DARWINIANA ISSN 0011-6793

40(1-4): 127-169. 2002

THE APOCYNACEAE S. STR. OF THE CARRANCAS REGION, MINAS GERAIS, BRAZIL

ANDRÉ OLMOS SIMÕES & LUIZA SUMIKO KINOSHITA

Dpto. de Botânica, IB, Unicamp, Caixa Postal 6109 CEP 13083-970, Campinas, São Paulo, Brasil.
E-mail: andreosimoes@hotmail.com

ABSTRACT: Simöes, A. O. & Kinoshita, L. S. 2002. The Apocynaceae s. str. of the Carrancas Region, Minas Gerais, Brazil. *Darwiniana* 40(1-4): 127-169.

The aims of the present work were to identify and characterize the species of Apocynaceae s. str. occurring in the Carrancas region, State of Minas Gerais, Brazil. Collections were performed from 1997 to 2000 and regional representative collections were also examined. The floristic survey showed the presence of 31 species belonging to 15 genera: *Aspidosperma* (5 spp.), *Condylocarpon* (1 sp.), *Forsteronia* (3 spp.), *Hancornia* (1 sp.), *Macrosiphonia* (2 spp.), *Mandevilla* (9 spp.), *Mesechites* (1 sp.), *Peltastes* (1 sp.), *Prestonia* (2 spp.), *Rauvolfia* (1 sp.), *Rhabdadenia* (1 sp.), *Rhodocalyx* (1 sp.), *Secondatia* (1 sp.), *Tabernaemontana* (1 sp.) and *Temnadenia* (1 sp.). In addition to a brief discussion on the most relevant morphological features, identification keys, descriptions and illustrations are provided. Comments on taxonomy, distribution and phenology are also given.

Key words: Apocynaceae, Carrancas, Floristic, Minas Gerais, Brazil.

RESUMEN: Simöes, A. O. & Kinoshita, L. S. 2002. Las Apocynaceae s. str. de la región de Carrancas, Minas Gerais, Brasil. *Darwiniana* 40(1-4): 127-169.

Los propósitos del siguiente trabajo son identificar y caracterizar las especies de Apocynaceae s. str. nativas en la región de Carrancas, Estado de Minas Gerais, Brasil. Las colecciones fueron realizadas entre 1997 y 2000; y colecciones previas, representativas de la flora regional, también fueron estudiadas. El estudio florístico indicó la presencia de 31 especies distribuidas en 15 géneros: *Aspidosperma* (5 spp.), *Condylocarpon* (1 sp.), *Forsteronia* (3 spp.), *Hancornia* (1 sp.), *Macrosiphonia* (2 spp.), *Mandevilla* (9 spp.), *Mesechites* (1 sp.), *Peltastes* (1 sp.), *Prestonia* (2 spp.), *Rauvolfia* (1 sp.), *Rhabdadenia* (1 sp.), *Rhodocalyx* (1 sp.), *Secondatia* (1 sp.), *Tabernaemontana* (1 sp.) y *Temnadenia* (1 sp.). Además de una breve discusión sobre los caracteres morfológicos más relevantes, se presentan claves de identificación, descripciones e ilustraciones. Se agregan comentarios complementarios sobre taxonomía, distribución y fenología.

Palabras clave: Apocynaceae, Carrancas, Florística, Minas Gerais, Brasil.

INTRODUCTION

Apocynaceae s. str. is a pantropical angiosperm family containing ca. 300 genera and 2000 species. An estimate for the Brazilian Flora encompasses about 41 genera and 376 species (Barroso et al., 1991). The family includes species with high economic importance, either for pharmaceuticals (alkaloids, cardiotonic glycosides), latex, wood production, or as ornamental plants (Rizzini & Mors, 1976).

Recently, the family has been the focus of several phylogenetic studies, with the subsequent re-evaluation of its delimitation (Judd et al., 1994; Struwe et al., 1994; Endress et al., 1996; Sennblad & Bremer, 1996). Current arrangements, (e. g. Endress & Bruyns, 2000) accepted and adopted the results of the above-referred studies, therefore merging Asclepiadaceae and Apocynaceae sensu Cronquist (1981) in a single family (Apocynaceae sensu lato). So delimited, the family Apocynaceae

encompasses about 355 genera and 3700 species, therefore becoming one of the largest Angiosperm families (Judd et al., 1999).

Floristic inventories involving South American Apocynaceae s. str. are needed to sample the local biodiversity. Relevant recent floristic studies include those of Ezcurra (1981, 1999) for Argentina, Ezcurra et al. (1992) for Paraguay, Zarucchi (1993) for Peru, Zarucchi et al. (1995) for Venezuela and Potgieter (1999) for Ecuador. In Brazil, the works of Azambuja (1947) and Markgraf (1968) (for the Santa Catarina State) are noteworthy. Among studies focused in specific geographic areas, we should mention those of Kinoshita-Gouvêa & Baldassari (1987), Bragatto-Vasconcellos & Kinoshita-Gouvêa (1994), Sales (1995) and Koch & Kinoshita (1999).

The need for floristic inventories is increasing in South America, due to its enormous and poorly understood biodiversity, which is considerably threatened by human activities.

The Carrancas region shows a remarkable diversity of vegetation formations and may be representative of a considerable part of the flora of the Minas Gerais State. Yet, Minas Gerais is poorly known from a floristic point of view and suffers considerable human pressure (fires, deforestation, cattle raising, etc.). An inventory of the Apocynaceae florula for the Carrancas region contributes not only to the knowledge of this family in Minas Gerais State, but also to the whole southeastern Brazilian Region.

MATERIALS AND METHODS

Study area: The Carrancas Municipality is located in the southern portion of Minas Gerais State encompassing an area of about 777 km^2. In addition, 10 other peripheral Municipalities were also considered: Andrelândia, Cruzília, Ingaí, Itumirim, Itutinga, Lavras, Luminárias, Minduri, Nazareno and São Vicente de Minas (Fig. 1). Collecting effort was concentrated in the Carrancas Municipality since all vegetation formations are represented there, in relatively wide and well-preserved areas.

In the study area, altitudes vary from 500 to 1500 m. Regional climate is tropical with humid, warm summers and dry winters, with altitudinal variations. The region is delimited by the Espinhaço Mountain Range to the north and the Serra da Mantiqueira to the south (Moreira & Camelier, 1977). The annual average temperature is about 20^{0}C. Rains concentrate between Nov. and Feb reaching about 1400 mm a (per) year (EPAMIG, UNENET & UFV, 1982).

The local flora is quite diverse, with "campos rupestres" (rupicolous formations, sometimes mixed with grassy and shrubby vegetations) formations prevailing. Forests, "capoeiras" (secondary forest formations), open grasslands, wet (partially inundated) grasslands; "cerrados" (savannas), and transitional environments are also represented.

A total of 20 collecting trips were undertaken from May 1997 until February 2000. Vouchers from the herbaria UEC, BHCB, BHMH, ESAL, HXBH, SP and SPF were examined, in order to verify the existence of previous collections. Herbaria citations follow Holmgren et al. (1990).

The afore-mentioned vouchers also provided phenological and habitat informations.

The circumscription of Cronquist (1981) for Apocynaceae s. str. is here followed. For subfamilies, the classification of Endress & Bruyns (2000) is followed.

Plants were identified and described using the morphological terminology of Radford et al. (1974), and Hickey (1973) for venation patterns. Fruit and seed terminology also follows Barroso et al. (1999). When necessary, other specific studies were also consulted. (Woodson, 1933, 1935a, 1935b, 1936; Ezcurra, 1981; Fallen, 1986; Sales, 1993). All drawings were made with the help of a stereomicroscope with a camera lucida attachment. Most drawings were made using pickled (70 % ethanol, FAA 50) flowers, fixed during fieldwork activities. This procedure avoids structural deformation of the flowers that may occur using pressed vouchers. A brief summary and discussion of morphological features with taxonomic importance is provided preceding genera and species descriptions. Descriptions and the discussion of morphological features refer only to the examined materials.

Additional material from other regions was consulted when locally collected exsiccate were insufficient or when reproductive structures were absent. Basionyms and synonyms are provided for each species. Only the most recent synonyms and those that are more frequently found in herbarium vouchers are cited.

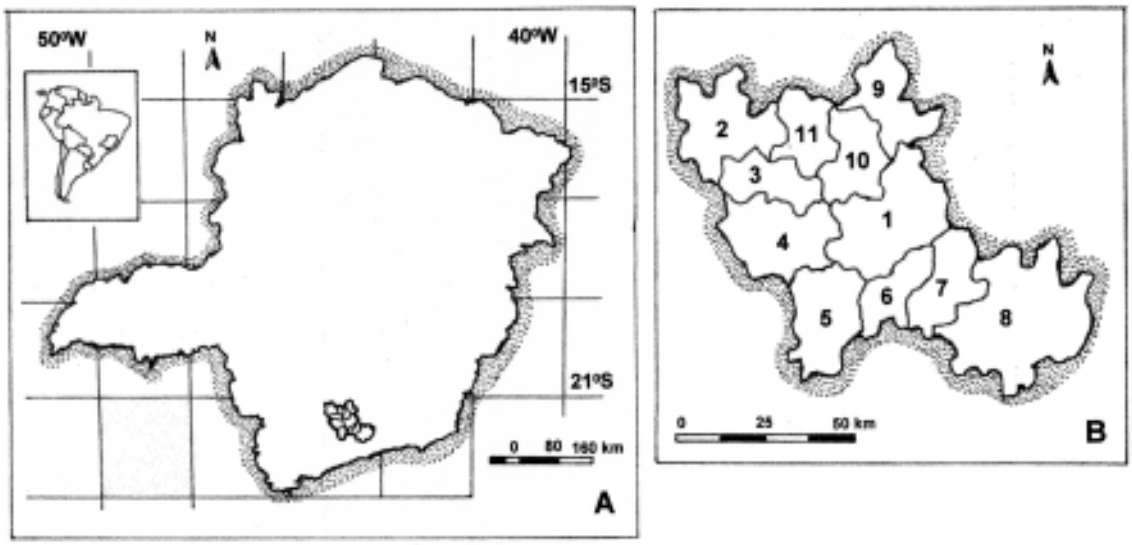

Fig. 1.- A: map of the State of Minas Gerais, showing the region of Carrancas; B: municipalities composing the Carrancas region: 1, Carrancas; 2, Lavras; 3, Ingaí; 4, Luminárias; 5, Cruzília; 6, Minduri; 7, São Vicente de Minas; 8, Andrelândia; 9, Nazareno; 10, Itutinga; 11, Itumirim.

Each taxon was described and additional pertinent data (phenology, geographic distribution, habitat, etc.) were also recorded and are provided here.

Plant vouchers were deposited at UEC and duplicates were distributed to the herbaria ESAL and BHCB.

RESULTS AND DISCUSSION

A. MORPHOLOGICAL FEATURES WITH TAXONOMIC RELEVANCE

HABIT

Arboreal species clearly predominate among the Rauvolfioideae, and only 1 species, *Condylocarpon isthmicum* (Vell.) A. DC., shows a twining habit. Among *Aspidosperma* species, treelets from 2-3 m tall (*A. tomentosum* Mart.) to trees up to 30 m (*A. olivaceum* Müll.Arg., *A. spruceanum* Benth. ex Müll.Arg.) are found.

Among the Apocynoideae, there is more or less the same number of vines (*Fosteronia* spp., *Mandevilla atroviolacea* (Stadelm.) Woodson, *M. hirsuta* (A. Rich.) K. Schum., *Mesechites mansoana* (A.DC.) Woodson, *Peltastes peltatus* (Vell.) Woodson, *Prestonia* spp., *Secondatia densiflora* A.DC. and *Temnadenia violacea* (Vell.) Miers) as of erect subshrubs (species of *Macrosiphonia*, the remaining *Mandevilla* spp., *Rhabdadenia pohlii* Müll. Arg. and *Rhodocalyx rotundifolius* Müll. Arg.), and these subshrubs always have a xylopod. In *Rhabdadenia pohlii*, other than the subshrub form, there are some individuals that develop twining or trailing branches.

LEAVES

The Rauvolfioideae species show a remarkable variation in leaf phyllotaxis, which can be alternate (*Aspidosperma* spp.), whorled (*Condylocarpon isthmicum*, *Rauvolfia sellowii* Müll.Arg.) or opposite (*Hancornia speciosa* Gomes, *Tabernaemontana catharinensis* A.DC.). Among the Apocynoideae, opposite leaves prevail, with the exception of *Mandevilla widgrenii* Ezcurra, where leaves are whorled in some parts of the branches.

The blade is always entire and has a basal insertion, except in *Peltastes peltatus*, where leaves are peltate. Leaf shape is quite variable, ranging from linear to orbicular.

COLLETERS

Colleters are secretory structures usually found in the nodal region, petiole, leaves, bracts and calyx of most Apocynaceae. All the colleters are structurally similar and their putative function is to protect developing meristems, through the secretion of a viscous, translucid to yellowish fluid. Other possible functions involve protection against herbivory and pathogens, in addition of reducing

cuticular evapo-transpiration (Thomas, 1991). In Apocynaceae, colleters normally appear in variable numbers, as small to conspicuous conic to deltoid appendages.

The origins of the colleters is a matter of controversy, many authors having used disparate terms, such as 'glandular appendages", "glandular outgrowths", "squamellae", "colleters" (Pichon, 1948b; Woodson, 1933, 1935b, 1936; Woodson & Moore, 1938). Throughout this contribution, we follow Thomas (1991), therefore calling all these kinds of appendages "colleters".

NODAL COLLETERS

Nodal colleters were found in all Apocynaceae genera, except *Aspidosperma*. They may be interpetiolar, intrapetiolar, or occur uniformly along the node. The number and disposition of colleters are of great taxonomic value (Fig. 2A-C). Intrapetiolar colleters were found in *Condylocarpon isthmicum, Prestonia spp., Rauvolfia sellowii* and *Tabernaemontana catharinensis*, and interpetiolar ones in *Forsteronia* spp., *Hancornia speciosa, Macrosiphonia spp., Rhabdadenia pohlii* and *Rhodocalyx rotundifolius*. The disposition of the interpetiolar colleters is characteristic, with 4 series of 1-2 colleters in the nodal region, each series at one side of the petiole (Fig. 2 B).

In some genera, such as *Mandevilla,* both intra and interpetiolar colleters may occur. Series of 1 to many interpetiolar colleters may occur at the side of each petiole, together with 2 to many intrapetiolar ones, often occupying the whole petiole adaxial surface. In *Peltastes peltatus, Secondatia densiflora* and *Temnadenia violacea* the colleters generally build a continuous ring in the nodal region (Fig. 2 C). However, quite often the colleters only appear in the intrapetiolar region, as in *Prestonia coalita* (Vell.) Woodson (Fig. 2 A).

LEAF COLLETERS

Colleters on the leaf blade were found only in genera *Forsteronia, Macrosiphonia, Mandevilla* and *Mesechites*. They usually appear in pairs, sometimes occurring in 1 to many series (of 1 to many colleters each) on the adaxial leaf surface (Fig. 2 D). Colleters are often inconspicuous; however, in *Mesechites mansoana* they are deltoid and very obvious. In these taxa the colleters are found on the upper surface of the leaf blade, clustered at the base of the midrib.

In *Mandevilla hirsuta* the colleters are not limited to the leaf base, but appear along the length of the midrib and following the bifurcations of secondary veins. This pattern is found exclusively in *Mandevilla* subgenus Exothostemon, and was used by Woodson (1933) to make the diagnosis for this subgenus.

CALYCINE COLLETERS

Most genera studied have calycine colleters. These colleters may occur at the base of the adaxial surface of the calyx lobes, in alternate, opposite or continuous position (Fig. 2 E-I). The number and disposition of colleters are characters of great taxonomic value, widely applied in generic and sometimes specific delimitations.

Colleters were absent in 4 genera of Rauvolfioideae (*Aspidosperma, Condylocarpon, Hancornia* and *Rauvolfia*), and only in 1 genus of Apocynoideae (*Rhabdadenia*). Colleters are continuous in *Forsteronia* spp., *Macrosiphonia* spp., *Mandevilla tenuifolia* (J.C. Mikan) Woodson, *Mesechites mansoana* and *Tabernaemontana catharinensis*, opposite in *Prestonia spp., Mandevilla hirsuta, Peltastes peltatus Temnadenia violacea*, and alternate in *Rhodocalyx rotundifolius, Secondatia densiflora* and the remaining species of *Mandevilla.* When colleters are opposite, there is generally only 1 per sepal, though it may be deeply laciniate. In *Mandevilla hirsuta* and *Prestonia* spp. they are well developed and deltoid, appearing centered at the base of each calyx lobe (Fig. 2 F). In *Peltastes peltatus* and *Temnadenia violacea*, colleters are fimbriate seemingly numerous (Fig. 2 E). Alternate colleters always occur in the sinus bewtween 2 adjacent calyx lobes (Fig. 2 H-I). They are usually in number of 5 per calyx. Yet, in some *Mandevilla* species and *Rhodocalyx rotundifolius* they can be numerous and disposed in 2 groups of one to many colleters in the sepal sinuses (Fig. 2 H).

Woodson & Moore (1938) suggested a possible correlation between the position of nodal and calycine colleters among the Echitoideae (=Apocynoideae). They noticed that in some species, the occurrence of opposite calycine colleters correlates with the presence of intrapetiolar nodal ones. Conversely, in other species, alternate calycine colleters correlate with interpetiolar nodal ones. This pattern, however, was

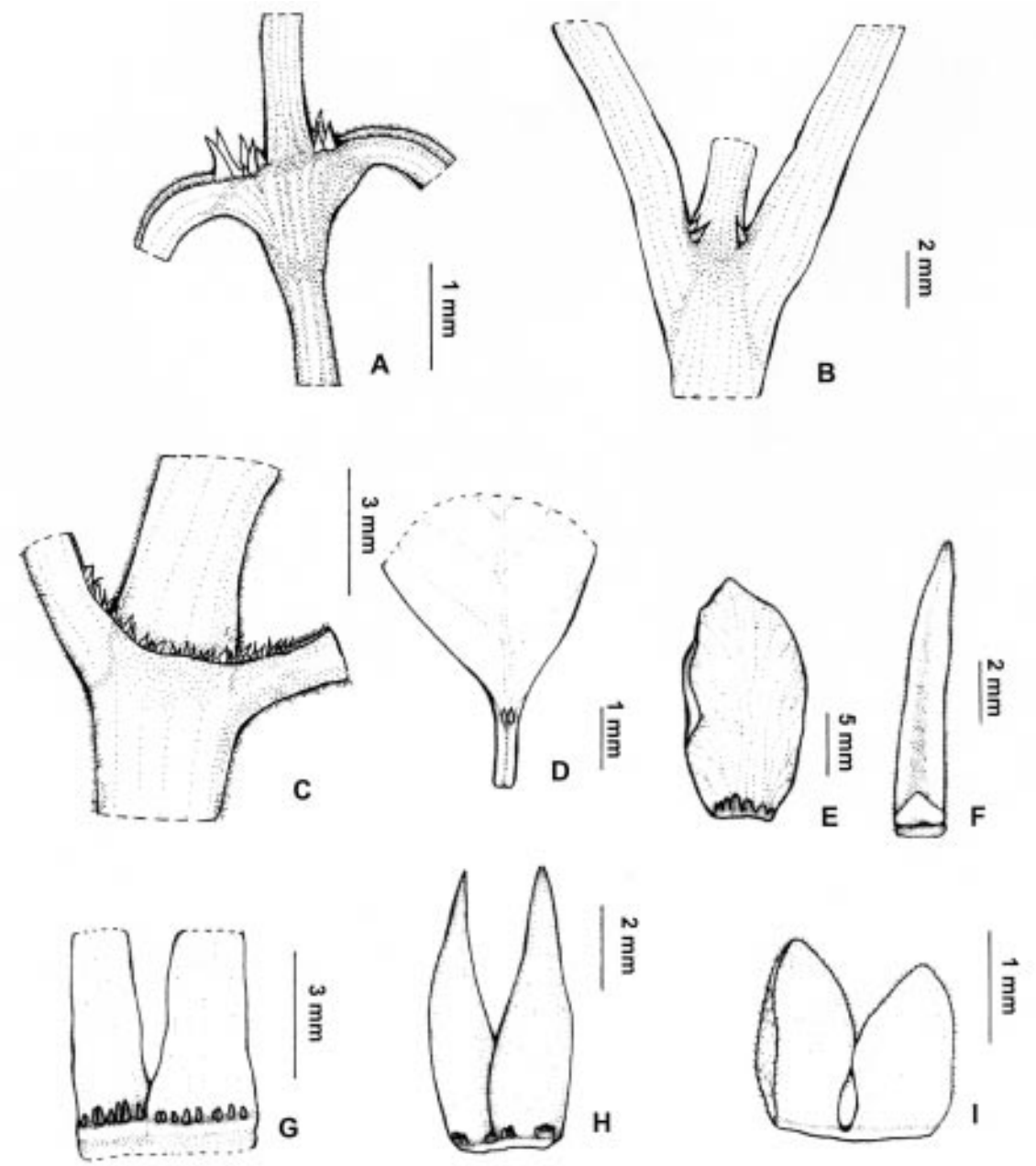

Fig. 2.- Colleter types. A-C: nodal colleters. A: *Prestonia coalita*, intrapetiolar colleters; B: *Hancornia speciosa*, interpetiolar colleters; C: *Peltastes peltatus*, intra and interpetiolar colleters. D: leaf colleters. D: *Mandevilla atroviolacea*, colleters at the base of adaxial surface of leaf blade. E-I: calycinal colleters. E: *Peltastes peltatus*, opposite, fimbriate colleters; F: *Prestonia coalita*, opposite, entire colleter; G: *Macrosiphonia longiflora*, continuous colleters; H: *Mandevilla atroviolacea*, alternate colleters, disposed in four groups in sepal sinuses; I: *Secondatia densiflora*, alternate colleter, disposed in the sepal sinuse between two contiguous calyx lobes.

not verified for many species studied here. Only in some genera such as *Macrosiphonia*, *Prestonia* and *Rhodocalyx*, were we able to verify this pattern. In some *Mandevilla*, however, calycine colleters may be alternate, despite having both interpetiolar and intrapetiolar nodal colleters. In *M. hirsuta*, calycine colleters are opposite, but the nodal ones are not exclusively intrapetiolar, as would be

expected following Woodson & Moore (1938). Interpetiolar colleters may also occur. Therefore, there is no clear correlation between the distribution of nodal and calycine colleters.

INFLORESCENCE

Inflorescences are normally cymose, except in *Macrosiphonia* and *Mandevilla*, where they are racemose. In *Macrosiphonia longiflora* (Desf.) Müll.Arg., a very reduced number of flowers (up to 3) are produced, and solitary flowers are frequent. Among the cymose inflorescences, corymbiform types occur in *Aspidosperma* spp., *Condylocarpon isthmicum, Rauvolfia sellowii, Tabernaemontana catharinensis* and *Secondatia densiflora*. Bostrycoid inflorescences occur in *Mesechites mansoana, Peltastes peltatus, Prestonia* spp. and *Temnadenia violacea*. Simple dichasia occur in *Hancornia speciosa* and thyrsiform inflorescences occur in *Forsteronia* spp. Two-flowered inflorescences are found in *Rhabdadenia pohlii* (rarely solitary flowers). Inflorescences may be axillary to terminal, surpassing the subtending leaves or not.

According to Woodson (1935a), the evolutionary basal kind of inflorescence in Apocynaceae may be a dichasial cyme. All the other types would have originated through symmetric or asymmetric reduction. The 2-flowered inflorescences of *Rhabdadenia pohlii* probably evolved through the loss of the terminal flower of simple dichasia. Bostrycoid inflorescences may have originated through the reduction of one of the axis of each dichasial cyme. Thyrsiform inflorescences may have originated from the aggregation of a dichasial cyme and the progressive regression of the lateral axis of a multinodal ramification, while further reductions may have given rise to racemose inflorescences.

CALYX

The calyx is gamosepalous, pentamerous, and deeply laciniate. Calyx lobes were scarious in most of the species studied, being foliaceous only in *Mandevilla emarginata* (Vell.) Ezcurra, *M. hirsuta, Peltastes peltatus* and *Rhodocalyx rotundifolius*. They were generally erect, being reflexed only in *Tabernaemontana catharinensis* and *Prestonia* spp. Calyx lobes were normally green, or reddish as in *Macrosiphonia* spp.and *Mandevilla* spp. In *Rhodocalyx rotundifolius*, calyx lobes were wine-colored and showy, functioning as attractive elements to the pollinators.

COROLLA

The corolla is gamopetalous, pentamerous, and actinomorphic to slightly zygomorphic. Aestivation is contorted, and its direction (dextrorse or sinistrose) is useful for taxonomic purposes. This character is fundamental when delimiting the subfamilies. Sinistrorse aestivation is characteristic of Rauvolfioideae. The left margin of each corolla lobe partially covers the neighbouring one (Fig. 3 A). Dextrorse aestivation is characteristic of subfamily Apocynoideae. Here, the right margin of each lobe partially covers the neighbouring one (Fig. 3 B). Structurally, the corolla can be divided in 3 different parts (Fig. 3 C). The fused parts build the corolla tube. The corolla tube can be divided in 2 portions: the lower tube, below the stamens insertion, and the upper tube, beyond the stamen insertion up to the base of the corolla lobes. The free parts constitute the limb, made up by 5 lobes. Yet, this is a terminology which is here exclusively used for morphological characterization. No ontogenetical inferences can be made for the time being.

The shape of the corolla tube may be tubular (*Mandevilla emarginata*), subrotate (*Forsteronia* spp.), salverform (all species of Rauvolfioideae, *Macrosiphonia* spp., *Mandevilla tenuifolia, Mesechites mansoana, Prestonia* spp., *Rhodocalyx rotundifolius* and *Secondatia densiflora*) or infundibuliform (*Peltastes peltatus, Rhabdadenia pohlii, Temnadenia violacea* and the remaining species of *Mandevilla*). The shape of the corolla may vary within the same genus, as in *Mandevilla*, whose species can have tubular, salverform or infundibuliform corollas.

In all species with a tubular corolla and in some species with a salverform corolla (e.g. *Aspidosperma* spp., *Prestonia* spp. *and Secondatia densiflora*), there is no clear separation between upper and lower corolla tube. In these cases, the corolla was considered as a single, entire structure and measurements were taken accordingly.

The size and shape of the upper tube are taxonomically relevant characters, often being used in generic and specific identifications. In *Mandevilla* spp., these are important characters

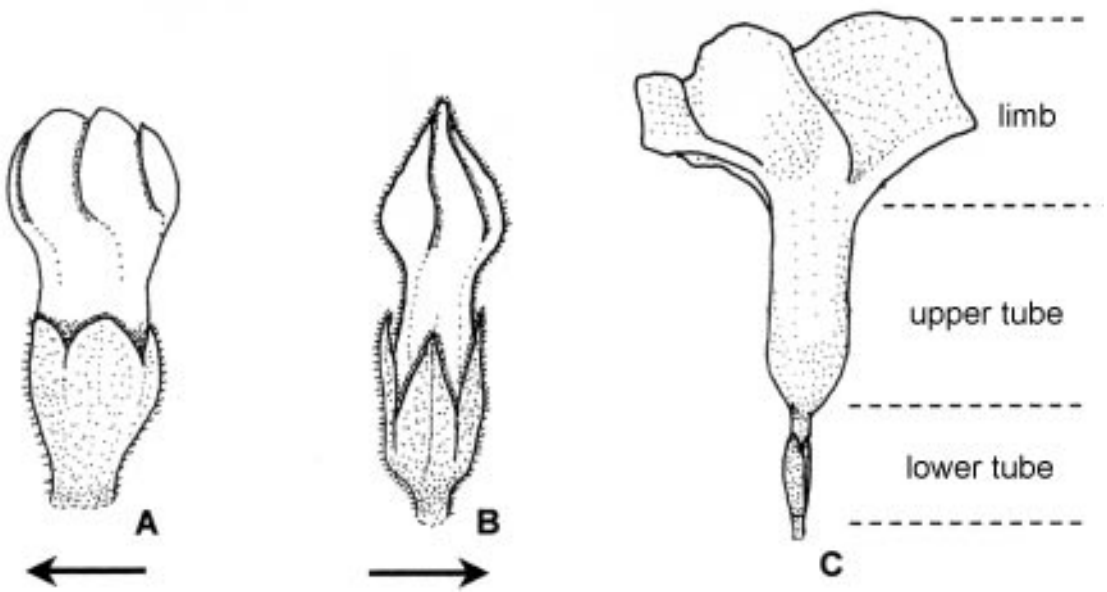

Fig. 3.- Corolla structure. A-B: aestivation. C: parts of the corolla. A: *Condylocarpon isthmicum* (Rauvolfioideae), flower bud, sinistrorse aestivation; B: *Prestonia tomentosa* (Apocynoideae), flower bud, dextrorse aestivation. The arrows indicate the direction of rotation. C: *Rhabdadenia pohlii*, fully opened flower showing the limb, the upper tube and the lower tube.

since they (size and shape of upper corolla tube) have a great deal of variation, while other flower characters are quite constant. Corolla lobes may vary in position (from reflexed to erect), indument, shape and dimensions. The shape of the corolla lobes is a character whose utility still needs thorough analysis. Yet, in our studies it proved to be useful for identifications at specific level.

In *Prestonia* spp. and *Rhodocalyx rotundifolius*, the mouth has a thickening in the shape of a fleshy ring. *Prestonia tomentosa* R. Br. and several other species of this genus, in addition to having this fleshy ring, presents 5 opposite epistaminal appendages, just behind the anthers.

ANDROECIUM

The stamens are 5, alternate with the corolla lobes, included to exserted. These are significantly diverse from a morphological point of view, and these morphological differences are taxonomically relevant. Fallen (1986) recognized 4 levels of complexity in the anthers of Apocynaceae s. str., a criterion that we follow in this contribution.

In Rauvolfioideae, the stamens can be free or contiguous, but never adnate to style head. The anthers are completely fertile, with the thecae occupying the whole anther length. This set of characters is characteristic of the subfamily and is represented in the first, second and third ground plan levels proposed by Fallen (1986).

The first level, considered as the evolutionary most basal among Apocynaceae, was observed in all the species of *Aspidosperma*, *Condylocarpon isthmicum*, *Hancornia speciosa* and *Rauvolfia sellowii*. In this type, the anthers are unspecialized, ovate, cordate at the base, with the dorsal part unmodified (Fig. 4 F). From this evolutionary stage, two evolutionary trends can be traced, giving rise to the second and third complexity levels, respectively. The second level is present only in the genera of subfamily Cerberoideae sensu Pichon (1948a), (now merged in Rauvolfioideae, e.g. Endress & Bruyms, 2000), which are absent in the Carrancas region. In this level, the anthers have modified connectives, which become enlarged at the base, causing the thecae to be displaced laterally. In the third level, the anthers are more specialized, differing of these of the first level by the presence of schlerenchymatic tissue in the anther adaxial region, which is prolonged into a sagittate base (Fig. 4 G). This level was exclusively found in *Tabernaemontana catharinensis*.

The fourth complexity level is found exclusively in Apocynoideae, where the stamens show the greatest differentiation and specialization. Stamens are similar to those of the third level, differing by the presence of a connecting tissue between the anther and style-head (Fig. 4 H-I). This connecting tissue, called "retinacle" by Pichon (1948c), is located on the ventral face of the anthers below the level of thecae. This allows the building of a gynostegium, as the consequence of the fusion of parts of the androecium and gynoecium.

GYNOECIUM

The ovary is superior, apocarpous (syncarpous in *Hancornia speciosa*), 2-carpellate, and 2-locular, with axillary or marginal placentation. In most of the genera studied, nectaries surround the ovary. These nectaries were absent only in *Aspidosperma* spp. and *Condylocarpon isthmicum*. They may either be more or less coalesced into a 5-lobed disk-like shape, or appear as 2 free nectaries alternate with the carpels. The nectary structure and its dimensions when compared with ovary length are taxonomically relevant characters, mainly at species level.

The style is cylindrical, simple, often forked next to the ovary. The style exhibits a great diversity of lengths, being almost non-existent in *Condylocarpon isthmicum* and *Secondatia densiflora* or reaching a length of up to 10 cm, e.g. in *Macrosiphonia longiflora.*

The style head consists of a swollen, well-developed portion atop the style. Its size and dimensions may be quite diverse. This variability is important in identifying and characterizing taxa, from sub-familial to specific levels. Clavate forms were found in *Aspidosperma australe* Müll.Arg. and *A. olivaceum*. Globose forms were found in *A. cylindrocarpon* Müll.Arg., and capitate ones in *Condylocarpon isthmicum.* Fusiform types were found in *Forsteronia* spp., *Secondatia densiflora*, and cylindrical ones in *Hancornia speciosa*. Umbraculiform types were found *Macrosiphonia* spp., *Mandevilla* spp. and *Mesechites mansoana*.

There is a noteworthy correlation between style-head and anther evolution, which reflects a morphological series of progressive structural complexity. This coevolution is so close that it leads to the development of a gynostegium, with consequent highly specialized reproductive mechanisms.

Fallen (1986) recognized 4 types of style head, based on its levels of complexity. These types are adopted here. The first and second levels are found exclusively in Rauvolfioideae. The first level was observed in *Aspidosperma* spp., *Condylocarpon isthmicum* and *Hancornia speciosa*. This represents the simplest organizational level, morphologically undifferentiated (Fig. 4 A, J). The second level was recorded in *Rauvolfia sellowii* and *Tabernaemontana catharinensis*. In this level, there is and morphological and structural differentiation (Fig. 4 B, L). The style-head can be divided into 4 parts: 1) an apical, thickened part, in general forming a ring, acting as a pollen presenter (for pollen of the same flower); 2) a cylindrical main body, secreting a sticky substance; 3) a more or less thickened lower wreath or ring, which retains donor pollen during the pollination process; 4) a basal stigmatic region, in the transition area with the style.

In Apocynoideae, the third and fourth complexity levels are present. The third level was found in *Peltastes peltatus*, *Prestonia* spp., *Rhabdadenia pohlii*, *Rhodocalyx rotundifolius* and *Temnadenia violacea*. In this level, the style head is morphologically similar to those of the second level, differing by the presence of a connecting tissue with the anthers ("retinacle"), forming a gynostegium (Fig. 4 C, M). The fourth level, found in all species of *Forsteronia* and *Secondatia densiflora*, is the most specialized of all Apocynaceae *s. str*. It is structurally similar to the first level, but with a uniform, fusiform, homogeneous shape (Fig. 4 E, N). This structural "simplification" is a consequence of the loss of pollen-retaining structures at the base. It is believed that a transference of function occurs, with anther structures taking over the function of retaining donor pollen (Fallen, 1986).

The genera *Macrosiphonia*, *Mandevilla* and *Mesechites* show a particular style head structure (Fig. 4 D). This type is characteristic of tribe Mesechiteae sensu Endress & Bruyns (2000), the style head being umbraculiform, with 5 strongly projecting longitudinal ribs from half (*Mesechites*) to most of length of style head (*Mandevilla* and *Macrosiphonia*). This structural type does not fit in of the third complexity level proposed by Fallen (1986), by the absence of any kind of apical or basal wreath and ring. And, it also does not fit the fourth complexity level, because of the non-fusiform shape

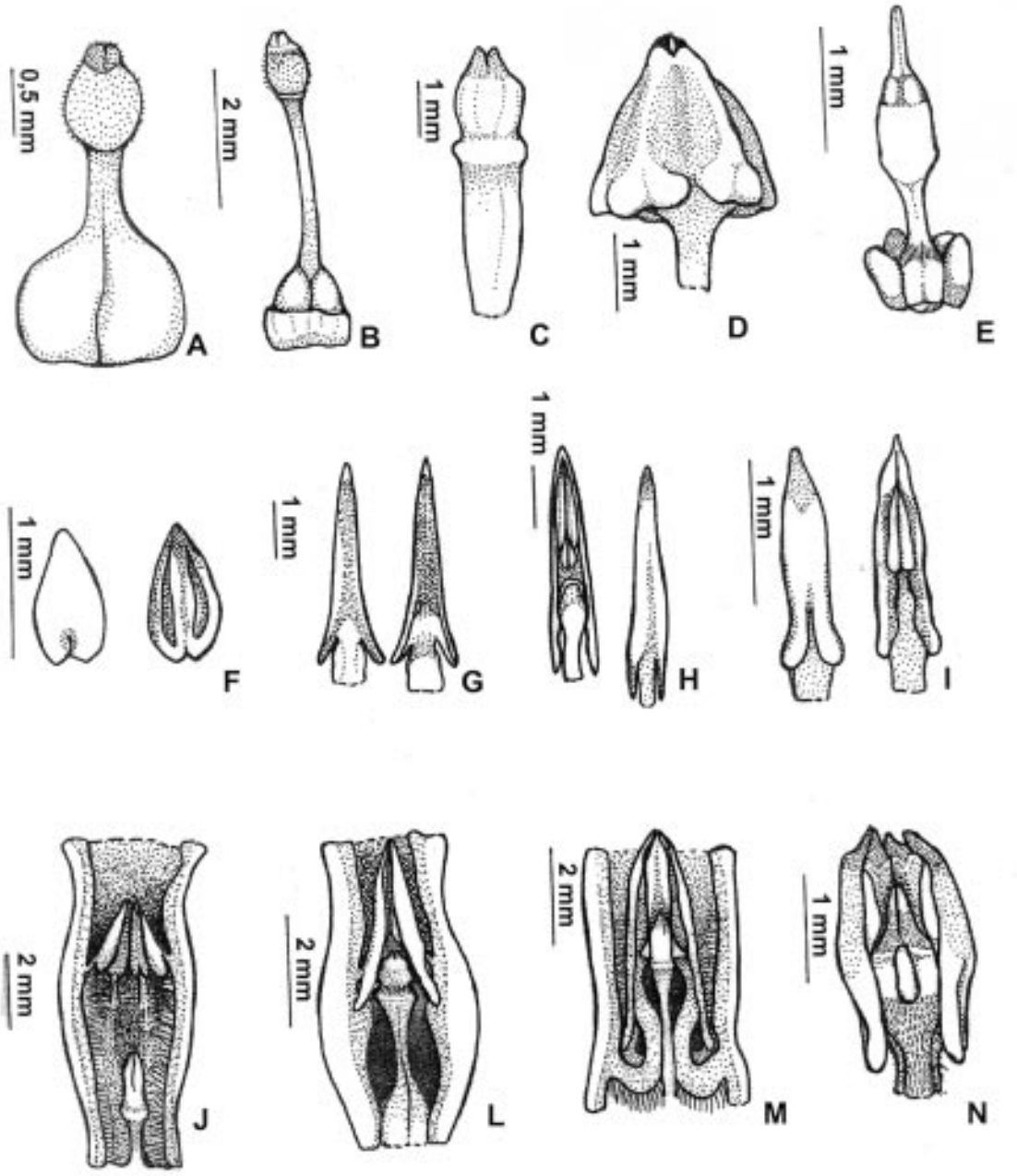

Fig. 4.- Gynoecium and androecium structural levels of complexity, according to Fallen (1986). A-E: style head types. A: *Aspidosperma cylindrocarpon*, level 1; B: *Rauvolfia sellowii*, level 2; C: *Peltastes peltatus*, level 3; D: *Macrosiphonia velame*, umbraculiform-type, level non-specified, falling outside Fallen´s (1986) classification; E: *Forsteronia rufa*, level 4. F-I: anther types. F: *Aspidosperma olivaceum*, level 1, dorsal and ventral view; G: *Tabernaemontana catharinensis*, level 3, dorsal and ventral view; H: *Prestonia coalita*, level 4, ventral and dorsal view; I: *Forsteronia rufa*, level 4, dorsal and ventral view. J-M: gynostegium types. J: *Hancornia speciosa*, the anthers free and positioned above the style head; L: *Tabernaemontana catharinensis*, the anthers contiguous but not adnate to style head; M: *Prestonia coalita*, the anthers adnate to style head; N: *Forsteronia australis*, the anthers adnate to style head.

and by the presence of projecting longitudinal ribs. Therefore, we here assume that this structural type is either intermediate between third and fourth levels, or that it represents a new structural level (not described as yet) in Apocynaceae s. str.

FRUITS

In Apocynoideae the fruit is always composed of 2 follicles, which may vary in size, shape and indument (Fig. 5 E-I). The fruits may be falciform, moniliform, torose, or cylindrical to narrowly cylindrical. Follicles in each pair may also be geminate, parallel, subparallel or divergent. They are generally free from each other, but sometimes can be fused at the apex, either in young fruits or until dehiscence, as in *Mandevilla hirsuta* and *Peltastes peltatus* (Fig. 5 I).

Among the Rauvolfioideae, there is greater fruit diversity (Fig. 5 A-D). Baccate fruits were found in *Hancornia speciosa*, drupaceous mericarps in *Rauvolfia sellowii*, indehiscent mericarps in *Condylocarpon isthmicum*, and follicles in all the species of *Aspidosperma* and *Tabernaemontana catharinensis*. The follicles of *Tabernaemontana catharinensis* are muricate, with a fleshy endocarp. The follicles of *Aspidosperma* are dolabriform (*A. australe, A. olivaceum*) cylindrical (*A. cylindrocarpon*) or pyriform (*A. spruceanum, A. tomentosum*). In *Aspidosperma,* usually only one follicle develops through the abortion of one carpel. The indehiscent mericarps of *Condylocarpon isthmicum* show a set of characters suggesting dispersal by water (Fallen, 1983), such as spongy, air-filled tissues in the mericarps. In the Carrancas region, this species was always found in riverine forests, near watercourses, seemingly reinforcing this hypothesis.

SEEDS

Among the Rauvolfioideae, the seeds can be naked (*Condylocarpon isthmicum, Hancornia speciosa* and *Rauvolfia sellowii*), arillate (*Tabernaemontana catharinensis*) or winged (*Aspidosperma* spp.) (Fig. 5 J-N). The position of the seminal nucleus is taxonomically important in *Aspidosperma*, being lateral in *A. cylindrocarpon* and central in the remaining species (Fig. 5 J). In *Condylocarpon isthmicum* the seeds are verrucose and ellipsoid, always in number of 1 per segment (Fig. 5 M). The seeds of *Rauvolfia sellowii* are compressed, 1 per drupaceous mericarp within a pyrenium (Fig. 5 N). In *Hancornia speciosa*, the seeds are almost orbicular, lacking any kind of ornamentation (Fig. 5 L).

In Apocynoideae the seeds show a well-developed coma in the apical region. This character is fixed in the whole subfamily. Size, shape, and presence or absence of a rostrum are important characters when identifying genera and species (Fig. 5 O-T). Rostrate seeds appear in *Forsteronia* spp., most *Mandevilla, Mesechites mansoana, Peltastes peltatus, Prestonia coalita, Rhabdadenia pohlii, Secondatia densiflora* and *Temnadenia violacea*. Seeds lacking a rostrum appear in *Macrosiphonia* spp., *Mandevilla hirsuta* and *Rhodocalyx rotundifolius* (Fig. 5 O). The rostrum can be short in *Secondatia densiflora* (Fig. 5 P), medium-sized in *Peltastes peltatus* and *Prestonia coalita* (Fig. 5 Q-R) and long in *Rhabdadenia pohlii* and *Temnadenia violacea* (Fig. 5 S-T).

B. TAXONOMIC TREATMENT

Apocynaceae Juss.

Latescent shrubs, subshrubs, vines, trees or herbs, often with nodal colleters. Leaves simple, opposite, alternate or whorled, rarely with domatia in the axils of the veins on the abaxial surface. Inflorescence cymose, racemose or, more rarely, solitary flowers. Flowers 5-merous, generally actinomorphic, less commonly slightly zygomorphic. Calyx gamosepalous, with or without colleters abaxially at the base. Corolla gamopetalous, variously shaped; aestivation sinistrorse or dextrorse. Stamens 5, alternate with the corolla lobes; filaments short, anthers free, included or exserted, free, adherent or adnate to the style head, completely or partially (in the upper part) fertile. Ovary superior (semi-inferior in *Himatanthus*), 2-carpellate, apocarpous or syncarpous, usually surrounded by 2 to 5 free nectaries or by a nectary disc; style head variously shaped. Fruit a capsule, follicle or drupe, rarely a berry. Seeds comose or not, sometimes winged or arillate.

Pantropical family, with ca. 170 genera and 1800 species.

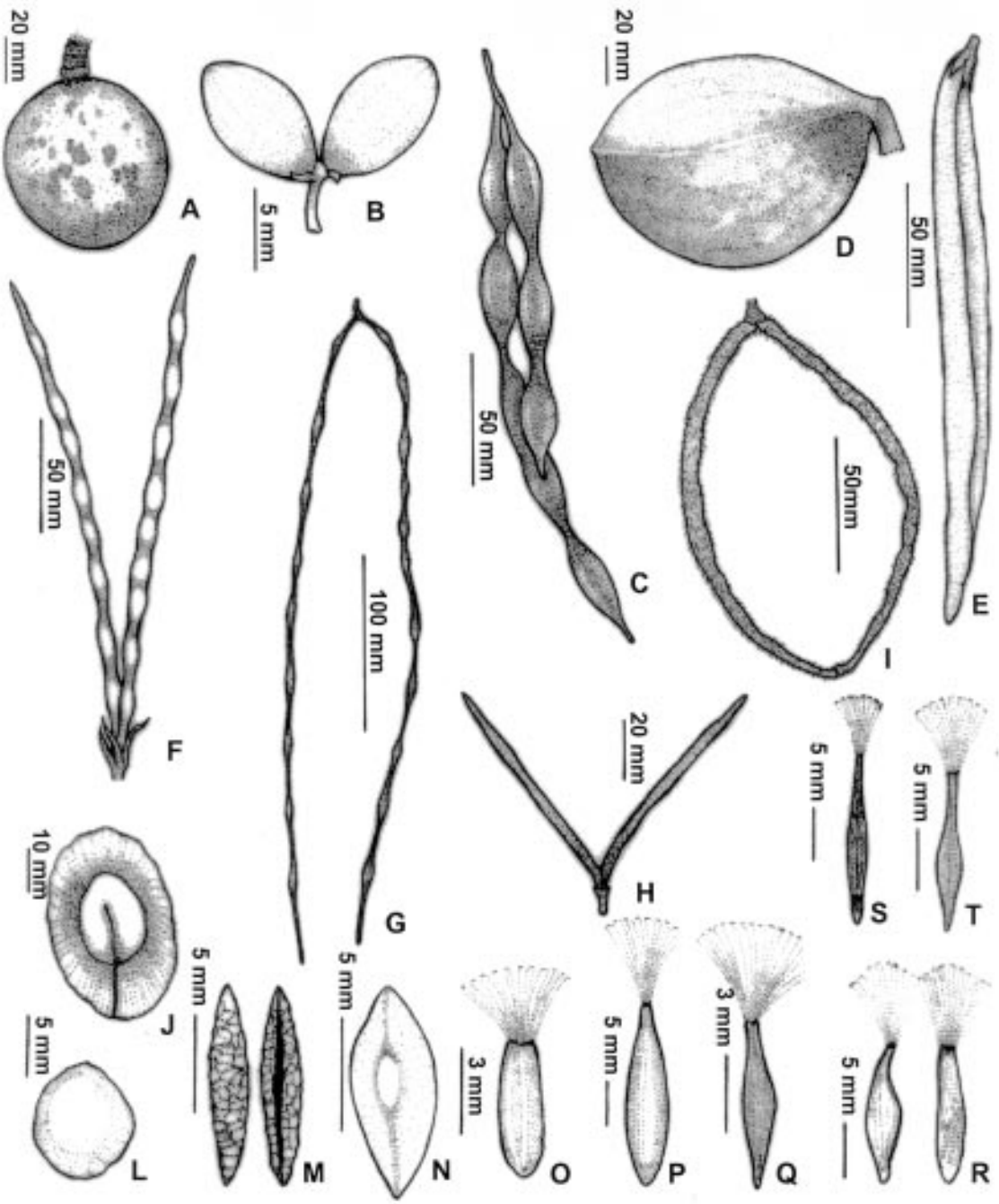

Fig. 5.- Fruit and seed types. A-I: fruit types. A-D: fruits of Rauvolfioideae. A: *Hancornia speciosa*, baccate; B: *Rauvolfia sellowii*, drupaceous; C: *Condylocarpon isthmicum*, indheiscent mericarps; D: *Aspidosperma spruceanum*, follicle pyriform. E-I: fruits of Apocynoideae. E: *Temnadenia violacea*, geminate follicles; F: *Macrosiphonia longiflora*, torose follicles; G: *Forsteronia australis*, moniliform follicles; H: *Rhabdadenia pohlii*, cylindrical follicles; I: *Mandevilla hirsuta*, slightly torulose follicles, united at apex. J-T: seed types; J-N: seeds of Rauvolfioideae. J: *Aspidosperma australe*, winged; L: *Hancornia speciosa*, orbicular; M: *Condylocarpon isthmicum*, verrucose, dorsal and ventral view; N: *Rauvolfia sellowii*, pirenium. O-T: seeds of Apocynoideae, always comose. O: *Rhodocalyx rotundifolius*, not rostrate, dorsal view; P: *Secondatia densiflora*, shortly rostrate. Q-R:seeds with a conspicuous, medium-sized rostrum. Q: *Prestonia coalita*, in dorsal view; R: *Peltastes peltatus*, lateral and dorsal view. S-T: seeds longely-rostrated, in dorsal view. S: *Rhabdadenia pohlii*; T: *Temnadenia violacea*.

Key to the genera of Apocynaceae s. str. found in the region of Carrancas, MG, Brazil.

1. Corolla aestivation dextrorse. Anthers mostly fertile in the upper part, adnate to style head. Seeds comose (Subfamily Apocynoideae) …… 2

1. Corolla aestivation sinistrorse. Anthers completely fertile (partially fertile in *Tabernaemontana*), free or contiguous to style head but never adnate with it (Subfamily Rauvolfioideae) 11

2(1). Corolla subrotate ..... 6. *Forsteronia*

2. Corolla salverform or infundibuliform 3

3(2). Leaves peltate ..... 10. *Peltastes*

3. Leaves not peltate …..... 4

4(3). Corolla with a ring in the mouth of the throat 5

4. Corolla without a ring in the mouth of the throat 6

5(4). Vines. Inflorescence axillary, bracts scarious, inconspicuous. Flowers yellow to greenish yellow. Calyx with opposite colleters ..... 11. *Prestonia*

5. Erect subshrubs. Inflorescence terminal, bracts foliaceous, showy. Flowers purplish. Calyx with alternate colleters ..... 13. *Rhodocalyx*

6(4). Inflorescence racemose 7

6. Inflorescence cymose 8

7(6). Branches and abaxial leaf surface covered with a dense whitish tomentose indument. Lower corolla tube more than 50 mm long …..... 7. *Macrosiphonia*

7. Branches and abaxial leaf surface glabrous to tomentose. Lower corolla tube less than 50 mm long ..... 8. *Mandevilla*

8(6). Calyx without colleters. Inflorescence usually 2, rarely 1-flowered ..... 12. *Rhabdadenia*

8. Calyx with colleters. Inflorescence 3 to many-flowered ……..... 9

9(8). Flowers wine-coloured, more than 30 mm long; corolla infundibuliform ……..... 15. *Temnadenia*

9. Flowers white to yellow, less than 30 mm long; corolla salverform 10

10(9). Leaves subcoriaceous, adaxially with colleters at the base of midrib. Anthers glabrous. Style 10-12 mm long ..... 9 *Mesechites*

10. Leaves membranaceous, without colleters. Anthers pilose. Style inconspicuous …..... 14 *Secondatia*

11(1). Vine. Corolla lobes long-caudate ……..... 2 *Condylocarpon*

11. Shrub or tree. Corolla lobes not caudate …..... 12

12(11). Ovary syncarpous. Flowers more than 2 cm long. Fruit a berry ..... 3 *Hancornia*

12. Ovary apocarpous. Flowers less than 2 cm long. Fruit drupaceous or follicular ……..... 13

13(12). Leaves opposite or alternate. Fruit follicular 14

13. Leaves whorled. Fruit drupaceous ..... 4 *Rauvolfia*

14(13). Leaves opposite. Calyx with colleters. Anthers sagittate, sclerified abaxially. Seeds arillate ..... 5 *Tabernaemontana*

14. Leaves alternate. Calyx without colleters. Anthers ovate, not sclerified. Seeds winged ..... 1 *Aspidosperma*

SUBFAMILY **RAUVOLFIOIDEAE**
(=PLUMERIOIDEAE)

Corolla aestivation sinistrorse; anthers free or contiguous to style head, completely fertile (fertile in upper part only in *Tabernaemontana*). Fruit berry, capsule, drupe or follicle. Seeds ecomose, sometimes winged or arillate.

The subfamily is locally represented by the genera *Aspidosperma* (5 spp.), *Condylocarpon* (1 sp.), *Hancornia* (1 sp.), *Rauvolfia* (1 sp.) and *Tabernaemontana* (1 sp.).

1. Aspidosperma Mart. & Zucc., Flora 7 (1Beil.): 135. 1824., nom. cons.

Trees or shrubs. Latex white to reddish. Trunk straight to very tortuous; branches suberous or not. Leaves alternate, rarely opposite or whorled. Inflorescences modified corymbiform dichasia, axillary or subterminal, more rarely extra-axillary or ramiflorous. Flowers actinomorphic, white, yellow or greenish. Calyx without colleters. Corolla tubular or salverform, tube terete to somewhat gibbous. Stamens included; anthers ovate, free and positioned above the style head. Ovary apocarpous; style head clavate, capitate, subcapitate or globose. Follicle compressed or terete, with usually only 1 of the carpels developing. Seed winged, seminal nucleus central to lateral.

Neotropical genus, ca. 43 species, most of them occurring in Brazil. The genus is locally represented by 5 species.

References: Woodson (1951), Marcondes-Ferreira (1988), Ezcurra et al. (1992), Koch & Kinoshita (1999).

Key to the species of Aspidosperma

1. Latex reddish. Youngest branches not lenticellate. Leaves coriaceous, margin revolute. Seeds 50-65 mm ..... 4. *A. spruceanum*

1. Latex white. Youngest branches lenticellate. Leaves membranaceous, margin straight to crenate. Seeds 25-45 mm 2

2(1). Leaves not congested at the branch apex. Corolla lobes lanceolate, 5-6 mm long, longer than the tube. Follicle oblong. Seeds with basal seminal nucleus ..... 2. *A. cylindrocarpon*

2. Leaves congested at the branch apex. Corolla lobes ovate to oblong, 1-3 mm long, shorter or with the same size as the tube. Follicle dolabriform or pyriform. Seeds with central seminal nucleus 3

3(2). Tortuous trees. Branches suberous, covered by a dense yellowish villous indument in the younger parts. Corolla lobes oblong ..... 5. *A. tomentosum*

3. Straight trees. Branches not suberous, glabrous or pilose. Corolla lobes ovate 4

4(3). Inflorescence with greyish indument. Flowers 7-9 mm long ..... 1. *A. australe*

4. Inflorescence with brownish indument. Flowers 5-6 mm long ..... 3. *A. olivaceum*

1. Aspidosperma australe Müll.Arg., in Mart., Fl. bras. 6(1): 58. 1860. (Fig. 6 A-C).

Iconography: Markgraf, in Fl. Il. Catarinense, Apocináceas: 14, est. 3. 1968.; Ezcurra, Darwiniana 23: 467, figs. 27A-D. 1981.; Ezcurra et al., in Fl. Paraguay 17: 13, fig. 1. 1992.

Tree, 5-15m high, latex white. Trunk straight; branches lenticellate, not suberous, the older glabrous to pilose and the younger with a white-greyish indument. Leaves alternate, congested at the branch apex, glabrous to puberulent, membranaceous; blade elliptic to narrowly elliptic, 6,6-10 x 2,4-3,1 cm, apex acute to rounded, base attenuate, margin slightly crenate. Venation brochidodromous or eucamptodromous. Inflorescence terminal or sub terminal, many-flowered, 25-30 mm long, with dense, greyish indument. Flowers grayish yellow, 7-9 mm long. Calyx lobes ovate, 2 x 1 mm. Corolla tubular, tube 4-6 x 1,8-2,3 mm; lobes ovate-oblong, spreading, 2-2,5 x 1,2-1,5 mm. Anthers 1 mm long. Ovary pilose, about 1 mm long; style 1,5-1,8 mm long; style head terete-conical or clavate, seemingly papillose, 0,8-1 mm long. Follicle dolabriform, stipitate, glabrous, 55-60 x 25-30 mm. Seeds 8-12 per follicle, ovate, with central seminal nucleus, 32-45 x 20-26 mm.

Common name: "Guatambú, Guatambú-amarelo".

Selected materials: BRAZIL**. Minas Gerais.** Carrancas, caminho para Cachoeira da Zilda, 1-X-1999 (fl./fr.), *A. O. Simões et al. 861* (UEC).

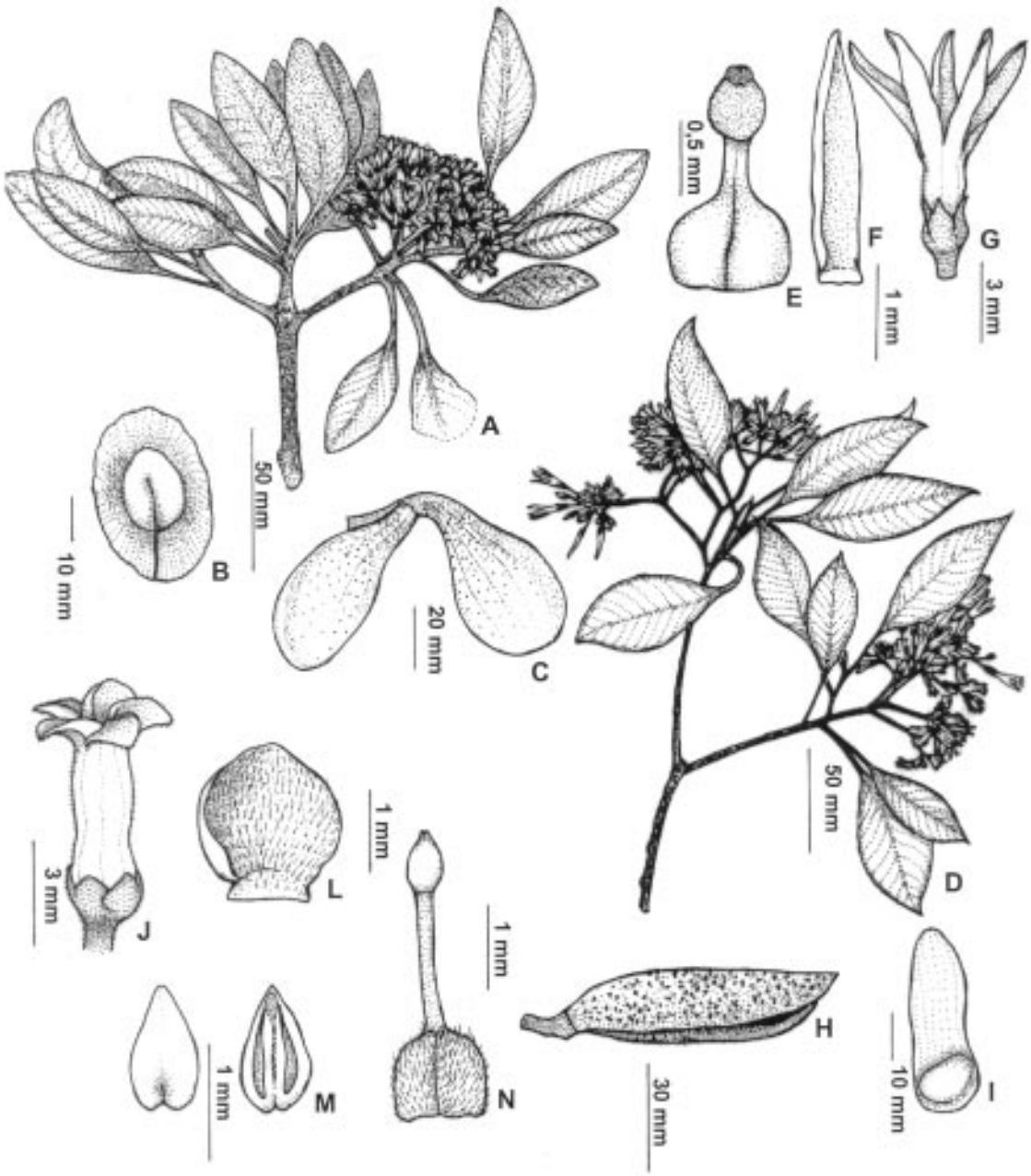

Fig. 6.- A-C: *Aspidosperma australe* Müll.Arg. A: flowering branch. B: seed. C: fruit. D-I: *Aspidosperma cylindrocarpon* Müll.Arg. D: flowering branch; E: gynoecium; F: corolla lobe, adaxial surface; G: flower; H: fruit; I: seed. J-N: *Aspidosperma olivaceum* Müll.Arg. J: flower; L: corolla lobe, adaxial surface; M: anther; N: ginoecium. A, *Simões et al. 1001*; B-C, *Simões et al. 861*; D-I: *Simões et al. 866*; J-N: *Simões et al. 878.*

Observations: occurring from southeastern Brazil to Bolivia, Argentina and Paraguay. This species was locally found in forest formations or quite often as isolated individuals at roadsides. Flowering takes place from September to December and fruiting occurs all year round.

This species is characteristic because of its greyish indument in the inflorescence and because of its larger flowers. It is a close relative of A. *olivaceum*, and both species are difficult to differentiate in the field. W. Marcondes-Ferreira (pers. comm.) considers *A. australe*, *A. olivaceum*

and *A. parvifolium* (absent in Carrancas) as closely related but distinct species, a taxonomic criterion which is here accepted and followed.

2. Aspidosperma cylindrocarpon Müll.Arg., in Mart., Fl. bras. 6(1): 54. 1860. (Fig. 6 D-I).

Iconography: Ezcurra et al., in Fl. Paraguay 17: 17, fig. 3. 1992.; Koch & Kinoshita, Acta. Bot. Bras. 13(1): 66, figs. 2-4, 1999.

Tree, 10-22 m high, latex white. Trunk straight; branches lenticellate, glabrous, the younger sometimes pubescent. Leaves alternate, not congested at the branch apex, membranaceous, glabrous; blade elliptic to ovate-elliptic, 5,9-13 x 2,8-5,4 cm, apex acute to acuminate, base acute, margin slightly crenate. Venation brochidodromous. Inflorescence axillary, many-flowered. Flowers yellowish white, 9-11 mm long. Calyx lobes triangular, 1,5-2 x 0,7-1 mm. Corolla salverform, glabrous, tube cylindrical, greenish, 3 x 1-1,2 mm; lobes lanceolate, suberect, yellowish white to orangish yellow, 5-6 x 0,7-1 mm. Anthers 0,5 mm long. Ovary glabrous, 1 mm long; style 0,5-0,7 mm long; style head globose, 4-5 mm long. Follicle oblong, glabrous, 67-85 x 20-27 mm. Seeds about 20 per follicle, oblong to falciform, with basal seminal nucleus, 25-40 x 10 mm.

Common name: "Peroba, Peroba-rosa"

Selected materials: BRAZIL. **Minas Gerais.** Carrancas, 01-X-1999 (fl./fr.), *A.O. Simões et al. 866* (UEC).

Observations: occurring in forests in south, southeastern and central-western Brazil, also reaching Peru, Bolivia and Paraguay. Flowering occurs in September and October and fruiting all year round.

This species is characterised by its cylindrical fruits and seeds bearing a basal seminal nucleus. Its wood is of excellent quality, and is widely used for construction.

3. Aspidosperma olivaceum Müll. Arg. in Mart., Fl. bras. 6(1): 57-58. 1860. (Fig. 6 J-N).

Tree, 7-27 m high, latex white. Trunk straight; branches lenticellate, not suberous, glabrous, the younger ones sometimes pubescent. Leaves alternate, congested at the branch apex, membranaceous, glabrous to sparsely puberulent; blade narrowly elliptic, obovate-elliptic, oblanceolate or obovate, 6,5-10,3 x 1,8-3,8 cm, apex acute to rounded, base cuneate, margin straight. Venation brochidodromous. Inflorescence axillary to subterminal, many-flowered, with brownish indument. Flowers yellow to orangish-yellow, 5-6 mm long. Calyx lobes ovate, 1-1,5 x 0,8-1 mm. Corolla salverform, tube 4,5-5 x 1-1,5 mm; lobes ovate, reflex, 1,2-1,7 x 1,2-1,5 mm. Anthers 1 mm long. Ovary pilose, 1 mm long; style 2 mm long; style head terete-conical to clavate, papillose, 0,8-1 mm long. Follicle dolabriform, minutely yellowish brown when younger, becoming glabrous when ripe, 48-60 x 25-30 mm. Seeds 8-12 per follicle, ovate, with central seminal nucleus, 36-45 x 22-27 mm.

Common name: "Guatambú, Guatambú-amarelo"

Selected materials: BRAZIL. **Minas Gerais.** Carrancas, 02-X-1999 (fl./fr.), *A. O. Simões et al. 878* (UEC). Minduri, estrada Carrancas-Minduri, 02-X-1999 (fl./fr.), *A. O. Simões et al. 881* (UEC).

Observations: this species occurs in forest formations in southeastern Brazil. It was locally found in forests and often as isolated plants at roadsides. Flowering occurs in October and November; fruiting all year round. Flowering and fruiting periods overlap with these of A. *australe*, both species occurring nearby.

This species is a close relative of *A. australe*, but can be easily differentiated because of its yellowish-ferruginous inflorescence indument and smaller flowers.

4. Aspidosperma spruceanum Benth. ex Müll. Arg. in Mart., Fl. bras. 6(1): 52. 1860. (Fig. 7 A-E).

Tree 15-22 m high, latex reddish. Trunk straight; branches not suberous, not lenticellate, glabrous or puberulent, when puberulent the indument is farinaceous. Leaves alternate, coriaceous, adaxially glabrous to puberulent, abaxially glabrous to densely puberulent, glaucous; blade elliptic, 80-163 x 22-40 mm, apex acuminate to rounded, base attenuate, margin revolute. Venation craspedodromous. Inflorescence axillary, many-flowered, tomentose. Flowers yellowish, 7-10 mm long. Calyx lobes ovate, 2-4 x 1-2 mm. Corolla salverform, glabrous, tube 4-5 x 1,5-2 mm; lobes lanceolate, erect to sub erect, 3,5-4 mm long. Anthers 0,5 mm long.

Ovary glabrous, 0,5-0,8 mm long; style 0,7-1 mm long; style head clavate, papillate, 0,3-0,4 mm long. Follicle pyriform, mucronate, stipitate, pubescent, greyish-brown, 70-105 x 50-70 mm. Seeds about 10 per follicle, orbicular, with central seminal nucleus, 50-65 mm in length.

Common name: "Guatambú-macho".

Selected materials: BRAZIL. **Maranhão:** Tuntum, 27-II-1983 (fl.), *J. U. Santos et al. 704* (UEC). **Minas Gerais.** Itutinga, V-1993 (veg.), *E. Van den Berg s.n.* (ESAL). Minduri, idem, 3-XII-1998 (fr.), *A. O. Simões et al. 625* (UEC).

Observations: this species shows a widespread distribution, occurring in forest formations from Mexico to Brazil. In Brazil it occurs in Amazonian, northeastern, central-western and southeastern states, its southern limit being the Serra da Mantiqueira in Rio de Janeiro State. This species is found near watercourses. According to Marcondes-Ferreira (1988), flowering takes place all year round, especially in August-September. In the Carrancas region, this species was only found in fruit from July to September.

Because of its reddish latex and coriaceous leaves, this species can easily be identified in the field even when sterile.

5. Aspidosperma tomentosum Mart., Flora 7 (1Beibl.): 135. 1824. (Fig. 7 F-L).

Iconography: Müller Argoviensis in Mart., Fl. bras. 6(1): pl. 15. 1860.; Ezcurra et al., in Fl. Paraguay 17: 32, fig. 10. 1992.; Koch & Kinoshita, Acta Bot. Brasil. 13(1): 68, figs. 11-13. 1999.

Tree 1-5 m high, latex white**.** Trunk tortuose; branches suberous, lenticellate, covered with a dense yellowish, villous indument in the younger parts. Leaves alternate, congested at the branch apex, subsessile, membranaceous, glabrous to tomentose, densely white-tomentose when young; blade obovate to obovate-elliptic, 8,2-20,5 x 3,2-7,8 cm, apex acute to rounded, base attenuate, margin crenate. Venation semi-craspedodromous. Inflorescence subterminal, many-flowered, densely villous. Flowers yellowish white, 4-6 mm long. Calyx lobes lanceolate, 2 x 0,5 mm. Corolla salverform, tube cylindrical, 3 x 1,5 mm; lobes oblong, reflexed, 2,5-3 x 0,5 mm. Anthers 1 mm long. Ovary glabrous, 1-1,2 mm long; style 1 mm long; style head terete-fusiform, 1 mm long. Follicle pyriform, shortly stipitate, densely ferruginous-tomentose when young, glabrous when mature, 50-80 x 25-35 mm. Seeds 6-12 per follicle, ovate, with a central seminal nucleus, 32-36 x 20-22 mm.

Selected materials: BRAZIL. **Minas Gerais:** Carrancas, fazenda Grão-Mogol, 19-IX-1998 (fl.), *A. O. Simões & R. B. Singer 243* (UEC).

Observations: this species is widespread in Brazilian "cerrados", reaching nearby regions of Bolivia and Paraguay. Regionally, it occurs in "campo rupestre" or rocky grasslands, also appearing near forest formations.

This species is easily recognized by its small size, tortuous trunk, suberose branches and densely tomentose leaves. Flowering takes place in September and October. Fruiting occurs all year round.

2. Condylocarpon Desf., Mem. Mus. Hist. Nat. 8: 119. 1822.

Woody vines, latex white. Leaves opposite or whorled, with or without domatia abaxially in the axils of secondary veins with the midvein. Inflorescence thyrsiform, many-flowered, become congested in the terminal branchlets. Flowers actinomorphic, white, yellow or orange. Calyx without colleters. Corolla salverform or infundibuliform, often globose in bud, with long-caudate lobes. Stamens included; anthers ovate, free, inserted near mid-tube or above. Ovary apocarpous; style head globose or turbinate. Mericarps 2, more rarely 1, articulated into one to several, one-seeded, indehiscent segments.

Neotropical genus with 7 species; in the region, it is represented by *C. isthmicum.*

References: Fallen (1983), Ezcurra et al. (1992), Koch & Kinoshita (1999).

6. Condylocarpon isthmicum (Vell.) A. DC., Prodr. 8: 381. 1844. *Echites isthmica* Vell., Fl. Flum. 3: 112. 1829. (Fig. 7 M-R).

Condylocarpon rauwolfiae (A.DC.) Müller Argoviensis in Mart., Fl. bras. 6(1): 64. 1860.

Iconography: Müller Argoviensis in Mart., Fl. bras. 6(1): pl. 19-20. 1860.; Markgraf in Fl. Il. Catarinense, Apocináceas: 26, est. 7(1). 1968.; Ezcurra, Darwiniana 23: 449, fig. 23. 1981.; Ezcurra et

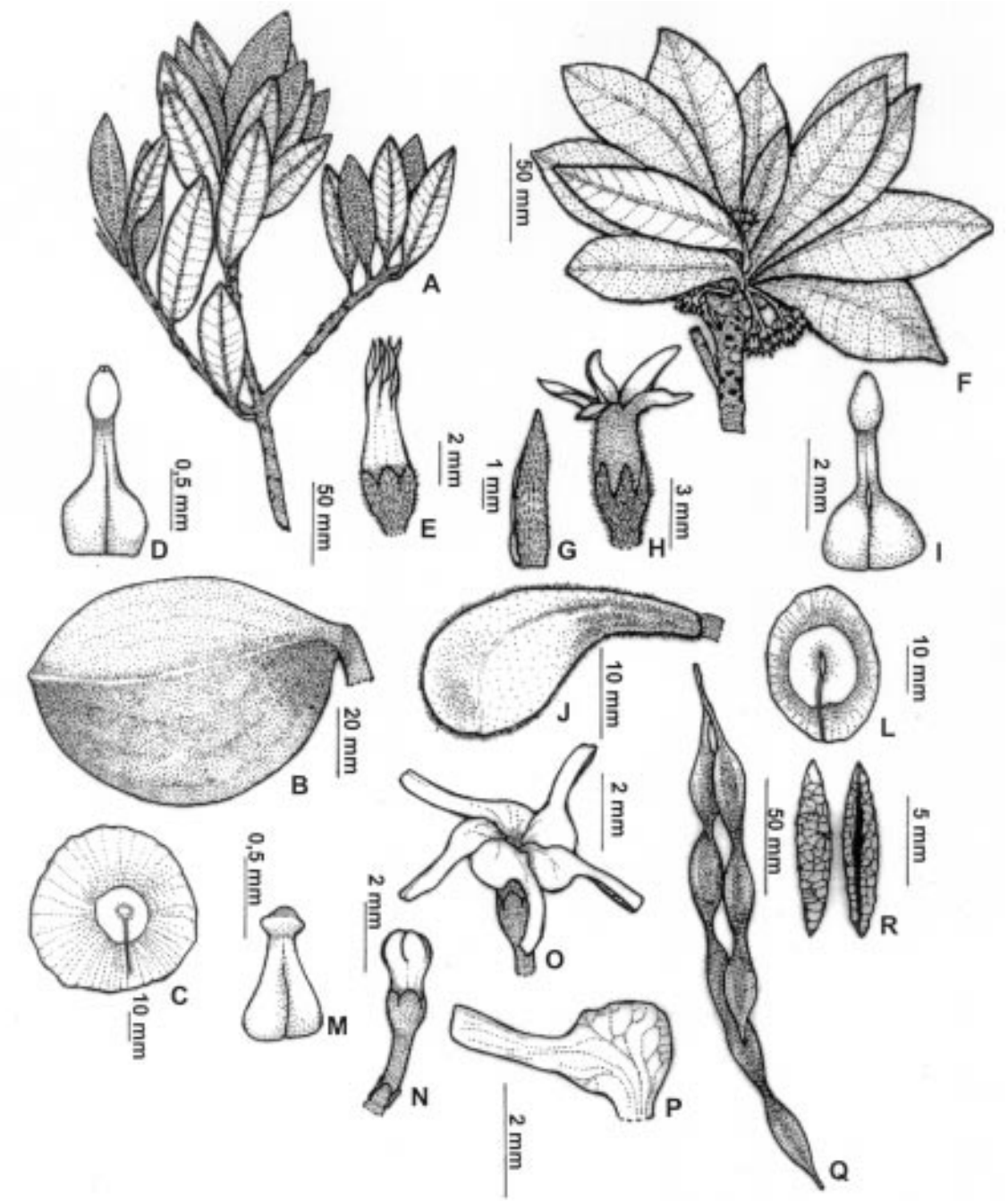

Fig. 7.- A-E- *Aspidosperma spruceanum* Benth. ex Müll.Arg. A: branch; B:- fruit; C: seed; D: gynoecium; E: flower. F-L: *Aspidosperma tomentosum* Mart. F: flowering branch; G: corolla lobe, adaxial surface; H: flower; I: gynoecium; J: fruit; L: seed. M-R: *Condylocarpon isthmicum* (Vell.) A. DC. M: gynoecium; N: flower bud; O: flower; P: corolla lobe, adaxial surface; Q: fruit; R: seed in dorsal and ventral view. A-C, *Simões et al. 625*; D-E, *J. U. Santos et al. 704*; F-I, *Simões & Singer 243*; J-L, *Simões & Jannini 202*; M-P, *Kinoshita et al. 98/243*; Q-R, *Simões et al. 76*.

al., in Fl. Paraguay 17: 36, fig. 12. 1992. Koch & Kinoshita, Acta Bot. Brasil. 13(1): 68, figs. 14-17. 1999.

Branches twining, glabrous or pubescent, with intrapetiolar colleters. Leaves whorled, 3 per node, more rarely 2 and then opposite; blade elliptic to

narrowly elliptic, 4,9-10 x 2,1-4 cm, apex acute to acuminate, base acute to obtuse, margins straight, with pilose domatia. Venation brochidodromous. Inflorescence corymbose, terminal, glabrous. Flowers orangish yellow, 2,5-4 mm long, globose in bud. Calyx lobes ovate, 0,2-0,6 x 0,3 mm. Corolla salverform, tube 1-1,5 x 0,5 mm; corolla lobes spreading, 3,5 mm long. Anthers 1 mm long, located above the style head. Ovary glabrous, 0,5 mm long; style head globose, subsessile, 0,2-0,3 mm long. Mericarps 2, moniliform, 3-6 segmented, 118-170 x 5-10 mm. Seeds verrucose, turning blackish, 5-10 x 1,5-2 mm.

Common name: "Macarrão".

Selected materials: BRAZIL. **Minas Gerais.** Carrancas, fazenda Grão-Mogol, 6-X-1998 (fl.), *L. S. Kinoshita et al. 98/243* (UEC). Itumirim, 07-I-1995 (fl.), *Oliveira s.n.* (HXBH). Itutinga, 18-IX-1998 (fl.), *A. O. Simões & R. B. Singer 233* (UEC). Lavras, 17-X-1989 (fl.), *F. F. Avezum & R. J. Almeida 31* (ESAL). Luminárias, 05-II-1998 (fr.), *A. O. Simões et al. 136* (UEC). Minduri, 3-XII-1998 (fl./fr.), *A. O. Simões et al. 631* (UEC).

Observations: occurring in grasslands and forests from Brazil to Argentina. Regionally, this species is found in forest and "capoeira" formations, becoming particularly abundant in riverine forests with some degree of human disturbance. This was the most frequently collected species during our studies. Found in flower from September to March and bearing fruits from September to December; yet, flowering was particularly evident in September-October.

This species is characteristic with its whorled leaves, long-caudate corolla lobes and indehiscent articulate mericarps.

3. Hancornia Gomes, Obs. Bot. Med. Pl. Bras. 2: 1. 1803.

Trees to treelets, latex white. Trunk tortuose or straight; branches greyish to brownish, glabrous to densely pubescent. Leaves opposite, glabrous to pubescent, with numerous secondary veins parallel to each other and forming a straight angle with the midvein. Inflorescence dichasial, terminal, few-flowered. Flowers actinomorphic, white or yellowish. Calyx without colleters. Corolla salverform. Stamens included; anthers ovate, located above the style head. Ovary syncarpous; style head fusiform. Berry rounded or oval, yellow to greenish-yellow.

Monotypic genus, widely distributed in Brazil, reaching the North of Paraguay.

References: Monachino (1945), Ezcurra et al. (1992), Koch & Kinoshita (1999).

7. Hancornia speciosa Gomes, Obs. Bot. Med. Bras. Pl. 2: 3. 1803. (Fig. 8 A-F).

Iconography: Müller Argoviensis in Mart., Fl. bras. 6(1):pl. 8. 1860.; Ezcurra et al., in Fl. Paraguay 17: 47, fig. 16. 1992.; Koch & Kinoshita, Acta. Bot. bras. 13(1): 68, figs. 18-19. 1999.

Tree 1-4 m high. Trunk tortuous; branches suberous, with interpetiolar colleters. Leaves opposite, glabrous; blade elliptic to elliptic-oblong, 4-6 x 2,1-3 cm, apex cuspidate, base attenuate to acute, margin straight. Venation craspedrodomous, secondary veins 35-50. Inflorescence 3-5 flowered. Flowers white, 30-40 mm long. Calyx lobes ovate, 1,6-3 x 1-2 mm. Corolla 23-35 x 2-3 mm; lobes oblique-linear, suberect to spreading, 10-12 x 2,5-3mm. Anthers 1,5-2 mm long. Ovary glabrous, 2 mm long, style 15-20 mm long; style head 2 mm long. Berry rounded, greenish yellow with red spots, 40-60 mm. Seeds 1-6, orbicular to ovate, 8-10 x 7-8 mm.

Common name: "Mangaba, Mangabeira"

Selected materials: BRAZIL. **Minas Gerais.** Carrancas, cachoeira da Zilda, 13-XI-1998 (fl./fr.), *A. O. Simões et al. 527* (UEC).

Observations: a widely distributed species, occurring from southeastern Amazonia to São Paulo State, also in Paraguay, but especially in the Brazilian Central Planalto. This species is characteristic in "cerrados" and "campos rupestres" formations. Regionally, this species was exclusively found in rocky habitats. Recorded bearing flowers and fruits from November to February.

This species is noteworthy because of its pattern of secondary veins, a unique feature among all the studied species, and because of its baccate, sweet-tasting, juicy fruits. These fruits are widely used in Brazil to produce ice creams and juices.

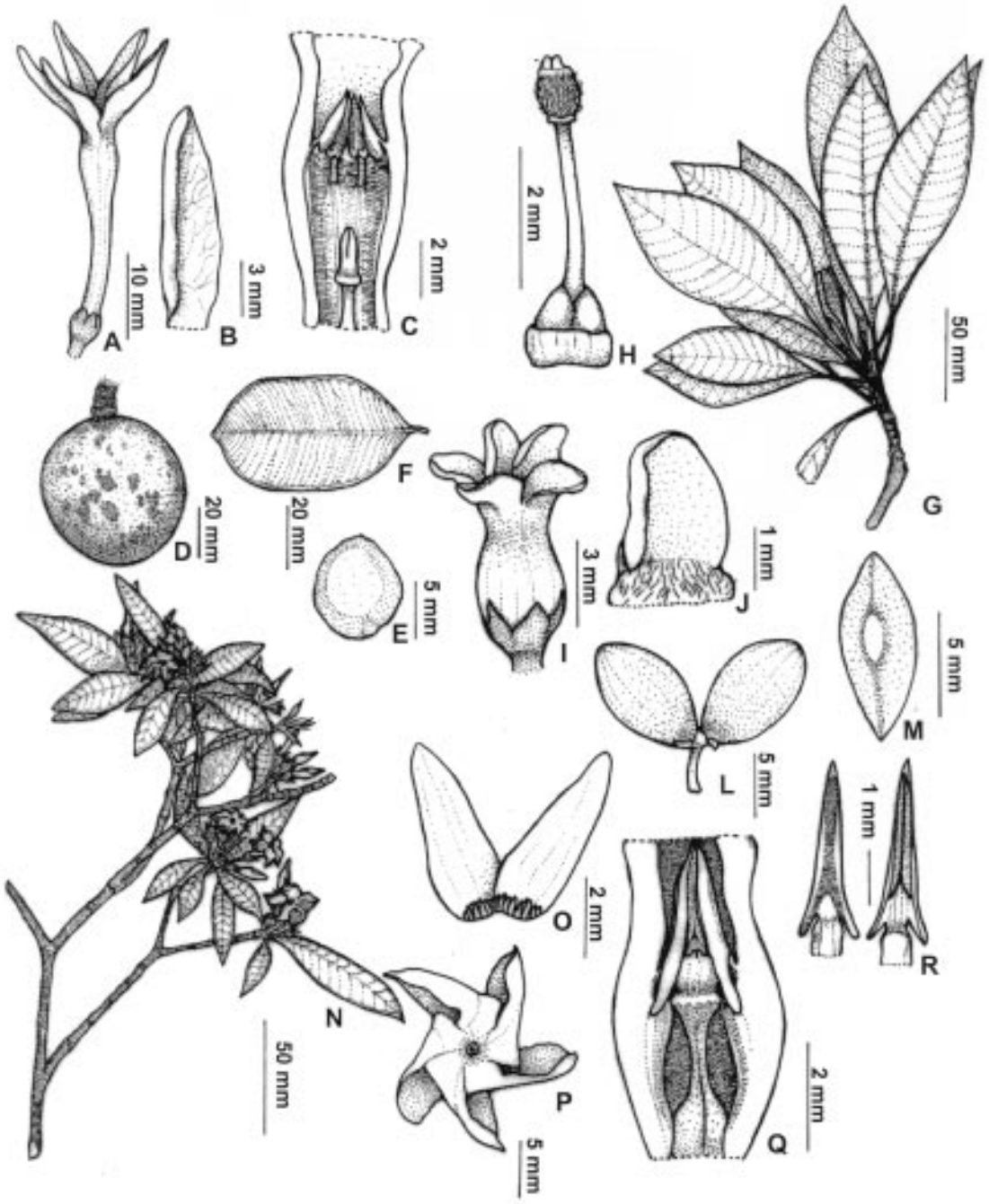

Fig. 8- A-F: *Hancornia speciosa* Gomes. A: flower; B: corolla lobe, adaxial surface; C: longitudinal section of flower, showing gynostegium; D: fruit; E: seed; F: leaf blade, abaxial surface. G-M: *Rauvolfia sellowii* Müll.Arg. G: branch; H: gynoecium; I: flower; J: corolla lobe, adaxial surface; L: fruit; M: seed. N-R: *Tabernaemontana catharinensis* A. DC. N: flowering branch; O: adaxial surface of calyx lobes with continuous colleters at base; P: flower in frontal view; Q: longitudinal section of flower, showing gynostegium; R: anther in dorsal and ventral view. A-E, *Simões et al. 527*; F, *Simões et al. 692*; G, *Oliveira-Filho s.n., ESAL 14613*; H-J, *Koch s.n.*; L-M, *Mathes et al. 673*; N-R, *Gavilanes 5891*.

4. Rauvolfia L., Sp. Pl. 1: 208. 1753.

Trees or shrubs, latex white. Leaves whorled, 3-5 per node. Inflorescence cymose, axillary or terminal, few to many-flowered. Flowers actinomorphic, usually white. Calyx without colleters. Corolla salverform, infundibuliform, urceolate or campanulate. Stamens included; anthers ovate, adherent to the style head. Ovary apocarpic or syncarpic; style head terete to capitate. Drupe composed of 1 or 2 mericarps.

A pantropical genus, with ca. 80 species. In Carrancas, only 1 species, *R. sellowii*, was reported.

References: Rao (1956), Ezcurra et al. (1992).

8. Rauvolfia sellowii Müll.Arg., in Mart., Fl. bras. 6(1): 33. 1860. (Fig. 8 G-M).

Iconography: Markgraf in Fl. Il. Catarinense, Apocináceas: 22, est. 6(1). 1968.; Ezcurra et al., in Fl. Paraguay 17: 96, fig. 39. 1992.

Tree up to 15 m high. Trunk straight; branches terete to slightly compressed, with intrapetiolar colleters. Leaves 4 per node; blade oblong-ovate to elliptic, 9-16,8 x 3,4-5,2 cm, apex obtuse to acuminate, base attenuate, margin straight. Venation brochidodromous. Inflorescence many flowered, glabrous. Flowers white, 6-9 mm long. Calyx lobes ovate, 1,5-2 x 1 mm. Corolla salverform to slightly urceolate, tube 4-6 x 1,3-1,8 mm; lobes ovate, slightly reflex, 2,5-3 x 1-1,2 mm. Anthers 1-1,5 mm long. Ovary apocarpous, glabrous, 1 mm long, nectary disk entire; style 1-2,5 mm long; style head capitate, 0,5-0,8 mm long. Drupe composed of 2 elliptic mericarps, 9-12 x 6-8 mm. Seeds 1 per mericarp, elliptic-compressed, 8,5-9 x 3,5-5 mm.

Common name: "Casca-d'anta"

Selected materials: BRAZIL. **Minas Gerais.** Itutinga, Mata de Camargos, 13-X-1991 (veg.), *A. T. Oliveira Filho et al. s.n.* (ESAL 14613). Poços de Caldas, 12-I-1981 (fr.), *L. A. F. Mathes et al. 673* (UEC). **São Paulo.** São Paulo, Parque Estadual das Fontes do Ipiranga, 24-XI-1976 (fr.), *L. B. Noffs et al. 5* (SP, UEC). Campinas, Fazenda Santa Elisa, X-1999 (fl.), I. *Koch 865* (UEC).

Observations: occurring in forest formations, often near water sources, from southeastern Brazil to northeastern Argentina and the east of Paraguay. According to Ezcurra et al. (1992), this species flowers from September to November and fructifies from November to May. In the study area, only sterile plants were found.

This species is easily diagnosed by its verticillate leaves and drupaceous mericarps.

5. Tabernaemontana L., Sp. Pl. 1: 210. 1753.

Trees or shrubs, latex white. Leaves opposite. Inflorescence cymose, terminal, few to many-flowered. Flowers actinomorphic, white to pinkish. Calyx usually with colleters at base. Corolla salverform. Stamens included or exserted; anthers fertile in the upper part only and with sterile basal appendages, adherent to the style head. Ovary apocarpous; style head terete without a basal ring or somewhat terete with 5 to 10 lobes at the base and at the apex. Fruit baccate or follicular, composed of two mericarps separated or united at the base, arillate.

A Neotropical genus, with ca. 110 species; regionally represented by *T. catharinensis*.

References: Leeuwenberg (1994), Ezcurra et al. (1992), Koch & Kinoshita (1999).

9. Tabernaemontana catharinensis A. DC., Prodr. 8: 365. 1844. *Peschiera catharinensis* (A. DC.) Miers, Apocyn. S. Amer.: 41. 1878. (Fig. 8 N-R).

Peschiera affinis (Müll.Arg.) Miers, Apocyn. S. Amer.: 40. 1878.
Peschiera australis (Müll.Arg.) Miers, Apocyn. S. Amer.: 46. 1878.
Peschiera hilariana (Müll.Arg.) Miers, Apocyn. S. Amer.: 41. 1878.

Iconography: Markgraf in Fl. Il. Catarinense, Apocináceas: 42, est. 12, 45 est. 13. 1968.; Ezcurra, Darwiniana 23: 443, fig. 21. 1981.; Ezcurra et al., in Fl. Paraguay 17: 109, fig. 45. 1992.; Koch & Kinoshita, Acta Bot. Brasil. 13(1): 71, figs. 24-26. 1999.

Trees or shrubs, 2,5-7 m high. Trunk straight or slightly tortuous; branches glabrous to pubescent, with intrapetiolar colleters. Leaves congested at the branch apex, glabrous to pubescent; blade elliptic to narrowly elliptic, 4,5-5,4 x 1,4-1,7 cm, apex acute or acuminate, base cuneate, margin straight. Venation brochidodromous. Inflorescence 8-20- flowered, pubescent. Flowers white, 8-10 mm long. Calyx lobes oblong-ovate, 4-4,5 x 1,5-2 mm, with many continuously distributed colleters. Corolla 6-7,5 x

1,8-2 mm; lobes obliquely oblong-narrow, spreading, 7,5-10 x 3,5-6 mm. Stamens included; anthers 3-4 mm long. Ovary glabrous, 1-1,5 mm long; style 1,5 mm long; style head terete, with lateral projections, densely pilose, 1 mm long. Follicles 2, divergent, reniform, muricate, 20-30 x 15 mm. Seeds rounded, blackish, surrounded by a reddish aril.

Common name: "Leiteiro, Leiteira"

*Selected materia*ls: BRAZIL. **Minas Gerais.** Lavras, X-1993 (fl.), *M. L. Gavilanes 5891* (ESAL). **São Paulo**. Agudos, X-1992 (fl.), *Koch & Jesus 57* (UEC). Bauru, IV-1994 (fr.), *Koch & Guimarães 188* (UEC). Campinas, X/1999, *A. O. Simões 1015* (UEC).

Observations: occurring either in forests or open areas from northeastern to southeastern Brazil, reaching Bolivia, Uruguay, Paraguay and the north of Argentina. According to Leeuwenberg (1994), full flowering takes place from October to November and fruiting from May to June. In the study area, plants were found in flower during October.

Leeuwenberg (1994) considered *Peschiera* A. DC. to be a section of *Tabernaemontana* and placed several binomials under the synonymy of *T. catharinensis*, considerating the latter as a very polymorphic species in vegetative and floral features as well. This species is closely related to *T. hystrix*, from which it can be differentiated by its smaller ratio between the length of corolla tube and lobes.

SUBFAMILY **APOCYNOIDEAE**

Corolla lobe aestivation dextrorse; anthers almost always fertile only in the upper part, adnate to style head; fruit always follicular; seeds comose.

The subfamily is regionally represented by the genera *Forsteronia* (3 spp.), *Macrosiphonia* (2 spp.), *Mandevilla* (9 spp.), *Mesechites* (1 sp.), *Peltastes* (1 sp.), *Prestonia* (2 spp.), *Rhabdadenia* (1 sp.), *Rhodocalyx* (1 sp.), *Secondatia* (1 sp.) e *Temnadenia* (1 sp.).

6. Forsteronia G. Mey., Prim. Fl. Esseq.: 133. 1818.

Vines or rarely shrubs, latex white. Leaves opposite or rarely whorled, with colleters on the base of adaxial surface, usually with domatia abaxially in the axils of secondary veins with the midvein, glabrous or pilose. Inflorescence thyrsiform to subcorymbose, terminal or axillary. Flowers actinomorphic, white or yellow. Calyx with many colleters continuously distributed. Corolla rotate or subrotate. Stamens included or exserted; filaments free or adherent around the style forming a column; anthers with base truncate or slightly sagittate. Ovary apocarpous, nectary disk 5 or more rarely 2 to 3 lobed. Follicles 2, terete to moniliform, subparallel to divergent.

Neotropical genus with 46 species, 3 of them occurring in the study area.

References: Woodson (1935b); Hansen (1985), Koch & Kinoshita (1999).

Key to the species of Forsteronia

1. Leaves glabrous. Domatia glabrous. Stamens completely exserted ..... 10. *F. australis*

1. Leaves pubescent to tomentose. Domatia absent or pilose. Stamens partially exserted 2

2(1). Branches and leaves covered with a dense ferruginous indument. Inflorescence conical to subterete. Follicles moniliform, subparallel, pendulous ..... 11. *F. rufa*

2. Branches and leaves glabrous to tomentose, not ferruginous. Inflorescence subcorymbose, congested. Follicles terete, divergent, erect ..... 12. *F. velloziana*

10. Forsteronia australis Müll.Arg., in Mart., Fl. Bras. 6(1): 103. 1860. (Fig. 9 A-G).

Vine. Branches twining or scandent, glabrous, with interpetiolar colleters. Leaves opposite, glabrous, domatia glabrous; blade elliptic, 5,5-7,7 x 2,3-3,5 cm, apex acute to cuspidate, base acute to rounded, margin straight, with 2 adaxial colleters at base. Venation brochidodromous. Inflorescence thyrsiform, terminal, conical to narrowly conical, equal to or surpassing the subtending leaves, 40-60 mm long. Flowers yellowish white, 4-4,5 mm long. Calyx lobes ovate, 1 x 0,5-0,8 mm. Corolla subrotate, tube 1,5-2 mm; lobes oblong, reflexed, pubescent, 2-3 mm long. Stamens totally exserted; filaments coalesced and forming a column around style; anthers oblong, base sagittate, 2 mm long. Ovary pilose, 0,5 mm long, nectary disk 5-lobed; style 1 mm long; style head fusiform-capitate, 1 mm long. Follicles moniliform, pendulous, subparallel, 250-

360 x 2-4 mm, 6-12 segmented. Seeds oblong-elliptic, shortly rostrate, 8-9 x 2-3 mm.

Selected materials: BRAZIL. **Minas Gerais.** Carrancas, caminho para Serra de Bicas, 8-X-1998 (fl.), *L. S. Kinoshita et al. 98/601* (UEC).

Observations: occurring in Brazil from Ceará to São Paulo State. Locally frequent in "capoeiras" and forest borders. This species was found in flower from October to December and bearing fruits in February.

11. Forsteronia rufa Müll.Arg., in Mart., Fl. bras. 6(1): 100. 1860. (Fig. 9 H-M).

Iconography: Müller Argoviensis in Mart., Fl. bras. 6(1): pl. 31. 1860.; Markgraf in Fl. Il. Catarinense, Apocináceas: 94, est. 24(4). 1968.

Vine, latex white. Branches twining, the older pubescent and the younger bearing a dense ferruginous indument, with interpetiolar colleters. Leaves opposite, densely covered with a ferruginous tomentose indument in both surfaces, domatia pilose; blade narrowly elliptic to elliptic, 6,7-9,6 x 3-4 cm, apex acute to acuminate, base subcordate or rounded, margin straight, with 2 colleters adaxially at base. Venation brochidodromous. Inflorescence thyrsiform, terminal, conical to subterete, surpassing the subtending leaves, 120-155 mm long, ferruginous-tomentose. Flowers white to yellowish white, 4-5 mm long. Calyx lobes lanceolate, 1,5-2,3 x 0,5-1 mm long. Corolla subrotate, tube ca. 2 mm, lobes erect to somewhat reflexed, 2-2,5 mm long. Stamens partially exserted; filaments free; anthers oblong, base sagittate, about 1,5 mm long. Ovary puberulent, 0,5 mm long, nectary disk 5-lobed; style 0,8 mm long; style head fusiform, 1-1,3 mm long. Follicles moniliform, subparallel, pendulous, 8-9 segmented, 300-430 x 5-7 mm.

Selected materials: BRAZIL. **Bahia.** Livramento do Brumado, Rio das Contas, 23-III-1977 (fr.), *R. M. Harley 19872* (UEC). **Minas Gerais.** Carrancas, fazenda Grão Mogol, I-1999 (fl.), *A. O. Simões & K. Matsumoto 695* (UEC). Lavras, Fazenda Polo, 11-XII-1980 (fl.), *H. F. Leitão Filho et al. 12013* (UEC). Minduri, estrada Minduri-Carrancas, 3-XII-1998 (fl.), *A. O. Simões et al. 630* (UEC). **Paraná.** Paranaguá, Ilha do Mel, 12-IV-1986 (fr.), *S. M. Silva* & *R. M. Britez 24604* (UEC). **São Paulo.** Rodovia Pariquera-Açu – Cananéia, 11-I-1995 (fl.), *L. C. Bernacci et al. 1127* (UEC).

Observations: occurring in pristine and secondary forests in Brazil from Bahia to Santa Catarina State. According to Hansen (1985), full flowering takes place from December to February and fruiting occurs from March to July. This species was collected with flowers in December.

This species is characteristic because of the ferruginous indument of branches, leaves and inflorescences.

12. Forsteronia velloziana (A. DC.) Woodson, Ann. Missouri Bot. Gard. 21(4): 622. 1934. *Echites velloziana* A. DC., Prodr. 8: 474. 1844. (Fig. 9 N-R).

Iconography: Koch & Kinoshita, Acta Bot. Brasil. 13(1): 73, figs. 38-40. 1999.

Vines. Branches twining or scandent, glabrous to tomentose, with interpetiolar colleters. Leaves opposite, pubescent to pilose, lacking domatia; blade narrowly elliptic, ovate-elliptic or elliptic, 2-5,4 x 1-2,2 cm, apex acute to acuminate, base subcordate, margin straight, with 2 adaxial colleters at base. Venation brochidodromous. Inflorescence subcorymbose, congested, terminal, smaller than the subtending leaves, 10-15 mm long. Flowers white, 2,5-4 mm long. Calyx lobes ovate-lanceolate, 2,5-3 x 1-1,5 mm. Corolla subrotate, tube 1-2 x 1,2-1,5 mm; lobes oblong, erect to suberect, 2,5-3 mm long. Stamens partially exserted; filaments adherent; anthers oblong-ovate, base shortly sagittate, 1-1,2 mm long. Ovary densely pilose, 0,5 mm long, nectary disk 5-lobed; style 0,4-0,5 mm long; style head fusiform, 1,2-1,5 mm long. Follicles terete, divergent, erect, 56-120 x 2,5-5 mm. Seeds oblong, non rostrate, 4,5-10 x 1-2 mm.

Selected materials: BRAZIL. **Minas Gerais.** Carrancas, Toca da Ponte, 5-X-1998 (fl./fr.), *A. O. Simões 343* (UEC). Minduri, Mata Triste, 05-XI-1999 (fl.), *A. O. Simões et al. 963* (UEC).

Observations: occurring in Brazil from Minas Gerais to Santa Catarina State. This species may appear in grasslands, "capoeiras" and forest as well; when occurring in rupicolous environments, it is always near water sources. Collected with flowers in September and October and bearing fruits from October to March.

These plants, among other *Forsteronia* species, are easily diagnosed by its cylindrical fruits and congested inflorescences.

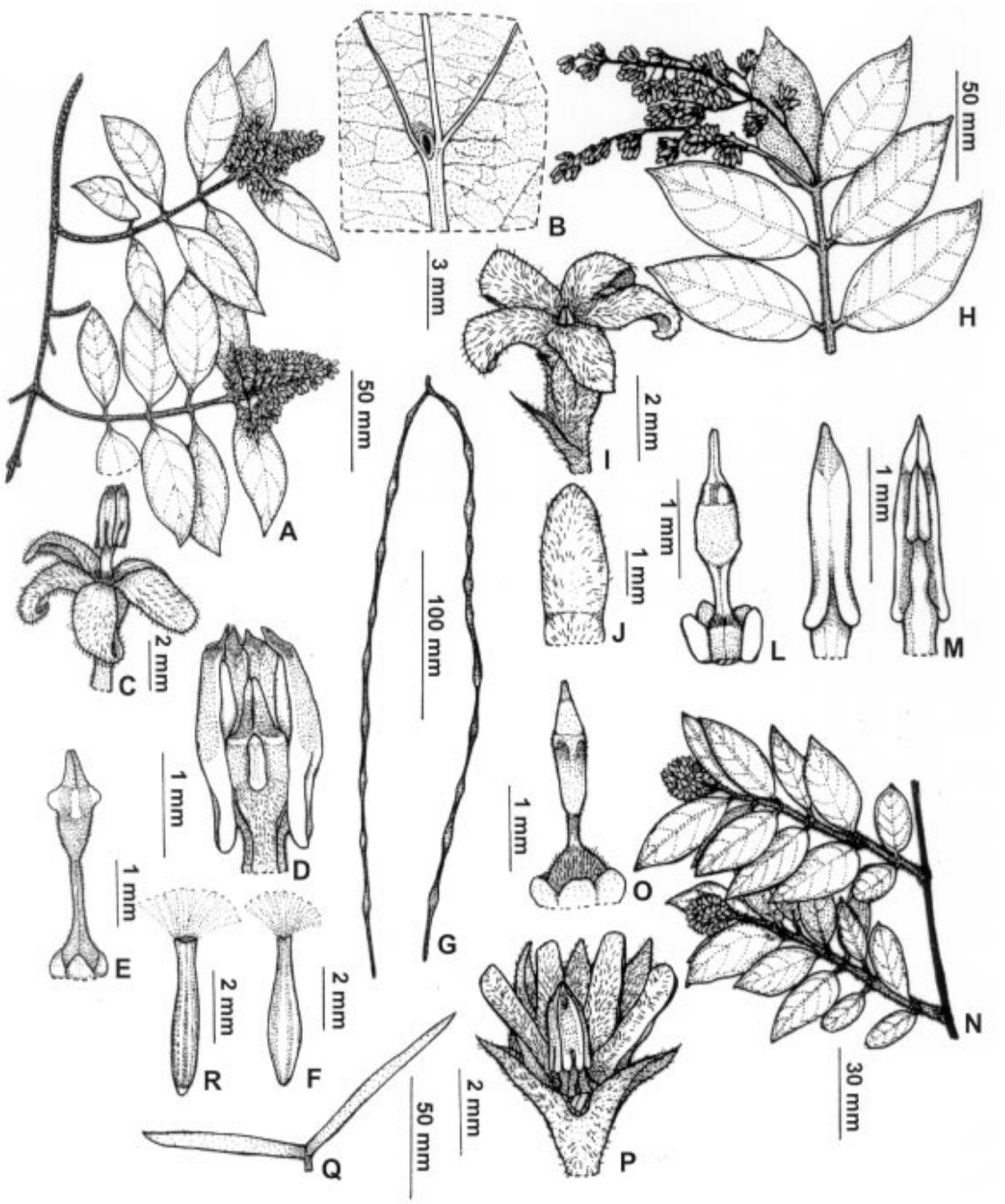

Fig. 9.- A-G: *Forsteronia australis.* Müll.Arg. A: flowering branch; B: detail of abaxial surface of leaf blade, showing domatia; C: flower; D: longitudinal view of stamens and style head; E: gynoecium; F: seed; G: fruit. H-M: *Forsteronia rufa* Müll.Arg. H: flowering branch; I: flower; J: corolla lobe, adaxial surface; L: gynoecium; M: anther in dorsal and ventral view. N-R: *Forsteronia velloziana* (A. DC.) Woodson. N: flowering branch; O: gynoecium; P: flower; Q: fruit; R: seed. A-E, *Kinoshita et al. 98/601*; F-G, *Simões et al. 915*; H-M, *Simões et al. 630*; N-P, *Kinoshita et al. 98/622*; Q-R, *Simões et al.76.*

7. Macrosiphonia Müll.Arg., in Mart., Fl. bras. 6(1): 137. 1860.

Subshrub, latex white, with xylopod. Stems erect or ascending, densely lanuginose, with interpetiolar colleters. Leaves opposite or sometimes whorled, densely whitish lanuginose, at least on abaxial surface, usually with adaxial colleters at the base, usually 2. Inflorescence racemose, terminal, subterminal or axillary, 1 or few-flowered. Flowers actinomorphic, white to greenish white. Calyx with many continuosly distributed colleters. Corolla salverform, lower tube long, terete, upper tube terete to campanulate, yellow inside; lobes white, margins crispate. Stamens included; anthers base truncate to slightly cordate. Ovary apocarpous, nectary disk 5-lobed; style head umbraculiform, without basal collar. Follicles 2, terete or torose.

After Henrickson (1996), *Macrosiphonia* consists of 5 exclusively South-American species; all of them corresponding with *Macrosiphonia* subg. *Macrosiphonia* sensu Woodson (1933). Henrickson (1996) placed the remaining 5 North American species under the genus *Telosiphonia*. Regionally, this genus is represented by 2 species.

References: Woodson (1933), Ezcurra (1981), Ezcurra et al. (1992).

Key to the species of Macrosiphonia

1. Leaves concolor, densely whitish lanuginose on both surfaces. Corolla with lower tube less than 100 mm long ..... 14. *M. velame*

1. Leaves discolor, densely whitish lanuginose only on abaxial surface. Corolla with lower tube more than 100 mm long ..... 13. *M. longiflora*

13. Macrosiphonia longiflora (Desf.) Müll.Arg., in Mart., Fl. Bras. 6(1): 137. 1860. *Echites longiflora* Desf., Mem. Mus. Hist. Nat. 5: 276. 1819. (Fig. 10 I-J).

Iconography: Müller Argoviensis in Mart., Fl. bras. 6(1): pl. 43. 1860.; Markgraf in Fl. Il. Catarinense, Apocináceas: 50, est. 14(1). 1968.; Ezcurra, Darwiniana 23: 421, fig. 15G. 1981.; Ezcurra et al., in Fl. Paraguay 17: 50, fig. 17. 1992.

Erect subshrub, 12-30 cm high. Leaves opposite, subssesile, discolor, with the adaxial surface glabrescent to lanuginose and the abaxial surface densely whitish lanuginose; blade ovate-lanceolate to ovate, 2-3,8 x 0,7-1,8 cm, apex acuminate, base obtuse to slightly cordate, margin slightly revolute. Venation inconspicuously brochidodromous. Inflorescence terminal, 2-flowered or flowers solitary, white-lanuginose. Flowers greenish white, 145-170 mm long. Calyx lobes linear, vinaceous, 14-28 x 1,6-2,7 mm. Corolla greenish white, lower tube 122-140 x 2-4 mm, upper tube campanulate, 12-25 x 10-23 mm; lobes obovate, 30 mm long. Anthers oblong-linear, base slightly cordate, 12-13 mm long. Ovary glabrous, 2 mm long; style 130-145 mm long; style head 5 mm long. Follicles torose, woody, erect, 190-250 x 3-5 mm. Seeds oblong, not rostrate, 9-10 x 2,5-3 mm.

Selected materials: BRAZIL. **Minas Gerais.** Andrelândia, Serra de Santo Antônio, 26-VIII-1936 (fl.), *Mello Barreto 5294* (BHMH). Carrancas, Capela do Saco, 12-XI-1997 (fl./fr.), *A. O. Simões et al. 47* (UEC). Itumirim, 19-X-1985 (fl.), *A. M. Bernardes s.n.* (ESAL). Itutinga, estrada Lavras-São João Del-Rey, 30-XI-1999 (fl.), *A. O. Simões et al. 859* (UEC). Lavras, estrada Lavras-São João del Rey, 5-X-1999 (fl.), *A. O. Simões et al. 930* (UEC).

Observations: occurring in "cerrados", grasslands or altitude grassy formations from central-western to southern Brazil, reaching Uruguay, Argentina, Paraguay and Bolivia. In the study area, this species was collected in grassy, open areas; often near rupicolous environments. This plant was collected in bloom from September to November, and fruiting in November.

14. Macrosiphonia velame (A. St.-Hil.) Müll.Arg., in Mart., Fl. Bras. 6(1): 138. 1860. *Echites velame* St.-Hil., Bull. Sci. Soc. Philom.: 77. 1824. (Fig. 10 A-H).

Iconography: Müller Argoviensis. in Mart., Fl. bras. 6(1): pl. 42. 1860.

Erect subshrub, 20-45 cm high. Leaves opposite, concolor, densely whitish tomentose on both surfaces; blade oblong-ovate, oblong-lanceolate, ovate or oblong-elliptic, 3,5-8,3 x 1,4-5,1 cm, apex acuminate, base obtuse, margin slightly revolute. Venation inconspicuously brochidodromous. Inflorescence terminal, 2-4 flowered, whitish tomentose. Flowers greenish white, 70-130 mm long. Calyx lobes linear, wine-coloured, 16-33 x 1-3 mm. Corolla greenish white, lower tube 45-90 x 2,5-5 mm,

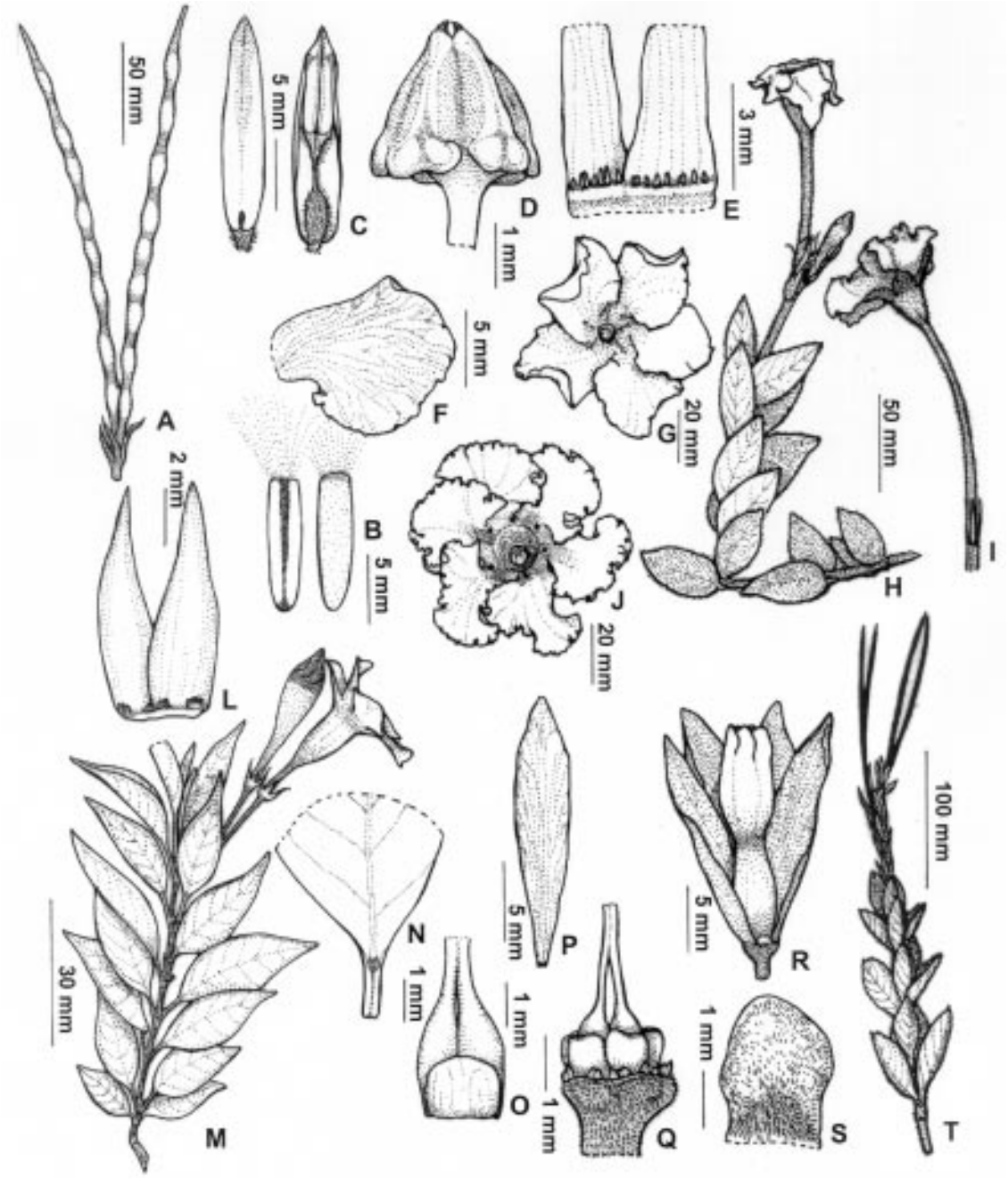

Fig. 10.- A-H: *Macrosiphonia velame* (A. St.-Hil.) Müll.Arg. A: fruit; B: seed; C: anther in dorsal and ventral view; D: style head; E: adaxial surface of calyx lobes with continuous colleters at base; F: corolla lobe, adaxial surface; G: flower in frontal view; H: flowering branch. I-J: *Macrosiphonia longiflora* (Desf.) Müll.Arg. I: flower in lateral view; J: flower in frontal view. L-O: *Mandevilla atroviolacea* (Stadelm.) Woodson. L: adaxial surface of calyx lobes with alternate colleters at base; M: flowering branch; N: detail of adaxial surface of leaf blade with two colleters at base; O: ovary and nectary disk. P-T: *Mandevilla emarginata* (Vell.) Ezcurra. P: calyx lobe, adaxial surface; Q: longitudinal section of the basal part of flower, showing the ovary, the nectary disk and calycinal colleters, with petals removed; R: flower; S: corolla lobes, adaxial surface; T: flowering branch. A-B, *Simões et al. 148*; C-F, *Simões et al. 580*; G-H, *Simões et al. 533*; I-J, *Simões et al. 930*; L-O, *Simões et al. 964*, P-T: *Simões et al. 721*.

upper tube campanulate, 17-35 x 8-17 mm; lobes obovate, 25-35 x 25-30 mm. Anthers oblong-linear, base slightly cordate, 10-15 mm long. Ovary glabrous, 2 mm long; style 50-90 mm long; style head 5 mm long. Follicles torose, woody, erect, 167-290 x 3-6,5 mm. Seeds oblong, not rostrate, 8-10 x 2-3mm.

Common name: "Velame".

Selected materials: BRAZIL. **Minas Gerais.** Carrancas, Serra de Carrancas, 18-II-2000 (fl./fr.), *L. S. Kinoshita et al. 2000/67* (UEC). Lavras, Serrinha, 7-XII-1983 (fl.), *H. F. Leitão Filho et al. 15307* (UEC).

Observations: occurring in Brazilian "cerrado" formations in Goiás, Distrito Federal (Brasília), Minas Gerais, São Paulo and Rio Grande do Sul State. We found this species in rupicolous and grassy environments, from 900 to 1200 m.a.s.l. This species was found in flower from September to February, and bearing fruits from December to September. Full flowering takes place in November-December.

This species is easily separated from *M. longiflora* by its concolorous leaves, the white-lanuginose indument, which covers the vegetative parts and by its smaller flowers.

8. Mandevilla Lindl., Edwards's Bot. Reg. 26: pl. 7. 1840, nom cons.

Shrubs, subshrubs or vines, latex white. Branches with interpetiolar, intrapetiolar or both kinds of colleters. Leaves opposite or whorled, with 1 to many colleters restricted to the base of the blade or distributed adaxially along the length of midrib. Inflorescence racemose, axillary or terminal, few to many-flowered. Flowers actinomorphic or slightly zigomorphic, variously coloured. Calyx lobes with alternate, opposite or continuously distributed colleters at the base. Corolla tubular, salverform, subsalverform or infundibuliform, lower tube terete to gibbous, upper tube of various shapes. Stamens included; anther base truncate to slightly sagittate. Ovary apocarpous, bearing a 5-lobed nectary disk or 2 free nectaries; style head umbraculiform, without basal collar. Follicles 2, terete or torose, geminate, subparallel or divergent.

Neotropical genus of ca. 108 species, 9 of them being locally represented.

References: Woodson (1933), Ezcurra et al. (1992), Sales (1993); Morales (1998).

Key to the species of Mandevilla

1. Adaxial leave surface with colleters along the length of midrib. Flowers slightly zigomorphic. Calyx with opposite colleters. Corolla with lower tube gibbous. Anthers with filaments laterally enlarged ..... 17. *M. hirsuta*

1. Adaxial surface of leaves with colleters at the base of midrib only. Flowers actinomorphic. Calyx with alternate or continuously distributed colleters. Corolla with lower tube terete. Anthers with filaments not enlarged 2

2(1). Corolla tubular. Calyx lobes equal to or longer than corolla tube ..... 16. *M. emarginata*

2. Corolla salverform, subsalverform or infundibuliform. Calyx lobes shorter than corolla tube 3

3(2). Flowers red. Corolla lower tube 3-4 mm long ..... 21. *M. spigeliiflora*

3. Flowers pinkish to dark-wine coloured. Corolla lower tube more than 4 mm long 4

4(3). Corolla salverform or subsalverform 5

4. Corolla infundibuliform 6

5(4). Flowers 50-53 mm long. Corolla with upper tube terete, about twice as long as the lower tube, 23 mm long, lobes obliquely rhombic ..... 19. *M. novo-capitalis*

5. Flowers 15-20 mm long. Corolla with upper tube slightly expanded, 2-4 times shorter than the lower tube, 3-6 mm long, lobes obliquely obovate ..... 22. *M. tenuifolia*

6(4). Vines. Petiole 7-15 mm long. Inflorescence axillary. Flowers dark wine-coloured to magenta .. 15. *M. atroviolacea*

6. Erect subshrubs. Petiole 1,5-6 mm long. Inflorescence terminal. Flowers pinkish to lilac 7

7(6). Leaves whorled, at least on the lower part of branches; blade linear, less than 1 cm wide. In inundated grasslands ..... 23. *M. widgrenii*

7. Leaves opposite, blade narrowly elliptic to suborbicular, more than 1 cm wide. In "cerrados" and dry grasslands 8

8(7). Corolla upper tube campanulate-conical, longer than the upper tube, mouth not prominent, lobes obovate-orbicular ..... 20. *M. pohliana*

8. Corolla upper tube tubular-turbinate, about the same size as the lower tube, mouth proeminent with its star-shaped distal parts extending toward the lobes, lobes obliquely obovate ..... 18. *M. illustris*

15. Mandevilla atroviolacea (Stadelm.) Woodson, Ann. Missouri Bot. Gard. 20(4): 724-725. 1933. *Echites atroviolacea* Stadelm., Flora 24 (1 Beibl.): 75. 1841. (Fig. 10 L-O).

Iconography: Markgraf in Fl. Il. Catarinense, Apocináceas: 61, est. 17(2). 1968.

Vine, branches scandent or twining, glabrous. Petiole 7-15 mm long. Leaves opposite, glabrous; blade elliptic to broadly elliptic, 3,6-6 x 1,9-3,2 cm, apex acuminate, base attenuate to obtuse, margin slightly revolute, with 2 colleters adaxially at base. Venation brochidodromous. Inflorescence axillary, 2-5 flowered, glabrous; bracts scarious. Flowers actinomorphic, dark wine-coloured to magenta, 62-80 mm long. Calyx lobes lanceolate to ovate-lanceolate, vinaceous, 5,5-8 x 1,8-2,2 mm, with many alternate colleters. Corolla infundibuliform, glabrous, lower tube terete, 17-22 x 2,7-4,5 mm, upper tube terete-turbinate, orangish inside, 20-36 x 14-24 mm; lobes obliquely ovate, suberect to spreading, 20-35 x 22-35 mm. Anthers 8-10 mm long. Ovary glabrous, 2,5-3 mm long, nectaries 2, free; style 20 mm long; style head 2-3 mm long. Follicles terete, glabrous, 92-130 x 6-8 mm. Seeds oblong, shortly rostrate, 4-5 x 0,5 mm.

Selected materials: BRAZIL. **Minas Gerais.** Carrancas, Serra de Bicas, 12-XI-1998 (fl./fr.), *A. O. Simões et al. 461* (UEC). Minduri, Mata Triste, 05-XI-1999 (fl.), *A. O. Simões et al. 964* (UEC).

Observations: occurring in south and southeastern Brazil, especially in forest formations. Locally found as rupicolous or forest plant at altitudes above 1300 m.a. s. l.; this represents the limit in its western distribution. Plants may be found as isolated individuals or building large populations, with conspicuous flowering. This species was collected with flowers from November to February and bearing fruits in November-December.

16. Mandevilla emarginata (Vell.) Ezcurra, Candollea 47(1): 92. 1992. *Echites emarginata* Vell., Fl. Flum. 113. 1829; Icon. 3: pl. 46. (Fig. 10 P-T).

Mandevilla erecta (Vell.) Woodson, Ann. Missouri Bot. Gard. 19(1): 62. 1932.

Iconography: Müller Argoviensis in Mart., Fl. bras. 6(1): pl. 41. 1860.; Markgraf in Fl. Il. Catarinense, Apocináceas: 56, est. 15(1). 1968.; Ezcurra, Darwiniana 23: 437, fig. 20A-B. 1981.; Ezcurra et al., in Fl. Paraguay 17: 64, fig. 24. 1992.

Erect subshrub, 40-50 cm high, with xylopod. Branches glabrous to tomentose. Petiole 3,5-7mm long. Leaves opposite, pubescent to tomentose; blade elliptic-ovate or elliptic, 6,8-8,1 x 3,8-5,7 cm, apex acuminate, base slightly cordate, margin straight, with 2 to many adaxial colleters at base. Venation brochidodromous or eucamptodromous. Inflorescence terminal, many-flowered; bracts foliaceous, lanceolate to ovate-lanceolate, 14-15 x 2-2,5 mm. Flowers actinomorphic, greenish yellow, 13-15 mm long. Calyx lobes foliaceous, lanceolate to ovate-lanceolate, 19-23 x 0,3 mm, with many alternate colleters. Corolla tubular, glabrous, tube 12-13 x 3-4 mm; lobes ovate to oblong, erect, 2-3 x 1,5-2 mm. Anthers 5-6 mm long. Ovary glabrous, 1 mm long, nectary disk 5-lobed; style 7-8 mm long; style head 2 mm long. Follicles terete, divergent, erect, glabrous or pubescent, 200-300 x 3,5-5 mm. Seeds narrowly oblong, non rostrate, 6-7 x 2 mm.

Selected materials: **BRAZIL. Minas Gerais.** Carrancas, estrada para cachoeira da Zilda, 13-III-1999 (fl./fr.), *A.O. Simões et al. 721* (UEC). Poços de Caldas, Campo do Saco, 13-I-1981 (fl.), *L. S. Kinoshita-Gouvea et al. 722* (UEC 23315). **São Paulo.** Botucatu, 7-X-1995 (fl.), *L. R. H. Bicudo et al. 1235* (UEC). Ibitinga, 20-IV-1949 (fr.), *D. Pickel 3296* (SPSF). São João da Boa Vista, 7-X-1995 (fl.), *R. R. Rodrigues et al. 386* (UEC).

Observations: occurring from central-western to southern Brazil, reaching Paraguay,

northeastern Argentina and northern Uruguay, typically as a "cerrado" plant, but also as rupicolous or in grassy environments. Regionally found as an open-area plant. According to Sales (1993), flowering takes place during November until April, with more intensity in January-February. Fruiting occurs in June-July. Regionally this plant was bearing both flowers and fruits in March.

This species is characteristic because of its well-developed foliaceous to subpetaloid bracts and calyx lobes.

17. Mandevilla hirsuta (A. Rich.) K. Schum. in Engl. & Prantl., Nat. Pflanzenfam. 4(2): 171. 1895. *Echites hirsuta* A.Rich., Actes Soc. Hist. Nat. Paris 1: 107. 1792. (Fig. 11 A-G).

Vine, branches twining, hirsute. Petiole 8-26 mm long. Leaves opposite, adaxially pilose and abaxially pilose to densely tomentose; blade elliptic, 7,4-14 x 2,8-6,7 cm, apex cuspidate, base cordate, margin straight, with many colleters distributed adaxially along the entire midrib. Venation brochidodromous. Inflorescence axillary, few-flowered, tomentose; bracts foliaceous, rhombic, 15-25 x 6-12 mm. Flowers slightly zigomorphic, yellow, 50-65 mm long. Calyx lobes ovate-lanceolate, 8-13 x 1-2 mm, with 5 opposite colleters, 1 at the base of each lobe. Corolla infundibuliform, densely pilose, lower tube gibbous, 19-25 x 2,5-4 mm, upper tube campanulate, reddish inside, 14-20 x 12-20 mm; lobes obliquely ovate, spreading, 25-30 x 15-20 mm. Anthers 3,5-4 mm long, with filaments laterally enlarged. Ovary puberulent, 1,5-2 mm long, nectary disk 5-lobed; style 17-20 mm long; style head 2-2,5 mm long. Follicles torose, pilose, 130-145 x 3-6 mm. Seeds oblong-elliptic, pubescent, not rostrate, 9 x 3-4 mm long.

Selected materials: BRAZIL. **Minas Gerais.** Carrancas, Serra do Moleque, 3-XII-1998 (fl./fr.), *A. O. Simões et al. 633* (UEC). Lavras, 9-XII-1980 (fl./fr.), *H. F. Leitão Filho et al. 11845* (UEC).

Observations: this is the most widely distributed of the species we found, its habitat ranging from Brazil to Mexico. This species may occur as rupicolous, but also in "capoeiras" and forest formations. Collected in flower from October to January, and fruiting in October-March. This species is characteristic because of the colleters disposed the whole foliar blade, because of the slightly zigomorphic corolla, the gibbous lower tube and the opposite calicine colleters.

18. Mandevilla illustris (Vell.) Woodson, Ann. Missouri Bot. Gard. 20(4): 727. 1933. *Echites illustris* Vell., Fl. Flum. 114. 1829. (Fig. 11 H-J).

Iconography: Müller Argoviensis in Mart., Fl. bras. 6(1): pl. 38. 1860.; Ezcurra et al., in Fl. Paraguay 17: 66, fig. 25A. 1992.; Koch & Kinoshita, Acta Bot. Brasil. 13(1): 77, fig. 44. 1999.

Erect subshrub, 15-50 cm high, with xylopod. Stem tomentose to velutinous. Petiole 2-6 mm long. Leaves opposite, pubescent to velutinous; blade elliptic to ovate, 4,2-11 x 3,4-9 cm, apex mucronate, base rounded to cordate, margin straight, with 2 adaxial colleters at the base. Venation brochidodromous. Inflorescence terminal; bracts scarious. Flowers actinomorphic, pinkish to lilac, 28-63 mm long. Calyx lobes lanceolate to ovate, vinaceous, 6-13 x 1,5-4 mm, with many alternate colleters. Corolla infundibuliform, lower tube terete, 8-20 x 2-3,5 mm, upper tube tubular-turbinate, 8,5-27 x 4,7-16 mm, mouth purplish, with its star-shaped distal parts extending toward the lobes; lobes obliquely obovate, spreading, 30-46 x 25-40 mm. Anthers 7-8 mm long. Ovary glabrous, 2 mm long, nectaries 2, free; style 16-17 mm long; style head 2-3 mm long. Follicles terete, erect, glabrous, 220-300 x 3-8 mm. Seeds oblong-elliptic, shortly rostrate, 7-8 x 1-2 mm.

Common name: "Rosa-dos-campos".

Selected materials: BRAZIL. **Minas Gerais.** Carrancas, Serra de Carrancas, 10-XI-1998 (fl./fr.), *A. O. Simões et al. 338* (UEC). Cruzília, 08-XI-1999 (fl.), *A. O. Simões et al. 1009* (UEC). Itumirim, 6-XII-1983 (fl.), *H. F. Leitão Filho et al. 15240* (UEC). Itutinga, 10-XII-1980 (fl.), *F. Barros 579* (SP). Lavras, subida da Serrinha, 9-XII-1980 (fl.), *H. F. Leitão Filho et al. 11754* (UEC).

Observations: this species has its distribution associated with the plateau and mountain environments of the central-western and southern Brazilian regions and northeastern Paraguay, occurring as a rupicolous and "cerrado" plant. Regionally, the species was found as rupicolous or grassland plants. Found in flower from September to April, concentrated in October-November. Fruits were evident in November to February.

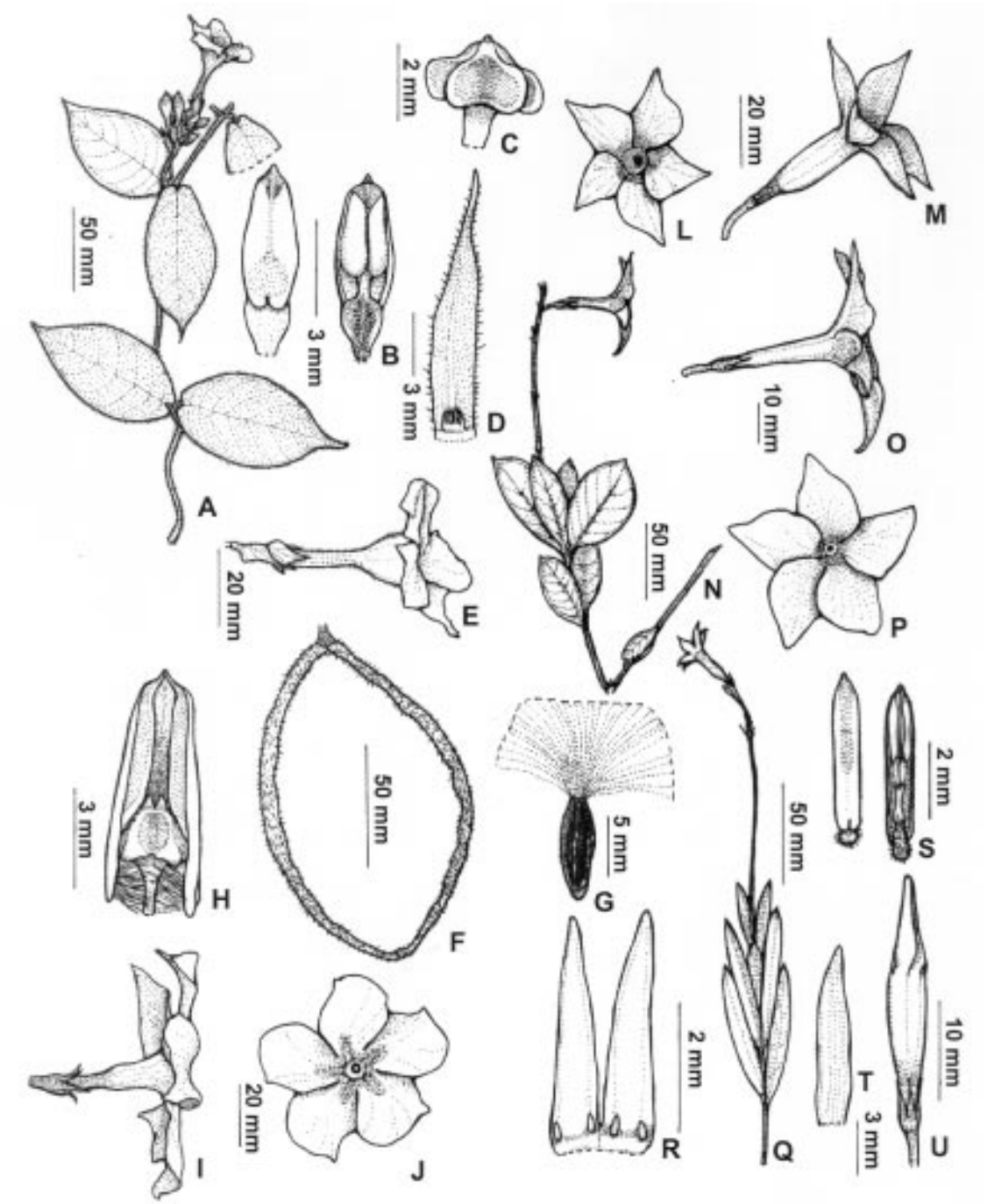

Fig. 11.- A-G: *Mandevilla hirsuta* (A. Rich.) K. Schum. A: flowering branch; B: ather in dorsal and ventral view; C: style head; D: adaxial surface of one calyx lobe with one opposite colleter at base; E: flower; F: fruit; G: seed. H-J: *Mandevilla illustris* (Vell.) Woodson. H: longitudinal view of stamens and style head; I: flower in lateral view; J: flower in frontal view. L-M: *Mandevilla pohliana* (Stadelm.) A. Gentry. L: flower in frontal view; M: flower in lateral view. N-P: *Mandevilla novo-capitalis* Markgraf N: flowering branch; O: flower in lateral view; P: flower in frontal view. Q-U: *Mandevilla spigeliaeflora* (Stadelm.) Woodson. Q: flowering branch; R: adaxial surface of calyx lobes with alternate colleters at base; S: anther in dorsal and ventral view; T: corolla lobe, adaxial surface; U: flower bud. A, *Simões et al. 77*; B-E, *Simões et al. 633*; F-G, *Kinoshita et al. 98/3*31; H-J, *Kinoshita et al. 98/132*; L-M, *Simões et al. 531*; N-P, *Simões et al. 460*; Q, *E.P. Heringer s.n., SP 41130*; R-U, *M. Pereira Neto 164.*

This species is quite similar to, and often confused with, *M. pohliana*; it can be differentiated from the latter by the upper tube shape, which is tubulose-turbinate, oblique-ovate lobes and because of the purplish, evident, star-shaped mouth.

19. Mandevilla novocapitalis Markgraf, Bradea 1(8): 49. 1971. (Fig. 11 N-P).

Erect subshrub, about 45 cm high, with xylopod. Stem puberulent. Petiole 3,5-4mm long. Leaves opposite, glabrous; blade elliptic-obovate, 6,7-7,3 x 4-4,2 cm, apex mucronate, base rounded or slightly cordate, margin slightly revolute, with 2 colleters adaxially at the base. Venation brochidodromous. Inflorescence terminal, ca. 5-flowered, glabrous; bracts scarious. Flowers actinomorphic, pinkish, 50-53 mm long. Calyx lobes lanceolate or ovate-lanceolate, reddish, 8,3-9 x 1,6-2 mm, with many alternate colleters. Corolla subsalverform, lower tube terete, 9 x 3,3 mm., upper tube terete, orangish inside, 23 x 5-9 mm; lobes obliquely rhombic, spreading, 20-21 mm. Anthers 7-8 mm long. Ovary glabrous, 1 mm long, nectaries 2, free; style 12 mm long; style head 1,5 mm long. Fruits and seeds unknown.

Selected materials: BRAZIL. **Distrito Federal:** Catetinho, 15-XI-1973 (fl.), *E. P. Heringer 13011* (UEC). Sobradinho, 29-VIII-1975 (fl.), *E. P. Heringer 14958* (UEC). **Goiás.** Santo Antônio do Descoberto, 20-X-1976 (fl.), *E. P. Heringer 16233* (UEC). **Minas Gerais.** Carrancas, subida da Serra de Bicas, XI-1998 (fl.), *A. O. Simões et al. 460* (UEC).

Observations: this species shows a disjunct distribution, occurring in the Brazilian Planalto Central (Distrito Federal and Goiás) and Minas Gerais State as well. In Minas Gerais State, its distribution seems to be restricted to the Cadeia do Espinhaço (Espinhaço Mountains). In the study region, this species occurs as rupicolous. According to Sales (1993), this species blooms From September to February, most intensely in November, and the fruiting period is unknown. In the Carrancas region, this species was found in flower in November.

The examined material shares morphological features of both, *M. illustris* and *M. pohliana*, but fits better the description of *M. novo-capitalis* since its has a sub-salverform corolla type.

20. Mandevilla pohliana (Stadelm.) A. H. Gentry, Ann. Missouri Bot. Gard. 71(4): 1079. 1985. *Echites pohliana* Stadelm., Flora 24 (1 Beibl.): 73. 1841. (Fig. 11 L-M).

Mandevilla velutina (Mart. ex Stadelm.) Woodson, Ann. Missouri Bot. Gard. 20(4): 731. 1933.

Iconography: Müller Argoviensis in Mart., Fl. bras. 6(1): pl. 38. 1860.; Markgraf in Fl. Il. Catarinense, Apocináceas: 56, est. 15(3). 1968.; Ezcurra, Darwiniana 23: 426, figs. 16F-I. 1981.; Ezcurra et al., in Fl. Paraguay 17: 66, figs. 25B-E. 1992.; Koch & Kinoshita, Acta Bot. Brasil. 13(1): 77, figs. 45-46. 1999.

Erect subshrub, 20-80 cm high, with xylopod. Stem glabrous to tomentose. Petiole 1,5-3mm long. Leaves opposite, glabrous to tomentose; blade obovate, narrowly elliptic, elliptic or widely elliptic, 4-9,5 x 2-5,9 cm, apex mucronate, base attenuate or slightly cordate, margin straight, with 2-4 colleters adaxially at base. Venation brochidodromous. Inflorescence terminal, 4-10 flowered; bracts scarious. Flowers actinomorphic, pinkish to lilac, (42)55-80 mm long. Calyx lobes lanceolate, vinaceous, 5-15 x 1-4 mm, with many alternate colleters. Corolla infundibuliform, lower tube terete, 7-14 x 2-5 mm, upper tube campanulate-conical, the upper two-thirds purplish and the lower one-third orangish inside, (20)24-53 x 9-18 mm, mouth not proeminent; lobes obovate-orbicular, suberect to spreading, 14-30 x 12-38 mm. Anthers 7-8 mm long. Ovary glabrous, 1,3-2 mm long, nectaries 2, free; style 13-20 mm long; style head 2-2,5 mm long. Follicles terete, erect, glabrous to pubescent, 300 x 7-10 mm. Seeds oblong-elliptic, shortly rostrate, 7-10 x 1-2 mm.

Selected materials: BRAZIL. **Minas Gerais.** Carrancas, subida da Serra do Moleque, 13-XI-1998 (fl./fr.), *A. O. Simões et al. 531* (UEC). Cruzília, 08-XI-1999 (fl.), *A. O. Simões et al. 1008* (UEC). Itutinga**,** Rodovia Lavras-São João Del Rey, 10-XII-1980 (fl.), *H. F. Leitão Filho et al. 11916* (UEC). Lavras**,** 10-XII-1980 (fr.), *H. F. Leitão Filho et al. 11985* (UEC). Rosário**,** XII-1982 (fl.), *D. A. C. et al. s.n.* (UEC). Minduri, estrada Carrancas-Minduri, 16-II-2000 (fl.), *L. S. Kinoshita et al. 2000/41* (UEC).

Observations: occurring in the montane and plateau regions from central-western to southern Brazil, reaching Bolivia, Paraguay and Argentina, as

rupicolous or "cerrado" plants. Regionally, it was found in grasslands. This species was collected with flowers from October to February and bearing fruits in November-December. Flowering is concentrated in October-November.

A quite polymorphic species, showing a great variation in flower size and colouration (from pinkish to lilac).

21. Mandevilla spigeliiflora (Stadelm.) Woodson, Ann. Missouri Bot. Gard. 20(4): 736-737. 1933. *Echites spigeliiflora* Stadelm., Flora 24 (1 Beibl.): 58. 1841. (Fig. 11 Q-U).

Iconography: Müller Argoviensis in Mart., Fl. bras. 6(1): pl. 37. 1860.; Ezcurra et al., in Fl. Paraguay 17: 69, fig. 26. 1992.

Erect subshrub, 20-55 cm high, with xylopod. Stem glabrous. Petiole 1-3mm long. Leaves opposite, glabrous; blade linear to narrowly elliptic, 4,6-8 x 0,6-1,3 cm, apex acute to acuminate, base acute to obtuse, margin straight or somewhat revolute, with 2 adaxial colleters at base. Venation brochidodromous. Inflorescence terminal, 7-11 flowered, glabrous; bracts scarious. Flowers actinomorphic, red, 40 mm long. Calyx lobes lanceolate, 3-5 x 0,7-1 mm, with 10 alternate colleters. Corolla infundibuliform, lower tube terete, 3,4 x 2,2 mm, upper tube tubular-campanulate, 10-15 x 3-4 mm, lobes narrowly elliptic to narrowly oblong, spreading to suberect, 12-16 x 3-4 mm. Anthers 4-5 mm long. Ovary glabrous, 1 mm long, nectaries 2, free; style 3,5-4 mm long; style head 1-1,5 mm long. Fruits and seeds unknown.

Selected materials: BRAZIL. **Distrito Federal.** Brasília, 20-VIII-1976 (fl.),*E. P. Heringer* 16585 (UEC). **Minas Gerais.** Lavras, Fazenda Boa Vista, 2-III-1939 (fl.), *E. Heringer 215* (SP). **São Paulo.** Jales, 24-I-1950 (fl.), *W. Hoehne s.n.* (SPF 12605).

Observations: occurring in Brazil in the Distrito Federal, Goiás, Mato Grosso do Sul and Minas Gerais State, reaching Bolivia and Paraguay, in inundated or wet grasslands. We did not collect this species, and its last report was in the Lavras Municipality, sixty-two years ago (see "Selected materials"). This species may either be very rare or locally extinct. According to Sales (1993), this species flowers from December to March. Fruits and seeds are unknown. The local record indicates that flowering takes place in March.

This species is often confused with *M. coccinea*, but they can be differentiated by the corolla structure. In *M. coccinea*, the corolla is salverform with the upper tube bottle shaped and the lobes obliquely-ovate. In *M. spigeliiflora*, the corolla is infundibuliform, with the upper tube tubular-infundibuliform and the lobes narrow, elliptic to oblong.

22. Mandevilla tenuifolia (J.C. Mikan) Woodson, Ann. Missouri Bot. Gard. 20(4): 679. 1933. *Echites tenuifolia* J.C. Mikan, Del. Fl. Faun. Bras.: fasc. 3, t. 14. 1820. *Dipladenia tenuifolia* (J.C. Mikan) A. DC., Prodr. 8: 482. 1844. (Fig. 12 A-G).

Iconography: Müller Argoviensis in Mart., Fl. bras. 6(1): pl. 36. 1860.

Erect subshrub, 10-40 cm high, with xylopod. Stems glabrous or pilose. Petiole 0,5-2mm long. Leaves opposite, glabrous to puberulent; blade linear to oblong-lanceolate, 3,1-13,5 x 0,1-0,7 cm, apex acute, base attenuate, margin straight to revolute, with 2 colleters adaxially at base. Venation inconspicuously brochidrodomous. Inflorescence terminal, glabrous; bracts scarious. Flowers actinomorphic, pinkish to lilac, 15-20 mm long. Calyx lobes lanceolate, vinaceous, 2,1-10 x 0,5-1 mm, with many colleters continuously distributed. Corolla salverform, lower tube terete, 7-14 x 0,5-1,6 mm, upper tube slightly expanded 3-6 x 2-3 mm, whitish lobes obliquely obovate, spreading, 4-16 x 3-11 mm. Anthers 2 mm long. Ovary glabrous, 1,2-1,5 mm long, nectaries 2, free; style 1-1,3 mm long; style head 1,5 mm long. Follicles slightly torose, erect, divergent, 54-90 x 2 mm. Seeds narrowly oblong, shortly rostrate, 6-7 x 1-1,5 mm.

Selected materials: BRAZIL. **Minas Gerais.** Carrancas, Serra do Moleque, 1-XII-1998 (fl./fr.), *A. O. Simões et al. 583* (UEC). Ingaí, Serra da Bocaina, 27-II-1987 (fl.), *D. A. C. et al. s.n.* (UEC). Itumirim, Serra da Estância, 25-II-1990 (fl.), *M. L. Gavilanes 4743* (ESAL). Itutinga, 9-XI-1998 (fl.), *A. O. Simões et al. 360* (UEC). Lavras, fazenda Boa Vista, 22-I-1939 (fl.), *E. Heringer 123* (SP).

Observations: this is the most widely distributed species in Brazil, occurring from São Paulo to Pará State, as rupicolous or "cerrado" plants. Regionally, it was found as rupicolous, but also thriving in wet or inundated grasslands. This is a polymorphic

species, with 2 local forms in Carrancas. Bigger plants (20 to 40 cm in high), display linear leaves. The smaller plants (5 to 10 cm in high) show oblong-lanceolate leaves. Collected in flower from October to February and bearing fruits in December. Flowering is concentrated in October-November.

23. Mandevilla widgrenii Ezcurra, Candollea 45(1): 39. 1990. (Fig. 12 H-L).

Mandevilla linearis (Müll.Arg.) Woodson, Ann. Missouri Bot. Gard. 20(4): 733. 1933, nom. illeg.

Iconography: Ezcurra et al., in Fl. Paraguay 17: 70, fig. 27. 1992.; Koch & Kinoshita, Acta Bot. Bras. 13(1): 77, fig. 47. 1999.

Erect subshrub, 40-80 cm tall. Stems glabrous or sparsely puberulent. Petiole 1-3,5mm long. Leaves whorled, sometimes opposite on the upper part of branches, glabrous; blade linear, 7,1-8,4 x 0,4-0,6 cm, apex acute, base attenuate, margin revolute, with 2 adaxial colleters at base. Venation hyphodromous. Inflorescence terminal, erect, 5-10 flowered, glabrous; bracts scarious. Flowers actinomorphic, pinkish, 60-80 mm long. Calyx lobes lanceolate to linear, 8-10 x 1,5-2 mm, with many alternate colleters. Corolla infundibuliform, glabrous, lower tube terete, 3,5-4,5 x 10-12 mm, upper tube terete, orangish yellow inside, 30-40 x 12-13,5 mm; lobes obliquely ovate, erect to suberect, 20-23 x 12-15 mm. Anthers 7-8 mm long. Ovary glabrous, 1-1,5 mm long, nectary disk 5-lobed; style 10-12 mm long; style head 2 mm long Follicles terete, erect, glabrous, 70-165 x 4-6,5 mm. Seeds unknown.

Selected materials: BRAZIL. **Minas Gerais.** Minduri, 17-II-2000 (fl./fr.), *L. S. Kinoshita et al. 2000/46* (UEC). Nazareno, Mangue, 3-XII-1992 (fl.), *D. A. Carvalho et al. s.n.* (ESAL 13643). **São Paulo.** Agudos, 30-VII-1993 (fr.), I. *Koch & O. Cavassan 130* (UEC).

Observations: a ubiquitous plant occurring exclusively in inundated grasslands from cental-western to southern Brazil, reaching Paraguay. Collected in flower from December to February and and bearing fruits in February.

This species is very similar to *M. pohliana*, and these 2 species are often confused. Nevertheless, *M. widgrenii* is distinguished by its whorled linear leaves.

9. Mesechites Müll. Arg., in Mart., Fl. bras. 6(1): 150. 1860.

Vines, latex white. Leaves opposite, with 1-4 colleters clustered adaxially at base. Inflorescence bostrycoid, axillary. Flowers actinomorphic, white to yellow. Calyx with alternate or continuous colleters. Corolla salverform. Stamens included; anthers base truncate. Ovary apocarpous, bearing a 5-lobed nectary disk; style head umbraculiform-oblong, with five lateral projections at the base. Follicles 2, terete.

Neotropical genus with ca. 10 species; locally represented by *M. mansoana*.

References: Woodson (1933), Ezcurra et al. (1992), Koch & Kinoshita (1999).

24. Mesechites mansoana (A.DC.) Woodson, Ann. Missouri Bot. Gard. 20(4): 636-637. 1933. *Echites mansoana* A. DC., Prodr. 8: 448. 1844. (Fig. 12 M-Q).

Iconography: Ezcurra et al., in Fl. Paraguay 17: 73, fig. 28. 1992.; Koch & Kinoshita, Acta Bot. Brasil. 13(1): 80, figs. 48-50. 1999.

Branches twining, glabrous to puberulous, with interpetiolar colleters. Petiole 8-13mm long. Leaves glabrous, with 1-3 colleters; blade elliptic to ovate-elliptic, 6,8-8,3 x 4,1-4,6 cm., subcoriaceous, apex acute or acuminate, base acute to rounded, margin straight. Venation brochidodromous. Inflorescence 20-30 flowered. Flowers white, greenish white or yellow, 20-29 mm long. Calyx lobes oblong-ovate to ovate, 4 x 2-3 mm, with many continuous colleters. Corolla glabrous, with a noteworthy narrowing at the point of stamen insertion, lower tube slightly urceolate, 9-12 x 2-3 mm, upper tube terete, 7-9 x 3,5-4 mm; lobes obliquely ovate, spreading, 4-5 x 5 mm. Anthers oblong, glabrous, 4,5-5 mm long. Ovary glabrous, 2 mm long; style 10-12 mm long; style head 2 mm long. Follicles pendulous, subparallel, 220-300 x 2-3 mm. Seeds oblong, rostrate, 5-7 x 1 mm.

Selected materials: BRAZIL. **Minas Gerais.** Lavras, 9-XII-1980 (fl.), *H. F. Leitão Filho et al. 11767* (UEC). **São Paulo.** Avaí, IX-1993 (fr.), I. *Koch & O. Cavassan 135* (UEC). Pedregulho, III-1994 (fl.), *W. Marcondes-Ferreira et al. 813* (UEC). Santo Antônio da Posse, II-1976 (fl.), *G. J. Shepherd & P. E. Gibbs 11274* (UEC).

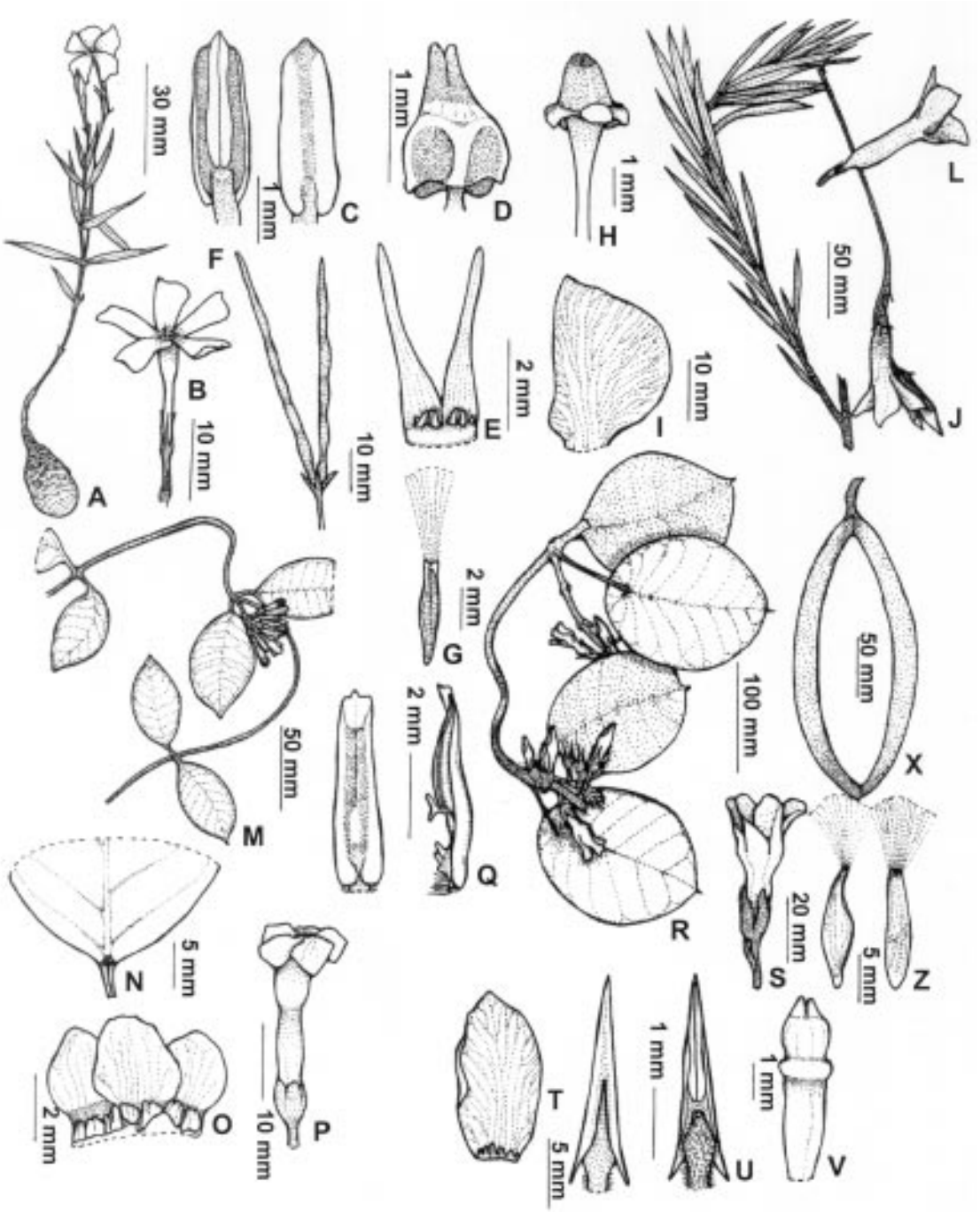

Fig. 12- A-G: *Mandevilla tenuifolia* (J.C. Mikan) Woodson. A: flowering branch; B: flower; C: anther in ventral and dorsal view; D: style head; E: adaxial surface of calyx lobes with continuous colleters at base; F: fruit; G: seed. H-L: *Mandevilla widgrenii* Ezcurra. H: style head; I: corolla lobe, adaxial surface; J: flowering branch; L: flower. M-Q: *Mesechites mansoana* (A. DC.) Woodson. M: flowering branch; N: adaxial surface of leaf blade with colleters at base; O: adaxial surface of calyx lobes with continuous colleters at base; P: flower; Q: anther in dorsal and ventral view. R-Z: *Peltastes peltatus* (Vell.) Woodson. R: flowering branch; S: flower; T: adaxial surface of calyx lobe with opposite colleters at base; U: anther in dorsal and ventral view; V: style head; X: fruit; Z: seed in lateral and dorsal view. A-E, *Simões et al. 462*; F-G, *Simões et al. 586*; H-I, *Simões et al. 951*; J-L, *D. A. Carvalho et al. s.n.*, ESAL 13643; M-Q, *H.F. Leitão Filho et al. 11767*; R-V, *Simões et al. 946*; X-Z, *Simões et al. 1040*.

Observations: occurring in southeastern Brazil, reaching Bolivia and Paraguay, as rupicolous, but also as "cerrado" or open-area (grasslands) plants. According to Koch & Kinoshita (1999), flowering takes place from October to March and fruiting from March to September. This species was locally recorded in bloom in December, but neither fruits nor seeds were found.

A characteristic species because of its coriaceous leaves with evident colleters and cymose inflorescences.

10. Peltastes Woodson, Ann. Missouri Bot. Gard. 19(4): 375. 1932.

Vines, latex colorless. Leaves opposite, peltate. Inflorescence bostrycoid, axillary, few to many-flowered. Flowers actinomorphic, greenish to yellowish green. Calyx with opposite or continuous colleters. Corolla infundibuliform. Stamens included; anthers base sagittate. Ovary apocarpous, bearing a 5-lobed nectary disk; style head fusiform, with a basal collar. Follicles 2, terete to falcate.

Neotropical genus, with 5 species, 1 of them represented in the study area: *P. peltatus*.

References: Woodson (1936), Ezcurra et al. (1992), Koch & Kinoshita (1999).

25. Peltastes peltatus (Vell.) Woodson, Ann. Missouri Bot. Gard. 19(4): 376. 1932. *Echites peltata* Vell., Fl. Flum.: 110. 1829. (Fig. 12 R-Z).

Iconography: Müller Argoviensis in Mart., Fl. bras. 6(1): pl. 53. 1860.; Woodson, Ann. Missouri Bot. Gard. 23: 432, pl. 4. 1936.; Markgraf in Fl. Il. Catarinense, Apocináceas: 80, est. 21. 1968.; Ezcurra, Darwiniana 23: 412, fig. 12. 1981.; Ezcurra et al., in Fl. Paraguay 17: 77, fig. 30. 1992.; Koch & Kinoshita, Acta Bot. Brasil. 13(1): 80, figs. 53-54. 1999.

Branches twining, glabrous to ferruginous-pubescent, with colleters both intrapetiolar and interpetiolar. Petiole 3,6-6,2 cm long. Leaves glabrous to ferruginous-pubescente; blade orbicular, widely ovate or ovate, 11,2-19,8 x 6,8-13,5 cm, apex acuminate, base rounded, margin straight. Venation brochidodromous. Inflorescence 2-8 flowered; bracts foliaceous, oblong or oblong-ovate, 9-12 x 2,5-3 mm. Flowers greenish, 43-64 mm long. Calyx lobes foliaceous, oblong or oblong-ovate, 14-22 x 3,5-9 mm, with 5 deeply fimbriate opposite colleters,. Corolla glabrous, lower tube slightly gibbous, 17-22 x 8-10 mm, upper tube campanulate-cylindric, 9-18 x 14-15 mm; lobes obliquely ovate, erect to suberect, 17-26 x 8-12 mm. Anthers oblong-linear, glabrous or abaxially pilose, 9-11 mm long. Ovary glabrous or ferruginous-tomentose, 2,5-3 mm long; style 11-21 mm long; style head 2 mm long. Follicles falcate, parallel to subparallel, free or united at the apex, 230-250 x 10-13 mm. Seeds oblong-ovate, shortly rostrate, sparsely pilose, 13-14 x 3-4 mm.

Selected materials: BRAZIL. **Minas Gerais.** Carrancas**,** caminho para a Serra de Carrancas, 07-XI-1999 (fl.), *A. O. Simões et al. 1000* (UEC). Itutinga, estrada Lavras-São João del Rey, 04-XI-1999 (fl.), *A. O. Simões et al. 946* (UEC). Minduri, estrada Carrancas-Minduri, 08-XI-1999 (fl.), *A. O. Simões et al. 1006* (UEC). **São Paulo.** Cananéia**,** Ilha do Cardoso**,** 3-XII-1985 (fl.), *J. Y. Tamashiro & H.F. Leitão Filho 17970* (UEC). Ubatuba, Picinguaba, 29-X-1999 (fl.), *A. O. Simões & R.B. Singer 939* (UEC).

Observations: occurring in forests of south and southeastern Brazil. Regionally found as a forest plant, in shadowy, humid, (often near water sources) environments. According to Koch & Kinoshita (1999), flowering takes place from October to December and fruiting happens from July to November. This species was locally collected with flowers in November, but fruits were not observed.

A characteristic species because of its orbicular peltate leaves. This is a polymorphic species with respect to size of flower parts and indument of anther and ovary.

11. Prestonia R. Br., Asclepiadeae: 58. 1810, nom. cons.

Vines. Leaves opposite, with intrapetiolar colleters. Inflorescence bostrycoid, axillary. Flowers actinomorphic, yellow or greenish yellow. Calyx with 5 opposite colleters, 1 at the base of each lobe. Corolla salverform, with a ring on the throat. Stamens included, anthers base sagittate, sometimes with epistaminal appendages. Ovary apocarpous, nectary disk 5-lobed; style head oblong with a basal collar. Follicles 2, terete to moniliform, separated or united at base, divergent or parallel.

Neotropical genus with about 60 species, 2 of which are locally represented.

References: Woodson (1936), Ezcurra et al. (1992), Koch & Kinoshita (1999).

Key to the species of Prestonia

1. Branches and leaves glabrous or pubescent. Leaf blade elliptic to oblong-elliptic. Flowers 14-23 mm long; corolla glabrous, with an inconspicuous ring on the throat. Anthers included; epistaminal appendages absent ..... 26. *P. coalita*

1. Branches and leaves densely ferruginous-tomentose. Leaf blade ovate to ovate-elliptic. Flowers 26-28 mm long; corolla hirsute-tomentose, with a conspicuous ring on the throat. Anthers partially exserted; epistaminal appendages present..... 27. *P. tomentosa*

26. Prestonia coalita (Vell.) Woodson, Ann. Missouri Bot. Gard. 18(4): 552. 1931. *Echites coalita* Vell., Fl. Flum.: 112. 1829. (Fig. 13 A-H).

Iconography: Müller Argoviensis in Mart., Fl. bras. 6(1): pl. 50. 1860.; Markgraf in Fl. Il. Catarinense, Apocináceas: 86, est. 23(2). 1968.; Ezcurra et al., in Fl. Paraguay 17: 85, fig. 34. 1992.; Koch & Kinoshita, Acta Bot. Brasil. 13(1): 80, figs. 55-57. 1999.

Vine, latex colorless. Branches twining, glabrous to pubescent. Petiole 3-13 mm long. Leaf glabrous to pubescent; blade elliptic to oblong-elliptic, 5,3-12,4 x 1,5-4,9 cm, apex acuminate, base attenuate to obtuse, margin straight. Venation brochidodromous. Inflorescence umbelliform, 10-15 flowered, glabrous. Flowers yellow or greenish yellow, 14-23 mm long. Calyx with lobes oblong-lanceolate, glabrous, 3-5,5 x 1-1,6 mm. Corolla glabrous, tube slightly expanded at base, 10-17 x 2-4 mm, with an inconspicuous ring on the throat; lobes obliquely ovate, spreading, 4-6 x 3-4 mm. Anthers included, oblong-linear, 4 mm long. Ovary glabrous, 1 mm long; style 7-8 mm long; style head 1-1,2 mm long. Follicles torose, pendulous, glabrous, 250-430 x 2-4 mm. Seeds oblong, rostrate, 8-1 x 1-1,5 mm.

Selected materials: BRAZIL. **Minas Gerais.** Carrancas, Serra do Moleque, 3-XII-1998 (fl.), *A. O. Simões et al. 634* (UEC). Itutinga, estrada Itutinga-Carrancas, 15-III-1999 (fl.), *A. O. Simões et al. 765* (UEC).

Observations: this is a widely distributed species in Brazilian forest formations. During our studies, we found this species in forest and "capoeiras", especially at the borders. Collected with flowers from December to March and bearing fruits in January-February.

A characteristic species because of the flower's inconspicuous fleshy ring on the throat and elongate, narrow fruits, often reaching more than 30 cm in length.

27. Prestonia tomentosa R. Br., Mem. Wern. Nat. Hist. Soc. 1:70.1811. (Fig. 13 I-Q).

Iconography: Ezcurra, Darwiniana 23: 402, figs. 8A-E. 1981.; Ezcurra et al., in Fl. Paraguay 17: 91, fig. 37. 1992.

Vine, latex colorless. Branches twining, densely ferruginous-tomentose. Petiole 4-8 mm long. Leaf adaxially pubescent to tomentose, abaxially densely ferruginous-tomentose; blade ovate to elliptic-ovate, 10,1-13,8 x 3,8-7,5 cm, apex acuminate, base obtuse to rounded, margin straight. Venation brochidodromous. Inflorescence umbelliform, 7-13 flowered, ferruginous-tomentose. Flowers yellow, 26-28 mm long. Calyx lobes foliaceous, ovate to ovate-oblong, tomentose, 12-14 x 4-5,5 mm. Corolla hirsute-tomentose, tube terete, 15-17 x 5,5-6 mm, with a white, conspicuous ring on the throat; lobes obliquely orbicular, spreading, 10 mm long. Anthers partially exserted, oblong-linear, 5-6 mm long; epistaminal appendages 5, opposite the anthers, partially exserted, 2,5-3,5 mm long. Ovary glabrous, 1,5 mm long; style. 20 mm long; style head 2 mm long. Follicles napiform, divergent, ferruginous-tomentose, 55-87 x 13-18 mm. Seeds oblong-ovate to oblong-elliptic, longely rostrate, 16-19 x 3,5-5 mm.

Selected materials: BRAZIL. **Minas Gerais.** Carrancas, estrada Itutinga-Carrancas, II-2000 (fl.), *L. S. Kinoshita et al. 2000/11* (UEC). **São Paulo.** Campinas, Fazenda Santa Genebra, 25-V-1996 (fr.), *M. T. Grombone-Guarantini et al. 07* (UEC).

Observations: occurring from Colombia, Venezuela, Bolivia, northeastern of Argentina and Paraguay. In Brazil, this is a widely distributed species, occurring in Amazonia, Minas Gerais, Mato Grosso, Mato Grosso do Sul, Rio de Janeiro and São Paulo State. According to Ezcurra et al. (1992), this species flowers from November to March and fructifies from March to August. It was regionally found with flowers in February, but fruits were not seen.

This species can easily be distinguished from *P. coalita* due to the ferruginous indument of its branches and leaves, and by its larger flowers displaying a conspicuous ring on the throat and because of its epistaminal appendages.

12. Rhabdadenia Müll.Arg., in Mart., Fl. bras. 6(1): 173. 1860.

Vines or erect shrubs, latex white. Leaves opposite. Inflorescence reduced to a 2-flowered dichasium, more rarely 1-flowered, terminal or axillary. Flowers actinomorphic, white or pinkish. Calyx without colleters. Corolla infundibuliform. Stamens included; anthers base truncate to sagittate. Ovary apocarpous, bearing a 5-lobed nectary disk; style head conical, expanded at base. Follicles 2, terete.

Neotropical genus, with 4 species, locally represented by *R. pohlii*.

References: Woodson (1936), Ezcurra (1981), Ezcurra et al. (1992).

28. Rhabdadenia pohlii Müll.Arg., in Mart., Fl. bras. 6(1): 174. 1860. (Fig. 13 R-X).

Iconography: Müller Argoviensis in Mart., Fl. bras. 6(1): pl. 52. 1860.; Markgraf in Fl. Il. Catarinense, Apocináceas: 74, est. 19. 1968.; Ezcurra, Darwiniana 23: 395, fig. 6G. 1981.; Ezcurra et al., in Fl. Paraguay 17: 100, fig. 41. 1992.

Erect subshurb, 15-30 cm high. Stem erect, twining or prostrate, glabrous, with interpetiolar colleters. Petiole 1,6-3,7 cm long. Leaves glabrous; blade lanceolate, narrowly ovate or oblong-ovate, 7-8,1 x 0,85-0,9 cm, apex acute, base cordate, margin straight. Venation brochidodromous. Flowers pinkish, 70-80 mm long. Calyx lobes oblong-lanceolate, 6-7 x 1,5-2 mm. Corolla glabrous, lower tube terete, purple, 12-14 x 2 mm, upper tube terete, pinkish with a purplish base outside, purple inside, 31-38 x 9-19 mm; lobes obliquely ovate, spreading, 20-23 x 15-17 mm. Anthers oblong, pilose abaxially, base truncate to slightly cordate, 6-7 mm long. Ovary glabrous, 8-10 mm long; style 12-14 mm long; style head pilose apically, 2-2,5 mm long. Follicles erect, divergent, 82-90 x 3-4 mm. Seeds linear, longely rostrate, 1,7-2 x 2 mm.

Selected materials: BRAZIL. **Minas Gerais.** Lavras**,** Sítio Três Barras, 25-II-1984 (fl./fr.), *M. L. Gavilanes 1218* (ESAL). Minduri, idem, 17-II-2000 (fl./fr.), *L. S. Kinoshita et al. 2000/45* (UEC).

Observations: occurs in Brasil, Colombia, Argentina and Venezuela. Locally, it was only found in inundated grasslands, in the same habitat as *Mandevilla widgrenii*. This species was collected with flowers in November and February and fruits in February.

A characteristic species because of its 2-flowered inflorescence and lack of calyx colleters.

13. Rhodocalyx Müll.Arg., in Mart., Fl. bras. 6(1): 172. 1860.

Erect subshrub, latex colorless. Stem with interpetiolar colleters. Leaves opposite. Inflorescence cymose, terminal, with foliaceous bracts. Flowers actinomorphic, purplish. Calyx with alternate colleters. Corolla salverform, with a yellow ring on the throat. Stamens included; anthers base sagittate. Ovary apocarpous, bearing a 5-lobed nectary disk; style head oblong with a basal collar. Follicles 2, terete to falciform.

Monotypic genus, widely distributed in Brazil, mainly in Cerrado formations. This genus reaches Northeastern Paraguay.

References: Woodson (1936); Ezcurra et al. (1992); Stranghetti & Kinoshita (1996).

29. Rhodocalyx rotundifolius Müll.Arg., in Mart., Fl. Bras. 6(1): 173. 1860. (Fig. 14 A-G).

Prestonia erecta (Malme) J.F. Morales, Novon 9(1): 90. 1999.

Iconography: Müller Argoviensis in Mart., Fl. bras. 6(1): pl. 32. 1860.; Ezcurra et al., in Fl. Paraguay 17: 104, fig. 43. 1992.; Koch & Kinoshita, Acta Bot. Brasil. 13(1): 82, figs. 61-62. 1999.

Erect subshrub, 15-50 cm high, with xylopod. Stem glabrous to tomentose. Petiole 2-6mm long. Leaves pilose to tomentose; blade orbicular, widely elliptic or elliptic, 4-10,7 x 3,6-10 cm, apex acuminate or mucronate, base attenuate, margin straight. Venation brochidodromous. Inflorescence erect, 6-15 flowered; bracts ovate-oblong, purplish, showy, 10-20 x 3-6 mm. Flowers 20-25 mm long. Calyx lobes foliaceous, ovate-oblong, purplish, 13-25 x 5-12 mm. Corolla glabrous, tube 15-19 x 3 mm; lobes obliquely ovate, spreading, 10-15 x 10-12 mm. Anthers oblong-linear, 5-6 mm long. Ovary 1,5-2

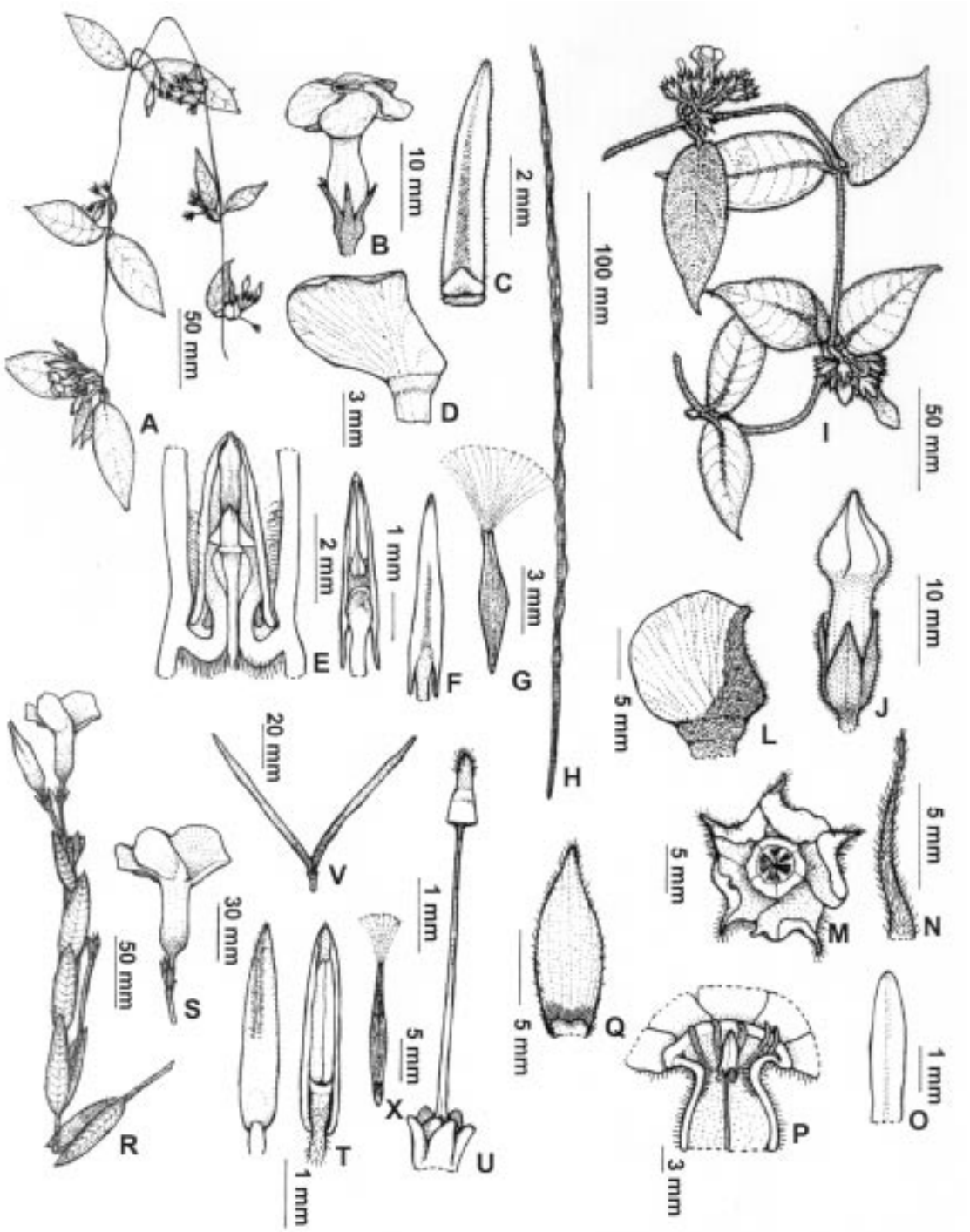

Fig. 13- A-H: *Prestonia coalita* (Vell.) Woodson. A: flowering branch; B: flower; C: adaxial surface of calyx lobe with one opposite colleter at base; D: corolla lobe, adaxial surface; E: longitudinal section of the upper part of flower, showing gynostegium; F: anther in ventral and dorsal view; G: seed; H: fruit. I-Q: *Prestonia tomentosa* R. Br. I: flowering branch; J: flower bud; L: corolla lobe, abaxial surface; M: flower in frontal view; N: bract; O: epistaminal appendage; P: longitudinal section of upper part of flower, showing stamens and epistaminal appendages; Q: adaxial surface of one calyx lobe with one opposite colleter at base. R-X: *Rhabdadenia pohlii* Müll.Arg. R: flowering branch; S: flower; T: anther in dorsal and ventral view; U: gynoecium; V: fruit; X: seed. A-F, *Simões et al. 123*; G-H, *Simões & Singer 179* ; I-Q, *Kinoshita et al. 2000/11*; R-U, *Simões et al. 950*; V-X, *Kinoshita et al. 2000/45*.

mm long; style 10 mm long; style head 2 mm long. Follicles erect, divergent, minutely pilose, 45-160 x 5-9 mm. Seeds oblong, not rostrate, 5-6 x 1,5-1,8 mm.

Selected materials: BRAZIL. **Minas Gerais.** Carrancas, Vargem Grande, 17-II-2000 (fl./fr.), *L. S. Kinoshita et al. 2000/66* (UEC). Itumirim, 12-X-1985 (fl.), *G. B. Souza s.n.* (ESAL). Lavras, 05-X-1999 (fl.), *A. O. Simões et al. 931* (UEC).

Observations: this species is widely distributed in Brazil, reaching Bolivia and northeastern Paraguay. Locally found as rupicolous but also in grassy environments. Collected with flowers from October to February and bearing fruits in January-February. Flowering concentrates in October.

This species is characteristic because of its fleshy yellow ring on the throat and its foliaceous, wine-coloured calyx lobes and bracts. Stranghetti & Kinoshita (1996), in a comparative morphological study including *Rhodocalyx* and four species of *Mandevilla* and *Prestonia* (*M. emarginata*, *M. pentlandiana*, *P. riedelii* and *P. tomentosa*), concluded that *Rhodocalyx* must be conserved as a monotypic genus. To justify this conclusion, they highlighted a set of dyagnostic floral and vegetative features clearly separating these genera. Morales (1999) considered *Rhodocalyx* as a synonym of *Prestonia*, proposing the combination *Prestonia erecta* to include *R. rotundifolius*. To justify his proposal, this author argued that the characters used by Stranghetti & Kinoshita (1996) to separate *Rhodocalyx* and *Prestonia* are inconsistent, with a clear overlapp of character states. We herein prefer to accept the criteria of Stranghetti & Kinoshita (1996), thus maintaining *Rhodocalyx* as a monotypic genus. Our decision is based in that we were able to observe all the characters pointed out by Stranghetti & Kinoshita (1996). By addressing these characters, we could easily distinguish *R. rotundifolius* from the two *Prestonia* spp. found in the study area (*P. coalita* and *P. tomentosa).*

14. Secondatia A. DC., Prodr. 8: 455. 1844.

Woody vines, latex white. Leaves opposite. Inflorescence cymose, terminal. Flowers actinomorphic, white. Calyx with 5 alternate colleters. Corolla salverform. Stamens included; anthers base sagittate. Ovary apocarpous, bearing a 5-lobed nectary disk; style head fusiform, slightly enlarged at base. Follicles 2, fusiform.

A neotropical genus, with ca. 7 species; locally represented by *S. densiflora*.

References: Woodson (1935b), Ezcurra et al. (1992), Koch & Kinoshita (1999).

30. Secondatia densiflora A. DC., Prodr. 8: 445. 1844. (Fig. 14 H-N).

Iconography: Müller Argoviensis in Mart., Fl. bras. 6(1): pl. 32. 1860.; Ezcurra et al., in Fl. Paraguay 17: 107, fig. 44. 1992.; Koch & Kinoshita, Acta Bot. Brasil. 13(1): 82, figs. 63-65. 1999.

Branches twining or scandent, glabrous, with only interpetiolar or also intrapetiolar colleters. Petiole 7-10mm long. Leaves glabrous; blade ovate or ovate-elliptic, 8-8,6 x 3,8-4 cm, membranaceous, apex cuspidate, base cuneate, margin straight, glabrous. Venation brochidodromous. Inflorescence corymbose, smaller than the subtending leaves, 10-15 flowered. Flowers 9-10 mm long. Calyx lobes ovate, 1,5-2 x 1 mm. Corolla glabrous, tube 5-7 mm long; lobes obliquely ovate-triangular, spreading, 3,6-4 x 3-3,5 mm. Anthers oblong-linear, abaxially pilose, 4 mm long. Ovary glabrous, 0,75-1 mm long; style head subsessile, 1,5-1,7 mm long. Follicles woody, pendulous, 120-132 x 20-25 mm. Seeds oblong-elliptic, shortly rostrate, 21-22 x 4-5 mm.

Selected materials: BRAZIL. **Minas Gerais.** São Vicente de Minas, 16-IV-1993 (fl.), *A. A. Fraga s.n.* (ESAL 2334). **São Paulo.** Bauru, 28-VIII-1993 (fr.), I. *Koch & A. R. S. Jesus 134* (UEC). São José do Rio Preto, 9-V-1996 (fr.), *A. A. Rezende 447* (UEC).

Observations: this species is widely distributed in South America. Regionally, it occurs as a forest plant. According to Koch & Kinoshita (1999), this species flowers mainly from September to November and fructifies mainly in September. Regionally it is reported as flowering in April.

This species is characteristic because of its vigorous, shrub-like habit, and because of its flowers in terminal inflorescences.

15. Temnadenia Miers, Apocyn. S. Am.: 207. 1878.

Vines, latex colorless. Leaves opposite. Inflorescence bostrycoid, axillary. Flowers actinomorphic, greenish to purplish or yellow. Calyx with opposite colleters. Corolla infundibuliform. Stamens included; anthers base sagittate. Ovary

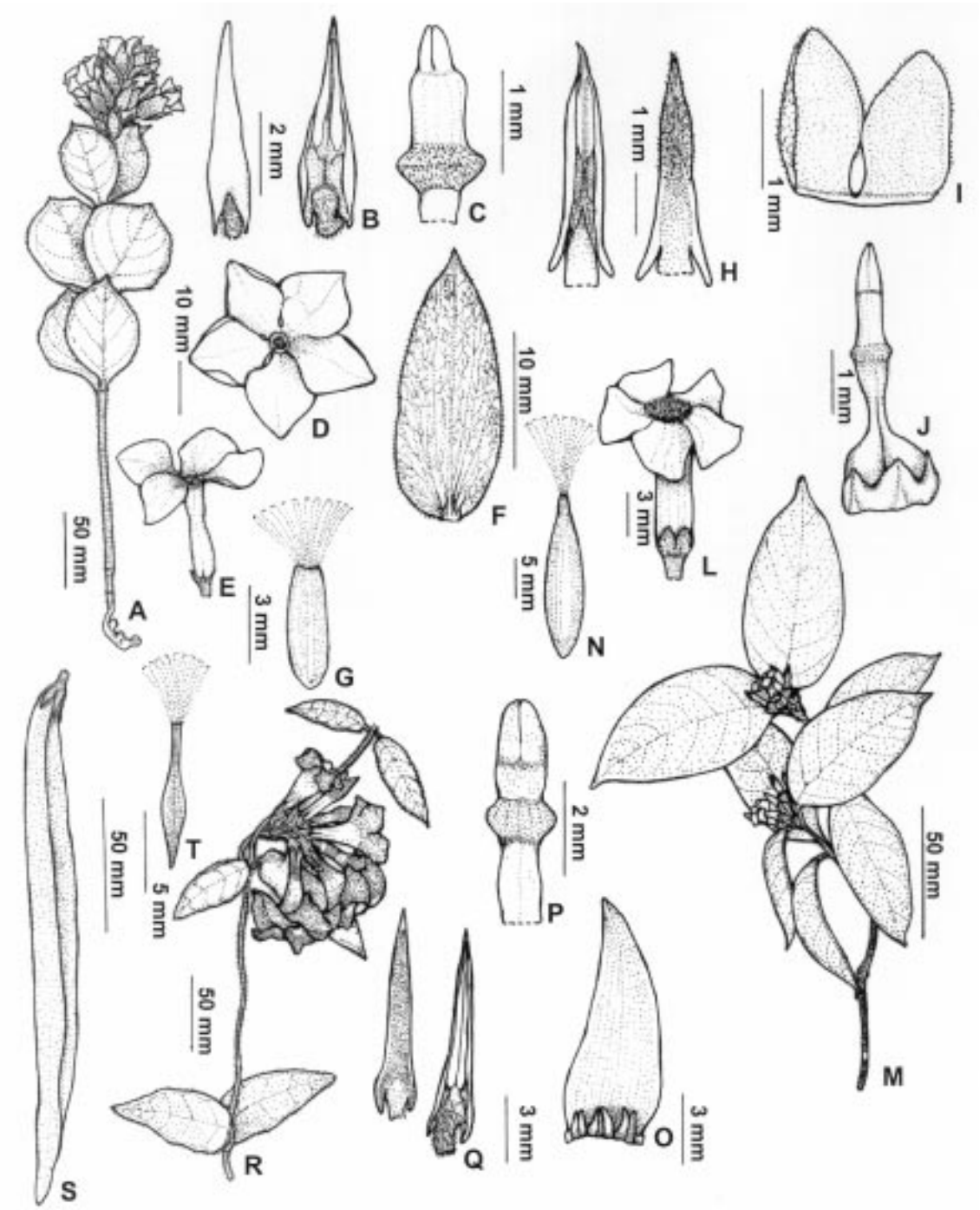

Fig. 14- A-G: *Rhodocalyx rotundifolius* Müll.Arg. A: flowering branch; B: anther in dorsal and ventral view; C: style head; D: flower in frontal view; E: flower in lateral view, with one of the corolla lobes removed; F: adaxial surface of calyx lobe; G: seed. H-N: *Secondatia densiflora* A. DC. H: anther in ventral and dorsal view; I: adaxial surface of two calyx lobes with one alternate colleter at base; J: gynoecium; L: flower; M: flowering branch; N: seed. O-T: *Temnadenia violacea* (Vell.) Miers. O: adaxial surface of calyx lobes with opposite colleters at base; P: style head; Q: anther in dorsal and ventral view; R: flowering branch; S: fruit; T: seed. A-F, *Kinoshita et al. 98/391*; G, *Kinoshita et al. 2000/66*; H-M, *A. A. Fraga s.n., ESAL 2334*; N, *Koch & Cavassan 134*; O-R, *Simões et al. 694*; S-T, *Simões et al. 109.*

apocarpous, bearing a 5-lobed nectary disk; style head fusiform with a basal collar. Follicles 2, terete, geminate.

A south American genus with 4 species, 3 of them endemic in Brazil. Locally represented by *T. violacea*.

References: Woodson (1936); Koch & Kinoshita (1999).

31. Temnadenia violacea (Vell.) Miers, Apocyn. S. Amer.: 208. 1878. *Echites violacea* Vell., Fl. Flum.: 110. 1829. (Fig. 14 O-T).

Iconography: Müller Argoviensis in Mart., Fl. bras. 6(1): pl. 50. 1860.; Koch & Kinoshita, Acta Bot. Brasil. 13(1): 82, figs. 66-67. 1999.

Branches twining, puberulent to pubescent, with only interpetiolar or also intrapetiolar colleters. Petiole 2-7 mm long. Leaves puberulent; blade elliptic to ovate, 6,4-11 x 3-6,4 cm, apex acuminate or mucronate, base rounded, oblique or slightly cordate, margin straight. Venation brochidodromous. Inflorescence 7-15 flowered. Flowers greenish purple, 45-60 mm long. Calyx lobes ovate-lanceolate, 7-12 x 3-4,5 mm, with 5 deeply fimbriate, opposite colleters. Corolla glabrous, lower tube terete, 8-19 x 3-6 mm, upper tube infundibuliform, 14-23 x 10-17 mm; lobes obliquely ovate, suberect to spreading, vinaceous, 30-35 x 27-30 mm. Anthers oblong, pilose abaxially, 10 mm long. Ovary glabrous, 3,5-4 mm long, style 40-50 mm long; style head 3-3,2 mm long. Follicles pendulous, 135-230 x 4-8 mm. Seeds oblong-elliptic, long-rostrate, 12-13 x 1,5-2 mm.

Selected materials: BRAZIL. **Minas Gerais.** Carrancas, fazenda Grão-Mogol, 24-I-1999 (fl.), *A. O. Simões & K. Matsumoto 694* (UEC). Lavras, 9-XII-1980 (fl.), *H. F. Leitão Filho et al. 11736* (UEC). Minduri, estrada Carrancas-Minduri, 3-XII-1998 (fl.), *A. O. Simões et al. 616*.

Observations: occurring in Brazil in Ceará, Minas Gerais, Rio de Janeiro, São Paulo and Paraná State, mainly in "cerrado" or grassy environments. Regionally, this species occurs as rupicolous or forest plant. Collected with flowers from October to February and bearing fruits in January. Flowering concentrated in January.

ACKNOWLEDGMENTS

This contribution is part of first authors´s M. Sc. Thesis at Unicamp University, made possible through a FAPESP grant which is greatly acknowledged. The authors want to thank the curators of the herbaria UEC, ESAL, BHCB, BHMH, HXBH, SP and SPF for sending necessary herbaria loans. Mary Endress is thanked for signifficant suggestions and english improvements. Rodrigo B. Singer is thanked for suggestions, inking the original drawings, translating the first version of the manuscript and field assistance. The colleagues Alexandre W. Jannini, Kazue Matsumoto, Samantha Koehler and Aparecida D. Faria are thanked for assistance in many ways.

LITERATURE CITED

Azambuja, D. 1947. Contribuição ao conhecimento das Apocynaceae encontradas no Brasil. *Arq. Serv. Florest.* 3: 9-112.

Barroso, G. M., Peixoto, A. L., Costa, C. G., Ichaso, C. L. F., Guimarães, E. F. & Lima, H. C. 1991. *Sistemática de Angiospermas do Brasil*. Vol. 3. Universidade Federal de Viçosa, Imprensa Universitária.

——, Morim, M. P., Peixoto, A. L. & Ichaso, C. L. F. 1999. *Frutos e Sementes: Morfologia Aplicada à Sistemática de Dicotiledôneas.* Universidade Federal de Viçosa, Editora UFV.

Bragatto-Vasconcellos, M. & Kinoshita-Gouvêa, L. S., 1994. As Apocynaceae da região de Poços de Caldas, MG. *Acta Bot. Brasil*. 7: 107-127.

Cronquist, 1981. *An integrated system of classification of flowering plants.* Columbia Univ. Press, New York.

Endress, M.E. & Bruyns, P. V. 2000. A revised classification of the Apocynaceae *s.l. Bot. Rev. (Lancaster)* 66: 1-56.

——, Sennblad, B., Nilsson, S., Civeyrel, L., Chase, M. W., Huysmans, S., Graftröm, E. & Bremer, B. 1996. A phylogenetic analysis of Apocynaceae *s. str.* and some related taxa in Gentianales: a multidisciplinary approach. *Opera Bot. Belg.* 7: 59-102.

EPAMIG, UNENET & UFV 1982. *Atlas climatológico do Estado de Minas Gerais.* Belo Horizonte.

Ezcurra, C. 1981. Revision de les Apocináceas de la Argentina. *Darwiniana* 23: 367-474.

——. 1999. Apocynaceae, in F. Zuloaga & O. Morrone (eds.), Catálogo de las Plantas Vasculares de la Republica Argentina II. *Monogr. Syst. Bot. Missouri Bot. Gard.* 74: 64-73.

——, Endress, M. E. & Leeuwenberg, A. J. M. 1992. Apocynaceae, in R. Spichiger & L. Ramella (eds.), *Flora del Paraguay* 17: 7-121.

Fallen, M. E. 1983. A taxonomic revision of *Condylocarpon* (Apocynaceae). *Ann. Missouri Bot. Gard.* 70: 149-169.

——. 1986. Floral structure in the Apocynaceae: Morphological, functional and evolutionary aspects. *Bot. Jahrb. Syst.* 106: 245-286.

Hansen, B. F. 1985. *A monografic revision of Forsteronia*. PhD Thesis, Dept. of Biology, University of South Florida.

Henrickson, J. 1996. Studies in *Macrosiphonia* (Apocynaceae): Generic recognition of *Telosiphonia*. *Aliso* 14(3): 179-195.

Hickey, L. J. 1973. Classification of the architecture of dicotyledonous leaves. *Amer. J. Bot*. 60: 17-33.

Holmgren, P.K., Holmgren, N.H. & Barnett, L.C. 1990. *Index Herbariorum*. Part. I: The Herbaria of the World. New York Botanical Garden. New York.

Judd, W. S., Sanders, R. W. & Donoghue, M. J. 1994. Angiosperm family pairs: preliminary phylogenetic analysis. *Harvard Pap. Bot*. 5: 1-51.

——, Campbell, C. S., Kellogg, E. A. & Stevens, P. F. 1999. *Plant Systematics: A Phylogenetic Approach.* Sunderland, Massachusetts, U.S.A. Sinauer Associates, Inc.

Kinoshita-Gouvêa, L. S. & Baldassari, I. B. 1987. Flora fanerogâmica do Parque Estadual das Fontes do Ipiranga, São Paulo- Apocynaceae. *Hoehnea* 14: 89-94.

Koch, I. & Kinoshita, L. S. 1999. As Apocynaceae s. str. da região de Bauru, São Paulo, Brasil. *Acta Bot. Brasil*. 13(1): 61-86.

Leeuwenberg, A. J. M. 1994. A revision of *Tabernaemontana.* V. 2. The new world species and *Stemnadenia*. *Series of revision of Apocynaceae: XXXVI.* Royal Botanic Gardens, Kew.

Marcondes-Ferreira, W. 1988. *Aspidosperma Mart. nom. cons. (Apocynaceae): estudos taxonômicos.* Tese de Doutorado, Universidade Estadual de Campinas, Campinas.

Markgraf, F. 1968. Apocináceas, fasc. Apoc: 3-112. in R. Reitz (ed.), *Fl. Il. Catarinense.* Itajaí.

Monachino, J. 1945. A Revision of *Hancornia* (Apocynaceae). *Lilloa* 11: 19- 48.

Morales, J. F. 1998. A synopsis of the genus *Mandevilla* (Apocynaceae) in Mexico and Central America. *Brittonia* 50: 214-232.

——. 1999. *Rhodocalyx* (Apocynaceae), a new synonym of *Prestonia*. *Novon* 9: 89-91.

Moreira, A. A. N. & Camelier, C. 1977. *Relevo, in Geografia do Brasil: Região Sudeste* 3: 1-50. IBGE, Rio de Janeiro.

Pichon, M. 1948a. Classification des Apocynacées. V. Cerberöidées. *Notul. Syst. (Paris)* 13: 212-229.

——. 1948b. Classification des Apocynacées. X. Genre Mandevilla. *Bull. Mus. Natl. Hist. Nat., Ser. 2*, 20: 211-216.

——. 1948c. Classification des Apocynacées. XIX. Le rétinacle des Echitoidées. *Bull. Mus. Natl. Hist. Nat., Ser. 2*, 22: 211-216.

Potgieter, K. 1999. Apocynaceae, in P.M. Jørgensen & S. León-Yánez (eds.), *Catalogue of the Vascular Plants of Equador.* Missouri Botanical Garden. St. Louis.

Radford, A. E., Dickison, W. C., Massey, J. R. & Bell, C. R. 1974. *Vascular Plant Systematics.* Harper & Row, Publishers, New York, Evanston, San Francisco, London.

Rao, A. S. 1956. A revision of *Rauvolfia* with particular reference to the American species. *Ann. Missouri Bot. Gard*. 43: 253-354.

Rizzini, C.T. & Mors, W.B. 1976. *Botânica Econômica Brasileira*. EPU e USP, São Paulo.

Sales, M. F. 1993. *Estudos taxonômicos de Mandevilla Lindl. subgênero Mandevilla (Apocynaceae) no Brasil.* Tese de Doutorado, Universidade Estadual de Campinas, Campinas.

——. 1995. Apocynaceae, in B. L. Stannard (ed.), *Flora of the Pico das Almas, Chapada Diamantina, Bahia, Brazil,* p. 128-135. Royal Botanic Gardens, Kew.

Sennblad, B. & Bremer, B. 1996. The familial and subfamilial relationships of *Apocynaceae* and *Asclepiadaceae* evaluated with *rbc*L data. *Pl. Syst. Evol.* 202: 153-175.

Stranghetti, V. & Kinoshita, L. S. 1996. Reavaliação do gênero monotípico *Rhodocalyx* Müll.Arg. (Apocynaceae). *Revista Brasil. Bot.* 19: 133-144.

Struwe, L., Albert, V. A. & Bremer, B. 1994. Cladistics and family level classification of the Gentianales. *Cladistics* 10: 175-206.

Thomas, V. 1991. Structural, functional and phylogenetic aspects of the colleter. *Ann. Bot.* 68: 287-305.

Woodson, R. E. Jr. 1933. Studies in the Apocynaceae. IV. The American genera of Echitoideae. *Ann. Missouri Bot. Gard*. 20: 605-790.

——. 1935a. Observations on the inflorescence of Apocynaceae. *Ann. Missouri Bot. Gard*. 22: 2-49.

——. 1935b. Studies in the Apocynaceae. IV. The American genera of Echitoideae. *Ann. Missouri Bot. Gard*. 22: 153-306.

——. 1936. Studies in the Apocynaceae. IV. The American genera of Echitoideae. *Ann. Missouri Bot. Gard*. 23: 169-548.

——. 1951. Studies in the Apocynaceae VIII. An Interim Revision of the Genus *Aspidosperma* Mart. & Zucc. *Ann. Missouri Bot. Gard.* 38: 119-204.

——, & Moore, J. A. 1938. The vascular anatomy and comparative morphology of Apocynaceae flowers. *Bull. Torrey Bot. Club.* 65: 135-166.

Zarucchi, J. L. 1993. Araceae, in L. Brako & J. L. Zarucchi (eds.), Catalogue of the Flowering Plants and Gymnosperms of Peru. *Monogr. Syst. Bot. Missouri Bot. Gard*. 45: 71-82.

Zarucchi, J., Morillo, G. N., Endress, M. E., Hansen, B. F. & Leeuwenberg, A. J. M. 1995. Apocynaceae, in J.A. Steyemark et al. (eds.), *Flora of the Venezuelan Guayana*, vol. 2: 471-571. Missouri Botanical Garden. St. Louis.

LIST OF EXSICCATAE

Each voucher is cited through first collector´s name and number. In parenthesis the number (following the order of description in the text) attributed to each taxon is given.

Almeida, R.J. s.n. (ESAL) (6); Almeida, P.J. s.n. (ESAL) (6); Alves s.n. (ESAL) (29); Avezum 31 (6).

Barros 579 (18); Batista s.n. (ESAL) (29); Black 1080 (31); Bernacci 1127 (11); Bernardes s.n. (ESAL) (13); Bicudo 1235 (16).

Carvalho s.n. (ESAL 13643) (23); Chiea 497 (18).

D.A.C. s.n. (UEC) (20), s.n. (ESAL, UEC) (22), s.n. (ESAL) (29).

Fraga s.n. (ESAL 2334) (30); Ferreira s.n. (ESAL) (22); Freitas s.n. (ESAL) (13).

Garcia s.n. (ESAL) (29); Gavilanes 3280 (6), 5891 (9), 4743 (22), 1218 (28); Grombone-Guarantini 7 (27).

Harley 19872 (11); Heringer 76 (18), 13011, 14958, 16233 (19), 215, 16585 (21), 123 (22); Hoehne s.n. (SPF 12605) (21).

Kinoshita 2000/32 (1), 98/254, 98/274, 98/432 (5), 98/243, 98/267 (6), 98/601 (10), 98/154, 98/580, 98/622 (12), 98/142 (13), 98/560, 2000/67 (14), 2000/51 (15), 722 (16), 98/331 (17), 98/132, 98/262, 98/323, 98/482, 2000/65 (18), 98/181, 98/324, 2000/41 (20), 98/120, 98/162, 98/189 (22), 2000/46 (23), 2000/10 (26), 2000/11 (27), 2000/45 (28), 98/192, 98/209, 98/391, 2000/66 (29); Koch 865 (8), 57, 188 (9), 130 (23), 135 (24), 134 (30).

Leitão-Filho 112013 (11), 5373 (13), 15307, 15374 (14), 11845 (17), 11754, 11897, 15240, 15392 (18), 11916, 11985 (20), 1183, 11777, 15291 (22), 11767 (24), 11752, 15297 (29), 11736 (31).

Marcondes-Ferreira 813 (24); Mathes 673 (8); Mello Barreto 5294 (13); Morita s.n. (ESAL) (29).

Noffs 5 (8).

Oliveira s.n. (HXBH) (6); Oliveira Filho s.n. (ESAL 14613) (8).

Peixoto 13057 (25); Pereira Neto 164 (21); Pickel 3296 (16).

Rezende 447 (30); Rodrigues 386 (16).

Santos 704 (4); Shepherd 11274 (24); Silva 24604 (11); Simões 594, 775, 844, 861, 865, 875, 1001 (1), 601, 603, 604, 866, 1007 (2), 878, 881, 882, 883, 893 (3), 611, 625, 896 (4), 67, 110, 114, 115, 156, 158, 202, 243, 936, 1005 (5), 59, 60, 76, 103, 136, 233, 631, 639, 649, 699 (6), 251, 527, 692, 718 (7), 1015 (9), 122, 404, 915, 992 (10), 630, 695 (11), 126, 145, 161, 162, 293, 343, 703, 963, 997 (12), 20, 47, 336, 528, 859, 911, 930 (13), 29, 90, 91, 94, 107, 116, 117, 148, 289, 304, 388, 533, 580, 700, 965 (14), 461, 582, 629, 964 (15), 721 (16), 65, 77, 127, 633, 761 (17), 6, 9, 14, 16, 17, 23, 24, 42, 48, 55, 88, 125, 314, 315, 338, 512, 532, 979, 1009 (18), 460 (19), 5, 10, 18, 49, 68, 389, 399, 400, 454, 458, 459, 531, 579, 935, 1008 (20), 1, 72, 360, 417, 462, 583, 650, 855, 870, 902 (22), 951 (23), 939, 946, 1000, 1006, 1040 (25), 81, 84, 112, 123, 138, 140, 143, 146, 149, 179, 634, 681 765 (26), 950 (28), 12, 22, 92, 344, 931 (29), 27, 40, 69, 99, 109, 144, 557, 616, 636, 694 (31); Souza s.n. (ESAL) (29).

Tamashiro 17970 (25).

Van den Berg s.n. (ESAL) (4).

INDEX OF SCIENTIFIC NAMES

INDEX OF COMMON NAMES

Original recibido el 4 de marzo de 2002; aceptado el 27 de septiembre de 2002.