

## THE CAPITATE-FLOWERED EPIPHYTIC SPIRANTHINAE (ORCHIDACEAE) AND A NEW GENUS FROM PARAGUAY

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Burns-Balogh, Pamela, Harold Robinson (Department of Botany, NHB 166, Smithsonian Institution, Washington, DC 20560), and Mercedes S. Foster (Museum Section, U.S. Fish and Wildlife Service, National Museum of Natural History, Washington, DC 20560). The capitate-flowered epiphytic Spiranthinae (Orchidaceae) and a new genus from Paraguay. *Brittonia* 37: 154–162. 1985.—The *Eurystyles* Alliance is reviewed with regard to column characters, and a new genus, *Synanthes*, is described. Three genera, *Eurystyles*, *Pseudoeurystyles*, and *Synanthes*, compose the alliance of capitate-flowered epiphytic Spiranthinae.

The orchid subtribe Spiranthinae is composed primarily of terrestrial members with spirally arranged, resupinate flowers and fleshy fascicled roots, such as *Spiranthes*. However, the subtribe also includes a few epiphytic species in tropical America notable for their condensed capitate inflorescences and small flowers. These inadequately known epiphytes show considerable diversity in the details of flower structure and have been placed in two genera, *Eurystyles* Wawra and *Pseudoeurystyles* Hoehne. Garay (1982) did not recognize *Pseudoeurystyles* in his revision of the subtribe. Balogh (1982), however, indicated that *Eurystyles sensu lato*, including *Pseudoeurystyles*, was probably composed of three distinct genera and, at best, that *Eurystyles* was a convenience genus for all epiphytic Spiranthinae with capitate inflorescences and ciliate bracts. A collection from Paraguay of another of these epiphytic Spiranthinae with capitate inflorescences prompted us to review relationships in this complex. On the basis of column structure, a new genus, *Synanthes*, is proposed.

*Eurystyles* was described by Wawra in 1863 as a monotypic genus. In Wawra's description the capitate inflorescence, hispid scape, acute staminodes, and ciliate bracts were among those characters mentioned for the genus. However, Wawra thought he was dealing with a member of the Zingiberales and could not decide in which of two families to place this monotypic genus because of overlapping characters. Ultimately, he recognized the genus as an intermediate between the Zingiberaceae and the "Scitaminae."

The description of *Eurystyles* was not noticed by orchidologists until 1923. Meanwhile, additional species that eventually were transferred to this genus were recognized by Schlechter (1920) as belonging to his new genus *Trachelosiphon*. Schlechter transferred three species of *Stenoptera* and one species of *Stenorhynchos* into his genus. Schlechter (1923) later recognized *Trachelosiphon* as a synonym of *Eurystyles* when he described *Eurystyles auriculata*. It was not until 1925, however, that Schlechter transferred all species previously treated as belonging to *Trachelosiphon* into *Eurystyles*. At that time there were nine species in *Eurystyles*. Schlechter (1920) described the column structure of *Trachelosiphon* as (translated from Latin):

Column slender, adnate to the lower base of the sepals, foot decurved, closely adnate to the lower ovary. Rostellum triangular, obtuse, thin, erect. Stigma lobes 2, colored midway between themselves. Anther ovate-cucullate, somewhat blunt. Pollinia clavate, viscidium rounded, small, suspended at the rostellum apex. Ovary sessile, ellipsoid, scarcely twisted . . .

He mentioned that the species appeared to be related to *Sarcoglottis*, probably because of the nectar tube present in both genera. In spite of his characterization

of the genus, Schlechter noted that in most cases he was not able to find a rostellum, and the pollinia lacked a viscidium. This was due to the poor condition of the pressed specimens that he studied.

Hoehne (1943) described a second genus of capitate epiphytes, *Pseudoeurystyles*, in the Spiranthinae, based on *Eurystyles cogniauxii*, *E. lorenzii*, and one new species, *Pseudoeurystyles schwackeana*. He described the column as follows (translated from Latin):

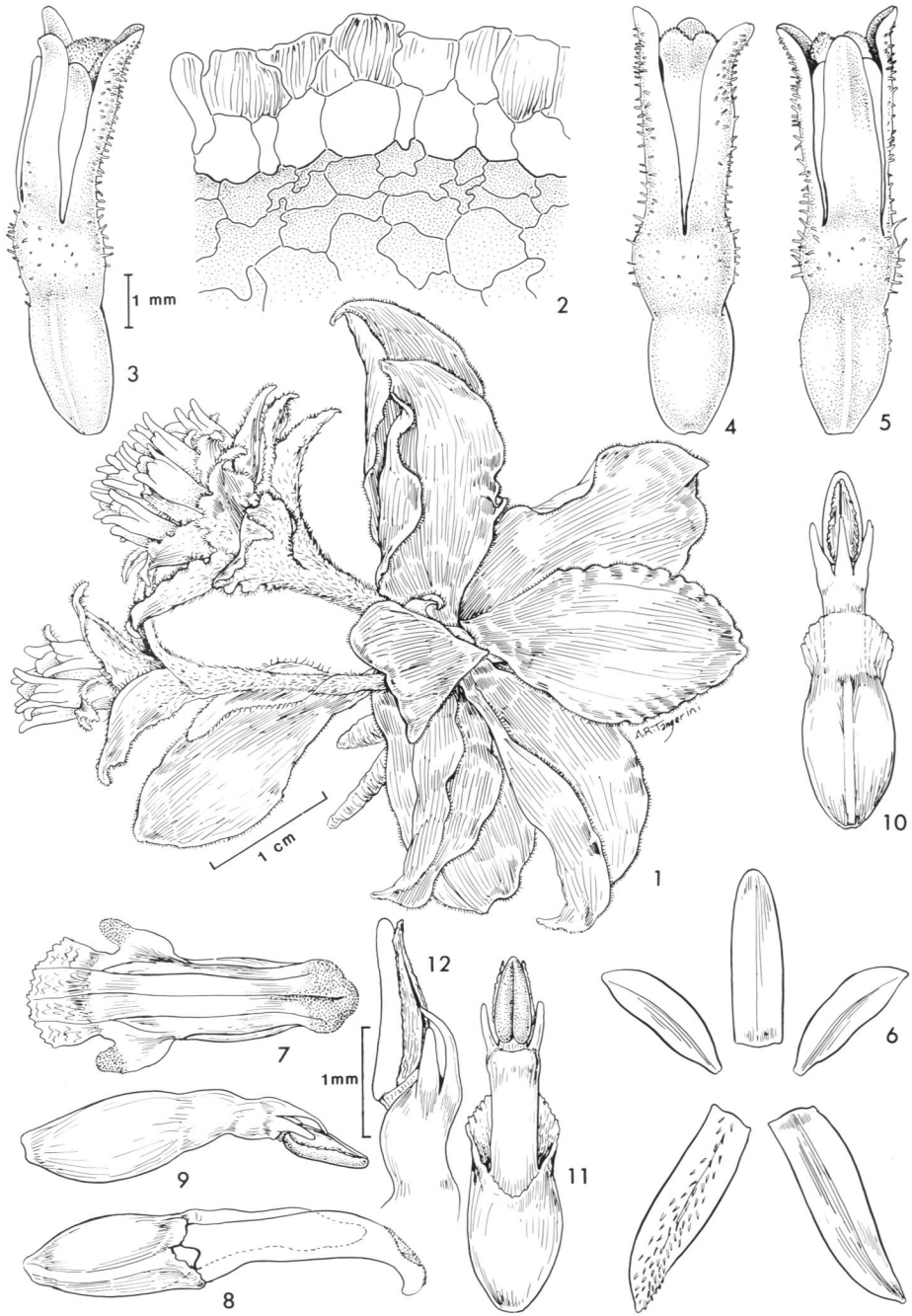
Lower column slender, semi-terete. Rostellum deeply trilobate, median lobe apically excised, lateral lobes acuminate. Anther oblong, narrow, basally subcordate, apically acute.

He also noted that the labellum lacked nectar glands.

In 1968 Heller described *Eurystyles borealis* from Nicaragua. Heller's plant was collected from the field and described from fresh material. In earlier correspondence with L. O. Williams (in litt.), Heller indicated that the species was not a *Lankesterella* because it lacked a spur, and that it was probably a *Eurystyles* in spite of an almost obsolete rostellum. The species formed an anomalous element in *Eurystyles* with a series of characteristics that are found again in the recent M. S. Foster collection from Paraguay (Figs. 1–12). To the extent that it is possible to determine, both species have staminodes that resemble the filament of the functional anther, a rostellum that is obsolete, no viscidium, a stigma that forms a narrow band across the column apex, a nectar spur hidden by the broad sepal bases, a column foot that is relatively long, and an anther mostly above the stigma similar to the type found in the neottioid orchids. The roots of the plants are greenish with the typical appearance of epiphytic orchid roots. The velamen, however, has only two layers of cells, the number typical of the Spiranthinae. No evidence of a larger number of cell layers, as is found in more advanced epiphytic Epidendroideae, is present. No root hairs are obvious in the two species, in contrast to the felt-like covering commonly illustrated in *Eurystyles* and *Pseudoeurystyles*. The roots seem small even for the comparatively small size of the plants, there being one or two roots about 2–10 mm long per inflorescence-bearing rosette in the type. Stolons were evident in the 1983 collections from moss-covered trees. Although in superficial appearance the two species found by Heller and Foster are similar to other epiphytic Spiranthinae with capitate inflorescences, the details, especially the position of the anther and the lack of a rostellum, place the species well beyond any reasonable definition of either *Eurystyles* or *Pseudoeurystyles*. The distinctions between the three different groups of species (genera) are summarized in Figure 13. As can be seen, the new genus, *Synanthes*, is isolated in the subtribe by the form of the stigma in a transverse band, the anther extending beyond the stigma, and the lack of a viscidium/rostellum.

It was fortunate that specimens of the new plant brought back from Paraguay flowered, thus enabling us to observe and illustrate living material (Figs. 1–12). The inflorescence seems to be characteristically borne in a horizontal or somewhat pendent position, agreeing with illustrations of *Eurystyles* and *Pseudoeurystyles*. Nectar is obvious in the flowers, indicating pollination by insects, but the insects probably alight on the head as a whole to probe at the flowers rather than alighting on the individual small flowers. The flowers are all directed upward in relation to the head and form a clump with all flowers essentially coinciding in their anthesis. The individual flowers are not twisted in relation to the axis of the inflorescence and, therefore, the labella face inward toward the center of the head.

It is likely that the pollinator may be a mosquito or a tiny moth, and Foster reported a large number of mosquitos in the forest. The small inflorescence and small flowers would not accommodate larger insects. Also, the comparatively



FIGS. 1-12. *Synanthes bertonii*. 1. Habit. 2. Cross-section of root surface. 3-5. Flowers in lateral, adaxial and abaxial views. 6. Sepals and lateral petals, one sepal showing outer surface. 7. Labellum, internal view. 8. Labellum, lateral view. 9-12. Flowers with perianth removed showing column morphology. 9. Lateral view. 10. Abaxial view. 11. Adaxial view. 12. Lateral view, enlarged.

## EURYSTYLES PSEUDOEURYSTYLES SYNANTHES

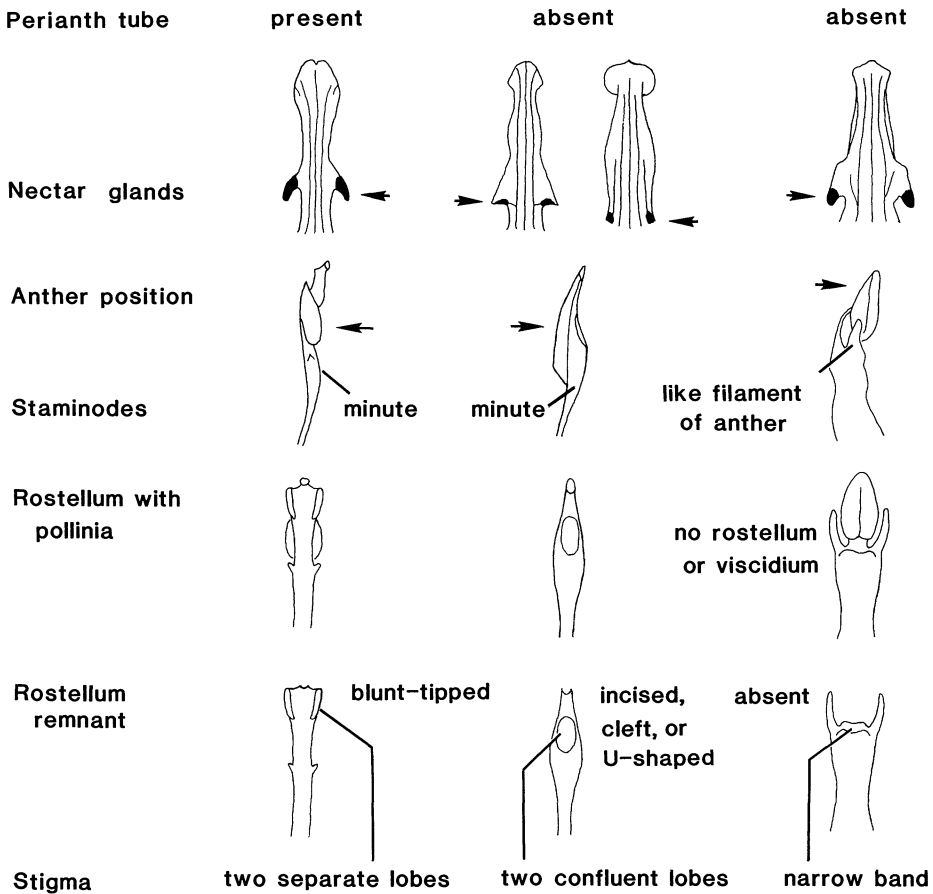


FIG. 13. Comparison of column and floral morphology of *Eurystyles*, *Pseudoeurystyles*, and *Synanthes*.

crumbly pollinia and the lack of a viscidium suggest no provision for transfer of the pollinia (pollinarium) as a whole, which might be expected if larger pollinators were involved. The reduced number of seeds in the ovary may be an adaptation by the plant to compensate for a less effective manner of pollen transfer.

Because of diversity of column and floral structure among the three genera, *Eurystyles*, *Pseudoeurystyles*, and *Synanthes*, it is necessary to question whether they are most closely related to each other. The epiphytic habit could have evolved in more than one line of Spiranthinae, each of which could show greater affinities to other genera. From the limited amount of material we were able to obtain from herbaria and from information obtained from illustrations of the species, *Eurystyles* closely resembles *Sauroglossum* in floral structure, whereas *Pseudoeurystyles* and *Synanthes* resemble *Spiranthes*. The capitate form of inflorescence could be a response to reliance on the same type of pollinators. Greenwood (pers. comm.) has noted that species of the predominantly terrestrial Mexican Spiranthinae that have reverted to an epiphytic habit (Robinson & Burns-Balogh, 1983) have condensed flowers. Nevertheless, the habits and inflorescence types of the three genera are similar, and the initial tendency is to regard them as related. If so, other

explanations for the differences in column form among the epiphytic genera would be necessary, since the differences seem to parallel those used to define alliances in other parts of the subtribe *Spiranthis*.

The column structure of *Pseudoeurystyles* presents no problem, being the cleft or incised rostellum remnant type, also found in *Spiranthes*, which is logically considered plesiomorphic in the subtribe. The rostellum in *Eurystyles* shows the type of reduction seen in the *Brachystele* Alliance, but such a reduction seems rather easily achieved, so easily that one cannot be certain that the *Brachystele* Alliance, which is defined by such a reduction, is a monophyletic group. The form of the column in the new genus, *Synanthes*, has no parallel in the rest of the *Spiranthis*, and the anther situated mostly above the stigma apex is similar to the *Neottioideae* rather than other *Spiranthis*. The latter anther position is accentuated by the lack of a rostellum and the lack of well-developed stigmatic lobes in the genus, a feature unlike the *Neottioideae*. There seems to be no reason to regard the variations in column structure in the three genera as indicative of closer relationship of any of the genera to elements outside of the group. As a result, the epiphytic *Spiranthis* with ciliate bracts and capitate inflorescences relying on small pollinators are regarded here as forming a separate and natural evolutionary unit in the subtribe.

The point of origin of the *Eurystyles-Pseudoeurystyles-Synanthes* relationship within the subtribe cannot be fixed with certainty, but the presence of the plesiomorphic type of rostellum in the group allows for derivation from the basal stock of the subtribe. Furthermore, the diversity of column structure within the relationship and the distribution in Paraguay and Nicaragua of even its most specialized genus would indicate at least some age for the group. For this reason, it is recognized as a distinct alliance within the subtribe, distinguished from the *Spiranthes*, *Pelexia*, *Stenorhynchos*, and *Brachystele* alliances of the *Spiranthis* by the characters mentioned below.

### Nomenclature and Taxonomy

#### EURYSTYLES Alliance

TYPE: *Eurystyles cotyledon* Wawra.

Epiphytic, rosulate, inflorescence capitate, bracts with ciliated margins, flowers non-resupinate, labella all directed inward.

#### *Synanthes* Burns-Balogh, H. Robinson & M. S. Foster, gen. nov.

TYPE: *Synanthes bertonii* Burns-Balogh, H. Robinson & M. S. Foster.

Plantae corticolae rosulatae. Inflorescentia in capitulo erecto terminata; bracteae minute ciliate fimbriatae; flores nonresupinati in fasciculo erecti, columna e perianthio libera, stigmatibus transverse taeniiforme, rostello et viscidio nullo, anthera supra apicem stigmatibus inserta, staminodiis filiformibus.

Herbaceous epiphyte. Roots fleshy, fascicled, thin, green-tipped. Leaves basal, ovate, persistent at flowering, margin ciliate. Inflorescence capitate, spreading to pendent, several-flowered. Scape ciliate; bracts few, leaf-like, ovate. Flowers erect, lip facing toward center of inflorescence, non-resupinate. Floral bracts leaf-like, ovate, green, margins ciliate. Calyx minutely puberulous, lateral sepals connate, forming a shallow nectar spur. Corolla glabrous. Column foot approximately equal in length to free column portion below stigma and adnate to ovary apex; stigma starting as a spot on each side near bases of staminodes, in maturity confluent and band-like, below anther; rostellum/viscidium absent; anther inserted just above stigma apex; staminodes filament-like; pollinia 4, each clavate.

***Synanthes bertonii* Burns-Balogh, H. Robinson & M. S. Foster, sp. nov. (Figs. 1-12)**

Folia basilaria margine ciliata supra glabra subtus verrucata 2.4-3.0 cm longa. Inflorescentiae in vita horizontales vel leviter pendentes; scapi albo-virides ad 11 cm longi puberuli, pilis septatis; calyx sparse puberulus, sepalis lateralibus basi connatis leviter falcatis lanceolatis obtusis ca 5.4 mm longis, sepalis dorsalibus e petalis lateralibus libris obtusis ca 5.0 mm longis; corollae albae glabrae, petalis lateralibus leviter falcatis oblongis obtusis 4-6 mm longis; labellum 6.5 mm longum oblongo-lanceolatum apice succulentum base unguiculatum, appendicibus nectareis claviformibus; columna sui generis. Ovarium viride tricostatum.

Leaves basal, with large water-filled cells, ciliate outer margin, upper surface glabrous, undersurface warty, 2.4-3.0 cm long. Scape with septate trichomes, greenish-white, to 11 cm long. Inflorescence pendent. Flowers several, narrow, tubular, upper 1/2 white, lower 1/2 green. Calyx with scattered trichomes on outer surface; lateral sepals connate at base, slightly falcate, lanceolate, obtuse, ca 5.4 mm long; dorsal sepal free of lateral petals, lanceolate, obtuse, ca 5.0 mm long. Corolla white, glabrous; lateral petals slightly falcate, oblong, obtuse, 4.6 mm long; labellum succulent at apex, oblong-lanceolate, clawed, nectar glands knob-like, 6.5 mm long. Ovary green, 3-ribbed. Column as described for genus.

TYPE: PARAGUAY. DPTO. ITAPUA: El Tirol, 19.5 km NNE of Encarnación, 170-260 m elevation (ca 27°11'S, 55°47'W), collected Sept 1982, flowered and pressed Oct 1983, *M. S. Foster 83-42* (HOLOTYPE: US).

This species was collected in the forest adjacent to Hotel El Tirol. The canopy in this southern temperate forest is relatively low, reaching about 15 to 18 m, and the understory is open. The climate is seasonal; October ( $\bar{X}$  rainfall/month = 171 mm, N = 11), November ( $\bar{X}$  = 165 mm, N = 11), and December ( $\bar{X}$  = 163 mm, N = 11) are the wettest months, and July is the driest month ( $\bar{X}$  = 109 mm, N = 12). Annual precipitation averages 1734 mm (N = 10). Temperatures are highest from November through February when mean monthly maxima exceed 35°C and lowest from May through September when mean monthly minima fall below 4°C and frosts occasionally occur.

The species appears to be rare and patchily distributed throughout the habitat. Two plants were first collected in 1978. A third was located in 1980, and two plants were collected each in 1981 and 1982. In 1983, 10 plants were collected. All plants were located in the tallest, least disturbed parts of the forest, between about 220 and 240 elevation. With one exception, the plants collected from 1978 to 1982 were large (>2 cm in diameter) and grew as isolated individuals, each on vertical trunks of trees with DBHs of 10-15 cm. All trees had bare, smooth bark. The other plant was collected on a vine (Bignoniaceae sp., ca 5 cm diameter) with smooth bark. The orchids were between 1 and 2 m above the ground.

The above microhabitat contrasts sharply with those in which the 10 specimens were collected in 1983. Many of these were very small plants (<1 cm diameter, 1 or 2 leaves) and were taken from vertical trunks of three trees (DBH ca 25 cm) covered with a dense, deep (10-20 mm) growth of moss (*Zelometeorium patulum* (Hedw.) Manuel (Meteoriaceae)). The leaves of all specimens observed were nearly obscured by the moss. The plants were in a zone between 1 and 3 m above the ground. Two of the trees with three large plants each were only 40 cm apart. Close scrutiny of other trees nearby did not reveal any additional individuals of *S. bertonii*.

The plants collected in 1983 seemed to form networks, with stolons extending from the large main plant and connecting to tiny, new plants, producing a cluster. One plant collected in October 1978 was in flower, but was not preserved. Several collected in October 1983 had dehisced pendent seed pods in the field, but these were not preserved.

An attempt was made to bring all plants collected back to the United States for cultivation, but efforts were unsuccessful until September 1982. These particular plants, maintained in a greenhouse in northern Virginia, flowered in October 1983, and a type specimen was prepared.

We are pleased to name this species in honor of Hernando Bertoni, Minister of Agriculture and Livestock of Paraguay, who, in keeping with a long family tradition, has been an active supporter of conservation and natural history studies in Paraguay.

The following additional species is recognized in the genus.

***Synanthes borealis* (Heller) Burns-Balogh, H. Robinson & M. S. Foster, comb. nov.**

*Eurystyles borealis* Heller, Fieldiana, Bot. 31: 279–281. 1968. TYPE: NICARAGUA. *Heller 10861* (HOLOTYPE: F!).

Other genera and species described in the Alliance are as follows:

**EURYSTYLES Wawra**

*Eurystyles* Wawra, Oesterr. Bot. Z. 13: 223. 1863. TYPE: *E. cotyledon* Wawra.  
*Trachelosiphon* Schltr., Beih. Bot. Centralbl. 37: 423. 1920. LECTOTYPE: *Spiranthes actinosophila* Barb. Rodr.

***Eurystyles actinosophila* (Barb. Rodr.) Schltr.**

*Spiranthes actinosophila* Barb. Rodr., Orch. Nov. 2: 286. 1881. *Eurystyles actinosophila* (Barb. Rodr.) Schltr., Repert. Spec. Nov. Regni Veg. Beih. 35: 39. 1925. TYPE: BRAZIL. MINAS GERAIS, *Barbosa Rodrigues s.n.* (unknown, drawing at BR?).

***Eurystyles alticola* Dod**

*Eurystyles alticola* Dod, Moscosoa 1(3): 49–51. 1978. TYPE: DOMINICAN REPUBLIC. Santo Domingo, *Dod 609* (ISOTYPE: US!).

***Eurystyles ananassocomos* (Rchb.f.) Schltr.**

*Stenoptera ananassocomos* Rchb.f., Bot. Zeitung (Berlin) 21: 131. 1863. *Eurystyles ananassocomos* (Rchb.f.) Schltr., Repert. Spec. Nov. Regni Veg. Beih. 35: 39. 1925. TYPE: JAMAICA, *Wullschlaegel 1077* (W—Reichenbach herb!).

***Eurystyles auriculata* Schltr.**

*Eurystyles auriculata* Schltr., Repert. Spec. Nov. Regni Veg. Beih. 19: 86. 1923. TYPE: COSTA RICA, *Brade 1076* (B—destroyed WW-II; drawing AMES!).

***Eurystyles colombiana* (Schltr.) Schltr.**

*Trachelosiphon colombianum* Schltr., Repert. Spec. Nov. Regni Veg. Beih. 7: 69. 1920. *Eurystyles colombiana* (Schltr.) Schltr., Repert. Spec. Nov. Regni Veg. Beih. 35: 39. 1925. TYPE: COLOMBIA. CAUCA, *Madero s.n.* (B?).

***Eurystyles cotyledon* Wawra**

*Eurystyles cotyledon* Wawra, Oesterr. Bot. Z. 13: 233. 1863. TYPE: BRAZIL. BAHIA: Ilhéus, *Wawra s.n.* (W, cited by Garay (1982), not found in collection by curator, presumably lost, drawing W—Reichenbach herb!).

*Stenoptera roehlii* Schnee, Bol. Acad. Ci. Fis. 9: 249. 1946. TYPE: VENEZUELA. DISTRITO FEDERAL: Avila, *E. Röhl 48* (VEN).

*Eurystyles cristata* (Schltr.) Schltr.

*Trachelosiphon cristatum* Schltr., Repert. Spec. Nov. Regni Veg. Beih. 7: 69. 1920. *Eurystyles cristata* (Schltr.) Schltr., Repert. Spec. Nov. Regni Veg. Beih. 35: 39. 1925. TYPE: COLOMBIA. CAUCA, Madero s.n. (B?).

*Eurystyles domingensis* Dod

*Eurystyles domingensis* Dod, Moscosoa 1(2): 43. 1977. TYPE: DOMINICAN REPUBLIC. Santo Domingo, Villa Altagracia, Dod 475 (HOLOTYPE: SDM; ISOTYPE: US!).

According to Garay (1978, 1982) this equals *Eurystyles gardneri* which is treated here under *Pseudoeurystyles*, but on limited examination, the types seem different.

*Eurystyles guentherana* (Kraenzl.) Garay

*Stenoptera guentherana* Kraenzl., Repert. Spec. Nov. Regni. Veg. 25: 19. 1928. *Eurystyles guentherana* (Kraenzl.) Garay, Bot. Mus. Leafl. 28: 319. 1982. TYPE: BOLIVIA. Mapiri, San Miguel, Buchtien 483 (B?).

*Eurystyles paranaensis* (Schltr.) Schltr.

*Trachelosiphon paranaensis* Schltr., Repert. Spec. Nov. Regni Veg. 16: 327. 1920. *Eurystyles paranaensis* (Schltr.) Schltr., Repert. Spec. Nov. Regni Veg. Beih. 35: 39. 1925. TYPE: BRAZIL. PARANÁ, Dusen s.n. (B?).

*Eurystyles standleyi* Ames

*Eurystyles standleyi* Ames, Sched. Orchid. 9: 9. 1925. TYPE: COSTA RICA, Standley 33747 (AMES!, US!).

## PSEUDOEURYSTYLES Hoehne

*Pseudoeurystyles* Hoehne, Arq. Bot. Estado São Paulo 1(6): 129. 1943. *Eurystyles* sect. *Pseudoeurystyles* (Hoehne) Pabst, Bradea 1(47): 469. 1974. LECTOTYPE: *Stenoptera lorenzii* Cogn.

*Pseudoeurystyles cogniauxii* (Kraenzl.) Hoehne

*Stenorhynchos cogniauxii* Kraenzl., Kongl. Svenska. Vetenskapsakad. Handl. 46(10): 25. 1911. *Trachelosiphon cogniauxii* (Kraenzl.) Schltr., Beih. Bot. Centralbl. 37(2): 425. 1920. *Eurystyles cogniauxii* (Kraenzl.) Schltr., Repert. Spec. Nov. Regni Veg. Beih. 35: 39. 1925. *Pseudoeurystyles cogniauxii* (Kraenzl.) Hoehne, Arq. Bot. Estado São Paulo 1(6): 130. 1943. TYPE: BRAZIL. MINAS GERAIS: Caldas, Regnell III: 1204 (S).

*Pseudoeurystyles gardneri* (Lindley ex Gardn.) Hoehne

*Spiranthes gardneri* Lindley ex Gardn., London J. Bot. 1: 190. 1842. *Pseudoeurystyles gardneri* (Lindley ex Gardn.) Hoehne, Fl. Bras. 12(2): 167. 1945. *Eurystyles gardneri* (Lindley ex Gardn.) Garay, Fl. Ecuador 9: 257. 1978. TYPE: BRAZIL. GUANABARA: Corcovado, Gardner 128(3) (K).

Considered to include material from Ecuador and *Eurystyles domingensis* Dod from Santo Domingo by Garay (1978, 1982). If so, this is the only *Pseudoeurystyles* species occurring outside of Brazil.

*Pseudoeurystyles lorenzii* (Cogn.) Hoehne

*Stenoptera lorenzii* Cogn., Fl. Bras. 3(4): 255. 1895. *Trachelosiphon lorenzii* (Cogn.) Schltr., Repert. Spec. Nov. Regni Veg. Beih. 35: 39. 1925. *Eurystyles lorenzii* (Cogn.) Schltr., Beih. Bot. Centralbl. 37(2): 425. 1920. *Pseudoeurystyles lorenzii* (Cogn.) Hoehne, Arq. Bot. Estado São Paulo 1(6): 130. 1943. TYPE: BRAZIL. SANTA CATARINA: Blumenau, Lorenz s.n. (BR).

*Pseudoeurystyles schwackeana* Hoehne

*Pseudoeurystyles schwackeana* Hoehne, Arq. Bot. Estado São Paulo 1: 130. 1943. TYPE: BRAZIL. GUANABARA: Tijuca, Schwacke 6336 (RB).

### Acknowledgments

We thank Alice Tangerini for illustrating the new genus and Roy W. McDiarmid for cultivating the material. We also thank Hernando Berton, Minister of Agriculture and Livestock, and Ing. Hilario Moreno of the Servicio Forestal Nacional of Paraguay who arranged for plant collecting permits. We are grateful to Armando and Miguela Reynaers, owners of El Tirol, for allowing Foster to conduct research on their property. Rainfall data were obtained from records maintained at Hotel El Tirol. Temperature data for Capitan Miranda, about 4 km southwest of El Tirol, were obtained from the Meteorological Service of the Paraguayan Ministry of Defense. Finally, we thank the reviewers of this manuscript, Edward Greenwood, Roy W. McDiarmid, and Robert Dressler, for their comments.

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### ERRATUM

Allred, Kelly W. (Department of Animal and Range Sciences, New Mexico State University, Las Cruces, NM 88003). Morphologic variation and classification of the North American *Aristida purpurea* complex (Gramineae). *Brittonia* 36(4): 382–395. 1984.

I erroneously credited Arnou et al. (1980) with a statement about *Aristida arizonica* (p. 382). This reference should be deleted from the paper. I offer my sincere apologies to Mrs. Arnou and her colleagues for this error.—KELLY W. ALLRED.