

A GUIDE TO THE SPECIES OF *TILLANDSIA* REGULATED BY APPENDIX II OF CITES

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ABSTRACT. As of 11 June 1992, international trade in seven species of *Tillandsia* (Bromeliaceae) is regulated under Appendix II of CITES. To facilitate identification, *Tillandsia harrisii*, *T. kammii*, *T. kautskyi*, *T. mauryana*, *T. sprengeliana*, *T. sucrei*, *T. xerographica* are described and illustrated.

INTRODUCTION

At the eighth meeting of the Conference of the Parties, the Convention on International Trade in Endangered Species of Wild Fauna and Flora (CITES), held in Kyoto Japan, March 1992, two proposals (by Austria and Germany) were made to regulate trade in the bromeliad genus *Tillandsia*. Both proposed to list the entire genus (400-600 species) under CITES Appendix II. After opposition by the delegates of several of the range states (Bolivia, Guatemala, Honduras and Mexico) and the Netherlands, Switzerland and the United Kingdom, the proposal by Austria was withdrawn and the proposal from Germany was modified to include only seven species for listing on Appendix II. This proposal was accepted without objection. Regulation for these became effective on 11 June 1992.

To facilitate the identification, by regulatory officials, of the seven affected species of *Tillandsia*, this guide has been produced. Descriptions have been prepared based on examination of living specimens and supplemented by the published literature. In all cases, studies have included several examples of each species, growing under a variety of conditions and at different stages of maturity. Gross vegetative characters of each species are emphasized in the text and illustrations.

NOTE: *Tillandsias* prepared for shipment are often dried slightly. This usually results in increased recurving of the leaf blade toward the base of the plant and the leaf cross-section becoming more channeled or involute. Trichomes from dry plants should be examined and compared to the SEM photographs; wetting will mat the trichomes and obscure their features. Trichome features can be examined adequately under high magnification of a standard binocular dissecting microscope. Mature leaves taken from the lower 1/3 of the rosette are best; the abaxial (lower) surface of the leaf blade is usually free of dust or debris and is the area represented on the

SEM photographs. Trichomes vary in size, shape and density on other parts of the leaf.

Tillandsia harrisii R. Ehlers, *die Bromelie* 1987(3):34-6. 1987. See also R. Ehlers, *die Bromelie* 1987(4):54. 1987; R. Ehlers, *Journal of the Bromeliad Society* 39:75-6. 1989; H. Shimizu, *Tillandsia Handbook* 18. Japan Cactus Planning Co. Press, Shizuoka. 1992. Figures 1, 8a-b, 15.

DISTRIBUTION. Known for certain only from the cliffs along the Rio Teculután, El Zapato, Department of Zacapa, Guatemala at 500 m elevation.

STATUS IN HORTICULTURE. Common in cultivation.

DESCRIPTION. **Plant** a lithophyte, short to long caulescent, 6-30 (rarely to 80) cm tall, single or clustering; roots wiry, 1-2 mm in diameter, brown. **Leaves** densely arranged, spreading to recurving, often secund curving, 30 to 60 in number, light grey to silver-white. **Leaf sheaths** broadly elliptic, 20-30 mm wide, brown but densely and coarsely pale lepidote except at the extreme base. **Leaf blades** narrowly triangular, acute to attenuate, 10-25 cm long, 10-15 mm wide, channeled to involute, rather soft and brittle, densely covered with coarse, spreading, white trichomes and appearing slightly rough or pruinose. **Scape** erect, exerted above the leafy rosette. **Scape bracts** like the leaves but shorter. **Inflorescence** simple, cylindrical, 6-15 cm long, polystichously 5-to 10-flowered. **Floral bracts** broadly elliptic, rounded and apiculate to acute, 30-45 mm long, mostly or completely glabrous, shiny, orange to red. **Flowers** lasting a single day. **Sepals** oblanceolate, acute, 26-30 mm long, the adaxial pair carinate and 3-5 mm connate, pale green. **Corolla** tubular. **Petals** very narrowly oblanceolate, 55-60 mm long, shorter than the stamens and style, blue-violet.

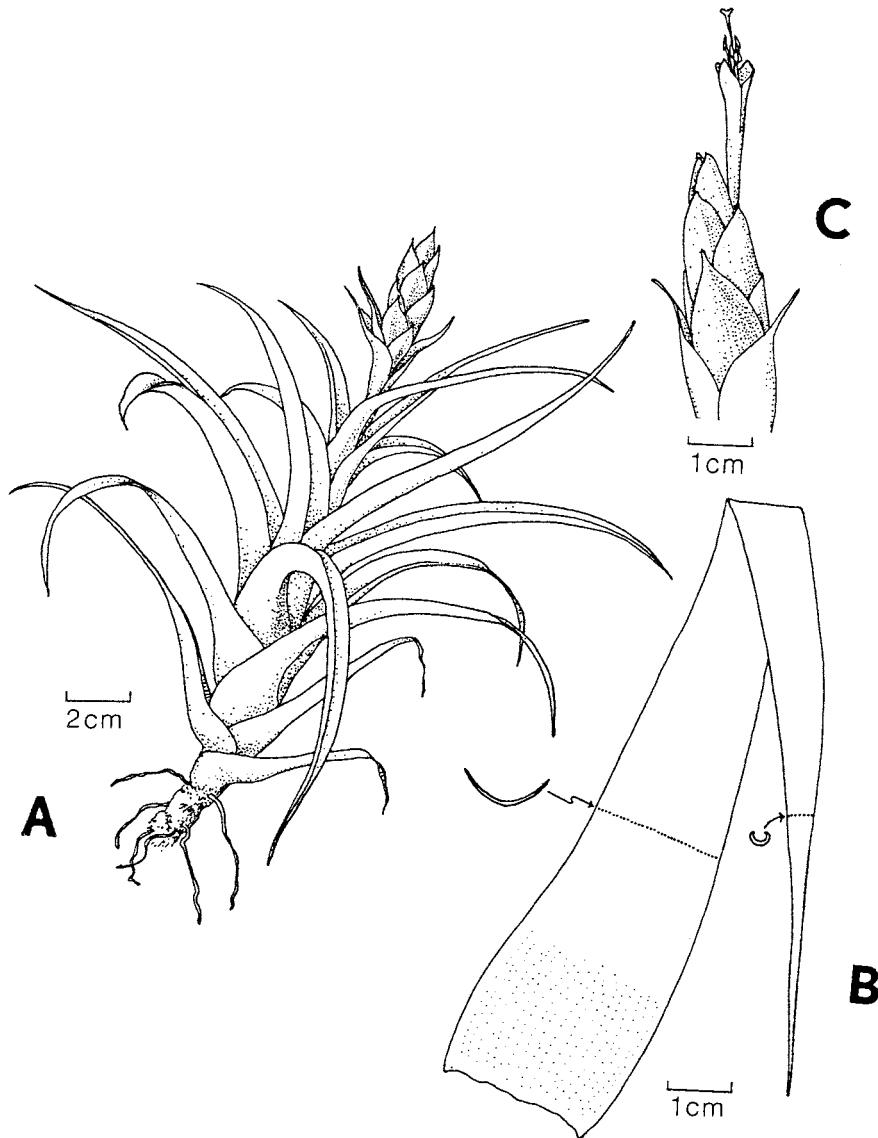


FIGURE 1. *Tillandsia harrisii*. A, habit. B, leaf. C, inflorescence.

SUMMARY. Small to medium (usually 6–30 cm tall; old, very long caulescent specimens are unlikely to be encountered) caulescent plant with spreading to recurving, channeled to involute leaves that appear slightly rough or pruinose and light grey to silver-white; a cylindrical inflorescence of red to orange bracts with a blue-violet, tubular corolla.

VEGETATIVELY RESEMBLES:

Tillandsia hondurensis Rauh, which is nearly stem-

less or very short caulescent with much shorter and narrower straighter leaves;

Tillandsia aff. *capitata* Grisebach (hort. synonym: *T.* “Sphaerocephala”) which has longer, more numerous and more densely arranged grey-green or dark grey leaves that are often tinged pink or salmon.

NOTE. *Tillandsia harrisii* is sometimes labelled by nurserymen as *T.* “Blanca”, *T.* “Sphaerocephala Alba”, *T.* “Himnorum” or *T.* “Capitata White”. It is propagated by offsets in large quantities by Guatemalan nurserymen.

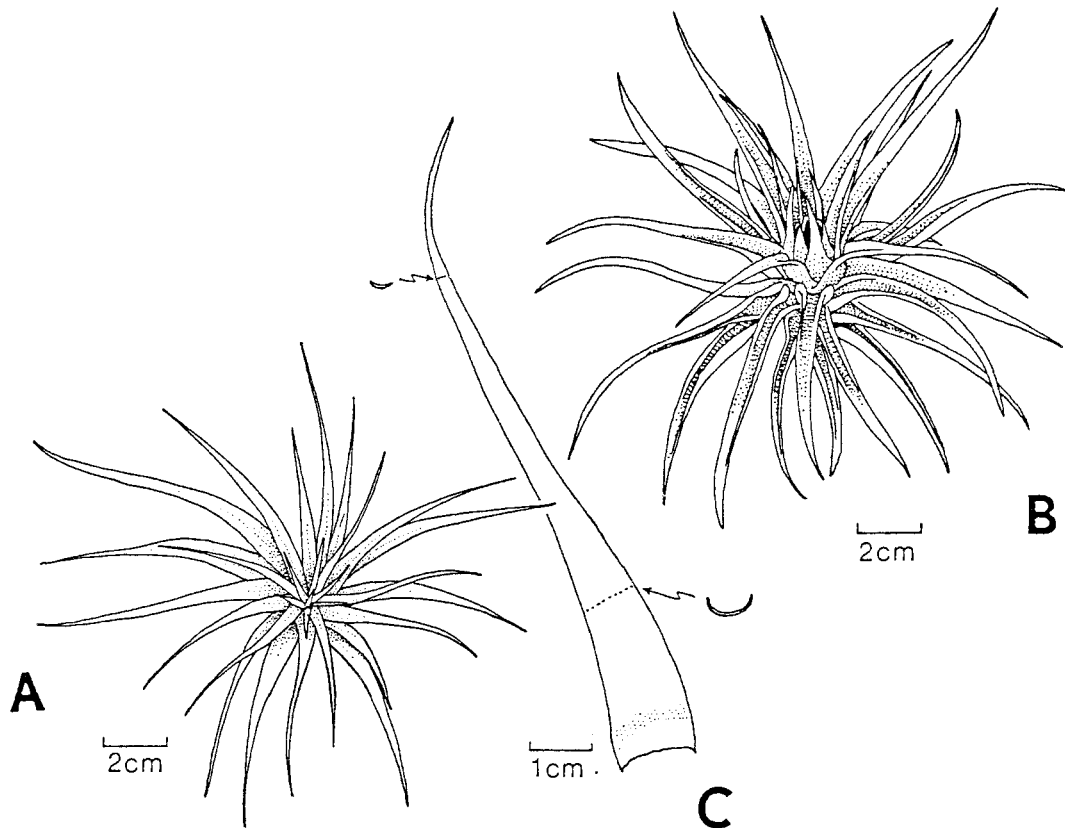


FIGURE 2. *Tillandsia kammii*. A, habit. B, habit of flowering plant. C, leaf.

Tillandsia kammii Rauh, *Tropische und subtropische Pflanzenwelt* 21:45-8. 1977. See also W. Rauh *Bromelien* 164-5, 227. Eugen Ulmer GmbH & Co., Stuttgart. 1990. Figures 2, 9a-b, 16.

DISTRIBUTION. Known from three disjunct sites in Honduras in the Departments of Olancho, Lempira and Copan, at elevations of 500-1200 m.

STATUS IN HORTICULTURE. Rare in cultivation.

DESCRIPTION. **Plant** an epiphyte, nearly stemless, 5-10 cm tall, single or clustering; roots wiry, 1 mm or less in diameter, brown. **Leaves** densely arranged, spreading to recurving, 30 to 50 in number, pale grey-green to silver. **Leaf sheaths** ovate to elliptic, 10-18 mm wide, tan but densely and coarsely pale lepidote. **Leaf blades** very narrowly triangular, attenuate, 5-12 cm long, 5-8 mm wide, channeled to involute, soft, densely covered with coarse, spreading, white trichomes and appearing slightly rough and pruinose. **Scape** very short, concealed within the leafy rosette.

Scape bracts like the leaves but smaller, becoming rose or red during flowering. **Inflorescence** simple, very short and dense, 1-2 cm long, polystichously 3-to 8-flowered. **Floral bracts** ovate, attenuate to acute, 20 mm long, white lepidote, rose to red. **Flowers** lasting a single day. **Sepals** elliptic, obtuse, 14-16 mm long, the adaxial pair carinate and low connate, glabrous, pale green. **Corolla** tubular. **Petals** narrowly oblanceolate, 4 cm long, equalling or exceeded by the stamens and style, light blue-violet.

SUMMARY. Small to medium (5-10 cm tall) stemless plant with numerous and narrow soft, spreading to recurving, channeled to involute leaves that appear slightly rough and pruinose and pale grey-green to silver; a very short, partly concealed inflorescence with red to rose bracts with a tubular light blue-violet corolla.

VEGETATIVELY RESEMBLES:

Tillandsia sp. nov. (*T. velutina* R. Ehlers. ined.; hort. synonyms *T.* "Brachycaulos var. Multiflora", *T.* "Brachycaulos Abdita") which has fewer,

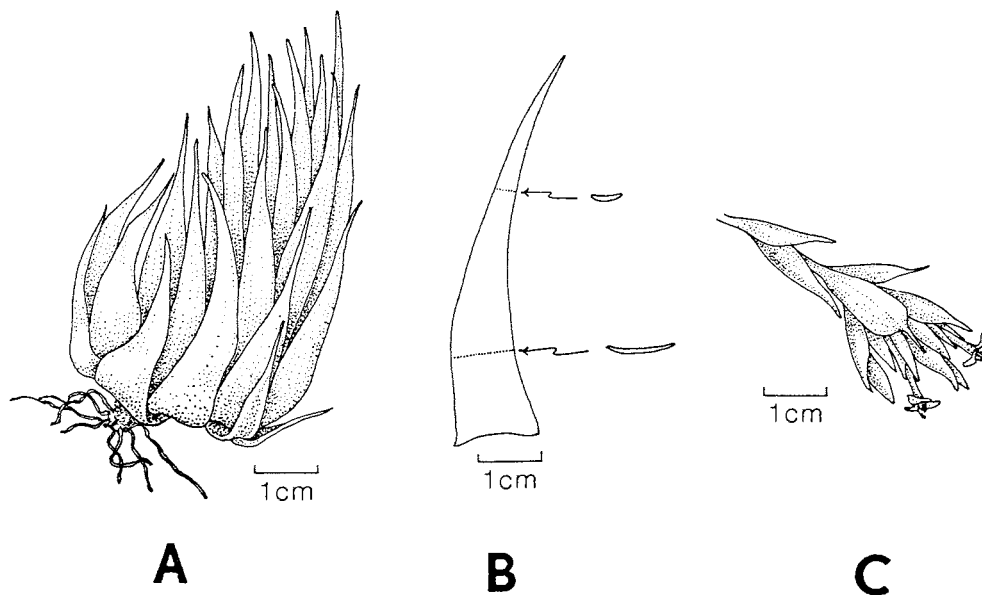


FIGURE 3. *Tillandsia kautskyi*. A, habit. B, leaf. C, inflorescence.

broader, darker grey leaves that have less densely arranged, smaller silver trichomes;

Tillandsia plagiotropica Rohweder which has broader, usually shorter leaves that are stiffer and brittle and appear nearly white.

NOTE. The *Tillandsia* "Brachycaulos var Multiflora" is very common in cultivation and is frequently exported from Guatemala. The *T. plagiotropica* is uncommon in cultivation.

Tillandsia kautskyi E. Pereira, *Bradea* 1:438, Tab. II. 1974. See also Smith & Downs, *Flora Neotropica Monograph* 14 Part 2:1392. Hafner Press, New York. 1977; W. Rauh, *Journal of the Bromeliad Society* 34:70-71. 1984; W. Rauh, *Bromelien* 130, 165. Eugen Ulmer GmbH & Co., Stuttgart. 1990. Figures 3, 10a-b, 17.

DISTRIBUTION. Endemic to wet mountain forests at elevations of 800-1000 m in the vicinity of Domingos Martins, State of Espírito Santo, Brazil.

STATUS IN HORTICULTURE. Uncommon in cultivation.

DESCRIPTION. **Plant** an epiphyte, nearly stemless, 3-8 cm tall, single or tightly clustering; roots wiry, 1 mm or less in diameter, brown. **Leaves** densely arranged, erect or slightly curving secund erect, 18 to 30 in number, light grey-green or silver-grey forming a slightly pseudobulbous, conical, rather strict rosette. **Leaf sheaths** ovate

to broadly triangular, 8-13 mm wide, appressed white lepidote except at the base. **Leaf blades** narrowly triangular, acute to attenuate, 3-6 cm long, 8-13 mm wide, slightly channeled to nearly plane, soft and brittle, densely covered with appressed white trichomes and appearing metallic. **Scape** erect, shorter than or equalling the leaves. **Scape bracts** like the leaves but tinged red or rose. **Inflorescence** 12-25 mm long, simple or compound with 3 to 6 branches. **Primary bracts** elliptic to ovate, acuminate, equalling to or exceeding the branches, soft, sparsely appressed white lepidote, pale red to rose or salmon. **Branches of the inflorescence** 2-flowered, erect to slightly spreading. **Floral bracts** ovate, acute, 8-10 mm long, carinate, soft, glabrous, pale red, rose or salmon. **Flowers** opening during the day and lasting 1-2 days. **Sepals** lanceolate, acute, 9-10 mm long, nearly free, ecarinate, glabrous, pale green to pale salmon. **Corolla** spreading. **Petals** narrowly oblanceolate, 16-18 mm long, lilac to pink.

SUMMARY. Small (3-8 cm tall) plant with soft and brittle erect, only slightly channeled leaves that appear metallic grey-green or silver, the rosette slightly pseudobulbous and conical; a short red, rose or salmon inflorescence with lilac or pink, spreading petals.

VEGETATIVELY RESEMBLES:

Tillandsia sprengliana Klotzsch ex Mez which has

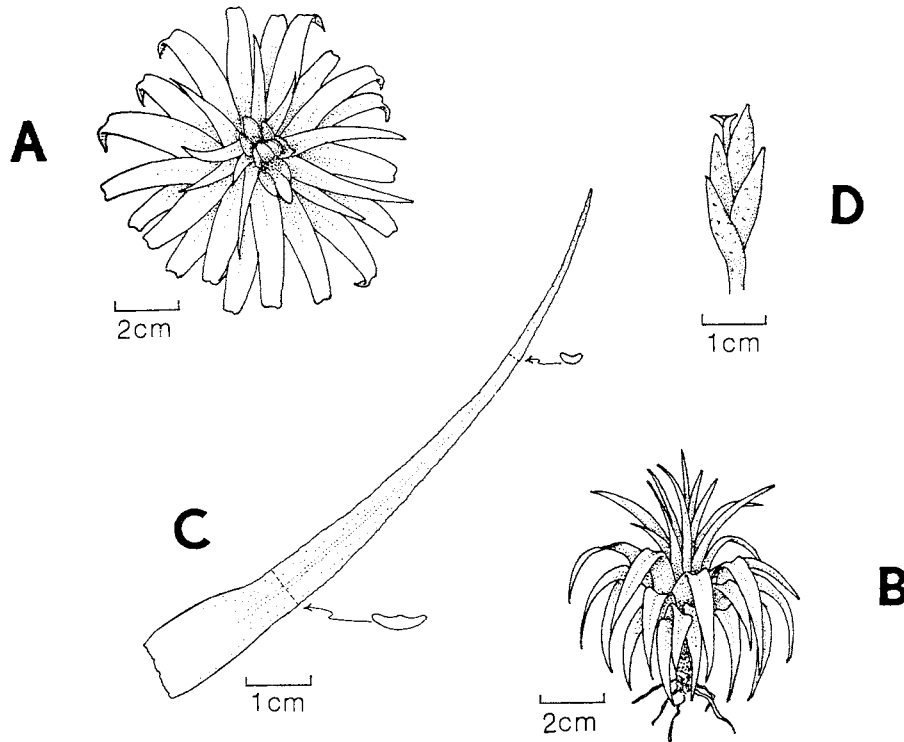


FIGURE 4. *Tillandsia mauryana*. A, habit of flowering plant. B, habit. C, leaf. D, branch of inflorescence.

more secund curving leaves that are subdensely covered with coarse spreading trichomes;

T. brachyphylla Baker which has broader leaves that are densely covered with coarse spreading trichomes and leaf blades that are more conspicuously channeled.

Tillandsia mauryana L.B. Smith, *Contributions from the Gray Herbarium* 117:31, pl. 31, figs. 32-3. 1937. See also *Flora Neotropica Monograph 14 Part 2:752-4*. Hafner Press, New York. 1977; W. Rauh, *Bromelien* 107, 174-5. Eugen Ulmer GmnBH & Co., Stuttgart. 1990; H. Shimizu, *Tillandsia Handbook* 23. Japan Cactus Planning Co. Press, Shizuoka. 1992. Figures 4, 11a-b, 18.

DISTRIBUTION. Native in Mexico, in the States of Hidalgo and Puebla, on steep, dry cliffs at elevations of 1500-2700 m.

STATUS IN HORTICULTURE. Not common in cultivation.

DESCRIPTION. Plant usually a lithophyte, nearly stemless to short caulescent, 5-12 cm tall, usually single, rarely tightly clustering; roots 1-2 mm in diameter, brown. **Leaves** very densely arranged,

all but the centermost tightly recurving (the centermost leaves often stiffly erect), 60 to 80 in number, silver-grey to silver, usually forming a spherical rosette. **Leaf sheaths** broadly elliptic, 8-20 mm wide, thick, pale green or tan but densely white lepidote except at the extreme base. **Leaf blades** very narrowly triangular, subulate, acute, 5-10 cm long, 5-8 mm wide, 1-2 mm thick, succulent, brittle, very slightly channeled, keeled or ribbed, very densely covered with coarse spreading white trichomes and appearing slightly rough or pruinose. **Scape** very short, concealed within the leafy rosette. **Scape bracts** like the leaves. **Inflorescence** compound, very densely digitate with 2 to 6 branches. **Primary bracts** elliptic, shorter than the branches, densely white lepidote. **Branches of the inflorescence** erect to slightly spreading, 1-3 cm long, 2- to 6-flowered. **Floral bracts** tightly imbricate, ovate, acute, 12-25 mm long, carinate, green, yellow or orange but densely white lepidote. **Flowers** lasting 1 to 3 days. **Sepals** lanceolate, acute, 12-15 long, green but densely white lepidote. **Corolla** spreading. **Petals** very narrowly lanceolate, 15-23 mm long, exceeding the stamens and style, green.

SUMMARY. Small to medium (5-12 cm tall) spherical plant with many recurving, thick, suc-

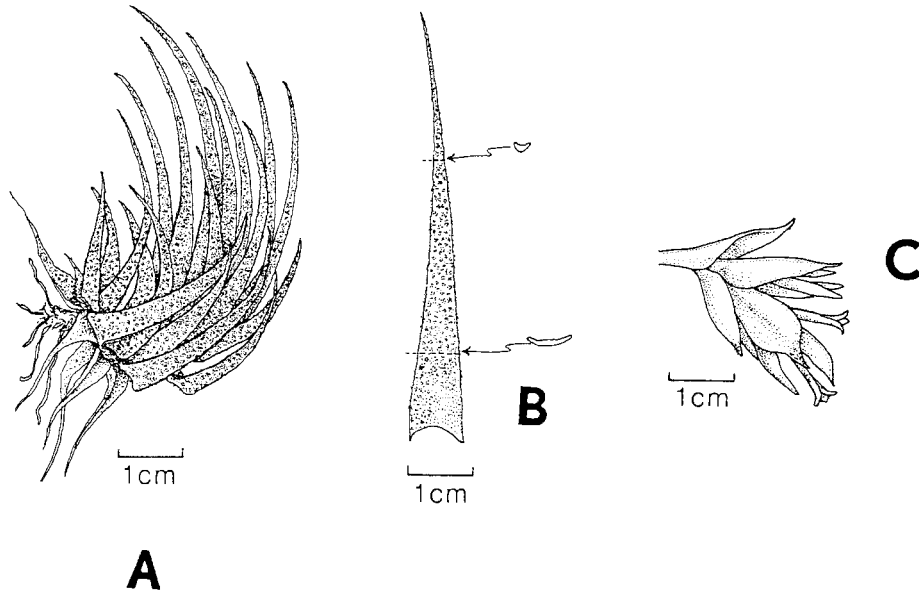


FIGURE 5. *Tillandsia sprengeliana*. A, habit. B, leaf. C, inflorescence.

culent, ribbed leaves that appear rough or pruinose and silver-grey to silver; a very short inflorescence with white lepidote bracts and a green, spreading corolla.

VEGETATIVELY RESEMBLES:

- Tillandsia atroviridipetala* Matuda which is smaller with nearly filiform leaf blades only 1–4 mm wide and more ciliate appearing trichomes;
T. ionantha Planchon (odd forms) which has fewer, more erect, narrower leaf blades which are less silver and frequently tinged red.

Tillandsia sprengeliana Klotzsch ex Mez in Martius, *Flora Brasiliensis* 3(3):596. 1894. See also Smith & Downs, *Flora Neotropica Monograph 14* Part 2:820-1. Hafner Press, New York. 1977; W. Rauh, *Bromelien* 227, 295. Eugen Ulmer GmbH & Co., Stuttgart. 1990; H. Shimizu, *Tillandsia Handbook* 29. Japan Cactus Planning Co. Press, Shizuoka. 1992; R. Ehlers, *Journal of the Bromeliad Society* 43:151, 179. 1993. Figures 5, 12a-b, 19.

DISTRIBUTION. Endemic to Restinga and Atlantic Forest at low elevations in the states of Rio de Janeiro and Espirito Santo, Brazil.

STATUS IN HORTICULTURE. Rare in cultivation.

DESCRIPTION. **Plant** an epiphyte, nearly stemless, 4–8 cm tall, single or densely clustering; roots wiry, 1 mm or less in diameter, brown. **Leaves** densely arranged, curving secund erect,

25 to 50 in number, grey-green to silver-grey, only a few of the oldest leaves reflexing toward the root system or stembase. **Leaf sheaths** broadly elliptic, 6–10 mm wide, subdensely and coarsely white lepidote except at the base. **Leaf blades** narrowly triangular, acute to acuminate, 3–8 cm long, 4–8 mm wide, slightly channeled, soft, subdensely and irregularly covered with coarse, spreading white trichomes and appearing conspicuously rough or pruinose. **Scape** erect, as long as or exceeding the leaves. **Scape bracts** like the leaves but less lepidote and tinged reddish. **Inflorescence** 10–25 mm long, simple, densely polystichously 4-to 10-flowered. **Floral bracts** ovate, acute to apiculate, 15–18 mm long, soft, sparsely white lepidote, rose-red. **Flowers** opening during the day and lasting 2–3 days. **Sepals** lanceolate, acute, 9–12 mm long, free, sparsely lepidote to glabrous, pale green. **Corolla** spreading. **Petals** narrowly oblanceolate, 15–20 mm long, rose.

SUMMARY. Small (4–8 cm tall) plant with curving, secund erect, slightly channeled leaves that appear grey-green or silver-grey and conspicuously rough or pruinose due to the less than complete and irregular covering of course spreading trichomes; a short rose-red inflorescence with rose, spreading petals.

VEGETATIVELY RESEMBLES:

- Tillandsia kautskyi* E. Pereira which has a more pseudobulbous form with more erect leaves that

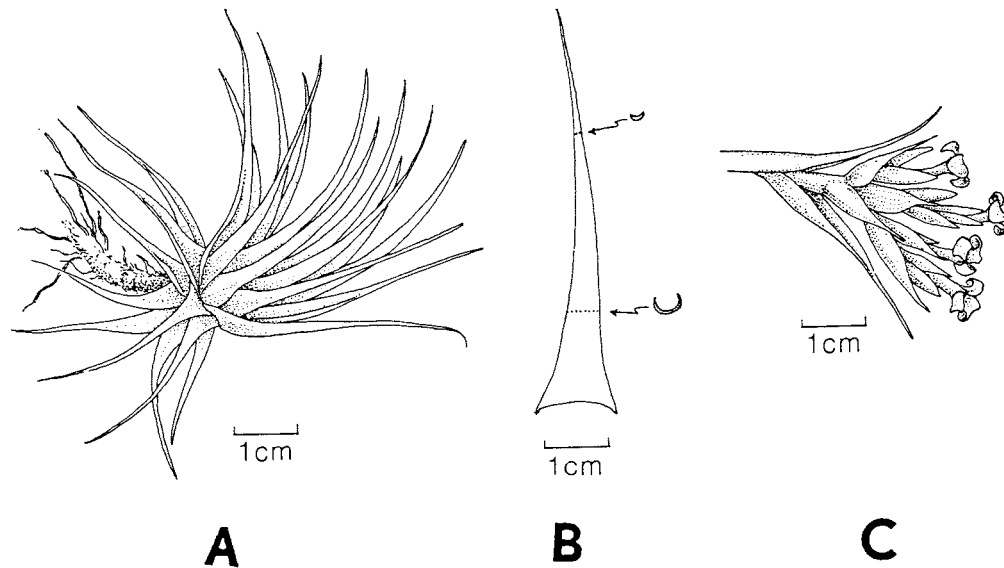


FIGURE 6. *Tillandsia sucrei*. A, habit. B, leaf. C, inflorescence.

are densely covered with appressed trichomes and appear metallic;

- T. brachyphylla* Baker which has broader leaves that are densely covered with coarse spreading trichomes and more conspicuously channeled;
- T. thiekenii* R. Ehlers which has more channeled to involute succulent leaves that, due to its pendent, lithophytic habit, are more tightly erect and not at all secund.

Tillandsia sucrei E. Pereira, *Rodriguesia* 26(38): 115, Est. IV. 1971. See also Smith & Downs, *Flora Neotropica Monograph* 14 Part 2:802. Hafner Press, New York. 1977; W. Rauh, *Bromelien* 131, 298. Eugen Ulmer GmbH Co., Stuttgart. 1990; H. Shimizu, *Tillandsia Handbook* 29. Japan Cactus Planning Co. Press, Shizuoka. 1992. Figures 6, 13a-b, 20.

DISTRIBUTION. Endemic to a few rock faces within the city of Rio de Janeiro, Brazil at elevations of 100 to 500 meters.

STATUS IN CULTIVATION. Uncommon in cultivation.

DESCRIPTION. **Plant** a lithophyte, nearly stemless to short caulescent, 3–6 cm tall, single or clustering; old plants may have the stem base covered with dead, reflexed leaves or the stem bare; roots wiry, ca. 1 mm in diameter, brown. **Leaves** laxly arranged, spreading to secund erect, 20 to 40 in number, silver-grey, the oldest leaves usually reflexing against the root system or substrate. **Leaf sheaths** broadly triangular, 6–10 mm wide, white lepidote except at the base. **Leaf**

blades narrowly triangular, acute to attenuate, 3–5 cm long, 4–7 mm wide, channeled to involute, rather soft, densely covered with coarse, spreading white trichomes and appearing slightly rough or pruinose. **Scape** erect, usually shorter than the leaves. **Scape bracts** like the leaves but tinged rose. **Inflorescence** 10–25 mm long, compound with 3 to 6 branches. **Primary bracts** elliptic to ovate, acute, about equalling the branches, densely white lepidote, rose. **Branches** of the inflorescence 2-to 3-flowered, laxly spreading. **Floral bracts** ovate, acute, 8–12 mm long, carinate, rather soft, densely white lepidote, rose. **Flowers** opening during the day and lasting 2–3 days. **Sepals** lanceolate, acute, 12–14 mm long, the adaxial pair carinate and 1/3 connate, white lepidote, rose. **Corolla** spreading. **Petals** oblanceolate, 15–18 mm long, pink or lavender pink.

SUMMARY. Small (3–6 cm tall) plant with rather soft spreading to secund erect channeled leaves that appear silver and slightly rough and scurfy, the oldest leaves usually reflexing toward the root system or substrate; a short rose inflorescence with pink or lavender-pink, spreading petals.

VEGETATIVELY RESEMBLES:

- Tillandsia brachyphylla* Baker which has broader, more densely arranged leaves with more strictly erect leaf blades;
- T. gardneri* Lindley which is several times larger with nearly plane, not channeled, leaf blades.

Tillandsia xerographica Rohweder, *Senckenbergiana* 34:113. 1953. (Synonyms: *T. kru-*

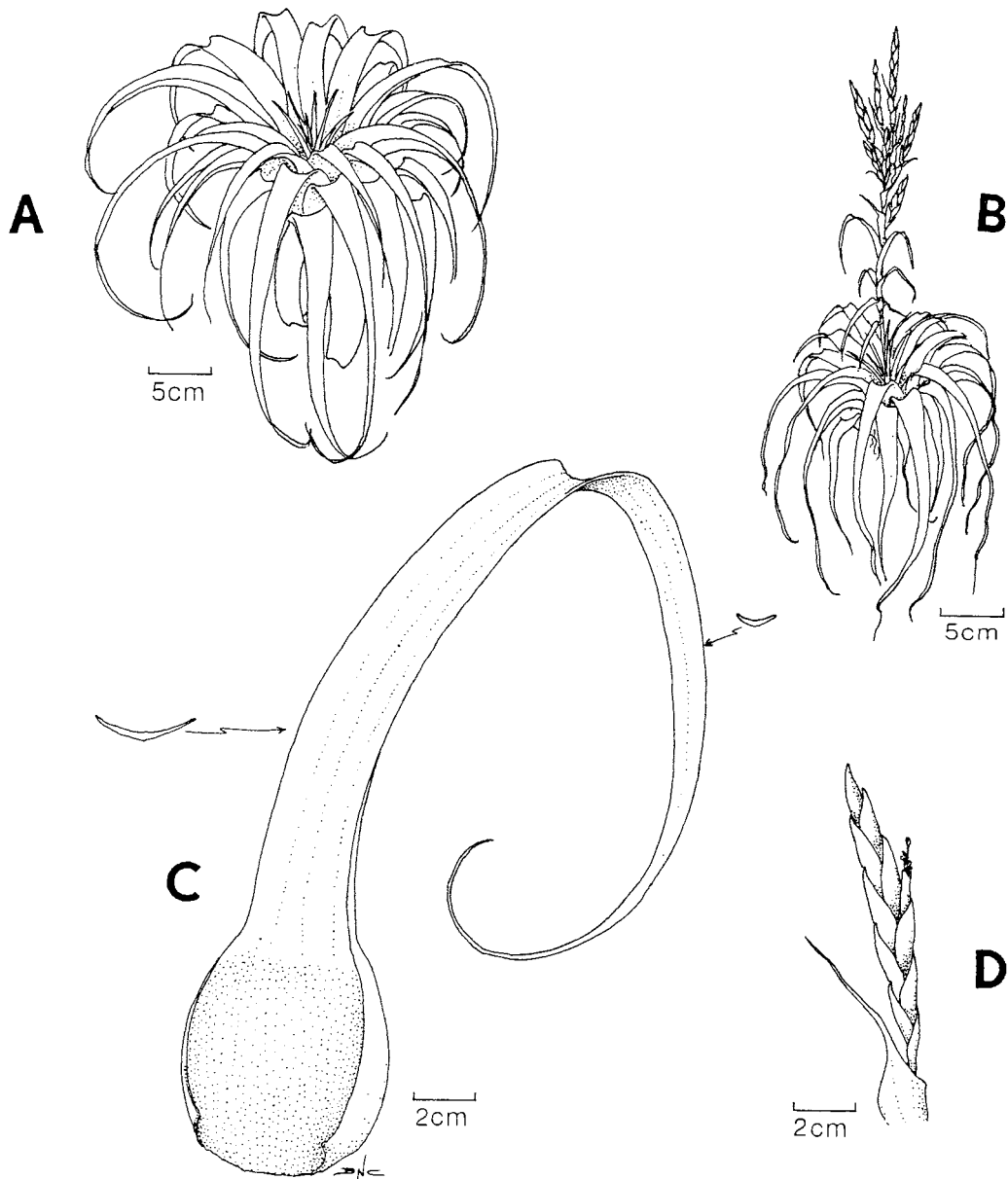


FIGURE 7. *Tillandsia xerographica*. A, habit of flowering plant. B, habit. C, leaf. D, branch of inflorescence.

seana Matuda, *Cactaceas y Suculentas Mexicanas* 19(1):24-5. 1974. *T. tomasellii* DeLuca, Sabato & Balduzzi, *Brittonia* 31: 474-7. 1979). See also Smith & Downs, *Flora Neotropica Monograph 14* Part 2:926. Hafner Press, New York. 1977; C. Gardner, *Selbyana* 7:374-5. 1985; P. Isley III, *Tillandsia* 126-7, 148, 238. Botanical Press, Gardena. 1987; W. Rauh, *Bromelien* 109,

186, 308. Eugen Ulmer GmbH & Co., Stuttgart. 1990; H. Shimizu, *Tillandsia Handbook* 30. Japan Cactus Planning Co. Press, Shizuoka. 1992; C. Blackburn, *Journal of the Bromeliad Society* 43:26-7. 1993. Figures 7, 14a-b, 21.

DISTRIBUTION. Native in dry forests from southwestern Mexico to El Salvador, Guatemala

and Nicaragua(?) at elevations of 150–700 meters.

STATUS IN HORTICULTURE. Very common in cultivation.

DESCRIPTION. Plant usually an epiphyte, rarely a lithophyte, nearly stemless, 10–100 cm tall, usually single; roots tough, wiry, ca. 1 mm in diameter, tan to brown. **Leaves** densely arranged, spreading to recurving (more or less erect or secund erect in young offsets), rarely twisted and pendent, 35 to 100 in number, light grey to silver-white, usually forming a full, pseudobulbous rosette. **Leaf sheaths** broadly ovate, 6–10 cm wide, inflated, brown but densely subappressed white lepidote except at the extreme base. **Leaf blades** narrowly triangular to nearly linear, acute to long attenuate, 30–75 cm long, 2–5 cm wide, channeled but becoming plane distally, usually obtusely ribbed, 1–2 mm thick, tough and leathery, very densely covered with coarse subspreading white trichomes and appearing nearly smooth and usually very white (occasionally tinged with pink). **Scape** erect, variable but always exserted above the leafy rosette. **Scape bracts** like the leaves, nearly always recurving. **Inflorescence** compound, densely digitate to very laxly pinnate, 20–50 cm long with 5 to 40 branches. **Primary bracts** from similar to the leaves (the proximal) to ovate and apiculate (the distal), mostly shorter than the branches, white lepidote, orange to rose. **Branches of the inflorescence** erect to spreading, narrowly lanceolate, 5–15 cm long, 5- to 15-flowered. **Floral bracts** tightly imbricate, lanceolate, acute, 30–45 mm long, variably carinate or nerved, glabrous, shiny, light orange to yellow to yellow-green. **Flowers** lasting a single day. **Sepals** lanceolate, acute, 20–35 mm long, the adaxial pair carinate and ½ connate, pale green. **Corolla** tubular. **Petals** very narrowly oblanceolate, 5–6 cm long, shorter than the stamens and style, lavender.

SUMMARY. Medium to large (unflowered 10–35 cm tall), heavy plant with usually spreading to

recurving channeled to plane, thick leaves that appear nearly smooth and very white; a leaf cross section usually reveals obtuse ribbing; a tall branched inflorescence of orange to rose and yellow to yellow-green bracts and a lavender, tubular corolla.

VEGETATIVELY RESEMBLES:

Tillandsia fasciculata Swartz which usually has narrower leaf blades that are channeled to involute throughout and smaller leaf sheaths that, due to the less dense covering of smaller trichomes, appear distinctly dark brown; young plants usually have very straight, stiff leaf blades and appear much less silver or white (in most cases, *T. fasciculata* appears grey-green to nearly pale green, rarely silver-grey);

T. rothii Rauh and *T. roland-gosselinii* Mez which have green or yellow-green (occasionally tinged red) leaves with much smaller, more appressed trichomes and smaller, less inflated leaf sheaths.

NOTE. *Tillandsia xerographica* is propagated by offsets in very large quantities in Latin America (principally Guatemala) and occasionally seed grown in Europe and USA. Seedlings resemble adult plants in conformation more than do young offsets. Young plants in the trade may be labeled as *T* “Fasciculata Blanca”, or rarely, *T*. “Sphaerocephala”.

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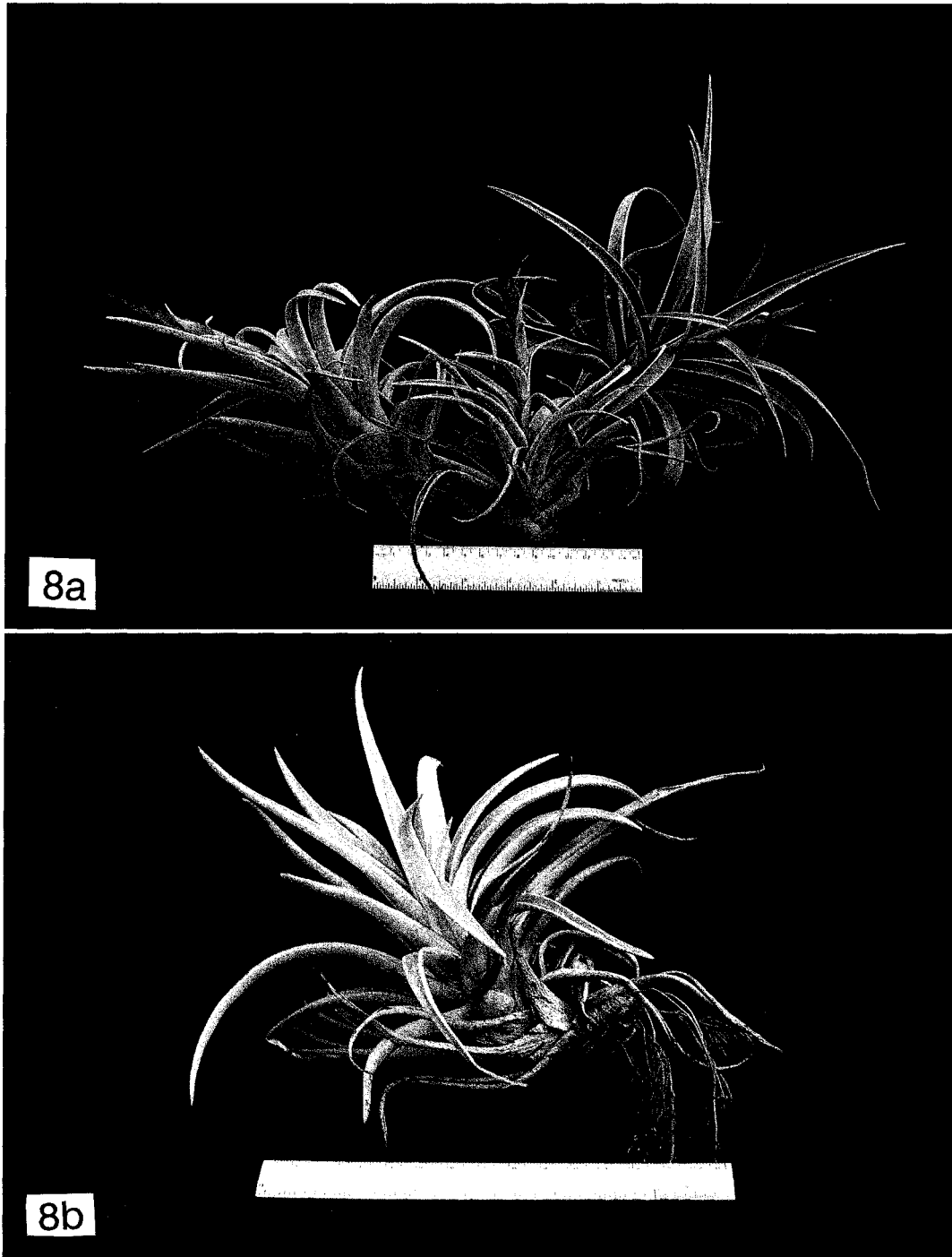


FIGURE 8a, b. *Tillandsia harrisii*. Habit. Rule is 15 × 2.5 cm.

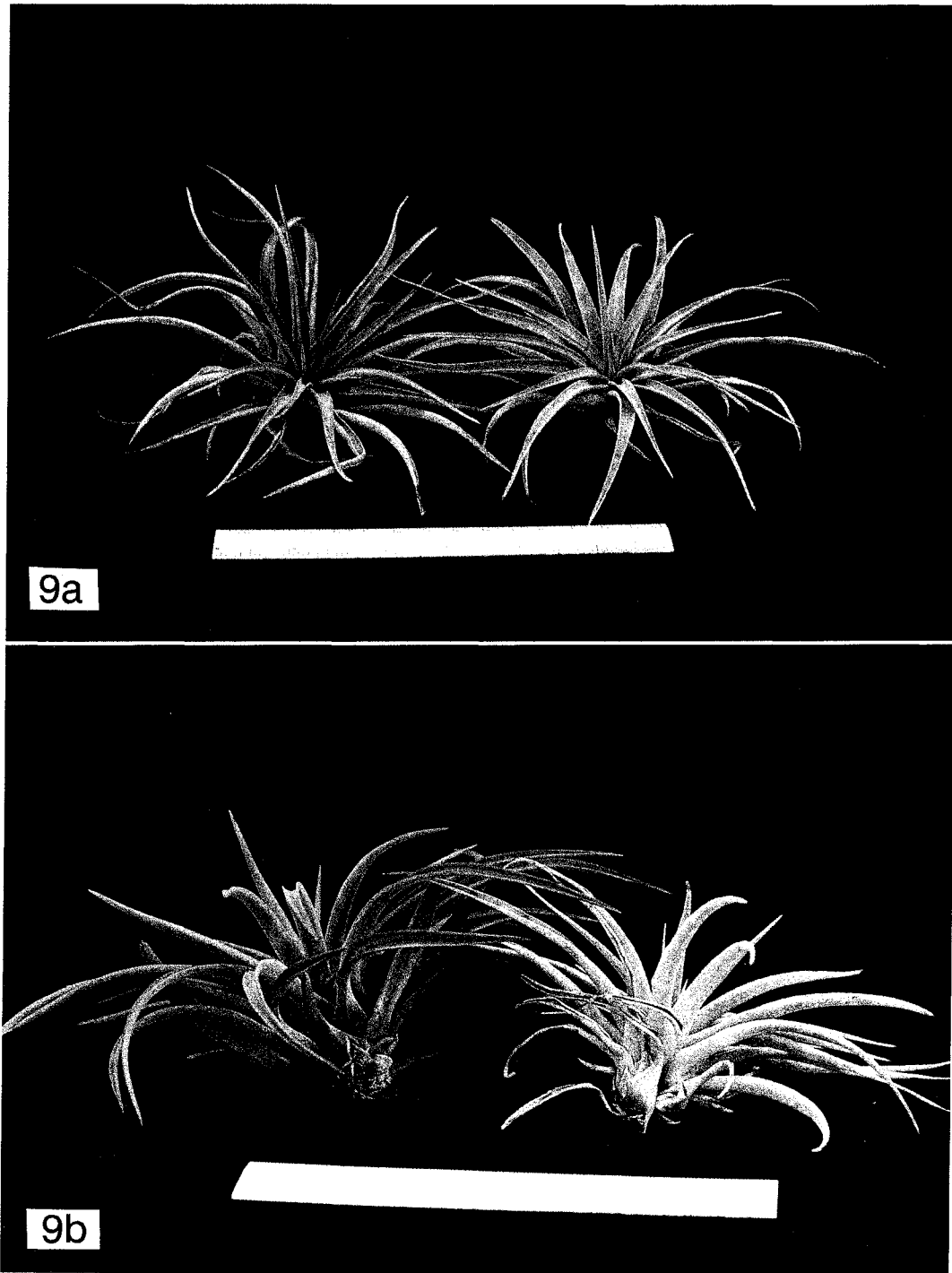


FIGURE 9a, b. *Tillandsia kammii*. Habit. Rule is 15 × 2.5 cm.

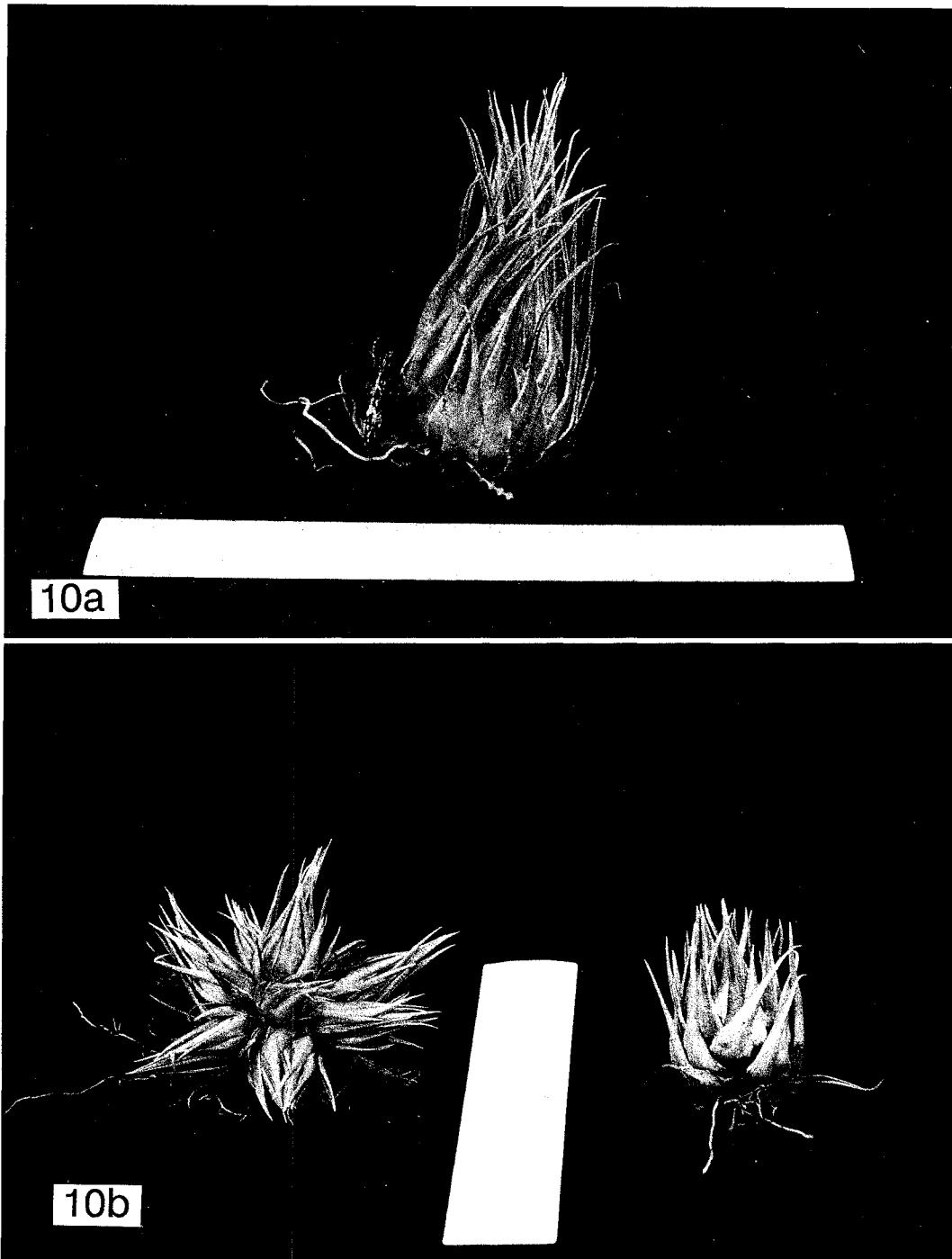


FIGURE 10a, b. *Tillandsia kautskyi*. Habit. Rule is 15 × 2.5 cm.

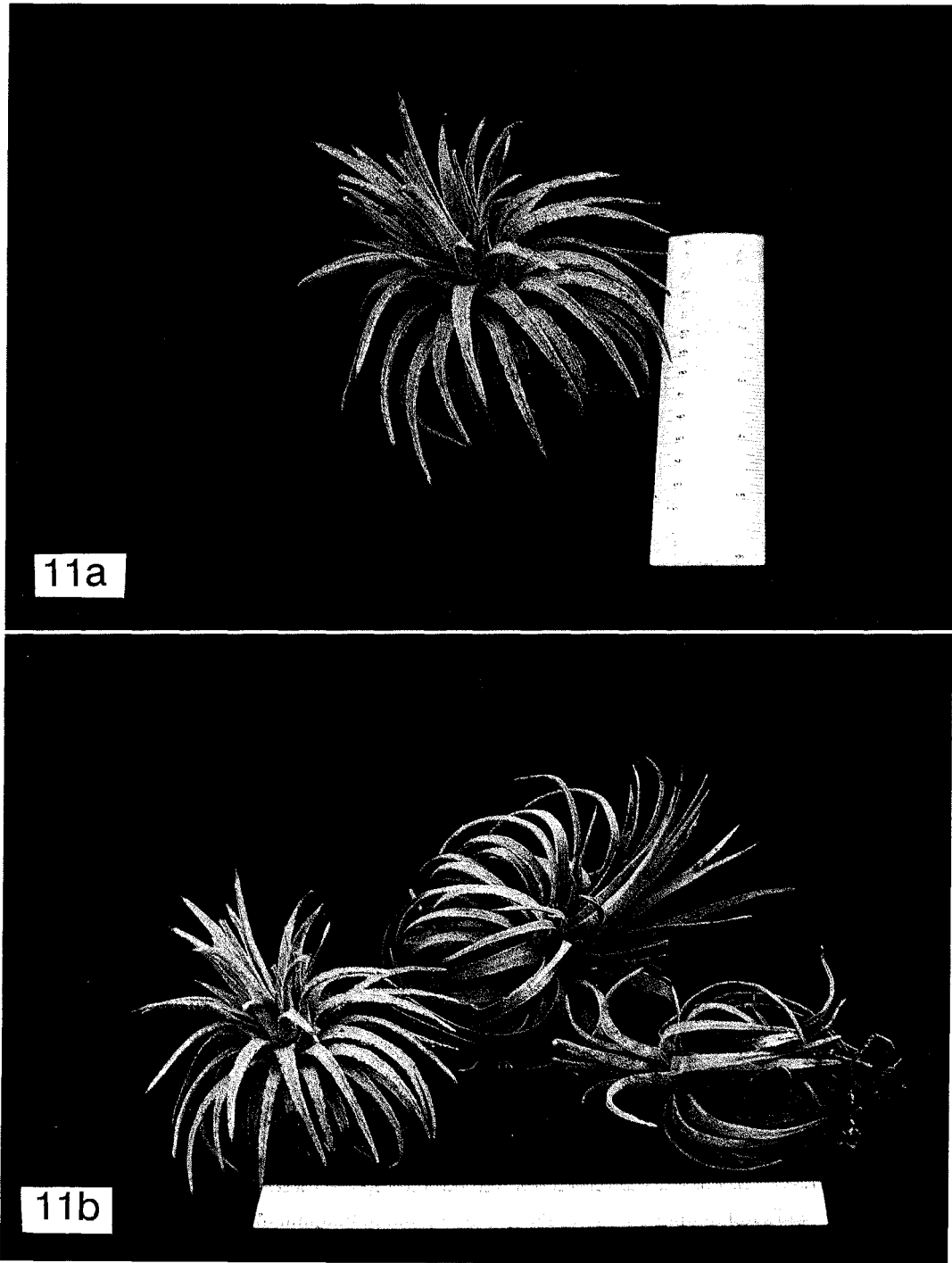


FIGURE 11a, b. *Tillandsia mauryana*. Habit. Rule is 15 × 2.5 cm.



FIGURE 12a, b. *Tillandsia sprengeliana*. Habit. Rule is 15 × 2.5 cm.

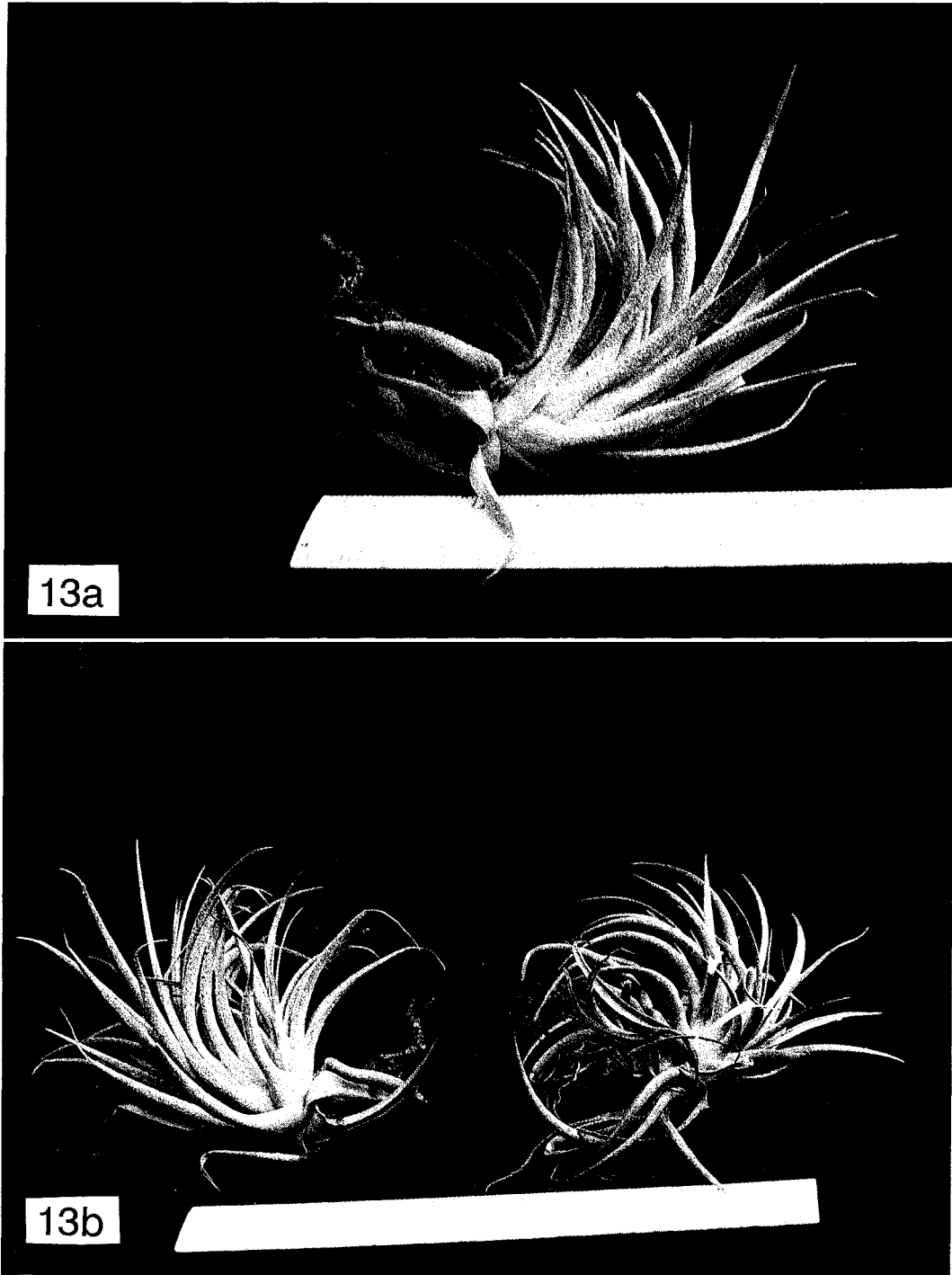


FIGURE 13a, b. *Tillandsia suerei*. Habit. Rule is 15 × 2.5 cm.

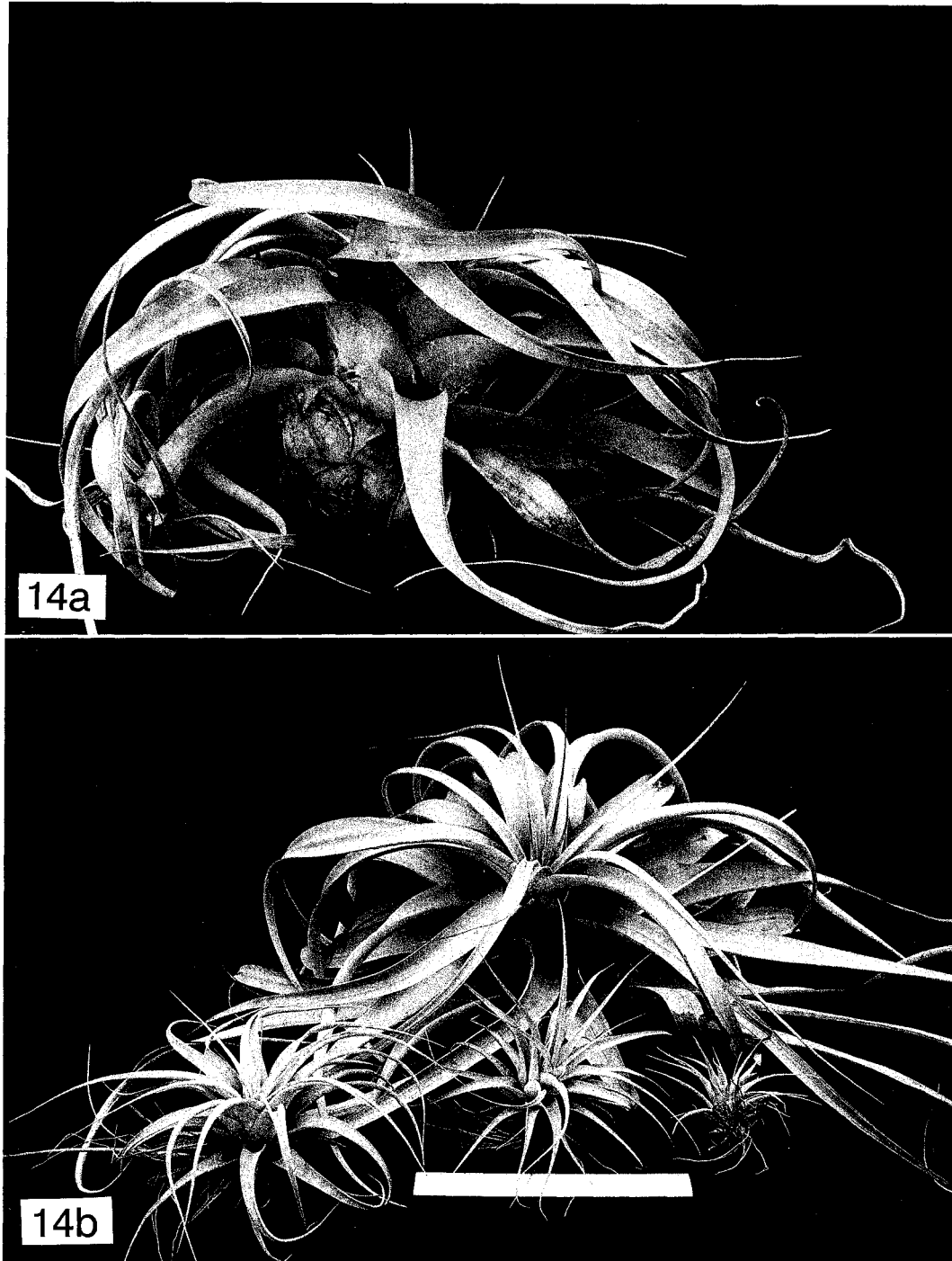


FIGURE 14a, b. *Tillandsia xerographica*. Habit. Rule is 15 × 2.5 cm.

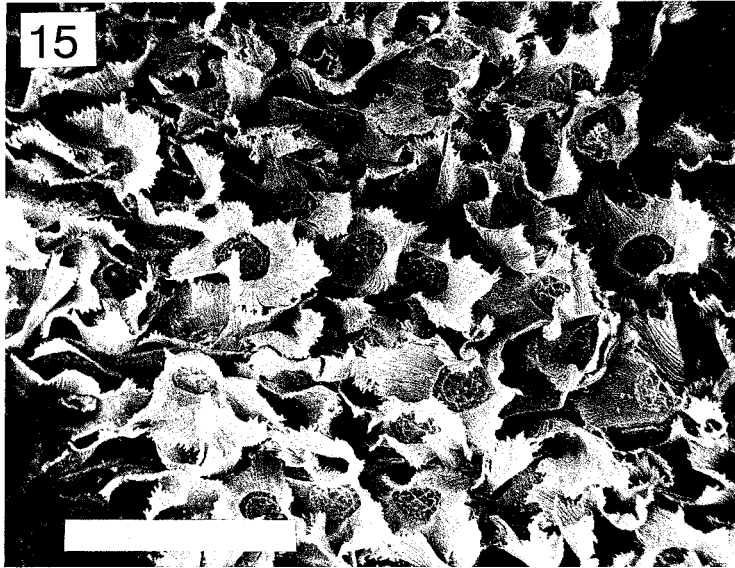


FIGURE 15. *Tillandsia harrisii*. Leaf blade, abaxial surface, bar = 0.5 mm. Note the dense, matted covering of trichomes with spreading to erect "wings".

FIGURE 16. *Tillandsia kammii*. Leaf blade, abaxial surface, bar = 0.5 mm. Note the dense, matted covering of trichomes with spreading to erect eccentric "wings".

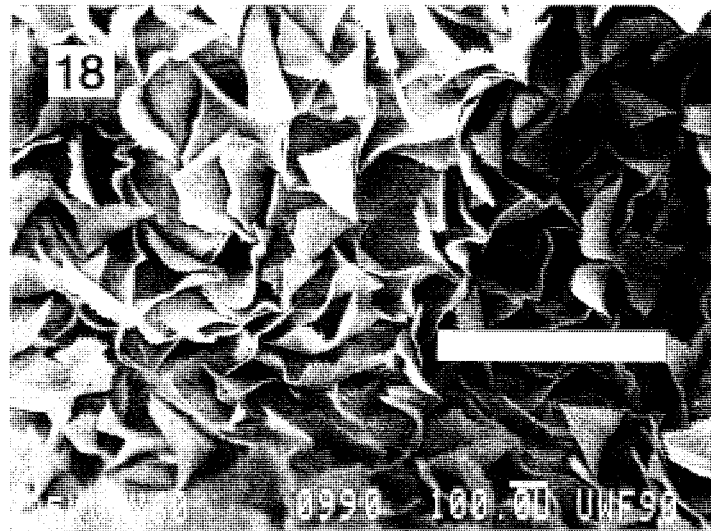
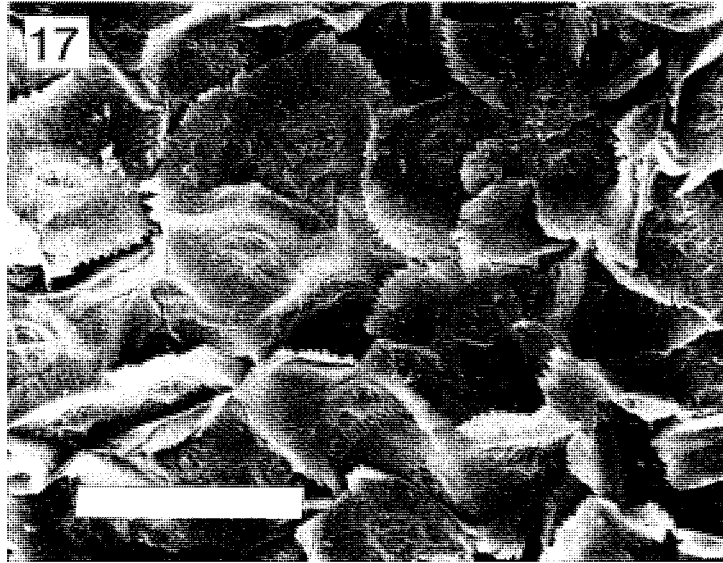


FIGURE 17. *Tillandsia kautskyi*. Leaf blade, abaxial surface, bar = 0.5 mm. Note the dense covering of trichomes with appressed "wings".

FIGURE 18. *Tillandsia mauryana*. Leaf blade, abaxial surface, bar = 0.5 mm. Note the very dense covering of trichomes with erect eccentric "wings".

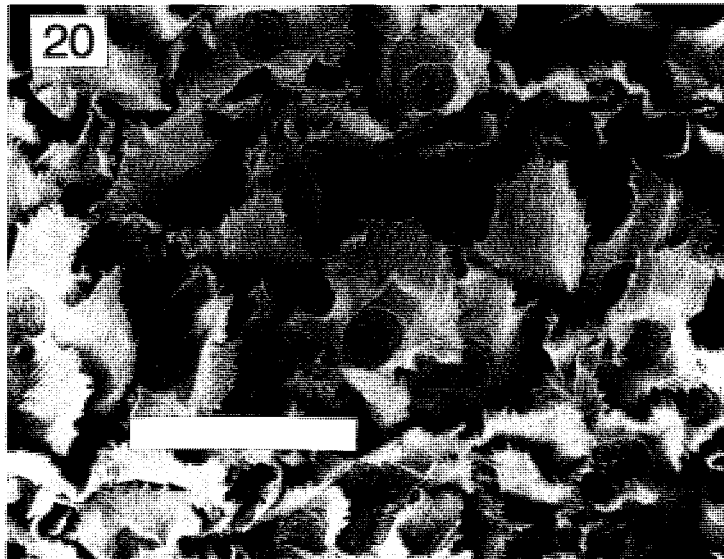
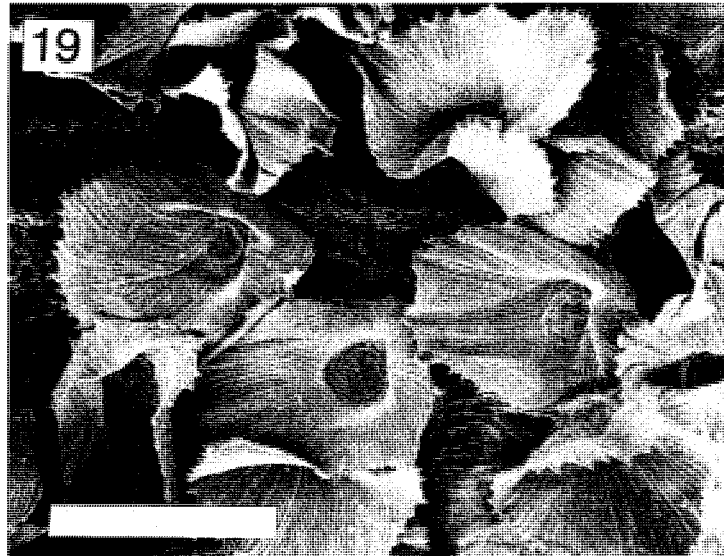


FIGURE 19. *Tillandsia sprengeliana*. Leaf blade, abaxial surface, bar = 0.5 mm. Note the less than complete, irregular covering of trichomes with spreading to erect "wings".

FIGURE 20. *Tillandsia suerei*. Leaf blade, abaxial surface, bar = 0.5 mm. Note the dense covering of trichomes with spreading to erect "wings".

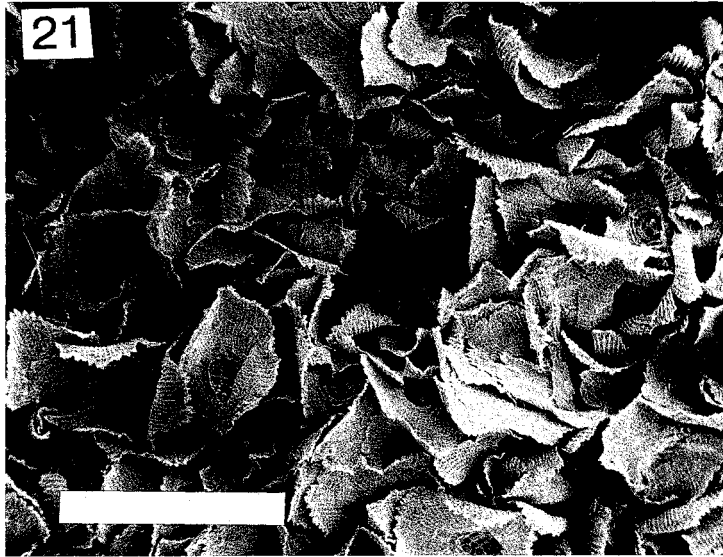


FIGURE 21. *Tillandsia xerographica*. Leaf blade, abaxial surface, bar = 0.5 mm. Note the dense matted covering of trichomes with spreading to erect "wings".