

NOTES ON BROMELIACEAE, XXII

Lyman B. Smith

PUYA

The present revision is the result of the use and consequent polishing of the rough manuscript key mentioned in "Notes on Bromeliaceae, XVI" in "Phytologia" 7: 426. 1961. Experience has shown that Puya is divisible into but two subgenera, of which Pitcairniopsis is the more primitive and includes most of the species, while Puya, the nomenclatorially typical subgenus, is a small specialized offshoot. Subgenus Chagualia, based on the character of appendaged petals, works well in Chile but breaks down in Bolivia and northern Argentina, and must be reduced to the synonymy of Pitcairniopsis.

The species of the subgenus Pitcairniopsis are arranged here on the idea that they have evolved from a lowland type with an open compound inflorescence, small bracts, narrow sepals, and scanty indument that give a minimum of protection to the flowers, to alpine types with compact simple inflorescences, large bracts, broad sepals, and dense wooly indument that give a maximum of protection. Puya floccosa of the first general type grows down to 600 meters elevation or less, while P. fosteriana of the second ascends to 4400 meters. The genus Espeletia in the Compositae is frequently associated with Puya in the high treeless páramos of the Andes and theories of its evolution make interesting comparison. See J. Cuatrecasas, "Distribution of the genus Espeletia" in "VIIIe Congrès International de Botanique 1954", section IV, p. 131.

A more effective key would result from making the primary divisions geographic, because with a few notable exceptions like Puya floccosa, P. raimondii, and a few Chilean species, all have very restricted ranges. However, to guard against publication of the same species more than once and to prove to my own satisfaction the validity of each species, the key has been made on traditional lines. Geographic locations have been added to the key so as not to lose the use of this helpful criterion entirely.

Some entries in the key are enclosed in parentheses to indicate that the combination of characters required for this position is to be expected, although not yet observed. For instance, a species with a depauperately compound inflorescence may be keyed out in the simple inflorescence part of the key but in parentheses.

1. Inflorescence and its branches fertile throughout or nearly so.....Subgenus PITCAIRNIOPSIS
2. Ultimate axes of the inflorescence more or less visible at anthesis; neither the inflorescence nor its branches strobilate.
3. Inflorescence compound.....Subkey I

3. Inflorescence simple.....Subkey II
2. Ultimate axes of the inflorescence completely covered; inflorescence or its branches strobilate (sometimes the flowers reflexed but the axis still covered).
4. Inflorescence obviously compound (at least by the lobed outline).....Subkey III
4. Inflorescence simple or pseudosimple with the short branches covered by the primary bracts.....Subkey IV
1. Inflorescence compound with branches sterile in large part toward apex.....Subgenus PUYA

Subgenus PITCAIRNIOPSIS

SUBKEY I

1. Branches of the inflorescence more than twice as long as the primary bracts, divergent to spreading; inflorescence usually broad.
2. Floral bracts coarsely pectinate-serrate.
3. Floral bracts shorter than the 20 mm long pedicels; sepals 40 mm long. Bolivia.....1. P. ultima
3. Floral bracts much exceeding the pedicels. Peru.
4. Pedicels 10 mm long; sepals 30 mm long....2. P. longisepala
4. Pedicels almost lacking; sepals 16-18 mm long. 3. P. roezlii
2. Floral bracts entire or obscurely and irregularly denticulate or serrulate.
5. Sepals sparsely lepidote or glabrous.
6. Pedicels curved-ascending or suberect, slender.
7. Sepals 8-14 mm long; inflorescence glabrous. Argentina.
8. Floral bracts shorter than the pedicels; sepals 8 mm long, obtuse.....4. P. micrantha
8. Floral bracts exceeding the pedicels; sepals 14 mm long, acute and mucronulate.....5. P. lilloi
7. Sepals 17-40 mm long.
9. Branches at least three times as long as the primary bracts.
10. Racemes lax throughout, the rhachis wholly visible.
11. Sepals alate-carinate throughout, even.
12. Pedicels densely ferruginous-lepidote; sepals 20 mm long. Argentina.....6. P. smithii
12. Pedicels sparsely white-lepidote; sepals 25 mm long. Bolivia.....7. P. alata
11. Sepals carinate or alate only at base, strongly sulcate when dry in most cases.
13. Pedicels soon glabrous.
14. Leaf-blades glabrous above; sepals 18-22 mm long.
15. Sepals acute. Argentina.....8. P. spathacea
15. Sepals rounded-mucronate. Chile.....9. P. violacea
14. Leaf-blades lepidote on both sides, though sometimes less so above. Bolivia.

16. Pedicels 15-18 mm long, about equaling the floral bracts.....10. P. hofstenii
16. Pedicels to 30 mm long, mostly twice as long as the floral bracts.....11. P. potosina
13. Pedicels persistently tomentose-lepidote.
17. Sepals alate at base, 20-32 mm long. Bolivia.
18. Leaf-blades densely lepidote on both sides when young; branches 20-30 cm long, many times exceeding the primary bracts.....12. P. rusbyi
18. Leaf-blades glabrous above; branches to 14 cm long, about three times as long as the primary bracts.
13. P. cristata
17. Sepals not more than carinate at base.
19. Leaf-blades tomentose beneath with coarse linear spreading scales; primary bracts only about half as long as the sterile bases of the branches; sepals 17 mm long. Bolivia.....14. P. laxa
19. Leaf-blades subspreading-lepidote to glabrous beneath but never tomentose.
20. Sepals rounded and apiculate; pedicels to 20 mm long. Peru?.....15. P. hortensis
20. Sepals acute.
21. Pedicels 15 mm long, mostly equaling or exceeding the floral bracts. Argentina....16. P. harmsii
21. Pedicels 5-10 mm long, much shorter than the floral bracts. Bolivia...17. P. sanctae-crucis
10. Racemes subdense; rhachis only partially exposed at anthesis.
22. Sepals 17 mm long, scarcely or not at all exceeding the floral bracts; pedicels glabrous. Bolivia.
18. P. fiebrigii
22. Sepals 28-40 mm long; pedicels tomentose-lepidote.
23. Floral bracts lanceolate, nearly flat.
Bolivia.....19. P. mezziana
23. Floral bracts ovate or elliptic, inflated.
24. Primary bracts much shorter than the long sterile bases of the branches; floral bracts much exceeded by the sepals. Bolivia.....20. P. secunda
24. Primary bracts far exceeding the short sterile bases of the branches; floral bracts nearly equaling to exceeding the sepals.
25. Floral bracts 20 mm long, exceeded by the sepals. Bolivia.....21. P. stenothyrsa
25. Floral bracts nearly 60 mm long, exceeding the sepals. Peru.....22. P. casmichensis
9. Branches little more than twice as long as the primary bracts. Bolivia.
26. Floral bracts lanceolate, acuminate.....23. P. glareosa
26. Floral bracts elliptic, ample, rounded and apiculate.
27. Pedicels to 25 mm long.....24. P. olivacea
27. Pedicels not over 10 mm long.....21. P. stenothyrsa
6. Pedicels straight and spreading, stout. Ecuador.

28. Floral bracts obtuse, about half as long as the pedicels; sepals 30 mm long.....25. P. obconica
28. Floral bracts acute or acuminate, exceeding the pedicels; sepals 20 mm long.....26. P. aequatorialis
5. Sepals densely and persistently lanate or tomentose-lepidote or stellate.
29. Pedicels over 15 mm long.
30. Pedicels stout; floral bracts drying dark.
31. Floral bracts about equaling the pedicels. Peru.
27. P. ramosa
31. Floral bracts much exceeding the pedicels. Bolivia.
28. P. riparia
30. Pedicels slender; floral bracts not drying dark.
32. Indument ferruginous-stellate. Ecuador, Peru, Bolivia.
(Immature specimens of Pitcairnia ferruginea might be sought here).
32. Indument white. Bolivia.
33. Primary bracts about 1/5 as long as the branches; sepals acute, 30 mm long.....29. P. alba
33. Primary bracts almost half as long as the branches; sepals obtuse and mucronulate, 35-40 mm long.
24. P. olivacea
29. Pedicels less than 15 mm long.
34. Sepals narrowly triangular or lanceolate, acute or acuminate with a narrow blunt apex.
35. Flowers distinctly pedicellate.
36. Pedicels 10-20 mm long.
37. Leaf-blades lepidote on both sides. Argentina.
16. P. harmsii
37. Leaf-blades soon glabrous above; flowers more or less secund. Bolivia.
38. Lateral branches over 30 cm long; floral bracts broadly elliptic.....30. P. pearcei
38. Lateral branches not over 9 cm long; floral bracts ovate.....31. P. penduliflora
36. Pedicels not over 5 mm long; flowers erect, not secund. British Guiana (Roraima), Venezuela, Colombia.
32. P. floccosa
35. Flowers subsessile. Colombia, Ecuador.
33. P. thomasiana
34. Sepals elliptic or oblong, broadly rounded or acute.
39. Flowers spreading-secund to nutant-secund.
40. Inflorescence ferruginous-stellate; primary bracts mostly shorter than the sterile bases of the branches Ecuador, Peru, Bolivia. (Immature specimens of Pitcairnia ferruginea might be sought here).
40. Inflorescence brown-tomentulose; primary bracts much exceeding the short sterile bases of the branches. Colombia.....34. P. bicolor
39. Flowers evenly polystichous or somewhat upwardly secund. (P. coerulea).
-

41. Sepals asymmetrically rounded; floral bracts reflexed.
Ecuador.....35. P. pichincae
41. Sepals symmetrical; floral bracts spreading.
42. Floral bracts about equaling or shorter than the pedicels.
43. Branches 20-30 cm long, very lax throughout. Peru.
44. Floral bracts about half as long as the pedicels.
36. P. glaucovirens
44. Floral bracts about equaling the pedicels.
37. P. westii
43. Branches 15 cm long, dense except at base. Ecuador.
38. P. roseana
42. Floral bracts much exceeding the pedicels.
45. Sterile bases of the branches (or the second internode) exceeding the primary bracts; floral bracts broadly ovate, closely enfolding the base of the flower. Colombia.....39. P. lehmanniana
45. Sterile bases of the branches much shorter than the primary bracts.
46. Sepals coriaceous, the posterior ones carinate at base. Colombia.....40. P. furfuracea
46. Sepals thin, ecarinate.
47. Indument thin, not obscuring the outlines of the bracts and sepals; branches elongate, many times exceeding the primary bracts. Chile.
41. P. coerulea
47. Indument thick, lanate, obscuring the outlines of the bracts and sepals; branches little more than twice as long as the dark brown primary bracts.
Peru.....42. P. araneosa
1. Branches of the inflorescence not more than twice as long as the primary bracts; inflorescence narrow or capitate.
48. Sepals glabrous or with a fine appressed deciduous stellate or lepidote indument.
49. Leaf-blades 12-75 mm wide.
50. Branches subspreading to reflexed; inflorescence more or less open.
51. Sterile base as long as or longer than the fertile part of the lateral branch. Chile.....43. P. venusta
51. Sterile base much shorter than the fertile part of the lateral branch.
52. Inflorescence drying to dark castaneous, almost black; floral bracts very broadly elliptic, obtuse. Bolivia.
44. P. atra
52. Inflorescence pale; floral bracts ovate, acute, 12-25 mm long.
53. Floral bracts 12-16 mm long, exceeding the pedicels; inflorescence glabrous. Argentina.....5. P. lilloi
53. Floral bracts to 25 mm long, about equaling the sepals; inflorescence covered with fine white stellate trichomes. Peru.....45. P. tovariana
-

50. Branches erect or ascending; inflorescence compact.
54. Sepals 11-12 mm long.
55. Flowers secund; lateral branches subaborted; floral bracts much exceeded by the sepals. Venezuela.
46. P. phelpsiae
55. Flowers not secund; lateral branches well developed. Argentina.
56. Terminal branch of the inflorescence little larger than the many divergent laterals; floral bracts equaling the middle of the sepals at anthesis.
47. P. dyckioides
56. Terminal branch of the inflorescence much larger than the few strict laterals; floral bracts equaling the sepals at anthesis.....48. P. assurgens
54. Sepals 15-35 mm long.
57. Scape almost none; inflorescence capitate. Bolivia. (Immature specimens of Pitcairnia nana might be sought here).
57. Scape well developed; inflorescence elongate.
58. Scape-bracts and primary bracts thin, dark brown. disintegrating rapidly after anthesis; flowering plant 3-5 meters high.
59. Sepals lanceolate, broadly acute; flowering plant to 5 meters high. Colombia.....49. P. goudotiana
59. Sepals linear, rounded and apiculate; flowering plant to 3 meters high. Venezuela....50. P. aristeguietae
58. Scape-bracts and primary bracts firm, persistent; flowering plant somewhat over a meter high at most.
60. Pedicels 3 mm long; floral bracts pectinate-serrate; inflorescence cylindric, 2-3 cm in diameter. Peru.
51. P. medica
60. Pedicels 8-17 mm long.
61. Primary bracts much shorter than the branches and covering only a fraction of each one.
62. Lateral branches 14-15 cm long; floral bracts and sepals aristate. Bolivia.....23. P. glareosa
62. Lateral branches 4-10 cm long; floral bracts and sepals acuminate. Peru.....52. P. densiflora
61. Primary bracts large, covering most or all of each branch.
63. Sepals lance-ovate, acuminate, 35 mm long. Bolivia.
53. P. glabrescens
63. Sepals elliptic, obtuse, 15 mm long. Peru.
54. P. fulgens
49. Leaf-blades 2-10 mm wide, covered beneath with pale narrow spreading scales; lateral branches few-flowered. Bolivia.
64. Pedicels 4-7 mm long, longer or shorter than the floral bracts; leaf-blades 2-3.5 mm wide.....55. P. tuberosa
64. Pedicels 1 mm long, the floral bracts 15 mm long; leaf-blades 10 mm wide.....56. P. reducta
48. Sepals densely lanate or tomentose, the indument usually persistent.

65. Lateral branches of the inflorescence well developed, numerous.
66. Flowers nutant-secund.
67. Floral bracts broadly elliptic, apiculate, equaling or slightly exceeding the pedicels. Colombia.
34. P. bicolor
67. Floral bracts lanceolate, acuminate, exceeding the sepals
Peru.....57. P. vargasiana
66. Flowers evenly polystichous.
68. Floral bracts thin.
69. Branches spreading; inflorescence open. Peru.
42. P. araneosa
69. Branches erect; inflorescence densely cylindrical.
Colombia.....58. P. gigas
68. Floral bracts coriaceous or subcoriaceous.
70. Floral bracts about equaling the sepals, sublustrous.
Ecuador.....59. P. parviflora
70. Floral bracts much exceeded by the sepals, dull.
71. Primary bracts serrate; floral bracts (especially the lower) reflexed. Ecuador.....60. P. sodiroana
71. Primary bracts entire except the obscurely serrulate apex; floral bracts straight. Bolivia..61. P. mollis
65. Lateral branches of the inflorescence basal, mere vestigial fascicles. Peru.....62. P. rauhii

SUBKEY II

1. Sepals glabrous or with a fine appressed deciduous stellate or lepidote indument.
2. Floral bracts strongly serrate.
3. Sepals nearly 60 mm long. Bolivia, Argentina. (Fruiting material of Pitcairnia mirabilis might be sought here).
3. Sepals 12-25 mm long.
4. Pedicels 10-15 mm long; flowers spreading to reflexed at anthesis; sepals 15-25 mm long. Peru.
5. Leaf-blades glabrous on both sides, 20-30 mm wide; sepals ovate, acute.....63. P. pyramidata
5. Leaf-blades covered on one side with white scales; sepals obtuse.
6. Leaf-blades lepidote beneath; sepals 25 mm long.

64. P. wurdackii

6. Leaf-blades lepidote above; sepals 15 mm long.

54. P. fulgens

4. Pedicels obscure; flowers subsessile, suberect; sepals 12 mm long. Ecuador.....65. P. eryngioides
2. Floral bracts entire or obscurely serrulate.
7. Sepals 16-40 mm long; leaf-blades 5-30 mm wide.
8. Leaf-blades entire, 5 mm wide. Peru.....66. P. mitis
8. Leaf-blades spinose-serrate, 10-30 mm wide.
9. Floral bracts lustrous, dark castaneous, coriaceous; leaf-blades densely lepidote above, glabrous beneath.
Colombia.....67. P. killipii

9. Floral bracts dull, often thin; leaf-blades evenly lepidote or glabrous above.
10. Pedicels 5-10 mm long.
11. Sepals rounded, 40 mm long; floral bracts black and brittle when dry. Peru.....68. P. nigrescens
11. Sepals acute or acuminate.
12. Floral bracts thick, coriaceous, rugose when dry. Colombia.....69. P. grantii
12. Floral bracts membranaceous, finely and evenly nerved. Peru.....70. P. gracilis
10. Pedicels 12-20 mm long; sepals often rounded and mucronate or apiculate.
13. Inflorescence lax; floral bracts little if at all exceeding the pedicels. Chile.....9. P. violacea
13. Inflorescence subdense; floral bracts much exceeding the pedicels.
14. Floral bracts reflexed, 5 cm long, lanceolate; leaf-blades glabrous with age. Colombia.
71. P. sanctae-martae
14. Floral bracts erect to spreading, smaller or much broader.
15. Floral bracts thick, coriaceous; pedicels stout; inflorescence glabrous. Peru.
72. P. pitcairnioides
15. Floral bracts submembranaceous; pedicels rather slender. Bolivia.
16. Sepals 25 mm long; floral bracts uniform narrowly lanceolate.....73. P. kuntzeana
16. Sepals 30-40 mm long; lower floral bracts much larger and ampler than the others...19. P. meziana
7. Sepals 7-11 mm long.
17. Leaf-blades 16 mm wide, covered beneath with appressed cinereous scales. Venezuela.....(46. P. phelpsiae)
17. Leaf-blades 2-6 mm wide. Bolivia.
18. Plant flowering 25-30 cm high; trichomes of the leaf-blade linear, spreading.....55. P. tuberosa
18. Plant flowering 9 cm high; trichomes of the leaf-blade broad, subspreading.....74. P. minima
1. Sepals densely lanate or tomentose, the indument mostly persistent after anthesis.
19. Upper floral bracts nearly equaling to exceeding the sepals.
20. Floral bracts narrowly triangular-ovate. Peru.
75. P. ferreyrae
20. Floral bracts elliptic or orbicular. Colombia.
21. Leaf-blades sparsely and obscurely lepidote, the spines spreading; floral bracts elliptic, acute, lustrous
76. P. nitida
21. Leaf-blades covered on both sides with appressed cinereous scales, the spines antrorse; floral bracts orbicular with a triangular blade.....77. P. barkleyana
19. Upper floral bracts much exceeded by the sepals.
22. Pedicels about equaling the floral bracts or longer. Peru.

23. Leaf-blades glabrous above; sepals narrowly lanceolate, 35 mm long.....78. P. macbridei
23. Leaf-blades covered on both sides with appressed scales; sepals oblong, 21 mm long.....79. P. argentea
22. Pedicels much shorter than the floral bracts.
24. Flowers erect or suberect at anthesis. Peru.
25. Pedicels slender, subcylindric, 20 mm long; leaf-blades soon glabrous above.....(62. P. rauhii)
25. Pedicels stout, obconic, 5-6 mm long; leaf-blades densely lepidote on both sides.
26. Sepals oblong, acute.....80. P. lopezii
26. Sepals linear-lanceolate.....81. P. sagasteguii
24. Flowers spreading to reflexed at anthesis.
27. Leaf-blades 37 mm wide; sepals narrowly ovate, 25-35 mm long. Peru.....82. P. reflexiflora
27. Leaf-blades 15 mm wide; sepals oblong, 20 mm long. Colombia.....83. P. grubbii

SUBKEY III

1. Sepals glabrous or with a fine appressed deciduous stellate or lepidote indument.
2. Lateral branches well developed; flowers not fasciculate.
3. Floral bracts much exceeded by the sepals.
4. Floral bracts dull, even, distinctly nerved.
5. Branches exceeding the primary bracts.
6. Floral bracts triangular-ovate, acuminate, not inflated; sepals 23 mm. long. Colombia.....40. P. furfuracea
6. Floral bracts ovate, acute, inflated; sepals 33 mm long. Bolivia.....21. P. stenothyrsa
5. Branches shorter than the broadly ovate densely laciniate primary bracts. Peru.....84. P. longistyla
4. Floral bracts lustrous, rugulose, nerveless. Peru.
85. P. ferox
3. Floral bracts nearly equaling to exceeding the sepals.
7. Sterile base as long as or longer than the fertile part of the lateral branch. Chile.....43. P. venusta
7. Sterile base much shorter than the fertile part of the lateral branch.
8. Floral bracts spinose-serrate. Peru.....86. P. grandidens
8. Floral bracts entire or sparsely and very minutely serrulate.
9. Floral bracts lustrous black; sepals 26 mm long. Bolivia.....44. P. atra
9. Floral bracts dull, paler.
10. Sepals ovate-elliptic, 17 mm long. Bolivia.
18. P. fiebrigii
10. Sepals narrowly lanceolate, 40 mm long. Peru.
22. P. casmichensis
2. Lateral branches very short with the flowers fasciculate, but the inflorescence interrupted at base and thus obviously compound.

11. Sepals 25 mm long; inflorescence dark purple. Peru.
87. P. depauperata
11. Sepals 11-12 mm long.
12. Leaf-blades glabrous on both sides; floral bracts spinose-serrate. Ecuador.....65. P. eryngioides
12. Leaf-blades lepidote at least beneath.
13. Floral bracts exceeded by the sepals. Venezuela.
46. P. phelpsiae
13. Floral bracts exceeding the sepals. Bolivia.
88. P. paupera
1. Sepals densely lanate or tomentose, the indument mostly persistent after anthesis.
14. Floral bracts much exceeded by the sepals.
15. Lateral branches well developed; flowers not fasciculate.
16. Pedicels 12-15 mm long.
17. Indument ferruginous. Peru.....89. P. llatensis
17. Indument cinereous or whitish.
18. Floral bracts thin, violet. Chile.....41. P. coerulea
18. Floral bracts coriaceous. Bolivia.
19. Leaf-blades densely appressed-lepidote beneath; floral bracts broadly ovate, about 35 mm long..61. P. mollis
19. Leaf-blades soon wholly glabrous; floral bracts elliptic-oblong, to 55 mm long.....90. P. valida
16. Pedicels not over 7 mm long.
20. Sterile base of the raceme 20-40 mm long, nearly equaling to exceeding the primary bract.
21. Sepals emarginate and mucronulate; sterile base of raceme 30-40 mm long. Colombia....39. P. lehmanniana
21. Sepals obtuse; sterile base of raceme 20-25 mm long. Peru.....91. P. stipitata
20. Sterile base of raceme not over 12 mm long. Ecuador.
22. Racemes distinctly though briefly stipitate; sepals 40 mm long.....60. P. sodiroana
22. Racemes subsessile; sepals 22-23 mm long.
23. Indument whitish; floral bracts heteromorphic; pedicels 5 mm long; sepals asymmetrically rounded and emarginate.....92. P. gummifera
23. Indument brown; floral bracts homomorphic; flowers subsessile; sepals subsymmetric.....93. P. asplundii
15. Lateral branches short with the flowers fasciculate, few and basal; pedicels slender, 20 mm long. Peru.
62. P. rauhii
14. Floral bracts nearly equaling (P. lasiopoda) to exceeding the sepals.
24. Sepals 32-45 mm long, narrow; inflorescence lax at least toward base.
25. Racemes secund; sepals narrowly lanceolate or linear, 40-45 mm long.
26. Racemes stipitate. Peru, Bolivia.....94. P. lasiopoda
26. Racemes subsessile. Peru.....95. P. commixta
25. Racemes not secund; sepals very narrowly triangular, 32 mm long. Peru.....96. P. oxyantha

24. Sepals 16-25 mm long.
27. Primary bracts conspicuously laciniate or pectinate-serrate; sepals elliptic, broadly acute or subobtusate.
28. Apices of the primary bracts narrowly triangular, distinct, the serration of slender spines. Bolivia.
97. P. ctenorhyncha
28. Apices of the primary bracts broadly triangular, merging with the bases, the serration of broad flat teeth.
- Peru.....98. P. fastuosa
27. Primary bracts entire or obscurely serrulate.
29. Primary bracts spreading to reflexed; racemes ellipsoid.
- Peru.....99. P. weberbaueri
29. Primary bracts suberect, racemes globose. Ecuador.
100. P. glomerifera

SUBKEY IV

1. Outer bracts (the primary bracts or in a simple inflorescence the floral bracts) conspicuously serrate.
2. Apical part of the outer bracts reflexed; bracts thin.
3. Inflorescence densely brown-lanate, compound; sepals 45 mm long; floral bracts light green, drying to stramineous.
- Bolivia.....101. P. fosteriana
3. Inflorescence sparsely white-lanate, simple; sepals 35 mm long; floral bracts rose. Argentina.....102. P. weberiana
2. Apical part of the outer bracts erect.
4. Flowers distinctly pedicellate.
5. Outer bracts lustrous. Peru.
6. Inflorescence compound; outer bracts strongly nerved.
103. P. laccata
6. Inflorescence simple; outer bracts obscurely nerved and rugose.....104. P. angulonis
5. Outer bracts dull or slightly lustrous.
7. Inflorescence compound at least toward base.
8. Sepals densely vestite, not contrasting with the pedicels
9. Leaf-blades covered on both sides with appressed whitish scales; sepals 30 mm long. Peru....105. P. cylindrica
9. Leaf-blades glabrous above; sepals 16-20 mm long.
10. Inflorescence ellipsoid, 30-50 cm long. Colombia.
106. P. santosii
10. Inflorescence slenderly cylindric, 10-20 cm long.
- Peru.....51. P. medica
8. Sepals soon glabrous and contrasting with the densely vestite slender pedicels. Bolivia...53. P. glabrescens
7. Inflorescence simple.
11. Flowering plant 40-80 cm. high. Colombia.
107. P. lineata
11. Flowering plant 15-30 cm high.
12. Floral bracts serrulate; sepals 20-30 mm long, oblong-lanceolate, acute. Argentina.....108. P. volcanensis
12. Floral bracts pectinate-serrate; sepals 17-20 mm long.
- Peru.

13. Sepals with an acicular apex, lance-oblong, carinate.
51. P. medica
13. Sepals obtuse, elliptic, ecarinate...109. P. pratensis
4. Flowers sessile or subsessile.
14. Sepals 18-30 mm long; inflorescence rufous-lanate.
Colombia.....110. P. vestita
14. Sepals 12 mm long; inflorescence glabrous except for the
furfuraceous axis. Ecuador.....65. P. eryngioides
1. Outer bracts entire or very obscurely serrulate.
15. Apical part of each outer bract reflexed.
16. Inflorescence compound; flowers fasciculate.
17. Sepals 17-20 mm long.
18. Outer bracts orbicular, apiculate, membranaceous, drying
pale brown. Peru.....111. P. membranacea
18. Outer bracts narrower, attenuate.
19. Inflorescence 7-8 cm in diameter; outer bracts 7 cm long
20. Pedicels 10 mm long; sepals narrowly triangular.
Ecuador.....112. P. compacta
20. Pedicels very short but distinct; sepals oblong-
elliptic, rounded and apiculate. Bolivia.
113. P. tristis
19. Inflorescence 3 cm in diameter; outer bracts 5 cm long.
Bolivia.....114. P. leptostachya
17. Sepals 24-30 mm long.
21. Indument dark brown; inflorescence clavate; pedicels
stout, obconic, 10 mm long. Colombia.
115. P. cuatrecasasii
21. Indument white or nearly so. Bolivia.
22. Bracts all membranaceous and subhyaline, soon shattered;
pedicels slenderly obconic; leaf-blades nearly
glabrous.....116. P. cardenasii
22. Bracts firmer, persistent; leaf-blades densely and
conspicuously appressed-lepidote beneath.
117. P. herzogii
16. Inflorescence simple.
23. Flowers and bracts reflexed; sepals narrowly spatulate,
obtuse, 40 mm long. Peru.....118. P. huancavelicae
23. Flowers erect to spreading; only the apices of the bracts
reflexed.
24. Floral bracts narrow, leaving much of the flower exposed
(mostly juvenile specimens keyed here).
25. Pedicels rather slender, 12-15 mm long; sepals 25 mm
long.
26. Flowers arcuate-spreading. Colombia.
71. P. sanctae-martae
26. Flowers erect or suberect. Bolivia....73. P. kuntzeana
25. Pedicels obconic, very short. Peru.....119. P. lanata
24. Floral bracts ample, ovate or elliptic.
27. Flowering plant 3-4 meters high; floral bracts 10-14 cm
long. Argentina.....120. P. yakespala
27. Flowering plant and floral bracts much smaller.
-

28. Leaf-blades entire along their apical 1/4; flowering plant 2-3 meters high. Colombia.....121. P. nivalis
28. Leaf-blades serrate throughout although sometimes more laxly so toward apex.
29. Floral bracts much shorter than the sepals. Peru.
122. P. lanuginosa
29. Floral bracts covering the sepals.
30. Sepals 14 mm long, acuminate. Bolivia.
123. P. tunarensis
30. Sepals 20-37 mm long, acuminate to broadly acute.
31. Inner face of the floral bract glabrous and nearly black, contrasting sharply with the pale persistent indument of the outer. Peru.
124. P. cerrateana
31. Inner face of the floral bracts almost exactly like the outer, not blackening.
32. Sepals 35-37 mm long.
33. Floral bracts subcoriaceous, greenish. Peru.
125. P. mariae
33. Floral bracts membranaceous, rose. Argentina.
102. P. weberiana
32. Sepals 20-25 mm long.
34. Floral bracts recurved from near the apex only. Peru.....126. P. isabellina
34. Floral bracts more than half recurved. Colombia.
127. P. trianae
15. Apical parts of the outer bracts erect.
35. Outer bracts clearly defined, their outline not obscured by the indument.
36. Inflorescence compound with the flowers usually fasciculate; branches sometimes 1-flowered but then a floral bract in the axil of the primary bract.
37. Lateral axes developed, but covered by the large imbricate primary bracts before anthesis. Colombia.
58. P. gigas
37. Lateral axes reduced to pulvini, the flowers fasciculate.
38. Sepals thinly vestite to glabrous, 11-16 mm long.
39. Inflorescence 3 dm long, 5-7 cm in diameter; floral bracts broadly acute. Costa Rica.
128. P. dasyliroides
39. Inflorescence not more than 1 dm long; floral bracts acuminate.
40. Sepals obtuse; inflorescence continuous; flowers not secund.
41. Flowers pedicellate for 6 mm. Bolivia.
88. P. paupera
41. Flowers sessile. Colombia.....129. P. boyacana
40. Sepals acute; inflorescence interrupted at base. Venezuela.....46. P. phelpsiae
38. Sepals densely lanate.
42. Leaf-blades lepidote only between the nerves beneath.
-

43. Inflorescence 30-50 cm long; leaf-blades concolorous. Colombia.
44. Inflorescence brown-tomentose....130. P. occidentalis
44. Inflorescence white-lanate.....106. P. santosii
43. Inflorescence 15 cm long; leaf-blades with a dark spot at the base of each spine. Ecuador.
131. P. maculata
42. Leaf-blades completely lepidote beneath.
45. Flowers slenderly short-pedicellate; plant 3 dm high. Ecuador.....132. P. pygmaea
45. Flowers subsessile; plant 7 dm high. Colombia.
133. P. cryptantha
36. Inflorescence simple with a single series of bracts.
46. Inflorescence nutant; sepals narrow, 18 mm long.
47. Upper scape-bracts and floral bracts firm, subchartaceous, opaque. Ecuador.....134. P. nutans
47. Upper scape-bracts and floral bracts membranaceous, translucent. Venezuela.....135. P. venezuelana
46. Inflorescence erect, or where uncertain (P. angusta), the sepals larger.
48. Sepals thinly vestite to glabrous.
49. Sepals 12-13 mm long; floral bracts acuminate. Bolivia.....136. P. humilis
49. Sepals 15-33 mm long.
50. Floral bracts narrowly lanceolate, acuminate; sepals triangular-acute, 25 mm long. Bolivia.
73. P. kuntzeana
50. Floral bracts broad.
51. Leaf-blades 7-8 mm wide; inflorescence few-flowered, 4-7 cm long. Colombia.....137. P. brachystachya
51. Leaf-blades 25-50 mm wide.
52. Pedicels 7-10 mm long.
53. Sepals obtuse, oblong, 15-20 mm long. Chile.
43. P. venusta
53. Sepals acute, 25-33 mm long. Peru.
54. Sepals broadly lanceolate, 30-33 mm long.
138. P. dolichostrobila
54. Sepals oblanceolate, 25 mm long.
87. P. depauperata
52. Pedicels very short and stout, the flowers appearing subsessile. Peru.
55. Inflorescence cylindrical, 30 cm long, 10 cm in diameter.....126. P. isabellina
55. Inflorescence ellipsoid, 14 cm long, 6 cm in diameter.....139. P. strobilantha
48. Sepals densely lanate.
56. Sepals emarginate, not over 10 mm long. Ecuador.
140. P. exigua
56. Sepals obtuse to acuminate, 15-28 mm long.
57. Leaf-blades densely lepidote above as well as beneath; sepals acuminate. Peru.....141. P. macrura
57. Leaf-blades soon glabrous above.

58. Inflorescence over 15 cm long; sepals acute or acuminate.
59. Sepals membranaceous, elliptic, 27 mm long; inflorescence slenderly cylindric, 4 cm in diameter. Colombia.....142. *P. gargantae*
59. Sepals coriaceous, lance-oblong or narrowly elliptic, 22-28 mm long.
60. Floral bracts soon glabrous and contrasting with the remainder of the inflorescence. Colombia. 143. *P. angusta*
60. Floral bracts equally vestite with the remainder of the inflorescence.
61. Leaf-blades sparsely lepidote beneath; sepals 22 mm long. Bolivia.....144. *P. brittoniana*
61. Leaf-blades densely appressed-lepidote beneath; sepals 28 mm long. Colombia....145. *P. alpicola*
58. Inflorescence 5-8 cm long; sepals obtuse.
62. Inflorescence globose, more than twice as wide as the scape and its bracts.
63. Sepals 20-28 mm long; indument nearly white. Colombia.....146. *P. santanderensis*
63. Sepals 15 mm long; indument ferruginous. Venezuela 147. *P. cardonae*
62. Inflorescence subcylindric, scarcely wider than the scape and its bracts; sepals 18 mm long. Ecuador. 132. *P. pygmaea*
35. Outer bracts with their outlines obscured by the very long dense indument.
64. Floral bracts rounded and apiculate.
65. Pedicels 10 mm long; sepals ovate-oblong, 30 mm long, 15 mm wide. Bolivia.....117. *P. herzogii*
65. Pedicels short and thick; sepals oblong, 25 mm long, 11 mm wide. Peru.....148. *P. herrerae*
64. Floral bracts acute or acuminate, not rounded. Colombia, Ecuador.
66. Plants 1-1.5 meters high; indument of the inflorescence brown; sepals lanceolate.....149. *P. clava-herculis*
66. Plants 2.5-4 meters high; indument of the inflorescence white; sepals broadly elliptic.....150. *P. hamata*

Subgenus PUYA

1. Caudex prostrate, branching and continuing to live after the fruition and death of the flowering shoot; leaf-rossette on a level with the ground; floral bracts mostly exceeded by the sepals.
2. Petals yellow or yellow-green; leaves soon glabrous on both sides. Chile.
3. Inflorescence 1 meter or longer with 80-100 branches, dense; sepals soon glabrous.....151. *P. chilensis*
3. Inflorescence not over 5 dm long with few branches, lax; sepals always tomentose-lepidote.....152. *P. boliviensis*

2. Petals blue or blue-green.
4. Sepals 20-25 mm long; petals ca. 5 cm long; leaves densely white-lepidote beneath, flexuous, arching-recurved. Chile.
5. Leaf-blades 15-25 mm wide; inflorescence of not more than 20 branches, lax; branches laxly few-flowered; flowering shoot 1.2-1.5 meters high.....153. P. alpestris
5. Leaf-blades to 50 mm wide; inflorescence of 80-100 branches dense; branches densely many-flowered; flowering shoot to 4.5 meters high.....154. P. berteroniana
4. Sepals to 18 mm long; petals 35 mm long; leaf-blades glaucous-green. Bolivia.....155. P. weddelliana
1. Caudex erect, simple and columnar, dying after the fruition of the flowering shoot; leaf-rosette at the summit of the caudex 4 meters above the ground; floral bracts exceeding the sepals, imbricate. Peru, Bolivia.....156. P. raimondii

Subgenus PITCAIRNIOPSIS

(including subgenus Chagualia Smith & Looser, Revista Univ., Univ. Catól. Chile 20:243. 1935).

1. P. ULTIMA L. B. Smith, Contr. U. S. Nat. Herb. 29:540, fig. 94. 1954. Bolivia.
2. P. LONGISEPALA Mez, Bull. Herb. Boiss. ser. 2, 4:629. 1904. Peru.
3. P. ROEZLII E. Morr. Belg. Hort. 35:80. 1885. Pitcairnia megastachya Baker, Handb. Bromel. 120. 1889. Puya pectinata L. B. Smith, Contr. Gray Herb. 98:12, pl. 4, figs. 1, 2. 1932. Peru.
4. P. MICRANTHA Mez, Fedde Rep. Nov. Spec. 3:8. 1906. Argentina, ("Bolivia").
5. P. LILLOI Castellanos, An. Mus. Nac. Hist. Nat. Buenos Aires 36:54, pl. 7. 1929. Argentina.
6. P. SMITHII Castellanos, Lilloa 2:13, pl. 1. 1938. Argentina
7. P. ALATA L. B. Smith, Phytologia 7:422, pl. 2, figs. 3, 4. 1961. Bolivia.
8. P. SPATHACEA (Griseb.) Mez in DC. Mon. Phan. 9:481. 1896. Pitcairnia spathacea Griseb. Goett. Abh. 24:329. 1879. Puya formosa Spegazzini, Physis 3:155. 1917. Argentina.
9. P. VIOLACEA (Brongn.) Mez in DC. Mon. Phan. 9:476. 1896. Chile.
- Var. a. VIOLACEA. ? Pourretia rubricaulis Miers, Travels in Chile 2:531. 1826, nomen. Pitcairnia violacea Brongn. Ann. Fl. & Pom. ser. 3, 1:116. 1847; Allg. Gartenzeit. 15:299. 1847. Pourretia violacea Linden, Cat. 1853, ex Bot. Zeitung 11:718. 1853. Puya paniculata Phil. Linnaea 33:247. 1864. Pitcairnia philippii Baker, Handb. Bromel. 122. 1889. Puya glabrata Phil. ex Baker, l. c., in synonym. Inflorescence glabrous; floral bracts ovate, acute or apiculate, much shorter than the pedicels.
- Var. b. MONTEROANA Smith & Looser, Revista Univ., Univ. Catól. Chile 20:252, fig. 6. 1935. Floral bracts distinctly exceeding the pedicels but much shorter than the sepals, narrowly lanceolate, acuminate.
- Var. c. INTERMEDIA Smith & Looser, Revista Univ., Univ. Catól.

Chile 20:252, fig. 7. 1935. Inflorescence strongly white-tomentose.

10. P. HOFSTENII Mez, Fedde Rep. Nov. Spec. 3:8. 1906. Puya hauthalii Mez, Fedde Rep. Nov. Spec. 16:65. 1919. Bolivia, Argentina.

11. P. POTOSINA L. B. Smith, Phytologia 7:423, pl. 2, figs. 7, 8. 1961. Bolivia.

12. P. RUSBYI (Baker) Mez in DC. Mon. Phan. 9:482. 1896. Pitcairnia rusbyi Baker, Handb. Bromel. 122. 1889. Bolivia.

13. P. CRISTATA L. B. Smith, Lilloa 14:95, figs. 7, 8. 1948. Bolivia.

14. P. LAXA L. B. Smith, Phytologia 6:195, pl. 1, figs. 7, 8. 1958. Bolivia.

15. P. HORTENSIS L. B. Smith, Phytologia 7:425, pl. 2, figs. 13, 14. 1961. Peru?

16. P. HARMSII (Castellanos) Castellanos, An. Mus. Nac. Hist. Nat. Buenos Aires 37:497. 1933. Puya spathacea var. harmsii Castellanos, An. Mus. Nac. Hist. Nat. Buenos Aires 36:54, pl. 9. 1929. Argentina.

17. P. SANCTAE-CRUCIS (Baker) L. B. Smith, Proc. Am. Acad. Arts & Sci. (Contrib. Gray Herb. 106) 70:154, pl. 2, fig. 1. 1935. Pitcairnia sanctae-crucis Baker, Handb. Bromel. 120. 1889. Puya floccosa sensu Mez in DC. Mon. Phan. 9:478. 1896, as to Bolivian material. Pitcairnia robusta Rusby, Bull. New York Bot. Gard. 6:488. 1910. Bolivia.

18. P. FIEBRIGII Mez, Fedde Rep. Nov. Spec. 3:9. 1906. Bolivia

19. P. MEZIANA Wittm. Mededeel. Rijks Herb. 29:85. 1916. Bolivia.

20. P. SECUNDA L. B. Smith, Phytologia 7:424, pl. 2, figs. 11, 12. 1961. Bolivia.

21. P. STENOTHYRSA (Baker) Mez in DC. Mon. Phan. 9:481. 1896. Pitcairnia stenothyrsa Baker, Handb. Bromel. 122. 1889. Pitcairnia bangii Baker, Mem. Torrey Bot. Club 6:124. 1896. Bolivia.

22. P. CASMICHENSIS L. B. Smith, Publ. Mus. Hist. Nat. "Javier Prado", Univ. Nac. Mayor San Marcos, ser. B, no. 16:2, figs. 3-5. 1964. Peru.

23. P. GLAREOSA L. B. Smith, Lilloa 14:96, figs. 9, 10. 1948. Bolivia.

24. P. OLIVACEA Wittm. Mededeel. Rijks Herb. Leiden 29:83. 1916; emend. L. B. Smith, Contr. U. S. Nat. Herb. 29:538, fig. 92. 1954. Pitcairnia olivacea (Wittm.) Mez in Engl. Pflanzenreich IV. 32:247. 1935. Bolivia.

25. P. OBCONICA L. B. Smith, Lloydia 11:306, fig. 5. 1949. Ecuador.

26. P. AEQUATORIALIS André, Énum. Bromél. 5. Dec. 13, 1888; Rev. Hortic. 60:565. Dec. 16, 1888. Ecuador.

Var. a. AEQUATORIALIS. Floral bracts acute or acuminate; petals dark violet.

Var. b. ALBIFLORA André, Énum. Bromél. 5. Dec. 13, 1888; Rev. Hortic. 60:565. Dec. 16, 1888. Floral bracts long-setaceous; petals white.

27. P. RAMOSA L. B. Smith, Phytologia 9:250, pl. 3, figs. 1,

2. 1963. Peru.

28. P. RIPARIA L. B. Smith, Phytologia 7:424, pl. 2, figs. 9,

10. 1961. Bolivia.

29. P. ALBA L. B. Smith, Phytologia 5:49, pl. 7, figs. 3-5.

1954. Bolivia.

30. P. PEARCEI (Baker) Mez in DC. Mon. Phan. 9:480. 1896. Pitcairnia pearcei Baker, Handb. Bromel. 120. 1889. Bolivia.

31. P. PENDULIFLORA L. B. Smith, Contr. Gray Herb. 98:12, pl. 4, figs. 3, 4. 1932. Bolivia.

32. P. FLOCCOSA (Linden) E. Morr. ex Mez in DC. Mon. Phan. 9:478. 1896, (earlier publications of name by E. Morren, a nomen, and by Baker, in synonymy, invalid). Puya guianensis Kl. in Schomburgk, Fauna u. Flora 1067. 1848, nomen. Pourretia floccosa

Linden, Catal. 1853 ex Bot. Zeitung 11:718. 1853. Pitcairnia

floccosa Regel, Act. Hort. Petrop. 3:124. 1875. Pourretia lanu-

ginosa Hort. ex Regel, op. c. 125, nomen. Pourretia violacea

Hort. ex Regel, l. c., nomen. Puya meridensis E. Morr. Belg.

Hortic. 35:81. 1885, nomen. Puya quetameensis André, Énum. Brom-

mél. 5. Dec. 13, 1888; Rev. Hortic. 60:565. Dec. 16, 1888. Pit-

cairnia guyanensis Baker, Handb. Bromel. 120. 1889. Agallosta-

chys guyanensis Beer ex Baker, l. c., nomen. Pitcairnia queta-

meensis Baker, op. c. 121. Pitcairnia meridensis Hort. ex Baker,

l. c., nomen. Pourretia achupalla Hort. Linden ex Baker, op. c.

126, nomen. Puya bonplandiana sensu Baker, l. c., in part as to

above, non Schult. 1830. Puya achupalla Mez in DC. Mon. Phan. 9:

479. 1896, erroneously attributed to Baker. Pitcairnia sanctae-

crucis sensu Mez, l. c., non Baker 1889. British Guiana (Roraima),

Venezuela, Colombia.

33. P. THOMASIANA André, Énum. Bromél. 5. Dec. 13, 1888; Rev.

Hortic. 60:565. Dec. 16, 1888. Colombia, Ecuador.

34. P. BICOLOR Mez in DC. Mon. Phan. 9:482. 1896. Colombia.

35. P. PICHINCHAE Mez & Sodiro, Bull. Herb. Boiss. ser. 2, 4:

633. 1904. Ecuador.

36. P. GLAUCOVIRENS Mez, Fedde Rep. Nov. Spec. 3:9. 1906. Peru

37. P. WESTII L. B. Smith, Phytologia 7:421, pl. 1, figs. 16,

17. 1961. Peru.

38. P. ROSEANA L. B. Smith, Phytologia 7:421, pl. 1, fig. 13.

1961. Ecuador.

39. P. LEHMANNIANA L. B. Smith, Phytologia 5:34. 1954. Puya

lanuginosa Wittm. Bot. Jahrb. 11:56. 1889, non Schult. 1830.

Pitcairnia pastoensis Baker, Handb. Bromel. 122. 1889. Puya pas-

toensis Mez in DC. Mon. Phan. 9:483. 1896, non André 1889.

Colombia.

40. P. FURFURACEA (Willd.) L. B. Smith, Phytologia 5:34. 1954.

Pitcairnia furfuracea Willd. Enum. 1:346. 1809. Achupalla Humb.

Vues des Cordillères 221, pl. 30. 1813. Pourretia pyramidata

sensu H.B.K. Nov. Gen. & Sp. 1:296. 1816, non R. & P. 1802. Pit-

cairnia pyramidata Link, Enum. 1:308. 1821, as to material not as

to basonym. Puya bonplandiana Schult. in R. & S. Syst. 7, pt. 2:

1236. 1830. Pourretia bonplandiana D. Dietr. Syn. Pl. 2:1060.

1840. Colombia.

41. P. COERULEA Lindl. Bot. Reg. 26:pl. 11. 1840. Pourretia

caerulea Miers, Travels in Chile 2:531. 1826, nomen. Puya rubri-caulis Steud. Nomencl. ed. 2, pt. 2:419. 1841. Pitcairnia coerulea Benth. ex Baker, Handb. Bromel. 121. 1889. Chile.

42. P. ARANEOSA L. B. Smith, Phytologia 5:48, pl. 6, figs. 7-9. 1954. Peru.

43. P. VENUSTA Phil. An. Univ. Chile 91:613. 1895. Puya venusta Phil. Viaje Des. Atacama 4. 1860, nomen; Phil. ex Baker, Handb. Bromel. 123. 1889, in synon. Pitcairnia venusta Baker, l. c. Pitcairnia sphaerocephala Baker, l. c. Puya gaudichaudii Mez in DC. Mon. Phan. 9:496. 1896. Chile.

44. P. ATRA L. B. Smith, Contr. U. S. Nat. Herb. 29:536, fig. 90. 1954. Bolivia.

45. P. TOVARIANA L. B. Smith, Phytologia 5:48, pl. 7, figs. 1, 2. 1954. Peru.

46. P. PHELPSIAE L. B. Smith, Brittonia 7:78. 1950. Venezuela.

47. P. DYCKIOIDES (Baker) Mez in DC. Mon. Phan. 9:486. 1896. Pitcairnia dyckioides Baker, Handb. Bromel. 118. 1889. Argentina.

48. P. ASSURGENS L. B. Smith, Lilloa 9:199, pl. 1. 1943. Argentina.

49. P. GOUDOTIANA Mez in DC. Mon. Phan. 9:488. 1896. Colombia.

50. P. ARISTEGUIETAE L. B. Smith, Phytologia 7:2, pl. 1, figs. 9-12. 1959. Venezuela.

51. P. MEDICA L. B. Smith, Phytologia 4:216, pl. 2, figs. 1, 2. 1953. Peru.

52. P. DENSIFLORA Harms, Notizblatt 10:791. 1929. Peru.

53. P. GLABRESCENS L. B. Smith, Contr. U. S. Nat. Herb. 29:537, fig. 91. 1954. Bolivia.

54. P. FULGENS L. B. Smith, Phytologia 9:249, pl. 2, figs. 14-16. 1963. Peru.

55. P. TUBEROSA Mez in DC. Mon. Phan. 9:483. 1896; emend. L. B. Smith, Contr. U. S. Nat. Herb. 29:539, fig. 93. 1954. Bolivia, ("Peru").

56. P. REDUCTA L. B. Smith, sp. nov. A P. tuberosa Mez, cui verisimiliter affinis, foliorum laminis latioribus, pedicellis brevissimis, sepalis multo majoribus differt. A P. sanctae-crucis (Baker) L. B. Smith, cujus bracteae florigeras floresque valde imitans, ramis valde reductis, foliorum laminis multo minoribus differt.

Flowering 35-80 cm high; leaves ca. 4 dm long; sheaths ovate, 15 mm wide, spinose-serrate toward apex; blades linear, long-attenuate, 10 mm wide, glabrous above, subdensely tomentose beneath with white linear trichomes, laxly serrulate with slender pale antrorse spines 4 mm long; scape erect, ca. 3 mm in diameter, finely white-stellate; scape-bracts erect, ovate with a caudate apex, red, the upper ones about equaling the internodes; inflorescence laxly bipinnate, sparsely white-stellate, becoming glabrous; primary bracts like the upper scape-bracts but not caudate, nearly the same size and form as the floral bracts, exceeding the axis of the very short few-flowered lateral branches; branches divergent to spreading with a very short naked sterile base, subdense but with the axis largely exposed; floral bracts suberect, broadly ovate, acute and apiculate, 15 mm long,

ecarinate, broadly convex, red with a narrow scarious margin, subchartaceous; pedicels about 1 mm long but slender and distinct; sepals linear-lanceolate, narrowly obtuse and apiculate, 27 mm long; petals ca. 4 cm long, naked, twisted together after anthesis. Pl. 1, fig. 1: Branch x 1; fig. 2: Sepal x 1.

BOLIVIA: La Paz: On rocky slope between Altunkama and Caupolican, alt. 2600 m, August 1959, Cárdenas 5687 (US, type).

57. P. VARGASIANA L. B. Smith, *Phytologia* 8:227, pl. 2, figs. 9, 10. 1962. Peru.

58. P. GIGAS André, *Rev. Hort. 53:314*, fig. 74. 1881. Colombia.

59. P. PARVIFLORA L. B. Smith, *Contr. U. S. Nat. Herb.* 29:316, fig. 36. 1949. Ecuador.

60. P. SODIRCANA Mez, *Bull. Herb. Boiss. ser. 2*, 4:630. 1904. Ecuador.

61. P. MOLLIS Baker ex Mez in DC. *Mon. Phan.* 9:488. 1896. Bolivia.

62. P. RAUHII L. B. Smith, *Phytologia* 5:398, pl. 1, figs. 7, 8. 1956. Peru.

63. P. PYRAMIDATA (R. & P.) Schult. f. in R. & S. *Syst.* 7, pt. 2:1235. 1830. Pourretia pyramidata R. & P. *Fl. Peruv. & Chil.* 3:34, pl. 257. 1802. Pitcairnia pyramidata (R. & P.) Pers. *Syn. Pl.* 1:344. 1805. Bromelia pyramidata (R. & P.) Beer, *Bromel.* 34. 1857. Peru.

64. P. WURDACKII L. B. Smith, *Phytologia* 9:251, pl. 3, figs. 3, 4. 1963. Peru.

65. P. ERYNGIODES André, *Enum. Bromél.* 5. Dec. 13, 1888; *Rev. Hort.* 60:565. Dec. 16, 1888. Ecuador.

66. P. MITIS Mez, *Fedde Rep. Nov. Spec.* 3:10. 1906. Peru.

67. P. KILLIPII Cuatrecasas, *Not. Fl. Colombia* 6:38, fig. 31. 1944. Colombia.

68. P. NIGRESCENS L. B. Smith, *Publ. Mus. Hist. Nat. "Javier Prado"*, Univ. Nac. Mayor San Marcos ser. B, no. 16:4, figs. 6-8. 1964. Peru.

69. P. GRANTII L. B. Smith, *Phytologia* 5:181, pl. 2, figs. 11-13. 1955. Colombia.

70. P. GRACILIS L. B. Smith, *Contr. Gray Herb.* 98:11, pl. 3, figs. 12, 13. 1932. Peru.

71. P. SANCTAE-MARTAE L. B. Smith, *Phytologia* 4:382, pl. 2, figs. 5-7. 1953. Colombia.

72. P. PITCAIRNIOIDES L. B. Smith, *Publ. Mus. Hist. Nat. "Javier Prado"*, Univ. Nac. Mayor San Marcos ser. B, no. 16:5. 1964. Pitcairnia grandiflora Mez, *Fedde Rep. Nov. Spec.* 3:5. 1906, non Hook. 1861. Peru.

73. P. KUNTZEANA Mez in DC. *Mon. Phan.* 9:490. 1896. Puya rusbyi sensu L. B. Smith, *Proc. Am. Acad. (Contr. Gray Herb.* 106) 70:154. 1935, in part not as to type. Bolivia.

74. P. MINIMA L. B. Smith, *Phytologia* 7:423, pl. 2, figs. 5, 6. 1961. Bolivia.

75. P. FERREYRAE L. B. Smith, *Publ. Mus. Hist. Nat. "Javier Prado"*, Univ. Nac. Mayor San Marcos ser. B, no. 13:1, fig. 1-3. 1963. Peru.

76. P. NITIDA Mez in DC. Mon. Phan. 9:491. 1896. Puya woronowii Harms, Notizblatt 11:58. 1930. Colombia.
77. P. BARKLEYANA L. B. Smith, Phytologia 5:180, pl. 2, figs. 4-7. 1955. Colombia.
78. P. MACBRIDEI L. B. Smith, Contr. Gray Herb. 98:12, pl. 3, figs. 17, 18. 1932. Peru.
79. P. ARGENTEA L. B. Smith, Phytologia 5:397, pl. 1, figs. 5, 6. 1956. Peru.
80. P. LOPEZII L. B. Smith, Phytologia 8:501, pl. 2, figs. 11, 12. 1963. Peru.
81. P. SAGASTEGUII L. B. Smith, Phytologia 8:502, pl. 2, figs. 13, 14. 1963. Peru.
82. P. REFLEXIFLORA Mez, Fedde Rep. Spec. Nov. 16:66. 1919. Peru.
83. P. GRUBBII L. B. Smith, Phytologia 7:420, pl. 1, figs. 11, 12. 1961. Colombia.
84. P. LONGISTYLA Mez, Fedde Rep. Nov. Spec. 3:12. 1906. Peru.
85. P. FEROX Mez, Bull. Herb. Boiss. ser. 2, 4:632. 1904. Peru.
86. P. GRANDIDENS Mez, Fedde Rep. Nov. Spec. 3:10. 1906. Peru.
87. P. DEPAUPERATA L. B. Smith, Contr. Gray Herb. 98:10, pl. 3, figs. 10, 11. 1932. Peru.
88. P. PAUPERA Mez, Fedde Rep. Nov. Spec. 3:14. 1906. Bolivia
89. P. LLATENSIS L. B. Smith, Contr. Gray Herb. 98:11, pl. 3, figs. 14-16. 1932. Peru.
90. P. VALIDA L. B. Smith, sp. nov. A P. mollis Baker ex Mez, cui verisimiliter affinis, foliis mox utrinque glabris, inflorescentiae indumento valde appresso, bracteis florigeris oblongo-ellipticis differt.
- Flowering 3 m high; leaves incompletely known, over 6 dm long; blades narrowly triangular, 4 cm wide, soon wholly glabrous, laxly serrate with brown stiffly antrorse spines 3 mm long; scape erect, over 4 cm in diameter (! photo); scape-bracts early deciduous, unknown; inflorescence subdensely bipinnate, over 1 m long, except for the petals and genitalia covered with a fine white dense appressed tomentum; primary bracts small and inconspicuous (! photo); branches subspreading, strobilate, nearly 3 dm long, 7 cm in diameter; floral bracts elliptic-oblong, acute and apiculate, to 55 mm long, distinctly exceeded by the sepals, coriaceous, rigid, very minutely serrate toward apex; flowers suberect; pedicels subcylindric, 2 cm long, 5 mm in diameter; sepals lance-elliptic, rounded and apiculate, 35 mm long, coriaceous when dry, ecarinate; petals naked, twisted together after anthesis. Pl. 1, fig. 3: Flower and floral bract x 1; fig. 4: Sepal x 1.
- BOLIVIA: Chuquisaca: On rock slope by Río Chico, alt. 2500 m, April 1962, Cárdenas 6012 (US, type).
91. P. STIPITATA L. B. Smith, Contr. Gray Herb. 98:13, pl. 4, figs. 5, 6. 1932. Peru.
92. P. GUMMIFERA Mez & Sodiro, Bull. Herb. Boiss. ser. 2, 4: 863. 1904. Ecuador.
93. P. ASPLUNDII L. B. Smith, Phytologia 6:439, pl. 2, figs.

14, 15. 1959. Ecuador.

94. *P. LASIOPODA* L. B. Smith, Proc. Am. Acad. Arts & Sci. (Contr. Gray Herb. 106) 70:153, pl. 1, figs. 16, 17. 1935. Peru, Bolivia.

95. *P. COMMIXTA* L. B. Smith, Phytologia 8:501, pl. 2, figs. 9, 10. 1963. Peru.

96. *P. OXYANTHA* Mez, Bull. Herb. Boiss. ser. 2, 4:631. 1904. Peru.

97. *P. CTENORHYNCHA* L. B. Smith, Phytologia 5:49, pl. 7, figs. 6-9. 1954. Bolivia.

98. *P. FASTUOSA* Mez, Fedde Rep. Nov. Spec. 3:12. 1906. Peru.

99. *P. WEBERBAUERI* Mez, Bull. Herb. Boiss. ser. 2, 4:633. 1904. Peru.

100. *P. GLOMERIFERA* Mez & Sodiro, Bull. Herb. Boiss. ser. 2, 4:630. 1904. Ecuador.

101. *P. FOSTERIANA* L. B. Smith, Journ. Washington Acad. Sci. 40:216, fig. 1. 1950. Bolivia.

102. *P. WEBERIANA* E. Morr. ex Mez in DC. Mon. Phan. 9:492. Jan. 1896. *Puya flora* Spegazzini, Pl. Nov. Argent. pt. 3:382. Dec. 1896 (! Castellanos). Argentina.

103. *P. LACCATA* Mez, Fedde Rep. Nov. Spec. 3:11. 1906. Peru.

104. *P. ANGULONIS* L. B. Smith, Phytologia 6:260, pl. 1, figs. 13-15. 1958. Peru.

105. *P. CYLINDRICA* Mez, Fedde Rep. Nov. Spec. 16:66. 1919. Peru.

106. *P. SANTOSII* Cuatrecasas, Rev. Acad. Colombiana Cienc. Exact. Fisico-Quimic. y Nat. 4:160, figs. 1, 2, pls. 1, 2. 1941. Colombia.

Var. a. *SANTOSII*. Leaf-blades 50-60 cm long, 30-35 mm wide; inflorescence 10 cm in diameter; primary bracts elliptic or sub-orbicular, the lowest with acuminate apices.

Var. b. *VERDENSIS* Cuatrecasas, Not. Fl. Colombia 6:39, figs. 32, 33. 1944. Leaf-blades 30-40 cm long, 45 mm wide; inflorescence considerably less than 10 cm in diameter; primary bracts ovate, apiculate.

107. *P. LINEATA* Mez in DC. Mon. Phan. 9:497. 1896. *Puya leptodota* Cuatrecasas, Caldasia 1, no. 5:17, figs. 1-8. 1942. Colombia

108. *P. VOLCANENSIS* Castillon, Bol. Mus. Hist. Nat. Tucumán no. 7:51, figs. 1, 2. 1926. Argentina.

109. *P. PRATENSIS* L. B. Smith, Phytologia 4:217, pl. 2, figs. 3, 4. 1953. Peru.

110. *P. VESTITA* André, Énum. Bromél. 5. Dec. 13, 1888; Rev. Hortic. 60:565. Dec. 16, 1888. Colombia.

111. *P. MEMBRANACEA* L. B. Smith, Phytologia 7:421, pl. 1, figs. 14, 15. 1961. Peru.

112. *P. COMPACTA* L. B. Smith, Lloydia 11:305, fig. 4. 1949. Ecuador.

113. *P. TRISTIS* L. B. Smith, sp. nov. A *P. leptostachya* L. B. Smith, cui affinis, scapo elatiore folia superante, inflorescentia late ovoidea, bracteis florigeris suborbicularibus differt.

Flowering 6 dm high; leaves numerous in a spreading rosette, ca. 3 dm long; sheaths broadly ovate, 3-4 cm long, glabrous

toward base; blades linear-triangular, attenuate, pungent, 15 mm wide, glabrous above, covered beneath with subappressed white scales, laxly serrate with dark uncinatate spines 4 mm long; scape erect, exceeding the leaves, coarsely brown-tomentose; scape-bracts suboliateous, strict, many-ranked and densely imbricate, wholly covering the scape, brown-tomentose toward base; inflorescence densely ovoid, broadly rounded, 10 cm long, 8 cm in diameter, obscurely bipinnate, densely and coarsely brown-tomentose except the petals and genitalia; primary bracts attenuate from a suborbicular base, to 7 cm long, membranaceous, finely nerved, entire, the apical half reflexed at anthesis; branches nearly aborted, 2-flowered; floral bracts like the primary bracts but short-attenuate and only 35 mm long; pedicels short but slender and distinct; sepals oblong-elliptic, rounded and apiculate, 18 mm long, thin; petals over 3 cm long, blue, twisted together after anthesis. Pl. 1, fig. 5: Inflorescence x 1/4; fig. 6: Primary bract and flowers x 1/2; fig. 7: Sepal x 1.

BOLIVIA: Cochabamba: On rocky slope, km 89 between Cochabamba and Chapare, 3900 m, December 1962, Cárdenas 6067 (US, type).

114. P. LEPTOSTACHYA L. B. Smith, Lilloa 14:97, figs. 11, 12. 1948. Bolivia.

115. P. CUATRECASASII L. B. Smith, Phytologia 5:33, pl. 1, figs. 5-9. 1954. Colombia.

116. P. CARDENASII L. B. Smith, Lilloa 14:94, fig. 6. 1948. Bolivia.

117. P. HERZOGII Wittm. Mededeel. Rijks Herb. 29:86. 1916. Bolivia.

118. P. HUANCAVELICAE L. B. Smith, Phytologia 7:4, pl. 1, figs. 15, 16. 1959. Peru.

119. P. LANATA (H.B.K.) Schult. f. in R. & S. Syst. 7, pt. 2: 1233. 1830. Pourretia lanata H.B.K. Nov. Gen. & Sp. 1:296. 1816. Pitcairnia lanata Dietr. Lexicogr. Nachtr. 6:303. 1820. Peru.

120. P. YAKESPALA Castellanos, Gen. & Sp. Pl. Argent. 3:213, pl. 55. 1945. Argentina.

121. P. NIVALIS Baker, Handb. Bromel. 124. 1889. Colombia.

122. P. LANUGINOSA (R. & P.) Schult. f. in R. & S. Syst. 7, pt. 2:1234. 1830. Pourretia lanuginosa R. & P. Fl. Peruv. & Chil. 3:33, pl. 256. 1802. Bromelia lanuginosa Beer, Bromel. 32. 1857. Pitcairnia crystallina Pers. Syn. Pl. 1:344. 1805. Pitcairnia ruiziana Mez in DC. Mon. Phan. 9:491. 1896, as to material cited. Peru.

123. P. TUNARENSIS Mez in DC. Mon. Phan. 9:498. 1896. Bolivia.

124. P. CERRATEANA L. B. Smith, Contr. U. S. Nat. Herb. 29:533 fig. 88. 1954. Peru.

125. P. MARIAE L. B. Smith, Phytologia 9:250, pl. 2, figs. 17, 18. 1963. Peru.

126. P. ISABELLINA Mez, Fedde Rep. Spec. Nov. 16:66. 1919. Peru.

127. P. TRIANAE Baker, Handb. Bromel. 124. 1889. Colombia.

128. P. DASYLIRIOIDES Standley, Journ. Washington Acad. Sci. 17:159. 1927. Costa Rica.

129. P. BOYACANA Cuatrecasas, Rev. Acad. Colombiana Cienc.

Exact. Fisico-Quimic. y Nat. 4:162. 1941. Colombia.

130. *P. OCCIDENTALIS* L. B. Smith, Phytologia 5:34, pl. 2, figs. 1-3. 1954. Colombia.

131. *P. MACULATA* L. B. Smith, Mem. New York Bot. Gard. 8:26, fig. 1, a-d. 1952. Ecuador.

132. *P. PYGMAEA* L. B. Smith, Mem. New York Bot. Gard. 8:27, fig. 1, g-i. 1952. Ecuador.

133. *P. CRYPTANTHA* Cuatrecasas, Rev. Acad. Colombiana Cienc. Fisico-Quimic. y Nat. 4:161, pl. 2. 1941. Colombia.

134. *P. NUTANS* L. B. Smith, Mem. New York Bot. Gard. 8:27, fig. 1, e-f. 1952. Ecuador.

135. *P. VENEZUELANA* L. B. Smith, Phytologia 7:3, pl. 1, figs. 13, 14. 1959. Venezuela.

136. *P. HUMILIS* Mez in DC. Mon. Phan. 9:498. 1896. *Puya werdermannii* Harms, Notizblatt 10:793. 1929. Bolivia.

137. *P. BRACHYSTACHYA* (Baker) Mez in DC. Mon. Phan. 9:496. 1896. *Pitcairnia brachystachya* Baker, Handb. Bromel. 118. 1889. Colombia.

138. *P. DOLICHOSTROBILA* Harms, Notizblatt 10:215. 1928. Peru.

139. *P. STROBILANTHA* Mez, Fedde Rep. Nov. Spec. 3:13. 1906.

Peru.

140. *P. EXIGUA* Mez in DC. Mon. Phan. 9:495. 1896. Ecuador.

141. *P. MACRURA* Mez, Fedde Rep. Nov. Spec. 3:13. 1906. Peru.

142. *P. GARGANTAE* L. B. Smith, Phytologia 5:180, pl. 2, figs. 8-10. 1955. Colombia.

143. *P. ANGUSTA* L. B. Smith, Publ. Mus. Hist. Nat. "Javier Prado", Univ. Nac. Mayor San Marcos ser. B, no. 16:1, figs. 1, 2. 1964. Peru.

144. *P. BRITTONIANA* Baker, Handb. Bromel. 124. 1889. Bolivia.

145. *P. ALPICOLA* L. B. Smith, Phytologia 7:419, pl. 1, figs. 8-10. 1961. Colombia.

146. *P. SANTANDERENSIS* Cuatrecasas, Rev. Acad. Colombiana Cienc. Exact. Fisico-Quimic. y Nat. 4:162. 1941. Colombia.

147. *P. CARDONAE* L. B. Smith, Phytologia 7:107, pl. 1, figs. 7-9. 1960. Venezuela.

148. *P. HERRERAE* Harms, Notizblatt 10:792. 1929. Peru.

149. *P. CLAVA-HERCULIS* Mez & Sodiro, Bull. Herb. Boiss. ser. 2, 4:863. 1904. Colombia, Ecuador.

150. *P. HAMATA* L. B. Smith, Contr. U. S. Nat. Herb. 29:315, fig. 35. 1949. Colombia, Ecuador.

Subgenus PUYA

151. *P. CHILENSIS* Mol. Saggio 160, 351. 1782. *Renealmia ramosa*, *lutea*, *foliis spinosis* vulgo *Puya* Feuill. Obs. Hist. Pl. Med. 3:59, pl. 39. 1725. *Pourretia coarctata* R. & P. Syst. Veg. 1:81. 1798; Fl. Peruv. & Chil. 3:34. 1802. *Pitcairnia coarctata* Pers.

Syn. 1:344. 1805. *Puya suberosa* Mol. Saggio, ed. 2. 153. 1810. *Pitcairnia chilensis* Lodd. Cat. ex Loudon, Hort. Brit. 118. 1830, nomen. *Puya coarctata* Fisch. Sert. Petrop. pl. 19. 1846; Gay, Fl. Chil. 6:11. 1853. *Puya gigantea* Phil. Linnaea 33:246. 1864.

Puya chilensis "Var. *P. gigantea*" Baker, Handb. Bromel. 127.

1889. Puya chilensis var. gigantea Baker ex Mez in DC. Mon. Phan 9:473. 1896. Chile.

152. P. BOLIVIENSIS Baker, Handb. Bromel. 126. 1889. Puya copiapina Phil. An. Univ. Chile 91:613. 1895. Chile.

153. P. ALPESTRIS (Poepp.) Gay, Fl. Chil. 6:12. 1853; Gourlay, Kew Bull. 1952:501, pl. 2, fig. 4. 1952. Pourretia alpestris Poepp. Syn. 8. 1833; Reise 1:81. 1835; Peopp. & Endl. Nov. Gen. 2:41, pl. 156. 1838. Puya whytei Hook. f. Bot. Mag. 94: pl. 5732. 1868. Chile.

154. P. BERTERONIANA Mez in DC. Mon. Phan. 9:477. 1896; Gourlay, Kew Bull. 1952:501, pl. 1, fig. 2. 1952. Puya alpestris sensu Gay, Fl. Chil. 6:12. 1853, in part, as to plant of Valparaiso region, not as to basonym. Puya coarctata sensu Phil. Journ. Bot. 22:208, 1884, non Fisch. 1846. Pitcairnia coerulea sensu Benth. ex Baker, Handb. Bromel. 121. 1889, in part, not as to basonym. Puya coerulea sensu Johow, An. Univ. Chile 126:36. 1910, non Lindl. 1840. Puya whytei sensu Gourlay, Trans. & Proc. Soc. Edinb. 24:72, pl. 8. 1910. Pitcairnia alpestris L. H. Bailey, Stand. Cycl. Hort. 2863. 1916, nomen. Chile.

155. P. WEDDELLIANA (Baker) Mez in DC. Mon. Phan. 9:475. 1896. Pitcairnia weddelliana Baker, Handb. Bromel. 122. 1889. Bolivia.

156. P. RAIMONDII Harms, Notizblatt 10:213. 1928; Kinzl, Jahrb. Osterreich. Alpenvereins 74:59. 1949. Pourretia gigantea Raimondi, El Peru, Bot. 1:295. 1874, non Puya gigantea Phil. 1865, nec André 1879. Peru, Bolivia.

EXCLUDED AND DOUBTFUL TAXA

157. P. acris Hort. ex Gentil, Pl. Cult. Serres Jard. Bot. Brux. 153. 1907, nomen. Unknown.

158. P. altensteinii Lk., Kl. & Otto, Pl. Rar. Hort. Berol. 1: 1, pl. 1. 1840 = PITCAIRNIA ALTENSTEINII (Lk., Kl. & Otto) Lem.

159. P. augustae (Rich. Schomburgk) Mez in DC. Mon. Phan. 9: 487. 1896. = CONNELLIA AUGUSTAE (Rich. Schomburgk) N. E. Brown.

160. P. aurantiaca Hort. ex K. Koch, Ind. Sem. Hort. Berol. 1856, App.:3. 1857 = PITCAIRNIA DENSIFLORA Brongn. ex Lem.

161. P. carnea Regel, Catal. Pl. Hort. Aksak. 117. 1860 = PITCAIRNIA CARNEA Beer.

162. P. echinotricha André, Rev. Hortic. 60:565. 1888 = PITCAIRNIA FERRUGINEA.

163. P. edulis E. Morr. Belg. Hortic. 28:354. 1878 = DYCKIA sp. ?

164. P. flava Willd. ex Baker, Handb. Bromel. 135. 1889, nomen = DEUTEROCOHNIA LONGIPETALA (Baker) Mez

165. P. funkiana Linden, Cat. 5:2. 1850 = PITCAIRNIA MAIDIFOLIA (C. Morr.) Dcne. ex Planch.

166. P. grandiflora Hook. Bot. Mag. 87:pl. 5234. 1861 = PITCAIRNIA FERRUGINEA R. & P.

167. P. heterophylla Lindl. Bot. Reg. 26:pl. 71. 1840 = PITCAIRNIA HETEROPHYLLA (Lindl.) Beer

168. P. lanata R. & S. Syst. 7, pt. 2:1233. 1830, nomen = BROMELIA HUMILIS Jacq.

169. P. longifolia C. Morr. Ann. Soc. Agr. Bot. Gand. 2:483, pl. 101. 1846 = PITCAIRNIA HETEROPHYLLA (Lindl.) Beer.
170. P. macrostachya Schomb. Fl. & Fauna Guayana 1068. 1848, nomen = PITCAIRNIA ALTENSTEINII var. GIGANTEA (Hook.) Baker.
171. P. macrostachys A. Dietr. Allg. Gartenzeit. 16:145. 1848 = PITCAIRNIA ALTENSTEINII var. GIGANTEA (Hook.) Baker.
172. P. maidifolia C. Morr. Ann. Soc. Agr. Bot. Gand. 5:453, pl. 1849 = PITCAIRNIA MAIDIFOLIA (C. Morr.) Dcne. ex Planch.
173. P. nana Wittm. Mededeel. Rijks Herb. 29:85. 1916 = PITCAIRNIA NANA (Wittm.) L. B. Smith, cf. Phytologia 10:1. 1964.
174. P. quelchii (N. E. Brown) L. B. Smith, Contr. Gray Herb. 89:7. 1930 = CONNELLIA QUELCHII N. E. Brown.
175. P. recurvata Scheidw. Allgem. Gartenzeit. 10:275. 1842 = PITCAIRNIA RECURVATA (Scheidw.) K. Koch.
176. P. roraimae Mez, Fedde Rep. Spec. Nov. 12:417. 1913 = CONNELLIA QUELCHII N. E. Brown.
177. P. rubricaulis Steud. Nomencl. ed. 2, 2:419. 1841, nomen (based on Pourretia rubricaulis Miers, Travels in Chile 531. 1826, nomen) = PUYA COERULEA Lindl. or P. VIOLACEA (Brongn.) Mez?
178. P. ruiziana Mez in DC. Mon. Phan. 9:491. 1896, as to synonymy = PITCAIRNIA LANUGINOSA R. & P.
179. P. saxatilis Mart. in Spix & Mart. Reise in Brasilien 2: 757. 1828, nomen = ENCHOLIRIUM SPECTABILE Mart. ex Schult. f.
180. P. sulphurea Hook. Bot. Mag. 79:pl. 4696. 1853 = PITCAIRNIA WENDLANDII Baker
181. P. virescens Hook. f. Bot. Mag. 83:pl. 4991. 1857 = GUZMANIA VIRESCENS (Hook. f.) Mez.
182. P. warszewiczii H. Wendl. ex Hook. Bot. Mag. 87:pl. 5225. 1861 = PITCAIRNIA ATRORUBENS (Beer) Baker.
183. P. weberi Schlumb. ex Lillo, Fl. Tucumán 104. 1888 = DEUTEROCOHNIA LONGIPETALA (Baker) Mez.

INDEX

(by species numbers of Puya)

- ACHUPALLA 40.
 AGALLOSTACHYS guyanensis 32.
 BROMELIA humilis 168; lanuginosa 122; pyramidata 63.
 CONNELLIA augustae 159; quelchii 174, 176.
 DEUTEROCOHNIA longipetala 164, 183.
 DYCKIA sp. 163.
 ENCHOLIRIUM spectabile 179.
 GUZMANIA virescens 181.
 PITCAIRNIA altensteinii 158; altensteinii var. gigantea 170, 171; alpestris 154; atrorubens 182; bangii 21; brachystachya 137; carnea 161; chilensis 151; coarctata 151; coerulea 41, 154; crystallina 122; densiflora 160; dyckioides 47; edulis 163; ferruginea 162, 166; floccosa 32; furfuracea 40; grandiflora 72; guyanensis 32; heterophylla 167, 169; lanata 119; lanuginosa 178; maidifolia 165, 172; megastachya 3; meridensis 32; nana 173; olivacea 24; pastoensis 39; pearcei 30; philippii 9a; pyramidata 40, 63, quetameensis 32; recurvata 175; robusta 17; ruiziana 122;

rusbyi 12; sanctae-crucis 17, 32; spathacea 8; sphaerocephala 43; stenothyrsa 21; venusta 43; violacea 9a; weddelliana 155; wendlandii 180.

POURRETIA achupalla 32; alpestris 153; bonplandiana 40; caerulea 41; coarctata 151; floccosa 32; gigantea 156; lanata 119; lanuginosa 32, 122; pyramidata 40, 63; rubricaulis 9a; violacea 9a, 32.

PUJA suberosa 151.

PUYA achupalla 32; acris 157; aequatorialis 26; alata 7; alba 29; alpestris 153, 154; alpicola 145; altensteinii 158; angulonis 104; angusta 143; araneosa 42; argentea 79; aristeguitae 50; asplundii 93; assurgens 48; atra 44; augustae 159;.

barkleyana 77; berteroniana 154; bicolor 34; boliviensis 152; bonplandiana 32, 40; boyacana 129; brachystachya 137; brittoniana 144.

cardenasii 116; cardonae 147; carnea 161; casmichensis 22; cerrateana 124; chilensis 151; clava-herculis 149; coarctata 151, 154; coerulea 41, 154, 177; commixta 95; compacta 112; copiapina 152; cristata 13; cryptantha 133; ctenorhyncha 97; cuatrecasasii 115; cylindrica 105.

dasyliroides 128; densiflora 52; depauperata 87; dolichostrobila 138; dyckiioides 47.

echinotricha 162; eryngioides 65; exigua 140.

fastuosa 98; ferox 85; ferreyrae 75; fiebrigii 18; flava 164; floccosa 17, 32; flora 102; formosa 8; fosteriana 101; fulgens 54; funkiana 165; furfuracea 40.

gargantae 142; gaudichaudii 43; gigantea 151; gigas 58; glabrata 9a; glabrescens 53; glareosa 23; glaucovirens 36; glomerifera 100; goudotiana 49; gracilis 70; grandidens 86; grandiflora 166; grantii 69; grubbii 83; guianensis 32; gummifera 92.

hamata 150; harmsii 16; hauthalii 10; herrerae 148; herzogii 117; heterophylla 167; hofstenii 10; hortensis 15; huancavelicae 118; humilis 136.

isabellina 126.

killipii 67; kuntzeana 73.

laccata 103; lanata 119, 168; lanuginosa 39, 122; lasiopoda 94; laxa 14; lehmanniana 39; lepidota 107; leptostachya 114; lilloi 5; lineata 107; llatensis 89; longifolia 169; longisepala 2; longistyla 84; lopezii 80.

macbridei 78; macrostachya 170; macrostachys 171; macrura 141; maculata 131; maidifolia 172; mariae 125; medica 51; membranacea 111; meridensis 32; meziana 19; micrantha 4; minima 74; mitis 66; mollis 61.

nana 173; nigrescens 68; nitida 76; nivalis 121; nutans 134.

obconica 25; occidentalis 130; olivacea 24; oxyantha 96.

paniculata 9a; parviflora 59; pastoensis 39; paupera 88; pearcei 30; pectinata 3; penduliflora 31; phelpsiae 46; pichincha 35; pitcairnioides 72; potosina 11; pratensis 109; pygmaea 132; pyramidata 63.

quelchii 174; quetameensis 32.

raimondii 1 56; ramosa 27; rauhii 62; recurvata 175; reducta 56; reflexiflora 82; riparia 28; roezlii 3; roraimae 176; roseana

38; rubricaulis 41, 177; ruiziana 178; rusbyi 12, 73.

sagasteguii 81; sanctae-crucis 17; sanctae-martae 71; santanderensis 146; santosii 106; saxatilis 179; secunda 20; smithii 6; sodiroana 60; spathacea 8; spathacea var. harmsii 16; stenothyrsa 21; stipitata 91; strobilantha 139; sulphurea 180.

thomasiana 33; tovariana 45; trianae 127; tristis 113; tuberosa 55; tunarensis 123.

ultima 1.

valida 90; vargasiana 57; venezuelana 135; venusta 43; vestita 110; violacea 9, 177; virescens 181; volcanensis 108.

warszewiczii 182; weberbaueri 99; weberi 183; weberiana 102; weddelliana 155; werdermannii 136; westii 37; whytei 153, 154; woronowii 76; wurdackii 64.

yakespala 120.

RENEALMIA ramosa, etc. 151.

MISCELLANEOUS NOTES

MEXICO

AECHMEA MCVAUGHII L. B. Smith, sp. nov.

In subgenere Podaechmea ab omnibus speciebus inflorescentia pendula lepidibus magnis fulgente albis praedita, floribus magnis, sepalis serrulatis differt.

Leaves to 1 m long, in a large erect basket, waxy glaucous beneath (! McVaugh & Koelz); blades ligulate, 9 cm wide, broadly subacute with a stout rigid mucro 6 mm long, glabrous above, covered beneath with white subappressed scales, laxly serrate with flat curved spines 3-4 mm long; scape decurved, ca. 1 cm thick at apex, covered with persistent spreading coarse brilliantly white scales; scape-bracts suberect, densely imbricate, lanceolate, involute-acuminate at apex, 23 cm long, subchartaceous, rose, glabrous above, covered with appressed white scales beneath; inflorescence pendulous, 1 m long in fruit (! McVaugh & Koelz), bipinnate toward base, racemose toward apex, its axes, ovaries, and sepals coarsely white-lepidote like the scape; primary bracts like the upper scape-bracts, much exceeding the 5 cm long laxly few-flowered branches; floral bracts linear, attenuate, about 10 mm long; pedicels spreading, straight, cylindrical, to 15 mm long, 1 mm in diameter; flowers in line with the pedicels; sepals free or nearly so, subtriangular, 22 mm long, slightly asymmetric, serrulate toward apex, mucronate, ecarinate; petals imperfectly known, about 5 cm long, bearing 2 fimbriate scales at base; ovary globose, enlarged in fruit to 15 mm diameter; epigynous tube shallow; placentae elongate; seed suboblong, 3 mm long, black, finely reticulate. Pl. I, fig. 8: Flower and floral bract x 1; fig. 9: Sepal x 1.

MEXICO: Jalisco: Abundant on limestone rocks and on trees, high dense forest dominated by Brosimum, steep mountainside, 8 miles southwest of Pihuamo, alt. 500-600 m, December 6, 1959, McVaugh & Koelz 1491 (MICH, type; US).

.....

HECHTIA JALISCANA L. B. Smith, sp. nov.

A H. fosteriana L. B. Smith, cui affinis, bracteis primariis dense serratis, bracteis florigeris sepala subaequantibus differt.

Known only from fragments of the pistillate plant; leaves (one known) to 8 dm long; sheaths elliptic, 5-6 cm long, stramineous, glabrous toward base, serrate toward apex; blades narrowly triangular, 3 cm wide, glabrous above, covered with fine appressed cinereous scales beneath, subdensely repand-serrate at base with slender curved antrorse spines 3 mm long, more laxly so above; scape 1 m high (! McVaugh); inflorescence bipinnate so far as known, lax, sparsely pale-lepidote becoming glabrous; primary bracts lanceolate, caudate-acuminate, to 4 cm long, slightly longer to slightly shorter than the bracteate sterile bases of the branches, densely serrate; branches divergent, 14-24 cm long, straight or slightly curved, ca. 3 mm thick, sulcate, laxly subverticillate-flowered, flattened at base; floral bracts lanceovate, acuminate, to 9 mm long, about equaling the sepals, strongly convex, minutely denticulate, green toward base and brown toward apex, the margin not contrasting; pedicels spreading, stout, subcylindric, to 4 mm long, subulate, contracted and articulate at base; pistillate sepals ovate, broadly acute or obtuse, 4 mm long, nearly even, brown with prominent scarious margin; petals ovate, acute, barely exceeding the sepals; ovary wholly superior; capsule narrowly ovoid, acute, 11 mm long, sharply angled, deeply divided between the carpels; seeds caudate. Pl. I, fig. 10: Pistillate flower x 1.

MEXICO: Jalisco: Local around rocks, below Presa de Santa Rosa, in the barranca of the Río Grande de Santiago north of Amatitán, 750-800 m, September 1, 1960, McVaugh 18530 (MICH, type).

HECHTIA LAEVIS L. B. Smith, sp. nov.

H. glabra Brand. atque H. reticulata L. B. Smith affinis, a priore pedicellis teretibus gracilibus, a posteriore carpellis laevibus distinguenda.

Known from very young staminate and very old fruiting plants, flowering 2 m high; leaves densely rosulate, over 6 dm long; blades narrowly triangular, rigid, 3 cm wide, covered with pale appressed scales on both sides, becoming glabrous above, laxly repand-serrate with curved antrorse spines 3 mm long; scape (staminate) straight, ca. 10 mm in diameter, sparsely pale-lepidote, very soon glabrous; scape-bracts erect, exceeding the internodes but so narrow as to expose most of the scape, entire or subentire, the lower linear from a small triangular base, the upper narrowly triangular; inflorescence laxly bipinnate in both sexes, sparsely pale-lepidote when young; primary bracts (staminate) like the upper scape-bracts, to 17 mm long; branches spreading or subspreading, densely flowered with a short flattened sterile base, the pistillate to 15 cm long; floral bracts broadly triangular, much shorter than the pistillate pedicels; staminate flowers much too young (ca. 1 mm long) to show characters but the anthers already exerted; pistillate flowers with pedicels slen-

derly cylindric, 3.5 mm long, smooth, basally articulate; sepals broadly ovate, apiculate, 1.5 mm long; petals triangular, 3.5 mm long, white; ovary wholly superior; capsule ovoid, 8 mm long, deeply sulcate between the carpels, castaneous, even, covered at first with appressed white scales. Pl. I, fig. 11: Fruit x 1; fig. 12: Pistillate sepal x 5.

MEXICO: Colima: Abundant in rocky ravine and on open rocky slopes above, mountains 10 miles south-southwest of Colima on Manzanillo road, alt. 400-500 m, July 18, 1957, McVaugh 15528 (MICH, type; US).

PITCAIRNIA ABUNDANS L. B. Smith, sp. nov.

P. aequatoriale L. B. Smith in systema mea proxima sed rhachi sepalisque minutissime tuberculatis, floribus patentibus, ovario costato differt.

Short-caulescent, flowering 6-7 dm high; leaves subrosulate at the apex of the stem; sheaths concealed by each other; blades dimorphic, some reduced to dark pectinate-serrate flat spines, others foliaceous, deciduous, linear, acuminate, slightly narrowed toward base, 6 dm long, 18 mm wide, sparsely white-flocculose at base, entire above the line of abscission; scape erect, over 1 cm in diameter at base, soon glabrous; scape-bracts all exceeding the internodes, the lower subfoliaceous, the upper triangular, caudate-acuminate, green, entire, sparsely white-flocculose; inflorescence simple, 15-22 cm long, subdense, bearing a tuft of sterile bracts at apex; rhachis sulcate, minutely and obscurely tuberculate, otherwise glabrous; floral bracts narrowly triangular, caudate-acuminate, much exceeding the pedicels and the lowest about equaling the sepals; flowers stiffly spreading; pedicels 6 mm long, strongly sulcate when dry; sepals narrowly triangular, acuminate, 26-29 mm long, minutely tuberculate, sulcate when dry; petals linear, 6 cm long, probably white, bearing a truncate scale at base; stamens included; ovary about 2/3 superior, the lower part strongly costate; ovules caudate. Pl. II, fig. 1: Flower x 1; fig. 2: Sepal x 1.

MEXICO: Nayarit: Abundant on summits of rocks in shade in the barranca, mountains 10 miles southeast of Ahuacatlán, on the road to Barranca del Oro and Amatlán, alt. 1100-1300 m, November 17-18, 1959, McVaugh & Koelz 751 (US, type; MICH).

This is the first endemic Mexican species known to have deciduous leaves combined with appendaged petals.

GUATEMALA

TILLANDSIA LAMPROPODA L. B. Smith var. MAJOR L. B. Smith, var. nov.

A var. lampropoda foliis majoribus, inflorescentia digitata differt.

Flowering over 6 dm high; leaves ca. 8 dm long; blades 3 cm wide; scape-bracts subinflated, the lowest subfoliaceous, the highest apiculate; inflorescence digitate from 3 spikes; primary bracts like the upper scape-bracts, very broadly ovate, 5 cm

long; spikes lanceolate, strongly complanate, 13-19 cm long; floral bracts vermilion with green tips; petals white.

GUATEMALA: Without further locality, cultivated 1964, Wyly M. Billing, Jr. 55 (US, type).

COLOMBIA

GREIGIA MULFORDII L. B. Smith var. MACRANTHA L. B. Smith, var. nov.

A var. mulfordii foliorum laminis angustioribus, bracteis floribusque majoribus differt.

Leaf-blades ca. 3 cm wide, centrally subentire; primary bracts to 75 mm long, their green apices nearly as long as their castaneous bases; sepals 27 mm long; petals 45 mm long.

COLOMBIA: Cundinamarca: On páramo, Macizo de Bogotá, eastern drainage, Quebrada de Casarreales, Páramo de Palacio, alt. 3450 m, December 14, 1959, Cuatrecasas, Murillo & Jaramillo 25625 (US, type).

PERU

AECHMEA RETUSA L. B. Smith, sp. nov.

A Ae. chantinii (Carr.) Baker, cui affinis, foliorum laminis concoloribus, bracteis florigeris ellipticis retusis ovarium multo superantibus differt.

Flowering ca. 6 dm high; leaves 4 dm long, densely punctulate-lepidote; sheaths ovate, but slightly wider than the blades but mostly entire, nearly black above, brown with purple streaks beneath; blades ligulate, broadly subacute, 6 cm wide, wholly green, laxly serrate with dark spreading spines 3 mm long; scape erect, slender; scape-bracts much longer than the internodes but reflexed, lanceolate, rose, serrulate; inflorescence laxly bipinnate with 11 branches; primary bracts nearly all like the scape-bracts and reflexed, much exceeding the sterile naked base of the branch; branches spreading and then curved-ascending, 15 cm long, 2 cm wide, strongly complanate, dense, very sparsely white-flocculose; rhachis geniculate, winged, dark green drying to black, the internodes to 8 mm long; floral bracts distichous, suberect, exposing nearly all of the rhachis, elliptic, retuse, 17 mm long, much exceeding the ovary, ecarinate, pale green drying to stramineous, prominently nerved, soon glabrous; sepals free, asymmetric, suboblong, truncate with a minute mucro, 13 mm long, ecarinate, nerved; petals 16 mm long, bearing 2 fimbriate scales at base; ovary obovoid, 8 mm long at anthesis; epigynous tube distinct, 2 mm high; placentae apical; ovules caudate. Pl. II, fig. 3: Inflorescence x 1/10; fig. 4: Branch x 1/2; fig. 5: Sepal x 1.

PERU: Without further locality but probably from the Amazonian collections of Lee Moore, cultivated in Gotha, Florida, 1963, Julian Nally (US, type).

.....

BRAZIL

BILLBERGIA SEIDELII Smith & Reitz, sp. nov.

A *B. pohliana* Mez, cui verisimiliter affinis, scapi bracteis imbricatis, ovario obovoidea sulcato differt.

Flowering shoot 7 dm long, probably decurved; leaves 6 (! Seidel), over 5 dm long; blades ligulate, 3 cm wide, densely lepidote on both sides, prominently white-banded beneath, laxly serrulate with brownish spines 1 mm long; scape decurved, to 2 mm in diameter, soon glabrous; scape-bracts elliptic, acute, rolled about the scape in a slender cylinder, to 11 cm long, the upper imbricate, membranaceous, rose, covered with white appressed scales; inflorescence laxly bipinnate, few-flowered; axis slender, geniculate, finely and sparsely white-lepidote; primary bracts spreading, like the upper scape-bracts, to 8 cm long, much exceeding the branch-axes and about equaling the petals; branches short, 2-flowered; floral bracts broadly ovate, apiculate, about half as long as the ovary; flowers sessile; sepals slightly asymmetric, lance-oblong, broadly subacute and minutely apiculate, 25 mm long, 6 mm wide; petals 5 cm long, blue-purple toward apex; ovary obovoid, 5 mm long, strongly sulcate, densely white-lepidote except the ridge-crests, the epigynous tube short. Pl. II, fig. 6: Branch x 1/2; fig. 7: Sepal x 1.

BRAZIL: Rio de Janeiro: By the road from Niteroi to Campos, November 2, 1962, A. Seidel 504 (HBR, type; US photo).

DYCKIA ODORATA L. B. Smith, sp. nov.

Ab omnibus speciebus adhuc cognitis, scapo subnullo, sepalis 2, petalis 2, staminibus 4 differt.

Flowering shoot 10 cm high; leaves (separated) 15 cm long; sheaths triangular-ovate, inconspicuous, stramineous, smooth, sublustrous, sparsely lepidote toward apex; blades narrowly triangular, 5 mm wide, covered with white appressed scales on both sides, becoming glabrous above, laxly serrate with pale slender spreading spines 2 mm long; scape lacking; inflorescence simple but in 3 parts, a cluster of flowers at the base, the basal part of the raceme (4 cm) with obviously abortive flowers, and the terminal part with apparently well developed flowers, the whole subdensely white-flocculose; floral bracts broadly ovate, the basal ones with long narrowly triangular serrate blades that exceed the flowers, the highest merely apiculate; pedicels spreading, slender, 3 mm long; flowers 2-merous, "with a very sweet and strong fragrance" (David Hutt); sepals suborbicular, very broadly acute and minutely apiculate, 5-6 mm long; petals 10 mm long, orange, short-connate, the blade spreading, broadly rounded; stamens much shorter than the petals, the filaments almost completely connate, the anthers sagittate, curved, 1.5 mm long; ovary slenderly conical, the styles short but obvious and separate. Pl. II, fig. 8: Flower and bract x 1; fig. 9: Sepal x 2.

BRAZIL: Goiás: Region of the Chapada de Veadeiros at 47° 30' W, 14° 30' S, 5 km west of Veadeiros, Dawson 14578 (US, type; UC, cultivated in the Botanical Garden of the University of Califor-

nia and prepared October 5, 1963, by David Hutt).

NEOREGELIA CHLOROSTICTA (L. B. Smith) L. B. Smith, comb. nov.

Neoregelia sarmentosa (Regel) L. B. Smith var. chlorosticta L. B. Smith, Contr. Gray Herb. 104:79. 1934.

Neoregelia marmorata L. B. Smith, Contr. Gray Herb. 124:10. 1939; Smithsonian Misc. Coll. 126:157. 1955, in part, as to material cited not as to basonym.

Further study shows that Neoregelia chlorosticta has leaves of much thinner texture and more even surface than those of typical N. sarmentosa. Its sepals prove to be very close in form and size to those of collections that I had cited mistakenly under N. marmorata because of the leaf coloration. Actually N. marmorata has acuminate sepals while the material cited has them rounded and barely apiculate and much smaller.

NEOREGELIA SEIDELIANA Smith & Reitz, sp. nov.

A N. cruenta (R. Graham) L. B. Smith et N. concentrica (Vell.) L. B. Smith, quibus affinis, foliis e lepidibus appressis magnis omnino cinereo-coloratis differt.

Leaves many in an infundibuliform rosette, 45 cm long, covered on both sides with coarse appressed cinereous scales that obscure their coloration especially beneath; sheaths elliptic, ample, 10 cm long, entire except toward apex; blades ligulate, broadly subacute and slenderly involute-apiculate, 4 cm wide, laxly serrate with flat antrorse reddish spines 3 mm long; scape 8 cm long; inflorescence hemispheric, many-flowered, 6 cm in diameter; outer bracts broadly ovate, apiculate, much exceeded by the sepals, cinereous-lepidote; floral bracts linear, acute and mucronulate, incurved at apex, plicate, about equaling the mid-points of the sepals, cinereous-lepidote; pedicels slender, to 15 mm long; sepals asymmetric, lance-oblong, acuminate, involute-subulate, 24 mm long, connate for 2 mm; petals free, acute, blue toward apex; stamens included; ovary ellipsoid, 12 mm long at anthesis. Pl. II, fig. 10: Floral bract and flower x 1; fig. 11: Sepal x 1.

BRAZIL: Espírito Santo: Santa Tereza, October 13, 1961, L. Seidel 71-A (HBR, type; US photo). Without locality but doubtless the same collection, cultivated in Corupá, Santa Catarina, A. Seidel s. n. (US, received November 8, 1962).

Plate I

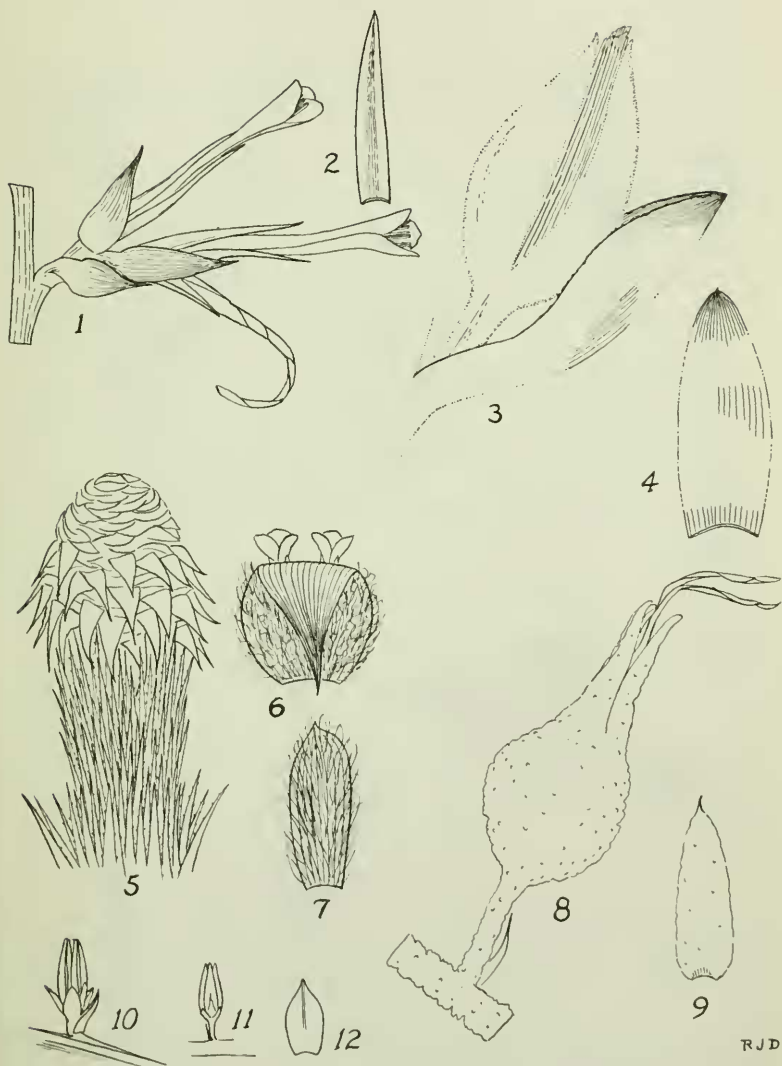


Fig. 1, 2: *Puya reducta*; fig. 3, 4: *P. valida*; fig. 5-7: *P. tristis*; fig. 8, 9: *Aechmea mcvaughii*; fig. 10: *Hechtia jaliscana*; fig. 11, 12: *H. laevis*.

Plate II



RJD

Fig. 1, 2: *Pitcairnia abundans*; fig. 3-5: *Aechmea retusa*; fig. 6, 7: *Billbergia seidelii*; fig. 8, 9: *Dyckia odorata*; fig. 10, 11: *Neoregelia seidelii*.