

The *Tillandsia adpressa* Assemblage: A Review and New Combinations in *Racinaea* (Bromeliaceae: Tillandsioideae)

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ABSTRACT. Studies of the Bromeliaceae have led to a reevaluation of the four-taxa *Tillandsia adpressa* André assemblage. Herbarium research and field studies show that three of the taxa in the assemblage should be recognized at the specific rank, while the remaining one should be transferred to subspecific status. All taxa are transferred to *Racinaea* as follows: *R. adpressa* (André) J. R. Grant, *R. adpressa* subsp. *orthiantha* (Standley) J. R. Grant, *R. miniata* (Rauh) J. R. Grant, and *R. schumanniana* (Wittmack) J. R. Grant. A discussion of the nomenclature, lists of exsiccatae, and a key to the taxa are provided.

The *Tillandsia adpressa* André assemblage has been treated in several manners. Smith (1930) created the "assemblage" by reducing *Tillandsia tonduziana* Mez and *T. orthiantha* Standley to varietal status under *T. adpressa* and placing *T. schumanniana* in synonymy with *T. tonduziana*. Mez in Engler (1935) returned each of these taxa to specific rank and arranged the taxa into two groups. Mez placed *T. schumanniana* near *T. orthiantha*, and *T. adpressa* near *T. tonduziana*, in different species groups. Standley (1937) followed Smith (1930) and treated *T. tonduziana* and *T. orthiantha* as varieties of *T. adpressa*, but did not mention either *T. schumanniana* or the typical form. Rauh (1974) examined the group further and described an additional variety, *T. adpressa* var. *miniata*. Smith & Downs (1977) followed the taxonomy of Smith (1930), but overlooked Rauh's new variety. Based on obovate, asymmetric sepals, the taxa comprising the *T. adpressa* assemblage are here transferred to *Racinaea* M. A. Spencer & L. B. Smith (Spencer & Smith, 1993), previously *Tillandsia* subg. *Pseudocatopsis*.

Although both Smith (1930) and Rauh (1974) considered the four taxa to be closely related, I believe that the group is not monophyletic. Both *Racinaea adpressa* and *R. adpressa* subsp. *orthiantha* are more closely related to *R. cuspidata* than either *R. miniata* or *R. schumanniana*; the latter two are more closely related to other elements including *R. tetrantha*.

KEY TO THE TAXA OF THE *RACINAEA ADPRESSA* "ASSEMBLAGE"

- 1a. Plants caulescent; leaves short and many; flowering plants 9–12 cm tall; branches of inflorescence inconspicuous, 3–7 mm long, sessile, with 1–4 small clustered flowers *R. miniata*
- 1b. Plants acaulescent; leaves longer and fewer; flowering plants 13–38 cm tall; branches of inflorescence distinct, 6–55 mm long, pedicellate, dense to laxly 4–13-flowered.
 - 2a. Scape and inflorescence usually completely erect at anthesis, pendent in fruit, the rachis linear to slightly flexuous; branches of inflorescence spreading to reflexed at maturity, diffusely flowered.
 - 3a. Sepals 4–5 mm long *R. schumanniana*
 - 3b. Sepals 6–9 mm long *R. tetrantha*
 - 2b. Scape erect to arching, rachis strictly linear, narrowly cylindrical to claviform in outline; the inflorescence declinate to pendent; branches of inflorescence strictly appressed to the rachis, densely flowered.
 - 4a. Sepals and floral bracts cuspidate *R. cuspidata*
 - 4b. Sepals and floral bracts no more than apiculate.
 - 5a. Sepals 5–6 mm long, shorter to equaling the floral bracts; lower primary bracts $\frac{1}{2}$ – $\frac{3}{4}$ the length of the subtending branch; plants of Colombia, Ecuador, and Peru *R. adpressa* subsp. *adpressa*
 - 5b. Sepals 7–9 mm long, exceeding the floral bracts; lower primary bracts exceeding the subtending branch; plants of Costa Rica and Panama *R. adpressa* subsp. *orthiantha*

1. *Racinaea adpressa* (André) J. R. Grant, comb. nov. Basionym: *Tillandsia adpressa* André, Énum. Bromel. 6. 13 Dec. 1888. TYPE: Ecuador. Pichincha: Pululahua Volcano, June 1876, André 3792 (holotype, K; photos GH, US).

Most specimens of *Racinaea cuspidata* at US have been incorrectly identified as *R. adpressa*. *Racinaea adpressa* is similar to *R. cuspidata* in having erect branches but differs in its generally broader leaf blades, reflexing (not erect to spreading)

flowers, and separate geographical distribution, i.e., separate slopes of the Andes (Luther, pers. comm.). Its lateral branches that are appressed to the rachis, an erect to arching scape, and declinate to strictly pendent inflorescence also separate it from both *R. miniata* and *R. schumanniana*.

Smith (1930) stated that the only character differentiating *Tillandsia adpressa* from *T. schumanniana* was the erect nature of its branches. He also stated that *Tillandsia orthiantha* only differed from *T. adpressa* by a more densely flowered inflorescence. Recent collections show an overall wider range of characters in specimens than those available to Smith (1930). They do, however, also exhibit characters that show clearer species trends. *Racinaea adpressa* subsp. *adpressa* differs from *R. adpressa* subsp. *orthiantha* by a distinctly cylindrical vs. claviform inflorescence outline, lateral branches that are less compactly situated along the rachis, shorter sepals, and bracts that do not exceed their subtending branches. Observations from fresh flowers have not been made to date.

Specimens examined. ECUADOR. **Pichincha:** Chiriboga, old road Quito-Santo Domingo, 15 July–15 Oct. 1983, *Hirtz 1027* (SEL); old road from La Palma to Quito via Chiriboga, 23 Oct. 1989, *Luther, Kress, Brown & Roesel 2762* (SEL). **Imbabura:** along the Río Crystal E of Lita, 5 Dec. 1991, *Girko E91D 051* (SEL).

2. *Racinaea adpressa* subsp. *orthiantha* (Standley) J. R. Grant, comb. et stat. nov. Basionym: *Tillandsia orthiantha* Standley, J. Wash. Acad. Sci. 17: 248. 1927. *Tillandsia adpressa* André var. *orthiantha* (Standley) L. B. Smith, Contr. Gray Herb. 89: 9. 1930. TYPE: Costa Rica. San José: Laguna de la Chonta, NE of Santa María de Dota, 2,000–2,100 m, 18 Dec. 1925, *Standley 42312* (holotype, US).

Racinaea adpressa subsp. *orthiantha*, which ranges from Costa Rica to Panama, is perhaps the most poorly known of the four taxa that make up the assemblage. *Racinaea adpressa* subsp. *orthiantha* differs from the sympatric *R. schumanniana* by a stout, erect inflorescence and densely flowered spikes, which are erect and appressed to the rachis. I place it at the subspecific rank because I believe it better reflects the relationship of *orthiantha* to *adpressa* than the varietal does.

Paratype. COSTA RICA. **San José:** Laguna de la Chonta, NE of Santa María de Dota, 2,000–2,100 m, 18 Dec. 1925, *Standley 42348* (US).

Specimens examined. COSTA RICA. **Alajuela:** near main entrance to Parque Nacional Volcán Poás, just outside of the park, 15 Jan. 1991, *Grant 91-01401, Rundell & Ramirez* (CR, US). **Cartago:** Cartago, 6,000 ft., 15

Dec. 1948, *Foster 2687* (US), *Foster 2688* (US); 22 mi. S of Cartago on Inter-American Hwy., N slope Talamanca Mts., Station 29, 17 July 1962, *Haines & Haines 726* (US), *Haines & Haines 739* (US); 18 mi. S of Cartago on Inter-American Hwy., 0.1 mi. SW of El Empalme, N side of Talamanca Mts., Station 53, 5 Aug. 1962, *Haines & Haines 767* (US). PANAMA. **Chiriqui:** along trail N of Cerro Punta, 29 May 1970, *Croat 10516* (US).

3. *Racinaea miniata* (Rauh) J. R. Grant, comb. et stat. nov. Basionym: *Tillandsia adpressa* André var. *miniata* Rauh in Abh. Akad. Wiss. Lit. Mainz, Math.-Naturwiss. Klasse, Trop. Subtrop. Pflanzenwelt 13: 5. 1974. TYPE: Ecuador. Tungurahua: 20 km Baños versus via Puyo, July 1973, *Rauh 34820* (holotype, HEID not seen; isotype, US).

Racinaea miniata is easily separated from the other taxa in the assemblage by its caulescence, clustered growth habit, much smaller size, short, narrow leaves, short inflorescence, and reduced, inconspicuous lateral branches with only 1–4 flowers.

Specimens examined. COLOMBIA. **Antioquia:** along the road Ventanas-El Cedro, 1,700 m, 15 Mar. 1989, *Dalstrom 1283* (SEL). ECUADOR. **Napo:** wet forest near Baeza, 1,900 m, 23 Feb. 1982, *Luer & Hirtz 7014* (SEL). **Morona-Santiago:** vic. Limón, ca. 1,300 m, 3 July 1989, *Girko E89033* (SEL). PERU. **San Martín:** Vic. Moyabamba, *Soerries 1984* (SEL).

4. *Racinaea schumanniana* (Wittmack) J. R. Grant, comb. nov. Basionym: *Catopsis schumanniana* Wittmack, Bot. Jahrb. 11: 70. 1890. *Tillandsia schumanniana* (Wittmack) Mez, DC. Monogr. Phan. 9: 740. 1896. TYPE: Colombia. Antioquia: Amalfi, 2,000 m, 22 Sep. 1884, *Lehmann XXII* (holotype, G not seen; photos SEL, US).

Tillandsia tonduziana Mez, Bot. Jahrb. 30, (Beibl. 67): 9. 1901. *Tillandsia adpressa* André var. *tonduziana* (Mez) L. B. Smith, Contr. Gray Herb. 89: 8. 1930. TYPE: Costa Rica. San José: La Palma, *Tonduz 9708* (holotype, BR not seen; photos GH, US).

Racinaea schumanniana, the most wide-ranging of the four taxa in the assemblage, is also the most morphologically variable. Ranging from Costa Rica to Bolivia, it is characterized by an erect inflorescence with conspicuous lateral branches spreading at about a 45° angle. The typical length of the inflorescence is 25–38 cm long, but is much reduced (to 13 cm) in depauperate specimens (e.g., *Girko E90-20*, SEL).

In addition to morphological characters, the taxa can be further differentiated by recent observations from the field. Luther (pers. comm.) has found that in Ecuador *Racinaea schumanniana* and *R. min-*

iata are sympatric, while *R. adpressa* is found on geographically separate slopes of the Andes. My own observations in Costa Rica have shown that *R. schumanniana* and *R. adpressa* subsp. *orthiantha* are sympatric.

Specimens examined. COSTA RICA. **Alajuela:** NW of San Ramón, km 23 Balsa Road to Fortuna, near the waterfall of San Ramón, 18 Feb. 1990, *Grant 90-00795, Hall, Wright & Williams* (CR, US). **Cartago:** El Muneco, on the Río Navarro, 1,400–1,500 m, 06–07 Mar. 1926, *Standley 51667 & Torres R.* (US). **Limón:** Guapiles, Los Angeles, San Miguel, between the Río Blanco and the Río Blanco, 1,300 m, 21 Feb. 1990, *Grant 90-00826* (CR, US). **Puntarenas:** Monteverde Reserve, 2 km SW of station, 10°18'N, 84°48'W, 1,500–1,550 m, 19 Nov. 1992, *Ingram 1754 & Ferrell-Ingram* (SEL). **San José:** SW slope of Cerro San Francisco, along the road from Santa María de Dota to El Empalme, 1 km SE of Jardín, 2,150 m, 27 Feb. 1990, *Grant 90-00891 & Grayum* (CR, US). PANAMA. **Chiriquí:** Bajo Chorro, Bogneti District, 13 Feb. 1938, *Davidson 280* (US). COLOMBIA. **Antioquia:** along the road Ventanas–El Cedro, 1,700 m, 15 Mar. 1989, *Dalstrom 1284* (SEL). **Boyaca:** Sierra Nevada del Cocuy, near Bachira, 2,100 m, 20 Aug. 1957, *Grubb 615, Curry & Fernandez-Perez* (US). **Santander:** Eastern Cordillera, S slope of Mount San Martín, near Charta, 2,300–2,500 m, 10 Feb. 1927, *Killip 19197 & Smith* (US). **Valle:** La Cumbre, Cordillera Occidental, 1,800–2,100 m, 14–19 May 1922, *Pennell 5746 & Killip* (US). VENEZUELA. **Falcón:** Sierra de San Luis, entre La Tabla y la bifurcación de la carretera hacia el Hotel Parador, 1,000–1,300 m, 18 July 1967, *Steyermark 99053-A* (US). **Zulia:** Campamento Frontera VI, on tepui-like sandstone ridge 4 by 0.5–1 km running E–W, E of the international border, between the headwaters of the Río del Norte and the southernmost branch of Río Aricuaísa, 9°30'N, 73°06'W, 2,400 m, 23–28 July 1974, *Berry 170* (US). ECUADOR. **Loja:** Cordillera de Sabanilla, 15 km S of Yangana, 2,480 m, 31 Dec. 1980, *M. & D. Madison & L. & A. Besse 7451* (SEL, US). **Morona-Santiago:** 8 km S of San Juan Bosco, 1,600 m, 02 Jan. 1981, *M. T. & D. Madison & L. & A. Besse 7545* (SEL). **Napo:** Cosanga, km 112 Quito–Tena, 1,850 m, 17 June 1983, *C. H. & P. M. Dodson, Benzing & Hirtz 14012* (SEL). **Pastaza:** along new road N Mera, 1,400 m, 10 Jan. 1986, *Dalstrom & Hoijer 1028* (SEL). **Sucumbios:** Gonzalo Pizarro Canton, Parroquia Reventador, Pre-

Cooperativa Garcia Moreno, Tercera Linea al N de la carretera, cerca al Río Due, 77°35'W, 00°03'N, 1,800 m, 23 May 1990, *Ceron & Ayala 9866* (SEL). **Tungurahua:** near Baños, 1,500 m, 26 Feb. 1973, *Rauh 34821* (US). **Zamora-Chinchipe:** along road Guisme-Condor, 1,700 m, 19 Jan. 1989, *Hoijer & Dalstrom 1167* (SEL). PERU. **Amazonas:** ca. 17 trail km E of La Peca in Serranía de Bagua, 1,850–1,900 m, 14 June 1978, *Gentry 23011, Dillon, Aronson, Diaz, & Barbour* (US). **Huanuco:** near Tingo María, May 1984, *Sorries s.n.* (SEL). **San Martín:** roadside at km 12 Tarapoto–Yuri–Maguas, 13 Sep. 1981, *Luther, Besse & Halton 702* (SEL). BOLIVIA. **La Paz:** Larecaja, Tipuani Valley, Hacienda Casana, 02 Dec. 1922, 1,400 m, *Buchtien 7188* (US); km 19 Coroico–La Paz, 1,850 m, Jan. 1983, *Besse s.n.* (SEL).

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