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A TAXONOMIC REVISION OF THE GENERA SEGUIERIA LOEFL. AND GALLESIA CASAR.

by

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Summary

The study of the complete collections of the genera *Seguieria* and *Gallesia* from 19 American and European herbaria has led to the recognition of a largely continuous pattern of variation in each genus. Therefore in *Seguieria* the number of accepted species is drastically reduced, from 16 in the most recent revision (NOWICKE 1968) to only six, of which three are highly polymorphic. Two additional correlated diagnostic characters (structure of the seed coat and indumentum) are introduced, which strongly plead against the sectional division proposed by WALTER (1909).

Furthermore the real identity of the type species, *S. americana* L., which has long been misinterpreted, is eludicated, and the reduction of *S. aculeata* Jacq. to *S. americana* L. by Linnaeus himself is shown to have been erroneous. This brings about nomenclatural changes in the most widespread and most frequent species.

Since *Gallesia* has already been treated as being monotypic by NOWICKE, only a minor change, the reduction of var. *ovata* is made in this genus.

Introduction

Within the Phytolaccaceae the neotropical genera *Seguieria* and *Gallesia* are best characterized by their unique samara fruits. There has never been any doubt about their close relationship, which was already recognized by CASARETTO (1843) when he first described the genus *Gallesia*. Therefore the present revision is concerned with both genera although only *Seguieria* was, as NOWICKE (1968) put it "badly in need of monographic revision". The monotypic *Gallesia* did not present taxonomic problems.

The first comprehensive account of this group, including keys to the species, was that by H. WALTER (1909) in ENGLER, Pflanzenreich. WALTER described the genus *Seguieria* with 23 species in two sections. Twelve of his species were based on only one collection, and of just as many species he did not see fruits. Because the flowers yield hardly any distinguishing characters, he had to rely heavily upon vegetative characters for classification. Since there are often considerable differences between duplicates of the same collection and variable species are quite frequent in the Phytolaccaceae, WALTER's specific delimitation rested on a rather weak basis.

In her revision of the Phytolaccaceae NOWICKE (1968) recognized this shortcoming very well, but due to lack of material her own treatment had to remain provisional. She even accepted WALTER's concept of the type species, *S. americana* L., although this was clearly a misinterpretation, as already HEIMERL (1934) had pointed out. The present study not only attempts to eludicate the real identity of *S. americana*, it also suggests a drastically changed subdivision of the genus *Seguieria*, based on the much enlarged amount of material now available.

This work has been based on the study of the material of the following institutions: B, BAF, BM, BR, C, G, HBG, IPA, K, M, MO, NY, R, RB, S, SP, US, VEN, W. The author is indebted to the curators of these herbaria for arranging loans of their specimens. Many thanks are also due to Prof. Dr. V. I. Grubov of the LE-herbarium for sending photographs of type specimens and to Mr. G. Hatschbach, Curitiba, and Mr. Valério Flechtmann Ferreira, Rio de Janeiro, Brazil for sending viable seeds. Prof. Dr. K. Kubitzki, University of Hamburg, is gratefully acknowledged for constant encouragement and steady interest in the progress of this work. To J. Kadereit, Cambridge, I am grateful for correcting the English.

General Part

Vegetative characters. - The species of the genus *Seguieria* are lianas, shrubs or trees up to about 20 m, rarely 30 m high. Transitional stages, e.g. semiscandent shrubs, tree-like lianas, are common. *Gallesia* is a tall tree, often described as 30 m high with a trunk diameter of 1 m. According to METCALFE and CHALK (1957) both genera show anomalous secondary thickening.

The leaves are - as in all other Phytolaccaceae - alternate, petiolate, entire and mostly mucronulate at the tip. Above the base of the petiole, i.e. at either side of the axillary bud, there usually is a pair of stipule-like excrescences. In *Gallesia* these are minute and ephemeral, in *Seguieria* they are transformed into thorns which are either straight

(in trees and shrubs) or recurved (in shrubs and lianas). Mostly these organs have been interpreted as stipules, but there is some evidence pleading in favor of ECKARDT's (1964) view that they are the prophylls of the axillary bud:

1. According to WEBERLING (e.g. 1958) stipules normally show proleptic development - these effigurations do not.
2. They usually fit into the phyllotactic spiral of the axillary bud (fig. 1).
3. There are no other organs which could be interpreted as prophylls.
4. There are all transitional forms between thorns and bud-scales in *Seguieria* (fig. 2).

The shape of the leaf blade ist especially in *Seguieria* rather variable. In the past a number of species have been based essentially on leafshape variants, but as leaf variation proved to be continuous, it cannot be used for the delimitation of species.

Inflorescences. - The structure of the inflorescences of *Seguieria* is exceptional among the Phytolaccaceae in that it develops distinct terminal flowers. *Gallesia* on the contrary shows the common condition, i.e. indeterminate inflorescences. In both genera the inflorescences are generally paniculate, but the degree of branching is rather variable, mostly even within the species. Only *S. brevithyrsa* invariably has simple racemes. In *Gallesia* the pedicels are frequently very short, so that the inflorescences could well be described as branched spikes. Bracts are always present. In the lower part of the main axis they are often leaflike but rapidly decrease in size towards the apex. In most species there are bracteoles as well, only in *S. brevithyrsa* and *S. paraguayensis* (but see p. 240) they are absent.

A closer look at the indumentum of the inflorescence offered interesting new aspects. Besides unicellular hairs there are essentially two types of multicellular trichomes. In *Gallesia* and in *Seguieria langsdorffii*, *S. paraguayensis* and *S. macrophylla* they are unbranched or rarely branched simply and consist of usually non-collapsed cells (fig. 3), whereas in *S. americana* and *S. aculeata* the hairs are mostly and often repeatedly branched and consist for the larger part of collapsed cells (fig. 4). In all species the hair-covering may become sparser after flowering. Only the racemes of *S. brevithyrsa* are completely glabrous or, at the most, having few hairs at the base.

Flowers. - Another important difference between *Seguieria* and *Gallesia* is found in the structure of the perianth. Unlike all other Rivinoideae but rather in agreement with the other subfamilies of the Phytolaccaceae *Seguieria* has five tepals in quincuncial arrangement which are more or less petaloid. The calyx like perianth of *Gallesia* on the other hand is tetramerous, like in the other Rivinoideae. In *Seguieria*, but not in *Gallesia*, there are sometimes

deviations from the normal number.

In both genera there are numerous stamens, about 15 to 65 have been found. Their number is rather variable even within the same inflorescence. Nevertheless, the species may be assigned to two overlapping, but statistically different groups (Tab. I).

Tab. I stamen numbers

	range	$\bar{x}$	n	s	
Gallesia integrifolia	23-44	31.2	12	6.3	
Seguieria langsdorffii	18-45	31.5	65	6.5	
S. paraguayensis	21-35	26.8	12	4.6	Group 1
S. macrophylla	17-38	28.3	19	5.4	
*S. brevithyrsa**	20	-	1	-	
S. americana	33-62	45.7	39	7.0	Group 2
S. aculeata	28-56	41.3	123	6.3	

* no statistical treatment possible due to lack of material

$\bar{x}$ = mean stamen number, n = number of flowers examined, s = standard deviation

Although there also is a significant difference ($0.1\ \% > p > 0{,}01\ \%$) between the mean stamen number of *S. americana* and *S. aculeata*, I prefer to unite them in one group for two reasons: (1) the difference between them is much smaller than the distance to the others ($p \ll 0.01\ \%$) and (2) the ranges of numbers of these species overlap almost completely.

All Rivinoideae are unicarpellate. Because of its leaf-like appearance and its decurrent stigma the carpel of *Seguieria* and *Gallesia* is somewhat reminiscent of the primitive one of *Degeneria*. This similarity, however, is purely superficial. A closer look especially at the vascular supply shows that the shape is not achieved by folding a leaf along its midrib but rather by an outgrowth of the style, preforming the wing of the fruit (fig. 5). Bicarpellate monstrosities may occur in *Seguieria*, but they are extremely rare.

In *S. americana* the ovary bears primordial lateral winglets. This is the only useful character found in the flowers. Nevertheless it can only be used with caution, since at least in herbarium material the ovaries of the other species may show deep impressions from the filaments, thus looking like bearing winglets as well.

Fruit and seed. - In the fruit again the perianth yields a differential character to separate *Seguieria* and *Gallesia*. In the latter the tepals enlarge considerably and become lignified, enclosing the basal part of the samara, in the former they are simply reflexed.

Apart from the lateral winglets of *S. americana* morphological characters of the fruits are unreliable for specific delimitation because their variation is continuous and they are

often rather variable within the same specimen. Only the so-called "weak" character "colour of the dried fruits" proved to be useful.

In *S. langsdorffii*, *S. macrophylla* and *S. brevithyrsa* the samaras become rather dark to pure black on drying (in *S. langsdorffii*, however, this tendency seems to diminish with maturity), in *S. paraguayensis* they get pale yellowish or at most very light brown. *S. americana* and *S. aculeata* are more variable in this respect as well as in others, but their fruits never become black.

The structure of the seed-coat is of prime importance for the subdivision of the genus *Seguieria*, and it is in clear contradiction to the sectional division of WALTER. The testa always consists of a thick-walled epidermis and a number of layers of collapsed cells below it. With this pattern is common, two very different types exist.

In *S. langsdorffii*, *S. paraguayensis*, *S. macrophylla* and *S. brevithyrsa* the epidermal cells are elongated radially, as they are in other Phytolaccaceae (CORNER 1976). Their height always exceeds 40 µm and their walls are enormously thickened, leaving only very small lumina (fig. 6). They are heavily pigmented so that the whole seed-coat is deep black in colour. The testa is very brittle and keeps its form on drying. Its outer surface shows a cell-like structure much coarser than the pattern of the epidermal cells.

In *S. americana* and *S. aculeata* the cells of the epidermis seem to be elongated tangentially (fig. 7), but the presence of bended radial walls suggests that this might be an artefact. Originally, the cells may as well have been radially elongated, but not thick walled in their lower part which therefore collapsed. The development of the seed-coad will have to be studied in fresh or liquid-fixed material in order to decide this question. The thick walled part of the cells, however, only rarely exceeds 40 µm a little. The walls are thinner and less pigmented, giving a red-brown colour to the entire seed-coat. The testa is somewhat more elastic and mostly shrivels on drying. Its outer surface shows the pattern of the epidermal cells.

The seed coat of *Gallesia* is essentially of this second type, but its epidermal cells are smaller and its surface is more irregular.

Phytochemistry. - Both genera still await phytochemical investigation. The results would certainly be interesting especially in *Gallesia*, which smells strongly of garlic and has long been used in local medicine (Martius 1843; Hatschbach & Guimarães 1973).

Taxonomic history, specific delimitation and chorology.

Seguieria. - The taxonomic history of *Seguieria* is marked by erros right from the very beginning. Already LINNAEUS (1767) himself made the first mistake when reducing

JACQUIN's *S. aculeata* into synonymy of his *S. americana*[1].

Type material of both species - if it has ever existed - has probably never come to Europe; at least it has never been cited nor does it exist in the Linnaean herbarium[2] or in any of the herbaria mentioned above.

Nevertheless it can be ascertained that LINNAEUS was wrong: The original description of the genus *Seguieria* by LOEFLING (1758), on which LINNAEUS based his *S. americana*, reads "capsula ... basi lateraliter utrinque notata alulis tribus membranaceis". So LOEFLING has seen a plant with lateral winglets at the base of the fruit. Today we know that such plants do not occur within a radius of several hundred kilometers around Cartagena, the type locality of *S. aculeata* Jacq. Moreover JACQUIN (1763) describes the fruit - which, however, he has seen only immature - as similar to that of *Securidaca* (Polygalaceae), which does not bear lateral winglets[3].

None of the later authors doubted the Linnaean interpretation. They rather included the description of *S. aculeata* in that of *S. americana*, which originally did not contain any statement about the leaves. Later BENTHAM (1841) used a leaf-character to separate his species from what he thought to be *S. americana*. Obviously he neither saw material of that species nor of *S. aculeata*.

MOQUIN-TANDON (1849) was the first to name a certain herbarium specimen *S. americana*. Unfortunately, his choice was erroneous. The collection Karsten 38 he cited lacks lateral winglets at the base of the fruit, though he described the species as possessing them. Therefore we must assume that he only saw the flowering parts of this collection.

H. WALTER (1909) saw the fruiting material as well. Instead of recognizing MOQUIN's mistake and looking for the real identity of *S. americana*, he based his concept of this species on the collection cited by MOQUIN.

HEIMERL (1934) recognized this misinterpretation, but did not solve the problem himself. So WALTER's faulty concept became established.

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1 As will be seen in the following, there are indeed some facts pleading in favour of treating these two taxa only as subspecies of but one species, thus applying a very much wider species concept than has ever been used in the genus. Even so, the considerations concerning their typification would remain valid.

2 For this information thanks are due to Prof. Dr. P. Hiepko, Berlin.

3 Nevertheless this description was also adopted by authors who had themselves only seen fruits with lateral winglets.

It was also adopted by NOWICKE (1968) in her recent revision of the Phytolaccaceae. She even selected a neotype in accordance with WALTER's interpretation. This neotype, of course, has to be rejected because its distinctness from the protologue is provable (Code 1979, Art. 8).

So it is the task of this work to find out which plants LINNAEUS and JACQUIN really meant when describing *S. americana* and *S. aculeata*, respectively.

In the case of *S. americana* this is a fairly easy. LOEFLING did not only stay within the borders of the Venezuela of today, he visited "Guayana" as well (RYDEN 1957). Later on parts of this Spanish colony became (British) Guyana. So the only *Seguieria* with lateral winglets at the base of the fruit he can have seen is the group later described as *S. foliosa* by BENTHAM. Especially one specimen from this region, coll. Irwin 797 (US), comes rather close to LOEFLING's description. I therefore propose this specimen as neotype for *S. americana* L.

Such an unequivocal decision is not possible in *S. aculeata*. Near Cartagena two species occur, *S. macrophylla* Benth. and the group taken for *S. americana* up to now. The description by JACQUIN does not include any constant differential character (these are very rare throughout the genus), but altogether it agrees better with the second group. The plant JACQUIN describes, and especially its leaves, are unusually small for a *S. macrophylla*. The description of the habit also fits better a semiscandent shrub than a true liana. Oval leaves are frequent in both species, but lanceolate-ovate ones are rare in *S. macrophylla*. Only what JACQUIN wrote about the leaf-tip, "emarginata cum acumine", fits *S. macrophylla* a little better. Emarginate leaf-tips do not occur in the group treated as "*S. americana*" up to now, in *S. macrophylla* they do, though very rarely and only in considerably larger leaves than those described. This character, however, should not be taken as decisive because the use of the terms in the 18th century was not as fixed as it is today (STEARN 1967). "Emarginata" could well have been meant to describe retuse tips[4], and these are occasionally found in both species.

At last there is also a rather pragmatic reason for giving the name *S. aculeata* to the group up to now called "*S. americana*": This will cause the smallest possible extent of confusion, since *S. aculeata* has always been treated as a synonym of this polymorphous species.

Unfortunately there is no collection in complete agreement with the protologue, so that the selection of a neotype (p. 248) among several specimens which are deviating in one character or another has to remain somewhat arbitrary.

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[4] Obviously MOQUIN used it this way.

Another serious flaw in the existing classification of the genus *Seguieria* is the sectional division introduced by WALTER. This division was based on the presence or absence of decurrent tubercules on the ovary and decurrent winglets on the fruit. In flowering material WALTER several times mixed up these winglet-primordia on the ovary with the deep impressions left by the filaments, thus often assigning very similar collections to different sections. The group with winglets he called Sect. *Euseguieria*, the one without Sect. *Seguieriella*.

NOWICKE thought she was bringing the nomenclature in accordance with the code when changing the name Sect. *Seguieriella* to Sect. *Seguieria* and Sect. *Euseguieria* to Sect. *Walteria*. But since according to the original description the type species bears lateral winglets, a further name-change would be inevitable, if a sectional division is maintained at all. Furthermore the delimitation of the sections had to be newly defined. Looking at the variational pattern, which below will be discussed, and its impact on the classification I prefer not to discriminate any sections.

Even the clear delimitation of the species is difficult within this genus. The 23 species in WALTER's treatment were for a large part separated by characters variable even on the same plant, such as "inflorescentiae foliis subaequales vel breviores - inflorescentiae quam folia longiores" or "aculei conspicui, recurvati - aculei inconspicui, minutissimi, tuberculiformes". NOWICKE had to use similar characters as well, with the result that for instance the type-specimen of *S. langsdorffii* from Kew would not key out as the right species in her key.

Further increase in the amount of material examined led to a breakdown of nearly all differential characters used up to now. New collections mostly had to be placed somewhere between the old species. A search for new diagnostic characters revealed differences in the indumentum (p. 233) and in the seed-coat (p. 235), but beyond that only showed more clearly the absence of real discontinuities. However, it eludicated the variational pattern. Only six taxa were found to be separable within the genus:

1. One narrowly circumscribed and therefore well delimited species, *S. brevithyrsa*, represented by two collections only.
2. Two species with a wider circumscription, which are nevertheless relatively homogeneous and fairly well definable.
3. Three extremely heterogeneous complexes, which in spite of their heterogeneity cannot be split up further, or only by means of rather artificial constructions, which always leave indeterminable a number of intermediate specimens.

EXELL (1953) commented on the handling of such complexes in *Combretum*. Since his considerations exactly fit this case as well, the paragraph concerned will be quoted here in full length (omitting the first sentence):

"All that it seems possible to do, at present, in the case of a presumably heterogeneous population in which there appears to be a constant reshuffling of genes, so that a number of characters occur in nearly every possible combination, is to give the "complex" the earliest legitimate name available and append a synonymy that is nearly always a long one, due to the many diverse elements included. It should be realized that the synonyms fall into three categories: (1) nomenclatural synonyms indissolubly linked with the accepted name; (2) names given to plants which appear to be identical with the type; and (3) names given to plants which differ in certain characters from the type but each of which represents one combination of a number of characters that combine in numerous ways within a heterogeneous population.

Whether or not any particular instance in this third category should be considered worthy of specific or infra-specific rank must be a matter of individual judgement or even of convenience; but it should be borne in mind that we are at present completely ignorant of the genetic structure and it seems better not to propose a classification which implies far more knowledge than we possess. Many such combinations of characters have been given specific or infra-specific epithets by various authors, but it is often evident that there is almost no end to such a process and that a synthesis is more convenient and perhaps more in accordance with the truth. Such a synthesis is no reflexion on the work of the original authors, who described the differences that they saw. The words "convenience" and "convienient" are used deliberately. Until it becomes possible (if ever) to give plants "chromosome maps", equivalent, in a way, to the formulae employed by chemists, it seems best to deal with these heterogeneous populations, within the framework of the International Rules of Nomenclature, in whatever manner seems most practically convenient".

In this way the naming of the three complexes as *S. langsdorffii*, *S. aculeata* and *S. americana* should be understood.

Being familiar with the genus, it is usually easy to recognize the members of the groups now treated as species by many characters which are most frequent in one or two taxa, but - and that is typical for the variational pattern - are neither confined to, nor constant within, any species or group of species. Therefore these characters cannot be used for diagnostic purposes. The characters in the key given below are those which appear most constant. However, in rare cases even they may be misleading. It is recommended to read the descriptions carefully, paying special attention to rare and frequent character-states.

Following VAN STEENIS (1957), the only possible taxonomic expression of such a variational pattern were infra-specific categories of only a single species. Here, however, some facts plead against such a treatment. The groups recognized

remain distinct even in the overlapping parts of their ranges, and they do so without any perceivable ecological differentiation. The discontinuities between them are bridged by only a few characters in each case, though nearly any character can be involved principally.

Because of the reticulate variation, it is hardly possible to establish any progressional lines within the genus. The only unequivocally derived condition found is the absence of bracteoles. By their reduction in the first-order branches of the inflorescence *S. brevithyrsa* (with racemes) can easily be derived from *S. macrophylla* (with panicles). The indumentum has been reduced as well, only the fruit seems to have undergone some further differentiation. If variation should be found in the degree of branching of the inflorescence, as it has been found in *S. paraguayensis* (see below), then *S. brevithyrsa* will have to be treated as an infraspecific taxon of *S. macrophylla*. Vegetatively there has been almost no progress, apart from a possibly more intense blackening of all parts in *S. brevithyrsa*. This points to a relatively recent separation of this latter species, as does the restricted range of *S. brevithyrsa* compared with the wide range of *S. macrophylla* (fig. 8).

S. paraguayensis lacks bracteoles as well, but sometimes not before the second order of branching. In a few cases there seem to be bracteoles, but these are always carrying another but in their axil. So the character "bracteoles absent" is less clear here than it is in *S. brevithyrsa*. Nevertheless *S. paraguayensis* must be regarded as being older as a species, for there is no existing species from which it could be derived. Furthermore, its range (fig. 9) is much larger than that of *S. brevithyrsa*. *S. paraguayensis* occurs within the South American continent in the drier to moderately humid parts. Unfortunately the notes of the collectors are too scarce to give a clear picture of its ecological requirements[5].

S. langsdorffii is more or less confined to the area of the southern costal rainforest (fig. 10). HATSCHBACH and GUIMARÃES (1973) regard it as an element of this rainforest, but much more frequently it has been collected on pastures, roadsides and in secondary vegetation. Although it sometimes may reach a height of 30 m, it obviously can compete only slightly better in closed forest formations than the smaller species. Its enormous variation does not show any geographical component within its relatively small range.

As mentioned above, the geographical range of *S. macrophylla* is rather large (fig. 8), extending from 11°N to 12°S. *S. macrophylla* has been collected most frequently in gallery-forest and secondary vegetation. Sometimes it is found in

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[5] All statements concerning the ecology of the species in the following are based on the notes of the collectors.

the "varzea", and there it penetrates farthest of all *Seguieria* species into the Amazonian forest. Being a tall liana, it is probably a better competitor than the smaller and/or arborescent species. On the other hand it seems less drought-resistant.

Widely distributed throughout South America with the exception of the Amazon Basin are *S. aculeata* (fig. 11) and *S. americana* (fig. 12). These two species are very close to each other and, as far as this is possible in such a homogeneous genus, a little removed from the other four species by another type of indumentum (p. 233), higher stamen-numbers (p. 234) and completely different testas (p. 235). If there had to be made a sectional division, the boundary would have to separate *S. aculeata* and *S. americana* from the rest of the genus.

Because both species are extremely variable, there is hardly any difference between them when only the total range of variation of each character is considered. Only the key-character "fruit with/without lateral winglets" is discontinuous, and even this may not be totally clear in a few cases. In *S. americana* the breadth of the winglets is variable, so that in some cases they are only narrow ridges on the fruit ("*S. pachycarpa*"). On the other hand, *S. aculeata* very occasionally may have fruits with a few irregular winglike excrescences besides normal fruits in the same infructescence.

Different character frequency nearly always allows their recognition even without fruits and thus pleads against reduction to one species. Only three collections were found to be intermediate.

S. aculeata grows in different habitats, in shrubby xerophytic vegetation as well as in gallery-forest or in the coastal rainforest. In the north it seems to prefer the drier, in the south the moister habitats, but even in the south it is only rarely found in the undisturbed lowland rainforest, but rather at higher elevation or, as very frequently throughout its range, in secondary vegetation. EWEL (1980) described such a colonisation of disturbed rainforest habitats by species from drier sites as characteristic of ruderal elements. *S. aculeata* - even more than the other species - could be called a facultative ruderal. Probably its abundance in southern Brasil is partly due to this property.

Apart from the still weakly documented ecological preferences, there also exist statistical differences in some characters between the northern (Venezuela, Colombia) and the southern population (Paraguay, Argentina-Misiones, southern Brasil). The northern population has usually shorter petioles, more frequently ovate leaves and in general less hairy inflorescences. But these characters vary completely independently from each other. Therefore they do not allow an infra-specific division.

S. americana as well has mostly been collected from forest-margins and gallery forests. It also shows geographic differentiation, but of another kind. The northern population (British Guiana, four collections) is deviating from the others (Peru and Brazil) by a much more restricted variational range rather than by different character frequencies within the same range. At least when fruiting its members are much closer to each other than to any of their conspecifics elsewhere. But their characters all occur as well in the rather heterogeneous Peruvian and Brazilian populations. Therefore the northern group is closer to some members of these populations than they are to each other. It is somewhat comparable to an island population, where an elsewhere rare combination of characters has become established without creating anything really new. Long-distance dispersal is one possibility to explain the restriced variational range, but it is not the only one. Isolation of a marginal population during changes in the range of a species may have the same effect. Today we know from a number of investigations (cf. SIMPSON-VUILLEUMIER 1971; PRANCE 1973; SIMPSON and HAFFER 1978) that also in South America the ranges of many groups of organisms have undergone drastic changes during the pleistocence as a result of climatic changes. In this context PRANCE suggested a way in which extremely polymorphous species (ochlospecies) may arise. The genus *Seguieria* seems to have followed this way very successfully. Since it mainly occurs in half-open formations such as gallery-forest and forest margins, it certainly will have spread further into the drier regions when the climate was moister and further into the rainforest regions of today when the climate was drier. Particularly two factors will have contributed to the quick colonisation of new sites becoming available:

1. the semiruderal properties of *Seguieria* and 2. the wind dispersal of its fruits, which is especially effective in times of low forest density. Repeated phases of enlargement and shrinkage of the range probably have led several times to the isolation of some populations, which subsequently developed divergently. Mostly they will have been united again in a later climatic change, either before sterility barriers developed or with subsequent breakdown of these barriers, e.g. by polyploidy[6].

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[6] Polyploidy seems not to be rare within the Rivinoideae. *Hilleria* has n = 18, *Rivina* n = 54 (FEDOROV 1969), *Petiveria* n = 18 and n = 36 (ORMOND et al. 1978). No chromosome numbers are known in *Seguieria*. Whether the considerable variability in the volume of the pollengrains which can be calculated from the data of BORTENSCHLAGER (1973) should be considered as a clue to polyploidy still awaits investigation.

If the enormous variability is explained this way, then the present ranges have to be interpreted as the result of numerous different migrations, particularly influenced by the more recent climatic changes. So we cannot explain the present ranges in terms of "speciation centres" and simple "migration routes" without producing even more "unwarranted speculations" in the sense of WHITE (1971) than are contained in the above considerations. In *Seguieria* this may be said so sharply because the absence of progressions not even allows to find any evolutionary trend in the geographic differentiation. Regional differences only concern the width of the variational range. It is widest in the surroundings of Rio de Janeiro, since only there the three most variable species occur together. This constitutes a parallel to a number of other plant taxa which have their centre of variation in the same region (L. B. SMITH 1968). SMITH calles this region "centre of speciation", but if we accept that there were climatic changes, we have to be more cautions. The present diversity need not have arisen "in situ" but many of its elements may have come to the surroundings of Rio de Janeiro by migration. Certainly the southern Brazilian coastal region was well suited for providing refuge and promoting differentiation as it allows horizontal and vertical migration and the distances between dry and moist habitats are relatively small. Nevertheless it is unlikely to have been the only region of differentiation or the only refuge in *Seguieria*, because at least *S. aculeata* seems to possess a second centre of variation in the north of its range and because three *Seguieria*-species do not occur near Rio de Janeiro.

There is a second parallel to other plant taxa, also to be seen from the work of L. B. SMITH. The characteristic extra Amazonian pattern of distribution is not only confined to *Seguieria* and *Gallesia* (see below), it is also found in *Psychotria carthagenensis* (Rubiaceae), *Polygonum punctatum* (Polygonaceae) and *Tillandsia usneoides* (Bromeliaceae), as well as in the genus *Rhamnus* (JOHNSTON and JOHNSTON 1978), particularly in *R. sphaerosperma*. SMITH interprets these distributional patterns as the result of distinct migrational movements, "Amazonian-andean migration" in *P. punctatum* and "recent andean migration" in *T. usneoides*. Following the above considerations, the explanation cannot be carried thus far in *Seguieria*. However, it is notable that all these very different plants obviously prefer less dense, less shaded habitats, or habitats with less competition. On the other hand they are unable to colonize dry regions. Although the reasons for this cannot be the same in tall trees, lianas, herbs and epiphytes, the resulting distributional patterns are very similar.

Gallesia. In contrast to *Seguieria*, *Gallesia* does not pose any taxonomic problems. In spite of its wide geographic range (fig. 13) the variation of the only species, *G. integrifolia* (Spreng.) Harms, is comparatively small and its

continuity is well documented. However, if the type specimen of *Thouinia integrifolia* Sprengel really had been destroyed, as NOWICKE thought it to be, there easily could have arisen nomencltural difficulty, because SPRENGEL's (1821) description of the flower is c o m p l e t e l y w r o n g i n a l l i m p o r t a n t c h a r a c t e r s. GARCKE (1891) had recognized SPRENGEL's specimen as a *Gallesia*, but his comment on it is only concerned with SPRENGEL's statement that there were three carpels. Therefore it is insufficient, as other details in the protologue are wrong as well (e.g. the presence of calyx and corolla, eight stamens only). So a critical evaluation of the original description in case the type was lost would inevitably have led to the exclusion of *Th. integrifolia* from *Gallesia*.

As already mentioned, *Gallesia* shows an extra-Amazonian distribution, too. In contrast to *Seguieria* it is confined to regions south of the equator. In the western part of the Amazon basin in Peru and in southern Brazil it may occur within the rainforest. With the gallery forest it penetrates far into the drier regions. Sometimes it is grown for shade. Since *Gallesia* generally has similar ecological requirements as *Seguieria*, it probably has undergone similar changes in distribution. Nevertheless it is lacking any geographic differentiation. Therefore is must be assumed that its evolutionary plasticity is smaller than that of *Seguieria*. This may be explained at least partly by the apparently longer generation time in *Gallesia*.

Systematic part

1. *Seguieria*

Loefling, Iter Hispan. (1758) 191
Seguiera Adans., Fam. Pl. 2 (1763) 443
Segueria Endl. 7, Ench. (1841) 508

Albertokuntzea O. Kuntze, Revis. Gen. Pl. 2 (1891) 550

Type: *S. americana* L.

Trees, ± scandent shrubs or lianas. Branches terete or subterete, glabrous, mostly lengthwise ± striate by small furrows, younger branches round or angled, rarely sparsely pubescent, above the bases of the petioles mostly provided with paired thorns (resembling stipular thorns), these sometimes minute or apparently absent (caducous?). Leaves alternate, petiolate. Leaf-blade entire, variable in shape, at the apex mostly mucronulate, glabrous, in very young leaves sometimes sparsely pubescent. Inflorescences axillary or

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7 This was obviously only a misprint. In the index this genus is spelt correctly, *Seguieria* Loefling.

terminal, few-flowered racemes to profusely flowering panicles, normally ± pubescent. Bracts on the axis of the inflorescence sometimes leaf-like, otherwise membranaceous and lanceolate to triangular. Bracteoles similar to the latter, smaller, less often absent. Flowers pedicellate, hermaphrodite, ± actinomorphous. Perianth simple. Tepals five, quincuncially imbricate, subequal, ± petaloid, white to yellow to green, sometime blackening on drying, in fruit reflexed. Stamens about 15 to 65. Filaments ± threadlike, shorter than the tepals or of nearly equal length, sometimes slightly narrowed towards the tip. Anthers linear, dorsifixed, extrorse, opening by longitudinal slits, deeply incised at the base, at the tip less or not at all incised, sometimes with a small process of the connective. Ovary superior, unicarpellate, one-locular, consisting of a subglobose or laterally compressed basal part which contains the only ovule and may bear primordia of lateral winglets, and of a winglike, asymmetrically flattened style.

Stigma papillose, decurrent on the thicker margin of the style, often covering as well its terminal edge. Ovule one, basal, campylotropous. Fruit winged, with a globular to ± pear-shaped, often laterally compressed basal part which sometimes bears lateral winglets, apically expanded into a large nerved wing which is thicker at one edge. Seed one, erect, in the mature state exalbuminous. Seed-coat ± brittle, glabrous, ± shining, either black or red-brown. Embryo extremely curved.

Key to the species:

1. Seed-coat red-brown. Hairs of the pedicels for the larger part collapsed, usually branched, mostly repeatedly. -- Flower or fruit never becoming black. Bracteoles always present 2

1. Seed-coat black. Hairs of the pedicels consisting of normally non-collapsed cells, rarely branched simply. -- Ovary or fruit never bearing lateral winglets 3

2. Ovary at the base with primordia of lateral winglets; fruit at the base with lateral winglets (rarely winglets only very narrow)..... 1. *S. americana* L.

2. Ovary without primordia of lateral winglets; fruit without lateral winglets. (Only very rarely the fruit may show a few ± winglike irregular processes, which never cover the basal part completely)... 2. *S. aculeata* Jacq.

3. Trees, rarely shrubs, never climbing. Thorns, if present, straight, ± directed to the tip of the branch or more rarely spreading perpendicularly. 4

3. Lianas or climbing shrubs. Thorns normally present, recurved. 5

4. Fruit normally becoming black on drying, otherwise at least becoming brown. Bracteoles present .... 3. *S. langsdorffii* Moq.

4. Fruit becoming very pale yellowish to brownish on drying. Bracteoles normally absent, if present always subtending an axillary bud. ..... 4. *S. paraguayensis* Morong

5. Inflorescences panicles, ± pubescent. Bracteoles present. ..... 5. *S. macrophylla* Benth.

5. Inflorescences racemes, glabrous (rarely with a few hairs). Bracteoles absent.... 6. *S. brevithyrsa* Walter.

1. *Seguieria americana* L., Syst. Nat. ed. 10 (1759) 1074:

I herewith propose the collection Irwin 797 (US) as ✓neotype for this species, see discussion on p. 237

S. floribunda Benth. in Trans. Linn. Soc. London 18 (1841) 235; ✓Type: Gardner 722 (BM, G, K, US, Fragm. B).
S. foliosa Benth. l.c. p. 236; ✓Type: Schomburgk 661[8].
S. longifolia Benth. l.c. p. 235; ✓Type: Pohl s.n. (Holo K).
S. vauthieri Moq. in DC., Prodromus XIII, 2 (1849) 7: ✓Type: Vauthier 29 (Holo K, Photo B).

Albertokuntzea americana (L.) O. Kuntze, Revis. Gen. Pl. 2 (1891) 550
A. floribunda (Benth.) O. Kuntze, l.c. p. 550
A. foliosa (Benth.) O. Kuntze, l.c. p. 550
A. longifolia (Benth.) O. Kuntze, l.c. p. 550
A. vauthieri (Moq.) O. Kuntze, l.c. p. 550

Seguieria emarginata H. Walter in Engler, Pflanzenreich IV, 83 (1909) 89; ✓Type: Glaziou 5730 (B, C, K, MO).
S. laurifolia H. Walter, l.c. p. 92; ✓Type: Glaziou 2488 (B, BM, BR, C, K).
S. pachycarpa H. Walter, l.c. p. 93; ✓Type: Riedel s.n. (B, K, Photo LE).
S. wangerinii H. Walter, l.c. p. 92; Syntypes: Beyrich 422 (B, M), Schenck 2914 (B).
S. alberti H. Walter in Fedde, Repert. spec. nov. reg. veg. 8 (1910) 79, based on:
S. elliptica H. Walter (non R.E. Fries) in Engler, Pflanzenreich IV, 83 (1909) 89; ✓Type: Glaziou 8260 (B, C, G).
S. coriacea auct. non Benth., Nowicke in Ann. Missouri Bot. Gard. 55 (1968) 326; cf. *S. aculeata*.

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[8] Probably this number has usually been read upside down. In some of the original labels the number is preceeded by a point (.661), suggesting that it should better be read 199. It actually has been interpreted this way in one specimen at G.

Shrub, very often scandent, or small tree (to 10 m high?). Thorns very often recurved, more rarely straight and spreading perpendicularly, very rarely directed to the tip of the branch, well-developed (to 11 mm long on a twig of 4 mm in diametre) to rather small, rarely absent. Petiole 1.5 to 10 mm long. Leaf-blade rather variable in shape, often ± elliptic to ovate, up to 15 cm long and 7 cm wide, 1.3 to 4 times (rarely 5 times) longer than wide, chartaceous to coriaceous, matt to shining, at the base attenuate to obtuse, more rarely rounded or nearly truncate, to the tip acuminate to ± rounded, rarely nearly truncate or distinctly emarginate, the tip itself narrowly rounded or often a little retuse, mostly distinctly mucronulate. Inflorescences axillary or terminal panicles, up to 40 cm long, about 15 to > 100-flowered, sparsely pubescent to densely lanate (hairs one- to many-celled, normally branched, mostly repeatedly, normally for the larger part collapsed), glabrescent in fruit, unicellular hairs for the larger part persistent. Bracts in the basal part of the axis of the inflorescence mostly leaf-like, diminishing in size towards the tip and often falling off in fruit. Bracteoles up to 1.3 mm long. Pedicels 3-10 mm long. Buds up to 4 mm in diametre. Tepals up to 7.5 mm long and 5 mm wide. Stamens about 30 to 65. Filaments up to 6.5 mm long. Anthers up to 2.4 mm long. Ovary with distinct primordia of lateral winglets. Stigma often covering the tip of the style, sometimes only half. Fruit not becoming black, to 50 mm long. Basal part up to 11 mm in diametre, with winglets up to 4 mm wide, rarely only rather narrow. Terminal wing up to 20 mm wide, of variable shape. Testa red-brown.

s. loc.: ex Herb. J. Miers 4502 (BM; non K!); Botanic Garden, Victoria, Cameroons: H. Winkler 81 (G).

BRITISH GUIANA:

s. prov.: C. Appun 1787 (K), R. Schomburgk 199 (G) = 661 (B, BM, G, K). R u p u n u n i D i s t.: D.H. Davis 893 (NY); south of Lethem, Takutu River: H. S. Irwin 797 (US).

PERU:

Dpt. S a n M a r t í n : Prov. Mariscal Caceres, Dtto. Tocache Nuevo: J. Schunke V. 3774 (G, NY, US).
Dpt. H u a n c a v e l i c a : Prov. Tayacaja: Vuelo-Pata: O. Tovar 4618 (US).
Dpt. M a d r e d e D i ó s : Río Acre, Seringal Auristella: Ule 9486 (G, K), 9487 (B, G, K).

BRAZIL:

s. prov.: Pohl s.n. (M); Riedel s.n. (B); F. Sello s.n. (BM); Vauthier 29 (K); "Sta. Tereza, Valança": Neves Armond s.n. (R); "Canta Gallo": Peckolt 182 (BR); "Tocaja": Pohl s.n. (BR, M); Mikan s.n. (B).

C e a r á : Frei Allemão 1306 & M. de Cysneiros (R); Maracanaú, road Fortaleza-Maranguape: A. Ducke 2576 (NY, R).

B a h i a : ex Herb. Kegel 12335 (W); Blanchet 464 (G), 755 (BM, G); Jitaúna, road to Jequié: R. P. Belém & R. S. Pinheiro 3381 (NY); Itajurú, Rio de Contas: R. P. Belém & R. S. Pinheiro 3410 (NY); Rio São Francisco, Serra Acurua, Utinga: Blanchet 2908 (BM, non B, G, K!); Vitória: F. Sello s.n. (B, BM, K), 333 (B); Itabuna, Jussari Experimental Station: N. T. Silva 58361 (K, NY, US).

M i n a s G e r a i s : A. F. Regnell s.n. (US); Campo Belo: ex Herb. J. de Saldanha 5092 (R); Juiz de Fora: A. Glaziou 2488 (B, BM, BR, C, K), 8260 (B, C, G), 11438 (B, C, K); Ibitipocá: H. de Magalhães 1296 (R); Caldas, Capivari, Rio Pardo: H. Mosén 1928 (S); Matias Barbosa ("Matthea Barbozo"): Pohl s.n. (K), 3747 (B); Caldas: A.F. Regnell III 1012 (US), III 1013 (1845 US, 1855: B, K, M, 1862: S, 1864: S, US, 1866: B, C, R, 1870: S, 1873: S, 1877: US), III 1013 b and g (S).

R i o d e J a n e i r o (incl. Guanabara): A. Glaziou 5730 (B, C, K, MO), 5731 (S); Riedel s.n. (B, K); Jacarepaguá: Hoehne 141 (SP); Restinga de Cabo Frio: D. Sucre 1409 (HBG, R, RB); Serra dos Orgãos: Beyrich s.n. (B) = 161 (M) = 422 (B); G. Gardner s.n. (BM), 722 (B, BM, G, K, US); H. Schenck 2914 (B); Barra Mansa, Fazenda Paraizo: A. P. Duarte 5483 (RB); Silvestre: A. P. Duarte 5529 (HBG, RB); Caititú, Petropolis: D. C. Goés & Dionisio Constantino 14 (RB), 144 (RB).

S ã o P a u l o : Serra da Mantiqueira, Cruzeiro: ex Herb. J. de Saldanha 8518 (R); Ilha de São Sebastião: Edwall 1748 (B, C, SP).

For plants collected by Glaziou localities were mostly taken from A. F. M. Glaziou, Plantes du Brésil Central, in Mém. Soc. Bot. France 3 (1905-13).

This species is the most heterogeneous complex within the genus. It comprises all former "species" with lateral winglets at the base of the fruit.

In WALTER's account these were nine in number (further four he erroneously attributed to his sect. 1), based on 18 collections of which six were included in the variably circumscribed *S. floribunda*. NOWICKE saw only 17 collections and distributed them to eight species (including what she thought to be *S. coriacea*, see discussion of *S. aculeata*). In spite of the small amount of material both authors several times had to use characters in their keys which are variable in a single plant. The enlarged number of collections now available shows that there is no correlation between fruit and vegetative characters.

2. *Seguieria aculeata* Jacq., Select. strip. am. hist. (1763) 170;

I herewith propose the collection Dugand 6485 as neotype for this species, see p. 237

S. americana auct. non L.; Walter in Engler, Pflanzenreich IV, 83 (1909) 95; Nowicke in Ann. Missouri Bot. Gard. 55 (1968) 331 & auct. plur.

S. coriacea Benth. in Trans. Linn. Soc. London 18 (1841) 235; Type: Blanchet 2908 (Holo K, Iso B, G, K; non BM!).

S. parvifolia Benth. l.c. p. 235; Type: Tweedie s.n. (Holo K, Iso ? K, Photo B).

S. guaranitica Speg. in Ann. Soc. Scient. Argentina 16 (1883) 88; Type: v. Gülich s.n. (n.v.).

Albertokuntzea coriacea (Benth.) O. Kuntze, Revis. Gen. Pl. 2 (1891) 550.

A. parvifolia (Benth.) O. Kuntze, l.c. p. 550

Seguieria floribunda (non Benth.) f. *alutacea* Chod. in Bull. Herb. Boissier 7 (1899) 65; Type: Hassler 1847 a (G, K).

S. elliptica R. E. Fries (non H. Walter) in Ark. Botanik 8 (8) (1909) 20; Syntypes: Fries 313, 455 (S, US).

S. votschii H. Walter in Engler, Pflanzenreich IV, 83 (1909) 97; Type: Sello 2466 (B).

S. guaranitica Speg. var. *microphylla* Heimerl in Verh. Zool.-Bot. Ges. Wien 62 (1912) 11; Type: Herb. Hassler 10906 (G).

S. securigera Heimerl, l.c. p. 11; Type: Hassler 587 (Holo G, Iso G).

Scandent shrub, up to 15 m high, rarely small tree (up to 10 m) with scandent or decumbent branches. Thorns mostly recurved, rarely straight and perpendicularly spreading, well-developed (up to 11 mm long on a twig of 3 mm diametre) to rather small, rarely completely absent. Petiole 1.5 to 11 mm long. Leaf-blade rather variable in shape, often ± elliptic to ± ovate, with all transitional stages towards lanceolate, oblanceolate or oblong, up to 18 cm long and 7.5 cm wide, but normally not more than 12 cm long, 1.2 to 4 times longer than wide, chartaceous to coriaceous, matt to shining, at the base attenuate to rounded, at the tip acuminate to obtuse, rarely rounded or retuse, mostly distinctly mucronulate. Inflorescences axillary or terminal panicles, up to 50 cm long, about 20 to > 100-flowered (mostly with a large number of flowers), in flower mostly lanate or densely pubescent, rarely only sparsely pubescent (hairs one- to many-celled, normally branched, mostly repeatedly, normally for the larger part collapsed), in fruit glabrescent, unicellular hairs for the larger part persistent. Bracts at the base of the axis of the inflorescence normally leaf-like, diminishing in size towards the tip, often falling off in fruit. Bracteoles up to 1.7 mm long. Pedicels 2.5 to 8 mm long, buds up to 5 mm in diametre. Tepals up to 7.5 mm long and 5.5 mm wide. Stamens about 25 to 60, filaments up to 6 mm long, anthers up to 2.8 mm long. Ovary without primordia of lateral winglets, smooth or at the base nerved or bearing small tubercules, when dried sometimes impressed by the filaments. Stigma mostly covering the tip of the style, sometimes only half, very rarely completely lateral.

Fruit not becoming black, up to 47 mm long. Basal part up to 9 mm in diametre (in one collection monstruosly deformed with 13 mm diametre) ± globular to obliquely pear-shaped, mostly with tubercules surrounding the petiole, extremely rarely laterally with a few winglike processes which never run down the whole basal part. Terminal wing up to 20 mm wide, of variable shape. Testa red-brown.

s. prov.: "Rio Seco": I. F. Holton s.n. (K)

VENEZUELA:

s. prov.: Moritz s.n. (BM); "Mariara": Preuss 1544 (B).
Est. B o l i v a r : central Río Caura, Temblador: Ll. Williams 11593 (S, US, VEN).
Est. M i r a n d a : Río Tuy valley, near Guayas: H. Pittier 12201 (VEN): road Carenero-Chirimena, 2 km NW of Chirimena: J. A. Steyermark & G. Bunting 102310 (MO, VEN, W).
D i s t r i t o F e d e r a l : 3 km from Las Caracas: M. Nee & S. Mori 4029 (MO, VEN); Caruao: H. Pittier 11923 (G, US, VEN); Cerro Naiguatá, northern slopes: J. A. Steyermark 91932 (NY, VEN); between Las Caracas and Todasana: J. A. Steyermark, L. Aristeguieta & T. Koyama 102335 (M, US, VEN); Dep. Libertador, on Río Chichiriviche, 1-2 km S of Chichiriviche: J. A. Steyermark & V. Carreño Espinoza 112701 (MO, NY, VEN); Fila de El Morrocoy: J. M. Vivas 14 (VEN); between Caracas and La Guaira: Ll. Williams 12268 (US, VEN).
Est. C a r a b o b o : Puerto Cabello: Karsten 38 (B, G); O. Kuntze 1728 (K); above Las Trincheras: H. Pittier 8182 (G, MO).
Est. F a l c ó n : Fila de Barigua, near Guaibacoa: "Flora Falcón" 109 (MO); Fila Barigua, near Chipare: H. v. d. Werff 3311 (MO), Sierra de San Luis, between La Negrita and La Chapa: H. v. d. Werff & R. Wingfield 3169 (MO).
Est. M é r i d a : near Tovar: A. Fendler 188 (K); El Hato de Estanques: S. Lopéz-Palacios 1496 (US); tributary of Río Chama, road to Chiguara: J. A. Steyermark & M. Rabe 97014 (NY, US).
Est. T a c h i r a : Sierra El Casadero, 13 km N of Rubio, between Las Dantas and Las Adjuntas: J. A. Steyermark, R. Liesner & A. Gonzáles 120091 (HBG, MO); between Tienditas and Ureña, near the Colombian border: J. A. Steyermark, R. Liesner & A. Gonzáles 120212 (HBG, MO, VEN); S of La Mulata, near the Colombian border: J. A. Steyermark, R. Liesner & A. Gonzáles 120238 (HBG, MO).

PANAMA:

Prov. D a r i é n : near Refugio, 15-21 miles N of Sante Fé: J. A. Duke 10289(3) (MO).

COLOMBIA:

s. prov.: Karsten s.n. (G), 10(2) (B); J. C. Mutis 3601 (US).
Com. G u a j i r a : near Carraipia: O. Haught 4370 (US).
Dep. M a g d a l e n a : Rio Cesare valley, western part near Caño Sagarriga, W of Los Venados: A. Dugand 5802 (US); La Paz: O. Haught 2330 (S, US); Rio Rancheria valley, S of Fonseca: O. Haught 4302 (US); Cerrejón, near Río Rancheria: O. Haught 6578 (US, VEN); Santa Marta: H. H. Smith 342 (B, BM, BR, G, K, MO, S).
Dep. A t l á n t i c o : A. Dugand 272 (US); near the road "El Limón": A. Dugand 106 & 272 (US): Barranquilla, El Prado: A. Dugand 1112 (US); near Barranquilla: A. Dugand 5190 (US, W), 5482 (W), 5912 (US); Bro. Elias 350 (US), 598 (US), 601 (US), 1262 (US); road to Puerto Colombia, km 6: A. Dugand 6485 (US, VEN); Usiacuri, Arroyo del Higuerón: A. Dugand & H. Garcia Barriga 2295 (US, VEN); Puerto Colombia: Bro. Elias 1020 (B, G, US), 1262 (G). NT
Dep. B o l í v a r : near Turbaco: E. P. Killip & A. C. Smith 14696 (US), near Cartagena: Gondon 1845 (G); Bro. Heriberto 195 (US).
Dep. C u n d i n a m a r c a : E of Apulo, on trail to Anapoima: E. P. Killip, A. Dugand & R. Jaramillo 38156 (S, US).

PERU:

Dep. S a n M a r t i n : Juan Juí; Alto Rio Huallaga: G. Klug 4318 (BM, K, MO, S, US).
Dep. C a j a m a r c a : Jaen: F. Woytkowski 5603 (MO, US).

BOLIVIA:

s. prov.: "Yuri": R. S. Williams 249 (BM, K, NY, US).
Dep. S a n t a C r u z , Prov. Cordillera: Rio Seco, 100 km S of Sta. Cruz de la Sierra: A. Krapovickas & A. Schinini 32472 (G, MO); La Morita, Cabezas: J. Peredo 57 (NY, W); Cabezas: J. Peredo 249 (NY).
Prov. Velasco: O. Kuntze s.n. (US).

ARGENTINA:

Prov. J u j u y: Dep. El Carmen, Abra de Santa Laura: A. L. Cabrera, J. Frangi, A. M. de Frangi, R. Kiesling & E. M. Zardini 22077 (K); Moralitos: A. Castellanos s.n. (BAF); Quinta near Laguna de la Brea: R. E. Fries 455 (S, US); Arroyo del Medio: R. E. Fries 313 (S, US). ST
Prov. S a l t a : Pearce s.n. (BM, K); Dep. Orán: Orán: C. A. O'Donell 3136 (BM, S); Quebrada del Diablo, NW of Urundel: E. P. Killip 39062 (US); Urundel: T. Meyer 8402 (W); El Bananal: T. Meyer 8455 (W); La Calera: S. A. Pierotti 203 (NY, W); Río Pescado: S. A. Pierotti 6526 (C); A. V. de la Sota 4584 (NY); Río Bermejo: A. V. de la Sota 4609 (W), 14 spanish miles N of Orán: J. Steinbach 1760 (BAF, G, K); Embaración: S. Venturi 5149 (S, US); Campo Grande: S. Venturi 7633 (US); Río Blanco: S. Venturi 7635 (US); Santa Maria: Willink 30 (S).

Dep. San Martín: Pocitos: T. Meyer 18316 (W). Dep. Metán: Metán: C. H. O'Donell 2442 (NY, W).
Terr. F o r m o s a : Guaiculé: P. Jörgensen 3078 (MO, US).
Gob. M i s i o n e s : Puerto Alguirre: Rojas 81-4478 (BAF); Parque nacional de Iguazú: Del Puerto & Brescia 2614 (US); Puerto Irigoyen: Rojas 83-4410 (BAF); Eldorado: Bertoni 1050 (NY, W); T. Meyer 6783 (S, W); Dep. San Pedro: Monte Carlo: E. Schwindt 1256 (C, W); Fracrán a San Pedro, Ruta 14: E. Schwindt 3909 (K, MO).
Dep. Cainguás: Campo Ramon: Bertoni 3317 (G, W); Campo Grande: G. J. Schwarz 4419 (MO), 4420 (W); Puerto Rico: E. Schwindt 578 (MO); Mineral: E. Schwindt 657 (W). Dep. San Ignacio: Santo Pipó: G. J. Schwarz 4627 (MO); Arroyo Ñancanguazú: G. J. Schwarz 6103 (C, K).
Dep. Candelaria: Jabelbyry: J. E. Montes 786 (W); Arroyo Bonito: G. J. Schwarz 965 (BM, S, W). Posadas: Picada: Bertoni 852 (NY, W); Bonpland: E. L. Ekman 1977 (S). Dep. San. Javiér: Arroyo Ramon: Bertoni 3802 (US), 3808 (G), San Javier: A. G. Schulz 7015 (BR, K, NY, S); Alba Posse: G. J. Schwarz 4043 (BR); Tres Bocas: G. J. Schwarz 4096 (C); Santa Rita: G. J. Schwarz 4204 (C); Durañona: G. J. Schwarz 4256 (C, MO).

PARAGUAY:

s. prov.: E. Hassler 1849 e (NY); G. W. Teague s.n. (BM); Río Apa region: Hassler s.n. (B); between Río Apa and Río Aquidabán: Fiebrig 4839 (BM, G, K), 4932 (BM, G, K); near Tobati: E. Hassler 1847 (BM, G, K, NY); near Sapucay: E. Hassler 1847 a (G, K); near Villa Occidental: P. G. Lorentz 116 (B), 118 (B, US), 121 (B, US); Río Y-acá valley: E. Hassler 7055 (BM, G, MO, NY, S).
Dep. A m a m b a y : near Bellavista: Hassler 8393 (B, BM, G, K, MO, NY, S).
Dep. C o n c e p c i ó n : Concepción: T. Rojas 54 (BAF), 10906 (= Herb. Hassler) (G).
Dep. S a n P e d r o : near Lima: A. Krapovickas; C. L. Cristóbal & L. Z. Ahumada 14263 (C); Alto Paraguay; Primavera: A. L. Woolston 424 (C, K, NY, S), 473 (C, K, NY, S, US).
Dep. C e n t r a l : T. Morong 645 (BM, G, K, MO); Asunción: Anisits 301 (S); B. Balansa 2413 (B, BM, G, K, S), 2413 a (B, G); Gibert 1024 (B, K); T. Rojas s.n. (BAF); G. W. Teague s.n. (BM); Villa Elisa: T. M. Pedersen 3152 (BR, C, G, MO, NY, S, US).
Dep. N e e m b u c u : near Tebicuary: E. Hassler 1847 b (G, K); near Azucarera, Tebicuary: C. V. Pavetti Morin 3591 (BAF).
Dep. L a C o r d i l l e r a : Cordillera de Altos: K. Fiebrig s.n. (B), 776 (BM, G, K, M); E. Hassler 3665 (BM, G, K, NY), 3786 (B, BM, G, K, NY, S); 2,5 km E of Caacupé, Itúmi, Cordillera de Altos: A. Schinini 14797 (MO), Caacupé: W. A. Archer 4819 & T. Rojas (US); near Altos: E. Hassler 587 (G); Lago Ypacarai region: E. Hassler 11502 (BM, C, G, K, MO, NY, S); San Bernardino: R. Endlich 34 (G), 211 (B);

E. Hassler 1102 (G), 1214 (G), 1502 (G), 1608 (G); T. Rojas 13291 (C); G. W. Teague 671 (BM).
Dep. C a a g u a z ú : Coronel Oviedo : T. Rojas 14438 (BAF).
Dep. G u a i r a : Villarrica: P. Jörgensen 3758 (C, MO); Monte Santa Clara: J. E. Montes 15868 (BR, S, US).
Dep. C a a z a p á : Cordillera de Caaguazú: J. West 8535 (MO).
Dep. A l t o P a r a n á : K. Fiebrig 5800 (G, K, US), 5818 (BM, G, K. US).

BRAZIL:

s. prov.: Sello 2466 (B); "Oliveiras, Linha Rio Claro": A. Löfgren 681 (SP).
R i o G r a n d e d o S u l : Cerro Largo, near S. Luiz: P. Buck 10936 (B); S. Francisco de Paula, Vila Oliva: P. Buck 28038 (MO); S. Leopoldo: J. Dutra 826 (R); Caracol near Canela: K. Emrich 50176 (B); Pôrto Alegre: Fox 287 (B, K); Pôrto Alegre, near Navegantes: Reineck & Czermak 706 (G); Rio Jacuí near Pôrto Alegre: Tweedie s.n. (K); Cruz Alta: G. O. A. Malme 1125 (S); Ipanema near Pôrto Alegre: G. Pabst 7280 (BM); B. Rambo 60 (SP); Belém Novo, on Rio Guaiba: M. A. Palacios & A. R. Cuezzo 417 (G); Chachoeirinha near Gravataí: B. Rambo 39569 (B, W); Sapucaia: B. Rambo 40448 (W); Esteio: B. Rambo 40602 (BR, G); Morretes near Canoas, Vasconcellos Jardim: B. Rambo 41372; Schwabenschneis near Novo Hamburgo: B. Rambo 41680 (B, US); Vila Elsa on Rio Guaiba: B. Rambo 41919 (BR, MO, W); on Rio Piaí near Caxias: B. Rambo 47162 (B, BR); Sta. Maria: W. Rau s.n. (RB); Cerro Largo: A. Sehmen 3599 (B); Montenegro, Pareci Novo: Strieder 33067 (C, K, US).
S a n t a C a t a r i n a : Mun. Descanso, Belmonte: A. Castellanos 24812 (MO); Herval: P. Dusén 11825 (NY, S); Coqueiro, Itapiranga: R. M. Klein 5161 (NY, R); Aguas de Chapecó: R. M. Klein 5285 (R); Nova Teutonia: F. Plaumann 22 (RB); Passo do Socorro, Lajes: P. R. Reitz 6552 (R, US); Itajaí, Luis Alves, Braço Joaquim: Reitz & Klein 2722 (B, NY, R, US); Sabiá, Vidal Ramos: Reitz & Klein 6315 (B, G, M, NY, R, S, US); Serra do Espigão, Monte Castelo: Reitz & Klein 12495 (R); Lacerdópolis, Capinzal: Reitz & Klein 14686 (NY, R, US); Blumenau: Schwacke 97 coll. IV (R); Mun. Mondaí-Itapiranga, 29 km S of Iporã: L. B. Smith & R. Klein 11725 (NY, R, US); Mun. Joaçaba, 2 km S of Joaçaba, west bank of Rio Peixe: L. B. Smith & R. Klein 11893 (R, NY, US); Mun. Chapecó, 3 km E of Rio Uruguai Station: L. B. Smith & P. R. Reitz 9764 (R, US); near Tubarão: E. Ule 1006 (HBG, US).
P a r a n á : Gil da Rocha 34 (HBG, RB); Vila Velha: A. Castellanos 22275 (HBG, R); Dusén 14286 (NY), 14826 (K, MO, S); G. Jönsson 1255 a pro parte! (S); Parque Nacional do Iguaçú: A. P. Duarte 1641 & E. Pereira (HBG, R, RB); G. Hatschbach 9760 (US); J. G, Kuhlmann s.n. (RB); E. Pereira 5324 (B, RB); A. Duarte & E. Pereira s.n. (W); Therezina: P. Dusén 11179 (K, NY, S); Ipiranga: P. Dusén 12079 (S);

Serra do Mar near Ipiranga: P. Dusén 12151 (S); Patrimonio: P. Dusén 16860 (MO, NY, S); Mun. Cianorte, Fda. Lagoa: G. Hatschbach 14371 (US); Mun. Icaraima, road to Pto. Camargo: G. Hatschbach 15769 (NY, US); Mun. Guaraqueçaba, Rio do Cedro: G. Hatschbach 18518 (C); Mun. Mal. Candido Rodon, Dois Irmãos: G. Hatschbach 19156 & O. Guimaraes (C, HBG, K, M, MO, SP); Porto Sta. Helena: G. J. Schwarz 7437 (BR, NY, S).

S a o P a u l o : Capital, Chácara dos Morrinhos: F. Glasauer, Herb. Pickel 4564 (HBG, IPA, SP); Santa Rita do Passa Quatro: E. Hemmendorff 68 (S); Paranapanema valley: A. Löfgren 4462 (SP); Ytú: Martius 615 (M); Serra do Caracol: H. Mosén 1572 (S); Loreto: O. Vecchi II 164 (R).

R i o d e J a n e i r o (incl. Guanabara): Widgren s.n. (S); Carmo: Neves Armond 149 (R); Angra dos Reis, Fazenda Japuhyba: M. Kuhlmann 2626 (SP); Campos: A. Sampaio s.n. (R).

E s p i r i t o S a n t o : plateau of Macuco, Reserva de Sooretama: D. Sucre 5677 (HBG, RB).

M i n a s G e r a i s : Catueiro, Goianá: Vasco Gomes 2411 (R, RB).

B a h i a : Rio S. Francisco, Serra Açurua, Utinga: Blanchet 2908 (B, G, K; non BM!); Pituba do Caraiba: P. Campos Porto 2499 (R, RB).

The following collections are "mixta composita" with *S. macrophylla*. For that species the given localities may be correct, but they are probably wrong for *S. aculeata*:

A m a z o n a s : Rio Branco, Jani: J. G. Kuhlmann 358 (HBG, RB).

R o r a i m a : Ilha do Ajarani: J. G. Kuhlmann 359 (R, RB, W).

This last collection is represented in R and W only by its *S. aculeata*-part, as No. RB 3104 (without collector).

The following collections are aberrant by showing unusually many rare characters in the same plant:
Rio de Janeiro: Souza Brito 28 (R);

Asunción: B. Balansa 2414 (B, G, K); in this collection especially the thorns are striking, as they are directed slightly towards the tip of the branch. The leaf-shape and the relatively short inflorescences are reminiscent of *S. paraguayensis*, but the indumentum and the bracteoles are fairly typical of *S. aculeata*.

In this group the number of collections is now large enough to show nearly every imaginable transition, so that the far-reaching reductions appear justified.

Already H. WALTER (1910) doubted whether *S. elliptica* R. E. Fries was separable from *S. parvifolia* Benth. and he noticed as well that both were rather close to *S. guaranitica* Speg.

As can be seen from the notes on the type specimen HEIMERL recognized his *S. securigera*, published in 1912, as being conspecific with *S. guaranitica* Speg. only two years later.

In 1934 he included both in *S. parvifolia* Benth. NOWICKE (1968) reduced *S. elliptica* R. E. Fries, *S. guaranitica* Speg. and *S. votschii* H. Walter to *S. parvifolia* Benth., neglecting *S. securigera* Heimerl. She still kept separate what she thought to be "*S. americana*". These two taxa she noticed to be the "catch-alls" of the genus, being "very variable" and "very difficult to define". She separated them by "samara wing with protuberance, leaves generally elliptic or ovate-elliptic, the stipules ± straight" as opposed to "samara wing without protuberance; leaves more ovate, or ovate-rounded, the stipules recurved". With the increase of material this already weak borderline vanished completely, not only because of a lack of correlation between these characters but also because of transitions within the same collection.

Why the complex thus arising must be called *S. aculeata* instead of *S. americana* has already been explained on p. 235-237

The only really new element added to the synonymy is *S. coriacea* Benth. At first sight this may be astonishing because WALTER as well as NOWICKE placed this "species" in the group with lateral winglets at the base of the fruit. But these two authors examined very different material. NOWICKE saw a specimen with the type number, Blanchet 2908, from BM, and only this specimen really has those winglets. She commented on the perplexing deviation of this plant from the original description without recognizing that this was not the same species as the one she saw in a photograph of the specimen of the same number at G. This latter had been examined by WALTER, who certainly had removed from it the fragments preserved in B. As in other cases, he must have mixed up filament-impressions on the ovary with primordia of winglets; of the latter there is not any trace here.

BENTHAM has based his description of *S. coriacea* on one of the specimens of Blanchet 2908 at Kew[9], and these are identical with the material at B and G, but very different from that at BM. Therefore I cannot accept the latter as an isotype. So *S. coriacea* has to be transferred to the group without lateral winglets. Within that group, however, it cannot be satisfactorily separated from the variable *S. aculeata*. The variational range of this species includes all characters of the type of *S. coriacea*.

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[9] From his description, however short it may be, it is even possible to tell which one.

3. *Seguieria langsdorffii* Moq. in DC., Prodromus XIII, 2 (1849) 6; Type: Langsdorff s.n. (Holo K).

Albertokuntzea langsdorffii (Moq.) O. Kuntze, Revis. Gen. Pl. 2 (1891) 550

Seguieria glaziovii Briq. in Ann. Conserv. et Jard. Bot. Genève 4 (1900) 214; Type: Glaziou 13126 (Holo G, Iso B, BR, C, K).

S. affinis Heimerl in Denkschr. Akad. Wien Math.-Nat. 79 (1908) 232; Syntypes: Campos Novaes 1026 and 1027 (W†; Lectotype ex Isosyntypes: Campos Novaes 1027 US, select. Nowicke in Ann. Missouri Bot. Gard. 55 (1968), Isosyntypes No. 1026 SP, US).

S. mammifera H. Walter in Engler, Pflanzenreich IV, 83 (1909) 99; Type: Riedel s.n. (Holo LE (Photo), Iso B).

S. rigida H. Walter, l.c. p. 98; Syntypes: de Moura 985, Riedel s.n. (LE n.v., B).

Tree up to 30 m high (but usually not more than 20 m), rarely shrub, never scandent. Thorns straight, + directed towards the tip of the branch, sometimes well developed (up to 14 mm long on a twig of 4 mm diametre, on older branches or on suckers even up to 50 mm long and perpendicularly spreading), sometimes very small, sometimes absent. Petiole 2-14 mm long. Leaf-blade rather variable in shape, often ± elliptic, otherwise lanceolate or ovate, more rarely obovate, up to 15 cm long and 7,5 cm wide but mostly smaller, being widest at ± the middle, (1.4-) 2-4 (-5.7) times longer than wide, normally coriaceous when mature, rarely chartaceous, matt to shining, at the base attenuate to obtuse, rarely rounded, at the tip acuminate to obtuse to slightly emarginate, mostly distinctly mucronulate.

Inflorescences often axillary, rarely terminal, racemes to panicles, up to 20 cm long, about 10 to 80 flowered, the terminal ones rarely >100 flowered and about 30 cm long, sparsely to densely pubescent (hairs one- to many-celled, rarely branched simply, rarely partly collapsed). Bracts only rarely leaf-like, otherwise up to 3 mm (rarely 6 mm) long. Bracteoles smaller, up to 2 mm long. Pedicels 2 to 12 mm long, buds up to 4.5 mm diametre. Tepals up to 6.5 mm long and 5 mm wide, sometimes becoming black on drying. Stamens about 15 to 45. Filaments up to 4 mm long. Anthers up to 3 mm, very rarely 3.5 mm long. Ovary very often becoming dark on drying, without primordia of lateral winglets, but often distinctly nerved or on drying with deep impressions by the filaments. Stigma normally covering half to the tip of the style, more rarely completely lateral or covering the tip completely.

Fruit mostly becoming black on drying, otherwise becoming brown, never pale, up to 50 mm long. Basal part up to 10 mm in diametre, either nerved or papillose, more rarely smooth. Terminal wing up to 70 mm wide, at the thicker margin ± straight or convex (very rarely slightly concave), at the other rather variable, sometimes slightly constricted next to the basal part. Testa black.

BRAZIL:

s. prov.: Binot III (BR); Bowie & Cunningham s.n. (BM); Glaziou 3863 (C); M. V. Queluz 7 (SP); Riedel s.n. (B, G, K), 908 a (B); F. Sello s.n. (BM); Widgren 121 (S).
E s p i r i t o S a n t o : Piracema: E. Pereira 9850 (M, NY), 9858 (K, M).
M i n a s G e r a i s : Langsdorff s.n. (K); 31 km from Poté, along road MG-3 to Teófilo Otôni: G. Davidse, T. P. Ramamoorthy & D. M. Vital 11498 (MO, US); 11 km N of Medina, along road BR 116: G. Davidse, T. P. Ramamoorthy & D. M. Vital 11566 (MO, US); Curimataí ("Curimotohy"): Glaziou 13126 (B, BR, C, G, K); Estacao Experimental de Café Coronel Pacheco: E. P. Heringer 526 (RB), 526 a (SP), 956 (SP); Caratinga: J. G. Kuhlmann 3 (R, RB); Teófilo Otôni: Mendes Magalhães 16961 (US); Viçosa, road to São Miguel, near km 11: Ynes Mexia 4358 (BM, G, K, MO, S, US); road to Barroso, near km 15: Ynes Mexia 4444 (BM, G, K, MO, S, US).
R i o d e J a n e i r o (incl. Guanabara): J. T. de Moura 985 (B); Riedel s.n. (B); Widgren s.n. (S); Petrópolis: A. Glaziou 3864 (C), 8259 (B, C, G, K); ibid, Castelania: ex Herb. Esc. Polytécnica 6097 (R); ibid, S. Antonio: A. Glaziou 5729 (C); Carmo: Neves Armond 148 (R); Nova Friburgo, Fazenda Dr. Goebel: A. P. Duarte 6268 (HBG, R, RB), 6295 (R, RB); Serra dos Orgãos: Gardner s.n. (BM); A. Mattos Filho 92 (HBG, R, RB); 98 (BM, MO, R, RB); J. Miers 4502 (K; non BM!); Jacarepaguá: F. C. Hoehne 24737 (US); E. Pereira 3639 (RB), 5655 (B), 5657 (M, NY); E. Pereira 4495 & A. Duarte (HBG, RB); Campos: A. Sampaio 8293 (R); 8307 (R), 9017 (R, RB).
S ã o P a u l o : Riedel s.n. (B); Angatuba, Fazenda do Servicio Florestal: M. Emmerich 2805 & R. Dressler (HBG, R); Campos do Jordão: Goro Hashimoto 67 (RB); Cubatão: D. Hoehne s.n. (SP); Serra da Cantareira: M. de Koscinski 125 (SP), M. Koscinsky 359 (SP); Firma Tanandare de Toledo jr. & A. C. Brade 7450 (= Brade 7450) (R, SP); Sta. Isabel: M. Kuhlmann s.n. (HBG, SP); Amparo, Monte Alegre: M. Kuhlmann 663 (SP); Limeira: M. Kuhlmann 818 (SP); near Viracopos airport: H. F. Leitão Filho 163 (NY); Campinas: F. de Campos Novaes s.n. (SP), 1026 (US, SP), 1027 (US), 1900 (B); Chácara dos Morrinhos: B. Pickel 4624 (SP), 4624 a (HBG, IPA).
P a r a n á : Serra da Prata, Caixa de Agua: P. Dusén 10225 (S); Porto Dom Pedro II: P. Dusén 11518 (S); Mun. Bocaiuva do Sul, Descampado: G. Hatschbach 3725 (US); Mun. Guaratuba, Garuva: G. Hatschbach 5524 (US); Mun. Arapoti, road to W. Braz., 15 km from Arapoti: G. Hatschbach 8363 (B, MO, US); Mun. Rio Branco do Sul, Curiola: G. Hatschbach 17589 (HBG); ibid, Quebrada Funda: G. Hatschbach 26848 (S); ibid, Serra do Caete: G. Hatschbach 42199 (HBG, NY); Mun. Campina Grande Sul, Sitio do Belizario: G. Hatschbach 17815 (C, K), 17826 (C); Mun. Cerro Azul. Estrela: G. Hatschbach 42546 (HBG); Vila Velha: G. Jönsson 1255 a pro parte! (S).
S a n t a C a t a r i n a : Blumenau: Ferreira s.n. (R); P. R. Reitz 4630 (R, US); Brusque: Inst. de Malariologia, Eq. Ecologia 143 = H. Veloso 143 = R. Klein 288 = R. Klein

290 (B, NY, R, RB, S, US); P. R. Reitz 3464 (R, S, US), Cunhas, Itajaí: R. M. Klein 1183 (B, NY, R, US), 1280 (= Reitz & Klein 1280) (R, US), Serra do Matador, Rio do Sul: P. R. Reitz 6085 (BR, G, M); Ibirama: Reitz & Klein 1563 (NY, R, S, US); Braço Joaquim, Luis Alves: Reitz & Klein 2257 (B, NY, R, US); Itajaí, Luis Alves: Reitz & Klein 2409 (B, NY, R, US).

Two collections look somewhat aberrant within this species but nevertheless seem to belong here:

Serra dos Orgãos: A. C. Brade 11503 (R); Glaziou & Schwacke (?) s.n. (R).

In this species the collections may be arranged in a more or less linear sequence. One extreme of this sequence are the plants labelled as "*S. langsdorffii*" by WALTER (they are not identical with the type). Their leaves are very narrow and relatively sharp-pointed. Rather close to them is "*S. rigida*" which again is continuously linked to "*S. affinis*". From this form "*S. mammifera*" is transitonal to "*S. glaziovii*" at the other extreme. The type of *S. glaziovii* has rather wide and almost aberrantly large leaves with retuse tips. Only very few collections cannot be placed within this line but rather form a "shortcut", e.g. between "*S. rigida*" and "*S. glaziovii*". As already mentioned, this variation is not directed geographically.

4. *Seguieria paraguayensis* Morong in Ann. New York Acad. Sci. 7 (1892) 210; Type: Morong 690 (Holo ?, Iso MO, Fragm. B).

S. inermis H. Walter in Engler, Pflanzenreich IV, 83 (1909) 88; Type: Riedel 908 (Holo LE (Photo), Iso B).

Tree up to 20 m, rarely 25 m high, rarely high shrub, never climbing. Thorns often very small or absent, but sometimes well developed (up to 7 mm long on a twig of 2 mm diametre), straight, a little directed towards the tip of the branch, sometimes spreading perpendicularly. Petiole 4-18 mm long. Leaf-blade normally ovate-elliptic to elliptic, rarely lanceolate, up to 9 cm long and 5,5 cm wide, being widest mostly 1/3 above the base to about at the middle, 1,2 to 2,3 times longer than wide (very rarely young leaves even 4 times longer than wide), chartaceous to coriaceous, normally matt, rarely almost shining, at the base widely wedge-shaped to obtuse, more rarely rounded or narrowly wedge-shaped, at the tip rounded or obtuse, sometimes a little retuse, rarely acute or acuminate, very often strongly mucronulate.

Inflorescences often axillary, more rarely terminal, simple or compound racemes, up to 10 cm, rarely 20 cm long, up to 20-flowered, sparsely to densely pubescent (hairs one- to many-celled, rarely branched simply, sometimes collapsed). Bracts rarely leaf-like, otherwise up to 5 mm long.

Bracteoles absent (but see p. 240). Pedicels 3.5 to 9 mm long, buds up to 4.5 mm in diametre. Tepals (in about 1/3 of the flowers only 4!) up to 5.5 mm long and 4.5 mm wide. Stamens about 20 to 35. Filaments up to 4.5 mm long. Anthers 2 to 3 mm long. Ovary without primordia of lateral winglets, normally smooth. Stigma completely lateral.

Fruit pale on drying, up to 30 mm long. Basal part up to 6 mm in diametre, either smooth or with prominent veins at the base. Terminal wing up to 11 mm wide, at the thicker margin ± straight or slightly convex, at the other ± convex to ± sigmoid, being widest 3/5 to 1/4 below the tip. Testa black.

BOLIVIA:

Dep. S a n t a C r u z : road between Sta. Cruz and the Río Piray: T. Herzog 1452 (G, S); Prov. Cercado, Barque del Canado del Piray: J. Steinbach 7121 (BM).
Dep. B e n i : Prov. Ballivián: near Río Yacuma: St. G. Beck 5621 (HBG).

PARAGUAY:

s. prov.: B. Balansa 2415 b (S); near "Villa occidental": P. G. Lorentz 106 (B, US).
Dep. C e n t r a l : Morong 690 (B, MO); Asunción: B. Balansa 2415 (B, G, K, S); T. Rojas s.n. (BAF); G. W. Teague 656 (BM).
Dep. L a C o r d i l l e r a : San Bernardino: R. Endlich 33 (G), 210 (B); E. Hassler 1584 (G); 3712 (B, BM, G, K, NY, S), 3887 (B, BM, G, K); Cordillera de Altos: K. Fiebrig 869 (BAF, BM, G, K, M, US); E. Hassler 1764 (BM, G, K, NY); Lago Ypacarai region: E. Hassler 12400 (BM, C, G, K, MO, NY, S, US).

ARGENTINA:

s. prov.: S. Venturi 222 (BAF).
Terr. F o r m o s a : on Río Salado: P. Jörgensen 1992 (US).

BRAZIL:

M a t o G r o s s o : near Cuyabá: Riedel 908 (B).

S. inermis has been reduced to *S. paraguayensis* here. WALTER placed the two "species" in different sections of the genus, *S. inermis* in Sect. *Euseguieria* with decurrent tubercules on the ovary and with lateral winglets at the base of the fruit and *S. paraguayensis* in Sect. *Seguiriella* without these characters. The type collection of *S. inermis* does not include fruits. Its flowers, however, actually do not show the slightest trace of primordia of winglets. WALTER was probably deceived by impressions of the filaments. There is only one character in which the type of *S. inermis* seems to differ from *S. paraguayensis*, viz. it seems to possess bracteoles. Upon closer examination this difference cannot be maintained. Not all flowers are provided with bracteoles,

and sometimes there is only one. But each supposed bracteole always subtends a bud, although this bud may sometimes be very small. So there is essentially no difference to the "typical" *paraguayensis*-inflorescences, since in these one or rarely two small leafy organs may be found in the position of bracteoles, being bracts of further buds.

The inflorescence of *S. inermis* is not glabrous as WALTER has described it, but shows the same hair type as *S. paraguayensis*. The absence of thorns in some branches also is nothing unusual. All other characters are concordant already in WALTER's description.

5. *Seguieria macrophylla* Benth. in Trans. Linn. Soc. London 18 (1841) 235; Type: Schomburgk 348 (K).

Albertokuntzea macrophylla (Benth.) O. Kuntze, Revis. Gen. Pl. 2 (1891) 550

Seguieria cordata Britton in Bull. Torrey Bot. Club 48 (1921) 331; Type: Broadway s.n., TRIN 9122 (Holo TRIN n.v., Iso K).

Tall liana or at least climbing shrub. At least older branches hollow. Thorns recurved, mostly well-developed (up to 12 mm long on a twig of 4 mm diametre) or very small, rarely absent. Petiole 3 to 14 mm long. Leaf-blade very often elliptic, otherwise ovate-elliptic, very rarely lanceolate or obovate-elliptic, up to 18 cm long an 8.5 cm wide, being widest at about the middle or below, 1.4 to 3.3 times longer than wide, mostly coriaceous, very often matt, rarely shining, at the base normally rounded, otherwise obtuse, rarely acute, at the tip normally shortly acuminate to obtuse, rarely rounded or retuse, very rarely a little emarginate, mostly distinctly mucronulate.

Inflorescences axillary or terminal panicles, up to 50 cm long, normally profusely flowering, often >100-flowered, sparsely to densely pubescent (hairs mostly many-celled, rarely branched simply, very rarely p.p. collapsed). Bracts very rarely leaflike, otherwise up to 5 mm long (mostly smaller). Bracteoles smaller, up to 1.5 mm long. Pedicels 3 to 9 mm long. Buds up to 3 mm, rarely 4 mm in diametre. Tepals up to 4.5 mm (rarely 6 mm) long and 3.5 (rarely 4.5 mm) wide. Stamens about 15 to 40, filaments up to 3.5 mm (rarely 4.5 mm) long, anthers 1.5 to 2.5 mm long. Ovary without primordia of lateral winglets, becoming dark on drying. Stigma normally completely lateral, very rarely covering up to the whole tip of the style.

Fruit becoming black on drying, up to 40 mm long. Basal part up to 8 mm in diametre, smooth or a little veined. Terminal wing up to 16 mm wide, at the thicker margin ± straight or convex or a little concave, at the other normally a little constricted next to the basal part, widened towards the tip, being widest at about the middle to nearly at the tip. Testa black.

BRITISH GUIANA:

R. Schomburgk 347 (BM), 348 (K); Lethem, Rupununi Dist.: V. Graham 375 (K); Courantyne River: G. S. Jenman 503 (K); E. F. im Thurm s.n. (K); NW part of Kanuku-Mountains, Mount Iramaikpang: A. C. Smith 3650 (K, US).

TRINIDAD:

Los Bajos, near government school: W. E. Broadway s.n. (K).

VENEZUELA:

s. prov.: lower Orinoco, Sacupana: H. H. Rusby & R. W. Squires 57 (B, BM, G, K, M, US).
Est. Delta Amacuro: Caño del Uricoa, San Antonio: F. E. Bond, T. S. Gillin & S. Brown 142 (K); Caño de Corisal, Corisal: F. E. Bond, T. S. Gillin & S. Brown 208 (US); Dep. Tucupita, 13-14 km SE of Piacoa, along trail to Río San José: G. Davidse & A. C. Gonzáles 16462 (HBG, MO).
Est. Miranda: Paparo: H. Pittier 11049 (NY, VEN); hills of Bachiller, western part, S of Caño Rico and Bachiller, 11 km (by air) SSE of El Guapo: J. A. Steyermark & G. Davidse 116786 (MO, VEN).
Est. Apure: Dist. San Fernando, ca. 4.5 miles (by air) ESE of San Carlos del Meta, on banks of Río Meta: G. Davidse & A. Gonzáles 13805 (MO, VEN); ibid, near Las Caracas, 12 km (by air) NW of Puerto Páez, on banks of Río Meta: G. Davidse & A. Gonzáles 14360 (MO, VEN); Dist. Pedro Camejo, ca. 3 km E of Mata de Guanábano, on banks of Río Meta: G. Davidse & A. Gonzáles 14346 (MO, VEN); ibid, bank of Río Orinoco, 35 km (by air) NE of Puerto Páez, just NE of Isla El Gallo: G. Davidse & A. Gonzáles 14470 (MO).
Est. Barinas: Punta de Piedras, on Río Caparo: L. Bernardi 1161 (K, NY, VEN); Reserva Forestal Caparo, unit I, E of Cachicamo camp, E of El Cantón: J. A. Steyermark, G. Bunting & C. Blanco 102102 (K, VEN).
Est. Zulia: near Machiques, Perija: L. Aristeguieta & (?) 2103 (VEN).

PANAMA:

Prov. Darién: Pico Piriaque: J. A. Duke 8149 (MO).

COLOMBIA:

Dep. Atlántico: border of Dep. Bolívar, Los Pendales: A. Dugand & R. Jaramillo 4127 (= A. Dugand 4127) (NY, US, VEN), 4131 (NY, US).
Dep. Meta: floodplain of Río Metica, just E of Puerto Lopéz: G. Davidse 5471 & F. Llanos (MO, US).

PERU:

Loreto: upper Amazonas, Maynas, Yurimáguas: Poeppig 7 (?) (W), 2176 (B).
Madre de Diós: Parque Nacional de Manu, Río Manu, Cocha Cashu camp: A. Gentry, J. Aronson & R. Ramirez 26854 (MO).

BRAZIL:

R o n d ô n i a : Guajará-Mirim, Bolivian border: J. G. Kuhlmann 440 (HBG, RB).

A m a z o n a s : Rio Juruá basin, near mouth of Rio Envira (tributary of Rio Tarauacá): B. A. Krukoff 4669 (B, G, K, S US), 5206 (G, K, S, US); Rio Branco, Jani: J. G. Kuhlmann 359 pro parte! cf. *S. aculeata* (HBG, RB).

R o r a i m a : Road Bôa Vista - Caracaí, Rio Mucajaí: R. L. Fróes 23076 (RB); Ilha do Ajaraní: J. G. Kuhlmann 359 pro parte! cf. *S. aculeata* (RB).

P a r á : Belém, southern forest of the IAN: W. A. Archer 7936 (K, MO, NY, S, US); Boca do Lago do Faro: A. Ducke 8657 (RB, US); road Bragança - Viseu, banks of Rio Piria, S of Curapati: G. T. Prance & D. T. Pennington 2046 (K, NY, US).

M a r a n h a o : Sao Luís, Granja Bareto: R. L. Fróes 28530 (SP); Rio Maracaçumé region, Candido Mendes: R. Fróes 1924 (under Krukoff) (BM, G, K, MO, S); Rio Alto Turiacu, Nova Esperança: J. Jangoux & R. P. Bahia 286 (NY).

The specimen A. C. Smith 3650 from US is extremely deviating from the normal appearance of this species. A duplicate from K, however, shows that it is a stunted *S. macrophylla*.

The reduction of *S. cordata* is based on the examination of the isotype from Kew. NOWICKE labelled this specimen as "insufficient material", and it really is rather scanty. Nevertheless the examination of a bud, poorly developed as it was, revealed good agreement with *S. macrophylla*: anthers 25, incised 2/5 at the base and 1/3 apically[10]; ovary dark-coloured, without winglet-primordia, stigma only convering a very small part of the apical edge of the flattened style. The indumentum of the pedicels also was typical of *S. macrophylla*.

In contrast to this there is rather poor agreement with the original description. The thorns are clearly recurved, not "nearly straight" and the leaves are by no means "cordate or subcordate at the base" but at most widely rounded. If the type collection of *S. cordata* is not heterogeneous (as is the type collection of *S. coriacea*) and if other parts of it do not show completely different characters, there is no reason to separate it from *S. macrophylla*.

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10 This deep incision is one of the many characters which are neither confined to a species nor constant within it but which nevertheless may help recognizing species because they are much more frequent in some than in others.

6. *Sequieria brevithyrsa* H. Walter in Engler Pflanzenreich IV, 83 (1909), 87; Type: Rusby 1353 (Holo G, Iso B, BM, K, NY, US).

Liana or climbing shrub. All parts of the plant becoming dark on drying. Thorns recurved, normally well developed (up to 8 mm long on a twig of 5 mm diametre). Petiole 5 to 15 mm long. Leaf-blade elliptic to lanceolate, up to 15 cm long and 6,5 cm wide, being widest at about the middle or below, 2 to 4 times longer than wide, in younger leaves relatively narrower than in older, firmly chartaceous to coriaceous, matt to almost shining, on drying becoming olive-blackish, at the base acute to rounded, at the tip normally acuminate, otherwise acute, distinctly mucronulate.

Inflorescences axillary (also terminal?) racemes, up to 8 cm long, up to 20-flowered, usually glabrous, rarely with a few hairs. Bracts up to 3 mm long. Bracteoles absent. Pedicels 3 to 8 mm long. Buds up to 3.5 mm in diametre. Tepals up to 5 mm long an 3.5 mm wide. Stamens about 20. Filaments up to 3.5 mm long, anthers 2 to 2.5 mm long. Ovary often with a small keel on either side, without primordia of lateral winglets. Stigma completely lateral.

Fruit becoming black drying, up to 50 mm long. Basal part up to 10 mm in diametre, at the base somewhat ridged, mostly with a distinct keel on either side. Terminal wing up to 20 mm wide, at the thicker margin ± straight or a little concave, at the other widening from the base of the fruit, reaching its maximum width ± 1/3 below the tip. Testa black.

BOLIVIA:

Dep. L a P a z : Prov. S. Yungas, basin of Rio Ropi, San Bartolome (near Calisaya): B. A. Krukoff 10166 (G, K, MO, S, US); Guanai: Rusby 1353 (B, BM, G, K, NY, US).

S p e c i e s n o n s a t i s n o t a :

Sequieria ierensis Britton in Bull. Torrey Bot. Club 48 (1921) 331; Type: Britton, Freeman & Nowell 2527 (Holo TRIN? n.v., Iso US).

NOWICKE included this species (sphalm. *inerensis* Nowicke) in *S. brevithyrsa* H. Walter. From her citation of the type, "Britton, Freeman & Nowell 2527, probably NY", I conclude that she has not seen it; nor have I. Only a sterile isotype from US is known to me. This specimen, however, does not confirm this reduction in any way[11].

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[11] This part of the type collection might possibly be a sucker. In this case it could no longer serve as a basis for discussion, because suckers widely deviate from the normal appearance of the plants, as could be seen in other species.

The description of *S. ierensis* is in even better agreement with *S. macrophylla*, *S. americana* and *S. aculeata* than with *S. brevithyrsa*, because of the statements "panicles, many-flowered, ..., puberulent".

These characters are also found in the collection Smith 2706. Like *S. ierensis* this plant has been collected in Trinidad and it cannot be placed in any of the better documented species. This probably led NOWICKE to take it for *S. ierensis* and - because of striking similarity in overall appearance - to reduce this species to *S. brevithyrsa*. But in spite of all superficial agreement the collection Smith 2706 differs from *S. brevithyrsa* not only in the characters mentioned above but also in the presence of bracteoles. If this collection really represents *S. ierensis*, this species is clearly different from *S. brevithyrsa*. But since the isotype known to me is not in agreement with this collection either, I prefer to treat *S. ierensis* as "species non satis nota" until further collections are observed.

S p e c i m i n a i n c e r t a e s e d i s

Three collections were found to be intermediate between *S. americana* and *S. aculeata*:

Caracas: Gollmer s.n. (B); the rather immature fruits seem to bear only one winglet on either side, this winglet, however, being very distinct. Following vegetative characters this collection could be placed in both species.
Pará: Rio Trombetas, below the rapids of Porteira: A. Ducke s.n. (R, RB); only some ovaries seem to have lateral winglets. Following vegetative characters, this collection would be near the limits of the variational range of both species.
Roraima: Rio Apiaú, 30 km from mouth: G. T. Prance; E. Forero, B. S. Pena and J. F. Ramos 4163 (G, K, M, MO, NY, S, US); the immature fruits show at their base several ridges in very regular distribution, but these ridges cannot be taken for real winglets. In the flowers there is no trace of winglet-primordia. In overall appearence this plant is closer to *S. americana*, especially to the type of *S. foliosa*.

Species exclusa:

S. asiatica Lour., Fl. Cochinch. 1. (1790) 341

There exists no material of this species. In the description the statements "capsula ... 2-valvis" and "semen ... connexum ala magna" suggest that this is no *Seguieria*.

Apart from that, only once a *Seguieria* has been collected outside South America up to now, and this was a cultivated specimen from the Botanical Garden of Victoria, Cameroons.

2. *Gallesia*

Casaretto, Nov. stirp. bras. dec. 5 (1843) 43
- monotypic -

Gallesia integrifolia (Spreng.) Harms in Engler & Prantl, Nat. Pflanzenfam. Ed. 2, 16 (1934) 144

Thouinia integrifolia Spreng., Neue Entdeck. II (1821) 155; Type: Sello s.n. (Holo B).
Crataeva gorarema Vell., Fl. Flumin. I (1825) 200
Gallesia gorarema (Vell.) Moq. (sphalm. *G. gorazema* Moq.) in DC., Prodromus XIII, 2 (1849) 8; Type lost.[12]
G. scorododendrum Casar., Nov. stirp. bras. dec. 5 (1843) 44; Syntypes: Casaretto 539 and ? (TO? n.v., Isosyntype No. 539 G).
G. ovata O. C. Schmidt in Fedde, Repert. spec. nov. reg. veg. 32 (1933) 97; Type: A. Raimondi 11696 (Holo B).
G. integrifolia (Spreng.) Harms var. *ovata* (O. C. Schmidt) Nowicke in Ann. Missouri Bot. Gard. 55 (1968) 321

Tree, up to 35 m high. Branches terete to somewhat angled, often with lenticels, young branches sometimes sparsely pubescent. Leaves alternate, petiolate. Petioles up to 6 cm (8 cm?) long, usually more than 2 cm long, with minute and ephemeral stipule-like-prophylls in their axils. Leaf-blade entire, ± elliptic to ovate, more rarely lanceolate-elliptic, up to 23 cm long and 11 cm wide, about 1.3 to 3 times (often ± 2 times) longer than wide, being widest at about the middle or below, coriaceous (in young leaves chartaceous), either glabrous or on the lower surface with hairs along the midrib and/or in the axils of the nerves, at the base acute to widely rounded, less often attenuate, at the tip normally acuminate, rarely obtuse, mucronulate.

Inflorescences axillary or terminal panicles, branches somewhat angled, about 20 to > 100-flowered, up to 35 cm long, softly pubescent (hairs usually many-celled, rarely branched simply, usually not collapsed, directed towards the tip, appressed). Bracts rarely leaf-like, mostly triangular to ± ovate, herbaceous, up to 2.7 mm long but usually not more than 2 mm. Bracteoles similar, usually smaller, up to 1.7 mm

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12 STAFLEU (1967) states that "According to the preface of the Flora fluminensis the types were deposited at the "Cabinet d'Histoire naturelle de Rio de Janeiro". Since there is no material in R or RB today, the type is probably lost. If necessary, *G. gorarema* (Vell.) Moq. may be typified by plats IV in ARRABIDA, Fl. flum. Icones V (1835). The collection Vauthier 146, cited as type by NOWICKE, had only been examined by MOQUIN, but not by VELLOZO.

long, very rarely larger and similar to the tepals.

Flowers sessile to subsessile, rarely with pedicels of up to 4 mm lenght, hermaphrodite, ± actinomorphous. Perianth simple. Buds subglobose, up to 4 mm in diametre. Tepals four, imbricate, subequal, up to 5.5 mm long and 5 mm wide but usually smaller, herbaceous, on the outside densely pubescent, enlarged in fruit, erect, ± woody, up to 8 mm long and 5 mm wide, often incised at the tip. Stamens about 20 to 45, irregularly inserted, filaments + thread-like, shorter than the tepals, up to 2.5 mm long. Anthers linear, dorsifixed, extrorse, opening by longitudinal slits, up to 2.5 mm long, deeply incised at the base and at the tip. Ovary superior, unicarpellate, unilocular, ± ovoid, laterally compressed, on drying impressed by the filaments, very often sparsely pubescent. Style very compressed, ± winglike, asymmetric. Stigma distinctly papillose, running down the thicker margin of the styles. Ovule one, basal, campylotropous.

Fruit winged, up to 40 mm long, often sparsely pubescent when immature. Basal part subglobose to ovate, somewhat compressed, up to 8 mm in diametre. Wing up to 15 mm wide, at the thicker margin ± straight to convex, rarely a little concave, at the other variable. Seed one, erect, subglobose, ± compressed. Testa thinly crustaceous, ± shining, glabrous, red-brown. Embryo extremely curved. Germination epigaeous, cotyledons cordate, about 1,5 cm long and wide.

s. loc.: Sello s.n. (B).

BRAZIL:

s. prov.: Bowie & Cunningham s.n. (BM); Burchell 5066 (BR, K); Lund s.n. (B, C); Pohl s.n. (NY); Riedel s.n. (G, K); Sello s.n. (B); 651 (M); Vauthier 146 (K); Widgren s.n. (S); "Canta Gallo": Peckolt 301 (BR):
C e a r á : Frei Allemão 1307 (R); S. Pedro: Frei Allemão & M. de Cysneiros 1308 (R); Serra de Maranguape, on Rio Pirapora: A. Ducke 2339 (NY, VEN).
P a r a í b a : Bananeiras, Sítio Cumatí: D. de Andrade Lima 705859 (HBG, IPA).
P e r n a m b u c o : Floresta, Serra Negra: Academia Brasileira de Ciências 966 = E. P. Heringer, D. de Andrade Lima, J. de P. Lanna Sobrinho & A. Coelho Sarmento 966 (HBG, IPA, RB); D. de A. Lima 51920 (HBG, IPA).
B a h i a : Blanchet 3491 (BR); Ilhéus, Centro de Pesquisas do Cacau: R. P. Belém, A. M. Aguiar & J. P. Lana 1378 (NY); R. P. Belém & M. Magalhães 964 (NY); Jacoubina: Blanchet 50 (BM); Itabuna, Centro de Pesquisas do Cacau: M. Magalhães 19743 (M).
M i n a s G e r a i s : Freireich 54 (BR); Regnell 59 (R); near Juiz de Fora: A. Glaziou 3671 (C), 13125 (C, G, K); Caldas: A. F. Regnell III 1014 (BR, C, K, M, R, S, US); Mendanha: ex Herb. de Saldanha 352 (R).

R i o d e J a n e i r o (incl. Guanabara): Frei Allemao s.n. (BR, G, RB); ex Herb. J. Gay s.n. (K); A. Glaziou 5753 (K); Graham s.n. (K), 9 (G); F. C. C. Raben s.n. (C); Weddell s.n. (B), 400 (B, G, NY); Botanic Garden: Dionisio s.n. (RB); Praia da Gavea and Botafogo: ex Herb. de Saldanha 5093 (R); Aguas de Raposo, near Coelho Bastos: H. Delforge 33 (RB); Jacarepaguá, Curicia: A. P. Duarte 4766 & E. Pereira (HBG, RB); Copacabana: A. Glaziou 4753 (B, C, S); Campos: Humboldt 128 (B); A. J. de Sampaio 8508 (HBG, R); Recreio das Bandeirantes: B. Lutz 1427 (HBG, R, US), 1427 a (HBG, R); Restinga da Tijuca: O. Machado s.n. (RB); Paraíba do Sul, Fazenda do Sobral: J. de Saldanha & Schwacke s.n. (R); Horto Florestal: F. G. da Silva 346 (RB).
S a o P a u l o : Casaretto 539 (G); Iguape, Morro das Pedras: A. C. Brade 7886 (B, R, RB); Quilombo: A. Gehrt s.n. SP31735 (HBG, NY, SP); Rio Paraná, Mun. Porto Epitacio: Hatschbach & Guimarães 21746 (MO); Ilha de São Sebastião, Vila Bela: A. B. Joly 1091 (SP); Mun. Amparo, Monte Alegre do Sul: M. Kuhlmann 454 (SP), 1808 (SP); Serra do Caracol: H. Mosén 1571 (S); Campinas: Campos Novaes 942 (SP).
P a r a n á : Patrimonio: P. Dusén 16786 (NY, S); Mun. Cerro Azul, Capivaras: G. Hatschbach 11153 (B, M, US); ibid, Barra do Lageado Grande: G. Hatschbach 41566 (C, HBG, MO, NY); Adrianópolis, Barra Grande, on Rio Ribeira: G. Hatschbach 11309 (B); Mun. S. Antonio do Caiua, Rio Paranapanema: G. Hatschbach 14454 (NY, US); Mun. Icaraima, Vila Nova, Rio Paraná basin: G. Hatschbach 17063 (NY, US); Mun. Terra Bôa, Fda. Mururê: G. Hatschbach 21535 (C, MO, RB).
M a t o G r o s s o : banks of Rio Guaporé: Rondon 2439 (R).
A c r e : Rio Acre, Iracema: A. Ducke s.n. = RB24212 (G, K, RB, S, US); upper Rio Jurupari: B. A. Krukoff 5216 (BM, G, K, M, MO, NY, S, SP, US); near mouth of Rio Macauã, tributary of Rio Iaco: B. A. Krukoff 5405 (BM, G, K, M, MO, NY, S, SP, US).
A m a z o n a s : Rio Purús, below mouth of Rio Acre, Monteverde: A. Ducke s.n. = RB24211 (G, K, RB, S, US).

BOLIVIA:

s. prov.: Serrania Ricardo Franco: E. Schmidt 59 (M); Amazon basin, Cobendo: C. E. White 1032 (K).
Dep. L a P a z : Prov. S. Yungas, basin of Rio Bopi, San Bartolomé (near Calisaya): B. A. Krukoff 10118 (G, K, MO, NY, S, US); Caranadi in the Coroico valley: E. Schmidt 170 (M).
Dep. B e n i : Prov. Ballivián, Rio Matos: A. C. & W. Terceros 17 (MO).

PERU:

Dep. M a d r e d e D i ó s : Prov. Manu, near Manu: R. B. Foster 2500 (K, MO); Parque Nacional de Manu, Cocha Cashu camp, on Rio Manu: A. Gentry, J. Aronson & R. Ramirez 27134 (MO).
Dep. C u s c o : Prov. La Convención, Quillabamba: J. D. Boeke 1530 & A. Gentry (HBG, NY, RB); ibid, Rosario Mayo:

R. Chávez 3338 (MO); slopes along Río Urubamba near Quillabamba: A. Gentry, J. Revilla, D. Alfaro C. & D. Daly 19462 (MO); valley of Río Yanatili, Hacienda de Santiago: A. Raimondi 11696 (B).

Dep. J u n i n : Prov. Jauja, Satipo, forest reserve, Granja: C. Bazán Vásques 8 (G, NY, US, W), 16 (G, NY, US, W).

Dep. S a n M a r t i n : near Tarapoto: R. Spruce 4156 (BR, C, G, K, NY); Huahuiva near Saposoa: F. Woytkowski 7321 (K, MO, US).

Dep. T u m b e s : Prov. Tumbes, Dtto. Pampas de Hospital, El Caucho: J. Vargas A. 13 (NY), 20 (NY).

ECUADOR:

Prov. E l O r o : Piedras: E. L. Little 6621 (K, US).

The neotype selected by NOWICKE is superfluous because the holotype still exists. As opposed to the *Seguieria* species, *Gallesia integrifolia* is very homogeneous. *G. ovata* O. C. Schmidt (of which the type still exists, too) cannot be separated, neither as a species nor as an infraspecific taxon. Its large leaves are not unusual, and the deviating shape of the fruit described by SCHMIDT simply is a frequently observed artefact caused by drying of the immature fruit. Apart from that, there is some variation in the outline of the samara wing within the species, but this variation is continuous.

I n d e x n o m i n u m

Accepted names are underlined.

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Notes added in proof:

(1) In the Index Londinensis the epithet "*perfoliata*" can be found under *Seguieria* Loefl. This, however, does not belong here but rather to the pre-Linnaean *Seguiera* Manetti (= *Blackstonia* Huds., Gentianaceae).

(2) Professor Kubitzki drew my attention to further two cases of extra-amazonian distribution, viz. the genera *Wissadula* and *Pseudabutilon* (Malvaceae) (R. E. Fries 1908 in Kongl. Svenska Vetenskaps Akademiens Handlingar 43 n. 4).

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fig. 1. Position of the thorns in *Seguieria*. The numbers show the sequence of scales on the axillary shoot. (x 8; Regnell III 1013).

fig. 2. Base of a petiole (P) and an axillary shoot (A) in *Seguieria*. T = initial stage of a thorn on a bud-scale. (x 16; Riedel s.n.).

fig. 3. Hairs of the non-collapsed type (x 400). In all species possessing this type branched hairs are the exception. A: *Gallesia integrifolia* (Spruce 4156). B: *Seguieria paraguayensis* (Endlich 33). C: *S. langsdorffii* (Hatschbach 17815). D: *S. macrophylla* (Froes 1924); in this species irregular incrustations on the cell-walls are most frequent.

fig. 4. Hairs of the usually collapsed and repeatedly branched type (x 400). A: *Seguieria americana* (Kegel 12335). B: *S. aculeata* (Hatschbach 18518).

fig. 5. Vascular supply in the carpel of *Seguieria*. M = carpel midrib. (x 16; Mattos Filho 92).

fig. 6. Section through a seed-coat of the black type (about x 500; combined after various sections).

fig. 7. Section through a seed-coat of the brown type (about x 500, combined after various sections).

fig. 8. Ranges of *S. macrophylla* ● and *S. brevithyrsa* ◆.

fig. 9. Range of *S. paraguayensis*.

fig. 10. Range of *S. langsdorffii*.

fig. 11. Range of *S. aculeata*.

fig. 12. Range of *S. americana*.

fig. 13. Range of *Gallesia integrifolia*.

pl. I. *Seguieria americana* L. A: Habit (x 1/2; Schomburgk 661). B: Ovary, with primordia of lateral winglets (x 6; Ule 9486). C: Fruit (x 1/2; Edwall 1748). D: Fruit (x 1/2; Vauthier 29). E: Fruit (x 1/2; Gardner 722). F: Fruit (x 1/2; Regnell III 1013). G: Fruit with the least development of winglets (x 1/2; Riedel s.n.). H: Fruit (x 1/2; Sello 333).

pl. II. *Seguieria aculeata* Jacq. A: Habit (x 1/2; Schwarz 6103); this specimen demonstrates best how much variation in leaf shape can be found in one collection. B: Recurved thorns (x 1/2; Williams 249). C: Straight thorns (x 1/2; Morong 645). D: Ovary (x 6; Hassler 11502). E: Fruit (x 1/2; Dugand 5482). F: Fruit (x 1/2; Meyer 18316). G: Fruit with small wing-like excrescences (x 1/2;

Endlich 211). H: Two fruits from the same infructescence (x 1/2; Fiebrig 4932).

pl. III. *Seguieria langsdorffii* Moq. A: Habit (x 1/2; Hatschbach 17815); the leaves of the type of *S. glaziovii* Briq. are very similar in shape, but twice as large. B: Leaf (x 1/2; Esc. Polytécnica 6097), these narrow leaves are the other extreme of the variational range in this species. C: Ovary (x 6; Hatschbach 8363). D: Fruit (x 1/2; Klein 290). E: Fruit (x 1/2; Davidse, Ramamoorthy & Vital 11566). F: Fruit (x 1/2; Koscinski 125). G: Extremely curved fruit (x 1/2; Davidse, Ramamoorthy & Vital 11498). H: Fruit (x 1/2; Kuhlmann s.n. SP 36274).

pl. IV. *Seguieria paraguayensis* Morong. A: Habit (x 1/2; Balansa 2415). B: Leaf of the rare acuminte form (x 1/2; Hassler 12400). C: Ovary (x 6; Hassler 3712). D: Fruit (x 1/2; Hassler 3887). E: Fruit (x 1/2; Steinbach 7121). G: Fruit (x 1/2; Balansa 2415).

pl. V. *Seguieria macrophylla* Benth. A: Habit (x 1/2; Davidse & Gonzáles 14470). B: Leaf (x 1/2; Davidse & Gonzáles 14346). C: Part of a branch with normally developed thorns (x 1/2; Fróes 1924). D: Bud, with bracteoles (x 3; Steyermark & Davidse 116786). E: Ovary (x 6; Davidse & Gonzáles 13805).

pl. VI. *Seguieria brevithyrsa* H. Walter. A: Habit (x 1/2; Krukoff 10166). B: Leaf (x 1/2; Krukoff 10166). C: Bud, without bracteoles (x 3; Rusby 1353). D: Ovary (x 6; Rusby 1353).

pl. VII. *Gallesia integrifolia* (Spreng.) Harms. A: Habit (x 1/2; Spruce 4156). B: Leaf (x 1/2; Gehrt s.n. SP 31735). C: Buds (x 3; Gehrt s.n. SP 31735). D: Ovary (x 6; Vásquez 8). E: Fruit, straight form (x 1/2; A. C. & W. Terceros 17). F: Fruit, curved form (x 1/2; Chavéz 3338).

fig. 1

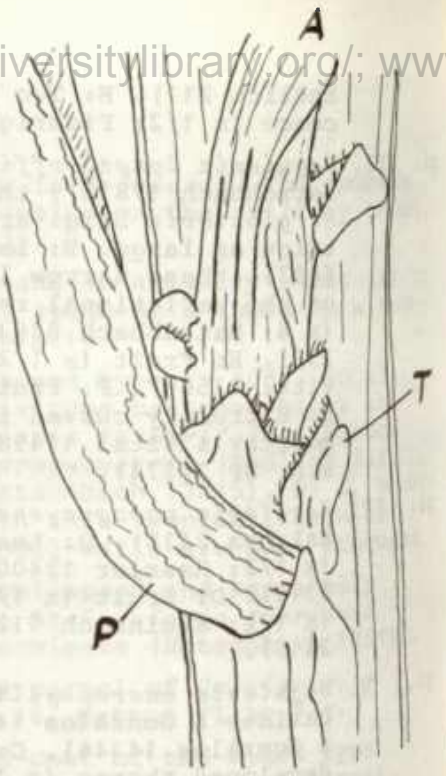
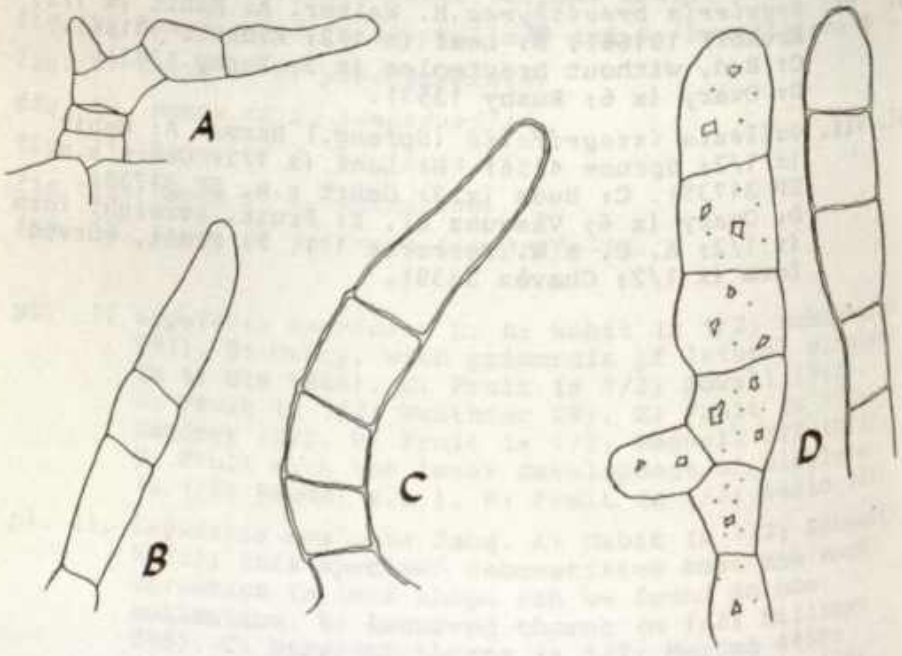


fig. 2



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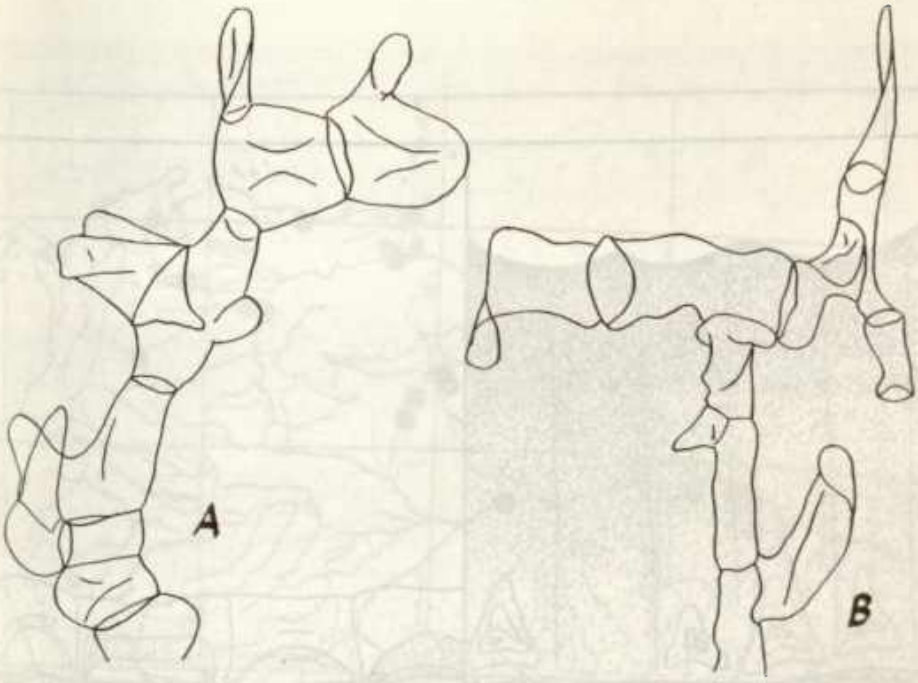


fig. 4

fig. 5

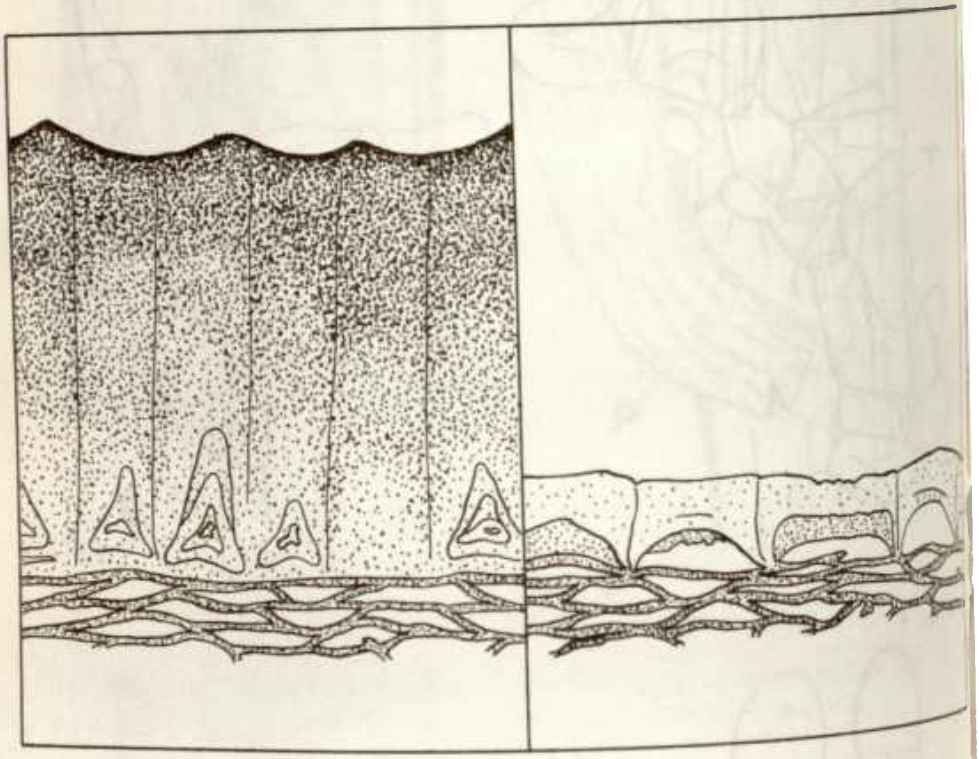


fig. 6

fig. 7

fig. 8

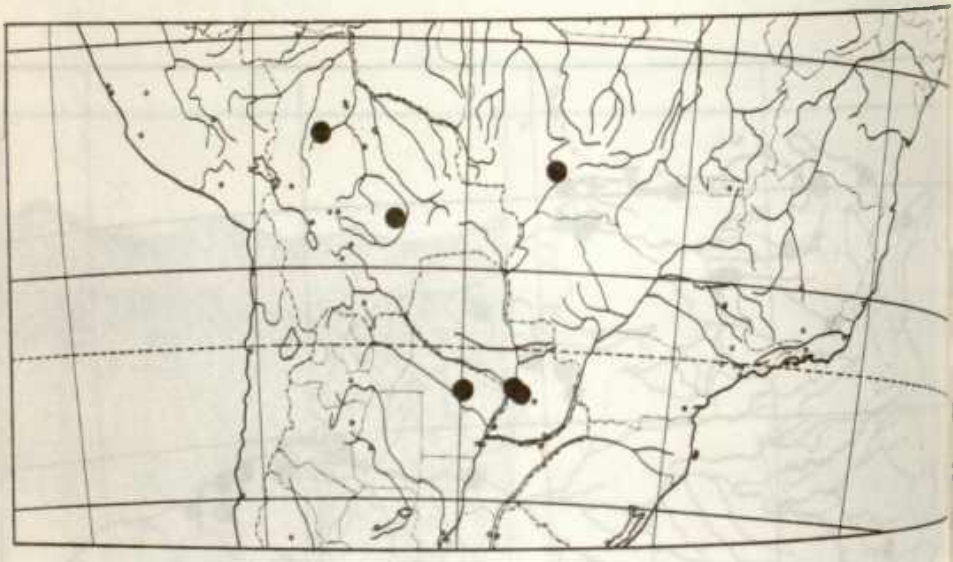


fig. 9

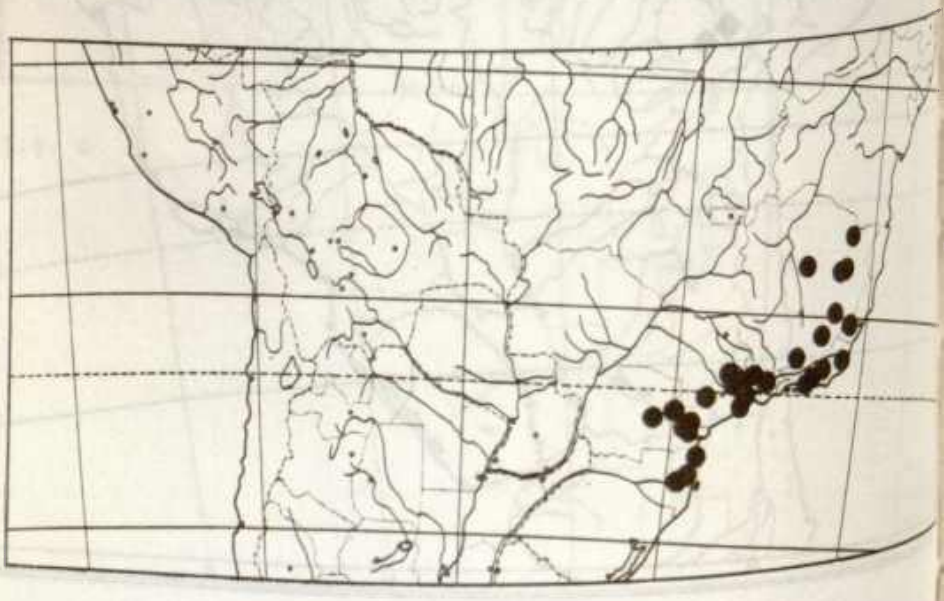


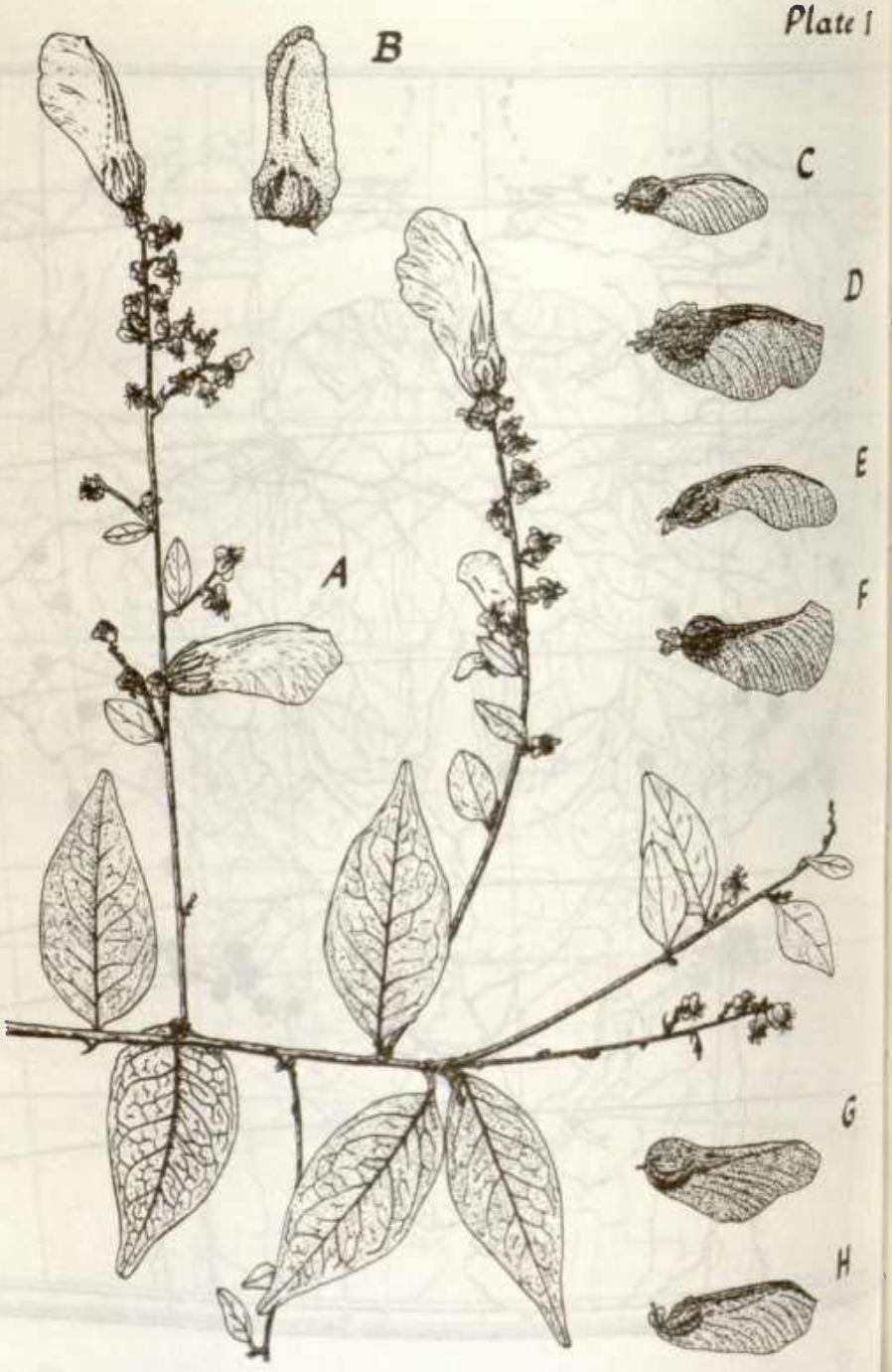
fig. 10

fig. 11

fig. 12

fig. 13

Plate I



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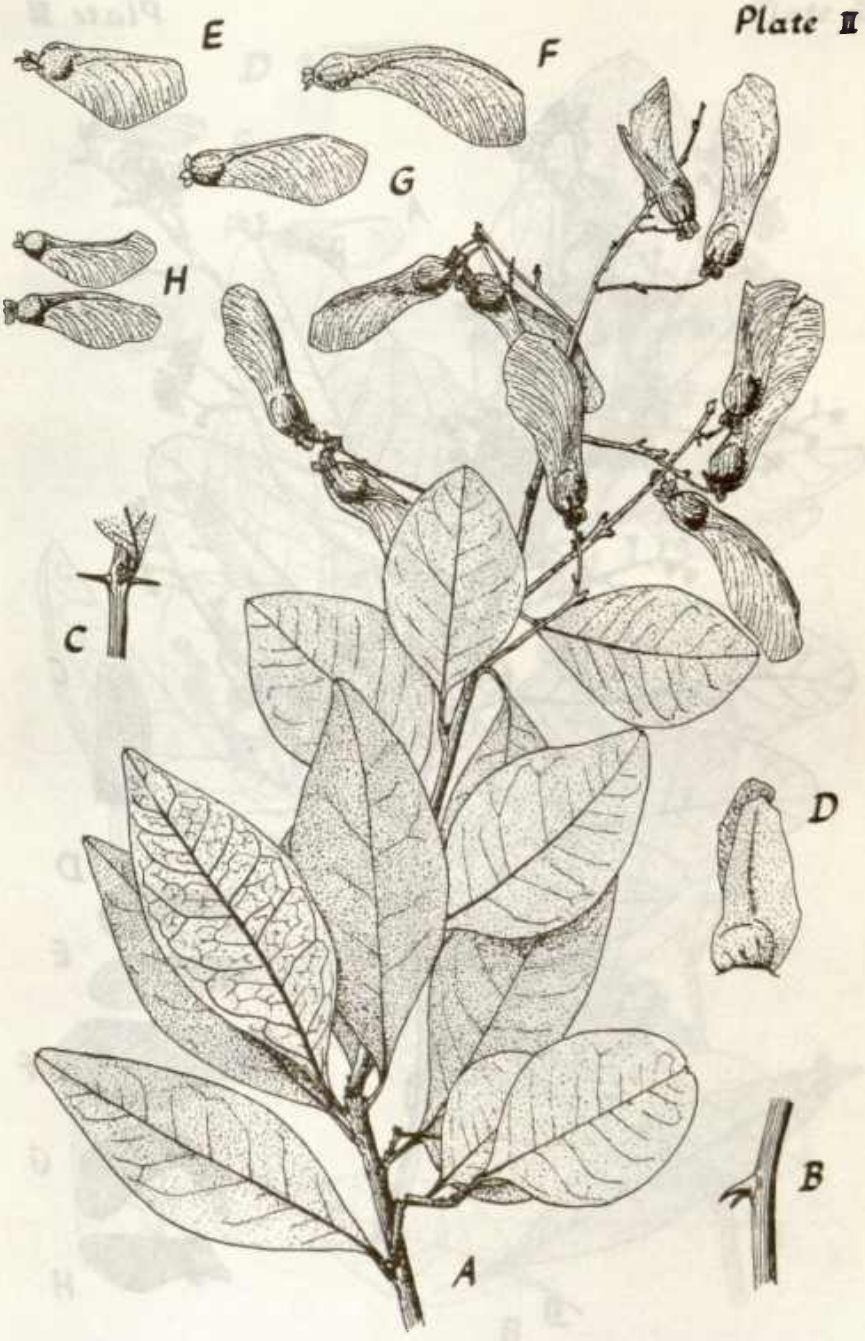
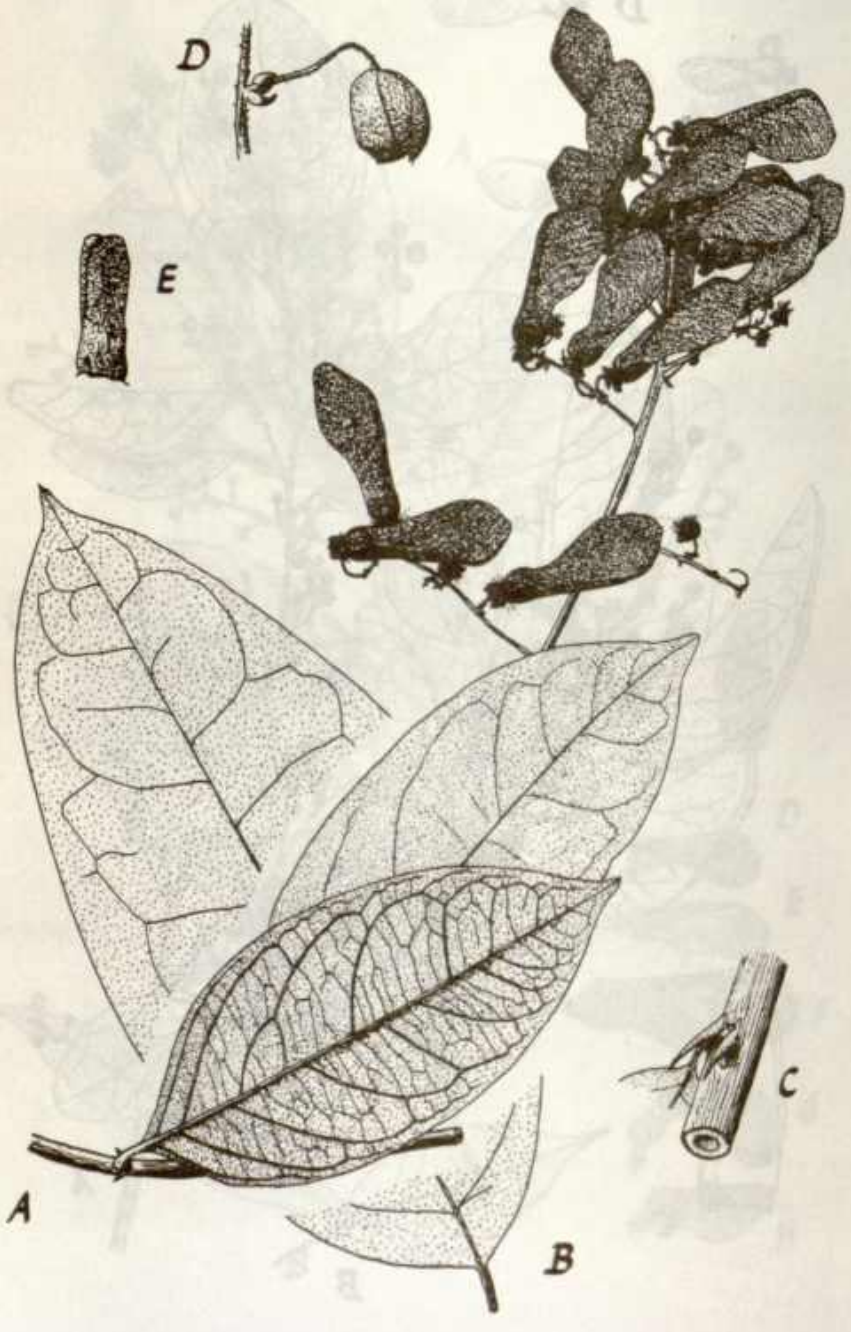


Plate III

Plate II

Plate I



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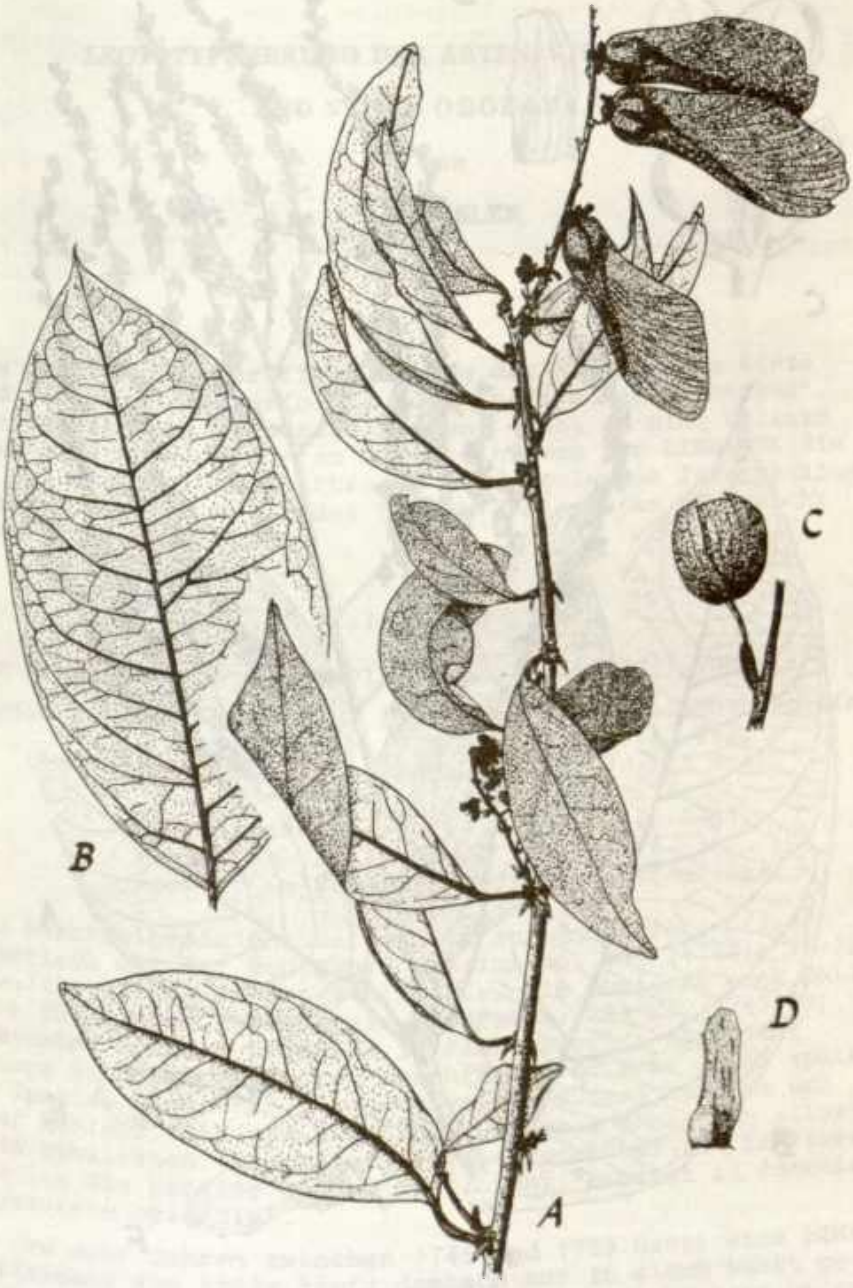

Plate II