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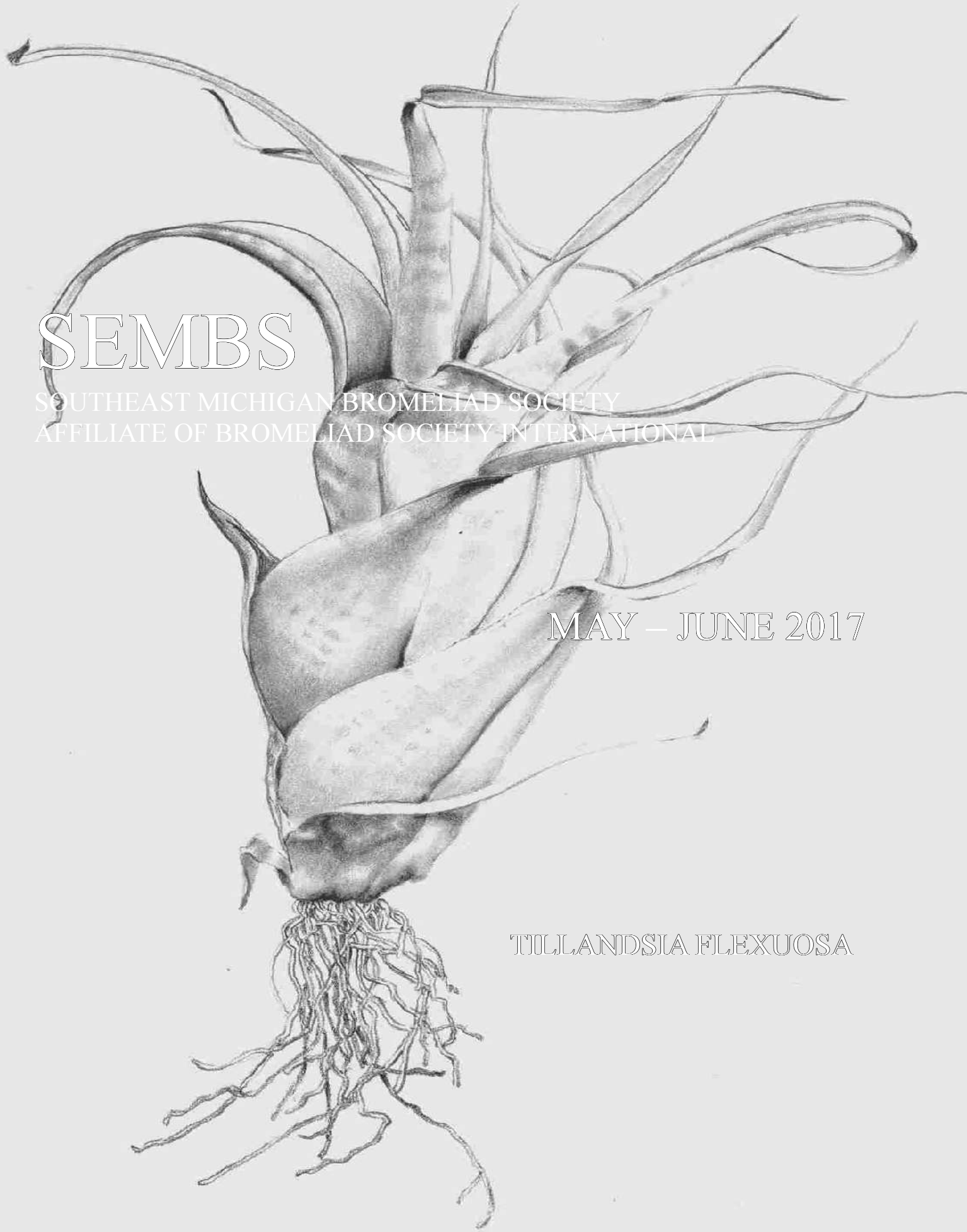


MAY – JUNE 2017

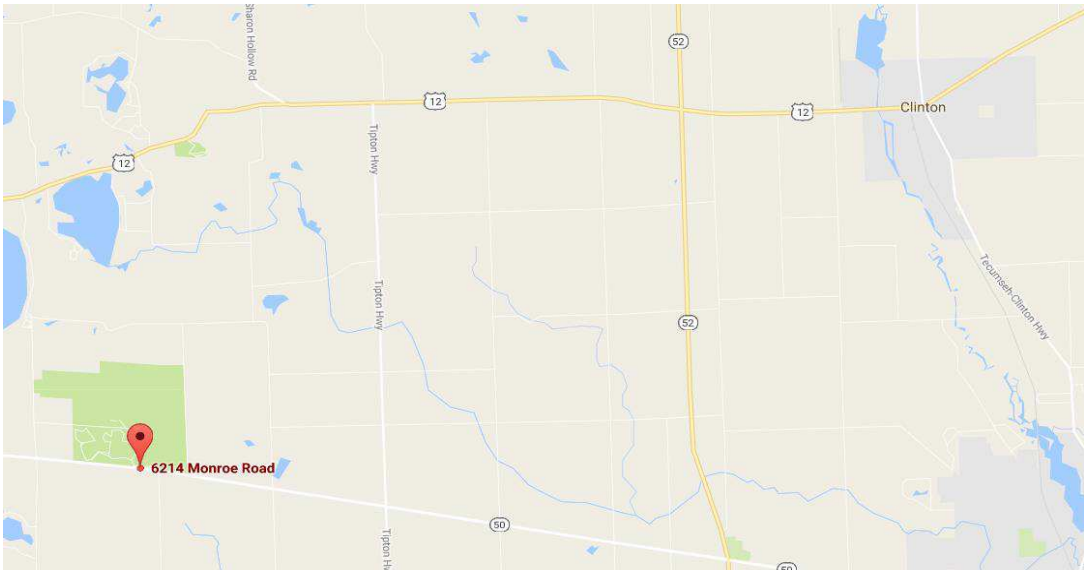
TILLANDSIA FLEXUOSA

Meeting this Saturday, June 24th

The meeting in earnest will take the form of lunch at The Clinton Inn in Clinton, MI at 12:30pm. From there we'll head to Hidden Lake Gardens in nearby Tipton, where a respectable assortment of bromeliads can be seen in the well-kept greenhouses.

The Clinton Inn is at **104 W Michigan Ave, Clinton, MI 49236**, off of US-12 just east of 52.

For those who want to visit the gardens but can't make lunch, Hidden Lake Gardens* are at **6214 Monroe Road (Hwy M-50), Tipton, MI 49287**



**please note: a $3 fee admission/parking fee is paid at the gate*

In recent years advances in research tools have enabled taxonomists to solve many classification problems and redefine relationships. Bromeliad research has kept pace and has resulted in the establishment of new genera and many name changes. We reprint here an excellent article on the revised classification of the Tillandsioids which appeared in January 2017 in *Bromeliana ,* the journal of the New York Bromeliad Society. edited for many years by Herbert Plever. An identification key, included in the article, will be published in the next issue of *SEMBS.*

SEMBS, the newsletter of the Southeast Michigan Bromeliad Society, is published six times a year for the purpose of disseminating information about Society activities and about bromeliads and their care. Editor: Penrith Goff , associate editor Drew Okla.

TAXONOMIC CHANGES IN SUBFAMILY TILLANDSIOIDEAE

By Herb Plever

Did you become unhinged a few years ago when I reported a proposal by scientists for a major revision in the number of sub-families in family Bromeliaceae from three to eight? We were used to the three: ***Pitcairnioideae, Bromelioideae*** and ***Tillandsioideae***, and now ***Pitcairnioideae*** has been split into six subfamilies - ***Brochinioideae, Lindmanioideae, Pitcairnioideae*** and ***Puyoideae***. These changes ere made by a group of cooperating molecular biologists and taxonomists from many countries around the world. The molecular biologists are doing phylogenet ic DNA sequencing on Bromeliad species to determine their evolutionary and biogeographical history and relationships. The study of the morphology of the Bromeliads has been sharpened with closer looks at their habitats, physical (anatomical) structure and parts: leaves, presence or absence of a central tank, presence or absence of petal appendages (nectar scales), position of the ovary, different shapes of corollas (20), stigmas (18) and pollen (9), ovules and seeds and absence or presence of ovule and seed appendages. (See photos on pages 4 to 8). When conclusions based on DNA sequence data agree with morphological data, it is possible to make more confident proposals that will work taxonomically. Lyman Smith's Monograph (1974-77) included text and graphics of many of these anatomical characters, but recent morphological studies have resulted in new, more extensive and critical data, particularly the stigma morphology that has been advanced by Gregory Brown. Now - hold on to your hat – new, important reclassifications have been proposed for subfamily ***Tillandsioideae*** based on a multi-locus DNA sequence phylogeny and morphology by Michael H. Barfuss, Walter Till, Elton M.C. Leme, Juan P. Pinzón, José M. Manzanares, Heidemarie Halbritter, Rosabelle Samuel & Gregory K. Brown. It was recently published in PHYTOTAXA (279-1) P. 1-98. (The phylogeny referred to above is a classification based on DNA clades that indicate the evolutionary relationships between the tribes, genera and species.) The main goals are: "to provide a stable classification based on monophyletic established genera, and new taxa (genera and subgenera) using new synapomorphic combinations of diagnostic morphological characters, provide a key for generic identification, and a comprehensive nomenclature for the accepted genera..." (A monophyletic genus is a group of species which form a clade of plants that have a recent common ancestor and all its descendants, and thus it ***will provide a stable classification for taxonomy.*** Synapomorphic characters are traits that the species in a DNA clade have in common which distinguish the clade from other clades.) The data from the DNA sequencing show when and which species have a common ancestor. The genera ***Mezobromelia, Tillandsia*** and ***Vriesea*** were polyphyletic - (they had common characters, but descended from two or more ancestors); the authors propose to reclassify them to create new monophyletic genera. (Unfortunately, it is necessary for me to use scientific jargon to properly describe and summarize the proposals. If this makes you weary, skip down to paragraph "3." in column 2.) The authors have succeeded in attaining those stated goals: There is a new, workable key to the genera of subfamily ***Tillandsioideae*** with many physical characters listed to define each genus. The key will be refined and amended as data from ongoing research become available. (There are many species that have not yet been analyzed.) By creating new sub-tribes, genera and sub-genera, and reclassifying species anomalies, a more or less stable classification "based on monophyletic established genera" has been created. The following is a brief summary of the key conclusions and important changes:

1. The heretofore recognized four tribes: ***Tillandsieae, Vrieseeae, Pogospermeae*** (now called ***Catopsideae***), and ***Glomeropitcairnieae***, are supported by the data. ***Vrieseeae*** has been split into 2 sub-tribes called ***Vriesinae*** and ***Cipuropsidinae***.

2. Eleven new genera have been created, raising the total of supported genera in sub-family ***Tillandsioideae*** to eighteen. (The data suggested the possibility that the species ***Vriesea subandina*** could be moved to a new, single species genus to be called **Cipuropsis**, but it was too weak to justify

such a move at this time.)
The genera are:

Racinaea (78 species),
Tillandsia (772 species),
Barfussia (3 species from ***Tillandsia***),
Lemeltonia (7 species from ***Tillandsia***),
Pseudoalcantarea (3 species from ***Tillandsia***),
Wallisia (5 species from ***Vriesea***),
Guzmania (219species),
Gregbrownia (4 species from ***Mezobromelia***),
Mezobromelia (5 species),
Josemania (5 species from ***Vriesea***),
Werauhia (92 species),
Goudaea (2 species from ***Vriesea***),
Jagrantia (1 species from ***Vriesea***),
Lutheria (4 species from Vriesea),
Zizkaea (1 species from ***Vriesea***),
Stigmatodon (18 species from ***Vriesea***),
Vriesea (238 species) and
Alcantarea (41 species).

Lutheria splendens (formerly Vriesea splendens)

3. A new subgenus ***Pseudovriesea*** has been added to genus ***Tillandsia,*** (I assume) as a place to transfer the xeromorphic, grey-leaved former Vrieseas as proposed by Jason Grant. But only 4 of the 41 species are named in the report.

4. The following is a short list of popularly grown Tillandsioids in which changes have been made.

Some former ***Vriesea*** species are now: ***Tillandsia andreettae, T. barclayana, T. cereicola, T. espinosae, T. heterandra, T. hitchcockiana, T. malzinei, T. tequendamae, T. heliconioides T. tillandsioides***.

Some former ***Vriesea*** species are now: ***Goudaea chrysostachys, G. ospinae, G. ospinae var. gruberi, Jagrantia monstrum, Lutheria glutinosa, L.splendens, Stigmatodon goniorachys, Zizkaea tuerckheimii.***

Some former ***Tillandsia*** species are now: ***Barfussia laxissima, B. platyrhachis, B. wagneriana, Lemeltonia dodsonii, L. monodelpha, L. narthecioides, L. triglochinoides, Pseudoalcantarea grandis, Ps. Viridiflora, Racinaea dyeriana, R.hamaleana, R. venusta, Wallisia anceps, W. cyanea, W. lindeneana*** (a new name for former ***T. umbellata***), ***W. pretiosa***.

Some former ***Mezobromelia*** species are now*:* ***Gregbrownia hutchisonii, Gregbrownia lymansmithii.***

5. Complexes – Some genera are similar in appearance and are closely related biogeographically and/or in their evolution. Similarly, groups of species similar in appearance can be identified as sub-complexes. They may have physical characters in common, but each has its own unique characters to justify retaining a genus or a species rank. These species complexes are a useful taxonomic tool, especially when supported by DNA sequencing. For example, in his seminar at the Monocots V Conference in 2013 Elton Leme identified and described a ***Cryptanthoid Complex*** consisting of three related genera: ***Cryptanthus, Orthophytum*** and ***Lapanthus,*** because they shared habitats and some important physical characters. The 2016 DNA results support the classification of species complexes, and this report identifies the following:: ***Tillandsia biflora*** (136 species)***, T. australis*** (4 species)***, T. disticha*** (2 species)***, T. dodsonii, T. gardneri*** (17 species)***, T. lindenii, T. purpurea*** (6 species)***, T. plumosa, T.rauhii*** 3 species)***, T. sphaerocephala*** (6 species) and ***T.***

wagneriana.

6. These many important changes will likely rattle our readers, but just think of the headache the the changes have created for Geoff Lawn, our BSI Cultivar Registrar, and his colleagues Eric Gouda and Derek Butcher, who maintain and keep the BCR current. Not only do they have the enormous job of correcting cultivar names to conform to newly created genera and changes in genera, but they have to invent new bigeneric names for cultivars where one or both parents are in changed genera. For example the parents of ***x Vrieslandsia*** 'Pink Magic' (Arden) are former ***Tillandsia laxissima*** (now ***Barfussia laxissima***) and ***Vriesea*** 'Redondo Beach'. They will have to create a new bigeneric name from ***Barfussia*** and ***Vriesea.*** I am happy to inform you that Geoff, Eric and Derek are already hard at work making those changes. I have expanded this issue to photos of plants from different habitats and different corollas and stigmas), and to present in its entirety the new key to the genera of subfamily ***Tillandsioideae.*** (See pages 4-10.) It is too soon to ascertain the assessments of the report by other leading biologists and taxonomists. Some understandable confusion has resulted from the placement of morphologically disparate species in ***subgenus Tillandsia***, based apparently on "weakly supported" DNA data. This and other issues will likely be revisited by the authors. An incomplete, complex system for Tillandsioids cannot be totally neat and tidy. The bromeliad world owes a debt of gratitude to the authors of this 2016 report and to their colleagues, researchers, lab assistants etc. for this major advance in bromeliad taxonomy.

Wallisia cyanea (formerly Tillandsia cyanea)

Racinaea dyeriana (formerly Tillandsia dyeriana)

Tillandsia biflora - Photo by Hiroyuki Takizawa

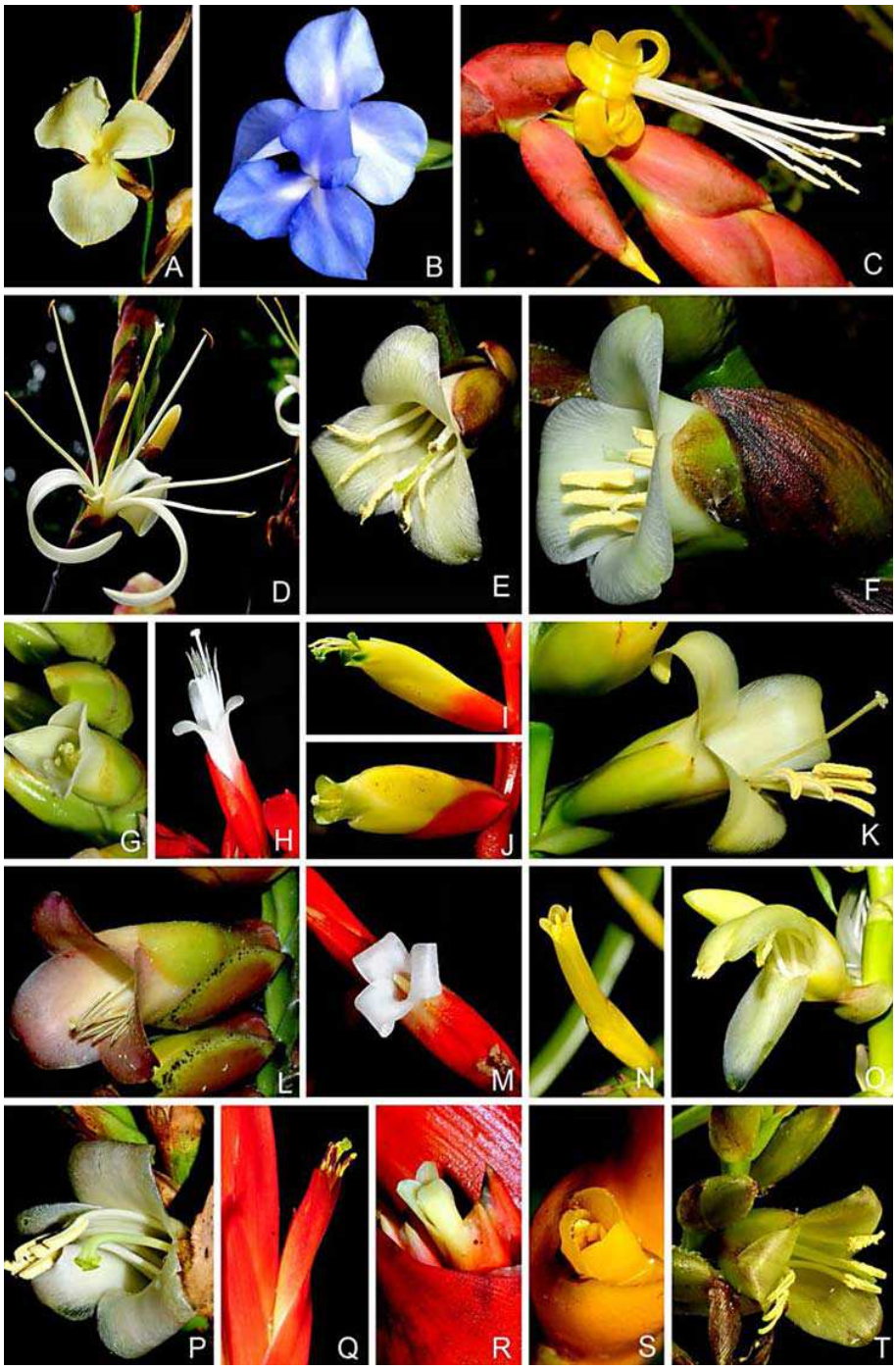
HABITAT OF SELECTED TILLANDSIOIDEAE

FIGURE 1. Habit of selected Tillandsioideae. Habit (adult): m = mesomorphic, sx = semi-xeromorphic, x = xeromorphic. Central tank (adult): a = absent, p = present. **A**. *Catopsis hahnii* (Leme 2482; m, p). **B**. *Barfussia wagneriana* (Takizawa s.n.; m, p). **C**.*Guzmania kareniae* (Leme 3439; m, p). **D.** *Josemania singularis* (Leme 2838; m, p). **E.** *Lemeltonia dodsonii* (Leme 2523; sx, a). **F.** *Pseudalcantarea viridiflora* (Takizawa s.n.; m, p). **G.** *Racinaea pugiformis* (Leme 5180; m, a). **H**. *Tillandsia geminiflora* (Leme s.n.; sx,a). **I**. *Racinaea hamaleana* (Leme 7319; m, p). **J**. *Tillandsia fasciculata* s.l. (Leme 4833; x, a). **K**. *Goudaea chrysostachys* (Leme 2509; m,p). **L**. *Mezobromelia capituligera* (Leme 5111; m, p). **M**. *Lutheria glutinosa* (Leme 2525; m, p). **N**. *Werauhia nephrolepis* (Leme 3955;m, p). **O**. *Vriesea psittacina* (Leme 7075; m, p). **P**. *Alcantarea imperialis* (Leme 304; m, p). **Q**. *Stigmatodon euclidianus* (Leme 5712 sx,p)

COROLLA TYPES IN TILLANDSIOIDEAE

FIGURE 2. Corolla types in Tillandsioideae. A. *Catopsis hahnii* (Leme 2482; urceolate). B. *Catopsis pisiformis* (Leme 2410; urceolate); C. *Gregbrownia lyman-smithii* (Leme 4655; tubular with spreading petal blades); D. *Barfussia laxissima* (Takizawa s.n.; salverform); E. *Guzmania patula* (Leme 4062; tubular with recurved petal blades); F. *Guzmania kareniae* (Leme 3439; tubular with spreading petal blades); G. *Guzmania cylindrica* (Leme 4586; tubular with enlarged, erect, slightly divergent petal blades); H. *Guzmania sanguinea var. comosa* (Leme 3253; tubular with cucullate petal tips); I. *Guzmania musaica* (Leme 3538; tubular with cucullate petal tips). J. *Pseudalcantarea viridiflora* (Takizawa s.n.; tubular with spreading, helicoiform petal blades). K. *Racinaea hamaleana* (Leme 7319; salverform); L. *Racinaea crispa* (Leme 2437; urceolate). M. *Tillandsia malzinei* (Leme 361; tubular with recurved petal blades). N. *Tillandsia xiphioides* (Takizawa s.n.; salverform). O. *Tillandsia incurva* (Leme 7299; tubular with divergent petal tips). P. *Tillandsia fasciculata* s.l. (Leme 4833; tubular). Q. *Tillandsia usneoides* (Leme 306; tubular with spreading petal blades). R. *Tillandsia graomogulensis* (Leme 1489; salverform). S. *Tillandsia geminiflora* (Leme s.n.; tubular with spreading petal tips). T. *Tillandsia tectorum* (Takizawa s.n.; tubular).

COROLLA TYPES IN TILLANDSIOIDEAE CONTINUED



Corolla types in Tillandsioideae (continued). A. *Lemeltonia dodsonii* (Leme 2523; salverform). B.*Wallisia lindeniana* (Barfuss s.n.; salverform). C. *Alcantarea farneyi* (Leme 1910; tubular with strongly recurved petal blades).D.*Alcantarea robertokautskyi* (Leme 3866; tubular with strongly recurved petal blades). E. *Stigmatodon plurifolius* (Leme 6997; campanulate). F.*Stigmatodon apparicianus* (Leme 7379; campanulate). G. *Stigmatodon amadoi* (Leme 5953; campanulate). H. *Vriesea flammea* (Leme 5471; tubular with spreading petal tips). I. *Vriesea psittacina* (Leme 7075; tubular). J. *Vriesea platynema* (Leme 1670; tubular). K. *Vriesea saxicola* (Leme 5236; campanulate). L. *Vriesea pseudoatra* (Leme 3917; campanulate). M. *Vriesea ('Cipuropsis') elata* (Leme 743; tubular with recurved petal blades). N. *Vriesea breviscapa* (Leme 8235; tubular). O. *Werauhia nephrolepis* (Leme 3955; cupshaped base and one petal blade spreading, the other two forming a hood). P. *Werauhia gladioliflora* (Leme 3967; campanulate). Q. *Lutheria glutinosa* (Leme 2525; tubular). R. *Mezobromelia capituligera* (Leme 5111; tubular). S. *Goudaea chrysostachys* (Leme 2509; tubular with cucullate petal tips). T. *Zizkaea tuerckheimii* (Gouda s.n.; campanulate).

STIGMA TYPES IN TILLANDSIOIDEAE

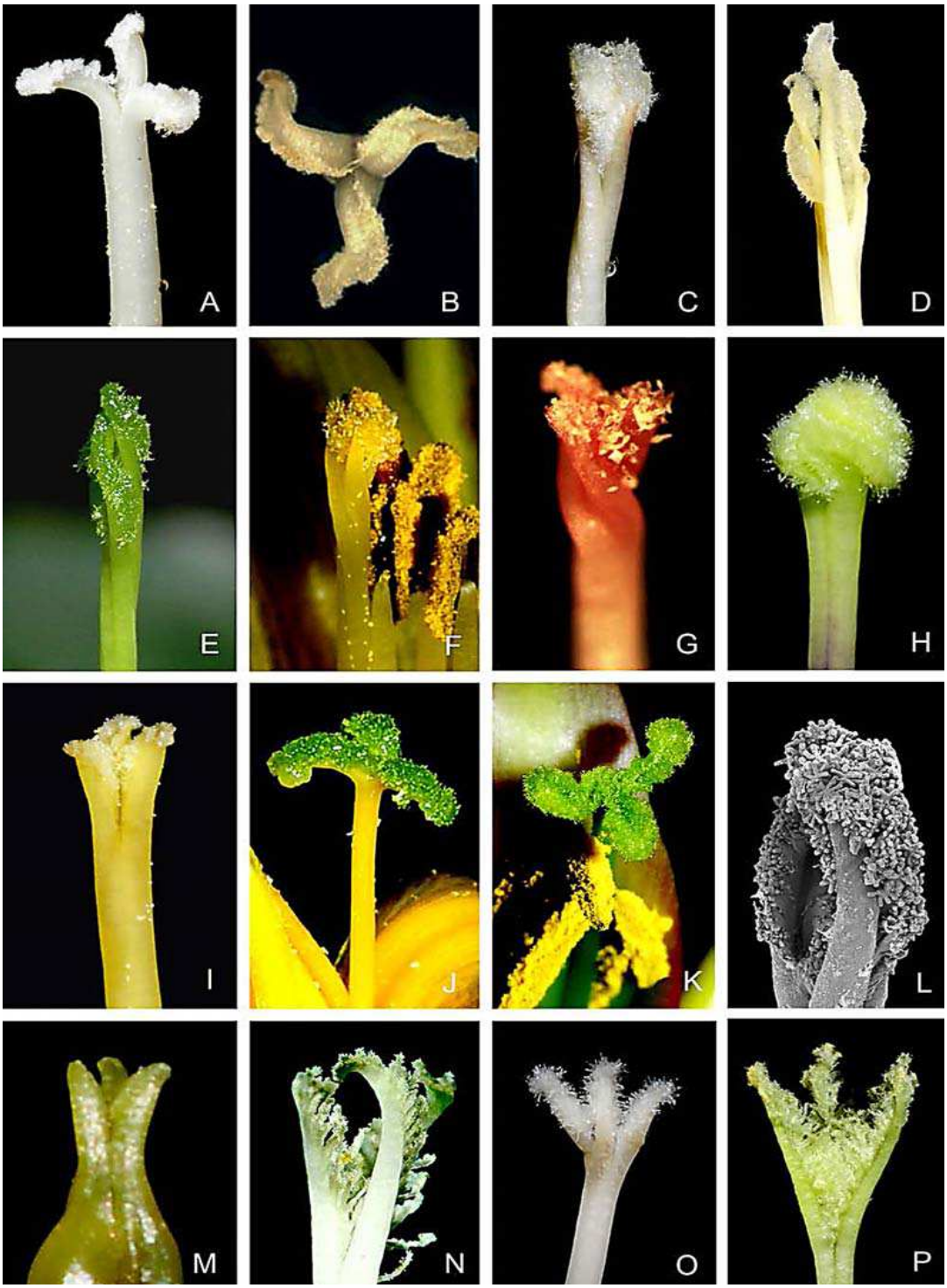


FIGURE 4. Stigma types in Tillandsioideae. Conduplicate and simple types (Table 5). A. *Alcantarea heloisae* (Leme 8055; cp, lateral view). B. *Alcantarea heloisae* (Leme 8055; cp, top view). C. *Alcantarea extensa* (Leme 1942; ce, early anthesis). D. *Alcantarea cerosa* (Leme 8551; ce, late anthesis). E. *Pseudalcantarea viridiflora* (Leme 2835; ce). F. *Gregbrownia lyman-smithii* (Leme 4655; cs). G. *Tillandsia gardneri* (Leme s.n.; cs). H. *Tillandsia fasciculata* s.l. (Leme 4833; cs). I. *Goudaea chrysostachys* (Leme 2509; se).J. *Guzmania sprucei* (Leme 3551; sp). K. *Tillandsia malzinei* (Leme 361; sp). L. *Guzmania musaica* (spi). M. *Catopsis floribunda*(Leme 8101; se). N. *Wallisia anceps* (Till et al. 15046; cpi). O. *Guzmania wittmackii* (Leme 2520; spi). P. *Wallisia lindeniana* (Leme2406;cpi).

STIGMA TYPES IN TILLANDSIOIDEAE CONTINUED*FIGURE 5. Stigma types in Tillandsioideae*

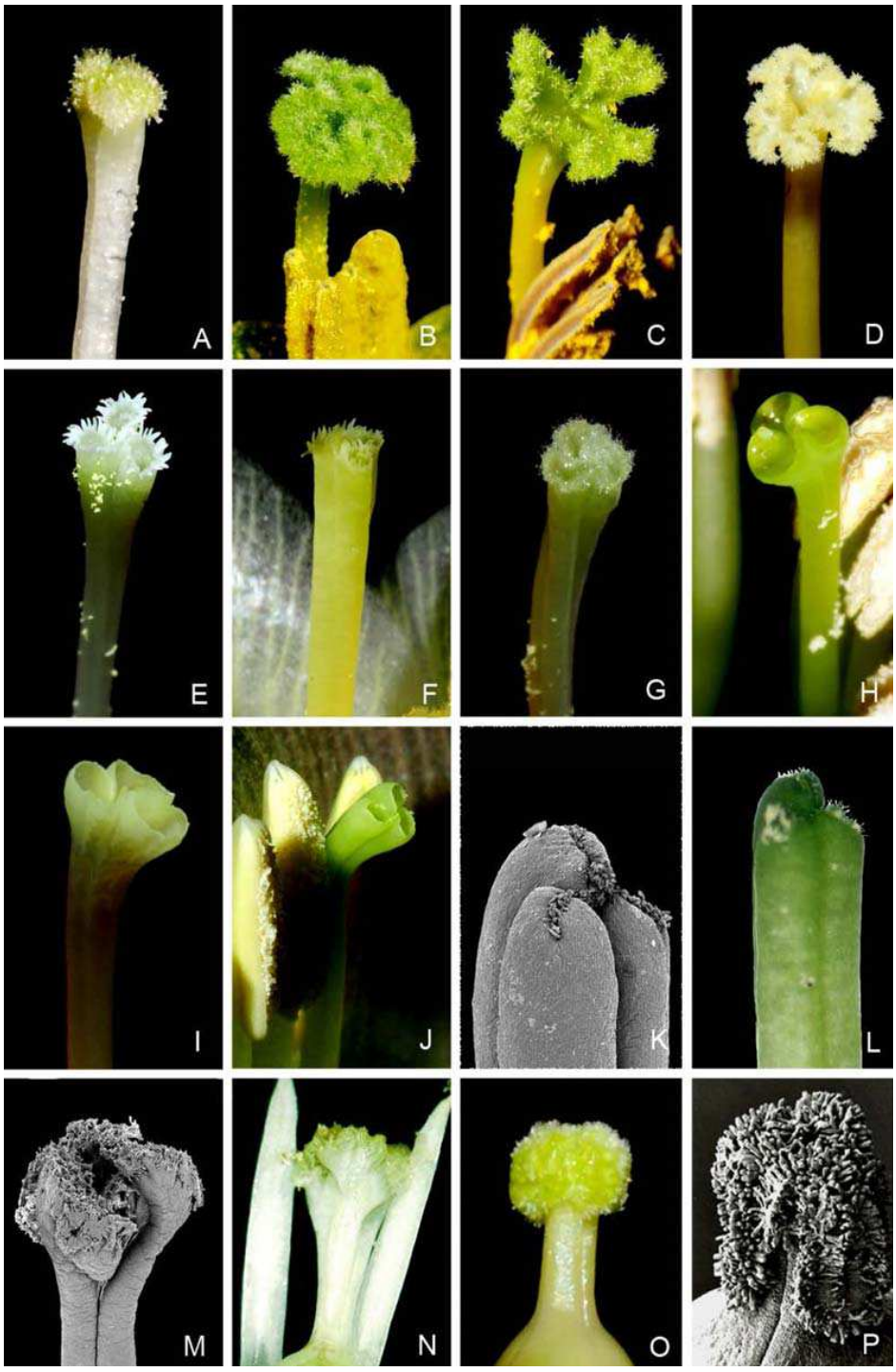


*FIGURE 5. Stigma types in Tillandsioideae (continued).. A. Guzmania patula (Leme 4062; cbI). B. Vriesea gradata (Leme573*8; cbII). C. *Vriesea psittacina* (Leme 7075; cbII). D. *Vriesea jonghei* (Leme 2189; cbII). E. *Stigmatodon bifidus (*Leme 7368; tl). F. *Stigmatodon funebris* (Leme 7976; tl). G. *Stigmatodon rosulatulus* (Leme 8621; tl with papillae). H. *Werauhia pedicellata* (Leme 7320; cup). I. *Werauhia subsecunda* (Leme 2561; cup). J.*Werauhia sp.* (Leme 3987; cup). K. *Zizkaea tuerckheimii* (W. Till 17055 & Hromadnik 25033; urc). L. *Zizkaea tuerckheimii* (W. Till 17055 & Hromadnik 25033; urc). M. *Barfussia platyrhachis* (Belvedere s.n.; co). N. *Barfussia platyrhachis* (Belvedere s.n.; co). O. *Racinaea venusta* (Leme 2590; cf). P. *Lemeltonia dodsonii* (MSBG 1981-0055; cf