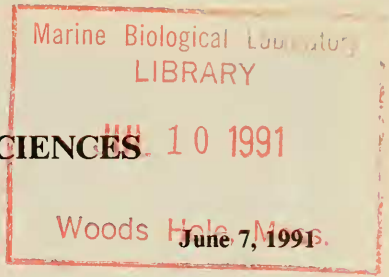


PROCEEDINGS
OF THE
CALIFORNIA ACADEMY OF SCIENCES



Vol. 47, No. 6, pp. 175-206, 12 figs.

A REVISION OF *TIBOUCHINA* SECTION *LEPIDOTAE*
(MELASTOMATACEAE: TIBOUCHINEAE)

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ABSTRACT: *Tibouchina*, with about 350 species, is the largest genus of neotropical capsular-fruited Melastomataceae, with a distribution extending from western Mexico and the West Indies to northern Argentina and Paraguay. Section *Lepidotae*, one of 11 recognized sections in the genus, is distinguished by its lepidote indument, free bracts that envelop floral buds, persistent calyx lobes, and glabrous stamens. It is closely allied to sections *Barbigerae* and *Tibouchina* but imperfectly separated from the latter as that section is currently defined. This revision of sect. *Lepidotae* includes a synoptic taxonomic history, a commentary on important taxonomic characters, a key to species, descriptions, diagnostic illustrations, and distribution maps for all taxa. As interpreted here, the section consists of nine species, three of which are newly described in this study—*T. elegantula*, *T. silvestris*, and *T. wurdackii*.

Received October 16, 1990. Accepted January 16, 1991.

INTRODUCTION

Tibouchina Aublet, with about 350 species, occupies a central position among the approximately 25 genera currently assigned to the tribe Tibouchineae. It is the largest genus among neotropical capsular-fruited Melastomataceae and the most widespread, with a distribution extending from western Mexico and the West Indies to northern Argentina and Paraguay. *Tibouchina* is readily recognized by its terete hypanthia, prevailing 5-merous flowers, ventrally bilobed anther connectives, setose ovary apex, and cochleate tuberculate seeds.

In the Andes and especially in southeastern

Brazil where the genus achieves its greatest diversity, many of the species with large, brightly colored flowers form a common and conspicuous element of the native vegetation. Several geographically defined tropical floras present good accounts of some of the species. The most recent monographic study of *Tibouchina* is that of Cogniaux (1891), in which 195 species were recognized. Since that time, many new species have been described, and heightened botanical exploration of the neotropics has generated a wealth of material in need of critical study.

Our attention was first drawn to sect. *Lepidotae* when one of us (FA) collected plants of

some Panamanian populations that could not be placed in any of the known species of *Tibouchina* characterized by a lepidote (scaly) indument. As we extended our observations to other species in the section, we became aware of the need to recognize additional new taxa and better define the limits of others. To facilitate recognition and comparison of these novelties, sect. *Lepidotae* has been revised with a key, descriptions, and critical assessments of taxonomic characters and interspecific relationships.

Comparative data derived from vegetative and reproductive morphology, scanning electron microscopic observations of trichome morphology, and ecogeographic distributions provide a rationale for recognizing nine species, three of which are newly described in this study.

SECTIONAL LIMITS, RELATIONSHIPS, AND TAXONOMIC HISTORY

In his extensive treatments of *Tibouchina*, Cogniaux (1885, 1891) arranged the genus into 11 sections. Section *Lepidotae* was established for those species characterized by a lepidote indument, free bracts that envelop floral buds, persistent calyx lobes, and glabrous stamens. The section included two species, *T. lepidota* (Bonpl.) Baillon and *T. paleacea* (Triana) Cogn. The former was initially described as a *Rhexia* by Bonpland (1808). The latter was originally treated as a variety of Bonpland's species but placed in the segregate genus *Pleroma* D. Don (Triana 1871). There were no subsequent additions to sect. *Lepidotae* until Gleason (1925) described *T. lepidota* var. *intermedia*, which was later elevated to species status (Wurdack 1977). Following Gleason's paper, three additional taxa (*T. aristeguietae*, *T. inopinata*, and *T. narinoensis*) were added from Venezuela, Costa Rica, and Colombia respectively (Wurdack 1959, 1968, 1977). A few of the species have been treated in recent regional floras (Uribe 1972; Wurdack 1973, 1980), but an assessment of species limits and interspecific relationships was beyond the scope of those studies.

Cogniaux (1885, 1891) did not comment on the affinities of sect. *Lepidotae*. Its pervasive indument of flattened scales is shared with sections *Barbigerae* Naudin and *Tibouchina* Cogn., both of which appear to be close relatives. The limits of sect. *Barbigerae* are sharply defined because all of its approximately 18 species have staminal

connectives with basal tufts of long pilose hairs. Section *Tibouchina* is also readily distinguished if we restrict it to include *T. aspera* and *T. spruceana*, the two savanna species used by Cogniaux to circumscribe the section. Plants of these two species have flowers that are individually subtended by an involucre of one or two pairs of bracts that are fused basally for $\frac{1}{3}$ – $\frac{2}{3}$ of their length. The current composition of sect. *Tibouchina* includes five additional Guayana Highland species that have the free floral bracts and glabrous staminal connectives of sect. *Lepidotae*. A critical revision of sect. *Tibouchina* will also be needed before the nature and extent of this perceived overlap can be evaluated. Pending realignment, we recognize sect. *Lepidotae* as a useful category that provides a framework for the placement of new taxa in the context of their closest relatives.

MATERIALS AND METHODS

Analysis of morphological characters consisted of studying living plants of some species in the field and examining approximately 500 herbarium specimens. We have examined the types of all recognized species and their taxonomic synonyms.

For scanning electron microscope (SEM) studies of trichomes, foliar material from dried herbarium specimens was cut into square or rectangular segments, affixed to stubs with silver paste, and coated with gold under a standard vacuum evaporator. Samples were examined and photographed with an Hitachi S-520 scanning electron microscope at a voltage of 15 kV. Voucher specimens for the SEM work are cited in the figure legends.

VEGETATIVE AND FLORAL MORPHOLOGY

HABIT AND BRANCHING.—All species in sect. *Lepidotae* are evergreen shrubs or trees with opposite decussate branching. With the exception of *T. aristeguietae*, *T. wurdackii*, and perhaps *T. narinoensis*, all species attain tree size ranging from about 7–20 meters at maturity. Except for *T. wurdackii*, which is always shrubby and appears to be restricted to the summits of low mountains in Panama, there appears to be no absolute correlation between habit, habitat, or elevational preference.

The distal branchlets of all species are terete

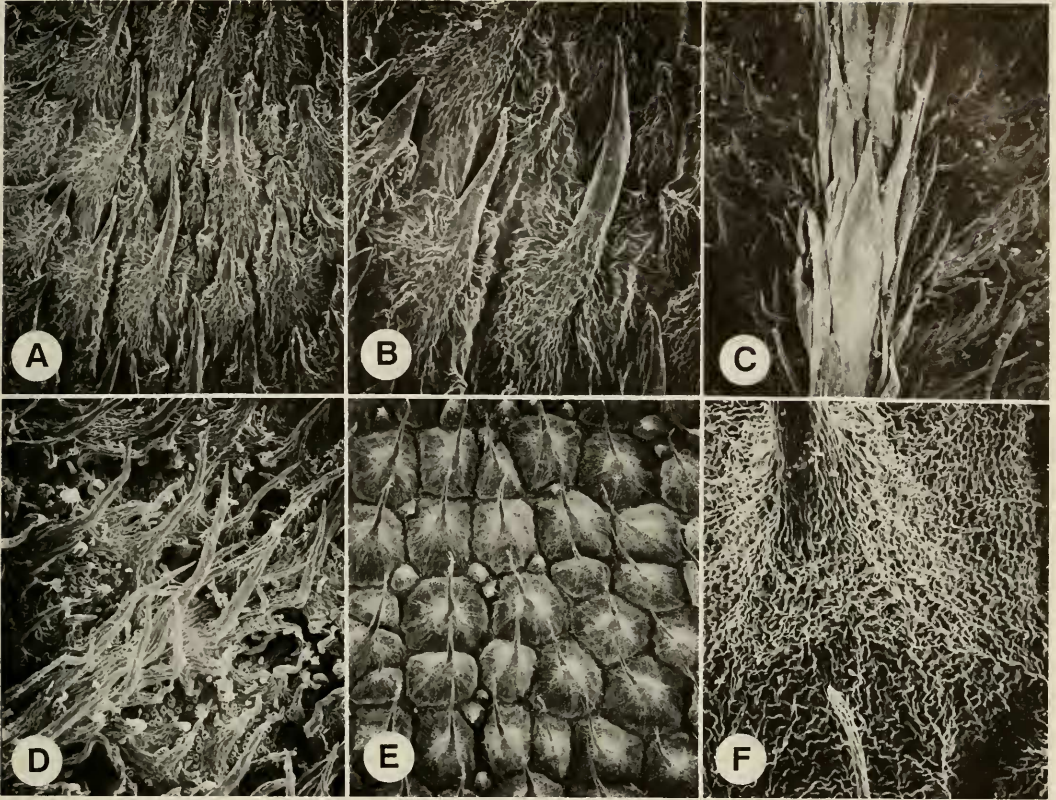


FIGURE 1. Scanning electron micrographs of foliar trichomes. A–D, *T. aristeguietae*: A, adaxial surface, $\times 40$; B, adaxial surface, $\times 80$; C, abaxial surface showing scales on elevated medial vein, $\times 40$; D, abaxial surface showing trichomes on elevated secondary veins and epidermis, $\times 80$. E–F, *T. elegantula*: E, adaxial surface showing bulla-based trichomes, $\times 20$; F, adaxial surface showing base of one bulla-based trichome, $\times 150$. (A–D from Wurdack et al. 2724, US; E–F from Luteyn et al. 7488, CAS.)

or subquadrate and covered with a conspicuous scaly indument. The bark on older, woody stems consists of thin, reddish-brown exfoliating strips. This condition is especially pronounced in *T. lepidota* and accounts for its common name, *siete cueros* (seven skins), in Colombia.

LEAVES.—Phyllotaxy of sect. *Lepidotae*, like that of *Tibouchina* generally, is opposite and decussate. All species have leaves with a well differentiated, entire basally symmetric blade and a canaliculate petiole. The leaves are more or less coriaceous when dry and range in shape from narrowly elliptic to elliptic-ovate, elliptic-lanceolate, or oblong-lanceolate. Foliar venation in sect. *Lepidotae* also conforms to a pattern commonly encountered in many Melastomataceae. The principal leaves have 3–5(–7) arcuate or longitudinal primary veins that arise at, or close to, a common point at the base of the blade and

converge toward the apex. We employ traditional terminology in describing the venation of these species as 3–7-nerved. According to Hickey's revised classification of dicotyledonous leaves, this pattern is described as acrodromous with essentially perfect or imperfect basal venation (Hickey 1979:31, Fig. 4.3).

On the adaxial (upper) leaf surfaces, the primary veins are impressed to give the blade a grooved or furrowed effect. Without exception, the primary veins are conspicuous and elevated on abaxial (lower) foliar surfaces, but the outermost (intramarginal) pair is often depressed and inconspicuous. The reticulate network of secondary and tertiary veins on abaxial leaf surfaces is prominent and elevated in all species except *T. inopinata* and *T. wurdackii*. Leaf shape is sufficiently constant within and between populations of a species to be of diagnostic value

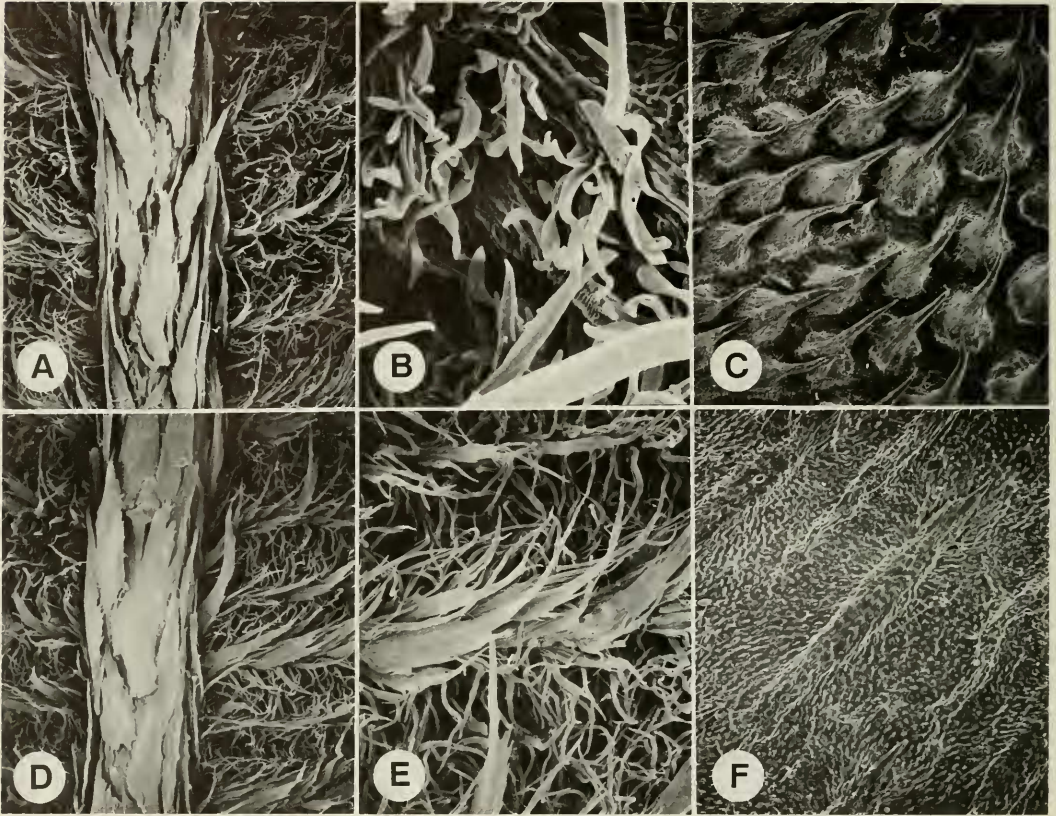


FIGURE 2. Scanning electron micrographs of foliar trichomes. A–B, *T. elegantula*: A, abaxial surface showing scales on elevated median vein and adjacent areas, $\times 20$; B, abaxial surface showing papillose epidermal puberulence, $\times 500$. C–E, *T. gleasoniana*: C, adaxial surface showing bulla-based trichomes, $\times 20$; D, abaxial surface showing scales on elevated median vein and indument of adjacent areas, $\times 20$; E, abaxial surface showing trichomes on elevated secondary veins and adjacent areas, $\times 50$. F, *T. inopinata*, adaxial surface showing trichomes (with pustulate bases) that are partially adnate to the epidermis, $\times 80$. (A–B from Luteyn *et al.* 7488, CAS; C–E from Luteyn & Lebrón-Luteyn 6824, CAS; F from Almeda *et al.* 3365, CAS.)

when correlated with other characters, such as complexity of the inflorescence, hypanthial size, and androecial details. Of greater taxonomic utility, however, is the foliar trichome complement discussed in the following section on indument.

INDUMENT.—The Melastomataceae exhibit greater trichome diversity than any other family of flowering plants (Wurdack 1986). Because of its diversity and pervasiveness, the trichome cover (indument) on the leaves, stems, and hypanthia provides some of the most important taxonomic characters for distinguishing species of sect. *Lepidotae*. For consistency, we have followed the descriptive terminology employed in Wurdack's (1986) useful atlas of melastome hairs. In some instances, however, we have applied a few of his terms somewhat differently. We have

also used scanning electron microscopy to provide a visual image of intricate trichome patterns.

A notable feature of sect. *Lepidotae*, which is common in melastomes, is the range of trichome types (trichome complement) present on plants of a single species. As noted by Wurdack (1986) for melastomes in general, the typical pattern in this section includes one type of trichome on the adaxial (upper) leaf surface and one or more different ones on the abaxial (lower) leaf surface. Trichomes on the elevated primary abaxial leaf veins, on the other hand, are usually of the same kind as those on distal cauline internodes, petioles, and the inflorescence axis.

A major trend in the evolutionary modification of trichomes in this section has been com-

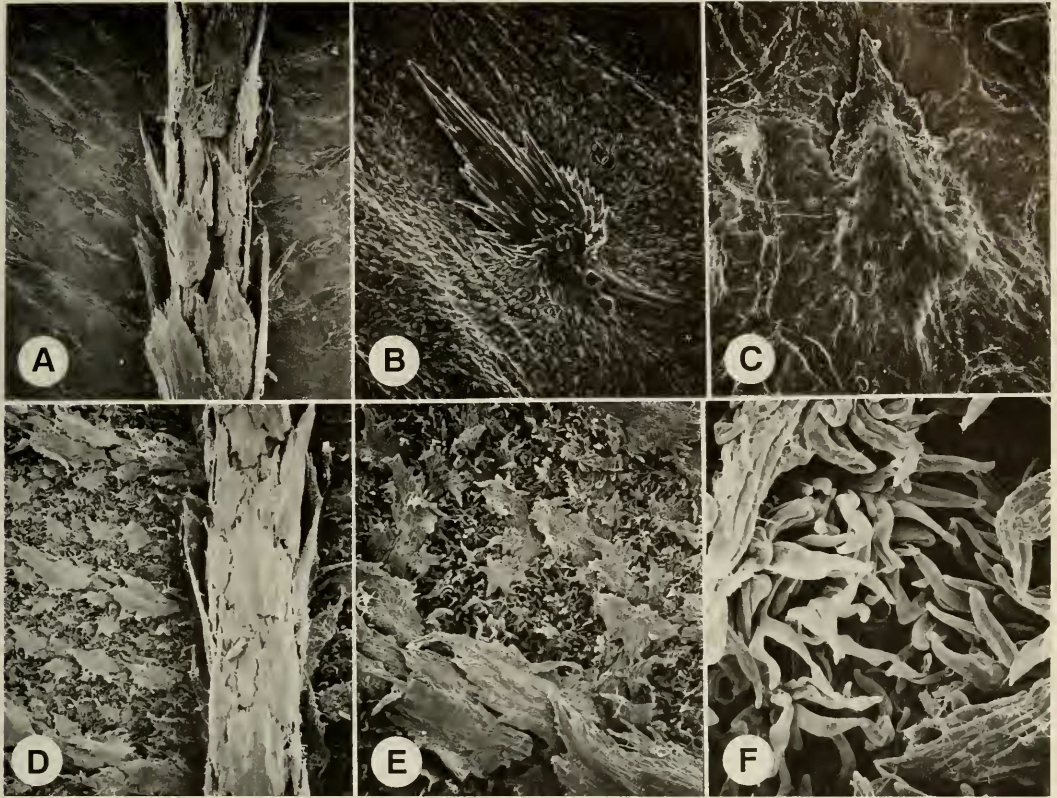


FIGURE 3. Scanning electron micrographs of foliar trichomes. A–B, *T. inopinata*: A, abaxial surface showing scales on elevated median vein and adjacent area, $\times 40$; B, abaxial surface showing a single epidermal scale, $\times 200$. C–F, *T. lepidota*: C, adaxial surface showing trichome partially adnate to the epidermis, $\times 120$; D, abaxial surface showing scales on elevated median vein and adjacent area, $\times 30$; E, abaxial surface showing scales on secondary veins and adjacent areas, $\times 70$; F, abaxial surface showing papillose epidermal puberulence, $\times 500$. (A–B from Almeda *et al.* 3365, CAS; C–F from Luteyn & Lebrón-Luteyn 5557, CAS.)

pression of hairs into sessile multicellular scales of varying size and shape. The most common type of scale on cauline internodes and elevated abaxial leaf veins is ovate to lanceolate with entire to irregularly erose or laciniate margins and basally developed lobes or a basal unlobed extension (Figs. 1C, 2D, 3D, 5C, 6D). When the base of these scales is extended into lobes or “ears” that obscure the point of attachment, we describe them as proximally attached. If no flattened basal expansion is produced below the point of attachment we describe the scales as basally attached. All species treated here have nodal cauline trichomes of this latter type (Figs. 11B, 12B). *Tibouchina lepidota* and *T. silvestris* stand apart from the others in having the proximally attached, eared cauline scales commonly intermixed with rectangular (plate-like) scales that are

horizontally attached. Trichome size, shape, and basal differences provide useful characters for delimiting taxa and assessing relationships. In five of the nine species, the adaxial foliar surface is covered with trichomes that are flattened and appressed for a portion of their length. The free distal portion can be setiform as it is in *T. aristeguietae* (Figs. 1A, B) and *T. silvestris* (Fig. 5E) or compressed into a scale with irregularly erose margins as it is in *T. inopinata* (Fig. 3B), *T. lepidota* (Fig. 3C), and *T. wurdackii* (Fig. 6C). The remaining species are characterized by bulla-based hairs that are swollen basally and taper to slender terminal setae (Figs. 1E, 2C, 4A, B, 5A).

The trichome complements on abaxial foliar surfaces are more diverse than those of the adaxial surfaces. The most complex complements are found in species with bulla-based hairs on

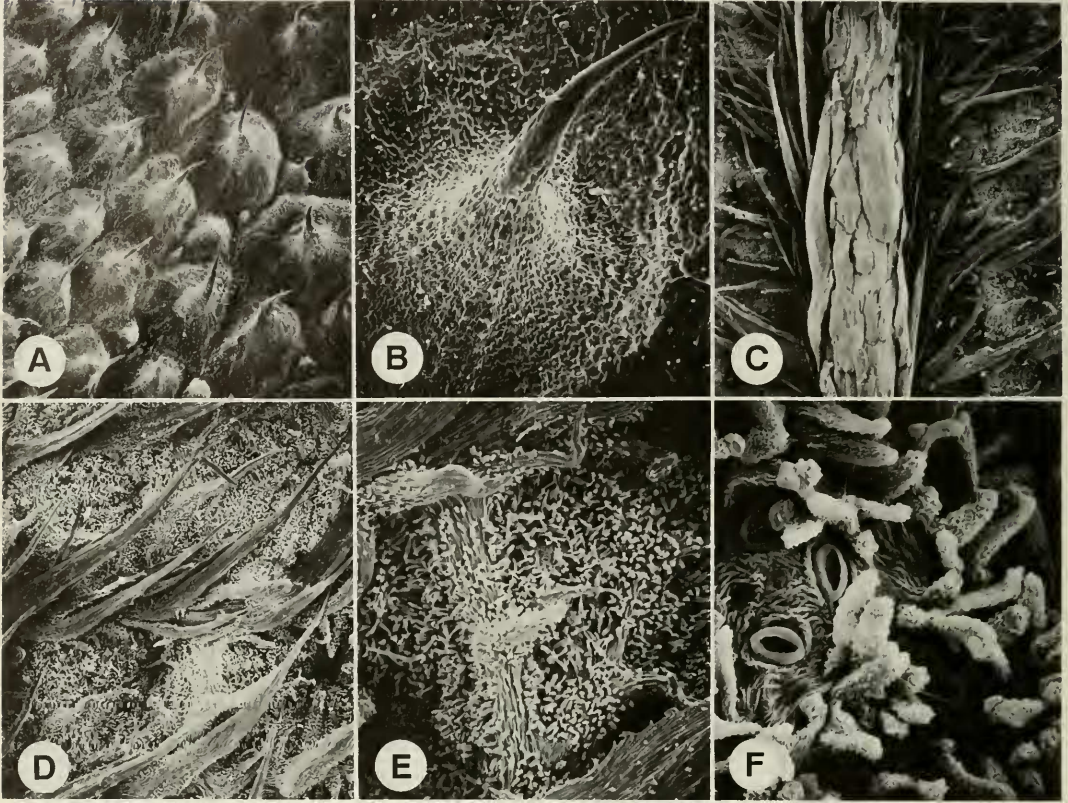


FIGURE 4. Scanning electron micrographs of foliar trichomes. A–F, *T. narinoensis*: A, adaxial surface showing bulla-based trichomes, $\times 20$; B, adaxial surface showing a single bulla-based trichome, $\times 120$; C, abaxial surface showing scales on elevated median vein and adjacent area, $\times 25$; D, abaxial surface showing slender scales on secondary veins and papillose puberulence on the epidermis, $\times 50$; E, abaxial surface showing epidermal papillose puberulence, $\times 150$; F, abaxial surface showing papillose puberulence, $\times 1,000$. (A–F from *Espinosa 2954*, NY.)

the adaxial surface. *Tibouchina elegantula* and *T. paleacea*, for example, have abaxial trichome complements consisting of lanceolate eared scales that grade into a mixture of slender scales, subterete hairs, and what we provisionally describe as a white papillose or farinaceous epidermal puberulence intermixed with a scattering of minute glandular hairs (Figs. 2A, B, 5C, D). This puberulence, which also occurs in *T. lepidota*, *T. narinoensis*, and *T. silvestris* (Figs. 3F, 4E, F, 6A, B), is a classic example of the difficulty involved in drawing sharp distinctions between papillae and unicellular trichomes (Theobald et al. 1979; Wilkinson 1979). In many respects this puberulence consists of structures that correspond to the descriptions and illustrations of papillae presented by Wilkinson (1979:148). The clustered structures in *T. silvestris* (Figs. 6A, B), however,

are reminiscent of the minute dendritic trichomes with moderately long, thin-walled arms illustrated by Wurdack (1986:66, Figs. 185, 186). Within sect. *Lepidotae* these minute structures appear to be of some taxonomic significance. They are smooth walled in *T. elegantula* (Fig. 2B), *T. lepidota* (Fig. 3F), and *T. paleacea* (Fig. 5D) but consistently striate in *T. narinoensis* (Fig. 4F) and *T. silvestris* (Fig. 6B). The smooth forms are found in species from higher elevations (1,500–3,100 m), whereas the striate forms are restricted to species from lower elevations (200–1,200 m).

The simplest trichome complements on abaxial foliar surfaces are found in *T. inopinata* and *T. wurdackii*. These species have elevated primaries that are densely covered with proximally attached lanceolate scales with irregularly

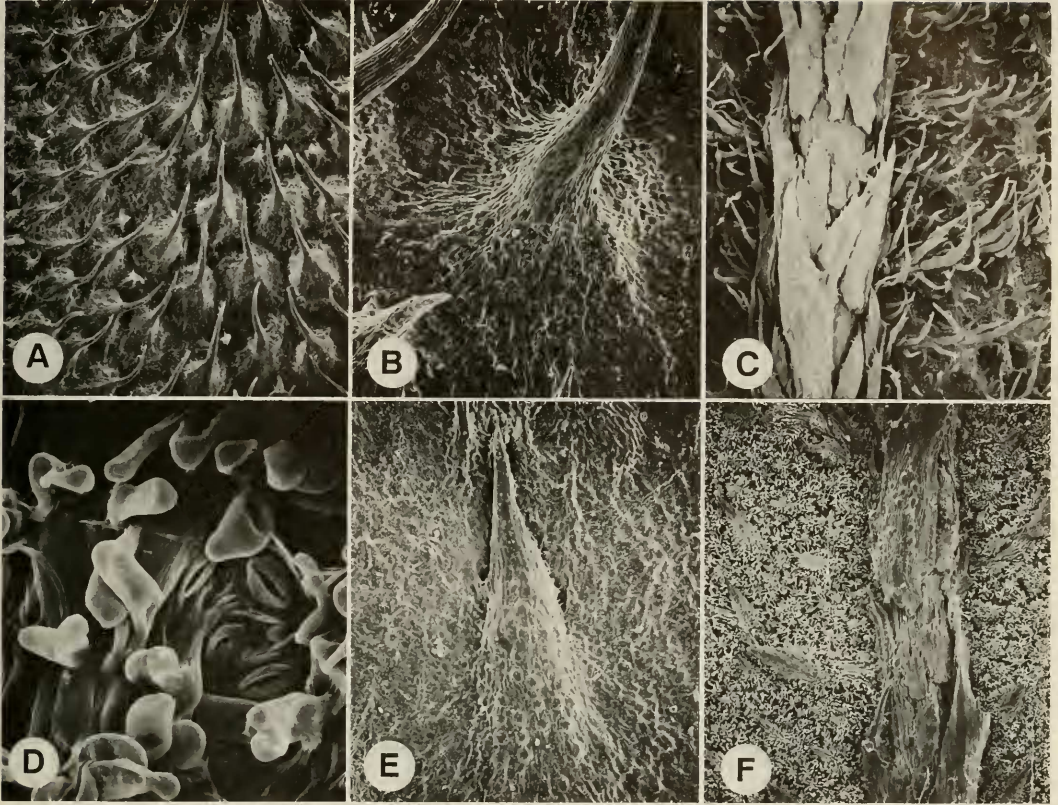


FIGURE 5. Scanning electron micrographs of foliar trichomes. A–D, *T. paleacea*: A, adaxial surface showing bulla-based trichomes, $\times 20$; B, abaxial surface showing base of a single bulla-based trichome, $\times 120$; C, abaxial surface showing scales on elevated median and secondary veins, $\times 30$; D, abaxial surface showing papillose puberulence, $\times 1,000$. E–F, *T. silvestris*: E, adaxial surface showing a single trichome (with pustulate base) that is partially adnate to the epidermis, $\times 120$; F, abaxial surface showing scaly indument on elevated median vein and mixture of smaller scales and papillose indument in adjacent areas, $\times 50$. (A–D from Maguire & Maguire 44204, US; E–F from Koie 4808, US.)

erose or lacerate margins and basal ears (Figs. 3A, 6D). The higher-order veins (when evident) and the leaf surface are moderately to sparsely beset with a mixture of triangular and ovate scales (Figs. 3B, 6E, F).

Indument density varies to some extent in all species. Variation is especially noticeable in the widespread *T. lepidota*, but we have been unable to detect any clinal patterns that correlate with ecology or geography.

The function and adaptive value of the scaly indument in sect. *Lepidotae* are debatable as are speculations about the significance of trichomes generally. The long-held contention is that trichomes retard water loss and alter heat exchange from plant surfaces. The extensive scaly indument may reflect light rays, thereby reducing

temperature build-up at the epidermal surface. In an overview of trichome structure and function, Johnson (1975) concludes that it is no longer tenable to accept the simplistic view that transpiration reduction is a primary function of plant hairs. Levin (1973) reviews some compelling evidence to show that trichomes may play an important role in defending plants against phytophagous insects. Hence, the complex development of indument types must have evolved in response to a whole host of environmental and developmental factors (Johnson 1975).

INFLORESCENCES.— Fueled by the seminal works of Troll (1964, 1969), analyses of inflorescence structure in the Myrtales have generated more rigorous descriptions and comparisons of inflorescence types (Briggs and Johnson 1979; Sell

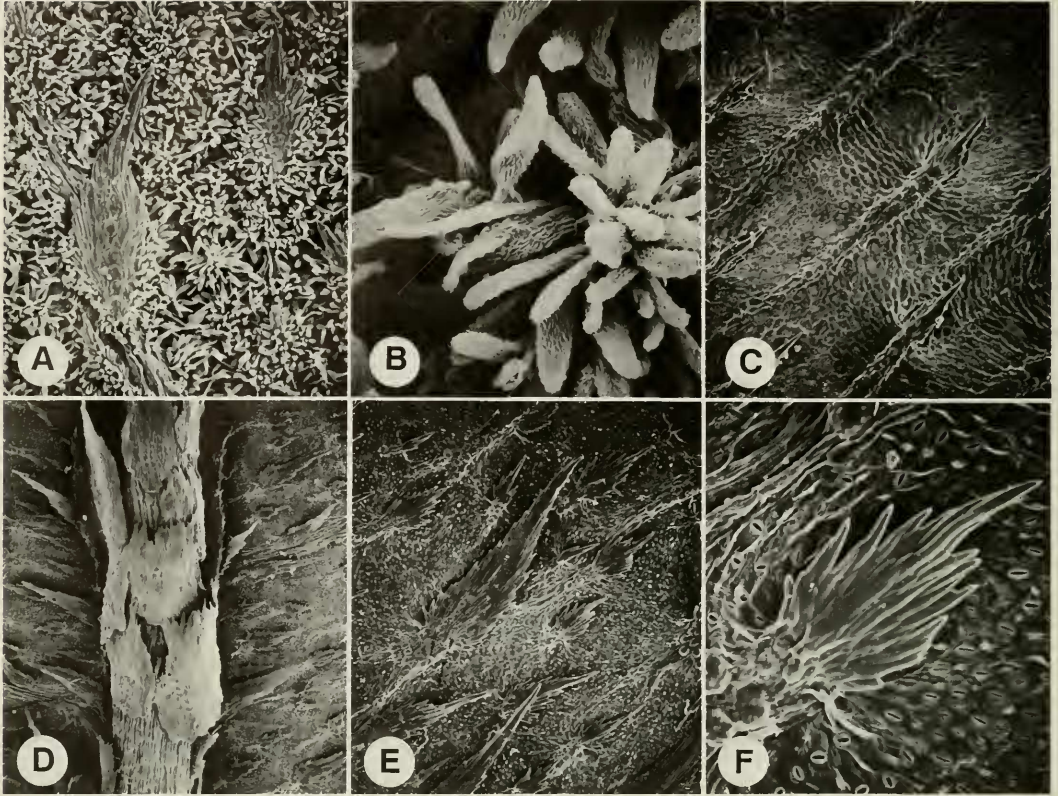


FIGURE 6. Scanning electron micrographs of foliar trichomes. A–B, *T. silvestris*: A, abaxial surface showing intercostal area with striate pustulate scales and clustered papillae-like trichomes, $\times 150$; B, abaxial surface showing clustered papillae-like trichomes, $\times 1,000$. C–F, *T. wurdackii*: C, abaxial surface showing trichomes (with pustulate bases) that are partially adnate to the epidermis, $\times 80$; D, abaxial surface showing complement of large scales on elevated median vein and smaller scales on epidermis of adjacent areas, $\times 40$; E, abaxial surface showing scale complement on intercostal area, $\times 80$; F, abaxial surface showing a single epidermal scale, $\times 400$. (A–B from *Koie 4808*, US; C–F from *Almeda et al. 6380*, CAS.)

and Cremers 1987; Weberling, 1988). Unfortunately, the terminology used in these studies is not uniform, but Weberling (1989) attempted to summarize much of the discursive literature on the subject. Although Briggs and Johnson (1979) focus on the Myrtaceae, the detailed nature of their study is applicable to flowering plant inflorescences generally. These workers recognize the division of inflorescences into two basic types: 1) determinate or monotelic, and 2) indeterminate or polytelic. Briggs and Johnson use anthotelic for determinate and blastotelic for indeterminate. All species in sect. *Lepidotae* have anthotelic inflorescences in which every primary, secondary, and higher-order axis ends in a flower. The species commonly show different degrees of modification from a leafy bracteose panicle with opposite and decussate branching (the frondobracteose panicle of Briggs and Johnson). As

interpreted here, a panicle is an anthotelic inflorescence in which the main and at least some of the lateral axes have nodes distal to the first pair of leaves on a branch axis. Consequently, a panicle is a determinate inflorescence and not indeterminate, as it is so often used by English-language authors. Among the species treated here, *T. elegantula*, *T. gleasoniana*, and *T. inopinata* are characterized by multiflowered panicles of the kind described above (Fig. 8A). In every species the ultimate units of the primary and lateral inflorescence axes consist of what are often referred to as simple (three-flowered) dichasia (the triad of Briggs and Johnson) or some reduced derivative of this unit. A much more common inflorescence type in the section is found in *T. lepidota*, *T. narinoensis*, *T. silvestris*, and *T. wurdackii*. All of these species have fewer flowered anthotelic inflorescences representing varying re-

ductions of the basic paniculate condition (Figs. 11, 12). In *T. lepidota*, for example, each flowering axis is terminated by what we describe as simple pedunculate dichasia or umbelliform dichasial clusters of four–six flowers. Using the multiflowered panicle as a starting point, these smaller inflorescences are readily derived by one or more of the following modifications: 1) reduction in the number of nodes and length of internodes, 2) suppression of branching on primary and secondary axes, and 3) reduction in the number of flowers (by abortion) concomitant with a reduction in the length of distal internodes. When taken to the ultimate extreme, these reductions result in the solitary flowers (monads of Briggs and Johnson) that are typical of *T. aristeguietae* and *T. paleacea*.

As in frondobracteose panicles generally, all species treated here have opposite-paired bracts that become smaller from the base of the inflorescence to the bracteoles subtending the flowers. The size, shape, and indument of bracteoles are useful characters for distinguishing species and groups of species. Like petals, they are early deciduous and not always present on dried specimens.

HYPANTHIUM AND CALYX.—The mature hypanthium, which envelops the free ovary, is tetere, externally pubescent, and ranges in shape from campanulate to urceolate. It is supplied with 10 longitudinal vascular ribs that are crowned by a circular vascular plexus referred to as the torus.

The five persistent calyx lobes are ciliate, oblong to triangular, and assume a spreading to ascending posture on mature hypanthia. There is much overlap in the length and width of hypanthia and calyx lobes among species in the section. Size differences coupled with details of the indument and other traits are useful in distinguishing such species as *T. aristeguietae*, *T. inopinata*, and *T. narinoensis*.

PETALS.—The five petals are dextrorsely imbricate in bud and assume a more or less horizontal posture when fully expanded. Each petal is attached to a point on the torus opposing a stamen and alternating with a calyx lobe. All petals are essentially obovate with an apex that is rounded but sometimes varies to asymmetrically retuse in *T. elegantula* and *T. narinoensis*. The petals are glabrous and the margins are consistently ciliate in all species except *T. elegantula*. Differences in petal size and color are useful in

characterizing several species. Like so many Melastomataceae, the petals are fugacious and difficult to rely on for species identification. Petal color is a useful field character in need of additional study. In *T. wurdackii* the petals are pink, but they are white in *T. inopinata*, its closest relative. In *T. lepidota* the petals are initially magenta or rose-red but fade to uniform lavender with age. This color change has been recorded for populations from Colombia (Uribe 1972), Ecuador (King & Almeda 7910), Peru (Knapp *et al.* 7511), and Venezuela (Wurdack *et al.* 2753). Floral color change following pollination or aging is reported for several flowering plants (Gori 1983), but the significance and prevalence of this phenomenon is still being explored. Because flowers that have undergone a visible change offer no food rewards (Gori 1983), pollinators picking up on this visual cue could increase their foraging efficiency by visiting only viable or unpollinated flowers. This remarkable color change is also reported for *G. gleasoniana* (Asplund 16227) and *T. paleacea* (Maguire & Maguire 44204). The diversity of flower color notes on herbarium labels suggests that this phenomenon may also be characteristic of other South American species in sect. *Lepidotae* that reportedly have purple, purple-pink, lavender, or lilac flowers. It is for this reason that we urge collectors to carefully record their field observations of petal color.

ANDROECIUM.—The 10 stamens in each flower are characterized by 2-celled, ventrally channeled, subulate anthers with ventrally inclined apical pores and anther connectives modified ventrally at the filament insertion into horizontal or upturned, bilobed ventral appendages (Fig. 8G). As is characteristic of *Centradenia* (Almeda 1977), *Pilocosta* (Almeda and Whiffin 1981), and other capsular-fruited genera in the family, each species has stamens that are differentiated into one of three size classes within a flower. These range from the strongly dimorphic condition of *T. elegantula*, *T. inopinata*, and *T. wurdackii* (Figs. 8G, 12G) through the weakly dimorphic staminal arrangement of *T. gleasoniana* and *T. silvestris* (Fig. 11G), to the more typical isomorphic situation found in all other species of the section. Filament insertion on the torus is like that found in most other capsular-fruited neotropical Melastomataceae. In those species with strongly dimorphic stamens, the five larger ones are inserted on the torus opposite the sepals (an-

tesepalous) and the five smaller stamens are inserted opposite the petals (antepetalous). In the species descriptions and discussions, when the anthers are described as alternately unequal, measurements of the antesealous anthers are listed first followed by the antepetalous ones. Connectives of the larger stamens in a flower are often conspicuously prolonged below the thecae to give anthers a pronounced curvature (Fig. 12G). In the smaller stamens, connective prolongation is shorter, and the anthers often assume an erect or ascending posture (Figs. 8G, 12G). Within the section there is also a consistent color difference between the large and small anthers in each flower, unlike the uniform yellow anthers of those species with isomorphic stamens. Even in *T. silvestris*, which has weakly dimorphic stamens, there is a consistent color difference between the antesealous and slightly larger antepetalous anthers (Fig. 11G).

The size, color, and orientation of anthers and associated connective features are useful in species identification. We have found it difficult, however, to correlate this androecial diversity with geography, ecology, or other characters in attempts to understand patterns of floral evolution in sect. *Lepidotae*.

GYNOCIDIUM AND FRUIT.—The superior ovary consists of five united carpels with axile placentation. The numerous ovules in each locule are anatropous and borne on prominent peltate placental intrusions. In all species the distal third of the ovary is gently fluted and moderately to densely covered with appressed simple hairs that give the summit a setose or bristly appearance. The glabrous style terminates in a truncate to slightly expanded papillose stigma. The styles are invariably hooked or somewhat incurved apically and assume a stationary deflexed posture opposing the stamens. The mature loculicidal capsules are dry, semi-woody, and fully enveloped by the scaly hypanthia. The capsules are ellipsoid to oblong-ovoid. Aside from modal size differences, neither gynocidia nor fruits provide significant taxonomic characters for distinguishing species.

SEEDS.—The seeds of all species in sect. *Lepidotae* are cochleate (Fig. 12H) to somewhat elongate-cochleate (Fig. 11H), tuberculate, and have a terminal hilum. As is generally true for the Tibouchineae, seed morphology is remarkably uniform (Whiffin and Tomb 1972). The principal variations, although minor and of little

value in distinguishing species, relate to seed length and tubercula size and shape. We have not seen mature seeds of *T. gleasoniana* and *T. paleacea* on any of the collections examined for this study. It seems unlikely, however, that they differ sufficiently to be of taxonomic significance.

CHROMOSOME NUMBERS

Chromosome numbers have been reported for only two species of sect. *Lepidotae*. Solt and Wurdack (1980) reported $n = \text{ca. } 27$ for *T. aristeguietae*. Raven (in Solt and Wurdack 1980) reported $2n = \text{ca. } 122$ for *T. lepidota* (Bonpl.) Baillon, while Hunziker et al. (1985) reported $n = \text{ca. } 62$. Based on chromosome numbers of numerous species of *Tibouchina* in seven different sections (Solt and Wurdack 1980), $x = 9$ is the base number in the genus. Although additional species will have to be sampled before any generalizations can be made for the section, the chromosome numbers for these two species are clearly of secondary polyploid derivation. Based on available data *T. aristeguietae* is probably a hexaploid, whereas *T. lepidota* appears to be an aneuploid derived from a high polyploid based on $9x$.

GEOGRAPHY AND ECOLOGY

The distribution of *Tibouchina* sect. *Lepidotae* is largely centered in the tropical South American Andes from western Venezuela (Mérida) to south-central Peru (Pasco) (Figs. 7, 9, 10). Two closely related extra-Andean species, *T. inopinata* and *T. wurdackii*, are restricted to floristically related areas of Costa Rica and Panama. The center of diversity for the section is in Colombia, where six of the nine species are found. Throughout the range of sect. *Lepidotae* no more than two species occur in any other country. This high concentration of species in Colombia is a common pattern for many genera with major centers of diversity in the Andes (Cuatrecasas 1985; Gleason 1929; Luteyn 1983; Todzia 1988).

Like many neotropical Melastomataceae, high amounts of light and moisture seem to be important requirements for growth and survival of the species. The most characteristic habitat is the cool montane forests where most of the species are found growing along road cuts or forest margins. In the Andes and mountains of southern Central America this vegetational formation is commonly referred to as "cloud forest," "fog for-

est," "montaña," or "ceja." *Tibouchina silvestris* is exceptional in that it appears to be restricted to low elevation wet forest formations.

The only widespread species, *T. lepidota*, occurs at elevations from 800–3,200 m. High polyploidy may be an important attribute that equipped this species for widespread colonization of the tropical Andes. All other species exhibit more restricted geographical and elevational distributions. A common pattern in sect. *Lepidotae* is one in which closely related species replace each other geographically. This is apparent in the following species pairs: *T. inopinata* and *T. wurdackii* (Figs. 9, 10), *T. elegantula* and *T. paleacea* (Figs. 7, 9), and *T. gleasoniana* and *T. paleacea* (Figs. 7, 9). *Tibouchina lepidota* and *T. silvestris*, which occur in the same general area, are isolated by different elevational tolerances while *T. narinoensis* and *T. paleacea* are isolated both geographically and elevationally. Although some species are found in the same 1 degree square quadrant (*T. gleasoniana*, *T. lepidota*, and *T. paleacea*), label information suggests that only one species of sect. *Lepidotae* is found at any one site. The spatial relationships among these species pairs suggest that geographic and/or elevational differentiation has been a recurrent evolutionary theme in sect. *Lepidotae*. This radiation is evidently a recent phenomenon because the tropical Andes and the mountains forming the southern Central American land bridge achieved prominent uplift during the Pliocene (Raven and Axelrod 1975; Simpson 1979). Uplift, coupled with the climatic fluctuations that resulted from Pleistocene glaciations, set the stage for speciation along a lengthy corridor of cool-forest habitats. This was the environmental setting that became available to the progenitors of sect. *Lepidotae*, which probably migrated from southern and eastern areas of the South American continent.

SYSTEMATIC TREATMENT

Tibouchina* sect. *Lepidotae Cogn. in Martius, Fl. Bras. 14(3):371. 1885. TYPE.—*T. lepidota* (Bonpl.) Baillon.

Trees or shrubs prevailing beset with trichomes that are compressed into flattened scales of varying sizes and shapes. Leaves opposite, decussate, petiolate, essentially entire, coriaceous, the blades of a pair essentially equal in size, 3–7-nerved, the primaries impressed adaxially and

conspicuously elevated on abaxial surface. Inflorescence an anthotelic frondobracteose panicle or some modification of this structure in which the main and at least some lateral axes have nodes distal to first pair of leaves on a branch axis; bracteoles variously pubescent or glabrous, early deciduous, commonly enveloping young floral buds. Flowers perigynous; hypanthium campanulate to urceolate, mostly copiously pubescent externally, 10-nerved, and crowned by a circular vascular ring (torus) bearing calyx lobes, petals, and stamens. Calyx lobes 5, persistent. Petals 5, obovate, entire but typically ciliate. Stamens 10, isomorphic, or weakly to strongly dimorphic with 2-celled ventrally channeled subulate anthers having ventrally inclined apical pores and glabrous anther connectives, the connectives variously prolonged and modified ventrally at filament insertion into horizontal or upturned, bilobed ventral appendages. Ovary superior, 5-celled with axile placentation. Style glabrous, hooked or incurved apically, typically declined to side of flower opposing stamens. Capsule dry, semiwoody, loculicidal. Seeds cochleate to elongate-cochleate and tuberculate with a terminal hilum.

Key to the Species of Sect. *Lepidotae*

1. Upper (adaxial) leaf surface covered with bulla-based hairs (hairs with swollen bases), the free portions of hairs spreading, awl-like.
2. Indument of uppermost internodes appressed (rarely antrorsely spreading), proximally attached scales with irregularly shaped basal ears or flattened extensions below point of attachment; flowers borne in modified compound panicles or dichasia with up to 34 flowers (sometimes flowers solitary because of abortion of lateral buds in simple dichasia); leaf base rounded or acute; stamens isomorphic to inconspicuously dimorphic.
3. Inflorescences composed of simple dichasia with only central flower typically persisting at anthesis; calyx lobes 8–11 mm long; hypanthial scales 3–5 mm long *T. paleacea*
3. Inflorescences composed of modified panicles with 8–34 flowers; calyx lobes 2–6 mm long; hypanthial scales 1–3 mm long.

4. Scales on elevated primary veins of lower leaf surface 2–4 mm long, very narrowly lanceolate with entire margins; scales on tertiary veins straight, 1–2 mm long, flattened, very narrowly lanceolate with entire margins; intercostal areas copiously papillose pubescent, lacking twisted terete hairs; hypanthia sparsely covered with scales, margins entire, epidermal surface visible *T. narinoensis*
4. Scales on elevated primary veins of lower leaf surface 1.5–2.5 mm long, lanceolate with irregularly erose margins; scales on tertiary veins curved, 0.5–1 mm long, lanceolate with irregularly erose margins; intercostal areas lanate, with twisted, golden, terete hairs ca. 0.5 mm long; hypanthia densely covered with scales, the margins irregularly erose, the epidermal surface not visible
..... *T. gleasoniana*
2. Indument of uppermost internodes (in part) spreading basally attached scales with prominent abaxial basal spurs or protuberances that diverge from the scale proper in nearly perpendicular fashion; flowers borne in compound panicles with ca. 50–90 flowers; leaf bases cordate to truncate; stamens dimorphic *T. elegantula*
1. Upper (adaxial) leaf surface covered with flattened scales, the free portions of hairs lanceolate or triangular.
 5. Inflorescences much-branched panicles with up to ca. 250 flowers; calyx lobes 1–1.5 mm long; petals 0.6–1.3 × 0.4–0.7 cm; Costa Rica, western Panama (Chiriquí, Bocas del Toro) .. *T. inopinata*
 5. Inflorescences consisting of solitary flowers, simple or umbelliform pedunculate dichasia with 3–6 flowers, or congested panicles with (3–)5–18 flowers; calyx lobes 3–9 mm long; petals 1.2–3.7 × 0.9–3.1 cm; Panama (Coclé, Darién, Veraguas) south to Colombia, Venezuela, Ecuador, and Peru.
 6. Flowers solitary; calyx lobes 7–9 mm long; anther thecae 8–9 mm long *T. aristeguietae*
 6. Flowers in simple or umbelliform dichasia or modified panicles; calyx lobes 3–6(–7) mm long; anther thecae 5–7.5(–9) mm long.
 7. Lower leaf surface lacking a white papillose puberulence on epidermis; bracteoles 4–9 mm long, lanceolate to subulate but not enveloping and concealing young floral buds; hypanthial scales 1–2 mm long; Panama *T. wurdackii*
 7. Lower leaf surface with white or tan papillose puberulence; bracteoles 8–15 mm long, ovate to elliptic, typically enveloping and concealing young floral buds; hypanthial scales 3–5 mm long; Venezuela, Colombia, Ecuador, and Peru.
 8. Hypanthial scales 1.5–3 mm long; lower leaf surface beset with lepidote scales; bracteoles covered with scales similar to hypanthia; stamens isomorphic, anthers yellow; western Venezuela to central Peru *T. lepidota*
 8. Hypanthial scales 3–5 mm long; lower leaf surface beset with lanceolate scales and white or tan papillose puberulence on epidermis; bracteoles glabrous; stamens weakly dimorphic, the slightly larger anthers yellow, the smaller anthers pink or red; Colombia (Valle) *T. silvestris*

Tibouchina aristeguietae Wurdack, Bol. Soc. Venez. Ci. Nat. 20:360. 1959. TYPE.—VENEZUELA. Mérida: Arriba de Santo Domingo, 2,600 m, Aug 1958 (fl, fr), *Aristeguieta 3262* (Holotype: NY!; isotypes: NY!, US!, VEN).

Shrubs 2–5 m tall; lower branches with red peeling epidermis; distal branches terete, the internodes covered with appressed, proximally attached, lanceolate scales 1–2 mm long, usually with entire margins, sometimes with irregularly erose margins and basal ears, the nodes with similar scales mostly 4–5 mm long. Petioles 3–5 mm long, covered with lanceolate scales like those of internodes; blades coriaceous, 1.6–5 cm long, 0.9–

1.7 cm wide, narrowly elliptic to elliptic, 5-nerved, the apex apiculate, the base attenuate, the margin entire and beset with clasping, folded scales; upper leaf surface covered with scales fused to leaf surface for $\frac{1}{4}$ – $\frac{3}{4}$ their length, the distal portion of scale free, flattened, triangular to subulate, the fused portion covered with minute white pustules; lower leaf surface with three types of scales and hairs that nearly conceal surface; scales on elevated primary veins similar in shape and size to cauline internodal scales, the secondary and tertiary veins beset with a mixture of straight lanceolate scales 0.5–1 mm long and shorter curved or twisted hairs ca. 0.25 mm long, both free almost to base and not concealing surface, which is also randomly but sparsely beset with minute sessile glands. Flowers solitary, terminal; bracteoles conspicuous, 1.1–1.4 cm long, elliptic, enclosing bud or young flower, beset with very narrowly lanceolate scales up to 1 mm long with a broad marginal glabrous band, early deciduous; pedicels 3–5 mm long. Hypanthia (at anthesis) 7–9 mm long to torus, 7–11 mm wide, campanulate to urceolate, moderately covered with very narrowly lanceolate appressed scales 4–5 mm long. Calyx lobes, 7–9 \times 3.5–4 mm, oblong, beset with scales up to 3 mm long, the scales progressively shorter toward margin, with a narrow glabrous marginal band, the margins ciliate. Petals 1.4–3.5 \times 2–3.1 cm, purple to purple-pink, obovate, sparsely ciliate, otherwise glabrous. Stamens isomorphic, anther thecae 8–9 mm long with ventrally inclined pores, filaments ca. 9 mm long, white, connective extended into an upturned bifid appendage ca. 2 mm long. Ovary (at anthesis) ovoid, 7 mm long, setose and fluted in distal half. Styles 8–19 mm long, strongly hooked, declinate; stigma truncate, papillose. Seeds ca. 0.5 mm long, light brown.

DISTRIBUTION AND PHENOLOGY.—Endemic to western Venezuela (Fig. 7) where it is found between 1,500 and 2,600 m, primarily in wet areas along roadsides and disturbed sites. Flowering in August and October through December; fruiting in August.

REPRESENTATIVE SPECIMENS EXAMINED.—VENEZUELA. Mérida: Distr. Rangel, along road near Santo Domingo (70°42'W, 8°52'N), 7 Aug 1983 (fl, fr), *van der Werff & Ortiz 6008* (MO); Distr. Rangel, Carretera Apartaderos-Sto. Domingo, 8 km antes de llegar a Sto. Domingo, 11 Oct 1983 (fl), *Aymard 2172* (CAS, MO); Distr. Rangel, Agua Caliente, a orillas de la carretera Mérida-Barinas, unos 2 km después de La Mitisús, 10 Dec 1961 (fl), *Ruiz-Terán 716* (CAS); Distr.

Rangel, road between Santo Domingo and Edo. Barinas boundary, 7 Nov 1972 (fl), *Wurdack et al. 2724* (NY, US). Trujillo: between Valera and Monte Carmelo, Aug 1923 (fl, fr), *de Bellard s.n.* (US).

This species, one of two in sect. *Lepidotae* occurring in Venezuela, is distinguished by its solitary flowers, large petals (1.4–3.5 \times 2–3.1 cm), long calyx lobes (7–9 mm), and hypanthia with long (4–5 mm), narrowly lanceolate scales. The leaves of *T. aristeguietae* have a unique complement of scales and hairs that link it to two different species groups within the section. In having upper leaf surfaces beset with flattened scales fused to the leaf surface for $\frac{1}{4}$ – $\frac{3}{4}$ their length, it is most like the group of species that includes *T. inopinata*, *T. lepidota*, *T. silvestris*, and *T. wurdackii*. The complex mixture of lanceolate scales, curved or twisted hairs, and the occasional admixture of sessile glands on secondary and higher order lower leaf veins, however, suggests a close relationship to *T. elegantula*, *T. gleasoniana*, and *T. paleacea*. Among this trio, *T. aristeguietae* is most like *T. gleasoniana* in its lack of the white papillose puberulence on lower leaf surfaces that is so typical of *T. elegantula* and *T. paleacea*. Wurdack (1959), in describing *T. aristeguietae*, suggested a relationship to *T. paleacea*, which differs in having larger leaves (4.2–11 \times 1.6–11 cm) and an indument of bulla-based hairs on upper leaf surfaces.

***Tibouchina elegantula* Todzia & Almeda, sp. nov.** (Fig. 8). **TYPE.**—COLOMBIA. Cauca: Parque Nac. Munchique, km 50–55 along road above Uribe, 1,875–2,256 m, 25 Apr 1979 (fl), *Luteyn et al. 7488* (Holotype: NY!; isotypes: AAU!, CAS!, CM!, COL, MO!, US!).

Frutex vel arbor 2–15 m; ramuli teretes sicut petioli inflorescentiaque dense pilis patulis squamatis eroso-ciliolatis 1–2 \times 0.25–0.5 mm induti. Petioli 0.5–1.7 cm longi; lamina 7–11(–14.2) \times 3.8–7.2 cm elliptica vel elliptico-ovata apice obtusa vel rotundata, basi cordata vel truncata, supra dense bullato-setulosa bullis ad basim 1–1.5 mm latis setula terminali ca. 1 mm longa, subtus in venis primariis et secundariis squamis eroso-ciliolatis 1–2.5 mm longis densiuscule obsita, subtus in superficie pilis teretiusculis plerumque 0.5–1 mm longis densiuscule obsita, 7-nervata coriacea et integra. Inflorescentia multiflora 7.5–19 cm longa; flores 5-meri, pedicellis (ad anthesim) 2–5 mm longis. Hypanthium (ad torum) 4–7 mm longum extus densiuscule paleis appressis 1.5–2 mm longis indutum; calycis lobis 3–4 \times 2–2.5 mm triangularibus. Petala 1.2–1.6 \times 0.9–1 cm obovata. Stamina dimorpha glabra, thecis subulatis 6 vel 5 mm longis poro ventraliter inclinato, connectivis 1 vel 0.25 mm prolongatis appendicibus ventralibus 1 vel 0.5 mm hebetibus. Ovarium 5-loculare apice modice setoso.

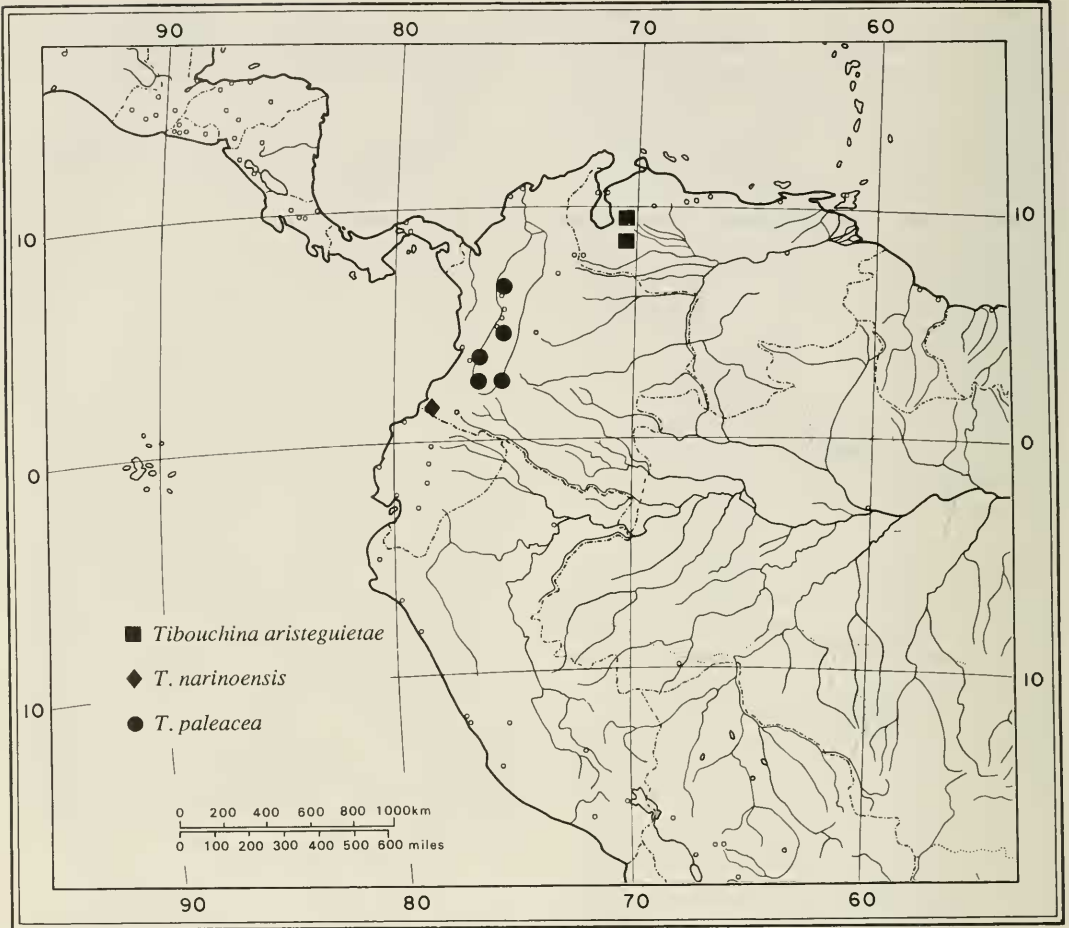


FIGURE 7. Distributions of *Tibouchina aristeguietae*, *T. narinoensis*, and *T. paleacea*.

Trees or shrubs 2–15 m tall; distal branches terete, the internodes densely covered with basally attached, reddish-brown scales 1–2 mm long with irregularly erose margins, the larger scales distinctly spreading and beset with a conspicuous basal knob on the abaxial surface, the nodes with similar proximally attached scales mostly 2–3.5 mm long. Petioles 0.5–1.7 cm long, covered with lanceolate scales similar to those of internodes; blades coriaceous, 7–11(–14.2) cm long, 3.8–7.2 cm wide, elliptic to elliptic-ovate, 7-nerved with the inconspicuous pair of intramarginal veins extending ca. halfway up margin, the apex bluntly rounded to obtuse, the base cordate to truncate, the margin entire and beset with overlapping, clasping, folded scales; upper leaf surface covered with bulla-based hairs with setae ca. 1 mm long; lower leaf surface with three types of scales or

hairs that completely conceal surface; scales on elevated primaries appressed, proximally attached, lanceolate, 1.5–2.5 mm long, with irregularly erose or lacerate margins; scales on secondary and tertiary veins lanceolate, curved, 1–2 mm long, with irregularly erose or lacerate margins, the intercostal areas covered with twisted, golden, terete hairs 0.5–1 mm long and a ground layer of white puberulence and scattered, sessile, glandular hairs. Inflorescences terminal, much-branched panicles 7.5–19 cm long, with ca. 50–90 flowers; bracteoles 4–6 mm long, enclosing young flower buds, ovate, beset with lanceolate scales ca. 1 mm long with irregularly erose or lacerate margins and small basal ears, early deciduous; pedicels 2–5 mm long, beset with scales similar to those on hypanthia. Hypanthia (at anthesis) 4–7 mm long to torus, 5–7 mm wide,

narrowly campanulate to urceolate, densely covered with appressed, proximally attached lanceolate scales 1.5–2 mm long with irregularly erose or lacerate margins and small basal ears. Calyx lobes 3–4 × 2–2.5 mm, triangular, densely beset with scales like those of hypanthia except for a very narrow glabrous marginal band, the margins ciliate. Petals 1.2–1.6 cm long, 0.9–1 cm wide, lavender, obovate, rounded to retuse at apex, glabrous, not ciliate. Stamens dimorphic, with ventrally inclined pores; larger stamens geniculate, filaments 6–7 mm long, anther thecae ca. 6 mm long, red, subulate, connective ca. 1 mm long with a yellow, erect, bifid appendage ca. 1 mm long; smaller stamens geniculate, filaments 5.5–6 mm long, anther thecae 5 mm long, subulate, yellow, connective ca. 0.25 mm long, with bifid appendages ca. 0.5 mm long. Ovary (at anthesis) ovoid, fluted at setose apex. Styles 6–8 mm long, declinate, hooked or straight at apex; stigma truncate, papillose. Seeds ca. 0.5 mm long, tan.

DISTRIBUTION AND PHENOLOGY.—Known only from Colombia (Cauca and Valle) (Fig. 9) where it occurs along roadsides in cloud forest at elevations of 1,875–2,256 m. Flowering in April; fruiting in November.

SPECIMENS EXAMINED.—COLOMBIA. Valle: Cordillera Occidental, vertiente oriental, hoyá del Río Cali, vertiente derecha, entre Puente de los Cárpatos y La Margarita, 2 Nov 1944 (fr), *Cuatrecasas 18489* (NY).

In proposing this new species we emphasize its short bracteoles (4–6 mm), comparatively small, eciliate petals (1.2–1.6 × 0.9–1 cm), and unusual cauline indument consisting of basally attached spreading scales that have irregularly erose margins and subbasal callosities or protuberances on the abaxial surface (Fig. 8B). The two known collections of *T. elegantula* were previously identified as *T. gleasoniana* and *T. paleacea*, probably because of similarities in foliar pubescence. *Tibouchina gleasoniana* differs consistently from *T. elegantula* and *T. paleacea* in its lack of the white papillose puberulence that is intermixed with a scattering of sessile glandular hairs on the abaxial foliar surface. The virtually identical foliar indument of these last two species leaves little doubt that they are closely related. *Tibouchina paleacea* is separable from *T. elegantula* by the 5-nerved leaves, prevailing appressed cauline scales with basal ears or flattened basal extensions, larger petals (1.7–2.6 ×

1.5–2.7 cm), and simple dichasial inflorescence with only the central flower typically persisting at anthesis.

Occasional specimens of *T. paleacea* are superficially reminiscent of *T. elegantula* in having cauline scales that are somewhat spreading. In *T. paleacea*, however, the cauline scales are always proximally attached and have well-defined basal ears.

The name for this species is derived from *elegantulus*, Latin for elegant or very fine. It emphasizes the handsome reddish upper internodes and striking foliar indument.

Tibouchina gleasoniana Wurdack, *Phytologia* 35: 241. 1977. *Tibouchina lepidota* (Bonpl.) Bailon var. *intermedia* Gleason, Bull. Torrey Bot. Club 52:328. 1925. TYPE.—ECUADOR: in forests of the Andes in the temperate zone, Sep, *Jameson 87* (Holotype: NY!).

Shrubs 1.5–6 m tall; distal branches quadrangular, internodes covered with appressed, proximally attached, ovate to lanceolate scales 1–2 mm long with irregularly erose or lacerate margins, nodes beset with basally attached, lanceolate scales 3–6 mm long with mostly entire margins. Petioles 0.7–2(–4.2) cm long, beset with proximally attached lanceolate scales 1.5–3.5 mm long with irregularly erose or lacerate margins; blades coriaceous, 5–13 cm long, 2.8–6.7 cm wide, elliptic to oblong-lanceolate, 5-nerved, the apex acute, the base acute to rounded, margin entire and beset with clasping, folded scales; upper leaf surface covered with bulla-based hairs, the terminal setae 0.5–1 mm long; lower leaf surface with two kinds of scales that nearly cover the surface; scales on elevated primary veins proximally attached, lanceolate, 1.5–2.5 mm long, with irregularly erose margins; scales on elevated secondary and tertiary veins curved, 0.5–1 mm long, lanceolate with irregularly erose or lacinate margins; intercostal areas covered with twisted, golden, simple or variously branched terete hairs ca. 0.5 mm long, giving lower leaf surface a lanate appearance, lacking a white papillose puberulence. Inflorescences terminal compound panicles, 6–13.5 cm long, with 8–34 flowers; bracteoles enclosing young floral buds, 1.2–1.5 cm long, elliptic, chartaceous, the midvein sometimes beset with scales like those on hypanthium, or with a triangular patch of scales at base, otherwise glabrous, early deciduous; pedicels 2–7

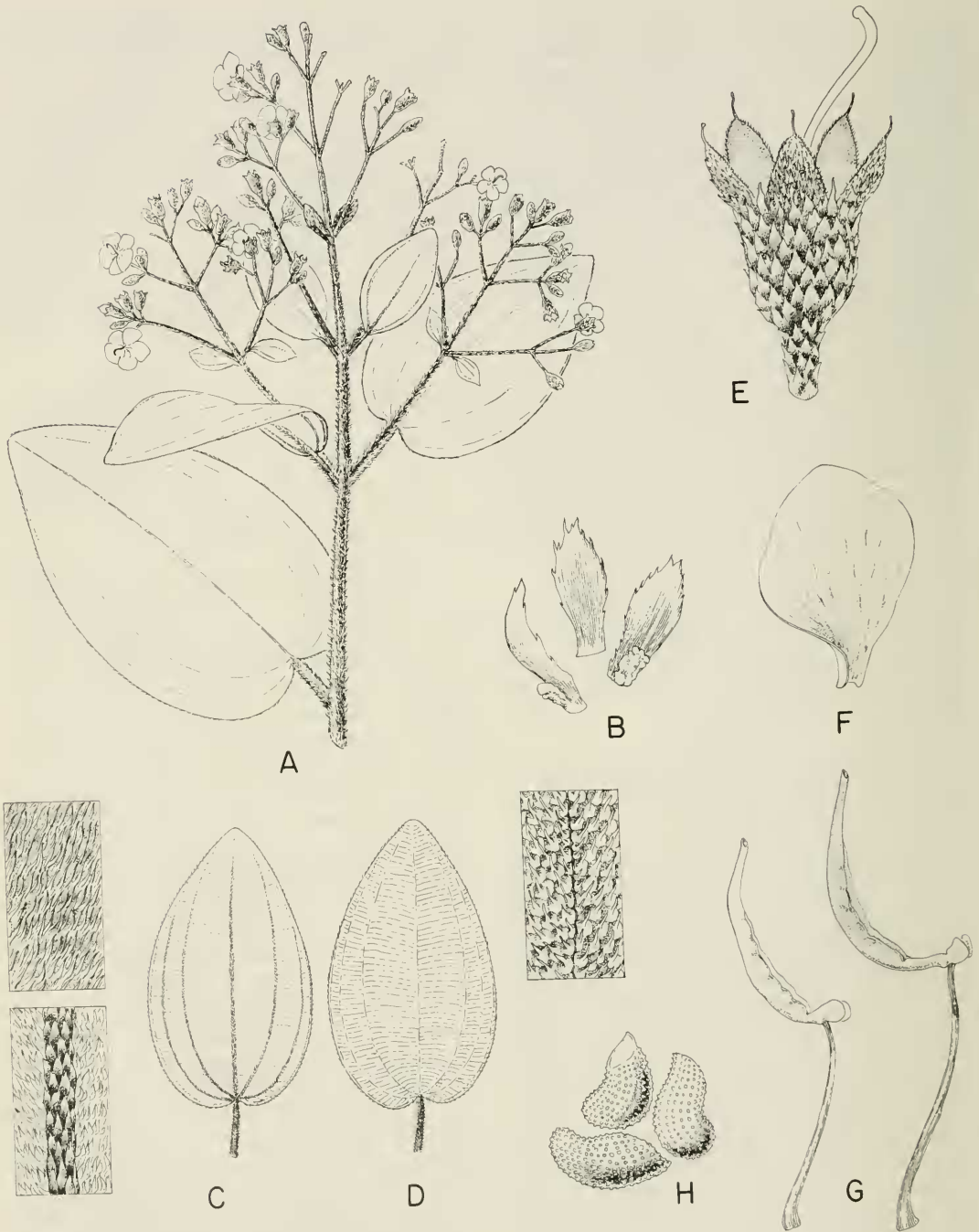


FIGURE 8. *Tibouchina elegantula* Todzia & Almeda. A, habit, \times ca. $\frac{1}{2}$; B, spreading cauline scales with subbasal protuberance \times 9; C, representative leaf (abaxial surface) with enlargement of intercostal indument (upper left) and indument of median vein (lower left), \times ca. $\frac{1}{3}$; D, representative leaf (adaxial surface) with enlargement of indument adjacent to impressed median vein (upper right), \times ca. $\frac{1}{3}$; E, hypanthium (at anthesis) with petals and stamens removed, \times 3; F, petal, \times ca. $2\frac{1}{2}$; G, antepetalous stamen, lateral view (left) and antesepalous stamen, lateral view (right), \times 5; H, seeds, \times 30. (A-H from Luteyn et al. 7488, CAS.)

mm long. Hypanthia (at anthesis) 7–10 mm long to torus, 5.5–7 mm wide, narrowly campanulate to urceolate, densely covered with appressed, proximally attached lanceolate scales (2–3 mm long) with basal ears and irregularly erose margins that conceal surface. Calyx lobes 3–6 mm long, ca. 3 mm wide, oblong to oblong-triangular, moderately beset with scales like those of hypanthia except for a narrow marginal glabrous band, the margins ciliate. Petals 2–3.2 × 1.8–2.9 cm, rose-purple fading to lavender with age, obovate, ciliate, otherwise glabrous. Stamens isomorphic to inconspicuously dimorphic, with ventrally inclined pores; filaments white, 7–8 mm long; anther thecae 5.5–8 mm long, yellow, connective 0.25–0.5 mm long, with a yellow upturned bifid appendage 0.5–1 mm long. Ovary (at anthesis) ovoid, fluted at setose apex. Styles 1.1–2 cm long, declinate, hooked or straight at apex; stigma truncate, papillose. Mature seeds not seen.

DISTRIBUTION AND PHENOLOGY.—Southern Colombia (Nariño) and north-central Ecuador (from Carchi to Bolívar) (Fig. 9) at elevations of 1,800–3,500 m, along roadsides and in disturbed areas of montane rainforest or cloud forest. Apparently flowering throughout the year.

REPRESENTATIVE SPECIMENS EXAMINED.—COLOMBIA. Nariño: Finca La Planada, near Chucunés, 13 Jan 1981 (fl), *Gentry et al.* 30583 (MO); Mpio. Ricaurte, La Planada, ca. 5 km S of Chucunés, Finca de L. Salazar, 24–25 Feb 1979 (fl), *Luteyn & Lebrón-Luteyn* 6824 (CAS, NY, US). ECUADOR. Bolívar: western cordillera, forest region above village of Balsapampa, Jul 1934 (fl), *Rimbach* 206 (NY). Carchi: 62–75 km W of Tulcán, ca. 0°50'N, 78°5'W, 7 Jan 1985 (fl), *Luteyn & Cotton* 10871 (AAU, CAS, NY). Cotopaxi: road Quevedo-Latacunga, Pilaló, 4 May 1968 (fl), *Harling et al.* 9085 (F, MO, US); around Pilaló, 79°2'W, 0°57'S, 7 Jul 1968 (fl), *Holm-Nielsen & Jepsen* 1490 (AAU, US); road Echeandía-Guanujo, E of Echeandía, 79°07'W, 1°25'S, 8 Jul 1979 (fl), *Holm-Nielsen & Andrade* 18584 (AAU); road Quevedo-Latacunga, 6 km before Pilaló, 16 Sep 1977 (fl), *Maas et al.* 2962 (US). Imbabura: Cuichocho-Apuela road km 28, 78°28'W, 00°22'N, 5 Oct 1984 (fl), *Jorgensen & Vive* 56079 (AAU); via Otavalo-INTAG, declivis occidentales del Cerro Cotacachi, 0°20'N, 78°25'W, 25 Nov 1987 (fl), *Palacios* 2172 (TEX). Pichincha: Los Paysanes on road from Quito to Santo Domingo de los Colorados, 28 Jun 1939 (fl), *Asplund* 7314 (LL, NY, US); Chiriboga, 5 May 1955 (fl), *Asplund* 16227 (K, LL); carretera Chilligallo-Chiriboga km 36, 18 Oct 1981 (fl), *Balslev* 2116 (AAU, NY); carretera Nono-Nanegalito en falda norte de Cerro Pichincha, 9 May 1982 (fl), *Balslev & Boom* 2484 (AAU, NY); carretera Quito a La Concordia via Nono, Míndo, San José de las Minas y Puerto Quito, km 32, 7 Aug 1984 (fl), *Dodson et al.* 15243 (MO); Tandayapa-Nono, west of Nono, 26 Jan 1974 (fl), *Harling & Andersson* 11628 (AAU, US); carretera via Cotocollao-Rundupamba-Nono-Nanegalito, 6 May 1980 (fl), *Jaramillo et*

al. 2479 (AAU, NY); Reserva Florística-Ecológica "Río Gualajito," km 59 de la carretera antigua Quito-Santo Domingo de los Colorados, 3.5 km al NE de la carretera, 78°48'10"W, 0°13'53"S, 11 Aug 1985 (fl), *Jaramillo & Zak* 7985 (MO, TEX, US); Quito-Nono-Pto. Quito road, 13 km NW of Nono, Río Alambi valley, 27 Dec 1978 (fl), *Luteyn & Lebrón-Luteyn* 6517 (NY); road from Chiriboga to Sto. Domingo, 10 km W of Chiriboga, 3 May 1985 (fl), *Stein et al.* 2678 (CAS); old highway Quito-Chiriboga-Sto. Domingo, 15 Nov 1986 (fl), *Ullea* 292 (AAU). Without locality, 21 Jan 1856 (fl), *Jameson* 419 (BM, K, P).

This species, first described as *T. lepidota* var. *intermedia*, was known by that name for over 50 years until Wurdack (1977) recognized its distinctiveness and elevated it to species rank. *Tibouchina gleasoniana* is characterized by yellow isomorphic to weakly dimorphic stamens, appressed cauline scales with erose or lacerate margins and basal ears, and complex foliar indument. The upper leaf surface is uniformly covered with bulla-based hairs. The lower leaf surface has lanceolate scales with irregularly erose margins on the elevated primary veins, and curved scales on the secondary veins that grade into an array of narrower scales and twisted, subterete hairs on higher order veins and intercostal areas. This gives the lower leaf surface a golden, woolly appearance. Also characteristic of *T. gleasoniana* are the deciduous bracteoles that are essentially glabrous abaxially except for a scaly indument restricted to a narrow median line or basal triangular patch. Within sect. *Lepidotae* only *T. silvestris* has completely glabrous bracteoles.

Tibouchina gleasoniana is probably most closely related to *T. paleacea*, judging from their similar vegetative morphology and complex foliar indument. Although restricted to high elevations in the Andes of Colombia and Ecuador, the geographic ranges of these two species do not appear to overlap (Figs. 7, 9). It is clear from specimen identifications in herbaria that *T. gleasoniana* and *T. paleacea* have been confused in the past. In addition to longer calyx lobes (8–11 mm), *T. paleacea* is readily distinguished by shorter inflorescences (1.6–4.4 cm) with only the central flower persisting in each simple dichasium, and by the white papillose puberulence on the lower leaf surfaces.

For the most part, *T. gleasoniana* is morphologically uniform throughout its range, but a few collections representing two morphological extremes stand out. *Luteyn & Cotton* 10871 (Ecuador: Carchi) and *Maas et al.* 2962 and *Harling et al.* 9085 (Ecuador: Cotopaxi) are unusual in

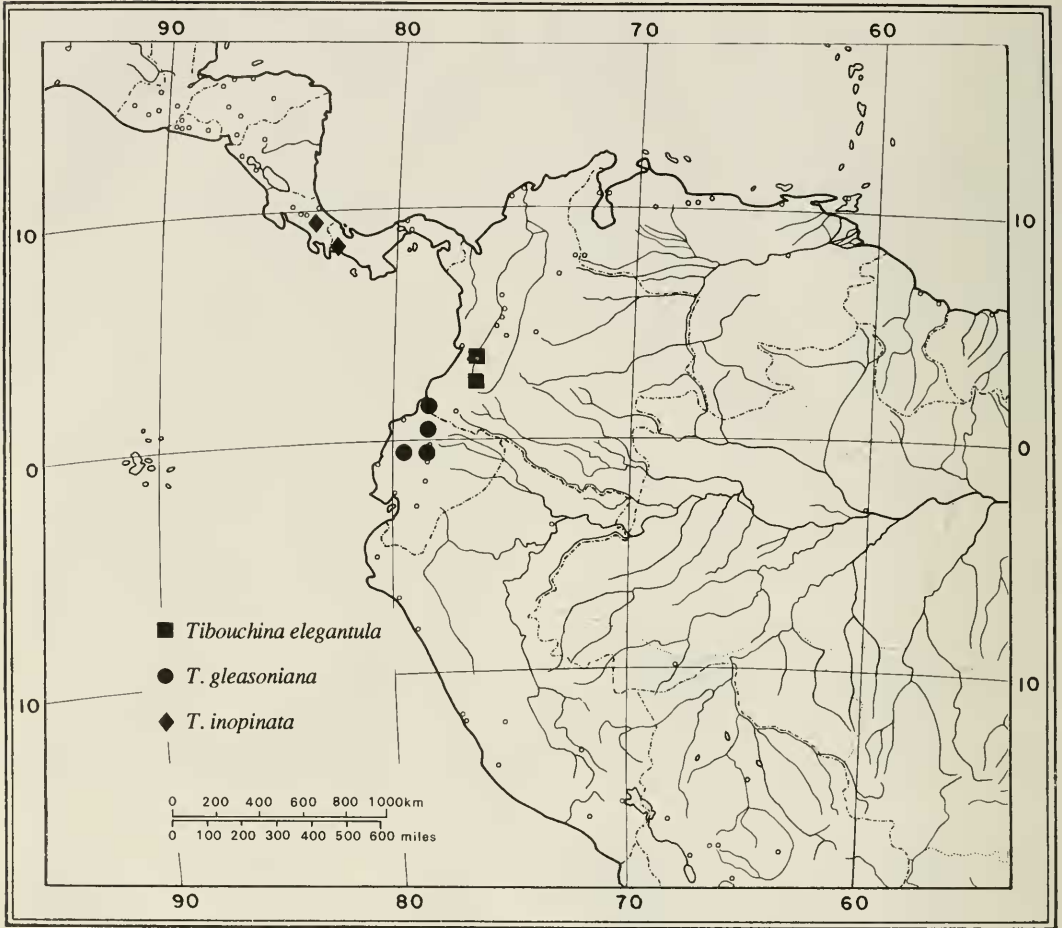


FIGURE 9. Distributions of *Tibouchina elegantula*, *T. gleasoniana*, and *T. inopinata*.

that the lower leaf surfaces have a sparser cover of shorter scales and twisted hairs. *Luteyn & Lebrón-Luteyn 6824* and *Gentry et al. 30583* (both from Colombia: Nariño) have narrowly lanceolate hypanthial scales with less pronounced lacerate margins than those of typical *T. gleasoniana*. Whether these variations are environmentally induced or the result of local genetic divergence is not known. We view these differences as well within the range of variation expected in this species and see no reason to give them formal recognition.

Tibouchina inopinata Wurdack, *Phytologia* 16: 169. 1968. TYPE.—COSTA RICA. Cartago: wooded slopes of Cordillera de Talamanca, 7.5 mi SW of Cartago, 5,300 ft, 15 Jul 1962 (fl, fr), *Webster et al. 12361* (Holotype: US!; isotypes: DAV!, F!, MICH!, MO!).

Shrubs to small, often spindly, arching trees 3–10 m tall; distal branches quadrangular, the internodes beset with, but not totally concealed by, appressed ovate proximally attached scales 0.5–1.5 mm long with irregularly erose or lacerate margins and truncate basal ears, the nodes with lanceolate scales 1.5–3 mm long with subentire to irregularly erose margins and small truncate basal ears. Petioles 0.6–1.4 cm long, covered with proximally attached ovate to lanceolate scales 1.5–3 mm long with truncate basal ears and sometimes with erose margins; blades coriaceous, 4.5–15 cm long, 1.6–3.6 cm wide, lanceolate to narrowly elliptic, 3-nerved with an additional inconspicuous pair of intramarginal veins, the apex narrowly and gradually acuminate, the base acute, the margin entire and beset with non-overlapping clasping folded scales; upper leaf surface beset with, but not concealed by,

flattened scales fused to surface for $\frac{2}{3}$ their length, the distal third of scale free, triangular with laciniate margins, or setiform and entire, the adnate portion covered with minute white pustules; lower leaf surface with three types of scales that do not completely conceal surface; scales on elevated primary veins similar in shape and size to petiolar scales, higher order veins (when evident) and actual surface covered with a mixture of minute ovate scales less than 0.25 mm long and lanceolate to triangular scales ca. 0.5 mm long, these obscurely auriculate at pustulate basal attachment. Inflorescences terminal much-branched panicles, 12.5–25 cm long, with up to ca. 250 flowers; bracteoles, 2–7 mm long, narrowly lanceolate to subulate, covered with scales like those of lower hypanthia; pedicels 3–9 mm long, beset with scales similar to those of hypanthia. Hypanthia (at anthesis), 3–5 mm long to torus, 3–5 mm wide, narrowly campanulate to urceolate, moderately covered with appressed, proximally attached, ovate to lanceolate scales with basal ears and irregularly erose margins. Calyx lobes 1–1.5 \times 1.5–2 mm, broadly triangular, beset with scales like those of hypanthia except for a narrow marginal glabrous band, the margins ciliate. Petals 0.6–1.3 \times 0.4–0.7 cm, white or pale pink, obovate, ciliate, otherwise glabrous. Stamens strongly dimorphic, with ventrally inclined pores; larger stamens geniculate, filaments 4–5 mm long, anther thecae 5–5.5 mm long, pink, subulate, connective 2–4 mm long with a yellow bifid appendage 1–1.2 mm long; smaller stamens more or less erect, filaments 4–6 mm long, anther thecae 3–4 mm long, yellow, subulate, connective strongly geniculate, 0.5–1 mm long, with a yellow, erect to incurved bifid appendage ca. 1 mm long. Ovary (at anthesis) ovoid, red and setose on upper half. Styles 6–9 mm long, more or less erect, strongly incurved distally; stigma truncate, papillose. Capsules usually upright on pendent branches; seeds ca. 0.33 mm long, light brown.

DISTRIBUTION AND PHENOLOGY.—Locally common in Costa Rica and Panama (Fig. 9) at elevations of 700–1,700 m, in disturbed montane forests. Flowering in May, June, July, and August; fruiting in July and August.

REPRESENTATIVE SPECIMENS EXAMINED.—COSTA RICA. Cartago: 1 km beyond Tapantí along road leading up the ridge to Tuis, 10 Jul 1977 (fl), *Almeda et al.* 3004 (CAS, CR); mountain sides along Río Grande de Orosí between bridge over river and Tapantí, 21 Jun 1971 (fl), *Gentry* 974 (F); along open trail to Tausito, 1 km NE of Tapantí, 4 Jun 1967 (fl), *Lent* 1023

(F, NY, US); steep graded banks along Interamerican Hwy. on the Cordillera de Talamanca, ca. 13 km from the Tejar cut-off enroute to El Empalme, 8 Jun 1972 (fl), *Almeda & Wilbur* 1635 (F, LL, NY); heavily forested slopes about 4.5 km from bridge at Tapantí above the Río Grande de Orosí, 27 Aug 1968 (fr), *Wilbur & Stone* 10491 (DS, F, LL, MO, NY, US); rain-forest on the steep slopes above the Río Grande de Orosí along a stretch of 9.3 km beginning 3 km from bridge at Tapantí, 9 Jul 1977 (fl), *Wilbur et al.* 22286 (F); Tapantí Hydroelectric Project, 4–10 km beyond entrance to project, 25 Jun 1976 (fl), *Uitley & Uitley* 5176 (CAS, F, MO, NY). Cartago/San José Border: ca. 8 km beyond Tejar turnoff to Interamerican Hwy. on Cordillera de Talamanca, 2 Aug 1977 (fl, fr), *Almeda et al.* 3365 (CAS, CR). Heredia: 7.3 km N of Varablanca off road to Puerto Viejo, 22 Jul 1977 (fl), *Almeda et al.* 3159 (CAS, CR). San José: trailside between Alto La Palma and $\frac{3}{4}$ the way to Bajo La Honduras, 13 Jul 1976 (fl), *Wilbur* 20387 (CAS). PANAMA. Bocas del Toro: Cerro Colorado, 9.2 mi W of Chamí along trail E of road that leads down to stream, 8°35'N, 81°50'W, 6 Jul 1988 (fr), *Croat* 69003 (CAS). Chiriquí: valley of El Hornito, vicinity of Fortuna Dam, along trail down from hwy., 8°45'N, 82°15'W, 26 May 1988 (fl), *McPherson* 12529 (CAS); km 30–34 along mining road at Cerro Colorado, 9–10 Aug 1984 (fr), *Todzia & Schmalzel* 2572 (CAS). Chiriquí/Bocas del Toro Border: windswept cloud forest vegetation on slopes and valleys of the Cerro Colorado region, 27 Jan 1989 (fl), *Almeda et al.* 6429 (CAS, PMA); Cerro Colorado, road to Bocas del Toro, end of mountain access road, just above face of mine, 14 Aug 1977 (fr), *Folsom et al.* 4731 (CAS, LL).

Tibouchina inopinata, the northernmost species in sect. *Lepidotae*, is a morphologically uniform taxon unlikely to be confused with other species. It is readily recognized by its many-flowered paniculate or highly compound dichasia with up to 250 flowers, erect broadly triangular calyx lobes, strongly dimorphic stamens, and sparse pubescence on the undersurface of the leaves. In the field it can even be recognized in sterile condition because of its distinctive, openly branched, arching habit and lanceolate leaves clustered at the ends of branches.

By virtue of its stamen morphology and mixture of large lanceolate and smaller ovate to ovate-lanceolate scales on the lower leaf surfaces, *T. inopinata* appears to be most closely related to *T. wurdackii*. Restricted to Central America, these two species are also geographically isolated from the South American species of the section.

Tibouchina lepidota (Bonpl.) Baillon, *Adansonia* 12:74. 1877. *Rhexia lepidota* Bonpl., *Rhex.* 38, pl. 15. 1808.—*Chaetogastra lepidota* (Bonpl.) DC., *Prodr.* 3:134. 1828.—*Pleroma lepidotum* (Bonpl.) Triana, *Trans. Linn. Soc. London* 28: 44, pl. 3, fig. 31k. 1871.—**TYPE.**—COLOMBIA or PERU. *Bonpland s.n.* (Holotype, P!; isotypes, P!, US!).

Tibouchina lepidota (Bonpl.) Baillon var. *congestiflora* Cogn., Bot. Jahrb. 8:17. 1887. TYPE.—ECUADOR. Pichincha: near S. Florencio at Río Pilatón, 1,800 m, Cordillera Central, 13 Jan 1881 (fl), *Lehmann 479a* (Holotype: B, destroyed, photographs F!, NY!; isotype: BR!).

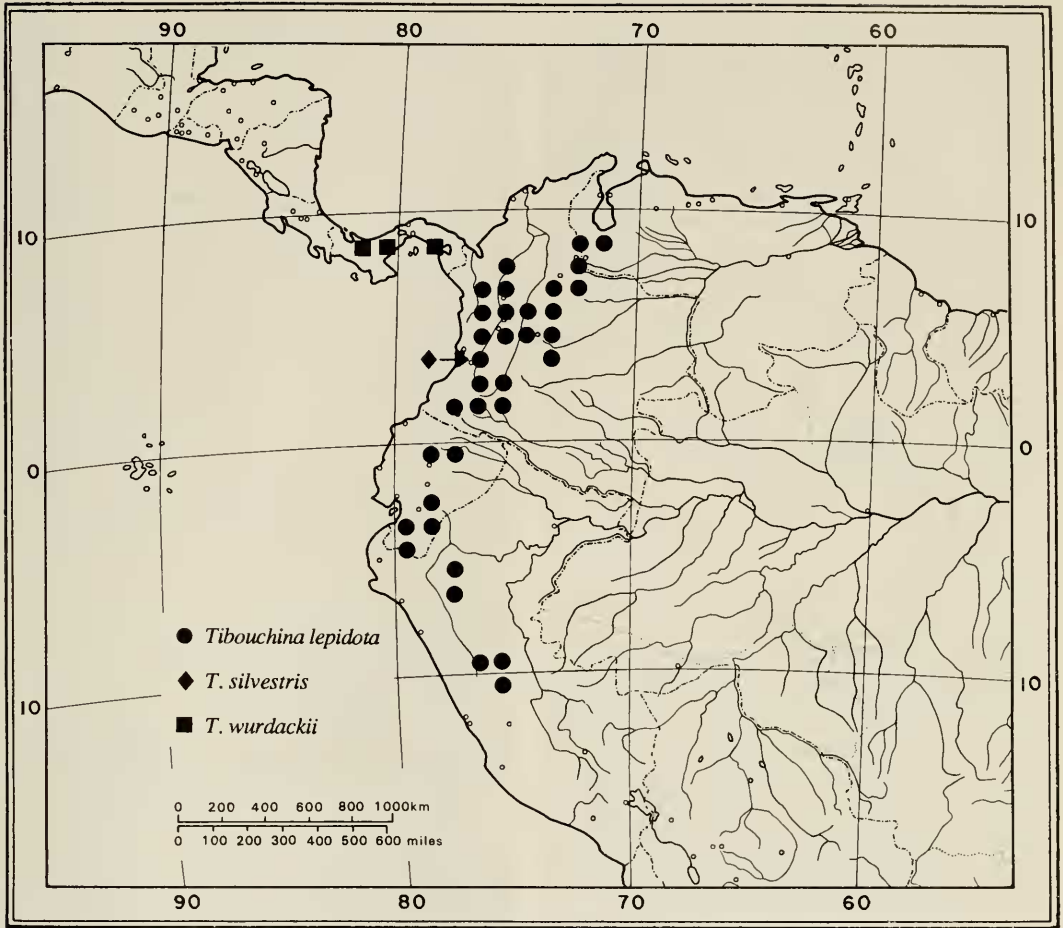
Trees or shrubs 2.5–20 m tall; bark plate-like, sometimes fissured, peeling in loose flakes; distal branches terete with appressed, horizontally attached rectangular, platelike scales intermixed with or replaced by proximally attached elliptic scales 1–2 mm long with basal ears and irregularly erose margins; nodes with very narrow basally attached lanceolate scales mostly 2–3 mm long. Petioles 0.8–1.5 cm long, with scales similar to those on internodes; blades coriaceous, 4–10(–12) cm long, 0.8–4(–6.2) cm wide, oblong-ovate to elliptic, (3–)5-nerved, the apex acute, the base rounded to acute, the margin entire and beset with overlapping clasping scales; upper leaf surface beset with, but not concealed by scales adnate to surface for $\frac{2}{3}$ – $\frac{3}{4}$ their length, the distal portion of flattened scale free and triangular, the adnate portion often swollen (bullae-based) and covered with minute white pustules; lower leaf surface with two types of scales that do not completely conceal epidermal surface; scales on elevated primary veins similar in size and shape to cauline scales; secondary and higher order venation and intercostal areas with irregularly erose or lacerate basally attached scales (these somewhat raised or spreading when dry), or if only sparsely covered with scales then with a ground layer of minute papillose puberulence. Inflorescences terminal, pedunculate, simple or congested umbelliform dichasia with 3–5 flowers, seldom with solitary flowers; peduncles 2.5–8(–13) cm long, beset with scales similar to those of uppermost internodes; bracteoles cucullate, 8–15 mm long, ovate to elliptic, covered with scales similar to those of hypanthia, glabrous along the margin; pedicels 1–12 mm long, beset with scales similar to those of hypanthia, early deciduous. Hypanthia (at anthesis) 4–7(–8) mm long to torus, 5–6 mm wide, campanulate, densely covered with appressed ovate to lanceolate, reddish to purplish brown, proximally attached scales (1.5–3 mm long) with basal ears and irregularly erose margins. Calyx lobes 4–6(–7) \times (2.5–)3–5 mm, oblong, purple-brown to deep red, densely beset with scales like those of hypanthia except for a

narrow marginal glabrous band, the margins ciliate. Petals (1.2–)1.5–2.8(–3.7) \times 1–2.7 cm, crimson or rose-purple fading to lavender, obovate, the margins ciliate, otherwise glabrous. Stamens isomorphic, erect, with ventrally inclined pores; filaments 6–8 mm long, white or purple; anther thecae 5–7(–9) mm long, yellow, the connective 0.5–1 mm long with a yellow-orange, upturned bifid appendage (0.5–)1–1.5(–2) mm long. Ovary (at anthesis) 5–6 mm long, ovoid, fluted at setose apex. Styles 1–1.7 cm long, strongly declinate, hooked at apex; stigma truncate, papillose. Seeds ca. 0.5 mm long, light brown.

DISTRIBUTION AND PHENOLOGY.—From western Venezuela to central Peru (Fig. 10) in disturbed and undisturbed montane forest at 800–3,200 m. In Venezuela, flowering is reported from July through November while in Colombia and Ecuador flowering occurs throughout the year. In Peru flowering is more common from February through May although two flowering specimens are recorded from June and July.

COMMON NAMES.—Rondon (Venezuela); Flor de mayo, mayo, siete cueros (Colombia); Pontac, arbol de la navidad (Ecuador).

REPRESENTATIVE SPECIMENS EXAMINED.—VENEZUELA. Mérida: Páramo de Zumbador, Oct 1842 (fl), *Linden s.n.* (P); Páramo de Guaraque, Cordillera de los Andes, Distr. Tovar, 6 Sep 1966 (fl), *López-Palacios 1546* (US); between Guaraque and Tovar, 12 Nov 1972 (fl), *Wurdack et al. 2753* (US). Táchira: Páramo El Zumbador, Sep 1956 (fl), *Aristeguieta 2548* (NY); Carretera Rubio-Las Delicias, 13 km above Diamante, immediately above Mata Mula, 4 Oct 1967 (fl), *Bunting 2418* (US); Quebrada El Reposo, ca. 6.7 km N of Villa Páez, at extreme NW of Páramo de Tamá, Distr. Junín, 28 Jun 1973 (fr), *Ruiz-Terán & Lopez-Figueiras 8953* (K, MO); between El Cobre and Cordero, 8 Jul 1944 (fl), *Steyermark 57127* (F, NY); between Michelena and Boca de Monte, W of Zumbador, 28 Aug 1966 (fl, fr), *Steyermark & Rabe 96797* (K, NY, US); below Páramo de La Negra on the road to Pregonero, 29–30 Aug 1966 (fl), *Steyermark & Rabe 96964* (F, NY, US); vicinity of Mata Mula, N of Delicias on road to Bramon, 7°38'N, 72°26'W, 26 Jul 1979 (fl), *Steyermark & Liesner 118683* (MO, US); brook ca. 9 km above La Grita on road to Porqueras, Serranías de Batallón, Cordillera de Mérida, Distr. Jáuregui, 31 Jul 1973 (fl), *Tillett 737-299* (MO). COLOMBIA. Antioquia: Mun. Guatapé, Vereda Santa Rita, Finca Montepinar, 6 Jun 1985 (fl), *Albert de Escobar et al. 5292* (NY); Santa Elena, near Antioquia, 9 Aug 1930 (fl), *Archer & Ramos 820* (NY, US); Medellín, La Sierra, 26 Dec 1930 (fl), *Archer 1070* (NY, US); below summit of Santa Elena, on road from Medellín to Rio Negro, 2 Apr 1949 (fl), *F. Barkley et al. 385* (NY, US); near Angelópolis, 22 Nov 1947 (fl), *F. Barkley & Gutiérrez 1676* (F, UC); Quebrada Anocosca, along Anocosca-Abriaqui road, 15 Mar 1944 (fl), *Core 445* (US); road between Robles and Guadalupe, 13 May 1944 (fl), *Core 695* (NY, US); Me-

FIGURE 10. Distributions of *Tibouchina lepidota*, *T. silvestris*, and *T. wurdackii*.

dellín, Mount El Boquerón, Alto de los Baldíos, 9 Apr 1958 (fl), *Cuatrecasas et al.* 24257 (US); "La Paloma" above Sonson, 24–25 May 1944 (fl), *Ewan* 15726 (NY, US); Salto de Guadalupe, 27 Jul 1947 (fl), *Hodge* 6966 (US); Santa Rosa, 27 Sep 1887 (fl), *Lehmann* 7507 (F, US); Yarumal-Valdivia road, km 123, ca. 10 km N of Yarumal, 22–23 Mar 1979 (fl), *Luteyn et al.* 7054 (CAS, NY); Uramita-Peque road, 20–22 km above Uranta (Las Juntas), 29 Mar 1979 (fl), *Luteyn & Lebrón-Luteyn* 7174 (AAU, CAS, NY); between Yarumal and the Llanos de Cuiba, 20 Feb 1942 (fl), *Metcalf & Cuatrecasas* 30134 (F, MO, NY, UC, US); Santa Barbara, Cauca Valley, 21 Sep 1922 (fr), *Pennell* 10913 (NY, US); Mpio. de Granada, km 24 of San Carlos-Granada road, 06°10'N, 75°08'W, 21 May 1988 (fl), *Zarucchi et al.* 6780 (CAS). Boyacá: region of Mt. Chapon, extreme western part of Dept. Boyacá, NW of Bogotá, 23 May 1932 (fl), *Lawrence* 98 (F, MO, NY, US); Bosques de Arcabuco, 24 Feb 1940 (fl, fr), *Pérez Arbeláez & Cuatrecasas* 8102 (NY, US); Cordillera Oriental, between Charalá and Tunja, 19 Jun 1966 (fl), *Schulz et al.* 468 (US). Caldas: between Salento and Tambores, 14 Mar 1876 (fl), *André* 2346 (K); Los Alpes, Aug 1944 (fl), *Dryander* 2800 (F, US); Río Quindío, Salento, Cordillera Central, 27–30 Jul 1922 (fl), *Killip & Hazen* 9032 (NY,

US); San Bernardino, 29 Aug 1922 (fl), *Pennell & Hazen* 10155 (NY, US); La Selva, Cordillera Occidental, vertiente occidental, 27 Jan 1946 (fl), *von Sneider* 5535 (F, US). Caquetá: Cordillera Oriental, vertiente oriental, Quebrada del Río Hacha, below Gabinete, 23 Mar 1940 (fl), *Cuatrecasas* 8509 (F, US). Cauca: 64 km from Pital towards Popayán beyond La Plata, 21 Jan 1976 (fl), *Luteyn et al.* 4972 (US); above Moroco, Río Moras Valley Paez basin, Tierra Adentro, 4 Feb 1906 (fl, fr), *Pittier* 1329 (US); near the village El Tambo, in forest near Chisquío, 25 Sep 1935 (fl), *von Sneider* 445 (NY); near the village El Tambo, 16 Nov 1939 (fl), *von Sneider* 2448 (US). Chocó: Alto de Guaduas, near Carmen, 1 Mar 1944 (fl), *Core* 347a (US); along road between San José del Palmar and Cartago at Vereda San Antonio between San Jose del Palmar and jct. in road to El Cairo, 4°55'N, 76°14'W, 12 May 1983 (fl), *Croat* 56660 (MO); carretera Tutunendo-El Carmen, between km. 135 and 120, Alto Río Atrato, 29 Apr 1979 (fl), *Forero et al.* 6082 (US); 16–18 km W of Bolivar, near top of Cordillera Occidental and Antioquia border, 6 Jan 1979 (fl), *Gentry & Renteria* 23695 (MO); Emisora La Sirena, 3 km W of La Mansa at top of Cordillera Occidental, 16 Jan 1979 (fl), *Gentry & Renteria* 24200 (US); highway between El Carmen and Quib-

- do, 5°40'W, 76°30'W, 27 Dec 1982 (fl), *Juncosa 518* (MO). Cundinamarca: San Francisco a La Vega, 18 Sep 1961 (fl), *García-Barriga 17347* (AAU, NY); Sasaima, San Bernardo, Quebrada La María and Río Dulce, 20–30 Nov 1962 (fl), *García-Barriga 17589* (AAU, NY); Patio Bonito, Batatas Valley, Cordillera de Helicon, 12 km SE of Gachalá, 22 Sep 1944 (fl), *Grant 10291* (NY, US); "Alto Isacar," Finca 11 km S of La Palma, 11 Mar 1944 (fl, fr), *Little 7406* (NY, US); eastern Cordillera, ca. 21 km NW of Facatativá, 14 Jul 1965 (fl), *King et al. 5935* (F, NY). Huila-Com. del Caquetá: Cord. Oriental, on divide, in Gabinete, 22 Mar 1940 (fr), *Cuatrecasas 8494* (COL, F). Huila: Andalusia, 22 Aug 1926 (fl), *Juzepczuk 6597* (NY); 12 km SE of Algeciras, SE along govt. trail to San Vicente, Cordillera Oriental, 23 Apr 1944 (fl, fr), *Little 7708* (NY, US); Balsillas, on Río Balsillas, 3–5 Aug 1917 (fl), *Rusby & Pennell 723* (NY, US). Nariño: Reserva Natural La Planada, cerca de Ricaurte, 15 Jun 1986 (fl), *León et al. 1671* (US); Ricaurte, 24 Apr 1941 (fl), *von Sneidern 631* (LL). Norte de Santander: region of Ocaña, between La María and Jurisdicciones, 25 Sep 1969 (fl), *Cuatrecasas & Rodriguez 27936* (F, NY, US). Putumayo: Valle de Sibundoy, camino de la hidráulica, 1 km N of Sibundoy, 21 Oct 1962 (fl), *Bristol 302* (COL, F); Alto de la Cordillera between El Valle de Sibundoy and Mococa, El Portachuelo, 30 Dec 1940, *Cuatrecasas 11480* (F, US); road between El Encano and Sibundoy, páramo El Capuchino, 7 Oct 1965 (fl), *García-Barriga et al. 18600* (NY); Sibundoy, hill N of valley, 28 May 1946 (fl, fr), *Schultes & Villareal 7519* (F, K, NY, US); Valle de Sibundoy, above Santiago, 24 Jul 1964 (fl), *Soejarto 1049* (US). Quindío: between Salento and Tambores, on western slope, 14 Mar 1876 (fl), *André 2346* (NY); Mun. de Calarca, Cerro al Campanario, camino de Pinares, 3 Jun 1986 (fl), *Arbéláez 1570* (US). Santander: region about La Paz, 25 km NE of Velez, 6 May 1944 (fl), *Fassett 25191* (NY, US); Quebrada de Pois, N of La Baja, 31 Jan 1927 (fl), *Killip & A. C. Smith 18809* (F, K, NY, US). Tolima: El Fresno, "Cuchillo del Topacio," 3 Dec 1939 (fl), *García-Barriga 8223* (COL, US); El Libano a Murillo (km 11 al 22 de la carretera), subpáramo en el Alto de Peñones, 20 Jul 1947 (fl), *García-Barriga 12260* (US). Valle: along road between Cali and Buenaventura at km 20.5 just beyond summit of road W of Dias y Ocho, 27 Aug 1976 (fl), *Croat 38558* (MO); Cordillera Occidental, filo de la Cordillera, al N de Las Brisas, Gibraltar, 25 Oct 1946 (fl), *Cuatrecasas 22515* (F, NY, US); Cordillera Central, Tenerife, hacia el cerro Pan de Azúcar, 26 Feb 1969 (fl), *Cuatrecasas et al. 27534* (F, K, NY, US); Mpio. El Cairo, El Brillante, 14 Aug 1986 (fl), *López 42* (MO); road to sea, western Cordillera, May 1939 (fl), *Dryander 2369* (F, K, NY, US); carretera San José del Palmar Chocó-Ansermanuevo, 17 km W of La Carbonera, 27 Feb 1977 (fr), *Forero et al. 3550* (MO); San Antonio, W of Cali, near summit of Cordillera Occidental, 26 Feb, 2 Mar 1939 (fl, fr), *Killip & García 33659* (F, NY, US); Cordillera Occidental, Cuenca del Río Cali, Pichindé, on side of road between Brasilia and Peñas Blancas, 23 Jan 1963 (fl, fr), *López Figueiras 8264* (US); Cali-Loboguero road, side road to San Antonio (Telecom tower) ca. km 16, 8 Mar 1979 (fl), *Luteyn & Lebrón-Luteyn 6982* (AAU, CAS, NY). ECUADOR. Azuay: Highway Cuenca-Cola de San Pablo, Sevilla de Oro, 17 Feb 1977 (fl), *Boeke & Loyola 1063* (AAU). Loja: 15 km S of Yangana on the road Loja-Zumbra, 79°8'W, 4°30'S, 24 Sep 1983 (fl), *Brandbyge 42285* (AAU); 5 km SE of Loja, 7 Mar 1947 (fl), *Espinosa 1561* (F, NY, US); road Loja-Zamora, on border to Zamora-Chinchipe, 13 Apr 1974 (fl), *Harling & Andersson 13498* (AAU, MO, US); Nudo de Sabaniilla, 10 Feb 1982 (fl), *Harling et al. 20545* (CAS); road Loja-Zamora, km 10.5, 79°10'W, 4°S, 17 Apr 1973 (fl), *Holm-Nielsen et al. 3656* (AAU); 2 km E of Loja on the road to Zamora, 31 Jan 1979 (fl), *King & Almeda 7910* (CAS, K, MO, US). Morona-Santiago: 3 km W of Indanza, on Gualaceo-San Juan Bosco road, 28 Jan 1981 (fl), *Gentry et al. 30980* (AAU); road Limón (General Plaza)-Gualaceo, km 16–18 from Limón, 22 Mar 1974 (fl), *Harling & Andersson 12697* (US); Lomipuerto, road Gualaceo-Limón, 78°35'W, 3°3'S, 23 Sep 1979 (fl), *Holm-Nielsen et al. 20379* (AAU, K). Napo: between Cuyuja and Baeza, 26 Dec 1939 (fl), *Asplund 10146* (CAS, US); road Baeza-Tena, 8 km from Baeza, 77°50'W, 0°31'S, 27 Oct 1976, *Balslev & Madsen 10377* (AAU, CAS, F, MO, NY); Cosanga-Río Cosanga, 4 Dec 1976 (fl), *Boeke & McElroy 408* (AAU, CAS, NY); km 140, Quito-Tena via Baeza, 3 Aug 1984 (fl), *Dodson et al. 14861* (MO); 2 km W of Reventador, 6 Nov 1974 (fl), *Gentry 12579* (AAU, MO, US); Borja (Virgilio Dávila), Río Quijos, 15–26 Jan 1959 (fl, fr), *Harling 3870* (LL, MO, NY); Río Borja, km 3, 77°47'W, 0°26'S, 21 Sep 1980 (fl), *Holm-Nielsen et al. 26600* (AAU, CAS); Cantón Quijos, at Río Cosanga near Cosanga, 13 Feb 1978 (fl), *Kirkbride & Chamba 4001* (NY, US). Pichincha: Los Dos Ríos on road between Chiriboga and Santo Domingo de los Colorados, 2 Jul 1955 (fl, fr), *Asplund 16813* (NY, US); km 70, old road from Quito to Santo Domingo, 13 Oct 1981 (fl, fr), *Dodson & Dodson 11851* (MO, NY); old road to Santo Domingo-Quito, Chiriboga, 8 May 1988 (fl), *Harling et al. 9237* (F, US); road Naeagalito-Pacto, km 8, 78°41'W, 0°4'N, 21 Jul 1980 (fl), *Holm-Nielsen et al. 24461* (AAU, NY); old road Quito-Santo Domingo, 12–15 km NE of turnoff to old road from junction with new road near Alluriquin, ca. 0°20'S, 78°55'W, 3 Feb 1982 (fl), *Luteyn et al. 8742* (AAU, CAS, NY). Santiago-Zamora: dense forest between Campanas and Arenillas, along Río Tintas, 10 leagues SE of El Pan, 13 Jul 1943 (fl), *Steyermark 53534* (F); along Quebrada Honda, vic. of Rancho Achupallas, 10 Oct 1943 (fl), *Steyermark 54549* (F, NY, US). Zamora-Chinchipe: Road Loja-Zamora, km 17, 79°08'W, 3°59'S, 16 Apr 1973 (fl), *Holm-Nielsen et al. 3598* (AAU, MO, NY, US); Planta Eléctrica de San Ramón, near Sabaniilla, 18 km E of Loja, 3°59'S, 79°03'W, 3 Sep 1975 (fl, fr), *Little et al. 211* (US); 3 miles from Loja, on road to Zamora, 28 Sep 1959 (fl, fr), *Maguire & Maguire 44343* (NY, US). PERU. Amazonas: Prov. Bongará, 4–8 km W of Pomacocha on road to Rioja, 5°45'S, 77°53'W, 9 Feb 1984 (fl), *Gentry & Smith 45188* (CAS, MO); 4–6 km W of Pomacocha on road to Pedro Ruíz Gallo, 77°50'W, 05°50'S, 7 Feb 1988 (fl), *Gentry et al. 61330A* (CAS, MO); Prov. Bongará, 4 km N of Pomacocha on road to Brijoja, trail down gorge to W of road, 5°40'S, 77°22'W, 2 Jun 1986 (fl), *Knapp et al. 7511* (CAS, TEX); Prov. Chachapoyas, Chachapoyas-Mendoza road, kms 546–549, W of Molinopampa, 11–12 Mar 1978 (fl, fr), *Luteyn & Lebrón-Luteyn 5557* (CAS, F, K, MO, NY, UC); white sand slopes along road E of Chachapoyas between Pisos and Molinopampa, 6°15'S, 77°40'W, 14 Feb 1985 (fl), *Luteyn & Cotton 11391* (CAS, NY); Prov. Bongará, 20 km on road from Pedro Ruíz to Pomacocha, 5°50'S, 77°52'W, 6 Feb 1985 (fl), *Stein & Todzia 2088* (CAS, MO); between Molinopampa and Mendoza, 10 km E of Molinopampa, 23 Feb 1978 (fl), *Wasshausen & Encarnación 1010* (K, MO, NY, US); jalca zone 3–6 km W of Molinopampa, above Laguna Pomacocha, 19 Jul 1962 (fl, fr), *Wurdack 1392* (F, NY, US). Huánuco: Prov. Huánuco, ca. 51 km NNE of Huánuco, ca. 10 km N of tunnel, 15 Jul 1981 (fl), *Dillon 2611* (F, K, MO, NY, TEX); Carpath Pass on Tingo María-Huánuco road, 14 Mar 1945 (fl, fr), *Hodge 6293* (US); Prov. Leoncio Prado, km 463 on Lima-Tingo María road, 6 Jun 1981 (fr), *Young & Sullivan 881* (CAS,

MO); Tumanga, 27 Apr 1963 (fl), *Woytkowski 7995* (MO, US). Pasco: Prov. Oxapampa, Los Chacos (valley of Río Yamaquizu) near Oxapampa, 75°22'W, 11°34'S, 11 May 1982 (fl, fr), *Smith & Pretel 1509* (US). San Martín: Bongará Prov., Pedro Ruíz-Moyobamba road, km 380, near Río Nieva, 77°45'W, 5°45'S, 29 Aug 1983 (fl), *Smith 4844* (US).

Tibouchina lepidota is readily separated from other species in the section by the following combination of characters: cauline pubescence consisting of a mixture of horizontally attached platelike scales and proximally attached elliptic scales; lower leaf surfaces densely covered with erose scales and a ground layer of minute papillose puberulence (Fig. 3E, F); inflorescences typically pedunculate simple dichasia; and stamens isomorphic with yellow anthers.

In the field, *T. lepidota* stands out because its magenta to rose-red petals fade to purple or lavender with age. In sect. *Lepidotae*, petal color change also occurs in *T. gleasoniana* and *T. paleacea*.

With populations extending from the Andes of western Venezuela to central Peru, *T. lepidota* has the broadest distribution of any species in sect. *Lepidotae*. Its high chromosome number ($n = \text{ca. } 62$) indicates that it is derived, but the lack of chromosome information for other members of the section creates difficulty in assessing its affinities. Similarities in cauline and foliar pubescence, however, suggest that *T. lepidota* and *T. silvestris* are sister taxa. For an enumeration of the differences between these species, see the discussion under *T. silvestris*.

Like other widespread woody taxa confined to montane habitats in the neotropics, *T. lepidota* exhibits its share of morphological variation. Three populations possess characters at variance with the majority of specimens examined for this study. Collections from west-central Colombia (Cundinamarca and Tolima) are unusual and might, with extended study, be shown to represent a distinct taxon. They differ in having solitary flowers (vs. terminal dichasia), lanceolate hypanthial scales with fimbriate margins (vs. ovate scales with erose margins), bracteoles that are glabrous except for a thin line of scales along the midvein (vs. bracteoles that are essentially covered with scales), and anthers 8–10 mm long [vs. 5–7(–8) mm long]. Collections of this variant are as follows: COLOMBIA. Cundinamarca: Aguadita, Cordillera Oriental, 4 Feb 1876 (fl), *André 1425* (F, NY, US); San Miguel, S of Sibaté on road to Fusagasugá, between km markers 34

and 35, 13 May 1972 (fl), *Barclay et al. 3411* (US); Cuesta de Fusagasugá, 18 Feb 1940 (fl), *Cuatrecasas 8025* (F, NY, US); San Miguel á Aguabonita, 20–25 Apr 1946 (fl), *Duque-Jaramillo 3333* (CM); entre Pacho and Río Negro, 22–26 Feb 1942 (fr), *García-Barriga 10742* (US); Fusagasugá, hwy. to San Bernardo, 4 Jul 1976 (fl), *García-Barriga 21044* (F, NY, US); ca. 26 km NE of Fusagasugá, 19 Jun 1965 (fl), *King & Guevara 5669* (F, NY, US); Páramo de Guerrero, between Zipaquira and Pacho, 28 Sep 1974 (fl), *Maas & Jaramillo 1797* (US); forests between El Alto de San Miguel and La Aguadita, before Sibaté, 6 Jun 1965 (fl), *Uribe 5237* (US). Meta: Río del Nevado, below confluence of Río Arroz, S slope of W Río Humadea, Páramo de Sumapaz, 3°59'N, 73°56'W, 1 Sep 1943 (fl), *Fosberg 20944* (NY, US). Tolima: Central Cordillera, 43 km ENE of Manizales, 16–17 Jul 1965 (fl), *King et al. 5987* (NY).

The second aberrant population of *T. lepidota* is from southern Ecuador (Azuay, Moron-Santiago, Santiago-Zamora); it differs from the norm in having adaxial foliar pubescence consisting of bulla-based hairs with raised setae 0.5–1 mm long. This feature is otherwise unknown in *T. lepidota* and none of the four species in the section with bulla-based hairs are recorded from southern Ecuador. This variant is represented by the following collections: ECUADOR. Azuay: Highway Cuenca-Cola de San Pablo, Sevilla de Oro, 17 Feb 1977 (fl), *Boeke & Loyola 1063* (MO, NY, US). Morona-Santiago: 3 km W of Indanza, on Gualaceo-San Juan Bosco rd., 28 Jan 1981 (fl), *Gentry et al. 30980* (MO). Santiago-Zamora: Tambo Consuelo to Tambo Cerro Negro, E slope of the cordillera, valley of the Río Chupianza (on the trail from Sevilla de Oro to Mendez), 17 Dec 1944 (fl), *Camp E-1617* (NY); dense forest between Campanas and Arenillas, along Río Tintas, 10 leagues SE of El Pan, 13 Jul 1943 (fl), *Steyermark 53534* (F); trail between Pailas and El Pan, 10 Sep 1943 (fl), *Steyermark 54314* (F, NY).

These two anomalous populations exhibit some geographic homogeneity, but it is not clear taxa, or stabilized variants with an asexual breeding system. Chromosome counts of these and other populations are also needed to determine whether observed differences are associated with heteroploidy or other cytological peculiarities.

The third and most problematic of the variants attributable to the *T. lepidota* complex is *Devia 208* (MO) from Dept. Valle in western Colombia. It is similar to *T. lepidota* in cauline indument, leaf shape, inflorescence details, and indument of the upper leaf surface. Indument of the lower leaf surface, on the other hand, varies toward, but is not identical to, *T. paleacea*. The secondary leaf veins in this collection have curved ovate scales with lacerate margins that grade into essentially terete hairs on the tertiary veins. In *T. paleacea* the straight scales on the secondary veins are slender, lanceolate and essentially entire, but they too grade into terete hairs on the tertiaries. The secondary and tertiary veins of this enigmatic collection have a scattering of the sessile reddish glands on the secondaries and higher order veins that are typical of *T. paleacea* but lacking in *T. lepidota*. Because *T. lepidota* and *T. paleacea* occur in Dept. Valle and have broadly overlapping elevational distributions, it is tempting to suggest that this variant originated from past hybridization between the two species. We have no other evidence, however, to substantiate this speculation.

***Tibouchina narinoensis* Wurdack, Phytologia 35: 241. 1977. TYPE.**—COLOMBIA. Nariño: Entre Ricaurte y Diviso, carretera Pasto-Tumaco, 6 Nov 1950 (fl), *R. Espinosa 2954* (Holotype: NY!).

Shrubs or small trees to 3 m tall; distal branches terete, the internodes covered with appressed proximally attached lanceolate scales 1.5–2 mm long with irregularly erose or lacerate margins and well-developed basal ears, the nodes with similar scales mostly 2.5–4 mm long. Petioles 0.7–1 cm long, covered with scales like those of internodes; blades coriaceous, 5.7–10 cm long, 2.2–3.7 cm wide, elliptic-lanceolate, 5-nerved, the apex acute to acuminate or bluntly apiculate, the base rounded, the margins entire and beset with clasping, folded scales; upper leaf surface covered with bulla-based hairs with terminal setae ca. 1 mm long; lower leaf surface with two kinds of scales that only sparsely cover the surface; scales on elevated primary veins 2–4 mm long, straight, very narrowly lanceolate with entire margins; scales on secondary and tertiary veins 1–2 mm long with entire margins, varying from narrowly lanceolate on secondaries to nearly setiform on tertiaries; actual surface covered with a minute papillose puberulence. Inflores-

cences terminal modified panicles, 7.5–14 cm long, with 9–12 flowers; bracteoles ca. 3–5 mm long, narrowly lanceolate to subulate, beset with scales like those of uppermost cauline internodes, early deciduous; pedicels 0.4–1.6 cm long, beset with scales like those of hypanthia. Hypanthia (at anthesis) 6–9 mm long to torus, 4–5 mm wide, narrowly campanulate to urceolate, sparsely covered with appressed ovate to lanceolate proximally attached scales, these 1–1.5 mm long, with basal ears and irregularly erose margins, the leaf surface visible. Calyx lobes 2–4 × 1–1.5(–2.5) mm, triangular, sparsely beset with scales like those on hypanthia, the margins ciliate. Petals 1.2–1.6 × 1.1–1.4 cm, lilac to purple, asymmetrically obovate, retuse at apex, ciliate, otherwise glabrous. Stamens isomorphic, with ventrally inclined pores, the filaments 5–7 mm long, the anther thecae 6–7 mm long, yellow, subulate, the connective straight, ca. 0.5 mm long, with upturned, bifid appendages ca. 0.5 mm long. Ovary (at anthesis) ovoid, fluted at setose apex. Styles 1–1.3 cm long, declinate, incurved distally; stigma truncate, papillose. Seeds 0.25–0.33 mm long, light brown.

DISTRIBUTION AND PHENOLOGY.—Along roadsides and forest edges in southern Colombia (Nariño) (Fig. 7) at elevations of 200–1,450 m. Flowering reported in January, July, August, and November; two fruiting specimens from July and August.

SPECIMENS EXAMINED.—COLOMBIA. Nariño: Barbacoas, Corregimiento Santander (Buenavista) a Barbacoas (vertiente del Río Telembi), 3–5 Aug 1948 (fl, fr), *García-Barriga 13164* (NY, US); 2–8 km E of Junín on Tumaco-Tuquiritas road, 1°15'N, 78°09'W, 26 Jul 1986 (fl, fr), *Gentry et al. 55227* (AAU); entre Altaquer y Junín, Cuyambe, 1 Jan 1957 (fl), *Idrobo & Kyburz 2357* (US); Mun. Altaquer, carretera entre Altaquer y Junín, Cuyambe, 17 Nov 1967 (fl), *Mora 4137* (COL).

Tibouchina narinoensis is known only from the type and the four collections cited here. Despite limited material, this well-defined species is easily distinguished from other South American members of the section by hypanthia with scales that do not conceal the actual surface. The foliar pubescence is also distinctive. The scales on the lower leaf surface are essentially entire, and the abaxial foliar surface is covered with a white papillose or farinaceous puberulence.

The affinities of *T. narinoensis* are with *T. paleacea*, which has a more northerly distribution in Colombia and occurs at much higher elevations (1,980–3,100 m). Differences between these

two species include characters of the calyx lobes, inflorescence, and floral bracteoles. The calyx lobes of *T. narinoensis* are triangular and only 2–4 mm long whereas those of *T. paleacea* are oblong and 8–11 mm long. The compound dichasial inflorescences of *T. narinoensis* are 7.5–14 cm long. In *T. paleacea* the inflorescences consist of simple dichasia mostly 1.6–4.4 cm long, but only the central flower persists at anthesis. Although bracteoles are rarely present on fruiting collections, their size and shape are of diagnostic value. In *T. narinoensis* they are narrowly lanceolate to subulate and 3–5 mm long. In *T. paleacea* they are longer (9–14 mm) and consistently ovate.

Tibouchina paleacea (Triana) Cogn. in Martius, Fl. Bras. 14(3):373. 1885. *Pleroma lepidotum* (Bonpl.) Triana var. *paleaceum* Triana, Trans. Linn. Soc. London 28:44. 1871. TYPE. COLOMBIA. Antioquia: Río Negro, 2,300 m, *Triana s.n.* (Lectotype, here designated: K!; isolectotypes: BR!, G-DEL, K!, NY!, P!).

Trees or shrubs 2.5–10 m tall; trunks with red peeling bark; distal branches quadrangular with appressed to antrorsely spreading proximally attached lanceolate scales 1.5–2 mm long, with entire or irregularly erose margins and basal ears, the nodes with appressed basally attached lanceolate scales 2–7 mm long with entire margins. Petioles 0.5–1 cm long, covered with lanceolate spreading scales similar to those of internodes; blades coriaceous, 4.2–11 cm long, 1.6–11 cm wide, narrowly elliptic to elliptic-lanceolate, 5-nerved, the apex bluntly acute to rounded or apiculate, the base rounded, the margin entire and beset with overlapping, clasping scales; upper leaf surface covered with bulla-based hairs with terminal setae 0.25–1 mm long; lower leaf surface with two types of scales or hairs that nearly conceal surface; scales on elevated primaries proximally attached, lanceolate, 1–2 mm long with irregularly erose margins and basal ears; elevated secondary and higher order veins with an indument varying from narrowly lanceolate scales to terete hairs 0.5–1 mm long that are slightly twisted and unbranched; intercostal areas covered with a white farinaceous puberulence and a scattering of red sessile glandular hairs. Inflorescences composed of simple dichasia with only central flower typically persisting at anthesis; peduncles 1.6–2.8(–4.4) cm long with scales similar to those on uppermost internodes; brac-

teoles enclosing young floral buds, 1.1–1.4 cm long, ovate, with scales like those of petioles and upper internodes, glabrous along margin, early deciduous; pedicels 0.3–1 cm long, with scales like those on hypanthia. Hypanthia (at anthesis) 6–8 mm long to torus, 6–7 mm wide, campanulate to urceolate, densely covered with appressed, proximally attached, lanceolate scales 3–5 mm long with irregularly erose margins. Calyx lobes 8–11 × 3.5–4 mm, oblong, with scales like those on hypanthia, up to 5 mm long, becoming progressively shorter toward margin, with a glabrous marginal band, the margins sparsely ciliate. Petals 1.7–2.6 × 1.5–2.7 cm, deep rose-purple becoming lavender with age, obovate, sparsely ciliate, otherwise glabrous. Stamens isomorphic, with ventrally inclined pores, filaments purple, 7–9 mm long, anther thecae 6–7 mm long, yellow, connective 1–2 mm long, extended into an upturned bifid appendage 1 mm long. Ovary (at anthesis) ca. 7 mm long, fluted and setose in the distal half. Styles 1.2–1.7 cm long, slightly curved distally, stigma truncate, papillose. Seeds not seen.

DISTRIBUTION AND PHENOLOGY.—In central Colombia (Fig. 7) in the eastern and central cordilleras, along roadsides in disturbed and undisturbed forests at elevations of 1,980–3,100 m. Flowering reported in February, March, April, July, August, and September.

REPRESENTATIVE SPECIMENS EXAMINED.—COLOMBIA. Antioquia: Río Negro, 1851–1857 (fl), *Triana s.n.* (BM). Caldas: Laguneta, Salento, 1 Apr 1942 (fl), *von Sneider* 3086 (BM, LL, NY, US). Huila: 8 km from Plata Vieja en route to Puracé, 12 Sep 1959 (fl), *Maguire & Maguire 44204* (NY, US); Moscopán, near Santa Leticia, 8 Sep 1961 (fl), *Uribe 3868* (COL, US). Quindío: Pié de San Juan, on the E slope of Mt. Quindío, 8 Mar 1875 (fl), *André 2265* (NY); Tolima: La Ceja to Agua Bonita, Old Quindío trail, 2 Aug 1922 (fl), *Killip & Hazen 9545* (NY); along Quindío Hwy., between Cajamarca and summit of Divide, 27–28 Mar 1939 (fl), *Killip & Varela 34651* (COL, NY, US); Prov. de Mariquita, La Ceja, Feb 1843 (fl), *Linden 1057* (P); ca. 30 km W of Cajamarca, 18 Aug 1959 (fl), *Maguire & Maguire 44010* (NY, US). Valle: Cordillera Occidental, Los Farallones, E slope, Almorzadero, 25 Jul 1956 (fl), *Cuatrecasas 21704* (F, NY).

The plants assigned to this species form a morphologically coherent taxon characterized by appressed to antrorsely spreading, proximally attached, cauline scales, narrowly elliptic to elliptic-lanceolate leaves with bulla-based hairs on the adaxial surface (Fig. 5A), inflorescences reduced to solitary flowers, and yellow isomorphic anthers.

An unusual variant from Dept. Valle, Colom-

bia (*Cuatrecasas 21704*) has inflorescences consisting of simple dichasia (sometimes reduced to two flowers) on elongate peduncles reminiscent of those of *T. lepidota*. In other characters, such as leaf and cauline pubescence and stamen morphology, this collection falls well within the range of variation here attributed to *T. paleacea*.

Two collections from Dept. Chocó, Colombia (*Lozano & Diaz 3217* at F and NY and *Silverstone-Sopkin et al. 1598* at MO and US) are also anomalous. They appear to combine characters of *T. paleacea* and *T. elegantula*. In hypanthial length, petal size, androecial morphology, inflorescence details, and foliar pubescence, these two collections fit comfortably into our concept of *T. paleacea*. In other features such as leaf shape, calyx lobe length, and the unusual spreading cauline scales, they are very much like *T. elegantula*. *Tibouchina paleacea* and *T. elegantula* are both known from western Colombia but neither is presently recorded from Dept. Chocó. These two puzzling collections present an interesting challenge for additional field work. Until more material is available for study, we cannot place them in our taxonomy of this section with any degree of confidence.

***Tibouchina silvestris* Todzia & Almeda, sp. nov.**

(Fig. 11). TYPE.—COLOMBIA. Valle: Anchicaya, 200 m, May 1969 (fl), *Uribe-Uribe & Cortés 6280* (Holotype: COL!; isotype: US!).

Arbor parva 5–7 m; ramuli teretes sicut petioli foliorum subtus venae primariae dense pilis appressis squamatis rectangularis vel lanceolatis obscure vel conspicue eroso-ciliolatis 0.5–1.5 × 0.5–1 mm induti. Petioli 0.5–1.4 cm longi; lamina 3–11 × 1.6–5.3 cm elliptica vel elliptico-ovata apice acuto basi obtusa vel rotundata, supra pilis ca. 1 mm longis et ½ vel ⅔ adnatis appressis sparsiuscule induta, subtus in venis secundariis squamis integris 0.5–1 mm longis sparsiuscule obsita, subtus in superficie pilis papillosis densiuscule obsita, 3–5-nervata coriacea et integra. Inflorescentia pauciflora 2.5–4.8 cm longa; flores 5-meri, pedicellis (ad anthesim) 0.2–0.7 cm longis, bracteolis glabris mox caducis. Hypanthium (ad torum) 4–5 mm longum extus densiuscule paleis appressis 3–5 mm longis indutum; calycis lobis 3–4 × 2–3 mm oblongis. Petala 1.3–1.7 × 1–1.2 cm obovata. Stamina paulo dimorpha glabra, thecis, subulatis 6 vel 5 mm longis poro ventraliter inclinato, connectivis 1 mm vel ca. 0.5 mm prolongatis appendicibus ventralibus ca. 1 mm. Ovarium 5-loculare apice modice setoso.

Trees 5–7 m tall; distal branches inconspicuously quadrate to terete, the internodes covered with appressed proximally attached, rectangular (often platelike) and lanceolate basally eared scales 0.5–1.5 mm long with irregularly erose margins, the nodes with appressed basally at-

tached lanceolate scales 2–4 mm long with smooth margins. Petioles 0.5–1.4 cm long, covered with scales similar to those of internodes; blades coriaceous 3–11 cm long, 1.6–5.3 cm wide, elliptic to elliptic-ovate, 3-nerved with an additional pair of prominulous intramarginal veins, the apex bluntly acute, the base obtuse to rounded, the margin entire, beset with clasping folded scales; upper leaf surface with flattened scales adnate to epidermis for ½–⅔ their length, the free distal portion very narrowly triangular, the adnate portion swollen and covered with minute, white pustules; lower leaf surface covered with three types of scales that do not completely conceal surface; scales on elevated primary veins similar in size and shape to internodal scales, the secondary veins sparsely covered with lanceolate scales 0.5–1 mm long with entire margins, the tertiary veins with shorter lanceolate scales mostly 0.25 mm long, the actual surface entirely covered with white or tan papillose puberulence. Inflorescences umbelliform dichasial clusters of 3–6 flowers; peduncles 2.5–4.8 cm long; bracteoles typically enveloping and concealing young floral buds, 9–11 mm long, ovate, chartaceous, glabrous, early deciduous; pedicels 0.2–0.7 cm long, densely beset with appressed lanceolate scales mostly 2–3 mm long with small basal ears and irregularly erose margins. Hypanthia (at anthesis) 4–5 mm long to torus, 5–6 mm wide, campanulate to urceolate, concealed by appressed lanceolate scales mostly 3–5 mm long with small basal ears and irregularly erose margins. Calyx lobes 3–4 × 2–3 mm, oblong, with scales like those of hypanthia except for a narrow marginal glabrous band, the margins ciliate. Petals 1.3–1.7 × 1–1.2 cm, pink-violet to lavender, obovate, ciliate, otherwise glabrous. Stamens weakly dimorphic with ventrally inclined pores; larger stamens geniculate, filaments 6–7 mm long, anther thecae ca. 6 mm long, yellow, subulate, connective strongly geniculate, 1 mm long, with a yellow-orange, incurved, bifid appendage ca. 1 mm long; smaller stamens geniculate, filaments 6–7 mm long, anther thecae red, subulate, ca. 5 mm long, connective strongly geniculate, 0.5 mm long with a yellow-orange incurved bifid appendage ca. 1 mm long. Ovary (at anthesis) fluted at setose apex. Styles 12–14 mm long, weakly declinate, incurved distally; stigma truncate, papillose. Seeds ca. 0.5 mm long, light brown.

DISTRIBUTION AND PHENOLOGY.—Known only from the Dept. of Valle, Colombia (Fig. 10), near

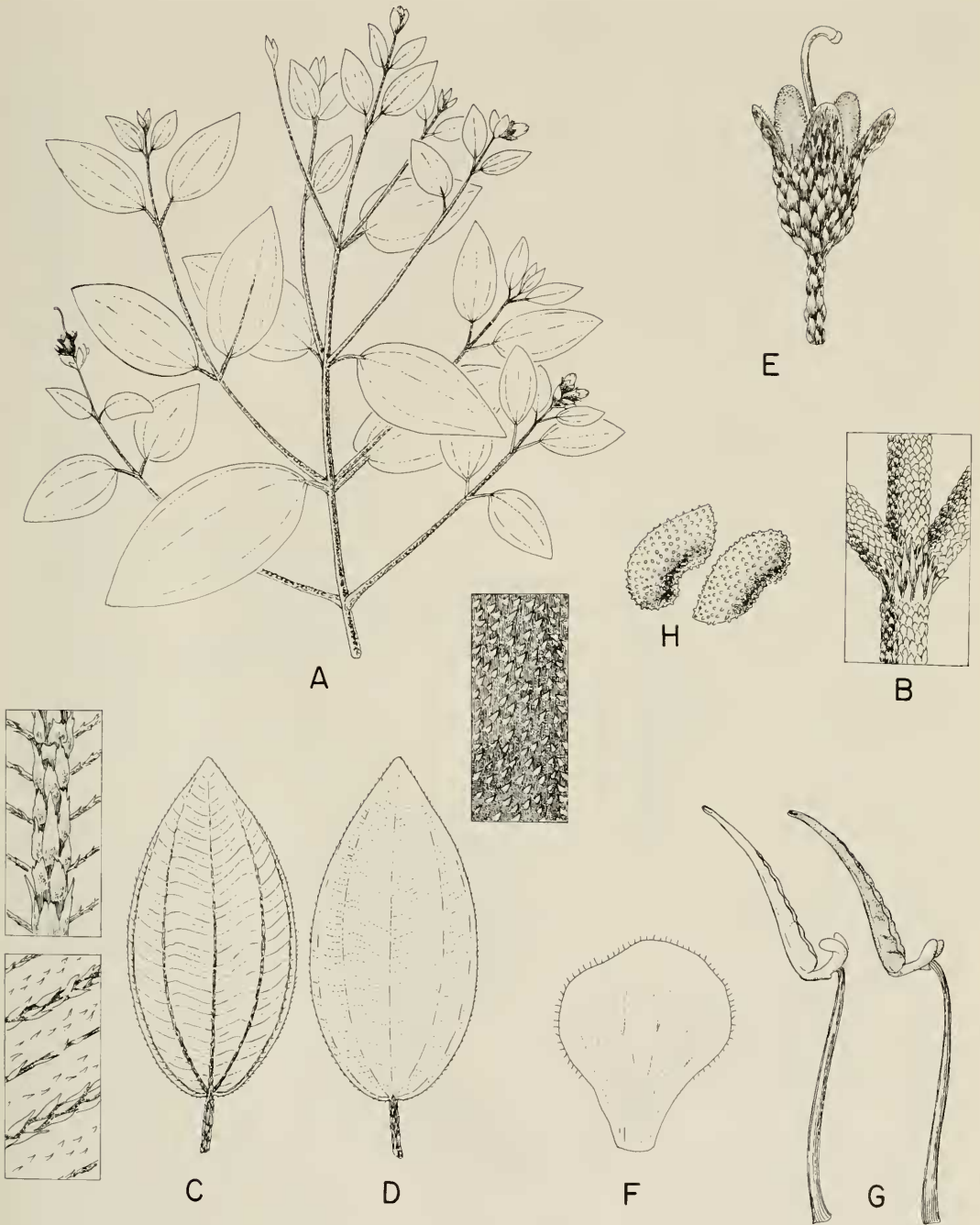


FIGURE 11. *Tibouchina silvestris* Todzia & Almeda. A, habit, \times ca. $\frac{1}{3}$; B, enlargement of cauline node; C, representative leaf (abaxial surface) with enlargement of median vein (upper left) and intercostal indument (lower left), \times ca. $\frac{1}{2}$; D, representative leaf (adaxial surface) with enlargement of intercostal indument (upper right), \times ca. $\frac{1}{2}$; E, hypanthium (at anthesis) with petals and stamens removed, $\times 2$; F, petal $\times 2$; G, antepetalous stamen, lateral view (left) and antescapalous stamen, lateral view (right), $\times 5$; H, seeds, $\times 30$. (A–D from *Koie* 4808; E–G from *Uribe-Uribe & Cortés* 6280, US.)

Anchicayá from 200–500 m in wet forest. Flowering reported in May, August, and December; fruiting reported in December.

SPECIMENS EXAMINED.—COLOMBIA. Valle: Río Anchicayá near CVC hydroelectric plant, ca. 3°40'N, 76°50'W, 15 Dec 1981 (fr), *Gentry 35662* (COL, US); Anchicayá, Cali-Buenaventura, 500 m, 11 Aug 1952 (fl), *Koie 4808* (US).

Tibouchina silvestris appears to be quite rare and occurs in a region that has been frequently visited, but perhaps not thoroughly explored, by field botanists. Although only three collections of this taxon were available for study, it is distinguished from all other species in the section by a diagnostic suite of characters: completely glabrous floral bracts and bracteoles, weakly dimorphic stamens with anther thecae that are alternately reddish-purple and yellow, essentially entire scales on the abaxial secondary leaf veins, and a conspicuous papillose puberulence on the lower leaf surfaces.

Prior to our study, the few collections of this species were identified as *T. lepidota*. Based on pubescence characters, it seems likely that *T. silvestris* is a close relative of *T. lepidota*, perhaps representing a specialized offshoot of the evolutionary line that gave rise to the latter species. In addition to its more extensive geographic range and higher elevation habitat, *T. lepidota* differs from *T. silvestris* in having shorter (1.5–3 mm), prevaillingly ovate, hypanthial scales, longer calyx lobes (4–7 mm), and uniformly yellow isomorphic anthers. Within sect. *Lepidotae*, the morphological and ecogeographical relationship between *T. silvestris* and *T. lepidota* parallels that exhibited by *T. narinoensis* and *T. paleacea*. Both *T. silvestris* and *T. narinoensis* are low elevation counterparts of *T. lepidota* and *T. paleacea*, respectively. An understanding of the relationship between these species pairs is limited by the lack of chromosome counts for most species in the section.

The epithet for this species is derived from *silva*, Latin for woods, trees, or forest, to emphasize its lowland forest habitat.

Tibouchina wurdackii Almeda & Todzia, sp. nov.

(Fig. 12). **TYPE.**—PANAMA. Coclé: forested slopes above El Copé along abandoned road leading to continental divide, 700–850 m, 8°38'N, 80°38'W, 24 Jan 1989 (fl), *Almeda et al. 6380* (Holotype: CAS!; isotypes: CR!, DUKE!, MO!, NY!, PMA!, TEX!, US!).

Frutex 1–2 m; ramuli teretes sicut petioli foliorum subtus venae primariae inflorescentia hypanthiaque dense pilis appressis squamatis lanceolatis eroso-ciliolatis 1.5–2.5 × 0.5–1 mm obsita. Petioli 2–12 mm longi; lamina 2.8–5.9 × 1–2.5 cm elliptica apice apiculato basi obtusa vel rotundata, supra pilis ca. 1 mm longis et ca. 2/3 adnatis appressis sparsiuscule induta, subtus in superficie squamis plerumque 0.5–2 mm longis obsita, 3–5-nervata nervis secundariis supra invisibilibus subtus planis et inconspicuis. Inflorescentia pauciflora ca. 3.5–7 cm longa; flores 5-meri, pedicellis (ad anthesim) 5–12 mm longis. Hypanthium (ad torum) 6–7 mm longum extus densiuscule paleis appressis 1–2 mm longis indutum; calycis lobis 3–5 × 3 mm oblongis. Petala 1.3–1.7 × 1–1.2 cm obovata. Stamina dimorpha glabra, thecis subulatis 6 vel 5 mm longis poro ventraliter inclinatis, connectivis 1 mm vel 0.5 mm prolongatis appendicibus ventralibus ca. 1 mm. Ovarium 5-loculare apice modice setosum.

Shrubs 1–2 m tall; distal branches inconspicuously quadrate to terete, the uppermost internodes covered with appressed, proximally attached, lanceolate scales 1.5–2.5 mm long with small basal ears and irregularly erose or lacerate margins, the nodes with similar scales mostly 4–6 mm long. Petioles 2–12 mm long, covered with lanceolate scales like those of internodes; blades coriaceous, 2.8–5.9 cm long, 1–2.5 cm wide, elliptic, 3-nerved with an additional inconspicuous pair of intramarginal veins, the apex acuminate, the base obtuse to rounded, the margin entire and beset with clasping, folded scales; upper leaf surface with flattened scales that are adnate for 2/3 their length, the distal third of the scale free and triangular, the adnate portion covered with minute white pustules; lower leaf surface with three types of scales that do not completely conceal the surface; scales on the elevated primary veins similar in shape and size to internodal scales, higher order veins (when evident) and actual surface covered with a mixture of ovate scales 0.5 mm long and narrowly lanceolate or triangular scales 1.5–2 mm long, these obscurely auriculate at basal attachment, lacking a white papillose puberulence. Inflorescences terminal, congested, paniculiform dichasia, 3.5–7 cm long, with (3–)5–18 flowers; bracteoles not enveloping or concealing young floral buds, 4–9 mm long, narrowly lanceolate to subulate, with scales like those of elevated lower leaf veins, early deciduous; pedicels 5–12 mm long. Hypanthia (at anthesis) 6–7 mm long to torus, 4–5 mm wide, narrowly campanulate to urceolate, densely beset with and concealed by appressed lanceolate scales 1–2 mm long, with basal ears and irregularly erose margins. Calyx lobes 3–5 mm long, ca. 3 mm wide, triangular, moderately beset with scales

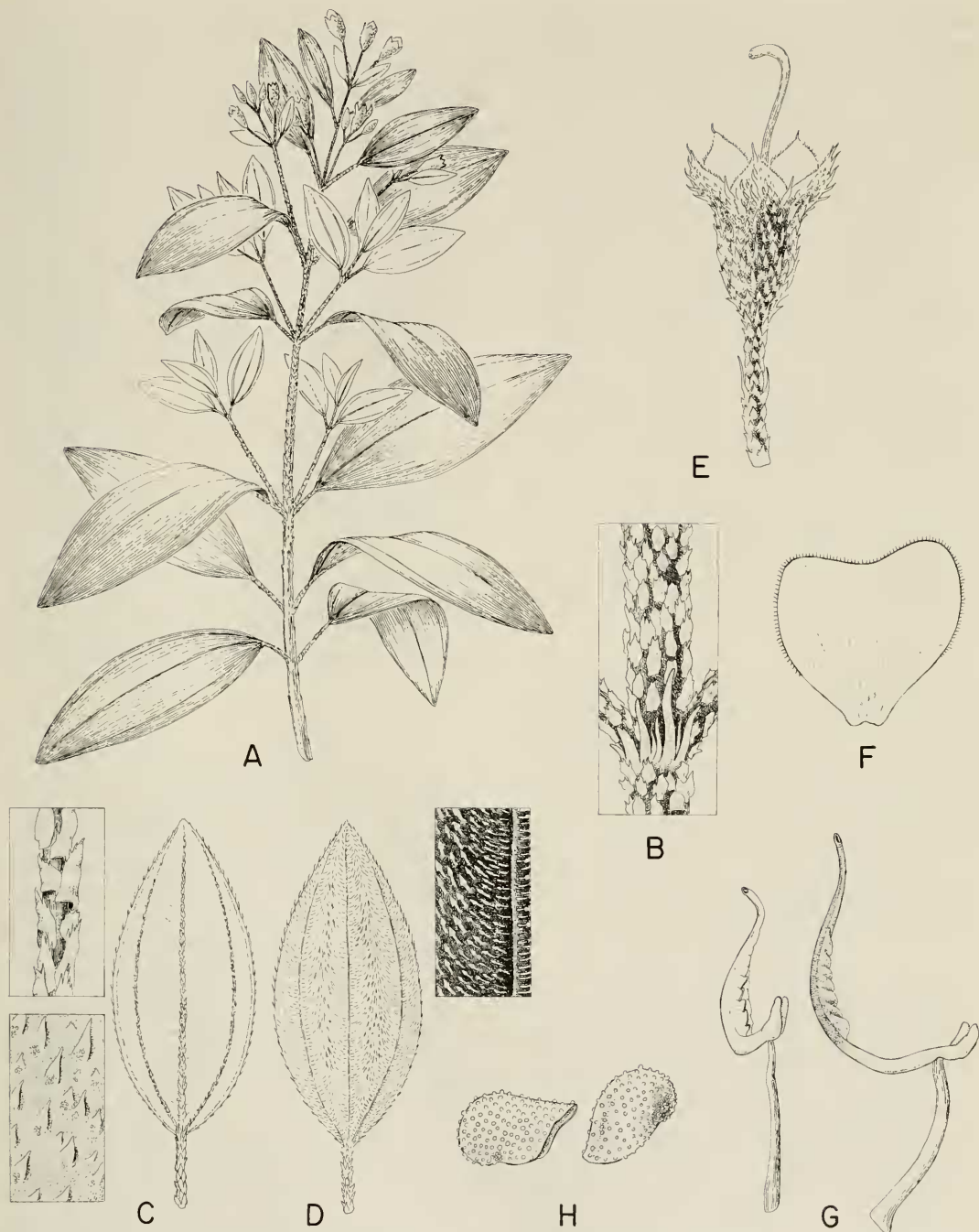


FIGURE 12. *Tibouchina wurdackii* Almeda & Todzia. A, habit, $\times \frac{1}{2}$; B, enlargement of cauline node; C, representative leaf (abaxial surface) with enlargement of median vein (upper left) and intercostal indument (lower left), \times ca. $\frac{2}{3}$; D, representative leaf (adaxial surface) with enlargement of indument adjacent to impressed median vein (upper right), \times ca. $\frac{2}{3}$; E, hypanthium, \times ca. 2; F, petal, \times ca. 17; G, antepetalous stamen, lateral view (left) and antesepalous stamen, lateral view (right), $\times 4$; H, seeds, \times ca. 50. (A–G from the holotype; H from Almeda *et al.* 5928, CAS.)

like those of *hypanthia* except for a narrow marginal glabrous band, the margins ciliate. Petals 1.2–1.8 × 0.9–2 cm, pink, obovate, emarginate, ciliate, otherwise glabrous. Stamens dimorphic, with ventrally inclined pores; larger stamens geniculate, filaments 9–10 mm long, anther thecae 7–7.5 mm long, red, subulate, connective 4–4.5 mm long with a yellow, upturned, bifid appendage 2 mm long; smaller stamens more or less erect, filaments 9–10 mm long, anther thecae 5–5.5 mm long, yellow, subulate, connective strongly geniculate, 1–1.5 mm long, with a yellow, erect to incurved, bifid appendage 1.5 mm long. Ovary (at anthesis) ovoid, fluted at the setose apex. Styles 10–11 mm long, declinate, strongly incurved distally; stigma truncate, papillose. Seeds 0.25–0.33 mm long, light brown.

DISTRIBUTION AND PHENOLOGY.—Local and uncommon in Panama (Fig. 10) at elevations of 700–1,402 m from Cerro Tute/Arizona in Prov. Veraguas to Cerro Sapo in Prov. Darién. Flowering in January and February; fruiting in January and February, April through June, and August.

REPRESENTATIVE SPECIMENS.—PANAMA. Coclé: Cerro Gaital, E slope and ridges leading to summit with montane rainforest and elfin woodland, 8°40'N, 80°07'W, 24 Feb 1988 (fl), *Almeda et al. 5916* (CAS, MO, PMA, TEX); forested slopes above El Copé along abandoned road leading to continental divide, 8°38'N, 80°38'W, 25 Feb 1988 (fr), *Almeda et al. 5928* (CAS, NY, PMA, TEX). Darién: NE slopes of Cerro Sapo summit, approach from Garachine, 8 May 1979 (fr), *Hammel 7250* (CAS, MO). Veraguas: top of Cerro Arizona, above Santa Fé, ca. 10 km NW of Santa Fé, on ridgetop in cloud forest, 19 May 1975 (fr), *Mori 6257* (MO); 16 Jun 1975 (fr), *Mori 6751* (MO); 3 Aug 1975 (fr), *Mori 7566* (MO).

Although this species was first collected in 1975, its exact identity remained an enigma until flowering material was gathered in 1988. *Tibouchina wurdackii* and the closely related *T. inopinata* are restricted to southern Central America, but their ranges replace one another (Figs. 9, 10), and they have different peak flowering times. Based on our field experience, *T. inopinata* flowers most profusely from May through August, whereas *T. wurdackii* is at its peak in January and February. The resemblance between *T. wurdackii* and *T. inopinata* is most evident in details of the scaly foliar indument (Figs. 2F, 3A, B, 6C–F). Both species are also characterized by a dimorphic androecium and petals that do not undergo a significant color change with age. In *T. wurdackii*

the longer petals (1.2–1.8 cm) are pink and the anthers are alternately 7–7.5 and 5–5.5 mm long. In contrast, the petals of *T. inopinata* are shorter (0.6–1.3 cm), typically white, and the anthers are alternately 5–5.5 and 3–4 mm long. Other subtle, but consistent, differences between the two species include foliar size and shape. The shorter blades of *T. wurdackii* are elliptic with an apiculate apex and an obtuse to rounded base, whereas the modally longer blades of *T. inopinata* are lanceolate to narrowly elliptic with a gradually acuminate apex and an acute base. In collections lacking diagnostic flower parts, careful attention to the size and complexity of the inflorescence will make confusion between the two unlikely. In *T. wurdackii* the relatively short (3.5–7 cm) few-flowered dichasia are crowded by subtending leaves. In *T. inopinata* the many-flowered compound panicles (12.5–25 cm long) are well exerted beyond the leaves at nodes initiating the inflorescence.

We take pleasure in naming this species for John J. Wurdack, friend, mentor, and colleague, in recognition of his many significant contributions to the taxonomy of neotropical Melastomataceae.

ACKNOWLEDGMENTS

This study was supported, in part, by the National Science Foundation Grant BSR 8614880 (Flora Mesoamericana), the California Academy of Sciences In-house Research Fund and the G. Lindsay Field Research Fund. For field assistance, advice, and/or technical support in the herbarium, we thank Bruce Bartholomew, Thomas F. Daniel, Greg de Nevers, Gordon McPherson, and Colleen Sudekum. For logistical support in the field, we are grateful to the Museo Nacional de Costa Rica, the Missouri Botanical Garden, and the Smithsonian Tropical Research Institute. Our special thanks go to Ellen del Valle for preparing the line drawings; Mahinda Martinez for reviewing the Spanish summary; Mary Ann Tenorio for technical and supervisory assistance in the scanning electron microscope laboratory at the Academy; and the curators and staffs of the following herbaria for loans or assistance during study visits: AAU, BM, BR, CAS, CM, COL, CR, DAV, DS, F, K, LL, MICH, MO, NY, P, PMA, TEX, UC, US.

RESUMEN

El género *Tibouchina*, con 350 especies, es el más grande de los géneros neotropicales de la familia Melastomataceae cuyos frutos son cápsulas. *Tibouchina* se distribuye desde la parte oeste de México, continuado a través de Centro América y Las Antillas hasta la parte norte de Argentina y Paraguay. La sección *Lepidotae* es una de las 11 secciones del género *Tibouchina*. Las características vegetativas y florales que se pueden usar para distinguir la sección son: indumento de pelos escamosos, bracteolas florales libres, sépalos persistentes, y estambres glabros. Las secciones *Lepidotae*, *Barbigeriae*, y *Tibouchina*, las únicas secciones en el género con pelos escamosos, están íntimamente relacionados. Se provee una revisión de la sección *Lepidotae* que incluye una sinopsis de la historia taxonómica, un comentario sobre las características vegetativas y florales importantes, una clave, descripciones, discusiones, ilustraciones y mapas de distribución para todas las especies. Se reconocen nueve especies y se describen tres especies nuevas, *T. elegantula* y *T. silvestris* de Colombia, y *T. wurdackii* de Panamá.

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