

## NEW COMBINATIONS IN *CROCODEILANTHE* (PLEUROTHALLIDINAE, ORCHIDACEAE)

A. L. V. TOSCANO DE BRITO<sup>1,2</sup>

**Abstract.** Four new combinations in *Crocodeilante* (Pleurothallidinae, Orchidaceae) are proposed. A second-step lectotype is selected for *Pleurothallis stelidioides* and a first-step lectotype for *Pseudostelis bradei*.

**Keywords:** *Crocodeilante*, *Niphanta*, *Physosiphon*, *Pseudostelis*, *Pleurothallis*, *Stelis*

*Crocodeilante* Rchb. f. & Warsz., as currently recognized by the author, comprises ca. 90 epiphytic orchids mostly distributed in Central and South America, with one species restricted to the Greater Antilles and another reaching Trinidad and Tobago (Luer, 1998). Previously considered a monotypic genus (Garay, 1974) and a subgenus of *Pleurothallis* (Luer, 1986, 1998), Luer finally elevated it to the generic rank in 2004.

*Pseudostelis* Schltr., which included species distributed in Central America through the Andes down to southern Brazil, was first described in 1922 based on three names: *Physosiphon spiralis* Lindl., *Stelis deregularis* Barb. Rodr. and *Pseudostelis bradei* Schltr. They all have been proven to be conspecific, and the oldest available binomial for this taxon is *Physosiphon spiralis*, the basionym of *Pseudostelis spiralis* (Lindl.) Schltr. Schlechter did not select a type for his new genus, but Garay (1974) designated *Physosiphon spiralis* as the lectotype.

Luer (1999) treated *Pseudostelis* as a subgenus of *Pleurothallis* R. Br. and recognized six species: *Pleurothallis bracteosa* C. Schweinf., *P. deregularis* (Barb. Rodr.) Luer, *P. magdalenae* Rchb.f., *P. melanostele* Luer & R. Vásquez, *P. rufobrunnea* (Lindl.) Luer, and *P. simplex* Ames & C. Schweinf. With exception of *P. rufobrunnea*, which is clearly a member of the genus *Stelis* and duly transferred to this genus by Williams (1939), the other five species share the same habit and floral morphology with *Crocodeilante*. While *Pleurothallis bracteosa* has been already transferred to *Crocodeilante* (Luer, 2011), the remaining names still wait for the necessary nomenclatural changes.

The molecular evidence published so far (Pridgeon et al., 2001; Solano, 2005; Karremans et al., 2013) suggests that *Crocodeilante* is largely a monophyletic assemblage and closely related to *Stelis* Sw., but not embedded in it. Only five *Crocodeilante* species were sampled and the nomenclatural type of the genus, *C. xiphiusa* Rchb. f., was not. This renders the relationships of *Crocodeilante* still uncertain. In Karremans et al. (2013), *Physosiphon spiralis* (cited as *Stelis deregularis*), the nomenclatural

type of *Pseudostelis*, was analyzed and found sister to *Crocodeilante*. *Pleurothallis rufobrunnea* (= *Stelis rufobrunnea* (Lindl.) L.O. Williams) was also sampled and not surprisingly found embedded in *Stelis*. This species presents typical sepals, petals, and lip found in *Stelis* and the column is not distinct from several others whose bilobed stigma coalesces in one. Luer (1999) erroneously placed it in *Pleurothallis* subgen. *Pseudostelis* (Schltr.) Luer.

Although vegetative and floral morphology align with available molecular data and support the inclusion of *Pseudostelis* in the synonym of *Crocodeilante*, additional studies employing a broader sample, using supplementary DNA fragments and additional methods of phylogenetic analysis combining morphological data, are required to clarify incongruences found in Karremans et al. (2013). The placement of *Crocodeilante domingensis* (Cogn.) Luer (cited as *Stelis antillensis* Pridgeon & M. W. Chase) next to *Stelis nexipous* Garay and to *Niphanta gelida* (Lindl.) Luer (cited as *Stelis gelida* (Lindl.) Pridgeon & M. W. Chase) should be further investigated and their assessment reconsidered.

*Crocodeilante*, including *Pseudostelis*, forms a well-defined group as presented by Luer (1998, 2004) and discussed in Luer & Toscano de Brito (2018). This genus may well include *Niphanta* Luer, as proposed by Carnevali & Ramírez (2014), with which it shares similar habit and floral morphology, but the transfer of all *Crocodeilante* species to *Stelis*, as proposed by Pridgeon & Chase (2002) and later advocated by Karremans et al. (2013) and Karremans (2015, 2016), is not justified and therefore not followed here.

In this article *Pseudostelis* is considered a synonym of *Crocodeilante* based on morphology and on the current molecular evidence. Therefore species previously treated in *Pseudostelis* and in *Pleurothallis* subgenus *Pseudostelis* are transferred herein to *Crocodeilante*, the only exception being *Pleurothallis rufobrunnea* for the reasons already stated in this article. *Stelis duckei* E. M. Pessoa & M. Alves, recently described for northeast Brazil, clearly belongs to this orchid group and it is also duly transferred to *Crocodeilante*.

The author is grateful to Carlyle A. Luer (MO) for comments on the manuscript, to Kanchi Gandhi (GH) for his assistance with nomenclature, and to other herbaria cited here for providing miscellaneous yet critical resources.

<sup>1</sup> Marie Selby Botanical Gardens, 811 South Palm Avenue, Sarasota, Florida 34236-7726, U.S.A.; atoscano@selby.org

<sup>2</sup> Orchid Herbarium of Oakes Ames, Harvard University Herbaria, 22 Divinity Avenue, Cambridge, Massachusetts 20138, U.S.A.

## TAXONOMY

**Crocodelanthus duckei** (E. M. Pessoa & M. Alves) Toscano, *comb. nov.*

Basionym: *Stelis duckei* E. M. Pessoa & M. Alves, *Brittonia* 66 (2): 156. 2013. TYPE: BRAZIL. Ceará: Município Maranguape, próximo a Rajada, 900 m, 14 Sept. 1908, A. Ducke s.n. (Holotype: SP [37566, not seen], Digital Image SP; Isotype: MG [not seen]).

This species has been recently described for the brejo forests of northeast Brazil. Reader should refer to Andrade Lima (1982) for a review of this type of forest. Together with *C. spiralis* (Lindl.) Toscano and another still unidentified species (A. L. V. Toscano de Brito and E. C. Smidt, unpubl. data), the genus is currently known to possess three species in Brazil.

**Crocodelanthus magdalenae** (Rchb. f.) Toscano, *comb. nov.*

Basionym: *Pleurothallis magdalenae* Rchb. f., *Bonplandia* (Hannover) 3: 72. 1855. TYPE: COLOMBIA. Old dept. of Ocaña: “Magdalena,” ca. 1854, H. Wagener s.n. (Holotype: W).

Synonyms: *Humboltia magdalenae* (Rchb. f.) Kuntze, *Revis. Gen. Pl.* 2: 667. 1891.

*Pleurothallis stelioides* Schltr., *Repert. Spec. Nov. Regni Veg. Beih.* 7: 116 (1920). TYPE: COLOMBIA. Cauca: dense forests around Chiribio and Paisbamba above Popayán, 1800–2400 m, Mar. 1885, F. C. Lehmann 8198 (B [destroyed]; Lectotype designated by Luer (2009), second-step Lectotype selected here: AMES [14836]; Isolectotypes: AMES [118477]; HB [not seen]; K [not seen], Digital Image K; US [not seen], Digital Image US).

*Stelis magdalenae* (Rchb.f.) Pridgeon & M. W. Chase, *Lindleyana* 16: 264. 2001.

*Pleurothallis ligulata auct. non* Lindl: *Kranzl. in Bot. Jahrb. Syst.* 26: 442. 1899.

Luer (2009) designated a lectotype for *Pleurothallis stelioides* based on an isotype at AMES, but there are two duplicates in that herbarium: AMES 14836 and AMES 118477. One of them, AMES 14836, is here selected as the second-step lectotype (see Article 9.17 of the *Code* in McNeill et al. 2012).

**Crocodelanthus melanostele** (Luer & R. Vásquez) Toscano, *comb. nov.*

Basionym: *Pleurothallis melanostele* Luer & R. Vásquez, *Phytologia* 49: 210. 1981. TYPE: BOLIVIA. La Paz: Prov. Inquisivi, between Inquisivi and Circuata, 2550 m, 28 Jan. 198, C. Luer, J. Luer, E. Besse & R. Vásquez 5798 (Holotype: SEL).

Synonym: *Stelis melanostele* (Luer & R. Vásquez) Pridgeon & M. W. Chase, *Lindleyana* 16: 264. 2001.

**Crocodelanthus simplex** (Ames & C. Schweinf.) Toscano, *comb. nov.*

Basionym: *Pleurothallis simplex* Ames & C. Schweinf., *Sched. Orchid.* 10: 37. 1930. TYPE: COSTA RICA.

San José: Cerro de las Vueltas, 29 Dec. 1925–1 Jan 1926, alt 2700–3000 m, P.C. Standley & J. Valerio 44023 (Holotype: AMES).

Synonym: *Stelis simplex* (Ames & C. Schweinf.) Pridgeon & M. W. Chase, *Lindleyana* 16: 266. 2001.

**Crocodelanthus spiralis** (Lindl.) Toscano, *comb. nov.*

Basionym: *Physosiphon spiralis* Lindl., *Edwards’s Bot. Reg.* 21, t. 1797. 1835. TYPE: BRAZIL. Santa Catarina: near Port St. Catharina (Florianoópolis), *J. Tweedie s.n.* (Holotype: K).

Synonyms: *Stelis deregularis* Barb. Rodr., *Gen. Spec. Orchid.* 2: 94. 1881. TYPE: BRAZIL. Rio de Janeiro, Paulo de Frontin (formerly Rodeio), 12 Mar. 1880 (date and year not cited in the protologue), *J. Barbosa Rodrigues s.n.* (Holotype: Lost; Lectotype here designated: illustration tab. 115, fig. B, vol. 2, in *Iconogr. Orchid. Brésil* at the Library of Rio de Janeiro Botanical Garden, cited as tab. 640 (unpubl.) in Barb. Rodr. *loc. cit.*; copied and reproduced in black and white in Cogn., *Fl. Bras. (Mart.)* 3(4), tab. 78, fig. 3. 1896, cited as *Physosiphon deregularis* (Barb. Rodr.) Cogn.; digitally restored image of the original reproduced in color in Sprunger et al., 1996, vol. 1: 171, fig. B., cited as *Pleurothallis deregularis*.

*Pleurothallis clausa* A. Rich. ex Rchb.f., *Cat. Orch.-Samml. Schiller*, ed. 3: 59. 1857, *nom. nud.*, *non* De Puydt 1880, *nom. nud.*

*Physosiphon deregularis* (Barb. Rodr.) Cogn., *Fl. Bras.* 3 (4): 341. 1896.

*Pseudostelis bradei* Schltr., *Anexos Mem. Inst. Butantan, Secç. Bot.* 1(4): 38. 1922. TYPE: BRAZIL. São Paulo, Iguape, Morro das Pedras, 20 m, collected in 1919, A. C. Brade 7793 (B, destroyed; Lectotype designated by Luer (1999): US [1208172], not seen, Digital Image US; Isolectotypes: AMES [30638], R [24942], not seen, Digital Image R; SP [8193]).

*Pseudostelis deregularis* (Barb. Rodr.) Schltr., *Anexos Mem. Inst. Butantan, Secç. Bot.* 1(4): 38. 1922.

*Physosiphon minutiflorus* Ames & Schweinf., *Sched. Orchid.* 8: 11. 1925. TYPE: PANAMA. Chiriqui: Caramillo, Oct. 1923, 5000 ft., C. W. Powell 345 (Holotype: AMES).

*Pleurothallis schweinfurthiana* L. O. Williams, *Ceiba* 5: 92. 1956, replacement name based on *Physosiphon minutiflorus* Ames & Schweinf. *non Pleurothallis minutiflora* Hoffmanns. 1842 *nec* S. Watson 1888 *nec* Cogn. 1896.

*Pleurothallis deregularis* (Barb. Rodr.) Luer, *Selbyana* 2(4): 385. 1978.

*Pleurothallis crassipes auct. non* Lindl., Rchb.f. in *Wawra Itin. Princ. S. Coburg* 2: 82. 1888.

The type specimen of *Stelis deregularis* is lost and the only extant, original material is the illustration which appeared in Barbosa Rodrigues’s *Iconographie des*

*orchidées du Brésil* and is now deposited in the library of Rio de Janeiro Botanical Garden. This illustration was copied and reproduced in black and white in Cogniaux (1896), and in color by Sprunger et al. (1996). It is here selected as the lectotype.

The name *Pseudostelis bradei* is based on a Brazilian collection by Alexander Curt Brade (1881–1971), numbered 7793, from Morros das Pedras, located in the municipality of Iguape, state of São Paulo, in 1919. The holotype was presumably destroyed at B during World War II, but duplicates exist at AMES, R, SP and US. Luer (1999) designated the specimen at US as the neotype, but as it is an extant original material, the use of neotype is to be

treated as an error and corrected to lectotype, according to Article 9.9 of the Code (McNeill et al. 2012). Barros (2004) provided a superfluous lectotypification for this taxon based on the duplicate at SP and mistakenly stated that the correct herbarium accession number of SP is “7703” not “7793.” He was certainly referring to the collector’s number not to the herbarium accession number. With exception of the specimen at SP, which carries 7703 as the collector’s number, all other duplicates agree with the protologue and bear “A. C. Brade 7793” on their labels. It should be noticed, however, that on the duplicate at AMES and the one at US the collection date is 1920, which is also most certainly erroneous.

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