THE SPECIES OF *ANTHURIUM* WITH PALMATELY DIVIDED LEAVES

*Michael Madison**

The genus *Anthurium* includes over 600 species of perennial herbs native to the neotropics. Where the rainfall is high they are common and abundant, and at the center of diversity in western Ecuador I have found as many as twenty species growing in a one hectare plot.

Genera of this size and diversity are of particular interest from an evolutionary point of view, and also present particular problems. In *Anthurium* the most immediate need is for a meaningful subgeneric classification. Engler (1905) divided *Anthurium* into eighteen sections, but these overlap considerably in their characters and the key to them is unworkable. With the exception of a few obviously natural groups (e.g. section *Tetraspermium* Engler, section *Digitinervium* Sodiro), Engler's sections are only vaguely delimited, and while each of the sections includes a nucleus of related species, placement of the rest of the species is seemingly random.

The lack of a subgeneric classification not only makes it difficult to identify specimens (at least half of the South American anthuriums in most herbaria are undetermined), but restricts taxonomic progress since natural groups of manageable size cannot be split off for revisionary studies. Under the circumstances I have chosen to revise an artificial but easily recognized group of species, those with palmately divided leaves. Half of these species are closely related and form section *Schizoplacium* Engler (as here emended). The remaining palmatifid species represent parallel evolution of leaf morphology in other sections of the genus.

MATERIALS AND ACKNOWLEDGEMENTS

This study was completed while the author was a postdoctoral fellow at the Marie Selby Botanical Gardens. The revision is based on observation of populations in the wild in Central and South America made in the course of field work carried out since 1971. In addition, 18 of the 27 species here treated are in cultivation at SEL and have provided opportunity for hybridization experiments; Dr. Timothy Plowman has kindly provided many of the propagules of the living collections. The taxonomic portion is based principally on study of about 1500 herbarium specimens from the following institutions (cited according to the abbreviations of Holmgren and Keuken 1974): SEL, A, F, GH, MO, NY, and US. I wish to thank the officers of these herbaria for loan of materials. The excellent plates are the work of Arlee Montalvo. Drs. C. H. Dodson and Dan Nicolson contributed several helpful suggestions on the manuscript.

Taxonomic Characters

Evolution in *Anthurium* has encompassed two major adaptive radiations: 1) diversification of pollination systems to include flies, wasps, and male euglossine bees, and 2) the evolution of epiphytism, involving considerable morphological, physiological, and demographic changes. The characters traditionally used in the classification of anthuriums reflect only indirectly, if at all, these biological adaptations. For example, species pollinated by male euglossine bees produce sweet or spicy floral fragrances, while many of the fly pollinated species produce rotten fruit-like floral fragrances. These biologically important differences have not been used at all in separation of species, though the loosely correlated character of spadix color (purple in fly-pollinated species, white or yellow in bee-pollinated species) has been employed to a limited extent.

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The most useful taxonomic characters in *Anthurium* are the shape and venation of the leaves; these are probably more diverse in *Anthurium* than in any other genus of plants. Despite some unconvincing recent attempts at explanation (Givnesh and Vermeij 1976), the biological significance of leaf shape remains a mystery, and thus much of the classification of *Anthurium* is based on characters of unknown evolutionary meaning.

Other vegetative features providing useful taxonomic characters in *Anthurium* are the nature of the cataphylls, the length of the internodes, and the structure of the roots. Growth in *Anthurium* is sympodial with each shoot bearing two cataphylls and a foliage leaf and terminating in an inflorescence, which may abort (Engler 1877). The first cataphyll on each shoot is a bicarinate prophyll and the second a single keeled cataphyll which is usually slightly longer than the first. The two cataphylls associated with each foliage leaf either abscise soon after maturity, or are marcescent, or decompose to a network of persistent brown or white fibers. In many of the epiphytic species the persistent fibers serve as a matrix for the accumulation of litter or as a framework for arboreal ant nests and thus are important indirectly in the mineral nutrition of the plants.

In scandent species the internode between the two cataphylls on each shoot is long (to 40 cm) and the other internodes are short (1-3 mm). In most of the terrestrial and fully epiphytic species all of the internodes are short, and in some cases the co-occurrence of short petioles results in the formation of rosettes. In epiphytic and lithophytic species the rosettes accumulate litter in a manner similar to bromeliads and aspleniums and thus provide the plants with soil in an otherwise nutrient-poor environment. In addition, the lightly canaliculate leaves of the rosulate forms direct intercepted rainwater to the roots.

Many epiphytic anthuriums show modifications of the roots, including negative geotropism in some pendent species (e.g. *A. pallidiflorum* Engler) and production of a velamen similar to that found in orchids. Presence of a velamen is used by Croat (1976) in distinguishing *A. gracile* (Rudge) Lindl. and *A. friedrichsthalii* Schott.

Length of the peduncle has been used extensively in classification of anthuriums. This may be quite variable in a species depending on the vigor of the individual; however, the ratio of peduncle length to petiole length is usually constant and provides a useful character.

Often anthuriums begin to flower as young plants and the early inflorescences are small and atypical of the mature plant. Even in fully mature plants the dimensions of the spadix are variable between individuals, and a particular spadix continues to thicken and elongate throughout its development. Nonetheless dimensions of the spadix are useful in distinguishing species, though a broad range of values must be given for each species, even if the stage of development is specified.

The berries of anthuriums are extremely diverse in shape and color, and in many the berries are bicolorous with the upper and lower halves of the berry contrasting. Presumably the broad range of fruit morphologies reflects differences in dispersal mechanism, but data to support this are lacking. Seed morphology is also diverse, but the seeds are soft and not well preserved on herbarium specimens.

Species Concept

The species concept here employed is a morphological-geographic one; groups of individuals which are morphologically and ecologically similar and which have a reasonably continuous geographic range are considered species. In several cases (e.g. *A. trilobum*, *A. truncicolum*) the specimens are too few and inadequate to allow for an assessment of the meaning of variability, and these species may prove to be groups of sibling species as more information becomes available.

Results of attempts at hybridization in cultivated plants (table 1) suggest that there are internal genetic barriers to hybridization in the palmatifid anthuriums in addition to any pollination or habitat differences which may serve to isolate species. Interpretation of negative results is difficult, but the fact that selfing of two individuals of the same clone nearly always resulted in 90%+ fruit set indicates that the technique and timing of pollen transfer probably were not responsible for failure of attempted hybridizations. Chromosome studies by Gaiser (1927) Marchant (1973), and Sheffer and Kamemoto (1976a, 1976b) indicate considerable cytogenetic diversity in *Anthurium*, and differing chromosome numbers and morphologies may constitute an important barrier to interspecific hybridization.

Table 1: Hybridization between Palmatifid Anthuriums

♀	♂	
A. kunthii	*A. pentaphyllum*	10% fruit development, seeds not viable
A. kunthii	*A. polyschistum*	20% fruit development, 1% seed set, not viable
A. pentaphyllum	*A. verapazense*	No fruit development
A. pentaphyllum	*A. kunthii*	10% fruit set, seeds not viable
A. pentaphyllum	self	95% viable seed
A. polyschistum	*A. araliafolium*	No fruit set
A. polyschistum	*A. pentaphyllum*	20% fruit set, 80% of seeds viable
A. polyschistum	self	99% fruit set, seeds viable
A. ptarianum	*A. podophyllum*	95% fruit development, no seeds
A. rimbachii	*A. polyschistum*	10% fruit development, seeds not viable
A. wendlingeri	*A. podophyllum*	70% fruit development, no seeds
A. SEL 77-75-4	*A. podophyllum*	95% fruit development, no seeds

Relationships of the Palmatifid Species

Schott (1860) grouped the species of *Anthurium* into 28 'flocks,' for which he used the term *grex*. This arrangement was broadly based on a number of vegetative and floral characters. The palmatifid species were relegated to two greges: grex *Schizoplacium* included species in which the lamina is pedately partite and grex *Dactylophyllum* included species in which the leaves are digitately divided.

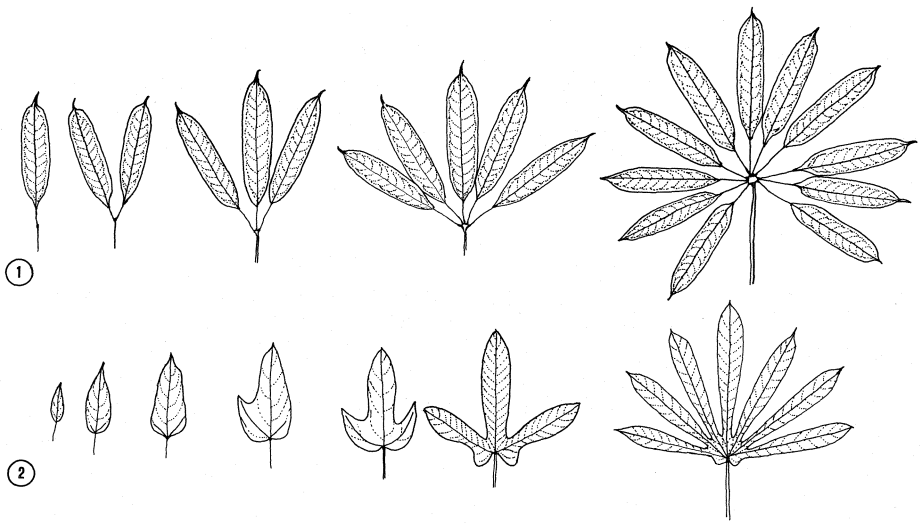
Although Engler (1905) revised Schott's subgeneric classification, many of Engler's 18 sections are very close to Schott's greges in their species composition. The palmatifid species are placed in sections *Semaeophyllum* Engler and *Schizoplacium* Engler; the stated difference is that species of the former have elongate-attenuate spadices and those of the latter short and conoidal spadices. *Anthurium angustisectum* Engler is separated from the other palmatisect species into section *Polyneurium* which otherwise includes species with ovate or cordate leaves.

Consideration of a number of characters leads me to conclude that more than two natural groups of species are represented among the anthuriums with palmately divided leaves; this type of leaf has apparently evolved independently a number of times in the genus. Seven groups of closely related species are delimited in Table 2 together with some of their diagnostic features.

Table 2. Suggested Natural Groups of *Anthurium* Species with Palmately Divided Leaves

1. *A. cutucuense*	**Cloud forest inhabitant; red pigment in vegatative parts; unusual venation, bullate leaves; Ecuador.**
2. *A. grex-avium* *A. truncicolum*	**Climbers with long internodes; trifid leaves with falcate lateral lobes; Andes.**
3. *A. rimbachii* *A. tilaranense* *A. trilobum*	**Acaulescent with persistent cataphylls; trifid leaves; Costa Rica to Pacific Ecuador.**
4. *A. pedato-radiatum* *A. podophyllum*	**Terrestrial; acaulescent; peduncles elongate; leaves pedately divided; Mexico.**
5. *A. pedatum*	**Pendent inflorescence from erect peduncle; pertains to *A. gualenanum* Engler complex; Colombia.**
6. *A. angustisectum* *A. expansum* *A. longissimum* *A. palmatum*	**Scandent; leaves palmately divided with the segments mostly united at the base; spadices elongate; Colombia to West Indies.**
7. *A. arisaemoides* *A. brevipedunculatum* *A. buchtienii* *A. clavigerum* *A. croatii* *A. eminens* *A. kunthii* *A. pentaphyllum* *A. polydactylum* *A. polyschistum* *A. sinuatum* *A. thrinax* *A. triphyllum* *A. trisectum*	**Section *Schizoplacium* Leaves digitisect, each segment free and with a basal pulvinus; spadices purple to gray; predominantly Amazonian.**

Only one group seems worthy of formal taxonomic recognition. Fourteen species with digitisect leaves are closely related and were mostly grouped together by Schott (1860) in grex *Dactylophyllum* and by Engler (1905) in section *Schizoplacium*. These species share a unique foliar morphology which is evident both in mature leaves and in heteroblastic series in developing plants, illustrated for *Anthurium eminens* Schott in Fig. 1. The early leaves of a young plant (from seed or a cutting) are lanceolate; these are followed by bifoliate or trifoliate leaves, and with subsequent leaves an increasing number of segments is added until the mature condition is reached. The added segments are free to the base where they have a pulvinus, and marginal veins exit at the apex of each segment. In contrast, the heteroblastic sequence in a developing plant of *A. palmatum* (fig. 2) shows increasing invagination and dissection of an initially ovate leaf. The significance of this difference in developmental patterns is not clear, but for the time being I consider that it warrants exclusion of *A. palmatum* and its allies from section



Figures 1-2. Sequence of leaves from juvenile to mature in 1. *Anthurium eminens* and 2. *A. palmatum*.

Schizoplacium. When a complete infrageneric revision is prepared it may prove that the *A. palmatum* group is best included in section *Schizoplacium*.

In adult leaves of the trifid species, e.g. *A. trilobum*, only the central segment is acuminate and has the marginal veins exiting in the apex; the lateral segments are apically rounded and the marginal vein curves back toward the geniculum indicating that the lateral segments are essentially lobes of the central segment, rather than independent leaflets as in section *Schizoplacium*.

Geography of Section *Schizoplacium*

The species of *Anthurium* section *Schizoplacium* inhabit tropical rain forests at lower elevations. Distributions of the species are shown in maps 1-14; it is evident from Map 1 that the section is predominantly Amazonian in distribution with the greatest concentration of species in the sub-Andean regions of Ecuador and Peru.

Interpretation of distribution patterns in Amazonian species has been stimulated in recent years by new geological and biological evidence indicating that during Pleistocene times the vegetation of Amazonia was radically altered by climatic fluctuations. During dry periods a considerable extension of semi-arid savanna balanced a contraction of the tropical rain forest into a few isolated regions. Evolutionary divergence of populations in separate forest refugia and their interactions when extension of forests led to their renewed contact are considered critical in the origin of present day distribution patterns (Haffer 1969, Vuilleumier 1971, Prance 1973, van der Hammen 1974).

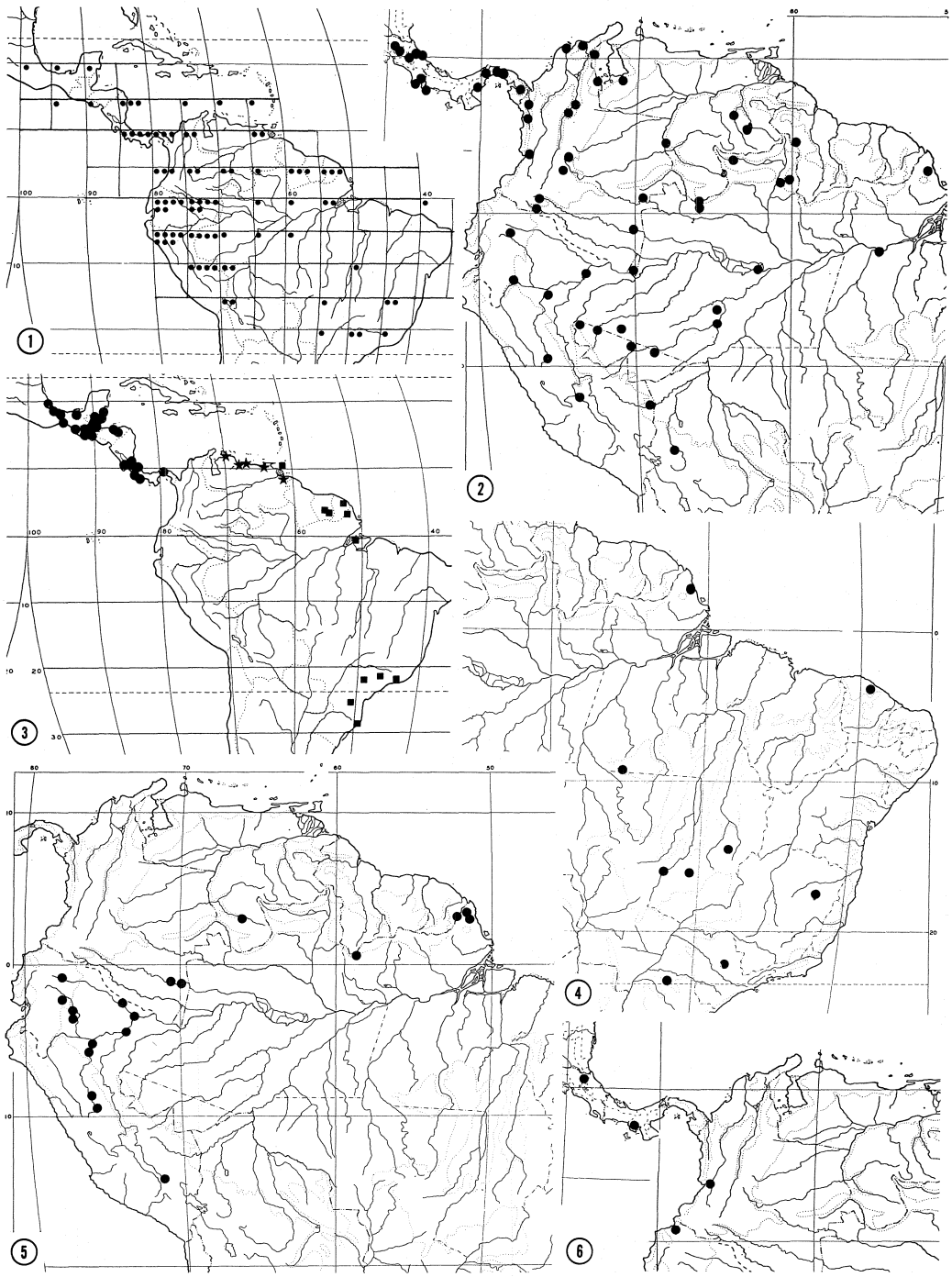
The reconstruction of Pleistocene forest refugia in the Amazon region has been based on current rainfall patterns and on species distributions. Regions of high endemism are presumed to indicate centers of refugia while contact zones of allopatric sibling species and regions of hybridization indicate borders between refugia. Several different constellations of Pleistocene forest refugia have been proposed, reflecting use of different groups of organisms for the reconstruction (Haffner 1969, Vanzollini and Williams 1971, Prance 1973).

In *Anthurium* section *Schizoplacium* several patterns are evident. *Anthurium pentaphyllum* (Map 3) has an extremely long and narrow range extending from Mexico along the Atlantic coast of S. America to Brazil. Along this range the species has differentiated into three geographically separate varieties. The closely related species *A. brevipedunculatum* (Map 7) is endemic to Peru and adjacent Ecuador and is separated by 2000 km from the nearest populations of *A. pentaphyllum.* This wide separation apparently represents Pleistocene extinction of geographic intermediates in a once continuous range with subsequent evolutionary divergence of the two remaining centers.

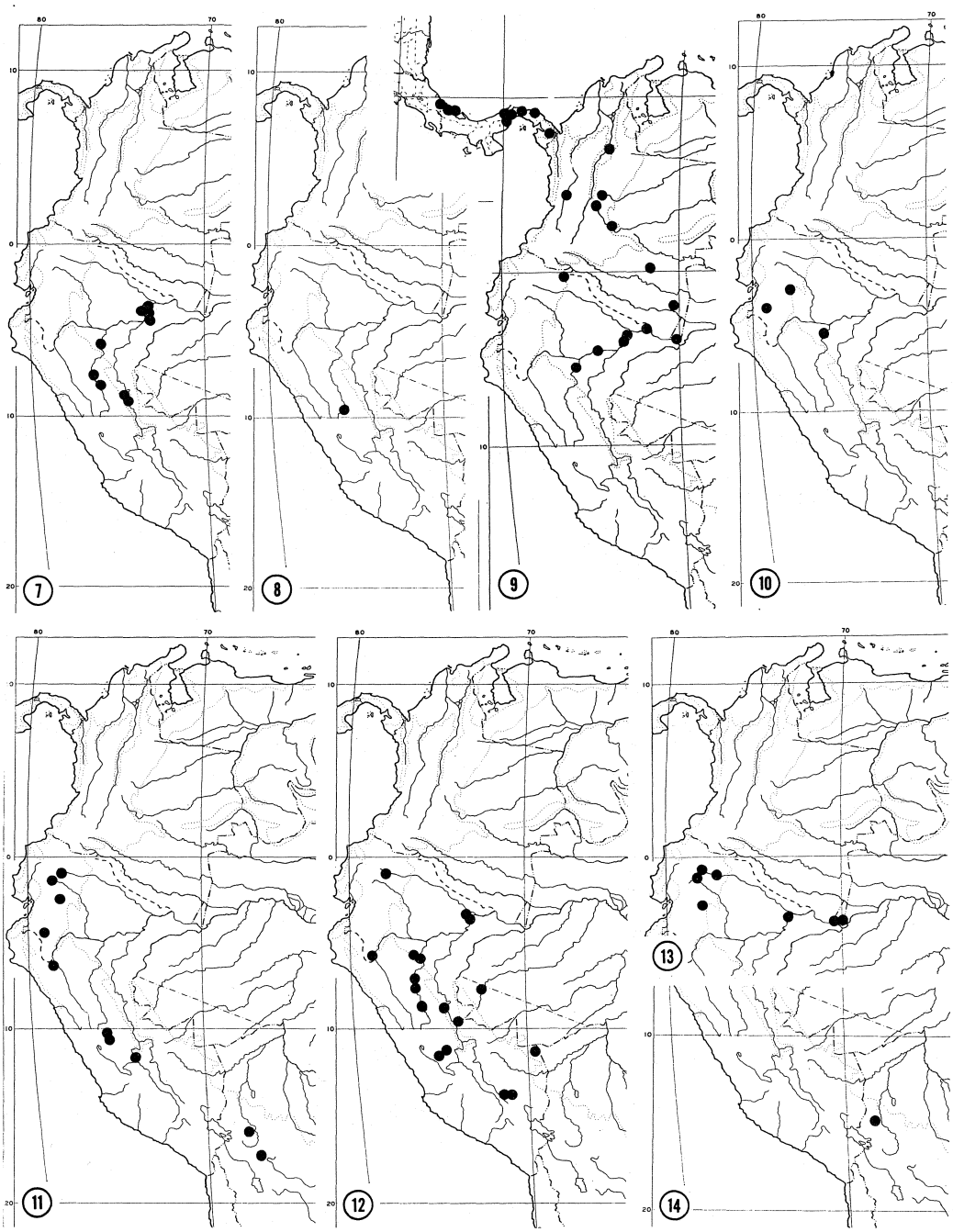
Anthurium clavigerum (Map 2) is widespread and perhaps persisted in a number of Pleistocene refugia. The species is quite variable throughout its range. Whatever genetic divergence of populations may have occurred in Pleistocene dry periods has been lost in the recoalescence of the separate populations.

The most perplexing aspect of the geography of section *Schizoplacium* is the sympatric occurrence of seven species in the Huallaga River valley in Peru. According to Haffer (1969) the Huallaga valley was an arid region during Pleistocene dry periods, and the present wet vegetation represents elements which have reinvaded the valley from the Napo and eastern Peruvian refugia following climatic amelioration in the late Pleistocene.

Patterns of variability in the Huallaga valley anthuriums indicate a high level of hybridization and introgression of characters, with many intermediates between species. This is consistent with the idea of simultaneous invasion of the region by related species which were formerly geographically isolated. However, five of the seven species are also sympatric in the region indicated by Prance (1973) as the Napo refuge, where they do not show the variability found in the Huallaga valley. This in part reflects the paucity of herbarium collections from eastern Ecuador and northern Peru, but it also suggests that some isolating mechanisms found in the Napo region may not be operating in the Huallaga populations.



Map 1. Density distribution of *Anthurium* section *Schizoplacium;* for each square of 5° latitude by 5° longitude the number of dots indicates the number of species occuring in the region; Maps 2-6: Distribution of *Anthurium* species; Map 2. *A. claivgerum;* Map 3. *A. pentaphyllum,* var. *pentaphyllum* (squares), var. *digitatum* (stars), var. *bombacifolium* (dots); Map 4. *A. sinuatum;* Map 5. *A. eminens;* Map 6. *A. trisectum.*



Maps 7-14. Distribution of *Anthurium* species: 7. *A. brevipedunculatum;* 8. *A. polydactylum;* 9. *A. kunthii;* 10. *A. arisaemoides;* 11. *A. triphyllum;* 12. *A. croatii;* 13. *A. polyschistum;* 14. *A. buchtienii.*

One species, *Anthurium polydactylum*, is endemic to the upper Huallaga valley. It is most closely related to *A. eminens*, with which it is sympatric, and to *A. kunthii* and *A. polyschistum* from which it is geographically isolated. The occurrence of an endemic species in this locality suggests a possible interpretation of the pattern of variability found in the species complex. If the upper Huallaga valley were a wet forest refugium during the last Pleistocene dry period, then subsequent colonization of the valley from both ends with resultant mixing of formerly separate populations could be responsible for the high degree of variability and hybridization now seen in the area.

Taxonomic Treatment

This revision treats the species of *Anthurium* with palmatifid or palmatisect leaves, including trifid species. The trifid forms merge into hastate and cordate forms which are not included; the criterion for inclusion has been that the lateral lobes curve forward toward the apex of the central lobe and are not reflexed. Although not all the twenty-seven species here described are closely related, some are, and the suggested relationships have already been outlined in the introduction. In order to make the key as useful as possible it does not attempt to indicate natural relationships, and the species descriptions appear in the order in which they come out in the key.

Key to *Anthurium* Species with Palmately Divided Leaves

A. Leaf divided into three segments.
  B. Leaf segments fully free to the base.
    C. Peduncle exceeding 70 cm, petiole exceeding 1 m (Guiana) . . . . . 1. *A. thrinax*
    C. Peduncle less than 50 cm, petiole less than 70 cm (C.R. to Bolivia).
      D. Peduncle equalling or exceeding the petiole, plant terrestrial (Ecuador and Peru) . . . . . 2. *A. arisaemoides*
      D. Peduncle conspicuously shorter than the petiole.
        E. Lamina strongly bullate with red petioles and midveins (Ecuador) . . . . . 3. *A. cutucuense*
        E. Lamina flat, petioles and midveins green.
          F. Spadix 4-6 cm long, small plant, Costa Rica to Pacific Ecuador. . . . . 4. *A. trisectum*
          F. Spadix 9-16 cm long, robust climber, eastern Andes Ecuador to Bolivia. . . . . 5. *A. triphyllum*
  B. Leaf segments united at the base.
    G. Climbers with internodes 6-30 cm, peduncle equalling or exceeding the petiole.
      H. Petiole 12-20 cm, leaf with velvety texture . . . . . 6. *A. grex-avium*
      H. Petiole 30-65 cm, leaf glossy. . . . . 7. *A. truncicolum*
    G. Terrestrial or epiphytic plants with internodes 0.5-2 cm, peduncle shorter than the petiole.
      J. Flowering spadix green, cataphylls entire, Costa Rica . . . . . 8. *A. tilaranense*
      J. Flowering spadix colored, cataphylls dissolving to a mass of fibers, Panama to Ecuador.
        K. Flowering spadix stipitate, red to yellow, with strong sweet odor. . . . . 9. *A. trilobum*

K. Flowering spadix sessile, purple, with no notable odor . . . . . 10. *A. rimbachii*

A. Leaf divided into five or more segments.
L. Leaf segments united at the base (the central one may be free).
M. Central leaf segment twice as long as the petiole (Colombia). . . . . 11. *A. angustisectum*
M. Central leaf segment shorter than the petiole.
N. Climbing plants, internodes 1-5 cm long, cataphylls deciduous (Venezuela, Guianas, and West Indies).
O. Spathe and spadix 40-60 cm long . . . 12. *A. longissimum*
O. Spathe and spadix less than 25 cm long.
P. Leaf segments 4-6 cm broad, peduncle 1/2 - 5/6 the petiole length; berries red, rounded at the apex (West Indies). . . . . 13. *A. palmatum*
P. Leaf segments 8-14 cm broad, peduncle 1/4 - 1/2 the petiole length; berries purple, acuminate (Venezuela, Guianas) . . . . . 14. *A. expansum*
N. Terrestrial, internodes 0.3-1 cm long, cataphylls mostly persistent as a mass of fibers.
Q. The 7-9 lamina segments each pinnatifid with 5-12 narrow divisions, peduncle exceeding the petiole (Mexico) . . . . . 15. *A. podophyllum*
Q. Lamina segments entire to repand, peduncle shorter than the petiole.
R. Central segment with undulate margins, twice as long as the lateral segments (Colombia) . . . . . 16. *A. pedatum*
R. Segments with entire margins, central segment only slightly longer than lateral segments.
S. Leaf segments pedately arranged, berries yellow, (Mexico) . . . . . 17. *A. pedato-radiatum*
S. Leaf segments palmately arranged, berries deep red (Peru) . . . . . 18. *A. croatii*
L. All leaf segments free to the base.
T. Margins of leaf segments sinuate to lobate, pinnatifid, or laciniate.
U. Flowering spadix 10-18 cm long, cataphylls entire, Fr. Guiana to S. Brazil . . . . . 19. *A. sinuatum*
U. Flowering spadix 20-40 cm long, cataphylls becoming fibrous (Costa Rica to Bolivia, E to Guianas and Brazil) . . . . . 20. *A. clavigerum*
T. Margins of leaf segments entire.
V. Terrestrial, internodes 0.2-0.8 cm, Peru. . . . . 18. *A. croatii*
V. Scandent or epiphytic, internodes 1 cm or longer.
W. Flowering spadix 25-45 cm long, leaf segments 4-12 cm petiolulate. . . . . 21. *A. eminens*
W. Flowering spadix 4-25 cm long, leaf segments 0-4 cm petiolulate.
X. Lamina 11-17-sect, segments linear lanceolate, 1-3 cm wide.
Y. Peduncle subequalling or exceeding the petiole, (Colombia to Peru) . . . . . 22. *A. polyschistum*

Y. Peduncle less than one-half petiole length (Peru). . . . . 23. *A. polydactylum*

X. Lamina 5-11-sect, segments narrowly elliptic to ovate, 4-10 cm wide.
  Z. Peduncle less than one-half petiole length.
    AA. Spathe triangular to ovate, deep purple, persisting erect; berries rostrate (Peru). . . . . 24. *A. brevipedunculatum*
    AA. Spathe lanceolate, green or lightly suffused with purple, reflexing or deciduous; berries globose (Mexico to Guianas, S to Brazil. . . . . 25. *A. pentaphyllum*
  Z. Peduncle greater than three-fourths petiole length.
    BB. Lamina 5-7-sect, petiole 25-60 cm, (Costa Rica to Peru). . . . . 26. *A. kunthii*
    BB. Lamina 11-sect, petiole 75 cm, (Bolivia) . . . . 27. *A. buchtienii*

1. **Anthurium thrinax** Madison, sp. nov.

Planta epiphytica scandens. Caudex teres, viridis, ca. 1 cm crassus, internodiis 1-2 cm longis. Cataphylla triangularia, 5-7 cm longa, mox decidua. Petiolus 1-1.2 m longus, breviter vaginatus. Lamina trisecta, segmenta sessilia, lanceolata, 25-35 cm longa, 7-9 cm lata, basi cuneata, apice acuta. Pedunculus gracilis, ca. 85 cm longus. Spatha viridis, lineari-lanceolata, 6-10 mm lata, 7-8 cm longa, base breviter decurrens, persistens. Spadix fructifer 3-5 mm stipitatus, ca. 8 cm longus, 1 cm crassus. Bacca purpurea, subsphaeroidea.

TYPE: British Guiana, Upper Mazaruni River Basin, Mr. Ayanganna, mixed evergreen forest on talus from cliffs along NE side, elev. 800-900 m, August 1960, *Tillett, Tillett, & Boyan 45665* (NY).

ETYMOLOGY: Greek *thrinax*, 'a three-pronged fork', referring to the trifoliate leaf with its long petiole.

This species is distinctive among the palmatisect anthuriums by the considerable length of the peduncles and petioles, which may exceed 1 m. It appears to be most closely related to *Anthurium kunthii* Poeppig, a smaller species with 5-foliate leaves which is primarily sub-Andean in distribution.

2. **Anthurium arisaemoides** Madison, sp. nov.
Plate 1

Planta parva terrestris. Caudex teres, gracilis, viridis, 5-9 mm crassus, internodiis 1-5 cm longis. Cataphylla 4-6 cm longa, marcescentia, mox decidua. Petiolus 15-25 cm longus, breviter vaginatus. Lamina membranacea, segmenta breviter petiolulata; segmentum medium ovatum, 10-18 cm longum, 4-7 cm latum, base acutum vel attenuatum, apice acuminatum; segmenta lateralia segmento medio paula breviora, ovata, base valde inaequalia, apice acuta. Pedunculus petiolo superans, gracilis, teres, 16-30 cm longus. Spatha viridis, ovata, 3-6 cm longa, 1-2.5 cm lata, reflexescens. Spadix florifer viridis vel purpureus, sessilis, cylindricus, 2-4 cm longus, 2-5 mm crassus.

TYPE: Ecuador, Prov. Morona-Santiago, Cordillera de Cutucú, general region of 2°46'S × 78°06'W, elev. 1700 m., Nov. 1976, *Madison, Bush, & Davis 3433* (SEL).

ETYMOLOGY: Latin *arisaemoides*, 'resembling *Arisaema*,' in reference to the similarity in appearance of this terrestrial plant with trisect leaves to a plant of *Arisaema*.

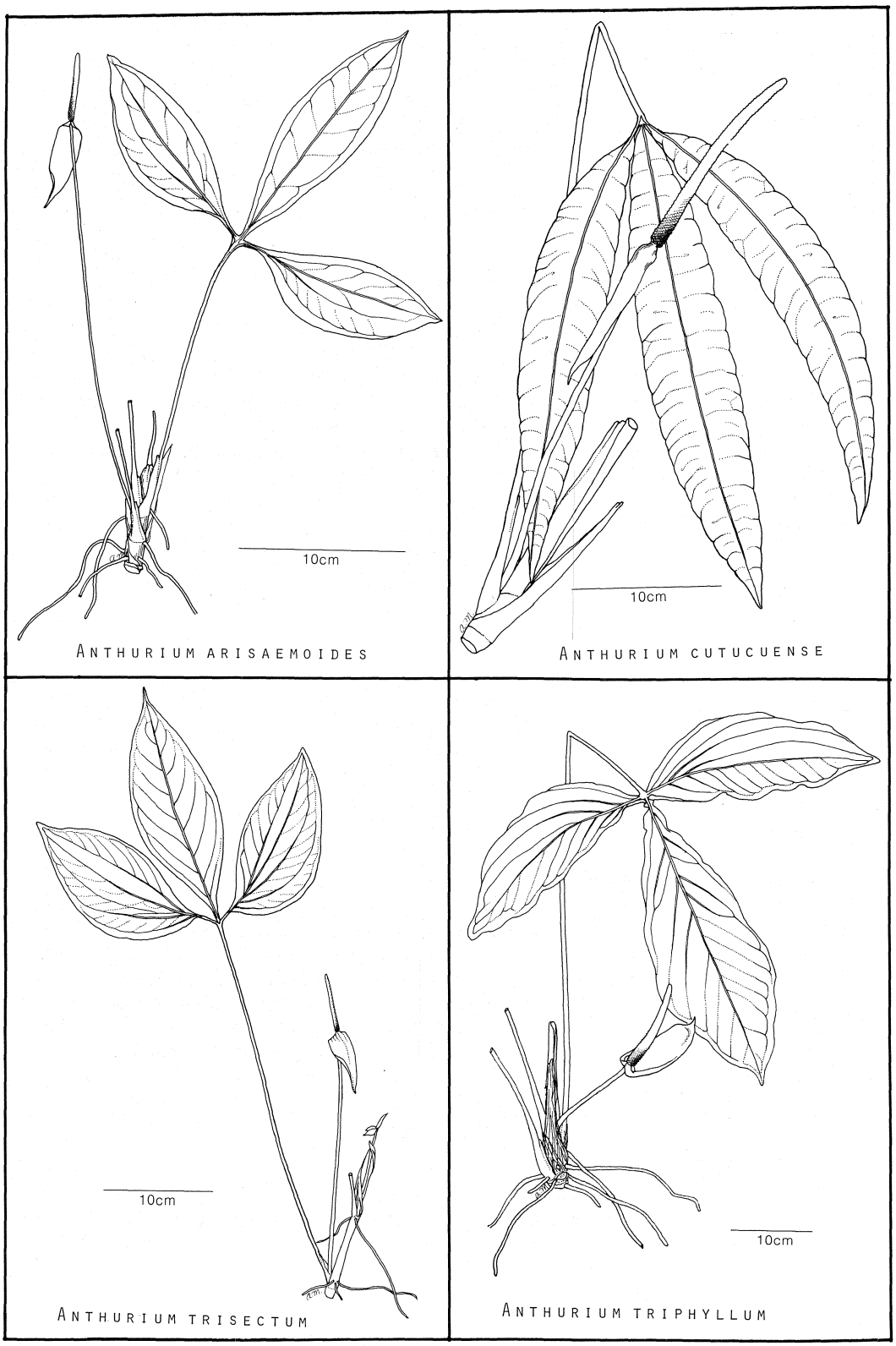

10cm
ANTHURIUM ARISAEMOIDES
10cm
ANTHURIUM CUTUCUENSE
10cm
ANTHURIUM TRISECTUM
10cm
ANTHURIUM TRIPHYLLUM

Plate 1

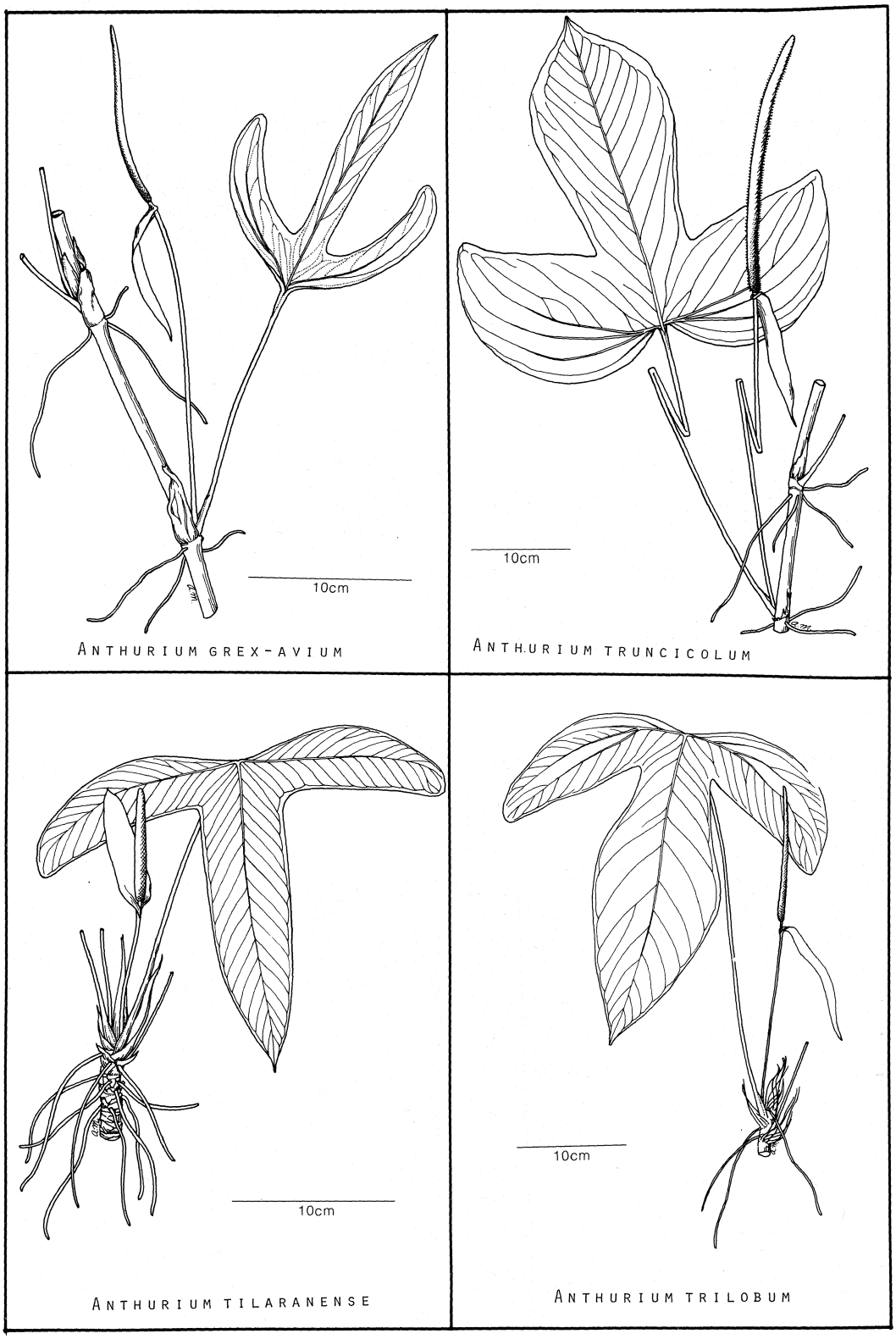

10cm
ANTHURIUM GREX-AVIUM
10cm
ANTHURIUM TRUNCICOLUM
10cm
ANTHURIUM TILARANENSE
10cm
ANTHURIUM TRILOBUM

Plate 2

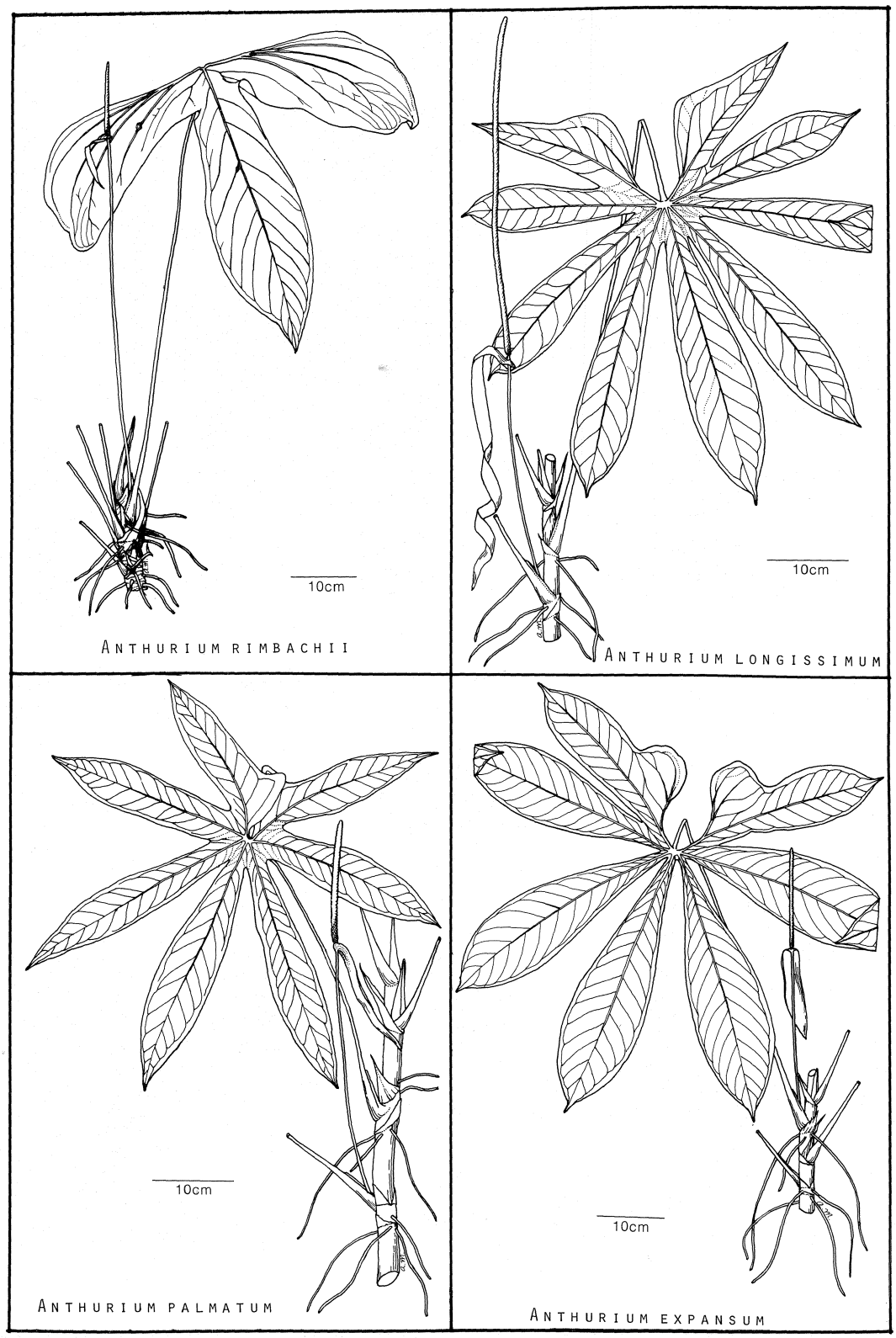

10cm
ANTHURIUM RIMBACHII
10cm
ANTHURIUM LONGISSIMUM
10cm
ANTHURIUM PALMATUM
10cm
ANTHURIUM EXPANSUM

Plate 3

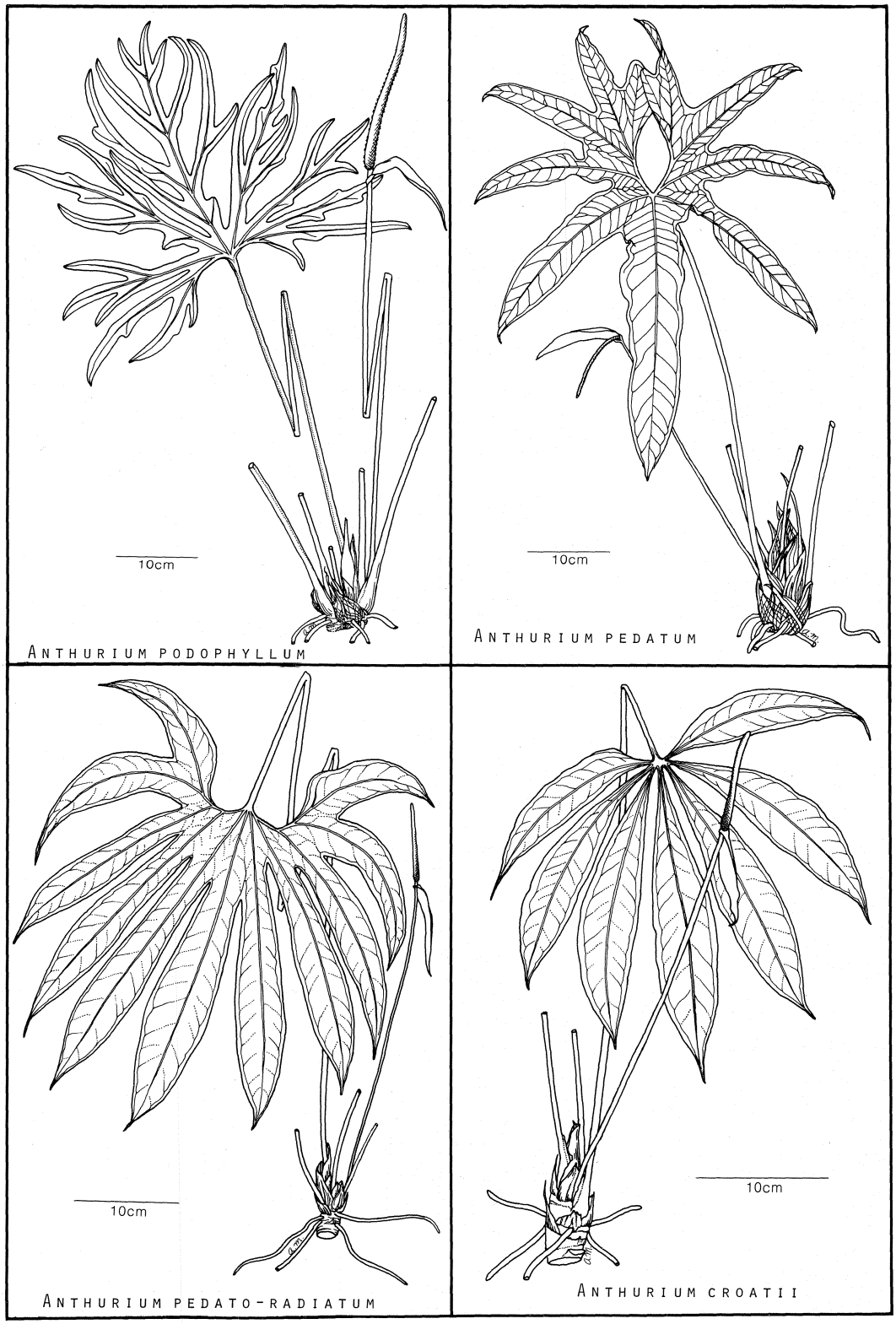

10cm
ANTHURIUM PODOPHYLLUM
10cm
ANTHURIUM PEDATUM
10cm
ANTHURIUM PEDATO-RADIATUM
10cm
ANTHURIUM CROATII

Plate 4

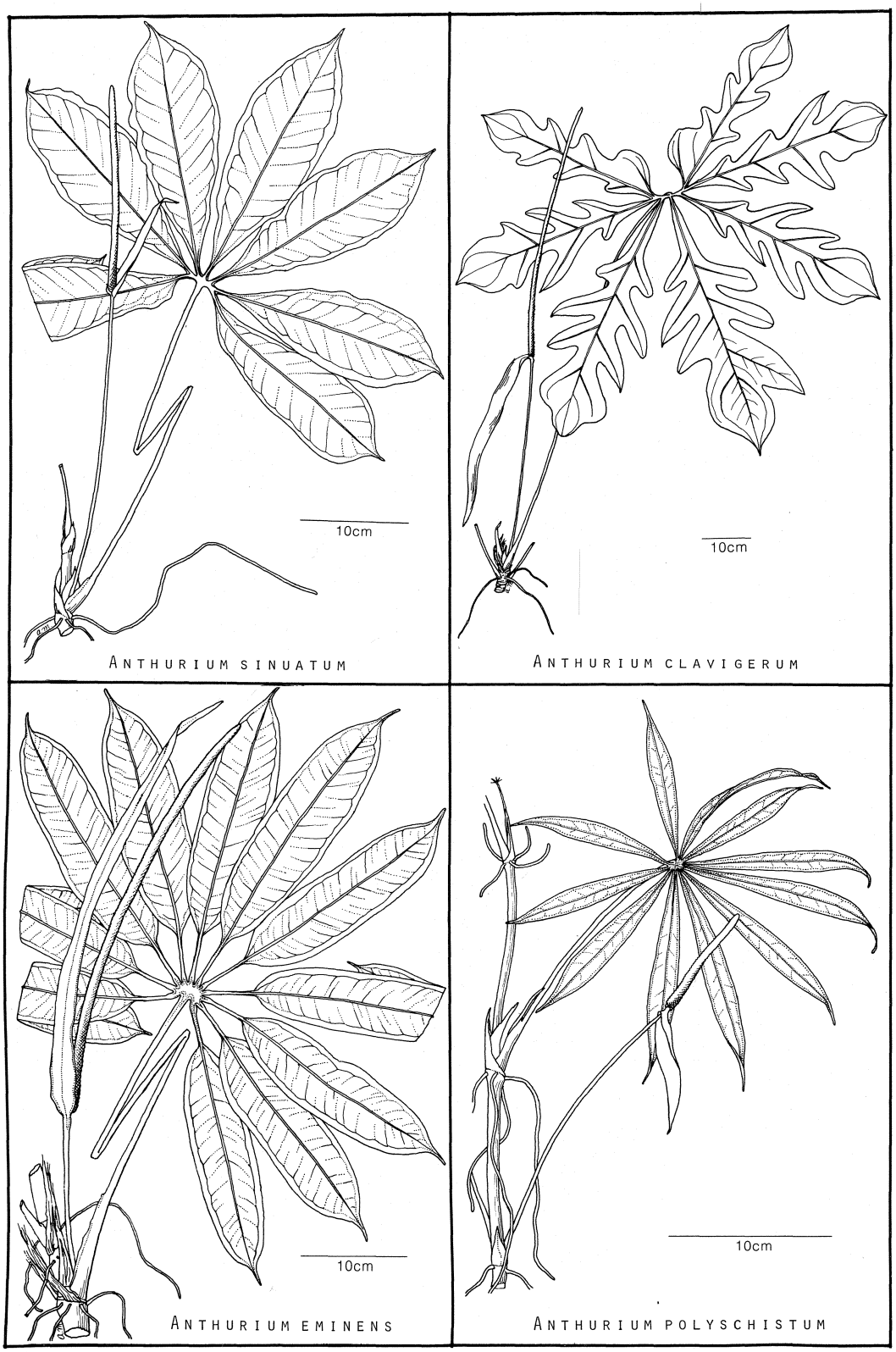

10cm
ANTHURIUM SINUATUM
10cm
ANTHURIUM CLAVIGERUM
10cm
ANTHURIUM EMINENS
10cm
ANTHURIUM POLYSCHISTUM

Plate 5

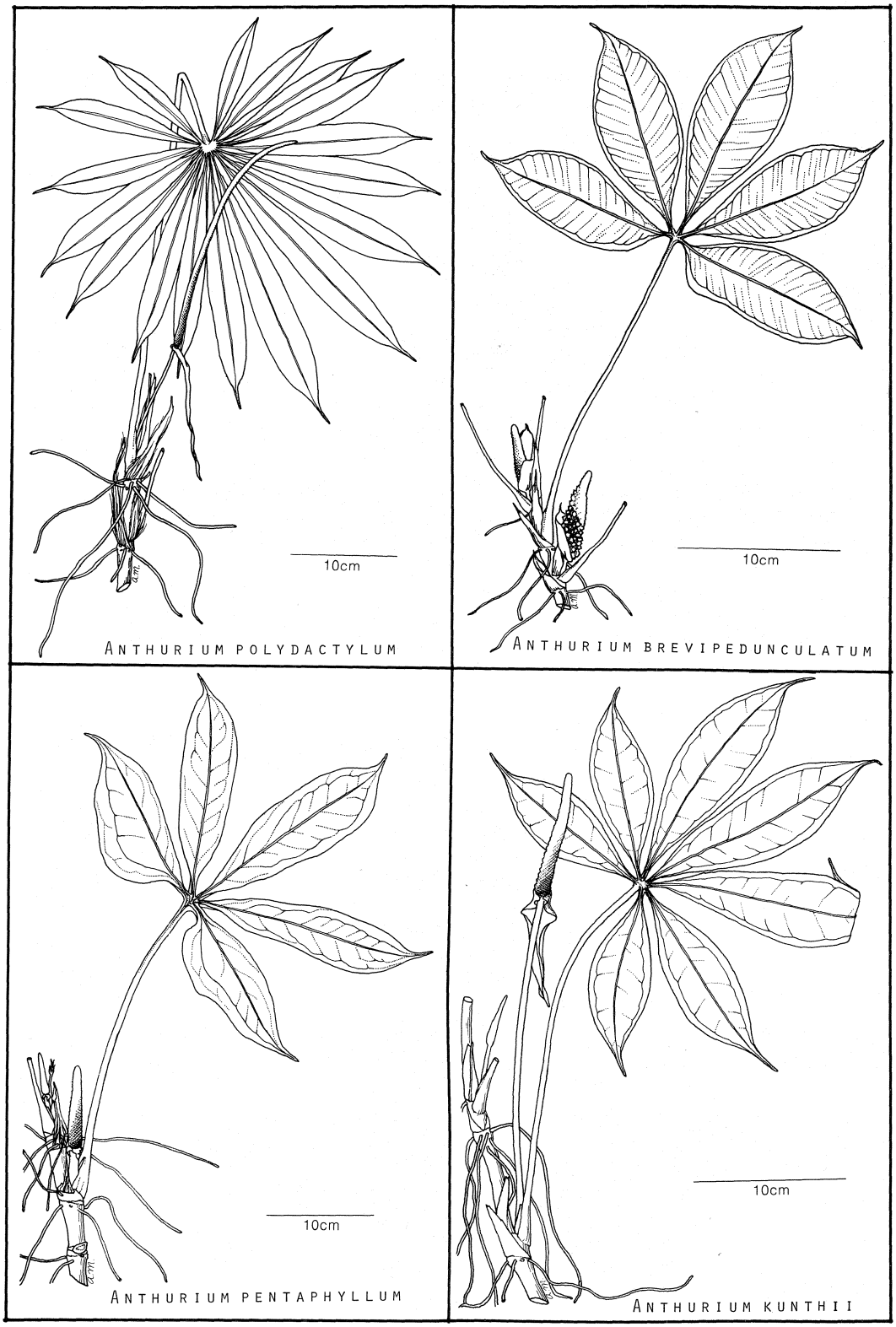

10cm
ANTHURIUM POLYDACTYLUM
10cm
ANTHURIUM BREVIPEDUNCULATUM
10cm
ANTHURIUM PENTAPHYLLUM
10cm
ANTHURIUM KUNTHII

Plate 6

DISTRIBUTION: Eastern slopes of the Andes, southern Ecuador and northern Peru.

ADDITIONAL SPECIMENS: *ECUADOR*. ZAMORA-CHINCHIPE: 15 km W of Zamora, elev. 1500 m., Dec. 1975, *Madison 2496* (SEL). *PERU*. LORETO: Santa Rosa, below Yurimaguas, elev. 135 m, Sept. 1929, *Killip & Smith 28882* (US).

Anthurium arisaemoides is most closely related to *A. trisectum* from which it is geographically separated by the intervening barrier of the Andes. Both species are diminutive plants with similar trisect leaves, and often are terrestrial. In *A. arisaemoides* the spathe is green and the peduncle longer than the petiole, while in *A. trisectum* the spathe is white or yellow at anthesis, and the peduncle is shorter than the petiole.

At the type locality in the Cordillera de Cutucú, *Anthurium arisaemoides* grows terrestrially in dense stands in the forest understory and in its general aspect it is remarkably similar to *Arisaema* growing in north temperate forests.

3. **Anthurium cutucuense** Madison, sp. nov.
Plate 1

Frutex funicularis in arborum ad 8 m scandens. Caudex teres, 1-2 cm crassus, internodiis 6-10 cm longis. Petioli rubro-punctulati, 35-45 cm longi. Lamina metallica-venosa, valde bullata, trisecta lobis lateralis lobum medium aequantibus; lobus medius lanceolatus, 4-5 cm latus, 25-35 cm longus, lobi laterales aliquantum falcati, costis rubris. Pedunculus petiolo duplo brevior. Spatha viridis, reflexa; spadix viridis, erectus, sessilis, cylindricus, 12-15 cm longus, 9-10 mm crassus; fructus ignotus.

TYPE: Ecuador, Prov. Morona-Santiago, Cordillera de Cutucú, in the general region of 2°46'S × 78°06'W, cloud forest, elev. 1830 m. *Madison, Bush & Davis 3386* (HOLOTYPE: SEL, ISOTYPE: US).

ETYMOLOGY: Latin *cutucuense*, 'inhabiting the Cutucú,' referring to the type locality.

Anthurium cutucuense is one of the handsomest species of *Anthurium* and well worthy of cultivation. The leaf lamina is a shiny, metallic blue-green in color, strongly bullate, with a bright red midrib. The three segments are pendent from the rigidly horizontal petioles, which are densely red punctulate. These features readily distinguish the species from other trisect *anthuriums*, to which it does not seem to be closely related.

4. **Anthurium trisectum** Sodiro
Plate 1

Anthurium trisectum Sodiro, Rev. Chilena Hist. Nat. 9:281 (1905).

TYPE: Ecuador, Prov. Esmeraldas, mouth of Río San Antonio, Aug. 1904, *Sodiro s.n.* (B, non vidid, photo F, US).

Small creeping herb, epiphytic or terrestrial. Stem green, subterete, 6-10 mm thick, the internodes 1-6 cm long. Cataphylls elongate-triangular, 2-8 cm long, disintegrating to fibers and ultimately deciduous. Petiole slender, slightly canaliculate adaxially, 18-30-(40) cm long. Lamina trisect, the segments sessile or with petiolules to 2 cm long, the central segment ovate, acute at the base, acuminate at the apex, 12-25-(30) cm long, 4-11 cm wide,

of thin texture, the veins strongly prominent below, pale abaxially; the lateral segments about 2/3 the length of the central segment, strongly unequal at the base, the inner margin narrowly attenuate, the outer margin obtuse to broadly cuneate, primary veins of the lateral segments 3 to 5 in number. Peduncle slender, terete, 1/2 - 3/4 the length of the petiole. Spathe green, becoming whitish or yellowish at anthesis, ovate, acute or rounded at the base, acuminate at the apex, 18-25 mm broad, 4-6 cm long, becoming reflexed. Spadix sessile, cylindric, in flower 4-6 cm long and about 5 mm thick, in fruit the tepals green and the berries dark red, globose with a short beak.

ETYMOLOGY: Latin *trisectum*, 'three-cleft,' referring to the three leaflets.

DISTRIBUTION: Low elevation forest, Costa Rica and Panama to Pacific lowlands of Colombia and Ecuador.

REPRESENTATIVE SPECIMENS: *COSTA RICA*. HEREDIA: 10°26'N × 84°0'W, elev. 100-200 m, April 1973, *Burger & Gentry 9274* (F). *PANAMA*. VERAGUAS: Between Alto Piedra and Calovebora, elev. 350-400 m, Aug. 1974, *Croat 27362* (MO). *COLOMBIA*. EL VALLE: La Trojita on Rio Calima, elev. 5-50 m, March 1944, *Cuatrecasas 16451* (F).

This diminutive epiphytic or terrestrial species is closely related to *Anthurium arisaemoides*, which see for a discussion.

5. **Anthurium triphyllum** Brongn. ex Schott
Plate 1

Anthurium triphyllum Brongn. ex Schott, Prodr. Syst. Aroid. p. 548 (1860).
TYPE: Bolivia, Yungas, *d'Orbigny 412* (P, non vidi, photo SEL).

Anthurium pastazae Sodiro, Anturios Equator. Suppl. 1:93 (1905).
TYPE: Ecuador, Pastaza, Feb. 1905, *Sodiro s.n.* (B, non vidi, photo F, US).

Scandent perennial of wet montane forests. Stem green, 2-4.5 cm thick, the internodes 0.5-2 cm long. Cataphylls 7-15 cm long, deciduous. Leaves 3 to 10 in number, arising approximately at right angles to the stem, petioles 40-70 cm long, the lamina coriaceous, trisect, the segments completely free to the base, the central segment ovate to obovate, 20-50 cm long, the apex acuminate, the base attenuate; the lateral segments 1/2 to 3/4 the length of the central segment, ovate, the apex rounded, the primary vein not exiting in the tip but connecting to a marginal vein, the base unequal, oblique. Peduncle 1/4 to 1/2 the petiole length. Spathe green, lanceolate, 8-14 cm long, 1-2.5 cm wide, becoming reflexed. Spadix green or white in flowers, cylindric, sessile, 9-16 cm long, the anthers elevated 1-2 mm beyond the tepals on elongate filaments; fruit unknown.

ETYMOLOGY: Greek *triphyllum*, 'three-leaved,' referring to the trisect leaves.

DISTRIBUTION: Eastern slopes of the Andes from Ecuador to Bolivia at elevations of (600)-1000-2000 m.

REPRESENTATIVE SPECIMENS: *ECUADOR*. NAPO-PASTAZA: Tena, Sept. 1939. *Asplund 9656* (US); Mera, 1200 m, Nov. 1974, *Plowman & Davis 4549* (GH). MORONA-SANTIAGO: Cord. de Cutucú, 800 m, *Madison 2629* (SEL). ZAMORA-CHINCHIPE: Between Campanas and Arenillas, elev. 2195 m, July 1943, *Steyermark 53624* (US). *PERU*. AMAZONAS: Rio Cenepa, E of Huampami, elev. 600 m, Nov. 1972, *Berlin 389* (MO). HUANUCO: Huamalies, between the Monzon and the Huallaga, 6-700 m, Sept. 1903, *Weberbauer*

3660 (B, non vidi, photo F, US). JUNIN: Hcda. Schunke above San Ramon, elev. 1400-1700 m, June 1929, *Killip & Smith 24581* (US); Oxapampa, *Soukup 2327* (GH). CUZCO: Cordillera Vilcabamba, across from Luisiana, elev. 1730 m, *Madison 10118* (US). *BOLIVIA.* LA PAZ: Coripata, June 1894, *Bang 2293* (NY, US); Hcda. Simaco, elev. 1400 m, Feb. 1920, *Buchtien 5343* (US, NY). COCHABAMBA: San Onofre, elev. 1700 m, Feb. 1929, *Steinbach 9279* (GH).

Anthurium triphyllum is a robust scandent species inhabiting wet montane forests on the eastern slopes of the Andes. Its notable features are short internodes, the three lobes of the trisect leaves fully free to the base, and the peduncles only 1/4 to 1/2 the length of the petioles.

In describing *Anthurium huallagense* in 1905, Engler cited two syntypes, *Weberbauer 3660 and 3661.* The former of these is a specimen of *A. triphyllum*, but since the written description applies to an entirely different plant (presumably *Weberbauer 3661*), *A. huallagense* is not to be considered a synonym of *A. triphyllum.*

6. **Anthurium grex-avium** Madison, sp. nov.
Plate 2

Frutex funicularis scandens et dependens, ad 8 m longus. Caudex viridis, 1-1.5 cm crassus, internodiis 10-20 cm longis. Petiolus 12-18 cm longus; lamina coriacea, supra saturate viridis, trilobata lobis basaliter connatis; lobus medius oblanceolatus petiolum aequans, apice acuminatus; lobi laterales elongati, valde falcati, apicibus rotundatis. Pedunculus petiolum superans; spatha lanceolata, viridis, 6-8 cm longa; spadix cylindricus, myosuroides, viridis, breviter stipitatus, 10-15 cm longus, 5 mm crassus. Fructus ignotus.

TYPE: Ecuador, Prov. Morona-Santiago, Cordillera de Cutucú, western slopes, in the general region 2°46'S × 78°06'W, wet montane forest, elev. 1600 m, Nov. 1976, *Madison, Bush & Davis 3477* (HOLOTYPE: SEL, ISOTYPES: US, GH, MO).

ETYMOLOGY: Latin *grex-avium* 'a flock of birds,' in reference to the fancied resemblance of the assemblage of alate leaves to a diving flock of birds.

Anthurium grex-avium is endemic to the Cordillera de Cutucú, Ecuador, where it is found in wet montane forests at elevations of 1600-1800 m. It is most closely related to *A. truncicolum* Engler, from which it is distinguished by its much smaller leaves with narrower lobes, its slender spadices, and its habit of flowering on pendent shoots. The two species are sympatric in the Cordillera de Cutucú, though *A. truncicolum* is generally found at lower elevations, and they are readily distinguishable in the field with no evidence of hybrids.

7. **Anthurium truncicolum** Engler
Plate 2

Anthurium truncicolum Engler, Bot. Jahrb. 25:452 (1898).
TYPE: Ecuador, Pinchincha, forests of Nanegal and Mindo, *Sodiro 44* (B, non vidi, photo F, US).

Anthurium divaricatum Sodiro, Anal. Univ. Quito 17:251 (1903).
TYPE: Ecuador, Pinchincha, Nanegal, *Sodiro 145* (Q, non vidi; B, non vidi, photo F).

Anthurium platyglossum Sodiro, Anal. Univ. Quito 17:252 (1903).
TYPE: Ecuador, Napo, between Coyuja and Baeza, *Sodiro* (Q, non vidi); illustrated, plate 27, in Sodiro, Anturios Equatorianos (1903).
Anthurium platyglossum Sodiro var. *nanegalense* Sodiro, Anal. Univ. Quito 17:252 (1903).
TYPE: Ecuador, Pichincha, Nanegal, *Sodiro* (no specimen known to me).
Anthurium alatum Engler, Das Pflanzenreich IV 23 B:276 (1905).
TYPE: Colombia, Cauca, on trees in the thick wet forest of the western cordillera at Arrayanal, 1800 m elev., *Lehmann 3263* (B, non vidi, photo US, F).
Anthurium tridigitatum Engler, Das Pflanzenreich IV 23 B: 276 (1905).
TYPE: Colombia, Quindio, elev. 2300 m, *Triana 688* (BM, non vidi).

Scandent perennial of wet montane forests. Stem tough, climbing, 1-3 m long, 1-2 cm thick, the internodes (5)-10-30 cm long. Cataphylls lanceolate, 4-10 cm long, deciduous. Leaves held at approximately right angles from the stem, the petioles 30-65 cm long; lamina coriaceous, trilobed but not trisect, the central lobe obovate, 16-40 cm long, acute to acuminate at the apex, in some cases strongly narrowed at the base, the lateral lobes 1/3 to 2/3 the length of the central lobe, somewhat falcate, rounded at the apex, broadly ovate with 3-9 primary veins. Peduncle 25-60 cm long, at maturity about the same length as the petiole or slightly shorter. Spathe green, lanceolate, 1.5-3.5 cm broad, 8-14 cm long, becoming reflexed, persistent. Spadix green in flower, cylindric, 8-15 cm long, 8-10 mm thick, in early fruit appearing spiny by the protrusion from among the tepals of the elongate apices of the developing berries, mature fruit unknown.

ETYMOLOGY: Latin *truncus*, 'trunk' or 'stem,' and *-cola*, 'dweller,' referring to the climbing habit of the species.

DISTRIBUTION: Colombia and Ecuador, in wet montane forests at elevations of (600)-1000-2500 m.

REPRESENTATIVE SPECIMENS: *COLOMBIA.* ANTIOQUIA: Jerico, Dec. 1940, *Tomas & Daniel 2584* (US). CALDAS: Canaan, S. of Salento, elev. 1400-1700 m, July 1922, *Pennell 9069* (GH, NY, US). *ECUADOR.* PICHINCHA: 11 km W of Tandapi, 1350-1550 m, Oct. 1974, *Gentry, Ortiz, & Narvaez 12120* (MO). BOLIVAR: Charquiyacu, elev. 600 m, Oct. 1943, *Acosta Solis 6112* (F). CHIMBORAZO: Sibambe, Hcda. 'La Carmelita,' elev. 2000 m, Aug. 1943, *Acosta Solis 5399* (F). PASTAZA: Colonia 24 de Mayo, 15-20 km NE of Puyo, Sept. 1968, *Lugo 436* (MO). MORONA-SANTIAGO: Cordillera de Cutucú, 2°46'S × 78°06'W, elev. 1200 m, *Madison, Bush, & Davis 3242* (SEL).

Anthurium truncicolum is a scandent species climbing on lower tree trunks in wet montane forests at middle elevations. Diagnostic features are the elongate internodes with deciduous cataphylls, the broad lateral lobes of the leaves with 3 to 9 primary veins, and peduncles about equal in length to the petioles. In the type description of *A. alatum* Engler reports the peduncle as being about 1/3 the length of the petiole; however, he was apparently dealing with an immature inflorescence, as indicated by the extreme slenderness of the spadix (5 mm).

Of the six synonyms for *Anthurium truncicolum*, three are described by Sodiro from the type locality of *A. truncicolum* itself, founded on slight variations in the relative shapes and sizes of the basal lobes. This suggests that Sodiro's species concept was a narrow one, and additional synonomies are to be expected in the more than 200 species of *Anthurium* he described.

8. **Anthurium tilaranense** Standley
Plate 2

Anthurium tilaranense Standley, J. Wash. Acad. Sci. 17:245 (1927).
TYPE: Costa Rica, Prov. Guanacaste, moist forest at Quebrada Serena, SE of Tilaran, elev. 700 m, Jan. 1926, *Standley & Valerio 46310* (US, photo SEL); PARATYPE: Costa Rica, Prov. Guanacaste, Los Ayotes, near Tilaran, *Standley & Valerio 45586* (US, photo SEL).

Anthurium latihastatum Engler ex Krause, Notizbl. Berlin Bot. Gart. 11:612 (1932).
SYNTYPES: Costa Rica, San Ramon, 1300-1400 m, May 1913, *Tonduz 17708* (B, non vidi, photo F); San Ramon, 1200 m, April 1913, *Tonduz 17704* (CR?, B?, non vidi).

Low epiphyte of wet forest. Stem to 1 m long, 1-2.5 cm thick, the internodes 0.5-2 cm long and the leaves crowded together at the apex of the stem. Cataphylls 4-10 cm long, persistent, not decomposing to fibers. Petioles green, 15-25-(35) cm long, channeled adaxially. Lamina deep green, coriaceous, trifid, the central lobe oblong, 15-25 cm long, acuminate at the apex, the lateral lobes falcate with the inner margin concave and the outer margin convex, rounded at the apex, 1/2-3/4 the length of the central lobe. Peduncle 7-20-(30) cm long, 1/2-3/4 the petiole length. Spathe green, ovate to oblong-ovate, 4-9 cm long, acuminate at the apex, attenuate at the base. Spadix green in flower, sessile, cylindric, 4-8 cm long; fruit unknown.

ETYMOLOGY: After Tilaran, the type locality.

DISTRIBUTION: Costa Rica.

REPRESENTATIVE SPECIMENS: *COSTA RICA*. GUANACASTE: Colinas de San Pedro de San Ramon, Jan. 1934, *Brenes 19047* (F). ALAJUELA: San Juan de Laja, 15 km N of Zarcero, elev. 1350 m, Feb. 1965, *Williams et al. 29013* (F). HEREDIA: 1 km S of Tirimbina, Sarapiqui, 220 m, Sept. 1971, *Lent 2123* (F). PUNTARENAS: E of Monteverde, 1300-1450 m, Oct. 1974, *Burger & Baker 9622* (F). CARTAGO: Río Pejibaye, 2 km SW of Taus, elev. 750 m, Oct. 1972, *Lent 2953* (F).

Anthurium tilaranense appears to represent a northern segregate of the closely related *A. trilobum*, which is a more robust plant in every feature. In addition to its smaller size and somewhat narrower lobes of the leaf lamina, *A. tilaranense* may be distinguished from *A. trilobum* by its green rather than bright yellow or red flowering spadix, and by the persistent cataphylls remaining intact rather than decomposing to a mass of fibers.

9. **Anthurium trilobum** Andre
Plate 2

Anthurium trilobum Andre, Ill. Hort. 24: t. 153 (1877).
TYPE: The description is based on a plant from Colombia cultivated in Brussels by Linden; the illustration in Ill. Hort. (24:t.153, 1877) serves as the type.

Philodendron holtonianum Mast., Gard. Chron. 1876. I:365.
TYPE: Colombia, cultivated in England by W. Bull, *N. E. Brown s.n.* (K, non vidi, photo SEL).
Anthurium trifidum Oliver, Bot. Mag. t. 6339 (1878); nomen novum for *Philodendron holtonianum* Mast.
Anthurium insigne Mast., Gard. Chron. 1878 I:430; nomen novum for *Philodendron holtonianum* Mast.
Anthurium furcatum Sodiro, Anal. Univ. Quito 17:168 (1903).
TYPE: Ecuador, Angamarca, *Sodiro 142* (Q, non vidi; B, non vidi, photo F, US; G, non vidi, photo SEL).
Anthurium bricarellii Sodiro, Rev. Chil. Hist. Nat. 9:277 (1905).
TYPE: Ecuador, Esmeraldas, *Sodiro s.n.* (B, non vidi, photo F).
Anthurium falcatum Sodiro, Rev. Chil. Hist. Nat. 9:276 (1905).
TYPE: Ecuador, Esmeraldas, mouth of Rio Cachabi, *Sodiro s.n.* (B, non vidi, photo F, US).
Anthurium tripartitum Engler, Das Pflanzenreich IV 23 B:277 (1905).
TYPE: Colombia, Nariño, Barbacoas, *Triana 687 bis* (BM, non vidi).
Anthurium garagaranum Standley, Field Mus. Nat. Hist., Bot. 22:68 (1940).
TYPE: Panama, Darien, foothills of Garagara, 30-500 m, Feb. 1912, *Pittier 5601* (US).

Terrestrial or epiphytic herb of low elevation forests. Stem terete, 2-4.5 cm thick, to 1 m long, the internodes 0.5-2 cm long, with the 2-6 leaves borne in a cluster at the apex of the stem. Cataphylls 5-12 cm long, persistent, decomposing to a mass of brown or white fibers. Petiole erect, 30-70 cm long, green or sparsely red-punctulate; lamina coriaceous, deep or medium green, glossy above, paler below, deeply trifid but not trisect, the central lobe ovate, 20-45 cm long, 8-20 cm wide, widest at the middle and narrowing to either end, the apex acute to acuminate; the lateral lobes 20-60 cm long, falcate, curving to become subparallel to the central lobe, smoothly rounded at the apex, with 2-5 primary veins. Peduncle 15-60 cm long, from 1/2-5/6 the length of the petiole, stiffly erect. Spathe oblong-lanceolate, 6-16 cm long, 1.5-4 cm wide, green (Panama) to reddish (Ecuador), becoming reflexed at time of flowering, in some specimens basally decurrent along the peduncle for 1-2 cm. Spadix stipitate 5-15 mm, cylindric, 6-20 cm long, 5-15 mm thick, bright yellow or yellow-green (Panama) to orange or reddish (Ecuador) in flower, with a strong sweet odor; tepals and berries red in fruit.

DISTRIBUTION: Panama to Ecuador, wet forests along the Pacific lowlands, elev. 0-500-(1100) m.

REPRESENTATIVE SPECIMENS: *PANAMA.* VERAGUAS: above Santa Fé, 730 m, July 1974, *Croat 25966* (MO). COCLE: Trail to Las Minas, N of El Valle de Anton, 1000 m, May 1941, *Allen 2462* (US). PANAMA: Cerro Campana, April 1971, *Croat 14229* (MO). COLON: Santa Rita Ridge, Jan. 1971, *Croat 13208* (MO). DARIEN: Slopes of Cerro Pirre, 500-1000 m, Dec. 1972, *Gentry & Clewell 7124* (MO). *COLOMBIA.* CHOCO: Quibdó, Rio Atrato, elev. 60 m, May 1931, *Archer 1937* (US). EL VALLE: Rio Calima, La Trojita, 5-50 m, March 1944, *Cuatrecasas 16457* (F). NARIÑO: Tumaco, Rio Mira, 65 m, March 1969, *Kennedy 189* (F). *ECUADOR.* PICHINCHA: Tinalandia, 16 km E of Santo Dominago de los Colorados, elev. 680 m, Oct. 1974, *Gentry, Ortiz-Crespo & Narvaez 12184* (MO). LOS RIOS: Km 12 on road from Patricia Pilar to 24 de Mayo, elev. 540 m. May 1976, *Dodson 6101* (SEL).

A series of specimens collected at sites from Costa Rica to Pacific Ecuador are quite similar and here considered to represent three closely related species. All are acaulescent herbs in which the leaves are trilobed and trident-shaped, with the lateral lobes falcate and rounded at the apex while the central lobe is ovate to lanceolate and acuminate at the apex.

The Costa Rican material is separated as *Anthurium tilaranense* Standley; it is distinguished by a green flowering spadix, by the cataphylls remaining entire rather than becoming fibrous, and by its smaller size than the plants from further south.

Specimens from Panama to Ecuador are here united, with some misgivings, into a single variable species, *A. trilobum* Andre. The flowering spadix is notably stipitate and varies in color from bright yellow (Panama) to ochraceous (Colombia) to red (Ecuador). Since the fruiting spadix is red in all cases, these color differences may simply reflect slightly more rapid production of the red pigment in the southern populations. Notes on a number of specimens describe a strong sweet fragrance, and one specimen *(Kennedy & Dressler 2983)* reports pollination by the Euglossine bee *Eulaema polychroma*. The spathe may be strongly decurrent on the peduncle, as in *A. tilaranense*, or not at all decurrent.

Leaf size in *A. trilobum* is extremely variable. In many specimens the central lobe is ovate to elliptic and quite broad at the center, while in some collections from Ecuador (e.g. *Madison 3822*) the central lobe is linear, 55 cm long and a uniform 5 cm in width. The extent to which the costae of the lateral lobes are denudate is also quite variable.

Quite possibly several species are represented in the concept of *Anthurium trilobum* as here delimited, but the scanty materials available do not allow for an informed subdivision at present.

Anthurium rimbachii is separated to accommodate a plant collected in Ecuador or Colombia by T. Plowman and cultivated at SEL. Though vegetatively indistinguishable from some specimens of *A. trilobum*, the spadix is sessile, dark purple, and produces no notable odor. This association of characters is typical of fly-pollinated anthuriums, and suggests that either the switch from fly to euglossine bee pollination is easily made or that *A. rimbachii* and *A. trilobum* represent a case of convergent evolution of vegetative parts.

10. **Anthurium rimbachii** Sodiro
Plate 3

Anthurium rimbachii Sodiro, Cont. Fl. Ecuat. Monog. 2:202 (1903).

TYPE: Ecuador, Guayas, near Quillallpa, elev. 200 m, *Rimbach 80*, location of specimen unknown.

Acaulescent terrestrial or epiphytic herb, the internodes 2-5 mm long. Cataphylls triangular, 4-9 cm long, persisting as a mass of brown fibers. Petiole cylindric, deep green to purplish, erect, the geniculum purple, 1.5-2.5 cm long. Lamina coriaceous, glossy, trilobed, the lateral lobes spreading and slightly falcate, rounded at the apex, hardly narrowed at the base, 15-25 cm long, 8-10 cm broad, the central lobe obovate, 30-40 cm long, acuminate at the apex. Peduncle terete, slightly shorter than the petiole. Spathe lanceolate, purplish, 8-10 cm long, about 1.2 cm wide, reflexing, not at all decurrent on the peduncle. Spadix sessile, cylindric, purple, with no notable odor, 8-12 cm long, 10-12 mm thick at the base.

ETYMOLOGY: Named for Dr. A. Rimbach, collector of the type.

DISTRIBUTION: Pacific Ecuador.

REPRESENTATIVE SPECIMEN: Northwestern South America, exact locality uncertain, collected by *T. Plowman s.n.*, cultivated at SEL, flowered in cult. June 1977, *Madison 4135* (SEL).

The sessile, purple spadix with no notable odor at anthesis distinguishes this species from *Anthurium trilobum*, which see for a discussion.

11. **Anthurium angustisectum** Engler

Anthurium angustisectum Engler, Bot. Jahrb. 25:391 (1898).
TYPE: Colombia, Cali, elev. 2000 m, *Lehmann 2949* (B, non vidi, photo F, US).

Scandent epiphyte, stem to 3 m long. Cataphylls 15-20 cm long, decomposing to a mass of persistent fibers. Petiole about 25 cm long, canaliculate. Lamina pedati-5-sect, the segments elongate linear-lanceolate, the outer pairs connate at the base, the central segment free, about 8 cm broad and 55 cm long; primary lateral veins of the segments numerous, arising at angle of 45° with the midvein. Peduncle longer than the petiole, about 35 cm long. Spathe linear lanceolate, 15 cm long; spadix cylindric, tapered, about 15 cm long in flower, 25 cm in fruit.

ETYMOLOGY: Latin *angusti-*, 'narrow,' and *sectum*, 'cut,' referring to the division of the palmate leaf into narrow segments.

DISTRIBUTION: Colombia, region of Cali, known only from the type.

Engler placed this poorly-known species in section *Polyneurium* Engler, which consists mostly of species with cordate leaves; this placement apparently was based on the large number of primary lateral veins of the leaf segments. However, this condition is not too dissimilar to the venation patterns of *A. expansum* and *A. longissimum*, to which *A. angustisectum* appears to be more closely related than to the cordate-leaved species of section *Polyneurium*.

12. **Anthurium longissimum** Pittier
Plate 3

Anthurium longissimum Pittier, Soc. Venez. de Ciencias Nat., Bol. 11:13 (1947).
TYPE: Venezuela, Aragua, Parque Nacional, cloud forest, Feb. 1946, *Pittier 15214* (US).

Scandent epiphyte. Stems to 2.5 cm thick, cataphylls deciduous. Petiole to 80 cm long, sulcate. Lamina coriaceous, deeply pedatifid with 7-9 lobes, the lobes basally connate for 2-8 cm, individually oblanceolate to obovate, to 60 cm long and 15 cm wide, the apex acute with a 1 cm long slightly falcate acumen. Peduncle 1/4 to 1/2 the petiole length, 20-50 cm long. Spathe green, linear-lanceolate, 40-60 cm long, 1.5-2 cm broad. Spadix about equal to the spathe, 40-60 cm long, 6-9 mm thick in flower, grayish lavender in color, becoming brownish in fruit with purple berries.

ETYMOLOGY: Latin *longissimum*, 'extremely long,' in reference to the considerable length of the spathe and spadix.

DISTRIBUTION: Venezuela, coastal mountains.

REPRESENTATIVE SPECIMENS: *VENEZUELA*. ARAGUA: Parque Nacional, 1200-1300 m, Feb. 1973, *Croat 21410* (MO). MIRANDA: Los Guayabitos, SE of Baruta, 1350-1400 m, Oct. 1963, *Steyermark 91652* (US). ANZOATEGUI: Confluence of Río Leon and Río Zumbador, NE of Bergantin, Feb. 1945, *Steyermark 61185* (F, US).

For a discussion of the relationships of this species see the remarks following *Anthurium expansum.*

13. **Anthurium palmatum** (L.) G. Don
Plate 3

Anthurium palmatum (L.) G. Don, in Sweet, Hort. Brit. ed 3, p. 633 (1839). *Pothos palmata* L., Spec. Plant. ed 2:1373 (1762).
TYPE: Martinique, Plumier, Plantes de L'Amerique, Paris, 1693, t. 64, 65.
Anthurium andersonii Schott, Oest. Bot. Woch. 7:325 (1857).
TYPE: St. Lucia, *Anderson s.n.* (K, non vidi, photo SEL).
Anthurium fissum K. Koch ex Regel, Gartenflora 16:323 (1867).
TYPE: The illustration accompanying the description is the type, (Gartenflora 16, t. 561, 1867).
Anthurium elegans Engler, Bot. Jahrb. 1:482 (1881).
TYPE: Martinique, *Hahn s.n.* (P, non vidi, photo SEL).

Scandent epiphyte to 5 m tall. Stem green, terete, 1.5-3 cm thick, the internodes 2-6 cm long. Cataphylls triangular, to 10 cm long, soon deciduous. Petiole 40-100 cm long; lamina coriaceous, glossy deep green, 5-11 pedatifid, the segments connate at the base, in larger leaves the central 1-3 segments may be free at the base but with the lamina extending to the geniculum and the segments not petiolulate, the segments oblanceolate, 25-40 cm long, 4-6 cm broad, broadest near the apex, with a 1-2 cm long acumen, attenuate at the base. Peduncle 1/2-5/6 the petiole length, 20-70 cm long. Spathe green, lanceolate, 6-18 cm long, 8-20 mm broad. Spadix sessile or stipitate, cylindric, tapered, 8-16 cm long in flower, 5-8 mm thick; berries red, ovoid, rounded at the apex.

DISTRIBUTION: Lesser Antilles, St. Lucia to Guadeloupe.

REPRESENTATIVE SPECIMENS: St. Lucia: Barre de l'Ile, June 1945, *Beard 1115* (US, MO, F); NE spur of Morne la Sorciere, June 1958, *Proctor 18165* (US). MARTINIQUE: Bois de la Regale, 1880, *Duss 520* (US, F). DOMINICA: Rosalie, 1903, *Lloyd 711* (NY); Mantipo River, Marigot, July 1938, *Hodge 312* (NY). GUADELOUPE: Ravine Montebello, Jan. 1938, *Questal 483* (US); Bois des Deshaies, 1893, *Duss 3294* (US, NY).

Anthurium palmatum as here delimited was considered by Engler (1905) to represent four species in two sections of the genus. This segration was based on differences in relative size and number of divisions of the leaf, and degree of connation of the segments. However, the specimens seem best interpreted as a single, somewhat variable, species distributed among the four islands. It apparently represents a long-distance dispersal from continental South America, where closely related species are found (see discussion under *A. expansum*). The absence of *A. palmatum* from the intervening islands of St. Vincent and Grenada is notable.

14. **Anthurium expansum** Gleason
Plate 3

Anthurium expansum Gleason, Bull. Torrey Bot. Club 56:8 (1929).
TYPE: British Guiana, Kurupung, Mazaruni River, Nov. 1922, *Lang & Persaud 223* (NY, non vidi, isotype F).
Anthurium potarense Gleason, Bull. Torrey Bot. Club 56:9 (1929).
TYPE: British Guiana, Potaro River, Oct. 1898, *Jenman 7466* (K, non vidi, photo SEL).

Scandent epiphyte. Stem 1.5-3.5 cm thick, the internodes 1-4 cm long, cataphylls deciduous. Petiole 50-100 cm long. Lamina coriaceous, deeply 7-9 pedatifid, the outer segments basally connate, the inner segments free or up to 6 cm connate, the central segment ovate, attenuate to the base, acute at the apex with a 1-2 cm long acumen, 30-55 cm long, 8-14 cm wide, the primary lateral veins strongly prominent below, 8-16 mm distant. Peduncle 1/4 -1/2 the petiole length, 15-45 cm long. Spathe green, narrowly ovate to lanceolate, 8-15 cm long, 2.5-4 cm broad. Spadix purple, cylindric, in flower 10-15 cm long and 5-8 mm thick, becoming larger in fruit; berries purple, ovoid, with an acute apex.

ETYMOLOGY: Latin *expansum*, 'spread out,' referring to the spreading lobes of the leaves.

DISTRIBUTION: Guiana highland area, from Venezuela to Suriname.

REPRESENTATIVE SPECIMENS: *VENEZUELA*. AMAZONAS: Cerro Sipapo, Feb. 1949, *Maguire & Politi 28777* (US, NY). *BRAZIL*. RORAIMA: Vicinity of Auaris, 64°25'W × 4°06'N, July 1974, *Prance, Fidalgo, Nelson, & Ramos 21350* (NY). *BRITISH GUIANA*. Upper Mazaruni River basin, Mt. Ayanganna, Aug. 1960, *Tillett, Tillett & Boyan 45004* (NY); Pakaraima Mts., Membaru-Kurupung trail, Nov. 1951. *Maguire & Fanshawe 32369* (NY). *SURINAME*. Tafelberg, June 1963, *Wessels-Boer 1572* (NY).

Anthurium expansum, *A. palmatum*, and *A. longissimum* are closely related species of similar appearance. In each the leaf is sub-digitately pedatifid with (normally) 7-9 segments. The outer segments are always basally connate; the central segments may be connate or free, but are never petiolulate.

The species are geographically distinct; *Anthurium expansum* occurs in the Guiana highland area, *A. longissimum* in the Caribbean coastal mountains of Venezuela, and *A. palmatum* in the lesser Antilles. *Anthurium longissimum* is readily distinguished from the other two by its elongate spathe and spadix (40-60 cm long vs. less than 20 cm long in the others). *Anthurium palmatum* is distinguished from *A. expansum* by narrower leaf segments and relatively longer peduncles as compared to the petioles. In addition, *A. palmatum* has ovoid red berries rounded at the apex whereas in *A. expansum* the obovoid berries are purple with a strongly acute apex.

15. **Anthurium podophyllum** (Cham. & Schlecht.) Kunth
Plate 4

Anthurium podophyllum (Cham. & Schlecht.) Kunth, Enumer. Plant. 3:80 (1841); *Pothos podophyllus* Cham. & Schlecht., Linnaea 6:22 (1831).
TYPE: Mexico, Hacienda de la Laguna, *Schiede & Deppe*, (B, non vidi, illustrated by Schott Aroideae 791, W, non vidi, photo SEL).
Anthurium polytomum Schott, Bonplandia 7:337 (1859).
TYPE: Mexico, Schott Aroideae 805 (W, non vidi, photo SEL).

Anthurium pseudopodophyllum Schott, Bonplandia 7:338 (1859).
TYPE: Cultivated in Vienna, Schott Aroideae 810 (W, non vidi, photo SEL).

Terrestrial herb of dark forest understory. Caudex short, 4-6 cm thick, internodes 5-10 mm long, the cataphylls chartraceous. Leaves erect, the petioles green, canaliculate adaxially, 40-80 cm long; the lamina coriaceous, dull green, dissected with 7 to 11 pedately arranged lobes, each of these pinnatifid with 5 to 12 divisions, the lobes basally connate, apices of the divisions acuminate or acute or sometimes rounded. Peduncle exceeding the petioles, 50-100 cm long, deep green, terete. Spathe green, lanceolate, 5-8 cm long; spadix green or purplish in flower, cylindric, tapering to the apex, 6-15 cm long, 8-15 mm thick at the base; berries red.

ETYMOLOGY: *Podophyllum* apparently refers to the similarity of the shape of the leaf to that of the genus *Podophyllum* L. (Berberidaceae).

DISTRIBUTION: Gulf coast of Mexico, at low elevations.

REPRESENTATIVE SPECIMENS: *MEXICO.* VERA CRUZ: Mirador, *Liebmann s.n.* (K, non vidi, photo SEL); Coatepec, Dec. 1971, *Madison 3722* (SEL); Zacuapan, Feb. 1913, *Purpus 6364* (F, MO, US).

Anthurium podophyllum is easily recognized by its highly dissected leaves, with 30-80 divisions. In mature leaves with numerous divisions the width of the lamina seldom exceeds 1 cm, but in juvenile leaves the number of lobes is fewer and the width of the lamina somewhat greater. These differences are the basis for the description by Schott of several species which are here considered synonyms. Engler (1905) lists *Anthurium ghiesbrechtii* Linden as a synonym of *A. podophyllum*, but the description is cryptic, and as I have seen no authentic material of the former it is not included in the synonymy.

Anthurium podophyllum is rare in the wild, but is widely cultivated and much sought after as a horticultural subject.

16. **Anthurium pedatum** (HBK) Kunth
Plate 4

Anthurium pedatum (HBK) Kunth, Enumeratio Plant. 3:79 (1841). *Pothos pedatus* HBK, Nov. Gen. et Spec. 1:64 (1815).
TYPE: Colombia, Andes of Popayán, between Meneses and Alto de Aranda, elev. 1380 hexap., *Humboldt & Bonpland* (location of specimen unknown; the illustration accompanying the description, t. 20, is here considered to typify the species).

Anthurium elegans Engler, Gartenflora 32:68 (1883), (non *A. elegans* Engler 1881).
TYPE: Gartenflora 32, t. 1112, facing p. 68. An illustration of a plant cultivated in St. Petersburg, collected in Buenaventura, Colombia, by Wallis.

Anthurium fortunatum Bunting, Baileya 11:9 (1963). This name was proposed as a nomen novum for *A. elegans* Engler (1883).

Terrestrial herb of wet montane forests. Stem 2-6 cm thick, very short, the internodes 2-10 mm long. Cataphylls to 20 cm long, decomposing to a network of rufous fibers, persistent. Petioles 30-75 cm long, green terete. Lamina bright green, coriaceous, glossy, pedato-radiate with 9-13 divisions, the denudate costae of the outer segments delimiting a V-shaped sinus, the segments connate in the basal 3-6 cm, unequal, the lateral segments only 2/3

or less the length of the central segment; the margins of the segments undulate, that of the central segment strongly undulate to pandurate or laciniate in robust specimens, the central segment 20-45 cm long, 5-8 cm wide, acuminate at the apex. Peduncle terete, from 1/2 to 5/6 the length of the petioles. Spathe yellow green, lanceolate, 6-10 cm long, 2-4 cm wide, inverted naviculiform, persistent in fruit. Spadix purplish or green, pendent below the horizontally held spathe, cylindric, 7-12 cm long, 5-10 mm thick, shortly stipitate; in fruit deep purple, 15-25 cm long, 1.5-3 cm thick.

ETYMOLOGY: Latin *pedatum*, 'pedate,' referring to the shape of the leaf lamina.

DISTRIBUTION: Colombia, western Andes, at elevations of (500)-1500-2000 m.

REPRESENTATIVE SPECIMENS: *COLOMBIA*. EL VALLE: Cordillera Occidental, La Laguna, 1250-1400 m, Dec. 1943, *Cuatrecasas 15651* (F); Pichindé, Jan. 1963, *Figueras 8275* (US); Dagua, April 1876, *Andre 2667* (NY). CAUCA: Popayán, 1500-2000 m, *Lehman 7363* (GH, US, F); Popayán, 1750-1800 m, June 1922, *Killip 7189* (US, GH). NARIÑO: Pasto, Ortega, 1500 m, *Triana 690* bis (US). Without locality; *Mutis 5637* (US).

Anthurium pedatum is a handsome plant, usually terrestrial, native to wet forests at middle elevations. It is not closely related to the other palmatifid anthuriums, but rather pertains to a complex of Andean species related to *A. cochlioides* Sodiro. These species are acualescent with the cataphylls persisting as a network of rufous fibers. The denudate costae of the basal lobes of the leaf lamina delimit a V-shaped sinus. The spathe in these species is inverted naviculiform in shape and held horizontally; it functions as an umbrella to keep rain off the spadix which hangs below. Except for *A. pedatum* the species in the complex have cordate leaves, and the pedatifid leaf of *A. pedatum* apparently represents parallel evolution of this feature independent of its origin in other sections of the genus.

17. **Anthurium pedato-radiatum** Schott
Plate 4

Anthurium pedato-radiatum Schott, Bonplandia 7:337 (1859).
TYPE: Mexico, cultivated at Vienna, illustrated by Schott Aroideae 780, 781, 782, 785, 787 (W, non vidi, photo SEL, F, US).
Anthurium helleborifolium Schott, Bonplandia 10:148 (1862).
TYPE: Mexico, no specimen cited; the description is the type.
Anthurium pedatifidum Regel & Linden, Gartenflora 15:66 (1866).
TYPE: The illustration accompanying the description (t. 501) is the type; based on a plant cultivated in Brussels by Linden, possibly from Brazil.
Anthrium mirandae Matuda, An. Inst. Biol. Mex. 22:375 (1951).
TYPE: Mexico, Chiapas, near El Ocote, NW of Ocozocuauatla, elev. 575 m, *Miranda 6312* (MEXU).

Terrestrial herb of forest understory. Caudex to 20 cm long, 2-5 cm thick, the internodes 3-8 mm long; cataphylls triangular, 1-8 cm long, chartaceous and ultimately deciduous. Leaves erect, the petioles 25-100 cm long, green; lamina subcoriaceous, glossy above, pedately 7-13 parted, the segments connate for 2-6-(12) cm at the base, the central segment connate to or sometimes free from the adjacent segments, the lamina 15-60 cm wide, the central segment 12-50 cm long, only slightly longer than adjacent segments, attenuate to the tip, the margins straight, the main veins prominent on both sides. Peduncle erect, terete, 1/4 to 2/3 the petiole length, the spathe green,

narrowly lanceolate, 5-10 mm wide, 3-12 cm long, becoming reflexed; the flowering spadix purplish, sessile or 1-3 mm stipitate, narrowly cylindric 2-5 mm thick, 3-9 cm long; fruiting spadix to 15 cm long, 3 cm thick; berries globose, deep yellow.

ETYMOLOGY: Latin *pedato-radiatum*, 'pedately radiate,' referring to the arrangement of the leaf segments.

DISTRIBUTION: Mexico, Veracruz, Tabasco, and Chiapas, from sea level to about 1000 m.

REPRESENTATIVE SPECIMENS: *MEXICO.* VERACRUZ: Santiago Tuxtla, *Bunting & Davis 160* (BH, non vidi, photo SEL). TABASCO: Teapa, Sept. 1944, *Gilly & Hernandez 296* (GH); Cerro las Campanas, 3 km E of Teapa, elev. 50-100 m, Aug. 1974, *Conrad, Conrad, & Rodriguez 2869* (MO). CHIAPAS: Ocozocoautla, elev. 700 m., March 1968, *Ton 3800* (F).

Anthurium pedato-radiatum is a relatively rare terrestrial plant native to limestone regions of Mexico. There is some variation in the extent to which the central segment is connate to the adjacent segments, and it may be fully free to the base. These differences have been the basis for distinguishing several species here included in synonomy as they differ in no other respect.

Anthurium pedato-radiatum is similar in appearance to *A. pedatum* from Colombia, from which it is distinguished by the shorter cataphylls which do not disintegrate into a mass of persistent fibers, by its much narrower spathe and flowering spadix, and by the segments of the leaf lamina not at all repand. Also, in *A. pedatum* the central segment of the leaf is at least 1/3 again as long as the adjacent segments, while in *A. pedato-radiatum* it is nearly of the same length.

18. **Anthurium croatii** Madison, sp. nov.
Plate 4

Planta terrestris, nunquam scandens. Caudex viridis, erectus, 5-20 cm altus, 8-35 mm crassus, internodiis 2-8 mm longis. Cataphylla triangularia, 3-7 cm longa, chartacescentia, mox decidua. Petiolus erectus, 40-75 cm longus. Lamina viridis, membranacea, profunde 5-7(-9)-secta; segmenta circa pariter longa, lanceolata vel anguste elliptica, extremis attenuatis, apicibus acuminatis, 15-30 cm longa, 3-8 cm lata, vix petiolulata, raro basaliter breviter connata. Pedunculus erectus, longitudine petiolum 1/2-5/6 aequans, 25-55 cm longus. Spatha viridis, lanceolata, 6-15 mm lata, 6-10 cm longa, mox reflexa. Spadix florens purpureus vel viridis, sessilis, cylindricus, 4-8 mm crassus, 6-12 cm longus, longitudine spatham paulo superans; spadix fructifer ad 1.5 cm crassus, 16 cm longus; baccae vinosae.

TYPE: Peru, Loreto, primary forest along Río Aguaytia above mouth of Quebrada Yurac-Yacu, Oct. 1972, *Croat 20866* (MO).

ETYMOLOGY: This species is named for Dr. Thomas B. Croat of the Missouri Botanical Garden, whose prolific and well-annotated collections of neotropical Araceae are unsurpassed by any other collector.

DISTRIBUTION: Amazonian Ecuador, Peru east of the continental divide, and the adjacent territory of Acre, Brazil.

REPRESENTATIVE SPECIMENS: *ECUADOR.* NAPO: Path Río Bueno-Santa Rosa, Feb. 1968, *Harling, Storm, & Strom 7197* (GB). *PERU.* AMAZONAS: E. of

Huampami, Aug. 1974, *Berlin 1908* (MO). SAN MARTIN: Juan Jui, Alto Río Huallaga, 400-800 m., June 1936, *Klug 4396* (NY, GH, MO, US, F); Tocache Neuvo, Fundo San Rafael, Sept. 1970, *Schunke 4437* (US, GH, MO, F). HUANUCO: Jacintillo, Río Monzon, W of Tingo Maria, elev. 700 m, April 1976, *Plowman 5890* (GH); rocky slope above Río Huallaga at Tingo Maria, Oct. 1972, *Croat 21079* (MO). JUNIN: Prov. Tarma, San Luiz de Shuara, elev. 700 m, March 1976, *Plowman & Kennedy 5655* (F, GH); La Merced, elev. 700 m, June 1929, *Killip & Smith 23734* (US, NY). CUZCO: Prov. Paucartambo, Pilcopata, elev. 720 m, Feb. 1975, *Plowman & Davis 5032* (GH); Huacayumbe a Quincemil, elev. 680 m, *Vargas 18514* (US). LORETO: Balsapuerto, elev. 220 m, April 1933, *Klug 2988* (GH, US, MO, F, NY); Iquitos, Aug. 1929, *Killip & Smith 27139* (US). MADRE DE DIOS: Iberia, elev. 200 m, Nov. 1973, *Alfaro 1690* (MO). *BRAZIL.* ACRE: N bank of Rio Jura, opposite Cruzeiro do Sul, Oct. 1966, *Prance, Pena & Ramos 2914* (US, NY).

This apparently common species has been well-represented in herbaria for the last fifty years and annontated with half a dozen different names; yet it is clearly distinct and undescribed. It is distinguished from all the other anthuriums with palmatisect leaves and free segments by being a strictly terrestrial plant with a very short stem; the remaining species are scandent epiphytes with more or less elongate internodes. In addition, the lamina is thin and membranaceous as opposed to the thicker more coriaceous leaves of the scandent species. *Anthurium croatii* is in cultivation at SEL, growing from a propagule collected by Timothy Plowman.

19. **Anthurium sinuatum** Bentham ex Schott
Plate 5

Anthurium sinuatum Bentham ex Schott, Oest. Bot. Woch. 7:318 (1857). TYPE: Brazil, Pará, Obidos, Nov. 1849, *Spruce 538* (K, non vidi, photo SEL).

Anthurium martini Schott, Oest. Bot. Woch. 7:325 (1857). TYPE: French Guiana, *Martin s.n.* (K, non vidi, photo SEL).

Anthurium regnellianum Engler, in Martius, Fl. Brasiliensis 3(2):96 (1878). TYPE: Brazil, Prov. São Paulo, 1857, *Regnell 1297* (S, non vidi, isotype US).

Anthurium sylvestre S. Moore, Trans. Linn. Soc. Ser. 2, 4:503 (1895). TYPE: Brazil, Mato Grosso, between Santa Cruz and Tapira, *Moore 392* (BM, non vidi, photo SEL).

Scandent epiphyte. Stems green, subterete, 1-2 cm thick, the internodes (2)-5-11 cm long. Cataphylls triangular, 3-6 cm long, entire and persistent, not decomposing to fibers. Petiole 35-55 cm long; lamina 5-to 7-sect, the segments pedately arranged, obovate, 12-30 cm long, attenuate at the base, hardly or not at all petiolulate, the margins sinuate to repand, the apex acuminate, drying a dull milky brown color. Peduncle 25-50 cm long, subequalling the petiole in length. Spathe maroon, lanceolate to linear-lanceolate, 8-18 cm long, 1-2.5 cm wide, persistent. Spadix in flower slender, 10-18 cm long, 5-8 mm thick at the base, tapering to the apex, lavender or purple.

ETYMOLOGY: Latin *sinuatus*, 'bent, curved,' referring to the margins of the leaf segments.

DISTRIBUTION: Eastern South America, French Guiana to southern Brazil.

REPRESENTATIVE SPECIMENS: *FRENCH GUIANA:* without locality, *Martin s.n.* (K, non vidi, photo SEL). *BRAZIL.* AMAPÁ: road to Amapá, km 108, Rio Pedreira, July 1962, *Pires & Cavalcante 52204* (NY). PARÁ: Serra do Cachimbo, elev. 425 m, Dec. 1956, *Pires et al. 6169* (NY). CEARÁ: Serra de Baturite, Sept. 1910, *Ule 9003* (US). MATO GROSSO: 78 km S of Xavantina, elev. 500 m, June 1966, *Irwin et al. 17289* (NY, US). GOIAS: Serra Dourada, 30 km SE of Goias Velho, elev. 700 m, Jan 1966, *Irwinn, Souza & Santos 11921* (NY, US); 22 km E of Formoso, June 1956, *Dawson 15069* (US). MINAS GERAIS: São Vicente, Nov. 1949, *Maceda 1973* (US, MO). SÃO PAULO: Porto Pulador, 8.9 km NNE of Santa Eudoxia, elev. 500 m, Sept. 1961, *Campos 67* (US).

Anthurium sinuatum is most closely related to *A. clavigerum*, from which it is geographically distinct by occurring further to the south and east. The 5-7-sect leaves with sinuate margins of *A. sinuatum* are hardly distinguishable from juvenile forms of *A. clavigerum*. However, *A. sinuatum* has shorter and narrower spadices, longer peduncles relative to the petiole length, and longer internodes with the cataphylls entire rather than decomposing to fibers.

20. **Anthurium clavigerum** Poepp.

Anthurium clavigerum Poepp., Poepp. & Endlich., Nov. Gen. et Spec. III:84 (1845).
TYPE: Peru, Pampayacu, Oct. 1829, *Poeppig 1423* (W, non vidi, photo F).
Anthurium panduratum Martius ex Schott, Oest. Bot. Wochen. 5:273 (1855).
TYPE: Brazil, Rio Negro, *Martius 3115* (M, non vidi, photo US).
Anthurium holtonianum Schott, Oest. Bot. Wochen. 7:317 (1857).
TYPE: Colombia, La Paila, 30 March 1853, *Holton s.n.* (K, non vidi, photo SEL).
Anthurium repandum Schott, Oest. Bot. Wochen. 7:317 (1857).
TYPE: Colombia, Santa Marta, *Purdie s.n.* (K, non vidi, photo SEL).
Anthurium wendlandii Schott, Oest. Bot. Zeit. 8:182 (1858).
TYPE: Costa Rica, San Miguel, *Wendland* (GOET?, Illustrated by Schott Aroideae 827, W, non vidi, photo F, US, SEL).
Anthurium kalbreyeri N. E. Brown, Gard. Chron. 1881 pt. 2:117.
TYPE: Colombia, Antioquia, *Kalbreyer s.n.* (K, non vidi).
Anthurium burchellianum (Engler) MacBride, Field. Mus. Nat. Hist. Bot. 11:7 (1931). *Anthurium panduratum* Martius ex Schott var. *burchellianum* Engler, Das Pflanzenreich IV 23 B:279 (1905).
TYPE: Brazil, Pará, *Burchell 9632* (K, non vidi).
Anthurium obovatum Gleason, Bull. Torrey Bot. Club 56:9 (1929).
TYPE: Br. Guiana, Kopinang River, Anandabaru, April 1926, *Altson 475* (K, non vidi, photo F).
Anthurium monsteroides Steyermark, Fieldiana 28:93 (1951).
TYPE: Venezuela, Merida, Río Onia near Bolero, N. of Mesa Bolivar, May 1944, *Steyermark 56727* (F).

Robust scandent epiphyte. Stems to 6 m tall, 2-4 cm thick, subterete, the internodes 1-4 cm long. Cataphylls triangular, 6-11 cm long, decomposing to brown fibers, ultimately deciduous. Petiole to 1 m long, lightly canaliculate. Lamina (5)-7-13-sect, the segments pedately arranged, not radiating from a genicular nexus, the segments 25-65 cm long, 4-12 cm broad, strongly sinuate to repand, lobate, pinnatifid, or laciniate, the pinnae apically rounded

or acuminate. Peduncle 1/2-1/3 the petiole length, stout, terete. Spathe purple, linear to linear-lanceolate, 1-3.5 cm wide at the base, 18-40 cm long, acuminate at the apex, becoming reflexed after anthesis, persistent. Spadix purple, 20-40 cm long at anthesis, about 1 cm thick at the base, tapering to the apex; in fruit the tepals brown to purple, the berries purple, the spadix 2-4 cm thick, setting fruit in the lower portion only, usually 20-30-(50) cm with fruit; the apical, non-fruiting portion of the spadix often abscising.

ETYMOLOGY: Latin *clavigerum*, 'club-bearing,' in reference to the stout, club-like spadix.

DISTRIBUTION: Costa Rica to Bolivia, eastward to the Guianas and Brazil.

REPRESENTATIVE SPECIMENS: *COSTA RICA:* ALAJUELA: 8 km NE of Villa Quesada, elev. 650 m, Feb. 1966, *Molina et al. 17843* (GH, F, US); 2 km NE of Arenal Volcano, elev. 450 m, June 1972, *Lent 2672* (MO, F). LIMON: 9° 57'N × 83° 02'W, elev. 0-10 m, Nov. 1975, *Burger & Baker 176* (F); Alto Guayacan, SE of Siquirres, elev. 700 m, Oct. 1967, *Lent 1410* (F). CARTAGO: Atirro, elev. 600 m, Apr. 1896, *Donnell-Smith 6815* (US). PUNTARENAS: Slopes above Golfito, elev. 100-300 m, Jan. 1967, *Burger & Matta 4770* (F, US); W of Rincon de Osa, Osa Peninsula, elev. 100 ft., March 1967, *Raven 20864* (US, GH). *PANAMA.* CHIRIQUÍ: Burica Peninsula, San Bartolo Limite, 18 km W of Puerto Armuelles, elev. 450 m, Feb. 1973, *Busey 606* (MO, F, GH). PANAMA: 25 km NE of Cerro Azul on Río Piedras, elev. 550 m, Nov. 1974, *Mori & Kallunki 3387* (MO); km 10 on road to Carti, near El Llano, Sept. 1974, *Kennedy et al. 3396* (US). COCLÉ: Boca del Toabre, April 1969, *Lewis et al. 5577* (MO). CANAL ZONE: Barro Colorado Island, April 1968, *Croat 4654* (MO). DARIEN: Río Pucuro, elev. 650 m, Jan 1975, *Gentry & Mori 13924* (MO); Road from El Real to Pinogana, July 1962, *Duke 5156* (MO, GH). *COLOMBIA.* CHOCÓ: Rio Atrato near Río Sucio, Jan. 1974, *Gentry 9311* (MO); Río Nercua near Q. Barrial, elev. 100 m, May 1967, *Duke & Idrobo 11427* (US). EL VALLE: Murillo, elev. 1000 m, Sept 1938, *Dryander 2165* (US). ATLANTICO: Usiacuri, July 1935, *Elias 1337* (F); Los Pendales, 20-50 m, elev., Jan. 1946, *Dugand & Jaramillo 4159* (US). MAGDALENA: Parque Tayrona, Canaveral, elev. 76 m, May 1975, *Plowman & Davis 3723* (GH, F). N DE SANTANDER: Petrolea, elev. 200 ft., *M. B. & R. Foster 1783* (A). SANTANDER: Puerto Wilches, elev. 100 m, Dec. 1926, *Killip & Smith 14752* (GH); Puerto Barrio, June 1935, *Haught 1820* (NY, US); META: 20 km SE of Villavicencio, elev. 500m, March 1939, *Killip 34266* (US, F); Sierra de La Macarena, Cano Yerly, Nov. 1949, *Philipson et al. 1568* (US). VAUPES: Río Pacoa, Feb. 1952, *Schultes & Cabrera 15236* (US); Rio Apaporis, Cachivera, elev. 250 m, Sept. 1951, *Schultes & Cabrera 14018* (US). AMAZONAS: Rio Loretoyacu, elev. 100 m, *Schultes 6071*, Oct. 1944. PUTUMAYO: Puerto Asis, 285 m, March 1942, *Schultes 3396* (GH, F); Río Caqueta, near Puerto Limon, elev. 300 m, Dec. 1968, *Plowman 2187* (GH). *ECUADOR.* NAPO: Between Tena and Napo, Jan. 1940, *Asplund 10205* (S). *PERU.* AMAZONAS: Rio Santiago, 3-5 km above mouth, elev. 250 m, Oct. 1962, *Wurdack 2207* (US); Quebrada Huampami, elev. 250 m, April 1973, *Ancuash 154* (MO). HUANUCO: Castillo Alto, W. of Tingo Maria, elev. 800 m, April 1976, *Plowman 5860* (GH); E. of Tingo Maria, elev. 700 m, Nov. 1971, *Schunke 5169* (US, F). AYACUCHO: Río Apurimac Valley, near Kimpitiriki, elev. 400 m, May 1929, *Killip & Smith 22994* (US). LORETO: Puerto Arturo, below Yurimaguas, elev. 135 m, Aug. 1929, *Killip & Smith*

27814 (US); 17 km SE of Iquitos, July 1972, *Croat 18459* (MO); MADRE DE DIOS: Aeropuerto Maldonado, elev. 350 m, Jan. 1967, *Vargas 18791* (US). BOLIVIA. LA PAZ: San Bartolome, near Calisaya, elev. 750-900 m, July 1939, *Krukoff 10478* (GH, F, MO); Huachi, Bopi River Valley, elev. 900 m, Sept. 1921, *Rusby 473* (NY). *VENEZUELA:* ZULIA: Sierra de Perija, Quebrada Koshida, elev. 325 m, Aug. 1967, *Steyermark 99953* (NY,US); MERIDA: Río Onia, near Bolero, May 1944, *Steyermark 56727* (F). BOLIVAR: Río Paragua, Guaiquinima, elev. 285 m, April 1943, *Killip 37500* (US, NY); Abácapa-tepuí elev. 420 m, March 1953, *Steyermark 74784* (NY) AMAZONAS: Cerro de la Neblina, elev. 130 m, Oct. 1957, *Maguire, Wurdack & Maguire 41982* (NY); Río Orinoco, 6 km above mouth of Río Atapapo, elev. 125 m, Aug. 1959, *Wurdack & Adderley 43786* (NY). *GUYANA:* Pakaraima Mountains, Parima Falls, elev. 600 m, Nov. 1951 *Maguire & Fanshawe 32580* (NY, US, F). FR. GUIANA. Saut Macaque, Sept. 1961, *Schnell 11784* (US). BRAZIL. ACRE: Rio Moa, vicinity of Maita, April 1971, *Prance et al. 11975* (NY, US); Mouth of Rio Macauhan, Aug. 1933, *Krukoff 5353* (A, US, MO). AMAZONAS: Mouth of Rio Embira, June 1933, *Krukoff 5889* (A); Tapuruquara, Oct. 1971, *Prance et al. 15372* (US, NY, F). RORAIMA: Posto Mucajai, March 1971, *Prance et al. 11241* (NY, US); Serra da lua, by Igarape Camarao, Jan. 1969, *Prance et al. 9381* (US, NY). PARÁ: Santarem, Aug. 1969, *Silva & Souza 2386* (US); AMAPÁ: Serra do Navio, Rio Araguari, *Pires, Rodrigues, & Irvine 51238* (NY).

Anthurium clavigerum is perhaps the most striking species of the genus. The huge leaves are 7-13 pedatisect with each segment being repand to pinnatifid, the pinnae either rounded or acuminate. Several species have been separated on the basis of slight differences in leaf shape, but the abundant material available seems best treated as a single, widespread, variable species. *Anthurium clavigerum* occurs mostly in wet forests at low elevations, seldom being found above 500 m elevation. Specimens of *A. clavigerum* from the Putumayo region of Colombia have only 3-5 leaflets, the margins of which are sinuate rather than fully pinnatifid or laciniate. These may represent introgression from some other species, possible *A. triphyllum.*

21. **Anthurium eminens** Schott
Plate 5

Anthurium eminens Schott, Oest. Bot. Wochen. 5:273 (1855)

TYPE: Peru, Huanuco, confluence of Río Huallaga and Río Chiechas, Nov. 1829, *Poeppig 1558* (W, non vidi, photo F)

Robust scandent epiphyte to 8 m tall. Stem green, terete, 1.5-4 cm thick, the internodes 2-5 cm long; cataphylls disintegrating to a mass of white fibers which are persistent. Petiole canaliculate, 50-75 cm long. Lamina coriaceous, drying a dull green, palmately 11-15-sect, the geniculum forming a rounded nexus from which the segments radiate; segments of roughly equal size, petiolulate, the petiolules 4-12 cm long, the segments narrowly oblong to oblong, rarely elliptic, 5-10 cm wide, 20-40 cm long, the sides nearly parallel with the margins straight or slightly undulate, the apex acute with a 1.5-3 cm long acumen, the base truncate to acute, the lateral veins parallel, very regular, arising at a broad angle with the midrib, sometimes at right angles to the midrib. Peduncle terete, purplish, less

than 1/3 the petiole length. Spathe green with a purplish blush, or green adaxially and purple abaxially, becoming purple, linear lanceolate, 1-2 cm wide, 20-50 cm long, often deciduous. Spadix in flower purple, brown, green, or cream, cylindric, 25-45 cm long, 6-12 mm thick; in fruit to 60 cm long and 4 cm thick, the berries purple, usually only the basal portion of the spadix setting fruit.

ETYMOLOGY: Latin *eminens*, 'projecting' or 'eminent,' perhaps referring to the outstanding stature of the species among the palmatisect anthuriums.

DISTRIBUTION: Amazonia: Colombia to Bolivia, east to Brazil and the Guianas.

REPRESENTATIVE SPECIMENS: *COLOMBIA*. VAUPES: Río Apaporis, Soratama, Dec. 1951, *Schultes & Cabrera 14918* (GH); Río Apaporis, Jirjirimo, Sept. 1951, *Schultes & Cabrera 14067* (US). AMAZONAS: Loretoyacu River, Sept. 1946, *Schultes & Black 8320* (US). PUTUMAYO: Río Mocoa 4 km E of Mocoa, Nov. 1968, *Plowman 2029* (GH). *ECUADOR*. NAPO-PASTAZA: Auca base camp, 40 km S.. of Coca, Nov. 1974, *Gentry 12524* (MO). MORONA-SANTIAGO: Cordillera de Cutucú, 25 km SE of Logroño, Dec. 1975, *Madison 2532* (SEL) PERU. AMAZONAS: N of Río Cenepa, Dec. 1972, *Berlin 752* (MO); Quebrada Huampami, July 1974, *Kayap 1155* (MO). SAN MARTIN: Palo Blanco, Tocache Nuevo, Nov. 1972, *Schunke 5642* (F, MO, US). LORETO: Santa Rosa, below Yurimaguas, Sept. 1929, *Killip & Smith 28750* (US); 12 km SW of Iquitos, July 1972, *Croat 18189* (MO). CUZCO: Sahuayacu, above Pacchar, Jan. 1975, *Plowman & Davis 4884* (GH) *VENEZUELA*. AMAZONAS: Río Yatua near Cano Tauavaca, Dec. 1953, *Maguire, Wurdack, & Bunting 36507* (NY) GUYANA. Omanaguishin rapids in Mapuera, Nov. 1952, *Guppy G599* (NY) FRENCH GUIANA. 2°20'N × 52° 38'W, Sept. 1960, *Irwin, Pires, & Westra* 48253 (NY) *BRAZIL*. AMAZONAS: Río Javarí, behind Palmeiras Army Post, Aug. 1973, *Leiras et al. P17026* (NY); Humayta, near Tres Casas, Oct, 1934, *Krukoff 6318* (A); Jurua Miry, July 1901, *Ule 5733* (Photo SEL). AMAPÁ: Río Iaue, 0.5 km E of confluence w. Rio Oiapoque, Aug. 1960 *Irwin, Pires & Westra 48253* (NY).

Anthurium eminens is a robust species easily recognized by several features. The leaf is palmately divided into 11-15 segments which radiate from a central nexus. The leaflets are long-petiolulate, oblong in shape and with very regular parallel lateral veins. The spathe and spadix are 20-50 cm long and borne on a stout peduncle.

Poeppig's field notes describe the species as 'arborescens,' which was indicated by Schott in the type description. This has been the source of some confusion; however, there are no arborescent anthuriums in this section and Poeppig's specimen clearly pertains to this species, which is a scandent epiphyte.

One Peruvian specimen *(Schunke 5642)* has elliptic leaflets with undulate margins rather than oblong leaflets with straight margins. It matches very closely a specimen at Geneva (ex Hort. Schoenbrunn s.n.) which was the basis of *Pothos undatus* Schott (nomen nudum). This name was applied by Kunth to material at Berlin and published (1841) as *Anthurium undatum* Kunth. However, Kunth's description was based on a different plant than that at Vienna, in reality a specimen of *A. pentaphyllum*. The name *A. undatum* was subsequently cited by Engler (1905) with Schott as author,

and applied to a description which combined aspects of both Schott's and Kunth's plants.

I consider the rounder leaflets and undulate margins of Schott's *Pothos undatus* to represent variation within *Anthurium eminens* not worthy of recognition by separate taxonomic status. The recent Schunke collection of this form is from the Huallaga valley, a region where there is considerable variability in *A. eminens* and where it apparently hybridizes with several related species. The name *Anthurium undatum* Kunth must be considered a synonym of *A. pentaphyllum*, regardless of Schott's unpublished use of the epithet or Engler's later interpretation of it.

Specimens of *A. eminens* have often been determined as *A. wittianum* Engler, a name first used by Engler on a specimen from Brazil *(Ule 5733*, B). However, *A. wittianum* was never validly published.

22. **Anthurium polyschistum** Schultes & Idrobo
Plate 6

Anthurium polyschistum Schultes & Idrobo, Bot. Mus. Leaflets, Harvard Univ. 18:310 (1959)

TYPE: Colombia, Amazonas, Loretoyacu River, elev. 100 m., March 1946, *Schultes 7179* (US)

Slender creeping plant, terrestrial or a low epiphyte. Stem smooth, green, 5-7 mm thick, the internodes 6-10 cm long. Cataphylls triangular, 3-4 cm long, remaining intact or decomposing into persistent fibers. Petiole subterete, lightly channeled above, 6-22 cm long. Lamina (9)-11 to 15-sect, the segments radiating from a genicular nexus, not pedately arranged; the segments linear-lanceolate, 5-15 mm broad, 8-15 cm long, attenuate at the base, sessile or shortly petiolulate, acuminate at the apex, membranaceous, paler below, the veins inconspicuous except for the midrib, in some specimens the segment margins crispate. Peduncle green, terete, 8-28 cm long, in mature plants somewhat longer than the petiole. Spathe green, lanceolate, 6-10 cm long, becoming reflexed. Spadix in flower slender, green, 3-6 mm thick, 6-14 cm long; in fruit becoming to 2 cm thick and 18 cm long, the tepals remaining deep green, the berries obovoid, plum to magenta in color, sweet.

ETYMOLOGY: Greek *poly-*, 'much,' and *-schistum*, 'cleft' or 'divided,' referring to the palmately much-divided leaf.

DISTRIBUTION: Colombia, Ecuador, and northern Peru, in the Amazonian retions.

REPRESENTATIVE SPECIMENS: *COLOMBIA.* AMAZONAS: Río Amazonas, 2 km downriver from Puerto Nariño, Feb. 1969, *Plowman et al. 2409* (GH). *ECUADOR.* NAPO: Santa Rosa at Río Napo, April 1972, *Harling 1995* (MO) PASTAZA: Río Pacayacu, vicinity of Canelos, March 1971, *Lugo 1615*, (MO, GB). MORONA-SANTIAGO: Cordillera de Cutucú, region of 2°46'S × 78°06'W, Nov. 1976, *Madison, Bush, & Davis 3137* (SEL). *PERU:* LORETO: Soledad, on Río Itaya, elev. 110 m, Sept. 1929, *Killip & Smith 29744* (US).

Anthurium polyschistum is one of the smallest species of section *Schizoplacium*, with each of the numerous leaflets less than 15 cm long. It is sometimes scandent but more often creeps along the ground; in parts

of eastern Ecuador it is locally abundant though seldom fertile. In the type specimen the leaflets are narrow with straight margins, but more commonly encountered is a widely cultivated introduction from Ecuador which has broader leaflets with strongly crispate margins.

23. **Anthurium polydactylum** Madison, sp. nov.
Plate 6

Planta epiphytica scandens. Caudex teres, viridis, 1-2 cm crassus, internodiis 6-10 cm longis. Cataphylla 7-11 cm longa, alba, fibrosa, pogonoidea. Petiolus 40-50 cm longus, breviter vaginatus. Lamina coriacea, profunde 13-17-secta, segmenta sessilia, linearia, 16-30 cm longa, 2-3 cm lata, basi attenuata, apice acuminata. Pedunculus 6-10 cm longus. Spatha alba, linearilanceolata, circa 13 cm longa, 1 cm lata, reflexa. Spadix purpureus, sessilis, cylindricus, 3-6 cm crassus, circa 25 cm longus. Fructus ignotus.

TYPE: Peru, Dept. Huanuco, Prov. Leoncio Prado, Jacintillo along Río Monzon, W of Tingo Maria, elev. 800 m, March 1976, *Plowman & Kennedy 5769* (GH).

ADDITIONAL SPECIMEN EXAMINED: Peru, Huanuco, Tingo Maria, 650-700 m elev, Sept. 1954, *Ferreyra 10306* (NY).

ETYMOLOGY: Greek *polydactylum*, 'many-fingered,' referring to the large number of palmately arranged leaf segments.

This species is close to *Anthurium eminens*, with which it has in common the characters of cataphylls persisting as white fibers, an elongate, myosuroid purple spadix, and linear reflexing spathe. It differs by its smaller size in every respect and by the structure of the leaf. In *A. eminens* the 11-15 leaflets are long-petiolulate with their laminae truncate to acute at the base and with prominulous lateral veins, whereas in *A. polydactylum* the 13-17 leaflets are narrower, sessile, and attenuate at the base, and the lateral veins are indistinct.

24. **Anthurium brevipedunculatum** Madison, sp. nov.
Plate 6

Planta epiphytica scandens. Caudex teres, viridis, gracilis, 3-8 cm crassus, internodiis 3-8 cm longis. Cataphylla 1-3 cm longa, naviculiformia, marcescentia. Petiolus 15-25 cm longus, breviter vaginatus. Lamina 3-5-secta, segmenta sessilia vel breviter petiolulata, obovata, 10-18 cm longa, 3-6 cm lata, basi attentuata vel acuta, apice caudata. Pedunculus 0.2-3 cm longus. Spatha rufa vel rubiginosa, purpurascens, late ovata vel triangularis, 1.5-3 cm lata, 2-5 cm longa, erecta, persistens. Spadix sessilis, brunneogriseus, conicus, 5-10 mm crassus, 3-4 cm longus, spatha leviter superans. Spadix fructifer 4-6 cm longus, obesus, 1.2-2.5 cm crassus. Bacca purpurea, sphaeroidea, breviter rostrata.

TYPE: Peru, Loreto, Mishuyacu, near Iquitos, elev. 100 m, forest Oct.-Nov. 1929, *G. Klug 514* (HOLOTYPE: US, ISOTYPES: F, NY).

ETYMOLOGY: Latin *brevi*, 'short,' and *pedunculatum*, 'pedunculate,' referring to the very short peduncles of the species, usually less than 2 cm long.

DISTRIBUTION: Ecuador and Peru, Amazonian drainage at lower elevations.

REPRESENTATIVE SPECIMENS: *ECUADOR:* NAPO: Lower Rio Aguarico, above Puerto Loja, Feb. 1968, *Harling, Storm & Strom 7421* (GB) *PERU:* HUANUCO: Prov. Pachitea, Bosque Nacional de Iparia, elev. 300-400 m, March 1967, *Schunke 1765* (US, F). SAN MARTIN: Río Sion, SW of Case-Río de Sion, Oct. 1969, *Schunke 3537* (US, F). LORETO: Soledad, on Rio Itaya, Sept. 1929, *Killip & Smith 29813* (US); Yurimaguas, elev. 135 m, Sept. 1929, *Killip & Smith 27639* (US); Balsapuerto, Aug. 1929, *Killip & Smith 28565* (US, NY); Iquitos, Aug. 1929, *Killip & Smith 27466* (US); Quebrada de Tabaco, W of Iparia, Aug. 1968, *Schunke 2680* (F, US); Quebrada Tahuayo, above Tamishiyaco, Aug. 1972, *Croat 19861* (MO).

This species is distinguished by the nearly sessile inflorescences with peduncles mostly only 1-2 cm long. The purple or deep brownish-red spathe is ovate or triangular, and persists in the erect position during the development of the fruits. The purple berries are globose with a short apical beak.

Anthurium brevipedunculatum is closely related to *A. pentaphyllum;* apparently the two have evolved from a common ancestor in geographic isolation. *Anthurium pentaphyllum* is distinguished by the longer peduncles, the green spathe either deciduous or reflexing, and the berries lacking an apical beak.

25. **Anthurium pentaphyllum** (Aubl.) G. Don
Plate 6

Scandent epiphyte to 5 m tall. Stem green, smooth, terete, 0.5-2 cm thick, the internodes 2-8 cm long. Cataphylls triangular, 2-5 cm long, marcescent, abscising before the adjacent leaves mature. Petiole green, smooth, terete, 20-55 cm long. Lamina 5-to 9-sect, thinly subcoriaceous to somewhat fleshy, the leaflets sessile to 2 cm petiolulate, palmately or slightly pedately arranged, subequal in size, ovate, 10-22 cm long, 4-10 cm wide, the apex acuminate to mucronate, the base obtuse to cuneate, the midvein prominent on both sides, the other veins prominent abaxially only, indistinct or furrowed adaxially, the collective vein 6-14 mm remote from the margin. Peduncle stout, subterete, smooth, 6-18 mm thick, 1-7-(15) cm long. Spathe green or lightly suffused with purple, coriaceous, lanceolate to ovate, subauriculate at the base, 3-7-(10) cm long, 0.7-3 cm wide, reflexing or deciduous. Spadix sessile, lavender to light gray or brown, conical, 8-20 mm thick at the base, tapering to the apex, 4-10-(15) cm long. Berries globose, red to purple.

KEY TO VARIETIES OF *ANTHURIUM PENTAPHYLLUM*

A. Spathe deciduous after anthesis (Mexico to Venezuela). . . . . .
  B. Flowering spadix 5-10 cm long, peduncle 2-7 cm long, Central America and Mexico . . . . . var. *bombacifolium*
  B. Flowering spadix 10-15 cm long, peduncle 5-12 cm long, Venezuela . . . . . var. *digitatum*
A. Spathe persistent in fruit, (Guianas to Brazil) . . . . . var. *pentaphyllum*

25a. **Anthurium pentaphyllum** (Aubl.) G. Don var. **pentaphyllum**

Anthurium pentaphyllum (Aubl.) G. Don, in Sweet, Hort. Brit. ed 3:633 (1839); *Dracontium pentaphyllum* Aublet, Hist. des Plantes de la Guiane Fr. 2:837 (1775); *Pothos pentaphylla* (Aubl.) Willd., Spec. Plant. ed. 4, 1:687 (1797).

TYPE: French Guiana, Cayenne, the illustration accompanying the description (Aublet Pl. 326) serves as the type.

Anthurium heptaphyllum (Vell.) Stellfeld, Mus. Parana. Arq. 8:175 (1950)
Pothos heptaphylla Vell., Flor. Flumin. 9:t.125 (1835)
TYPE: Brazil, maritime forests; the illustration (Flor. Flumin. 9:t.125) is the type

Anthurium enneaphyllum (Vell.) Stellfeld, Mus. Parana. Arq. 8:175 (1950)
Pothos enneaphylla Vell., Flor. Flumin. 9:t.126 (1835)
TYPE: Brazil; the illustration (Flor. Flumin. 9:t.126) is the type

Anthurium aubletti Kunth, Enumeratio Plant 3:81 (1841)
TYPE: Guiana, Cayenne; this is a superfluous nomen novum for *A. pentaphyllum* (Aubl.) G. Don based on *Dracontium pentaphyllum* Aubl.

Anthurium undatum Kunth, Enumeratio Plant. 3:82 (1841);
TYPE: Brazil; based on a plant cultivated at Berlin, the description is the type

Anthurium variabile Kunth, Enumeratio Plant 3:81 (1841)
TYPE: This is a superflous nomen novum for *Pothos hepataphylla* Vell.

Anthurium pachiraefolium Schott, Oest. Bot. Woch. 5:273 (1855)
TYPE: Brazil, Bahia, Ilheos, illustrated by Schott Aroideae 847 (W, non vidi, photo F, US)

Anthurium sonderianum Schott, Bonplandia 6:372 (1858)
TYPE: Brazil, Herb. Sonder, illustrated by Schott Aroideae 863 (W, non vidi, Photo F)

Anthurium grossum Schott, Oest. Bot. Zeit. 9:101 (1859) *A. pentaphyllum* (Aubl.) G. Don var. *grossum* (Schott) Engler in D.C. Monog. Phan. 2:203 (1879)
TYPE: Brazil, Bahia, Ilheos, *Ridley* (LE, non vidi, illustrated by Schott Aroideae 860, W, non vidi, photo F).

Anthurium pachiraefolium Schott var. *angustifolium* Engler, Engl. Bot. Jahrb. 1:482 (1883).
TYPE: Brazil, Espirito Santo, *St. Hilaire 387* (P, non vidi)

ETYMOLOGY: Greek *pentaphyllum*, 'five-leaved,' referring to five segments of the compound leaf.

DISTRIBUTION: Atlantic Coast of S. America, Trinidad to S. Brazil.

REPRESENTATIVE SPECIMENS: *TRINIDAD.* Mt. Tamana, April 1920, *Britton, 743* (NY). *SURINAME.* Forested lower slopes of Juliana Top, elev. 600 m, Aug. 1963, *Irwin et al. 54853* (NY); Jodensavanne-Mapane Creek area, Oct. 1953, *Lindeman 4988* (NY). *FRENCH GUIANA:* Cayenne, 1858, *Sagot s. n.* (US); Cayenne, July 1921, *Broadway 861* (GH) *BRAZIL.* AMAPÁ: 2°53'N × 52°22'W, Aug. 1960, *Egler & Pires 47738* (NY). PARÁ: Gurupa, Nov. 1929, *Killip & Smith 30606* (US) Rio de Janeiro: Petropolis, 500-700 m elev., April 1952, *Smith 6484* (US) SAÕ PAULO: Cubatão, elev. -0-50 m, March 1929, *Smith 2034* (GH); Piassaguera, Oct. 1921, *Hoehne 8001* (NY). PARANÁ: Rio Cachoerinha, April 1951, *Harshbach 2273* (US); SANTA CATARINA: Azambuja, Brusque, elev. 35-135 m, March 1952, *Smith & Reitz 6126* (US).

25b. **Anthurium pentaphyllum** (Aubl.) G. Don var. **digitatum** (Jacq.) Madison comb. et stat. nov.

Anthurium pentaphyllum (Aubl.) G. Don var. *digitatum* (Jacq.) Madison
Pothos digitata Jacq., Collectanea 4:119 (1790); *Anthurium digitatum* (Jacq.) G. Don, in Sweet, Hort. Brit. ed. 3:633 (1839)
TYPE: Venezuela, Caracas, illustrated by Jacq. Icones t.611 (1793)

ETYMOLOGY: Latin *digitatum*, 'fingered,' referring to the hand-like appearance of the palmatisect leaf.

DISTRIBUTION: Venezuela

REPRESENTATIVE SPECIMENS: *VENEZUELA.* FALCON: Sierra de San Luis, near Puente de Jobo, elev. 8-900 m, July 1967, *Steyermark 99258* (US). D.F.: Colonia Tovar, 1800 ft., 1854-5, Fendler 1333 (GH). MIRANDA:4 km W of Santa Terese, March 1943, *Killip & Tamayo 37043* (US); Quebrada de Turuma, near Guarenas, Dec. 1923 *Pittier 11262* (US, NY, GH). ANZOATEGUI: Río Leon, NE of Bergantin, elev. 500 m, Feb. 1945, *Steyermark 61035* (F, NY). BOLIVAR: E of Miamo, Altiplanicie de Nuria, elev. 500 m, Jan. 1961, *Steyermark 88517*

25c. **Anthurium pentaphyllum** (Aubl.) G. Don var. **bombacifolium** (Schott) Madison, comb. et stat. nov.

Anthurium bombacifolium Schott, Oest. Bot. Zeit. 8:182 (1858).
TYPE: Costa Rica, Atenas, *Hoffman s.n.* (B, non vidi, illustrated by Schott Aroideae 829, W, non vidi, photo F, SEL)

Anthurium aemulum Schott, Bonplandia 7:165 (1859)
TYPE: Mexico, Colipa, 1841, *Liebmann 15799* (C, non vidi, photo US)

Anthurium karwinskyi Schott, Oest. Bot. Zeit. 9:101 (1859)
TYPE: Mexico, *Karwinsky* (LE, non vidi, photo US)

ETYMOLOGY: Latin *bombacifolium*, 'bombax leaved,' referring to the resemblance of the palmatisect leaf to that of a bombax tree.

DISTRIBUTION: Mexico to Panama

REPRESENTATIVE SPECIMENS: *MEXICO.* PUEBLA: 47 km W of Papantla on road 130, elev. 300 m, Aug. 1972, *Madison 605* (GH). VERA CRUZ: Fortuno, elev. 30-50 m, March 1937, *Williams 8721* (F); 8 km S of Misantla on road to Xalapa, elev. 750 m, Dec. 1971, *Madison 592* (GH). OAXACA: Ubero, elev. 30-90 m, May 1937, *Williams 9289* (F). CHIAPAS: Esperanza, *Lundell 1160* (F) *GUATEMALA.* PÉTEN: Laguna Pacay, elev. 200 m, Nov. (GH, US, F). ALTA VERAPAZ: Cubilquitz, elev. 350 m, Oct. 1904, *von Tuerckheim 8766* (US); Chama, July 1920, *Johnson 408* (US). IZABAL: Cerro San Gil, elev. 300 m, Feb. 1941, *Standley 88212* (F) ESCUINTLA: San Juan Mixtan, elev. 500 ft, April 1890, *Donnell-Smith 2236* (US) SANTA ROSA: Río de las Pitas, E of Taxisco, elev. 225 m, Dec. 1940, *Standley 78961* (F). BELIZE: Sibun River, Jan. 1935, *Gentle 1491* (GH, US, NY, MO); Mile 22, Stann Creek Railway, March 1932, *Schipp S-279* (NY, MO). *HONDURAS:* ATLANTIDA: Lancetilla Valley, near Tela, elev. 20-600 m, March 1928, *Standley 56554* (US, F); 5 km S of La Ceiba, elev. 100 m, Sept. 1972, *Madison 706* (GH) *COSTA RICA.* ALAJUELA: Capulin, elev. 80 m, April 1924, *Standley 40127* (US); 2.5 km NE of Arenal Volcano, elev. 450 m, Aug. 1972, *Lent 2765* (F). GUANCASTE: Los Ayo-

tes, 600-700 m, Jan. 1926, *Standley & Valerio 45595*. HEREDIA: 5 km N of Puerto Viejo, elev. 100 m, Jan. 1967, *Burger & Matta 4338* (NY). LIMON: Siquierres, July 1923, *Stevens 708* (US); Guapiles, April 1941, *Leon 640* (F). CARTAGO: Juan Vinas, June 1911, *Pittier 3659* (US). PUNTARENAS: Santo Domingo de Golfo Dulce, March 1896, *Tonduz 7178* (US). *PANAMA*. CHIRIQUI: 2.5 km W of Puerto Armuelles, elev. 80 m, Feb. 1973, *Liesner 50* (US). COLON: Fato, July 1911, Pittier 3864 (US).

As indicated by the large number of synonyms, there has been considerable dispute over the delimitation of this species. The concept as here constituted includes the anthuriums with 5-9-sect leaves and a blunt, tapering spadix which is lavender to pale gray or light brown in color at time of flowering and is borne on a short, thick, peduncle. Three geographically distinct varieties are recognized. In Central America the spathe is deciduous soon after anthesis: often it splits longitudinally into several segments which curl up abaxially before abscising. The Venezuelan material (var. *digitatum)* also has a deciduous spathe and is distinguished by being a more robust plant with a longer (10-15 cm) spadix. In the material from the Guianas to southern Brazil the spathe is persistent to the time of fruiting and the spadices are smaller than in var. *digitatum*.

26. **Anthurium kunthii** Poeppig

Plate 6

Anthurium kunthii Poeppig, in Poeppig & Endl., Nov. gen. et Spec. 3:84 (1845),

TYPE: Peru, Maynas, *Poeppig* (W, destroyed, isotypes?)

Anthurium hoffmannseggii Schott, Oest. Bot. Woch. 7:325 (1857)

TYPE: Brazil, *Hoffmannsegg* (B, non vidi, illustrated by Schott Aroideae No. 890, photo SEL)

Scandent epiphyte of lower tree trunks. Stem green, terete, smooth, 6-15 mm thick, internodes 4-20 cm long. Cataphylls triangular, 3-6 cm long, entire, marcescent. Petiole green, terete, 25-60 cm long. Lamina 5-7-sect, the segments ovate-elliptic to obovate, 8-20 cm long, 4-6 cm wide, acuminate at the apex, acute to cuneate to attenuate at the base, petiolule 1-4 cm long, the petiolules radiately arranged, not pedate. Peduncle green, terete, 2-6 mm thick, equalling or slightly shorter than the petiole. Spathe purple, lanceolate, 7-12 cm long, 1-2 cm broad, becoming reflexed and persistent. Spadix purplish, narrow, tapered, 6-11 cm long, 4-8 mm thick at the base; in fruit larger, the berries plum to purple.

ETYMOLOGY: After Carl Sigismund Kunth (1788-1850), German botanist.

DISTRIBUTION: Costa Rica to Peru.

REPRESENTATIVE SPECIMENS: *COSTA RICA*. LIMON: La Colombiana farm, elev. 60 m, March 1924, *Standley 36807* (US); 9°37'N × 82°49'W, elev. 50 m, Feb. 1977. *Burger & Visconti 10373* (F) *PANAMA*. BOCAS DEL TORO: Water Valley, July 1940, *von Wedel 614* (MO, F); Milla, July 1971, *Croat & Porter 16371* (MO). PANAMÁ: Río Tapia, Dec. 1923, *Standley 28258* (US); Madden Lake, April 1972, *Gentry & Tyson 5041* (MO). CANAL ZONE: Barro Colorado Island, Feb. 1969, *Croat 8238* (MO). SAN BLAS: Río Mulatupo, Aug. 1967, *Elias 1766* (US, MO). DARIEN: Río Chico, Dec. 1966,

Burch, Oliver & Solis 1113 (US, GH, MO). *COLOMBIA.* SANTANDER: Barranca Bermeja, Magdalena Valley, 100-500 m, July 1934, *Haught 1302* (F). CAUCA: Cartago, 800 m, *Lehman 7361* (F). META: Hacienda Los Micos elev. 400 m, Sept. 1974, *Plowman, Davis, & Jacobs 4229* (GH); Llanos de San Martin, elev. 400 m, Nov. 1972, *Madison 845* (GH) AMAZONAS: Loretoyacu River, elev. 100 m, Oct. 1946, *Schultes & Black 8535a* (US). VICHADA: Rio Guaviare, Nov. 1948, *Molina & Barkley 18V1109 ECUADOR.* NAPO: Dureno, elev. 450 m, Aug. 1974, *Plowman, Sheviak, & Davis 4013* (GH) *PERU.* LORETO: La Victoria, Aug. 1929, *Williams 2125* (F); 12 km SW of Iquitos, Sept. 1972, *Croat 20090* (MO)

Anthurium kunthii has been confused with *A. pentaphyllum* from which it is distinguished by the long, slender peduncles nearly equal in length to the petiole, as opposed to the short, stout peduncles of *A. pentaphyllum.* The spadix of *A. kunthii* is narrow and tapered, purple to brown, in contrast to the conical pale lavender spadix of *A. pentaphyllum*.

27. **Anthurium buchtienii** Krause

Anthurium buchtienii Krause, Bot. Jahrb. 44, Beibl. 101:10 (1910)

TYPE: Bolivia, San Carlos Mapiri, elev. 700 m, Aug. 1907 *Buchtien 1291* (Holotype HBG? non vidi, isotype US)

Scandent epiphyte. Petiole 75 cm long, deeply canaliculate. Lamina 11-sect, the segments oblanceolate, 30-40 cm long, 6-8 cm wide, shortly petiolulate, attenuate at the base, the apex abruptly contracted into a cuspidate or caudate tip 2-3 cm long; peduncle terete, 70 cm long, slightly shorter than the petiole. Spathe purple, linear-lanceolate, 6-9 cm long. Spadix cylindric, tapered, 5-7 mm thick at the base, 8-10 cm long.

ETYMOLOGY: After Otto Buchtien, collector of the type.

DISTRIBUTION: Bolivia, known only from the type collection.

Anthurium buchtienii appears to represent a geographic and morphological segregate of *A. kunthii* to which it is closely related. It is distinguished by its much larger leaves with the segments strongly oblanceolate and caudate, by its canaliculate rather than terete petioles, and by its longer peduncles.

28. Species dubium: **Anthurium araliifolium** Regel

Anthurium araliifolium Regel, Gartenflora 19:98 (1876)

TYPE: The illustration accompanying the description (t. 648) serves as the type, based on a cultivated plant.

This name refers to an acaulescent plant with pedately 7-lobed leaves known only from a single cultivated specimen. The plant was exhibited in the 1870's in St. Petersburg and was said to have come from New Caledonia. Engler (1905) considered that it was probably from Central America.

In my opinion the name refers to a hybrid between *Anthurium podophyllum* and an unidentified species with a cordate leaf. The habit of the plant, the pale veins of the dull green leaf, the elongate peduncle, and the dimensions and appearance of the spadix all suggest that *A. araliifolium* has as one of its parents *A. podophyllum*, which was commonly cultivated in Europe at the time.

I obtained a similar probable hybrid from a commercial nursery in Florida under the trade name *Anthurium lowii* (*Madison 1921*, SEL). The aspect of the plant, the nature of the inflorescence, and the golden yellow fruits point to *A. pedato-radiatum* as one of the parents; presumably the other parent was a cordate-leaf species.

In this group, as with all anthuriums, the possibility must be considered that plants known only in cultivation from uncertain origins may be hybrids. This is especially so since many of the species flower prolifically and are easily crossed.

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