntype at Schlechter's herbarium, AMES 33371!); same locality, August 1912, C. Wercklé s.n. [839 in Herb. O. Jiménez] (B, destroyed; photograph ex B, AMES 24932!; floral analysis made by O. Ames from the syntype at Schlechter's herbarium, AMES 33371!; isosyntype, CR 34783!); same locality, February 1913, C. Wercklé s.n. [857 in Herb. O. Jiménez] (B, destroyed) (Fig. 22C, D).

In the protologue, Schlechter cited three collections made by Wercklé at La Palma, in August 1912 and February 1913, without designating a type. The specimens were received at Berlin through the herbarium of O. Jiménez, who assigned the numbers according to his collection of *exsiccata*. The existence of two isosyntypes in the collection of the Museo Nacional de Costa Rica was not recorded in the catalogue of types from CR by Lobo (2003). The specimen *Wercklé s.n.* [845 in Herb. O. Jiménez] at CR, selected as the lectotype, is in good condition and it has remnants of flowers. The sheet 24932 at AMES also includes a photograph of the holotype taken in Berlin before the destruction of Schlechter's herbarium, with the floral analysis by Schlechter and a drawing of the plant and details of the flower from the same specimen made

under Schlechter's supervision. The sheet 33371 at AMES has analyses of the flowers prepared by O. Ames from both the collections made by Wercklé in August 1912 (845 and 839 in Herb. O. Jiménez). It also includes a pocket, now empty, which preserved the fragment of a syntype, annotated by Schlechter as '*pars typi*'. The long-petiolate leaves subequal to the ramicauls, the long, erect inflorescence, the widely ovate petals and the subreniform lip, provided with a transversal keel at the middle are diagnostic of this species.

82. *Stelis subinconspicua* Schltr., Repert. Spec. Nov. Regni Veg. Beih. 19: 19. 1923. TYPE: Costa Rica. [San José: Moravia,] San Jerónimo, im Jahre 1922, C. Wercklé s.n. (holotype, B, destroyed; photograph ex B, with floral analysis by Schlechter, AMES 33557! and AMES 30424!; tracings of Schlechter drawing of the holotype, selected here as the lectotype, AMES 30424!; floral analysis by O. Ames from the holotype at Schlechter's herbarium, AMES 30424!) (Fig. 23A).

In the absence of any known isotypes of this species, the tracings of Schlechter's drawings of the holotype are selected as the lectotype. Sheet 30424 at AMES also includes a photograph of the holotype taken in Berlin before the destruction of Schlechter's herbarium, including Schlechter's original sketch and floral details drawn by O. Ames from the holotype in 1927. The small habit, with the ramicaul shorter than the leaf and the widely obovate, obtuse lip, with two rounded calli on the disc distinguish this species.

83. *Stelis wercklei* Schltr., Repert. Spec. Nov. Regni Veg. Beih. 19: 20. 1923. TYPE: Costa Rica. [San José:

Moravia,] San Jerónimo, blühend im Mai 1921, *C. Wercklé 15* (holotype, B, destroyed; destroyed; photograph ex B, AMES 30439!; tracings of Schlechter drawing of the holotype, selected here as the lectotype, AMES 30439!; floral analysis by O. Ames from the holotype at Schlechter's herbarium, AMES 30425!) (Fig. 23B).

No isotypes or other specimens associated with the protologue of this species are known to exist, so the tracings of Schlechter's drawings of the holotype are selected as the lectotype. The sheet 30439 at AMES also includes a photograph of the holotype taken in Berlin before the destruction of Schlechter's herbarium. Sheet 30425 has the drawing of a flower from the holotype made by O. Ames in 1927. The small, caespitose habit and the ovate lip, subauriculate at the base, distinguish this species.

84. *Trigonidium amparoanum* Schltr., Repert. Spec. Nov. Regni Veg. Beih. 19: 61. 1923. TYPE: Costa Rica. San José: Carrillo [Carrillo], blühend im Juni 1921, *C. Wercklé 26* (holotype, B, destroyed).

No isotypes or any material associated with the protologue are known to exist and I was unable to find any other specimens annotated by Schlechter or identified by him with the name of *T. amparoanum* to neotypify the species. The rhizomatous habit, the short inflorescence and the large flowers distinguish this species. The name is a synonym of *Trigonidium lankesteri* Ames.

#### ACKNOWLEDGEMENTS

I warmly acknowledge the curators and staff at AMES and, in particular Dr Gustavo A. Romero-González and CR, for their help during my visits and stays at their respective herbaria. The present paper is part of the Project 814-A7-015, 'Inventario y taxonomía de la flora epífita de la región Neotropical – Orchidaceae', supported by the Vice-Presidency of Research, University of Costa Rica.

#### REFERENCES

- Atwood JT, Mora-Retana E. 1999.** Flora Costaricensis. Family #39 Orchidaceae: Tribe Maxillarieae: Subtribes Maxillariinae and Oncidiinae. *Fieldiana, Botany, New Series* **40**: 1–182.
- Childs JL. 1899.** *Illustrated catalogue of Child's rare flowers, vegetables and fruits*. New York: J.L. Childs.
- Christ H. 1910.** *Die Geographie der Farne*. Jena: G. Fischer.
- Cogniaux A. 1898.** Orchidaceae. In: von Martius CFP, ed. *Flora brasiliensis*, Vol. 3. Munich: F. Fleischer, 1–604.
- Dressler RL. 1999.** Mesoamerican orchid novelties 4, *Habenaria*. *Boletín del Instituto de Botánica (Universidad de Guadalajara)* **7**: 93–101.
- Dressler RL. 2003.** Orchidaceae. In: Hammel BE, Grayum MH, Herrera C, Zamora N, eds. *Manual de Plantas de Costa Rica. Vol. 3. Monocotiledóneas (Orchidaceae-Zingiberaceae)*. Monographs in Systematic Botany from the Missouri Botanical Garden 93.
- Duque O. 2008.** *Orchidaceae. Stelis swartz – compendium*. Medellín: University of Antioquia.
- Fowlie JA. 1969.** Some notes on *Epidendrum schumannianum* Schltr., including the description of a new species from Panama, *Epidendrum pseudo-schumannianum* sp.nov. *Orchid Digest* **33**: 254–255.
- Gerlach G. 1994.** *Kefersteinia retanae*, una nueva orquídea de Costa Rica. *Brenesia* **41–42**: 99–106.
- Gómez Pignataro LD. 1978.** Contribuciones a la pteridología costarricense. XII. Carlos Wercklé. *Brenesia* **14–15**: 361–393.
- Hágsater E. 1992.** Nuevas especies del complejo *Epidendrum modestiflorum* de Costa Rica y Panamá. *Orquídea (Mex.)* **12**: 281–295.
- Hágsater E, Soto M, eds. 2002.** [publ. 2003]. Orchids of Mexico, parts 2 and 3. *Icones Orchidacearum* **5–6**: sub pl. 654.
- Hooker JD. 1899.** *Hidalgoa wercklei*. *Curtis's Botanical Magazine* **125**: sub pl. 7684.
- Lobo S. 2003.** Colección tipo del Herbario Nacional de Costa Rica (CR), IV. Revisión y actualización de las monocotiledóneas. *Brenesia* **59–60**: 21–34.
- Luer CS. 1987.** *Icones Pleurothallidarum IV. Systematics of Acostaea, Condylago and Porroglossum*. Monographs in Systematic Botany from the Missouri Botanical Garden 24.
- Luer CS. 1998.** *Icones Pleurothallidarum XVII. Systematics of subgen. Pleurothallis, sect. Abortivae, sect. Truncatae, sect. Pleurothallis subsect. Acroniae, subsect. Pleurothallis, subgen. Dracontia, subgen. Unciferia*. Addenda to *Dracula, Lepanthes, Masdevallia, Porroglossum and Scaphosepalum*. Monographs in Systematic Botany from the Missouri Botanical Garden. 72.
- Mansfeld R. 1931.** Blütenanalysen neuer Orchideen von R. Schlechter (†). II. Mittelamerikanische Orchideen. *Repertorium Specierum Novarum Regni Vegetabilis, Beihefte* **59**: 1–8.
- Ossenbach C. 2009.** Orchids and orchidology in Central America: 500 years of history. *Lankesteriana* **9**: 1–268.
- Pridgeon AM, Chase MW. 2001.** A phylogenetic reclassification of Pleurothallidinae (Orchidaceae). *Lindleyana* **16**: 235–271.
- Pupulin F. 2001.** Contributions to a reassessment of Costa Rican Zygopetalinae (Orchidaceae). The genus *Kefersteinia* Rchb.f. *Annalen des Naturhistorischen Museums in Wien* **103B**: 525–555.
- Pupulin F. 2002.** Catálogo revisado y anotado de las Orchidaceae de Costa Rica. *Lankesteriana* **4**: 1–88.
- Pupulin F. 2003.** A second look at the genus *Sigmatostalix* (Orchidaceae: Oncidiinae) in Costa Rica. *Harvard Papers in Botany* **8**: 35–59.
- Pupulin F. 2007.** Contributions toward a reassessment of Costa Rican Zygopetalinae (Orchidaceae). 3. A systematic revision of *Dichaea* in Costa Rica. *Harvard Papers in Botany* **12**: 15–153.

- Pupulin F, Karremans A. In press.** Two new species and a new record of *Epidendrum* (Orchidaceae: Laeliinae) from Costa Rica. *Selbyana*.
- Santiago Ayala E, Hágsater E. 2007.** *Epidendrum serruliferum*. Sub pl. 986. In: Hágsater E, ed. *The genus Epidendrum. Part 6. Species New and Old in Epidendrum. Icones Orchidacearum 9*. México: Herbario AMO, 901–1000.
- Schlechter R. 1906.** Orchidaceae novae et criticae. Decas V. *Repertorium Specierum Novarum Regni Vegetabilis* **3**: 45–51.
- Schlechter R. 1911.** Orchidaceae novae et criticae. Decas XIX. *Repertorium Specierum Novarum Regni Vegetabilis* **9**: 212–218.
- Schlechter R. 1912a.** Orchidaceae novae et criticae. Decas XIX–XX. *Repertorium Specierum Novarum Regni Vegetabilis* **10**: 396–397.
- Schlechter R. 1912b.** Orchidaceae novae et criticae. Decas XXXIV. *Repertorium Specierum Novarum Regni Vegetabilis* **10**: 480–486.
- Schlechter R. 1918.** Kritische Aufzählung der bisher aus Zentralamerika bekanntgeworden Orchideen. *Beihefte zum Botanischen Centralblatt, Kassel* **36**: 321–520.
- Schlechter R. 1920.** Orchidaceae novae et criticae. Decas LXVI–LXVII. *Repertorium Specierum Novarum Regni Vegetabilis* **16**: 437–450.
- Schlechter R. 1923.** Beiträge zur Orchideenkunde von Zentralamerika. II. Additamenta ad Orchideologiam Costaricensis. *Repertorium Specierum Novarum Regni Vegetabilis, Beihefte*. **19**: 1–307.
- Standley PC. 1926.** Carlos Wercklé. *Science* **63**: 221–223.
- Wercklé K. 1909.** *La subregión fitogeográfica costarricense*. San José: Sociedad Nacional de Agronomía.
- Wercklé K. 1913.** Las orquídeas de Costa Rica. *Boletín de Fomento (San José: Ministerio de Fomento)* **3**: 291–302.
- Williams NH, Chase MW, Fulcher T, Whitten MW. 2001.** Molecular systematics of the Oncidiinae based on evidence of four DNA sequence regions: expanded circumscriptions of *Cyrtochilum*, *Erycina*, *Otoglossum*, and *Trichocentrum*, and a new genus (Orchidaceae). *Lindleyana* **16**: 113–139.