

FIGURE 41.—*Neurolepis aristata* (Munro) Hitchcock (A) and *Neurolepis pittieri* McClure (B-N). A, Flowering plant,  $\times 0.6$ ; B, branch of an inflorescence,  $\times 2.4$ ; C, spikelet,  $\times 4.8$ ; D, E, transitional glumes,  $\times 4.8$ ; F and G, sterile lemmas,  $\times 4.8$ ; H, fertile lemma,  $\times 4.8$ ; I, palea,  $\times 4.8$ ; J, lodicule complement,  $\times 4.8$ ; K, stamen,  $\times 4.8$ ; L, gynoecium,  $\times 4.8$ ; M, apex of leaf sheath,  $\times 1.2$ ; N, diagrammatic cross-section of floret. Drawing A based on *Cuatrecasas 14813* (US) and B-N on *Pittier 10067* (US).

Freier's study (1945:103) of *Neurolepis pittieri* and *N. aristata* reveals a bambusoid type of leaf anatomy in both species. It seems to me, however, not unlikely that intensive comparative studies of the known members of the genus *Neurolepis*, undertaken on a broader interdisciplinary basis, may result in their being given a revised disposition within the subfamily Bambusoideae, possibly as a tribe distinct from the "true bamboos."

The genus was treated briefly by Soderstrom (in Maguire, et al., 1969) and a key given to the nine species which he recognized. Gould and Soderstrom (1970) reported a chromosome count of  $2n = 48$  for a specimen of *N. aperta* from Colombia.

DISTRIBUTION.—Species of *Neurolepis* have been reported from an area that embraces sites in Peru, Ecuador, Colombia, Venezuela, and the island of Trinidad. All are reported from relatively high elevations (2900–4500 m); some of them inhabit ecological formations characterized as "páramo." According to Munro (1868:73) *Chusquea aperta* Munro [= *Neurolepis aperta* (Munro) Pilger] was collected in Colombia by Goudot, who recorded for it the local name "Chusquea de Páramo." Notes by Jameson, collector of the type-specimen of *Chusquea aristata* Munro [= *Neurolepis aristata* (Munro) Hitchcock] are quoted by Munro (1868:61) as follows: "It is a tall reedy grass, found only on the Eastern chain of the Andes. At 13,000 feet [ca. 4000 m] it makes its appearance, in irregular patches; at 15,000 feet [5000 m] it completely covers the whole surface, forming what the natives call a 'carizal,' impenetrable to man or beast. It continues upwards nearly to the limits of perpetual snow."

#### Annotated Checklist of Recognized Species of the Genus *Neurolepis*

1. *Neurolepis angusta* Swallen, in Maguire, Wurdack, et al., 1957:249.

*Neurolepis densiflora* Swallen, in Maguire, Steyermark, Wurdack, et al., 1957:399.

2. *Neurolepis aperta* (Munro) Pilger, in Engler and Prantl, 1906:21.

*Planotia aperta* Munro, 1868:73.

*Planotia ingens* Pilger, 1898:721.

*Neurolepis ingens* (Pilger) Pilger, in Engler and Prantl, 1906:21.

3. *Neurolepis aristata* (Munro) Hitchcock, 1927b:313 (Figure 41A).

*Chusquea aristata* Munro, 1868:61.

*Planotia acuminatissima* Munro, 1868:72.

*Planotia stübelii* Pilger, 1898:720.

*Planotia tessellata* Pilger, 1898:720.

*Neurolepis acuminatissima* (Munro) Pilger, in Engler and Prantl, 1906:21.

*Neurolepis stübelii* (Pilger) Pilger, in Engler and Prantl, 1906:21.

*Neurolepis tessellata* (Pilger) Pilger, in Engler and Prantl, 1906:21.

*Neurolepis weberbaueri* Pilger, 1921:446.

4. *Neurolepis diversiglumis* Soderstrom, in Maguire, et al., 1969:16–18, 20.

5. *Neurolepis elata* (Kunth) Pilger, in Engler and Prantl, 1906:21.

*Platonia elata* Kunth, 1830:327, pl. 76.

*Planotia elata* (Kunth) Munro, 1868:71.

*Planotia nobilis* Munro, 1868:72.

*Neurolepis nobilis* (Munro) Pilger, in Engler and Prantl, 1906:21.

6. *Neurolepis glomerata* Swallen, in Maguire, Steyermark, Wurdack, et al., 1957:399.

*Neurolepis nigra* Swallen, 1957b:400.

7. *Neurolepis mollis* Swallen, 1931:14.

8. *Neurolepis pittieri* McClure, 1942:181, fig. 8 (Figure 41B-N).

9. *Neurolepis virgata* (Grisebach) Pilger, in Engler and Prantl, 1906:21.

*Platonia virgata* Grisebach, 1864:530.

*Planotia virgata* (Grisebach) Munro, 1868:71.

#### *Rhipidocladum* McClure, new genus

##### FIGURE 42

Plantae unicaespitosae, inermes. Rhizomata pachymorpha. Culmi infra-saltem medium sese sustinentes erecti, sursum vulgo vel scandentes vel

apice penduli; internodiis cylindratis, intus fistulosis. Ramorum complementum ad nodos medianos culmorum insertum; eiusdem axi primario appanato, subtriangulato, ad culmi superficiem appresso adnatoque, neque cylindrato neque segmentato; axibus secundariis numerosis, gracilibus, subaequalibusque, margine axis primarii insertis, ita ordinatione rhipidiforme sese ostendentibus. Foliorum lamina venulis transversis in speciebus plerisque extus vulgo haud manifestis, alibi plus minusve clare visibilibus.

Inflorescentiae semelauctantes, ramificatione typice racemosa, rachidi vel percurrenti vel deliquescenti; spiculae insertione et orientatione diversae; prophyllis bracteisque nullis. Glumae transitionales (glumae vecuae et lemmata sterilia) numero diversae atque nonnumquam inconstantes. Spiculae vel sessiles vel subsessiles vel pedicellatae, flosculos hermaphroditos vel paucos vel plures continentes, apice in anthesio depauperato sterilique terminantes. Lemma fertile maturitate saltem paleam suam basi tantum circumplectens. Palea dorso 2-carinata et late sulcata, antice hians. Lodiculae (nonnumquam -2, -1, -0) typice 3, duabus anterioribus plus minusve asymmetricis atque geminatis, posteriore symmetrica sat minoreque. Stamina 3, filamentis filiformibus liberisque. Stigmata 2. Fructus maturus caryopsidens; caryopsis oblonga sulcataque, leviter compressa, apice cuspidata; pericarpio vel pergamineo vel crustaceo, glabro, vel opaco vel nitido, crassitudine uniformi; sulco et embryotegio aut valde aut debiliter manifestis.

Plants unicespitate, unarmed. Rhizomes pachymorph. Culms self-supporting below, commonly either scandent or pendulous above, the internodes cylindrical, hollow. Primary branch buds (when present) at midculm nodes, solitary, each containing a single initial primordium. Branch complement at midculm nodes monoclade, of restricted insertion, the primary element neither cylindrical nor segmented, but thin, roughly triangular, appressed and more or less strongly adnate to the surface of the culm, the secondary axes numerous, slender, subequal, arising from primordia formed on the margin of the flat, primary element, of close-set apiculate insertion, with a fan-like pattern of orientation. Leaves (blades of leaf sheaths) with transverse veinlets in most species not at all (or scarcely)

manifest, but in an occasional one more or less clearly visible externally.

Inflorescences semelauctant, typically of racemose branching, the rachis either deliquescent, or percurrent and straight or zigzag, the spikelets inserted and oriented in diverse patterns. Excepting the lowermost one, bracts subtending primary branches usually obsolete or lacking; typical prophylls lacking. Transitional glumes (empty glumes and sterile lemmas) 2 or 3 (rarely 4) the uppermost one often subtending a depauperate flower, the others empty. Spikelets comprising few to several perfect florets, and terminating in one or more progressively depauperate sterile anthesia. Rachilla segments possessing at maturity the potential for disarticulating just below the locus of insertion of each fertile lemma. Lemma (when subtending a functional flower) fully embracing the palea only basally at maturity. Palea broadly sulcate and 2-keeled dorsally, the margins not at all or only slightly and partially overlapping. Lodicules typically 3, the anterior two asymmetrical and paired, the posterior one smaller (at least shorter or narrower) and symmetrical (all three symmetrical and subequal in *R. parviflorum*; exceptionally -2, -1, -0 as recorded for *R. ampliflorum*). Stamens 3, the filaments filiform, free. Stigmas 2. Mature fruit (as far as known; available examples are rare) an oblong, subfusiform, sulcate, apically mucronate caryopsis lightly compressed and lightly curved or asymmetri-

FIGURE 42.—*Rhipidocladum harmonicum* (Parodi) McClure (A-Q) and *Rhipidocladum verticillatum* (Nees) McClure (R-T). A, Rhizome and base of its culm,  $\times 0.6$ ; B, culm internode between nodes v and vi, showing first-order element of the branch complement with second-order elements developing from buds on its margin,  $\times 0.6$ ; C, first-order element of branch complement from B, removed and shown from the adaxial aspect,  $\times 1.8$ ; D, fully developed midculm branch complement, basal portion only, in situ,  $\times 0.48$ ; E, midculm sheath, adaxial aspect,  $\times 0.6$ ; F, sterile leafy twig,  $\times 0.6$ ; G, leafless flowering twig,  $\times 0.6$ ; H, apex of leaf sheath and base of blade,  $\times$  ca. 3; I, spikelet, sessile with portion of rachis attached,  $\times$  ca. 1.8; J, transitional glumes from I,  $\times$  ca. 6; K, floret,  $\times$  ca. 3.6; L, lemma,  $\times$  ca. 3.6; M, palea,  $\times$  ca. 3.6; N, lodicule complement,  $\times$  ca. 7.2; O, stamen,  $\times$  ca. 6; P, gynoeceum,  $\times$  ca. 14.4; Q, stigmatic processes, greatly enlarged; R, fruit, embryo side,  $\times 7.2$ ; S, fruit, hilum side,  $\times 7.2$ ; T, fruit, longitudinal section,  $\times 7.2$ . Drawings A, B based on McClure 21398 (US), C, E, F, H on McClure 21416 (US), D on Camp E-1613 (US), G, I-M on Killup and Smith 25622, N-Q on Sodiro s. n., Oct. 1900 (US), and R-T on Glazou 22424 (P).

cal in the dorsiventral plane; pericarp pergaminous (crustaceous in *R. verticillatum*), glabrous, of uniform thickness; the sulcus and embryotegium weakly to strongly manifest.

ETYMOLOGY.—The name *Rhipidocladum*, derived from the Greek, *rhipis*, fan, and *klados*, branch, alludes to the fan-like pattern formed by members of a mature midculm branch complement in all of the bamboos herein allocated to the genus.

TYPE-SPECIES.—*Rhipidocladum harmonicum* (Parodi) McClure, new combination. *Arthrostylidium harmonicum* Parodi (1944:478, fig. 1).

RELATIONSHIPS.—The combinations of morphological features used herein to define *Rhipidocladum* places this genus between *Merostachys* and *Arthrostylidium*, with some of its features indicating affinities toward *Merostachys* and other features indicating affinities toward *Arthrostylidium*. The taxa I have allocated to *Rhipidocladum* are perfectly uniform in terms of the ontogeny and morphology of the midculm branch complements and are, in this aspect, indistinguishable from the taxa I have retained in *Merostachys*. However, a comparison of the shape and orientation of the blade borne on culm sheaths representing their midculm range, insofar as these features have been documented, suffices to distinguish plants of taxa allocated to the genus *Rhipidocladum* (Figure 42e) from plants of taxa retained in the genus *Merostachys* (Figure 37b).

As *Merostachys* and *Rhipidocladum* are here

circumscribed, the component species of both genera show a considerable range of variation in morphological features of their inflorescences. The range of these diversities is the more marked in *Rhipidocladum*, where at one extreme it embraces deceptive simulations of *Merostachys* and at the other, *Arthrostylidium*. Fournier (1881:131) was misled by this latter case into transferring Steudel's *Arthrostylidium racemiflorum* to *Merostachys*.

As shown in the key below, the species currently allocated to *Rhipidocladum* embrace, in their inflorescences, six distinct patterns of insertion and orientation of the spikelets. An intimation of ostensible relationship between *Rhipidocladum* and *Merostachys* appears in the noticeable to marked secund orientation of the spikelets in the spicate racemes of seven species of *Rhipidocladum*.

*Rhipidocladum* and *Arthrostylidium* coincide here and there (compare *R. harmonicum* with *Arthrostylidium venezuelae*, and *R. urbanii* with *A. cubense*) with respect to certain forms assumed by the inflorescences. As mentioned above, however, the respective members of these two genera are readily distinguishable by the characteristics of their midculm branch complements.

DISTRIBUTION.—The eleven named species comprehended by the present circumscription of the genus *Rhipidocladum* represent taxa that occupy open or forested mesophytic situations at low to moderate altitudes in frost-free areas, from Mexico to Brazil and Bolivia.

### Key to Recognized Species of *Rhipidocladum*

- |  |  |
|--|--|
| 1a. Rachis deliquescent; spikelets pedicellate   | 11. <i>R. verticillatum</i> , new combination  |
| 1b. Rachis excurrent; spikelets sessile or subsessile  | 2  |
| 2a. Spikelets inserted on the rachis in predominantly binate clusters  | 4. <i>R. geminatum</i> , new combination   |
| 2b. Spikelets of monate (solitary) insertion   | 3  |
| 3a. Rachis geniculate (at least in its distal portion); spikelets in distichous orientation                                  | 5. <i>R. harmonicum</i> , new combination  |
| 3b. Rachis not geniculate; spikelets in secund orientation   | 4  |
| 4a. Spikelets oriented within a single plane giving a banneret-like form to each inflorescence                               | 6. <i>R. maxonii</i> , new combination   |
| 4b. Spikelets not oriented within a single plane   | 5  |
| 5a. Spikelets 4-5 cm long; the rachilla not disarticulating promptly at maturity   | 1. <i>R. ampliflorum</i> , new combination   |
| 5b. Spikelets not exceeding 2.5 cm in length; the rachilla disarticulating promptly at maturity (the following six species): | 2. <i>R. angustiflorum</i> , new combination;  |
|  | 3. <i>R. bartlettii</i> , new combination; 7. <i>R. parviflorum</i> , new combination; 8. <i>R. pittieri</i> , new combination; 9. <i>R. prestoei</i> , new combination; 10. <i>R. racemiflorum</i> , new combination. |