KEY TO THE GENERA OF BROMELIACEAE at 9/2017 by Derek Butcher

This follows roughly the information given in the Monograph by Smith and Downs (Flora Neotropica no. 14, 1974 - 77) which covered 46 genera. This was expanded in Lyman Smith’s paper in Beitr. Biol. Pflanzen 63 (1988) 403 - 411 to cover 51 genera where he added new genera Steyerbromelia, Brewecaria, Pseudaechmea, and Lymania. Lindmania was revived from synonymy of Cottendorfia. In the same issue but on pages 101 - 113 Elvira Gross reported findings on the germination processes of the three subfamilies and one facet is shown in the key below. The key was further updated in 1998 by L B Smith and W Till to cover 56 genera in The Families and Genera of Vascular plants, Kubitzki pages 83 - 86 (1998) where Alcantarea, Werauhia, Ursulaea, Pepinia, and Racinaea were added. Abromeitiella had been placed in synonymy under Deuterochnia. Note that Streptocalyx was retained purely because the genus Aechmea is currently in a state of flux. From a horticultural point of view the retention of this genus tends to make sense because of the similar growing conditions needed to get good specimens. However, Chevaliera was resurrected to genus status because of its clearly delineated boundaries and is said to be more of a natural group. Since this publication the genera have increased to 58 where Derek Butcher has now added Canistrum, and Edmundoa, and made adjustments to Canistrum, Nidularium, and Wittrockia because of Elton Leme’s recent work. Canistrum - Bromeliads of the Atlantic Forest (1997) and Canistropsis - Bromeliads of the Atlantic Forest (1998). The merging of Pepinia into Pitcairnia at generic level in Harvard Papers in Botany Vol. 4 no.1 195 - 202 (1999) by Robinson and Taylor has reduced the genera to 57. The creation of a new genus Viridantha for the ‘Little Green Mexican’ Tillandsias by Espejo in Acta Bot Mex 60: 2002 was not accepted by botanists outside Mexico. The transfer of Pseudananas to a synonym of Ananas see Coppens d’Eeckenbrugge, G & F Leal, The Pineapple: Botany, Production and uses. CAB Int. 2: 13-32. 2003 reduces the genera to 56. The resurrection of Andrea Brown & Leme in Taxon 54 (1): 63-70. 2005 (now Eduandrea see Leme et al in J. Brom. Soc 58(2): 61-4. 2008) increases genera to 57. Givnish et al in Aliso 23: 3-26. 2007 gave major changes within Pitcairnioideae which is now Hechtioideae, Puyoideae, Pitcairnioideae, Lindmanioideae, Broccinioideae, and Navioideae. Genus change is where Ayensua is now Brocchinia and new genus Sequencia. Number remains at 57. In Flora of Sao Paulo by Wanderley et al in 2007 we see some genera of plants from this state of Brazil treated differently. For example, Canistropsis treated as Nidularium, and Edmundoa and Wittrockia as Canistrum. These moves do not seem to have been accepted other than by botanists in Sao Paulo. No action taken. In 2010 Lapanthus added, number now 58. Barfuss et al 2016 reviewed sub family Tillandsioideae and added 11 new genera, Barfussia, Goudaea, Gregbrownia, Jagrantia, Josemania, Lemeltonia, Lutheria, Pseudalcantarea, Stigmatodon, Wallisia, and Zizkaea, so the number increases to 69. J. Aguirre-Santoro in Ronnberiga Alliance in Plant Syst Evol 2017 added Wittmackia so the number is now 70. Leme, Barfuss & Halbritter, gen. nov. Phytotaxa 299(1):001-035. 2017 added Waltillia. The numbers now 71 Cryptanthoid changes in Leme et al in Phytotaxa 318(1): 001-088. 2017 add 3 new genera – Forzzaea, Hoplocryptanthus, Rokautskyia. We now reach 74

The splitting of Portea from the rest is based on pedicellate flowers but there is an exception in the taxon which has all the attributes of a Portea but was described as Aechmea rubrolilacina. Leme has also transferred Portea lepantha to Aechmea lepantha indicating this genus needs review.
KEY
1. Fruits indehiscent, baccate ..................  Bromelioideae 9-56
   1a Fruits dehiscent, capsular ..................  2

2. Seeds plumose-appendaged ...............  Tillandsioideae 57-64
   These entries deleted and new key as per Barfuss 2016 placed at end
   2a Seeds winged or naked .......................  3

3. Flowers dioecious, plants of Central America ...  Hechtioideae  65
   3a Flowers perfect, or rarely monoecious or polygam dioecious, or dioecious and plants of
      the Brazilian Shield ....  4

4. Petal blades showy, tightly spiralled after anthesis, broad and distinct from claws
   ..............................................  Puyoideae 66
   4a Petal blades remaining free after anthesis, or if slightly coiled, then not clawed  5

5. Petals large and conspicuous or, if minute, then sepals imbricate and anthers basifixed,
   linear ...........  Pitcairnioideae 67-69
   5a Petals minute and sepals cochlear, or petals and bracts various and sepals convolute  6

6. Sepals convolute .........................  Lindmanioideae 70
   6a Sepals cochlear and petals minute  7

7. Leaves entire, stellate chlorenchyma abundant  Brocchinioideae 71
   7a Leaves toothed, stellate chlorenchyma absent ....  Naviodeae 72-75

9. Sepals symmetric or nearly so  10
   9a. Sepals asymmetric  34

10. Filaments forming a tube to which the fleshy petals are joined along their centres but
    with their margins free; sepals mostly free or nearly so; leaves very laxly and coarsely
    spinose-serrate  11
    10a. Filaments not connate but sometimes adnate  13

11. Sepals with soft, usually broad apices; inflorescences compound. Mexico and the West
    Indies to Argentina and Uruguay  Bromelia
    11a Sepals spinose-mucronate  12

12. Inflorescence simple, with almost no scape. Argentina  Deinacanthan
    12a Inflorescence branched with terminal cone-like branches, with a scape. S Mexico,
    Guatemala.  Hohenbergiopsis

13. Terminal axes of the inflorescence visible  14
    13a Terminal axes of the inflorescence covered by leaves or bracts  20

14. Petals naked; sepals 0.5-7 mm long  15
    14a. Petals appendaged; sepals mostly much larger  18
15. Inflorescence compound; sepals broadly ovate or oblong, 0.5-2mm long. Costa Rica and Trinidad to Amazonian Brazil
   **Araeococcus**

15a. Inflorescence simple; sepals narrowly elliptic, 7mm long; flowers subsessile or pedicellate. Mount Itatiaia area in E Brazil
   **Fernseea**

16. Petals zygomorphic or tightly recoiled and flowers sessile. W Mexico and Central America to Argentina and Uruguay
   17

16a. Petals not zygomorphic
   18

17. Epigynous tube usually well developed
   **Billbergia**

17a. Epigynous tube shallow. W Mexico
   **Ursulaea**

18. Petals erect. E Brazil
   19

18a. Petals recoiled at the top
   **Ursulaea**

19. Flowers sessile
   20

19a. Flowers pedicellate
   **Quesnelia**

20. Inflorescence simple, cone-like; flowers solitary in the axil of each bract
   21

20a. Inflorescence compound
   28

21. Scape short or none; cone-like branches nidular or axillary
   22

21a. Scape well developed, obvious
   26

22. Floral bracts leaf-like, petals with reflexed lobes. NE Brazil
   **Orthophytum**

22a. Floral bracts leaf-like, petals with straight lobes. NE Brazil
   **Lapanthus**

See Cryptanthoid key at end

22b. Floral bracts bract-like
   23

23. Scape distinct, its bracts shorter than the floral bracts; petals naked. Mexico and Venezuela to Chile
   **Greigia**

23a. Scape none or very short
   24

24. Epigynous tube shallow, bowl-shaped (*A. pitcairnioides*) Brazil: Bahia
   **Acanthostachys**

24a. Epigynous tube cylindric, deep. Chile
   25

25. Sepals obtuse, stamens included, petals blue
   **Fascicularia**

25a. Sepals acute with pungent apex, stamens exserted, petals rose
   **Ochagavia**

26. Scape erect, without bracts (*A. strobilacea*). S Brazil, Paraguay, Argentina
   **Acanthostachys**

26a. Scape covered with bracts
   27

27. Scape bracts leaf-like, scape erect. NE Brazil
   **Orthophytum**

See Cryptanthoid key at end

27a. Scape bracts leaf-like, no scape. NE Brazil
   **Lapanthus**

See Cryptanthoid key at end

27b. Scape bracts bract-like; scape prostrate. French Guiana and adjacent Brazil
   **Disteganthus**

28. Inflorescence obviously compound with several strobils on an elongate floral axis
   29

28a. Inflorescence pseudosimple with hands or flat fascicles in the axils of large bracts
   30
29. Floral bracts leaf-like, serrulate; cone-like branches sessile or subsessile. NE Brazil

   Orthophytum  See Cryptanthoid key at end

29a. Floral bracts bract-like, entire; cone-like branches on distinct scapes. Mexico and Venezuela to Chile

   Greigia

30. Outer bracts of the inflorescence leaf-like; sepals high connate; petals naked. NE Brazil

   Cryptanthus  See Cryptanthoid key at end

30a. Outer bracts of the inflorescence leaf-like; sepals free or connate; petals appendaged

   Lapanthus  See Cryptanthoid key at end

30b. Outer bracts of the inflorescence bract-like, large, and covering most of the flowers. E Brazil

31

31. Petals erect and apex distinctly obtuse cucullate, connate or agglutinated in a tube the height of the sepals

31a. Petals sub-erect to spreading at anthesis, free or nearly so

32

32. Inflorescence wool persistent after anthesis

32a. Inflorescence wool not persistent

33

33. Stolons slender, flowers 20-35 mm long

33a. Stolons stout or none, flowers 45-80 mm long

33b. Rhizomes underground, flowers 24-27 mm long, leaves entire

34

34. Ovaries coalescing to form a compound fruit; inflorescence simple, strobilate

34a. Ovaries always remaining distinct

35

35. Flowers pedicellate

35a. Flowers sessile or subsessile

36

36. Inflorescence nidular, simple in most species; petals naked. Amazonia, E Brazil

36a. Inflorescence scapose

37

37. Sepals more or less connate, long-mucronate; petals appendaged. E Brazil

37a. Sepals free or unarmed

38

38. Inflorescence simple; sepals without sharp tip

38a. Inflorescence compound

39

39. Petals naked. Colombia

39a. Petals appendaged. Colombia and Guyana to NE Brazil

40

40. Sepals 1.5-3 mm long; inflorescence glabrous; petals naked. Colombia to Suriname and Amazonian Brazil

40a. Sepals 3.5-22 mm long; inflorescence lepidote; petals appendaged. Mexico to Peru

41

41. Petals appendaged with well-developed appendages

41a. Petals naked or with lateral folds or rudimentary or reduced appendages

42

42. Epigynous tube shallow or lacking; flowers in tubular cone-like branches; inflorescence
mostly pinnate and lax, rarely digitate or simple and without petal appendages \((H.\ littoralis)\). Antilles to Venezuela and Brazil. \textit{Hohenbergia} 42a. Epigynous tube well developed; inflorescence various \textit{43}

43. Sepals without a sharp tip \textit{45}
43a. Sepals with a sharp tip. \textit{44}

44. Inflorescence not involucrate. N and S America \textit{Aechmea} subg. 3. \textit{Aechmea}, \textit{Aechmea} subg. 4. \textit{Otgiesia}, \textit{Aechmea} subg. 6. \textit{Pothuava} 44a. Inflorescence involucrate with large upper scape bracts and primary bracts. S. America \textit{Canistrum}

45. Floral bracts attached basally, not decurrent nor forming pouches; flowers polystichous \textit{46}
45a. Floral bracts decurrent and forming pouches around the flowers; flowers often distichous. N and S America \textit{Aechmea} subg. 5. \textit{Platyaechmea}

46. Inflorescence compound \textit{47}
46a. Inflorescence simple \textit{48}

47. Leaves distichous; blades marked with spots or bands; floral bracts minute; ovules obtuse \((Q.\ marmorata)\). Brazil: Espirito Santo to Sao Paulo \textit{Quesnelia} 47a. Leaves polystichous or the blades concolorous; floral bracts large to lacking; ovules long-caudate. Colombia, Venezuela, Amazonian Brazil \textit{Aechmea} subg. 2. \textit{Lamprococcus}

48. Ovules obtuse (no further distinction possible without keying by species). E Brazil \textit{Quesnelia} 48a. Ovules apiculate to caudate. Central America to Brazil and Argentina \textit{Aechmea} subg. 7. \textit{Macrochordon}

49. Ovary deeply sulcate; inflorescence simple or compound. NE Brazil \textit{Lymania} 49a. Ovary evenly rounded \textit{1} \textit{50}

50. Inflorescence lax; axes visible \textit{51}
50a. Inflorescence dense \textit{54}

51. Inflorescence simple. Costa Rica to Peru \textit{Ronnbergia} 51a. Inflorescence simple or compound. Pacific side of South America and Caribbean Islands \textit{Wittmackia}

51b. Inflorescence pinnately compound \textit{52}

52. Flowers very small; sepals not over 3mm long; ovules few; epigynous tube none. Costa Rica, Venezuela, Trinidad, Tobago, Guyana to Amazonian Brazil \textit{Araeococcus} 52a. Flowers small to large; sepals more than 3 mm long; epigynous tube distinct \textit{53}

53. Branches elongate, many-flowered; flowers perfect; anthers unappendaged. E and Amazonian Brazil and adjacent areas (treated by some as \textit{Aechmea}) \textit{Streptocalyx} 53a. Branches short, digitately few-flowered; flowers functionally unisexual on different plants; anthers appendaged. Central America: Guatemala to Costa Rica \textit{Androlepis}

54. Flowers 2 or more in the axil of each bract \textit{55}
54a. Flower single in the axil of each bract

55. Inflorescence involucrate; sepals only slightly asymmetric, not with sharp tip or mucronulate. E Brazil

55a. Inflorescence cone-like; sepals strongly asymmetric, mucronate. E and Amazonian Brazil and adjacent areas *(treated by some as Aechmea)*

56. Petals naked or with lateral folds; bracts papery or leathery; leaf blades often petiolate. Costa Rica to Peru. Ovaries red or pink at anthesis, turning dark purple to black in fruit; sepals becoming as fleshy as the carpels in fruit

56a. Petals naked or with lateral folds; bracts papery or leathery; leaf blades sometimes narrowed at base, Pacific side of South America and Caribbean Islands. Ovaries green, cream, yellow, or light purple either at anthesis or in fruit sepals persistent but not as fleshy as the carpels in fruit

56b. Petals bearing rudimentary or reduced appendages; bracts mostly thick and ligneous; leaf blades never petiolate; pollen sulcate. Mexico to Peru and Amazonian Brazil, E Brazil *(treated by some as Aechmea)*

For replacement 57-64 see Tillandsioideae at end

65. Plants dioecious with functionally unisexual flowers; petals rose or white; plants of Texas, Mexico, and northern Central America

66. Petal blades tightly spiraled after anthesis, broad, distinct from the bottom portion; leaf blades narrowly triangular, never contracted at base; ovary superior or slightly inferior; Andean plants of open slopes and summits from Costa Rica and Guayana to Chile and Argentina

67. Ovary wholly superior; petals regular

67a. Ovary partially to wholly inferior, or, if superior then the petals zygomorphic. Petals large, naked or appendaged, sepals convolute

68. Petals naked

68a. Petals each bearing a single basal appendage; xerophytic plants of the southern Andes from Peru to Chile, Argentina, and W. Brazil

69. Seeds with a sickle-like appendage; petal blades narrow, indistinct from the base; plants of NE Brazil

69a. Seeds bicaudate-appendaged or clavate. Anthers basifixed, linear, coiled at anthesis, inner filaments adnate to the base of the petals; leaf blades thin, more or less contracted at base; mesophytic plants of Mexico to Argentina and W Brazil

69b. Seeds broad alate, bases of the filaments forming a tube and adnate to the petals; petals yellow to orange; plants of Brazil, Uruguay, Paraguay, and Argentina

70. Flowers showy. Sepals free, convolute, apically rounded to obtuse, subcoriaceous; petals rose, red, or purple, free, unappendaged, blades broad, spreading after anthesis and not twisted together afterwards. Stamens included; anthers basifixed. Ovary wholly superior; style elongate. Fruit a septicidal capsule. Seeds bicaudate.
70a Flowers small. Sepals free, convolute, ovate to broadly ovate, rounded or broadly obtuse apically; petals free, unappendaged, exceeding the sepals, white, pink, yellow, or orange. Filaments mostly free; anthers versatile. Ovary superior, glabrous; style slender; placentae short, basal. Fruit an ovoid, septicidal capsule. Seeds slenderly fusiform, bicaudate.  

Lindmania

71. Capsular fruits, seeds bicaudate appendaged; petals minute, regular, free; sepals cochlear, with the two adaxial overlapping the abaxial; ovary partly to wholly inferior; in florescence racemose, paniculate, or capitate; leaves entire, almost always with stellate chlorenchyma.  

Brocchinia

72. Seeds bicaudate appendaged  
72a Seeds not bicaudate appendaged  

Sequencia

73. Stigma lobes distorted; sepals spiral in form with the abaxial overlapping both the adaxial cells of leaf epidermis straight walled, plants of NE Brazil  

Cottendorfia

73a Stigma lobes uniform  

74. Petals naked; inflorescence scapose, pinnate, and more or less open or sessile and capitate  

Navia

74a Petals appendaged  

75. Seeds wedge shaped, inflorescence long-scapose, simple, densely cylindric.  

Brewcaria

75a Seeds narrow elliptic to falcate elliptic, inflorescence compound, lax, stigmas broad, strongly contorted;  

Steyerbromelia

Key to the genera of Tillandsioideae

Note:-For determination, flowering plants are indispensable; fruiting material is helpful in some cases. Stigma types and other floral characters are best studied in fresh material just before or at flower opening when anthers are not yet dehisced and stigmatic surfaces free from pollen; the use of a hand-lens with 10x magnification is recommended. Characters after the ‘_’ dash are additional characters to verify the correct determination and need not necessarily appear in the corresponding couplet.

1.Ovary about 1/2-1/3 inferior; stigma of the convolute-umbrella type; fruit a partly septicidal capsule; seeds with appendages of the *Glomeropitcairnia* type, long appendaged on both ends. _ Flowers spirally arranged; petals bearing basal appendages  

Glomeropitcairnia

1a.Ovary less than 1/2 inferior or superior; stigma not of the convolute-umbrella type, if resembling a convolute type, then of the convolute-blade I type or the convolute-blade II type or of the convolute-obconic type; fruit a septicidal capsule; seeds with appendages of the *Catopsis* type or the Core Tillandsioideae type, usually long appendaged only on one end but the appendage at the apical end sometimes well developed _ Flowers spirally or distichously arranged; petals bearing or without basal appendages...... .......

2. Ovary superior to about 1/8 inferior; seeds with appendages of the *Catopsis* type, with a plumose flight apparatus formed at the apical end by multicellular hairs folded at maturity,
and a multicellular, undivided plume at the basal end. _ Flowers spirally arranged; sepals strongly asymmetric; petals without basal appendages....................,. .. **Catopsis**

2a. Ovary more than 1/8 inferior, but not more than 1/2 inferior; seeds with appendages of the Core Tillandsioideae type, with a plumose flight apparatus formed at the basal end, appendage at the apical end lacking, short and usually undivided, or rarely long and occasionally somewhat divided, not folded at maturity. _ Flowers spirally or distichously arranged; sepals usually symmetric or subsymmetric, if occasionally asymmetric, then flowers distichously arranged; petals bearing or without basal appendages

3. Petals conglutinated/connate into a tube for more than 1/4 of their entire length; filaments partially agglutinated/adnate to the conglutinated/connate portion of the petals. _ Flowers usually spirally, rarely distichously arranged; petals white, yellow, or green; seeds without a distinct appendage at the apical end .................. .................

3a. Petals free or sometimes conglutinated/connate into a tube shorter than or equalling about 1/4 of their entire length; filaments free, conglutinated/connate, or short agglutinated/adnate to the petals. _ Flowers usually distichously, rarely spirally arranged; petals violet, pink, red, orange, yellow, green, white, and rarely bicolored; seeds usually with a distinct appendage at the apical end usually up to the length of the seed proper, occasionally longer...................... 4.

4. Petals without basal appendages. Stigma of the convolute-blade I type or the simple-erect type, occasionally of the simple-patent type or simple-pinnatisect type ............ **Guzmania**

4a. Petals bearing basal appendages. _ Stigma of the simple-erect type or the conduplicate-spiral type,............

5. Inflorescence compound, once or rarely twice branched, with branches composed of dense flower fascicles, petals about 1/3-1/2 of their entire length conglutinate/connate into a tube, tips slightly divergent, bearing linear and entire basal appendages, highly adnate to the conglutinated/connate portion of the petals; stamens and style included within the corolla; anthers united into a tube surrounding the stigma, not versatile; stigma of the simple-erect type................

5a. Inflorescence compound, twice or rarely triple branched, a laxly flowered panicle; petals more than 1/2 of their entire length conglutinate/connate into a tube, blades spreading, bearing crenulated basal appendages adnate for less than 1/3 of the conglutinated/connate portion of the petals; stamens and style exserted from the corolla; anthers not forming a tube around the stigma, versatile; stigma of the conduplicate-spiral type (weakly spiral) ........

**Mezobromelia**

6. Stigma of the conduplicate-patent type or conduplicate-erect type ; petals linear, forming a tubular corolla with strongly recurved and ± coiled, or spreading and ± spirally twisted blades. _ Stamens and style much exserted from the corolla; ovary 1/3-1/2 inferior.......... 7

6a. Stigma usually not of the conduplicate-patent type or the conduplicate-erect type, if rarely resembling the conduplicate-patent type, then corolla tubular; petals forming a urceolate, campanulate, salverform or tubular corolla, usually with spreading or recurved blades or tips only. _ Stamens and style included within or exserted from the corolla; ovary usually up to 1/3, very rarely up to 1/2 inferior ............

7. Petals light green, spreading and ± spirally twisted (helicoiform); without basal appendages; ovules appendiculate, shorter than or equalling the ovule proper; seeds with an appendage at the basal end distinctly longer than the seed proper, appendage at the apical end short, about half as long as to equalling the seed proper, undivided; stigma green

**Pseudalcantarea**
7a. Petals white, cream, pale to bright yellow, rarely pale wine: castaneous or dark wine, recurved or coiled, bearing well-developed basal appendages; ovules distinctly appendiculate, longer than the ovule proper; seeds with an appendage at the basal end rather short, about equalling the seed proper, appendage at the apical end distinctly larger than the seed proper, sometimes somewhat divided; stigma white ......

Alcantarea

7b. differs from Alcantarea by petals 4 to 6 times longer than wide (vs. 10 to 15 times longer than wide), forming a narrow campanulate corolla (vs. corolla not campanulate), remaining persistent and becoming erect after anthesis (vs. ephemeral and flaccidescant after anthesis), unappendaged (vs. bearing well developed basal appendages); pollen sacs of the anthers with the line of dehiscence prevailing laterally (vs. prevailing markedly frontal), leaving the connective area completely exposed and not covered by the margins of the pollen sacs at anthesis (vs. the opposed margins of the pollen sacs becoming strongly recurved and touching each other and completely covering the connective area at anthesis), pollen with sulcus margins more or less well defined but not sharply cut (vs. margins sharply cut), sulcus covered by a kind of operculum of almost smooth exine elements with some perforations (vs. sulcus without any or bearing only small and low ornamental elements), and stigma of the convolute-blade II type (vs. conduplicate-erect or conduplicate-patent types).

Waltillia

8. Stigma of the cupulate type

8a. Stigma not of the cupulate type, if occasionally resembling a cupulate type, then of the urceolate type or tubo-laciniate type

9

9. Stigma of the urceolate type

9a. Stigma not of the urceolate type

10

10. Stigma of the tubo-laciniate type ............

Stigmatodon

11

11. Stigma of the convolute-blade II type . _ Leaves mesomorphic or rarely semi-xeromorphic, usually forming strongly to moderately impounding rosettes; petals usually bearing basal appendages .................. .......

Vriesea

11a. Stigma not of the convolute-blade II type, if rarely resembling a convolute type, then of the convolute-obconic type or the convolute-blade I type, the latter with xeromorphic, densely lepidote leaves, not forming impounding rosettes, and petals without basal appendages

12

12. Filaments conglutinate/connate at least at the base but sometimes for nearly the whole length, free from the petals; stigma of the coralliform type _ Leaves narrowly triangular; inflorescence simple, petals white or rarely yellowish with enlarged, spreading blades

Lemeltonia

12a. Filaments free from each other, but sometimes partially agglutinated/adnate to the petals; stigma usually not of the coralliform type, if rarely resembling the coralliform type, then filaments free from each other, leaves lingulate, and inflorescence usually compound

13

13. Stigma of the conduplicate-pinnatisect type; leaves mostly conspicuously longitudinally reddish (-brown) striped near base

Wallisia

13a. Stigma not of the conduplicate-pinnatisect type; leaves not longitudinally reddish striped near the base...........

14

14. Stigma of the convolute-obconic type. _ Leaves mesomorphic, lingulate, forming an impounding rosette

Barfussia
14a. Stigma not of the convolute-obconic type, if rarely resembling a convolute type, then of the convolute-blade I type and leaves xeromorphic and narrowly triangular, not forming impounding rosettes

15. Sepals usually distinctly asymmetric, free, and stigma of the simple-erect type or of the conduplicate-spiral type (weakly spiral); rarely sepals subsymmetric and stigma resembling the coralliform type. ............ *Racinaea*

15a. Sepals usually symmetric or subsymmetric, the adaxial ones often connate (and therefore appearing asymmetric); stigma not of the coralliform type, usually of the simple-erect type or conduplicate-spiral type, rarely of the simple-truncate type, the simple-patent type, the conduplicate-patent type or the convolute-blade I type ....

16. Floral bracts deciduous along a basal transversal line after anthesis when dry, 3 times the length of the sepals, laterally strongly compressed and sharply carinate

16a. Floral bracts persistent when dry, maximally 2 times the length of the sepals, ± rounded in transversal section even if carinate

17. Petals without basal appendages. _ stigma usually of the simple-erect type or the conduplicate-spiral type, rarely of the simple-truncate type, simple-patent type or convolute-blade I type. ........... ........................... 18

17a. Petals bearing basal appendages. _ stigma of the simple-erect type, the simple-patent type or the conduplicate-spiral type

18. Petals short connate at the base forming a common tube with the short adnate filament bases; leaf sheaths very dark, usually becoming silver-grey when dry. _ Petals yellow or rarely white; stamens and style included within the corolla; ovules obtuse, stigma of the simple-erect type

18a. Petals free and filament bases not adnate to the petals; leaf sheaths usually not very dark and not becoming silver-grey when dry. _ Petals violet, pink, red, orange, yellow, green, white, and rarely bicolored; stamens and style included within or exserted from the corolla; ovules usually appendiculate. rarely obtuse or subobtuse; stigma usually of the conduplicate-spiral type or the simple-erect type, occasionally of the simple-patent type or simple-truncate type, rarely of the conduplicate-patent type or the convolute-blade I type... *Tillandsia* p.p.

19. Leaves xeromorphic to occasionally semi-xeromorphic, usually densely lepidote; leaf blades narrowly triangular. _ Petals usually violet, rarely green or yellowish, often bicolored with contrasting margins, sometimes with crenulated margins; ovules appendiculate, shorter than or equalling the ovule proper... *Tillandsia* p.p. (T subg. *Pseudovriesea* p.p.)

19a. Leaves mesomorphic, not densely lepidote; leaf blades lingulate. _ Petals white, greenish-white, or yellow, rarely red or deep pink, margins always entire; ovules obtuse or rarely appendiculate

20. Corolla unilaterally bent. slightly zygomorphic; petals free; stamens and style exserted from the corolla, stigma of the conduplicate-spiral type or simple-patent type

20a. Corolla actinomorphic; petals short connate at the base for <1/4 of their entire length or about 1/4 of their entire length conglutinated/connate into a tube; stamens and style included within the corolla; stigma of the simple-erect type

21. Stigma of the conduplicate-spiral type; petals red, deep pink, or yellow, tips straight or slightly divergent *Lutheria*
21a. Stigma of the simple-patent type; petals white or greenish-white, the adaxial one ± straight, the two abaxial ones recurved \textit{Tillandsia} p.p. (\textit{Vriesea} sect. \textit{Cylindrostachys})

22. Petals short connate at the base for < 1/4 of their entire length, tips cucullate, forming a hardly opened corolla, petal appendages spathulate; anthers free; floral bracts ecarinate. \textit{Goudaea}

22a. Petals about 1/4 of their entire length conglutinated/connate into a tube, tips straight or recurved, petal appendages linear; anthers united into a tube surrounding the stigma, not versatile; floral bracts carinate \textit{Cipuropsis} and mesomorphic northern Andean 'Vriesea'

**Key to Cryptanthoid genera and subgenera**

1 Plants andromonoecious with perfect flowers in the basal fascicles and the staminate ones concentrated in the central/apical portion of the inflorescence; pollen sulcus completely covered by a net of exine elements; stigma conduplicate-patent, without papillae or inconspicuously and sparsely papillate; fruits 12-20 mm long, with the distal portion of the persistent sepals soon decaying and their proximal remnants 2-4 times shorter than the fruit; seeds 3.5-5 mm long. \textit{Cryptanthus}

1 * Plants homogamous; pollen sulcus only covered by small and sparse exine elements never forming a net; stigma other than conduplicate-patent or if conduplicate-patent then densely papillate; fruits 4-10 mm long, with persistent sepals, these slightly shorter to 3.5 times longer than the fruit; seeds 1.2-3 mm long

2

2 Petals without appendages, but at most with well developed longitudinal callosities. 3

2* Petals with well developed appendages 7

3 Petals connate at the base, usually white; or rarely free but then the petals greenish-yellow in their visible parts 4

3* Petals free, white or lilac-rose 6

4 Basal flower fascicles with (5-) 6-15 flowers; pollen 50-55 µm; stigma simple-imbricate; plants from the Atlantic Forest of Espirito Santo \textit{Rokautskyia}

4* Basal flower fascicles with 2-5 (-6) flowers or the inflorescence simple; pollen 40-50 µm; stigma not simple-imbricate; plants from Campos Rupestres of Minas Gerais 5

5 Leaves coriaceous, not succulent; petals connate at the base to 1/3 of that length, or rarely free but then the petals greenish-yellow in the visible parts; anthers always straight at anthesis; pollen ca. 50 µm; stigma cylindric-distent; persistent sepals slightly shorter to equaling the fruit length or rarely 1.4 times as long; seeds 35-75 per fruit \textit{Hoplocryptanthus}

5* Leaves thick-coriaceous, succulent; petals connate at the base to 1/7 of their length; anthers usually strongly recurved to spirally coiled at anthesis; pollen ca 40 µm; stigma simple-erect or simple-patent with tendency to simple-dilated; persistent sepals up to 1.5 times as long as the fruit; seeds 2-8 per fruit. \textit{Forrzaea}

6 Plants stemless; leaves thick-coriaceous, succulent; inflorescence with inconspicuous, to 6-flowered fascicles; stamens subequal in length; anthers usually strongly recurved to spirally coiled at anthesis; pollen ca. 40 µm \textit{Forrzaea}
6* Plants distinctly caulescent; leaves coriaceous, not succulent; inflorescence with conspicuous, up to 9-flowered fascicles, stamens distinctly unequal with the antepetalous ones much shorter than the antesepalous ones; anthers straight; pollen 40-45 µm

*Orthophytum* subg. *Orthocryptanthus*

7 Petals with laminiform appendages; stigma conduplicate-patent

*Lapanthus*

7* Petals with appendages other than laminiform; stigma simple-dilated or with tendency to simple-patent or conduplicate-spiral

8

8 Inflorescence sessile and petals neither obtuse-cucullate nor forming a clavate or subclavate corolla

8* Inflorescence on a short to elongate peduncle, if sessile then the plants long caulescent, and with the basal portion of the central leaves and the primary bracts turning reddish or bright red, forming a colorful ring around the inflorescence, petals obtuse-cuculate and forming a subclavate corolla

9

9 Plants long caulescent and the basal portion of the central leaves and primary bracts turning reddish or bright red forming a colorful ring around the inflorescence, if short caulescent or stemless then the petal appendages of the cupuliform or sacciform type; pollen 35-40 µm in diameter

*Orthophytum* subg. *Capixabanthus*

9* Plants stemless or nearly so, sometimes pseudocaulescent but then without a distinct leaf rosette; appendages of the echinatiform or scutelliform type, rarely with tendency to cupuliform or sacciform; pollen 40-60 µm in diameter

10

10 Flower fascicles subflabellate-pulvinate; petals obtuse-cuculate, erect and forming a clavate corolla not exposing the stamens; petal appendages scutelliform or rarely sacciform; plants from the central-northern Espinhaco Range in Minas Gerais state

*Orthophytum* subg. *Clavanthus*

10* Flower fascicles usually strobilate; petals acuminate, acute or rounded, erect except for the suberect to recurved distal portion, exposing the stamens; petal appendages echinatiform; plants with much broader geographical range, but mostly not encompassing the Espinhaco Range in Minas Gerais state.

*Orthophytum* subg. *Orthophytum*

11 Plants long caulescent; primary bracts green, not contrasting in color with the leaves; sepals 2.5-3.5 times the fruit length; petals broadly spatulate from a very narrow base, blades suborbicular, rose-lilac to lilac-purple, spreading at anthesis and flaccidescent afterwards; stamens deeply included and not visible; stigma conduplicate-spiral.

*Orthophytum* subg. *Krenakanthus*

11* Plants stemless; primary bracts and the basal portion of the inner leaves turning white, yellow or red, forming a colourful ring around the inflorescence in contrast with the color of the distal portion of leaves; sepals about equaling the fruit length; petals narrowly spatulate, blades ovate to obovate, white, erect to recurved at anthesis, not flaccidescent and remaining erect or nearly so afterward; stamens visible at least in part; stigma simple-erect with tendency to simple-patent.

*Sincoraea*