

SUPPLEMENTARY NOTES ON THE AMERICAN SPECIES

OF STRYCHNOS. XVII.

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Contents

Introduction.....	201
Supplement to the Keys published in Lloydia, 1972 (9).....	204
Tendrils and spines.....	206
Chemical studies of American species of Strychnos.....	209
Discussion of species (Note of explanation).....	211
Discussion of spp. of sect. Strychnos (# 1-38a).....	211
" " " Rouhamon (#39-48).....	219
" " " Breviflorae (#49-71).....	221
Appendices (Note of explanation).....	229
Appendix I - Regions where new species are expected.....	229
Appendix II - Species known from one collection.....	229
Appendix III - Species of which flowers are not yet known...	230
Appendix IV - Species of which fruits are not yet known.....	230
Appendix V - Species under which are listed many synonyms, basionyms, etc.....	230
Appendix VI - Closely related species.....	231
Appendix VII - Species poorly understood.....	236
Appendix VIII - Species described since the last extensive paper published in 1972 (9).....	236
List of Exsiccatae.....	237
Literature cited.....	238

Introduction

The first comprehensive treatment of American species of Strychnos was that of Progel in Martius, Flora Brasiliensis (11). It covered 27 Brazilian species now recognized as valid (including four now known under different names).

A monograph of American species by myself & J. Monachino published in 1942 (6) covered 44 species recognized as valid.

The second comprehensive paper, Supplements VIII and IX, by myself & R. Barneby was published in 1969 (7 and 8). In these two papers, published together, we summarized information which had appeared in short articles between 1943 and 1965 (Supplements I to VII inclusive) and for the first time studied carefully the fruits which are so important for characterization of several species. As a result of intensive field work from

1948 to 1963 largely by Adolpho Ducke and my former field assistant, Ricardo de Lemos Fróes, immense amounts of new material (1202 collections), many in fruit, were examined in 54 herbaria. This paper covered 71 species and 2 varieties, of which only one species (S. longisepala) has since been reduced to synonymy. This is the most comprehensive paper on the American members of the genus ever published.

A third extensive paper was published by me in 1972 (9) summarizing knowledge acquired in studies that lasted from 1941 to 1948 and again from 1963 onward. No new species were described and no nomenclatural innovations were proposed in this paper, but it is a compact and useful treatment and I am using it extensively in routine work. Incidentally, in this paper I prepared for the first time up to that date List of Exsiccatae and Keys based on flowers as well as on sterile and fruiting material.

In the present paper I plan to bring up to date the information accumulated in Supplements XII to XVII inclusive. In this period 525 new collections were examined, seven new species were described (for a list of them, see Appendix VIII), extension of ranges were recorded for 78 species and several species collected in flower or in fruit for the first time had been described. As of today 77 species and 2 varieties are recognized by us as valid. This is my last fairly extensive paper on American species of Strychnos and is supplementary to that published in Lloydia in 1972. There is no duplication of information in these two papers. They are the only two which are needed for routine work on the genus and there will not be sufficient new information available for at least 10-15 years to justify writing another extensive paper. Having reached 80 years recently it is unreasonable to expect that I will live that long. Naturally as long as I live I probably will routinely identify new collections, publish the description of new species, etc. It is most unfortunate that up to date I did not get a promise from Rupert Barneby to continue working on the genus extensively.

The next extensive paper should cover American species for Flora Neotropica (family Strychnaceae as interpreted by Hutchinson). This should be published when at least one half of the species (± 5) which are presently known only from a single collection will have been recollected and at least one half of species (± 7) known only from flowering or fruiting material will be fully known. I hope the person who will write the account of Strychnos for Flora Neotropica will have extensive field experience on the Amazon which is the center of the genus in the Western Hemisphere. Adolpho Ducke had the same opinion, that Strychnos should not be studied by taxonomists without extensive

field experience on the Amazon. (5: 8). This does not apply to Rupert Barneby. As he was working with me on Strychnos since 1963 onward he could write the genus for Flora Neotropica without field work on the Amazon and without visiting various herbaria.

In addition to the two above-mentioned papers which bring the information on Strychnos up to date, three things will facilitate the future monographer for Flora Neotropica.

1. up-to-date identifications of all specimens annotated by me in 54 herbaria.
2. two up-to-date card files, one listing all collections seen by me by species and another by collectors.
3. special files with posted information for each species.

According to my formal agreement with New York Botanical Garden the card files and special file cannot be sent on loan but will be available at NY to qualified persons.

Special mention should be made of the specimens of Strychnos which were received recently from Ceplac, Itabuna, Bahia, collected mostly by T. S. Santos. This is a most interesting collection as, with the exception of specimens collected by Fróes in my service in 1943 and extensive collection of R. P. Belém who collected with financial support and at my request, we have practically no material of Strychnos from this area. From the collection of R. P. Belém, we described 5 new species and one more is described in this paper. These are mostly endemic to coastal forests of Bahia, some extending probably to neighboring coastal Espirito Santo and/or Pernambuco. These are S. romeu-belenii, S. bahiensis, S. setosa, S. atlantica, S. recognita and S. alvimiana.

The State of Bahia is of particular interest as far as Strychnos is concerned as, in addition to the species mentioned above in the northern part of Bahia along the rivers, some Amazonian species (S. peckii, S. mitscherlichii var. mitschlerlichii and S. mattogrossensis) occur. In the southern part of Bahia near the boundary line with Espirito Santo are some species extending north from Rio de Janeiro and Espirito Santo (S. trinervis and S. gardneri). In the western dry part of Bahia in cerrados, caatingas, chapadas, etc., are found species which abound in Central Brazil (S. rubiginosa and S. parvifolia).

In the studies of American species of Strychnos I was fortunate that two excellent taxonomists (N. Y. Sandwith and Adolpho Ducke) were also interested and actively engaged in the

study of this genus. (See their papers 1, 2, 3, 4, 5, 12 and 13). They referred to our work both in print (3:1 and 5:6) and in private correspondence (now on deposit with my files at Smithsonian Institution) and except for minor disagreements with Ducke we saw eye to eye in understanding of various species. I was also very fortunate that since 1963 Rupert Barneby was my co-author. His advice in difficult cases was especially helpful. My former assistant, Ricardo de Lemos Fróes, probably unequalled by anyone as a collector in the Brazilian Amazonia, continually searched for Strychnos until his untimely death on Nov. 14, 1961. This is the reason why so few new species were found in that region.

Supplement to the Keys published in Lloydia, 1972 (9)

Comprehensive keys based on flower characters were published in 1972 (9: 209-213, 234-235, 241-243, and for fruit or sterile material 254-261). The proper time to prepare new keys will come when the 7 new species described subsequently are known both in flower and in fruit. In the meantime a supplement to the above keys is given describing how the new species can be distinguished from species included in the keys.

Sect. Strychnos

- 32a. S. croatii Krukoff & Barneby - Suppl. #14 - Phytologia 33:313. 1976.

It closely resembles S. erichsonii in vegetative characters. It has axillary inflorescences but its flowers are not yet known. The blades of S. erichsonii have dots, sometimes obscure, and are universally puberulent with very short adpressed hairs below; they are usually tuberculate to blistered above, whereas in S. croatii the blades have no dots, are essentially glabrous in all parts (occasionally puberulent on principal nerves near the base below) and are usually not tuberculate to blistered above.

S. croatii is immediately distinguished by its larger fruits, up to 8 not 3.5 cm in diam as in S. erichsonii. It is very likely that the ranges of the two species do not overlap as S. croatii is probably confined to Panama (to the south of the Canal Zone) and the adjacent Chocó in Colombia.

- 38a. S. ecuadoriensis Krukoff & Barneby - Suppl. #16 - Phytologia 39:276. 1978.

Known only from Napo, Ecuador (alt. ± 340 m). Its fruits are not yet known. The following combination of characters distinguishes S. ecuadoriensis from all known species of

section Strychnos: inflorescences axillary, style glabrous, calyx-lobes linear-lanceolate and corolla-tube glabrous inside. The sterile specimens are distinguished by the following characters: leaf-blades are essentially glabrous above and beneath, dull, membranaceous to chartaceous, not verrucular above or below, not barbate and without a membranaceous pocket beneath in axils of the inner principal nerves, essentially 3-plinerved.

Sect. Rouhamon (Aublet) Progel

44a. S. cayennensis Krukoff & Barneby - Suppl. #13 - Phytologia 27:101. 1973.

Known only from Montagne Boeuf Mort, Saül, French Guiana. Mature fruits are not known. S. guianensis, to which S. cayennensis is closely related, is extremely polymorphic in vegetative characters but it always has a glabrous style and ovary. Of the 4 species of Sect. Rouhamon with pilose style, S. hirsuta, unlike S. cayennensis has hirsute leaves, S. cogens and S. goiasensis have glabrous ovary, while S. melinoniana has leaves with principal nerves raised above (not deeply impressed).

Sect. Breviflorae Progel

53a. S. setosa Krukoff & Barneby

Probably endemic to coastal Bahia and adjacent Expirito Santo. Fruits are not known. This is immediately distinguished from all species of Sect. Breviflorae as its branchlets, petioles and blades beneath (especially on principal nerves) are hirsute with long (up to about 1 mm) rusty straight hairs. In vegetative characters it very closely resembles S. toxifera of Sect. Strychnos.

57a. S. recognita Krukoff & Barneby - Suppl. #13 - Phytologia 27:103. 1973.

Probably confined to the States of Bahia and Expirito Santo. Fruits are not known. In the diagnosis S. recognita was compared to S. fulvotomentosa, which it resembles in its terminal inflorescence and short style, characters common to members of Sect. Breviflorae. It differs from S. fulvotomentosa in its densely congested inflorescence and in the deeply impressed primary and secondary nerves of the mature leaf-blades. Leaves of this type are unknown elsewhere in Sect. Breviflorae but are very closely matched by leaves of S. solimoesana, an allopatric (Amazonian) member of Sect. Strychnos with the axillary inflorescences of its group.

- 66a. S. alvimiana Krukoff & Barneby - Supplement #13 -
Phytologia 27:105. 1973.

Probably endemic to coastal Bahia and adjacent Expirito Santo. The corolla is not yet known. Related to S. nigricans and S. cerradoensis but immediately distinguished by the extremely long calyx (4-4.5 mm), the tube ± 0.8 mm, and the narrowly lance-acuminate lobes ± 3 .-3.5 x 0.4-1.6 mm, minutely puberulent along margins, otherwise glabrous. Shells of fruit of this species are very thick (± 5 mm), as is the case with the two species last mentioned, and the Central American S. brachistantha.

71. S. schunkei Krukoff & Barneby - Suppl. #12 - Phytologia 27:53. 1972.

Known only from San Martín, Peru. Of 25 known species of Sect. Breviflorae 13 (S. fendleri, S. atlantica, S. rubiginosa, S. fulvotomentosa, S. acuta, S. brasiliensis, S. grayi, S. brachistantha, S. nigricans, S. cerradoensis, S. recognita, S. alvimiana and S. setosa) do not occur in the Amazon basin and of these only S. acuta resembles somewhat S. schunkei in its vegetative characters.

S. parviflora is immediately distinguished from S. schunkei by its axillary inflorescences; S. poeppigii, S. schultesiana and S. malacosperma by their glabrous linear-lanceolate calyx-lobes, 2.5--3 mm long; S. castelnaeana and S. progeliana by their leaves densely pubescent beneath; S. parvifolia by its leaf-blades being conspicuously verrucular on nerves and veinlets and often subciliate; S. pachycarpa and S. neglecta by the corolla-tube equal or longer than the lobes; S. oiapocensis by its inflorescences being congested and in spherical clusters even at anthesis; S. mattogrossensis by its lanceolate to ovate-acuminate calyx-lobes, 0.9--1.5 x 0.4--0.5 mm, corolla-tube 0.75--0.9 mm, anthers 0.55-0.6 mm long, leaf-blades beneath usually with membranaceous pockets in axils of the inner principal nerves; moreover it is a woody vine provided with tendrils and spines.

S. schunkei is related to S. tarapotensis from which it is immediately distinguished by much larger leaf-blades (2.3--6 x 1--2.8 cm) and the absence of membranaceous pockets beneath in axils of the inner principal nerves.

TENDRILS AND SPINES

I. Section Strychnos L.

Spineless bush-ropes with tendrils (S. pseudo-quina is a

tree devoid of tendrils and the only species of this section armed with spines). Tendrils were not seen in S. lobelioides and S. ecuadoriensis but expected to occur.

In identifying specimens it is helpful to remember that if spines are present then the specimen is of Sect. Breviflorae unless it is of S. pseudo-quina or of a new species.

II. Section Rouhaman (Aublet) Progel

Spineless bush-ropes or small woody vines with tendrils (S. hirsuta is a small shrub devoid of tendrils and spines, whereas S. progeliana is a shrub and the only species in this section armed with spines, tendrils in this species not seen). Tendrils were not seen also in S. goiasensis, S. cayennensis and S. duckei but expected to occur.

III. Section Breviflorae Progel subsection Breviflorae

Spineless bush-ropes with tendrils (S. parviflora, S. castelnaeana, S. fulvotomentosa, S. acuta; small or large woody vines with spines and tendrils (S. atlantica, S. rubiginosa, S. parvifolia, S. recognita and S. grayi); shrubs devoid or with very rudimentary tendrils, armed with spines (S. oiapocencis); shrubs or small vines armed with spines and devoid of tendrils (S. progeliana, S. fendleri and S. brasiliensis). In S. setosa neither tendrils nor spines were seen.

S. parvifolia in the southern part of its range and certain forms of an extremely variable S. brasiliensis are difficult to tell apart. If a given specimen has tendrils then it is of S. parvifolia.

Section Breviflorae Progel subsection Eriospermae Krukoff & Barneby

Spineless bush-ropes with tendrils (probably S. pachycarpa and S. neglecta on which neither tendrils nor spines were seen); bush-ropes with both spines and tendrils (S. brachistantha, S. nigricans, S. mattogrossensis, S. schultesiana and S. malacosperma); small vines armed with spines and devoid of tendrils (S. cerradoensis, S. alvimiana, S. poeppigii and S. tarapotensis). In S. schunkei neither tendrils nor spines were seen.

Types of tendrils and species armed with spines

In Supplement XI (Phytologia 22: 226-231. 1971) we published a study by Rupert Barneby of tendrils of different species. Below is given additional information for species for which this information was not available. Only specimens deposited at NY

were examined. See also Phytologia 33: 306. 1976 for Richard Wunderlin's discussion of tendrils in Bauhinia and Strychnos. I list here also all species in which spines were seen.

I. SECTION STRYCHNOS L.

- 3. colombiensis - Type II - Dudley 11486.
- 4. asperula - Type II - Maguire 56779.
- 9. araguaensis - Type I - Harvey et al. 10811, Prance 25307.
- 25. pseudo-quina - tendrils none (a tree with spines and without tendrils).
- 26. xinguensis - Type I - Prance 22506.
- 30. lobeliodes - tendrils expected to occur; not seen as yet.
- 32a. croatii - Type I - Forero 1310, 1524.
- 38a. ecuadoriensis - tendrils and spines not seen.

II. SECTION ROUHAMON (AUBLET) PROGEL

- 44. goiasensis - tendrils expected to occur; not seen as yet.
- 44a. cayennensis - tendrils expected to occur; not seen as yet.
- 45. duckei - tendrils expected to occur; not seen as yet.
- 51. progeliana - tendrils not seen; shrub armed with spines.

III. SECTION BREVIFLORAE PROGEL SUBSECTION BREVIFLORAE

- 52. oiapocencis - Oldeman 2614 deposited at P has a weak solitary tendril opposed to a developed leaf.
- 53. fendleri - small tree devoid of tendrils and armed with spines.
- 53a. setosa - neither tendrils nor spines seen.
- 55. rubiginosa - provided with tendrils and spines.
- 57a. recognita - some of the tendrils are opposed to developed leaf, while others are modified from one of the first branches of the cymose inflorescence; the only American species of Strychnos with stems armed with spines.
- 59. brasiliensis - shrub devoid of tendrils and armed with spines.

SUBSECTION ERIOSPERMAE KRUKOFF & BARNEBY

- 61. pachycarpa - probably spineless bush-ropes with tendrils; neither tendrils nor spines seen.
- 62. neglecta - probably spineless bush-ropes with tendrils; neither tendrils nor spines seen.
- 66. cerradoensis - armed with spines and devoid of tendrils.
- 66a. alvimiana - vine armed with spines and devoid of tendrils.
- 68. malacosperma - small bush-rope provided with tendrils and spines.
- 70. tarapotensis - small shrub armed with spines and devoid of tendrils.
- 71. schunkei - neither tendrils nor spines seen.

CHEMICAL STUDIES OF AMERICAN SPECIES OF STRYCHNOS

In 1972 G. B. Marini-Bettolo and N. G. Bisset published account of chemical studies on the alkaloids of the American species (9:195-202). A list of Strychnos species studied chemically since the early thirties was also published in the same paper covering 36 species and 1 variety (p. 207).

Below is given a supplementary list of species which were studied chemically since 1972 and those which were not studied as yet.

SECT. STRYCHNOS L.

2.	<u>ramentifera</u> Ducke	-not studied as yet.
3.	<u>colombiensis</u> Krukoff & Barneby	- " " " "
4.	<u>asperula</u> Sprague & Sandwith	- " " " "
8.	<u>barnhartiana</u> Krukoff	- " " " "
9.	<u>araguaensis</u> Krukoff & Barneby	- " " " "
10.	<u>brachiata</u> Ruiz & Pavon	-Marini-Bettolo et al. See Suppl. XIV, p.322.
15.	<u>bahiensis</u> Krukoff & Barneby	-not studied as yet.
16.	<u>eugeniaefolia</u> Monachino	- " " " "
17.	<u>krukoffiana</u> Ducke	- " " " "
18.	<u>medeola</u> Sagot	-Marini-Bettolo et al. See Suppl. XIV, pp. 310 & 322.
26.	<u>xinguensis</u> Krukoff	-not studied as yet.
27.	<u>amazonica</u> Krukoff	-Marini-Bettolo et al. See Suppl. XIV. See pp. 312 & 322 for additional studies.
29.	<u>froesii</u> Ducke	-Marini-Bettolo et al. See Suppl. XIV. See pp. 312 & 322 for additional studies.
30.	<u>lobelioides</u> Krukoff & Barneby	-not studied as yet.
32a.	<u>croatii</u> Krukoff & Barneby	- " " " "
34.	<u>pubiflora</u> Krukoff	- " " " "
35.	<u>bredemeyeri</u> (Schultes) Sprague & Sandwith	- " " " "
36b.	<u>mitscherlichii</u> var. <u>pubescentior</u> - Sandwith	- " " " "
38.	<u>dariensis</u> Seemann	" " " "
38a.	<u>ecuadoriensis</u> Krukoff & Barneby	- " " " "

SECT. ROUHAMON (AUBLET) PROGEL

42.	<u>bicolor</u> Progel	-not studied as yet.
43.	<u>panurensis</u> Sprague & Sandwith	- " " " "
44.	<u>goiasensis</u> Krukoff & Barneby	- " " " "
44a.	<u>cayennensis</u> Krukoff & Barneby	- " " " "
45.	<u>duckei</u> Krukoff & Monachino	- " " " "

SECT. BREVIFLORAE PROGEL SUBSECTION BREVIFLORAE

49.	<u>parviflora</u> Spruce	-not studied as yet.
51.	<u>progeliana</u> Krukoff & Barneby	- " " " "
52.	<u>oiapocencis</u> Froes	- " " " "
53.	<u>fendleri</u> Sprague & Sandwith	-Marini-Bettolo et al. See Suppl. XIV, p.316 & Suppl. XV, pp.21 & 22.
53a.	<u>setosa</u> Krukoff & Barneby	-not studied as yet.
55.	<u>rubiginosa</u> DeCandolle	- " " " "
57a.	<u>recognita</u> Krukoff & Barneby	- " " " "
60.	<u>grayi</u> Grisebach	- " " " "

SECT. BREVIFLORAE SUBSECTION ERIOSPERMAE KRUKOFF & BARNEBY

62.	<u>neglecta</u> Krukoff & Barneby	-not studied as yet.
63.	<u>brachistantha</u> Standley	- " " " "
64.	<u>nigricans</u> Progel	- " " " "
65.	<u>mattogrossensis</u> S. Moore	- " " " "
66.	<u>cerradoensis</u> Krukoff & Barneby	- " " " "
66a.	<u>alvimiana</u> Krukoff & Barneby	- " " " "
67.	<u>schultesiana</u> Krukoff	- " " " "
68.	<u>malacosperma</u> Ducke & Froes	- " " " "
69.	<u>poepigii</u> Progel	- " " " "
70.	<u>tarapotensis</u> Sprague & Sandwith	- " " " "
71.	<u>schunkei</u> Krukoff & Barneby	- " " " "

Discussion of species

For information on scientific names of species, synonyms and basionyms, type localities, description of species, ecology and the chemical studies, the reader is referred to the last extensive paper on Strychnos (9).

In this paper I brought up-to-date the distribution of species and compiled Supplement to the Key published in the above referred to paper.

I. Sectio Strychnos. -T: S. nux-vomica L.

1. Strychnos chlorantha Progel in Martius, Fl. Bras.6(1):273. 1868.

Distribution: Guatemala (Alta Verapaz); Costa Rica (Guanacaste, Puntarenas, Alajuela, Heredia and Limón); Panama (San Blas, Panamá). Doubtless occurs also in El Salvador, Honduras and Nicaragua. Known from 17 collections.

2. Strychnos ramentifera Ducke, Bull. Mus. Hist. Nat. Paris. II. 4:745. 1932.

Distribution: Amazonian Brazil (basins of Rio Tapajós and Rio Gurupí, also near Belém and near Breves, and along the road Belém-Brasília, km 67-93 in State of Pará; basins of the middle Rio Juruá, Rio Javari, and Rio Jutai in State of Amazonas, and basin of the upper Rio Turí in State of Maranhão); Surinam. Doubtless occurs in French Guiana, Colombia and Peru. Known from 19 collections.

3. Strychnos colombiensis Krukoff & Barneby, Mem.N.Y. Bot. Gard. 12(1):21. 1965.

Distribution: Panama (Colón); Colombia (Chocó, Valle and Nariño); Peru (Cuzco, Loreto, Amazonas). Doubtless found in Ecuador. Known from 9 collections.

4. Strychnos asperula Sprague & Sandwith, Kew Bull. 1927: 131. 1927.

Peru: Madre de Dios: Parque Nacional del Manu, Río Manu, vicinity of Cocha Cashu Station, Robin B. Foster 5007 (Aug. 28, 1976, frts.) (F).

This is the first collection of this species in fruit and the first record for Peru where it was expected to occur. In my second monograph of American spp. of Strychnos (9:215) I stated: "this species doubtless occurs also in Peru and Bolivia in the region adjacent to the State of Acre."

The collectors note on the label: upland forest, liana, ripe fruit lemon yellow, eater by Ateles and Cebus albifrons.

Fruits globose, yellowish, smooth, not sculptured, small (\pm 2-1/2 cm in diam); pericarp thin, \pm 2 mm, seeds about 3 per fruit.

Distribution: Amazonian Brazil (basins of the middle Rio Juruá

and Rio Tonantins in State of Amazonas; basin of the upper Rio Purús in State of Acre, and basin of Rio Madeira in the Territory of Rondônia; Peru (Madre de Dios). Doubtless occurs also in Bolivia in the region adjacent to the State of Acre. Known from 7 collections.

5. Strychnos romeu-belenii Krukoff & Barneby, Mem. N.Y. Bot. Gard. 20(1): 22. 1969.

Distribution: Coastal Bahia, Brazil and probably extending to coastal Espírito Santo. Known from 6 collections.

6. Strychnos rondeletiioides Spruce ex Benth, Jour. Linn. Soc. 1: 104. 1856.

Distribution: Very widely distributed in the Amazon basin, in Brazil, Venezuela (Bolívar and Amazonas), Colombia (Vaupés and Amazonas), Peru (Loreto) and Bolivia (basin of Río Mapiri, La Paz). In Brazil it has been collected in the State of Amazonas (basins of Rio Maués, of Rio Madeira, of the upper and lower Rio Negro, of Rio Jutai, of Rio Tonantins, of the middle Juruá and of the upper Rio Solimões); in the State of Pará (basins of Rio Tocantins, Trombetas, Pacajá and Muirapiranga, also along the road Belém-Brasília (km 64-92), near Portel and near Gurupá), and in the State of Mato Grosso on Serra do Roncador. Not yet collected in the Territory of Roraima or in the State of Acre where it doubtless occurs. Outside of the Amazon basin, it has been collected in the basin of Río Orinoco (State of Bolívar, Venezuela). Known from 122 collections.

7. Strychnos macrophylla Barbosa Rodrigues, Vellozia, ed. 2, 1: 33, pl. 2, fig. A. 1891.

Distribution: Vicinity of Manaus (basin of the lower Rio Negro, Amazonas, Brazil) and basin of Rio Urubú, about 100 km to the northeast of Manaus, where it is common. Known from 20 collections.

8. Strychnos barnhartiana Krukoff, Brittonia 4:268. 1942.

Distribution: Amazonian Brazil (basin of Rio Oiapoque in the Territory of Amapá; basin of Rio Xingú, and near Gurupá on the Rio Amazonas in State of Pará; basins of the upper Rio Negro, of Rio Tonantins, of Rio Içá, and of the upper Rio Solimões in State of Amazonas). Doubtless occurs also in adjacent Colombia, Peru and French Guiana. Known from 18 collections.

9. Strychnos araguaensis Krukoff & Barneby, Mem. N.Y. Bot. Gard. 20(1): 24. 1969.

Distribution: Amazonian Brazil (on Ilha do Marajó, Pará, basin of Rio Araguaia in the States of Pará and Goiás and basin of Rio Xingú in the State of Mato Grosso). Known from 13 collections.

10. Strychnos brachiata Ruiz & Pavón, Fl. Per. 2:30. 1799.

Distribution: Widely dispersed from sub-Andean Peru eastward to Furos de Breves in State of Pará, Brazil; Venezuela (on the upper Apure); Colombia (Boyacá, Putumayo); Peru; Bolivia (La Paz), and Brazil (basin of Rio Macacoari in Territory of Amapá, in Furos de Breves, on Rio Jarí in State of Pará, at the mouth of Rio Solimões (near Manaus), and in the basin of the middle Rio Juruá and Purús in State of Amazonas and in the State of Acre. Known from 26 collections.

11. Strychnos trinervis (Velloso) Martius, Syst. Mat. Med. Bras. 121. 1843.

Brazil: Santa Catarina: Ule 97 (US) (San Francisco), 1209 (US) (Blumenau); R. M. Klein 6987 (US) (Moro Costa da Laguna).

Distribution: Confined to the eastern states of Brazil (Paraíba, Pernambuco, Bahia, Espírito Santo, Minas Gerais, Rio de Janeiro, São Paulo, Paraná and Santa Catarina) and Bolivia (Santa Cruz). Doubtless occurs also in the States of Alagoas, Sergipe, Goiás and Mato Grosso in Brazil. Known from 141 collections.

12. Strychnos panamensis Seemann, Bot. Voy. Herald 166. 1854.

Mexico: Chiapas: T. Croat 40194 (MO) (road from Palenque to Bonampak, + 400 m), 43838 (MO). Guatemala: Zacapa: + 150 m, T. Croat 41877 (MO). Nicaragua: Matagalpa: Cordillera Dariense, + 1400 m, David Neill 3012 (MO). Costa Rica: Puntarenas: Ronald Liesner 3135 (MO) (Osa Peninsula), T. Croat 44412 (MO) (Las Cruces), Wm. Burger 10655 (F) (along Rio Barú). Panama: Canal Zone: Gene Montgomery s.n. (6/4-1976) (MO); Panama: Al Gentry 1952 (MO); Darién: Le Clezio 1 (1973) (MO).

First record of the species from Zacapa, Guatemala and Matagalpa (Nicaragua).

Distribution: Pacific coast of tropical Mexico (Sinaloa, Nayarit, Tepic, Guerrero, Oaxaca and Chiapas); Guatemala (San Marcos, Quetzaltenango, Retalhuleu, Suchitepéquez, Escuintla, Zacapa, Zacatepéquez and Santa Rosa); El Salvador (Ahuachapán, Santa Ana and San Salvador); Honduras (Yoro); Nicaragua (Matagalpa and Jinotega); Costa Rica (Guanacaste, Puntarenas, Alajuela and Limón); Panama (Coclé, Chiriquí, Canal Zone, Panamá and Darién); Colombia (Chocó, Magdalena, Santander, Antioquia and Caldas); Venezuela (Zulia, Falcón, Mérida, Barinas and Apure). Known from 191 collections.

13. Strychnos tabascana Sprague & Sandwith, Kew Bull. 1927: 128. 1927.

Mexico: Veracruz: Las Tuxtlas, G. Martinez C. 2297 (F).

Distribution: Mexico (Veracruz, Tabasco, Chiapas, Oaxaca); Belize; Guatemala (Petén, Alta Verapaz, Izabal); Honduras (Sta Bárbara, Cortés, Atlantida); and Costa Rica (Guanacaste, San

José, Alajuela). Doubtless found also in Nicaragua. Known from 82 collections.

14. Strychnos divaricans Ducke, Bull. Mus. Hist. Nat. Paris II. 4: 746. 1932.

Distribution: Surinam, French Guiana, and Brazil. In Brazil it has been collected in Pará (Jurity Velho near the boundary line with State of Amazonas and in the basin of Rio Tapajós, Rio Tocantins and of Rio Guama); Maranhão (basin of the upper Rio Pindaré), and Pernambuco. Doubtless occurs also in Territory of Amapá and in the States of Amazonas, Piauí, Ceará, Rio Grande do Norte and Paraíba. Known from 13 collections.

15. Strychnos bahiensis Krukoff & Barneby, Mem. N.Y. Bot. Gard. 20(1): 29. 1969.

Brazil: Bahia: Maraú a Ubaitaba, T. S. Santos 128 (10/10-1968).

Distribution: Low coastal forests in State of Bahia and probably extending to Espirito Santo. Known from 18 collections.

16. Strychnos eugeniifolia Monachino, Phytologia 4: 209. 1953.

Distribution: Surinam, French Guiana, and Brazil (basin of Rio Oiapoque in Territory of Amapá). Known from 9 collections.

17. Strychnos krukoffiana Ducke, Trop. Woods 90: 27. 1947.

Distribution: In the vicinity of Manaus, Amazonas, Brazil. Known from two collections from the same plant.

18. Strychnos medeola Sagot ex Progel in Mart. Fl. Bras. 6(1): 282. 1868.

Distribution: Surinam, French Guiana and Amazonian Brazil (basins of Rio Tocantins, Rio Tapajós, Rio Xingú, Rio Trombetas and various other localities in State of Pará; basin of Rio Amapari and Rio Jarí in Territory of Amapá; and near Parintins in State of Amazonas). Known from 43 collections.

19. Strychnos toxifera Robert Schomburgk ex Benth, Jour. Bot. Hook. 3: 240. 1841.

Distribution: Panama (Canal Zone, San Blas and Darién); Venezuela (upper Rio Orinoco, at Cassiquiare and Cerro Sefato in the State of Amazonas, also in Delta Amacuro and Aragua); the three Guianas; Colombia (Chocó, Antioquia, Vichada and Putumayo); Ecuador (Oriente, in the basin of Río Pastaza), and in Brazilian Amazonia, where collected in Territory of Roraima (Serra do Divisor, top of hill, 900 m); in State of Acre (basin of the upper Rio Juruá); in State of Amazonas (basins of the middle Juruá and of the upper Rio Solimões and in the basin of the lower Rio Negro). Doubtless occurs also in adjacent Amazonian

Peru and Bolivia. Known from 79 collections.

20. Strychnos tomentosa Benth, Jour. Linn. Soc. 1: 104. 1856.

Distribution: Venezuela (Federal District, Aragua, Sucre and Lara), the three Guianas and Brazil (basins of Rio Tapajós and Rio Tocantins, and various other localities in State of Pará; Territory of Amapá; basin of Rio Branco in Territory of Roraima; basins of Rio Solimões and Igarapé Jandiatube and vicinity of Lago Camatian in the State of Amazonas and basin of Rio Pindaré and other localities in the State of Maranhão). Known from 60 collections.

21. Strychnos diabolii Sandwith, Kew Bull. 1931: 486. 1931.

Guyana: Mazaruni River, P.J.M. Maas 2533.

Distribution: Venezuela (Amazonas); Guiana; Brazil (Territory of Roraima). Known from 10 collections.

22. Strychnos javariensis Krukoff, Brittonia 4: 279. 1942.

Distribution: Western part of the Amazon basin, Brazil (Amazonas), and Colombia (Putumayo; Amazonas); its range probably more or less similar to the range of S. castelnaeana. In State of Amazonas, Brazil it has been collected in the basins of the upper Rio Solimões, of Rio Içá, of the lower Rio Javari and of the middle Rio Juruá. Doubtless occurs in adjacent Peru. Known from 21 collections.

23. Strychnos sandwithiana Krukoff & Barneby, Mem. N. Y. Bot. Gard. 20(1): 36. 1969.

Peru: Loreto: Maynas, Rio Nanay, Al. Gentry 15643 (MO).

This is the first record of the species from Loreto.

Distribution: Amazonian Brazil (basins of Rio Maués, of Rio Urubu, of the upper and lower Rio Negro, of Rio Tonantins, of Rio Içá, of the upper Rio Solimões, of the middle Rio Juruá in the State of Amazonas and in the basin of Rio Tocantins in State of Pará); Colombia (Amazonas); and Peru (San Martín, Loreto). Known from 38 collections.

24. Strychnos jobertiana Baillon, Adansonia 12: 367. 1879.

Distribution: Venezuela (Amazonas); Colombia (Vaupés, Putumayo and Amazonas); Ecuador; Peru (Amazonas, Loreto, Huánuco, Cuzco); French Guiana and Brazil. In Brazil it has been collected in Territory of Amapá, in State of Pará (basins of Rio Tapajós and Rio Tocantins) and in State of Amazonas (basins of the upper and lower Rio Negro, of Rio Tonantins, of the middle Rio Juruá, of the lower Rio Javari and of Rio Solimões). Doubtless occurs also in Amazonian Bolivia. Known from 102 collections.

25. Strychnos pseudo-quina A. St. Hilaire, Mém. Mus. Paris 9: 340. 1822.

Distribution: Central Brazil (Mato Grosso, Goiás, Maranhão, Bahia, Minas Gerais and São Paulo) and adjacent Paraguay. Known from 306 collections.

26. Strychnos xinguensis Krukoff, Brittonia 4: 283. 1942.

Distribution: Brazil: Pará (basins of Rio Tocantins, Rio Xingú, upper Rio Tapajós and Rio Trombetas); Bolivia (basin of Rio Guaporé). Known from 7 collections.

27. Strychnos amazonica Krukoff, Brittonia 4: 284. 1942.

Distribution: Amazonian Brazil (basin of Rio Jarí in Territory of Amapá; Oriximina in State of Pará; basins of Rio Maués, of the lower Rio Negro, of Rio Madeira, of the middle Rio Juruá, of Igarapé Jandiatuba and of the upper Rio Solimões in State of Amazonas; near Rio Branco in State of Acre and in Territory of Rondônia); Peru (Loreto), and Colombia (Putumayo). Known from 43 collections.

28. Strychnos solimoesana Krukoff, Brittonia 4: 280. 1942.

Distribution: Brazil (basin of the upper Rio Solimões, Rio Tonantins and Rio Negro in the State of Amazonas); Colombia (Amazonas). Doubtless occurs also in Amazonian Peru. Known from 16 collections.

29. Strychnos froesii Ducke, An. Acad. Bras. Ci. 23: 209. 1951.

Distribution: Amazonian Brazil (basins of the lower Rio Tapajós and of the lower Rio Xingú in State of Pará and near Manaus in the basin of the lower Rio Negro in State of Amazonas). Known from 17 collections.

30. Strychnos lobelioides Krukoff & Barneby, Mem. N.Y. Bot. Gard. 12(1): 44, fig.2. 1965.

Distribution: Known only from the type collection from Rio Vaupés, Colombia.

31. Strychnos peckii B. L. Robinson, Proc. Amer. Acad. 49: 504. 1913.

Belize: T. Croat 24206 (MO). Costa Rica: Puntarenas: Osa Peninsula, Ronald Liesner 3206 (MO).

Distribution: Widely dispersed in South and Central America, Guatemala (Izabal); Belize; Costa Rica (Limón, Puntarenas); Panama (Darién), and doubtless also in Honduras and Nicaragua; Venezuela (Miranda, Aragua, Apure and Amazonas); Colombia (Bolívar, Antioquia, Meta, Putumayo, Vaupés, Amazonas, Valle (near the Pacific coast), and Nariño); Peru (Huanuco, San Martín); Ecuador (Oriente); Bolivia (La Paz, basin of Rio Mapiri); the three Guianas; and Brazil where widespread: State of Pará (near Belém, near Bragança, near Breves, in the basin of Rio Araguaia near the

southern border of the State, and in the basin of Rio Tapajós); State of Amazonas (in the basins of the upper and lower Rio Negro, of the middle Rio Juruá, of Rio Jutai, of Rio Tonantins and of Rio Ica); State of Mato Grosso (various localities); Territories of Roraima and Rondônia; and States of Maranhão and Bahia. In Brazil its range doubtless will be extended to include Territory of Amapá and State of Goiás, as well as some of the States situated between Maranhão in the north and Bahia in the South. Known from 172 collections.

32. Strychnos erichsonii Richard Schomburgk, Reisen 3: 1082.

1848, nomen; ex Progel in Mart. Fl. Bras 6(1): 274. 1868.

Peru: Loreto: Al. Gentry 18530 (MO) (Rio Nanay).

Distribution: Venezuela (Bolívar; the three Guianas; Brazil; Colombia (Valle, Vaupés, Amazonas and Putumayo), and Peru (Loreto). In Brazil collected in Territory of Amapá (incl. the basin of Rio Oiapoque), State of Pará (near Belém and in the basin of Rio Tocantins and of Rio Guama), Territory of Roraima, State of Amazonas (basin of the upper Rio Negro, of Rio Maués, of Rio Tonantins, of the middle Rio Juruá, of Rio Purús and of the upper Rio Solimões), and in States of Mato Grosso and Maranhão. Known from 186 collections.

32a. Strychnos croatii Krukoff & Barneby, Phytologia 33: 313. 1976.

Colombia: Chocó: Rio Munguido, alt. 50 m, Forero 1524.

Distribution: Panama (Colón, Panamá, San Blas, Darién; Colombia (Chocó). Known from 20 collections.

33. Strychnos gardneri A. DeCandolle in DeCandolle, Prodr. 9: 14. 1845.

Distribution: Eastern and central Brazil (Maranhão, Ceará, Paraíba, Bahia, Mato Grosso (near Cuiabá), Goiás, Minas Gerais, Espírito Santo, Rio de Janeiro and São Paulo). Doubtless occurs in States of Rio Grande do Norte, Pernambuco, Alagoas and Sergipe. Known from 53 collections.

34. Strychnos publiflora Krukoff, Brittonia 4: 290. 1942.

Distribution: State of Minas Gerais, Brazil (munic. Jaboticatubas, Santa Luzia and Buenópolis). Known from 4 collections.

35. Strychnos bredemeyeri (Schultes) Sprague & Sandwith, Kew Bull. 1927: 128. 1927.

Venezuela: Rio Carum, afl. del Paragua, \pm 360 m, F.

Cardona 1228 (Herb. Ven. 59214).

Cardona 1228 is a very important collection as it has shells of mature fruits. From this collection we know the approximate size of fruits and the thickness of their endocarp. It was collected in April 1945 from Rio Carum, tributary of Paragua,

Venezuela. It was cited in 7: 45. under a synonym of this species, Strychnos pedunculata, through an error as Cardona 1229. It is not cited in Exsiccatae and not in my card files. I borrowed specimens from Venezuela and checked on its identity. The above referred to errors are not being corrected. This specimen is cited in Exsiccatae and cards are now in the card files.

Years ago Ducke raised the question of the type locality of S. trinitensis Griseb., which is a synonym of S. bredemeyeri, suggesting that perhaps it is a valley of Rio Caura, a tributary of Rio Orinoco in Venezuela, rather than "Caura" on the Island of Trinidad. Sandwith rejected this suggestion in a very brief statement. I now quote C. Dennis Adams' letter of October 11, 1978 which settles this matter. "On the question about Strychnos trinitensis Griseb., there is no doubt whatsoever that Caura is a valid and well known locality in Trinidad and that Crueger would have collected there. If we question the authenticity of this locality, we question it for hundreds of our collections, as the Caura Valley, running north into the Northern Range from Tacarigua has been well explored. This makes it all the more strange that this species has not been collected here other than by Crueger. But that is our experience and each time we go collecting we bring in something that is either new or has not been seen for a long time."

Distribution: Island of Trinidad; Venezuela (Federal District, Sucre, Delta Amacuro and Bolívar); Guiana and Brazil (Territory of Roraima). Known from 20 collections.

36a. Strychnos mitscherlichii Richard Schomburgk, Reisen 2:451. 1848, var. mitscherlichii

Peru: Loreto: Maynas, Juan Revilla 1490.

Distribution: Venezuela (Bolívar); Colombia (Chocó, Valle, Putumayo and Amazonas-Vaupés); Ecuador (basin of Río Pastaza; upper Bobonaza); Guiana (Essequibo, Demerara and Berbice); Surinam; Brazil; Peru (Loreto, Amazonas), and Bolivia (basin of Rio Mapiri). In Brazil collected in State of Pará (basins of Rios Tocantins, Tapajós and Trombetas), State of Amazonas (basin of the upper Rio Solimões, basin of Rio Negro, and plateau between Rio Madeira and Rio Purús), State of Acre, Territory Rondônia, and States of Rio Grande do Norte and Bahia. Doubtless occurs also in States of Maranhão, Piauí, Ceará, Paraíba, Pernambuco, Alagoas and Sergipe. Known from 112 collections.

36b. Strychnos mitscherlichii var. pubescentior Sandwith, Brittonia 3: 91. 1938.

Distribution: Amazonian Brazil (basins of the tributaries of Rio Solimões, namely Rio Jutai, Igarapé Belém and lower Rio Javari in State of Amazonas) and Colombia (Vaupés and Amazonas). Known from 23 collections.

- 36c. Strychnos mitscherlichii var. amapensis Krukoff & Barneby, Mem. N. Y. Bot. Gard. 20(1): 48. 1969.

Distribution: Eastern Amazonian Brazil (basins of Rio Araguari and Rio Oiapoque in Territory of Amapá; near Catú and in basins of Rio Capim and Rio Guama in State of Pará). Doubtless occurs also in French Guiana. Known from 17 collections.

37. Strychnos solerederi Gilg in Engler, Bot. Jahrb. 25. Beibl. 60: 40. 1898.

Distribution: French Guiana; Colombia (Amazonas) and widely distributed throughout Amazonian Brazil where collected in State of Pará (basin of Rio Tapajós and in many other regions) and State of Amazonas (basins of the upper Rio Negro, Rio Tonantins, Rio Jutai and the upper Rio Solimões). Confidently expected in Mato Grosso (Brazil) and in Peru. Known from 44 collections.

38. Strychnos darienensis Seemann, Bot. Voy. Herald 166. 1854.

Peru: Loreto: Al. Gentry 18416 (Rio Itaya), T. Plowman 6678 and 6694 (Rio Ampiyacu).

Distribution: Very widely dispersed in Central and South America: Nicaragua; Costa Rica (Puntarenas); Panama (Veraguas, Colón and Canal Zone); Colombia (Valle, near the Pacific coast, Amazonas and between Misay and Timbiqui); Peru (Loreto and San Martín); Ecuador (Napo); Guiana (Essequibo); and Brazil (basins of Rios Amazonas, Jamundá, Tocantins, Tapajós and Trombetas in State of Pará; basins of Rios Negro, Solimões, Tonantins, Juruá, Jutai, lower Javari and upper Solimões in State of Amazonas; basin of Rio Acre in State of Acre; basin of Rio Araguaia in State of Mato Grosso; and in basin of Rio Branco in Territory of Roraima). Known from 89 collections.

- 38a. Strychnos ecuadoriensis Krukoff & Barneby, Phytologia 39: 276. 1978.

Distribution: Known only from the type collection in Ecuador (Napo).

II. Sectio Rouhamon (Aubl.) Progel in Mart. Flora Bras. 6(1): 275. 1868.

39. Strychnos guianensis (Aublet) Martius, Syst. Mart. Med. Bras. 121. 1843.

Colombia: Chocó: Rio Munguido, alt. 40 m, Forero 1489.

Peru: Loreto: Juan Revilla 1857 (MO) (Rio Nanay), Al. Gentry 18343 (Maynas), 18471 (Rio Itaya).

This is a new record of this species for Chocó.

Distribution: Well distributed in the basin of the middle and upper Rio Orinoco and throughout the entire Amazon basin: Venezuela (Sucre, Barinas, Bolívar and Amazonas; Colombia (Chocó, Vaupés, Putumayo and Amazonas); Ecuador (Oriente and Napo-Pastaza); Peru (Rio Nanay and Rio Mazán in Loreto); and

the three Guianas. In Brazil well distributed in State of Pará (basin of Rio Trombetas, a northern tributary of the Amazon, along the Amazon River proper, in the basins of Rios Xingú, of Tapajós and Tocantins (the southern tributaries of the Amazon), and in the basins of various small rivers draining to the Baía de Marajó and the Atlantic Ocean, such as Rio Acara, Rio Guama and others); Territory of Amapá (basin of Rio Oiapoque); Territory of Roraima; State of Amazonas (in the basins of Rio Urubu, of the lower and the upper Rio Negro, including its tributaries Vaupés, Içana, Cubate, Aiary and Padauiy, of Rio Maués, of Rio Madeira, of Rio Juruá, of Rio Jutai, of Rio Solimões and of Rio Javari); Territory Rondônia; and State of Mato Grosso (Rio Juruena). Known from 271 collections.

40. Strychnos glabra Sagot ex Progel in Mart. Fl. Bras. 6(1): 275. 1868.

Distribution: Venezuela: Guiana (Essequibo and Berbice); Peru (San Martín); French Guiana, and Amazonian Brazil (basin of Rio Jarí in Territory of Amapá; basin of the upper Parú, Rio Tapajós, of Rio Guama and near Catú in State of Pará; basins of Rio Madeira, of the lower and upper Rio Negro and of Rio Solimões in State of Amazonas; between Boa Vista and Caracarai in Territory of Roraima). Doubtless also occurs in Surinam and Colombia. Known from 55 collections.

41. Strychnos subcordata Spruce ex Benth, Jour. Linn. Soc. 1: 106. 1856.

Distribution: Amazonian Brazil (basin of Rio Oiapoque in Territory of Amapá; basins of the upper and lower Rio Negro, Rio Tonantins, Rio Içá, Rio Japurá, Rio Juruá, Rio Solimões and Rio Amazonas in the State of Amazonas); Peru, and Colombia (Putumayo). Doubtless also found in French Guiana. Known from 50 collections.

42. Strychnos bicolor Progel, Vidensk. Meddel. 1869: 31. 1869.

Distribution: Minas Gerais, Goiás, the Federal District, Mato Grosso and São Paulo in Central Brazil. Common in cerrados and on comparatively high elevations, as on Serra do Cipó. Known from 25 collections.

43. Strychnos panurensis Sprague & Sandwith, Kew Bull. 1927: 132. 1927.

Distribution: Panama (Panamá); French Guiana; Venezuela (Apure, Bolívar and Amazonas); Colombia (Chocó, Meta, Nariño, Putumayo, Vaupés and Amazonas); Peru (Loreto, San Martín and Junín; and Brazil (basin of Rio Amapari in Territory of Amapá; basins of the upper Rio Negro and of the middle Rio Juruá in State of Amazonas; and basin of the upper Rio Purús in State of Acre). Known from 65 collections.

44. Strychnos goiasensis Krukoff & Barneby, Mem. N.Y. Bot. Gard. 20(1): 55, fig.C. 1969.

Distribution: Known only from the type collection in Goiás, Brazil.

- 44a. Strychnos cayennensis Krukoff & Barneby, Phytologia 27: 101. 1973.

Distribution: Known only from the type collection in Saül, French Guiana. This region according to Oldeman is probably one of South American forest refuges in geological periods with a drier climate, and novelties were found here.

45. Strychnos duckei Krukoff & Monachino, Lloydia 9: 68. 1946.

Distribution: Known from the type locality in State of Amazonas (Tabatinga, near Marco, a few dozen meters from the Colombian boundary), Brazil, where collected twice from the same plant. Doubtless occurs also in adjacent Colombia and Peru.

46. Strychnos hirsuta Spruce ex Bentham, Jour. Linn. Soc. 1: 106. 1856.

Distribution: Amazonian Brazil (basin of Rio Tapajós in State of Pará and basins of the lower Rio Negro, of Rio Maués, of Rio Madeira and Rio Solimões in State of Amazonas). Known from 26 collections.

47. Strychnos cogens Bentham, Jour. Bot. Hook. 3: 241. 1841.

Distribution: Venezuela (Bolívar and Amazonas); Guiana; French Guiana; and Amazonian Brazil (Serra Tepequem in Territory of Roraima; Parintins, basins of the upper and lower Rio Negro, Rio Purús and of Rio Solimões, including those of its tributaries Rio Tonantins, Igarapé Jandiatuba and Igarapé Belém in the State of Amazonas). Doubtless occurs also in adjacent Colombia and Peru, as well as in Surinam. Known from 34 collections.

48. Strychnos melinoniana Baillon, Bull. Soc. Linn. Paris 1: 256. 1880.

Distribution: The three Guianas and Amazonian Brazil where collected in Territory of Amapá (basin of Rio Oiapoque) and in State of Pará (basin of the middle Rio Tocantins, along the road Belém-Brasília (km 17-129), and near Portel). Known from 29 collections.

- III. Sectio Breviflorae Progel in Mart. Fl. Bras. 6(1): 277. 1868.

Subsectio Breviflorae

49. Strychnos parviflora Spruce ex Bentham, Jour. Linn. Soc. 1: 107. 1856.

Distribution: Amazonian Brazil (basin of Rio Tapajós in State of Pará; basins of the upper and lower Rio Negro, the

middle Rio Juruá, Rio Jutáí, Rio Tonantins, lower Rio Javari, Igarapé Jandiatuba and upper Rio Solimões in State of Amazonas), and Peru (Loreto). Doubtless occurs also in adjacent Colombia. Known from 37 collections.

50. Strychnos castelnaeana Weddell in Castelnau, Exped. Am. Sud. 5: 22. 1851.

Distribution: Western part of the Amazon basin, centering around the border common to Peru, Brazil and Colombia. Collected in Brazil in State of Amazonas (basins of Rio Içá, Rio Japurá, Rio Javari and upper Rio Solimões) and Peru (Loreto). Doubtless occurs also in Colombia. Known from 99 collections.

51. Strychnos progeliana Krukoff & Barneby, Mem. N.Y. Bot. Gard. 20(1): 58. 1969.

Distribution: Known only from the type collection from the basin of Rio Japurá, Amazonas, Brazil. Doubtless occurs also in adjacent Colombia and Peru.

52. Strychnos oiapocensis Froes, Bol. Técn. Inst. Agrôn. Norte 36: 143. 1959.

Distribution: French Guiana, Surinam and Territory of Amapá, Brazil. Known from 16 collections.

53. Strychnos fendleri Sprague & Sandwith, Kew Bull. 1927: 129. 1927.

Venezuela: Guarico: near Ortiz, Hector Rodriguez 68 (F).

Distribution: Venezuela, where widely distributed in the drier tropics (Nueva Esparta, Zulia, Falcón, Lara, Miranda, Guárico, Anzoátegui, Sucre and Bolívar); Brazil (Roraima). It likely occurs also in northern Colombia adjacent to Venezuela (Guajira). Known from 25 collections.

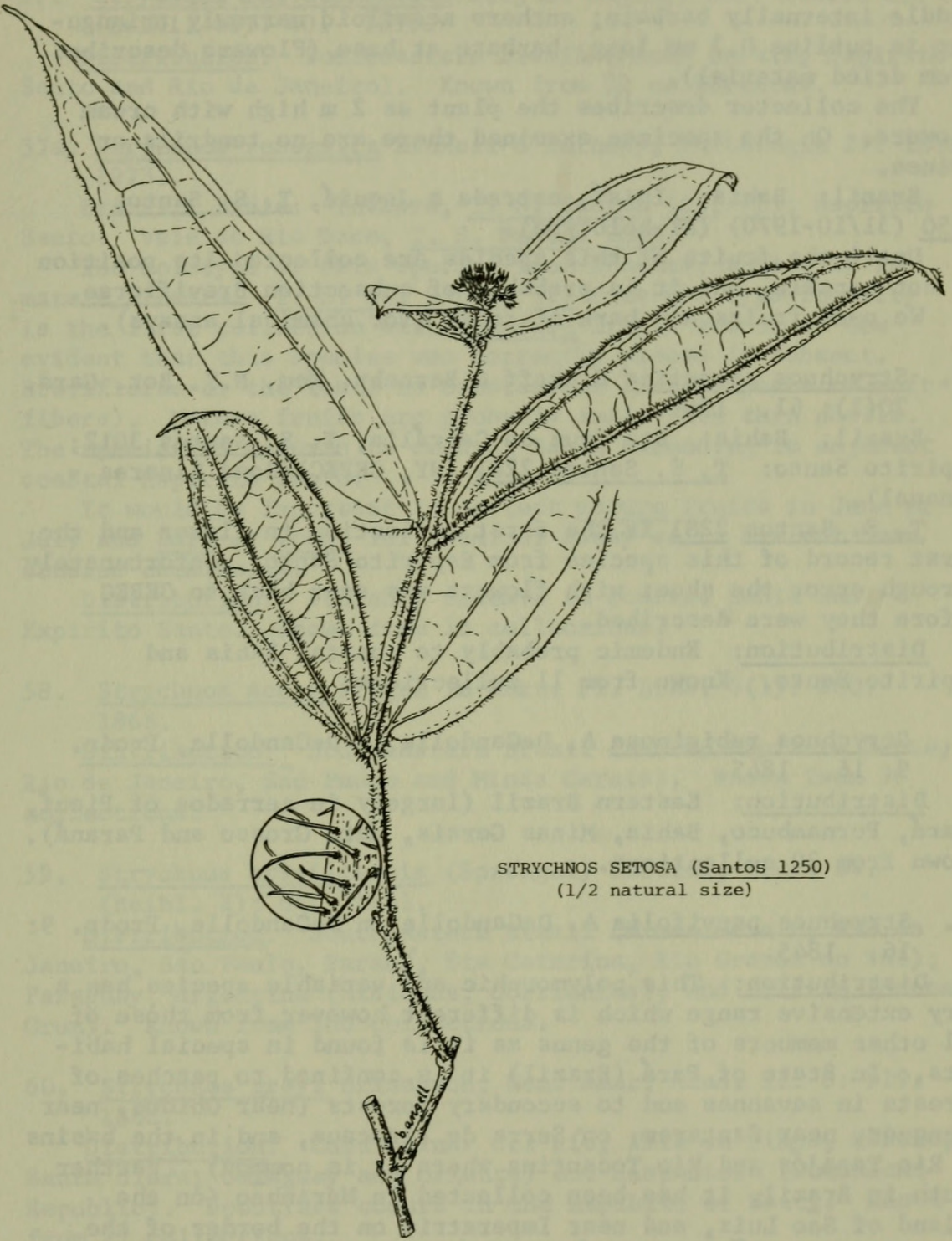
- 53a. Strychnos setosa Krukoff & Barneby sp. nov.

Ad sectionem Breviflorae referenda, sed inter illas ramulis petiolis inferiorique laminarum facie pilis rufis \pm 1 mm longis hirsuta praestans.

Macroscopic: Petioles about 3 mm long; blades elliptic, 7-13 cm long, 2.5-5 cm broad, rounded to cuneate at base, acuminate and finally pointed at apex, dull on both surfaces, greyish-green on drying, chartaceous, 3-plinerved (principal nerves impressed above) with the inner pair opposite and diverging at or near base, reticulation faint above and prominulous below.

Microscopic: petioles hirsute with long (up to about 1 mm) rusty straight hairs; blades beneath hirsute with similar hairs on principal nerves and sparsely so on lesser veins, above sparsely hirsute on midrib, leaf-margins ciliate with long hairs.

Inflorescences terminal in congested cymes; calyx \pm 1.8 mm long, the narrowly lance-subulate lobes glabrous dorsally, thinly setulose-ciliate; corolla \pm 2 mm long, the lobes \pm 1.3 x 0.5



STRYCHNOS SETOSA (Santos 1250)
(1/2 natural size)

mm, papillate dorsally and beyond middle ventrally, below middle internally barbate; anthers sessiloid narrowly triangular in outline 0.7 mm long, barbate at base (Flowers described from dried material).

The collector describes the plant as 2 m high with cream flowers. On the specimen examined there are no tendrils or spines.

Brazil: Bahia: Ipiaú, estrada a Jequié, T. S. Santos 1250 (31/10-1970) (NY-holotype).

Until the fruits of this species are collected its position is not certain, but it is probably of subsection Breviflorae.

We need fruits and bark of roots (for chemical assays).

54. Strychnos atlantica Krukoff & Barneby, Mem. N.Y. Bot. Gard. 20(1): 61. 1969.

Brazil: Bahia: Sta Cruz de Cabralia, T. S. Santos 3012; Espirito Santo: T. S. Santos 2281 (NY, CEPEC) (Road Linares - Bananal).

T. S. Santos 2281 is the first collection in flower and the first record of this species from Espirito Santo. Unfortunately through error the sheet with flowers was sent back to CEPEC before they were described.

Distribution: Endemic probably to coastal Bahia and Espirito Santo. Known from 11 collections.

55. Strychnos rubiginosa A. DeCandolle in DeCandolle, Prodr. 9: 16. 1845.

Distribution: Eastern Brazil (largely in cerrados of Piauí, Ceará, Pernambuco, Bahia, Minas Gerais, Mato Grosso and Paraná). Known from 20 collections.

56. Strychnos parvifolia A. DeCandolle in DeCandolle, Prodr. 9: 16. 1845.

Distribution: This polymorphic and variable species has a very extensive range which is different however from those of all other members of the genus as it is found in special habitats. In State of Pará (Brazil) it is confined to patches of forests in savannas and to secondary forests (near Obidos, near Alenquer, near Santarem, on Serra de Pirocaua, and in the basins of Rio Tapajós and Rio Tocantins where it is common). Farther south in Brazil, it has been collected in Maranhão (on the Island of São Luiz, and near Imperatriz on the border of the States of Maranhão and Goiás), Goiás, Mato Grosso, Piauí, Ceará, Rio Grande do Norte, Paraíba, Pernambuco, Bahia, Minas Gerais, Espirito Santo, Rio de Janeiro and São Paulo, usually in open situations. Also in Paraguay and Bolivia (in savannas of Santa Cruz). Known from 145 collections.

57. Strychnos fulvotomentosa Gilg in Engler, Bot. Jahrb. 25. (Beibl. 60): 40. 1898.

Distribution: Southeastern Brazil (Minas Gerais, Espirito Santo and Rio de Janeiro). Known from 32 collections.

- 57a. Strychnos recognita Krukoff & Barneby, Phytologia 27: 103. 1973.

Brazil: Bahia: Itacaré, T. S. Santos 165, 727; Espirito Santo: vale do Rio Doce, T. S. Santos 2055.

The holotype of this species from Itacaré, Bahia, is in mature flowers. T. S. dos Santos 727 from the type locality is the first collection with immature fruits and it is now evident that this species was correctly placed in subsect. Breviflorae as the testa is crustaceous (not composed of soft fibers). Mature fruits are probably small with thin shells. The species is endemic to coastal Bahia extending to adjacent coastal Espirito Santo.

It would be important to collect mature fruits in June or July and bark of roots for chemical assay as it has not been studied chemically.

Distribution: Probably endemic to coastal Bahia and Espirito Santo. Known from 13 collections.

58. Strychnos acuta Progel in Mart. Fl. Bras. 6(1): 280. 1868.

Distribution: Southeastern Brazil (Bahia, Espirito Santo, Rio de Janeiro, São Paulo and Minas Gerais). Known from 36 collections.

59. Strychnos brasiliensis (Sprengel) Martius, Flora 24. (Beibl. 2): 84. 1841.

Distribution: Southeastern Brazil (Minas Gerais, Rio de Janeiro, São Paulo, Paraná, Sta Catarina, Rio Grande do Sul); Paraguay; Argentina (Misiones, Corrientes), and Bolivia (Santa Cruz). Known from 306 collections.

60. Strychnos grayi Grisebach, Mem. Amer. Acad. II. 8: 519. 1862.

Distribution: Cuba (Pinar del Río, Isla de Pinos, Habana, Santa Clara, Camaguey and Oriente) and Hispaniola (Dominican Republic). Doubtless occurs in the Republic of Haiti. Known from 27 collections.

Subsectio Eriospermae Krukoff & Barneby, Mem. N.Y. Bot. Gard. 20: 68. 1969.

61. Strychnos pachycarpa Ducke, Bol. Técn. Inst. Agron. Norte 3: 15. 1945.

Brazil: Amazonas: Manaus - Itacoatiara road, km 29,

Reserva Ceplac, forest on terra firme, latosol, growing in Q9, G. T. Prance & J. F. Ramos 23153 (Dec. 24, 1974 - frts.) (NY, INPA, MG, R, U, US, K, S. High liana in crown of forest, fruits orange.

This is the fourth collection of this species. It has been known previously from two Ducke collections from the same plant from the general vicinity of Manaus (in flower in October, and in fruit in December). The third collection (Oliveira 2794 (frts. in October) is from km 35 of Manaus - Itacoatiara road.

The young leaves of this species, not seen by me previously, resemble superficially those of S. asperula, fruits of which were not known until recently. Through error I placed this collection with S. asperula in Suppl. XIV (Phytologia 33: 308. 1974).

The shells of the fruit of this species are very thick and Ducke told me that he observed that it takes \pm 2 years before such thick shells of Amazonian species disintegrate and germination takes place. It would be interesting to check this experimentally.

Distribution: Known from 4 collections from the general vicinity of Manaus, Amazonas, Brazil.

62. Strychnos neglecta Krukoff & Barneby, Mem. N.Y. Bot. Gard. 20(1): 69. 1969.

Distribution: Known only from the type collection from the basin of Rio Japurá, Amazonas, Brazil. Doubtless occurs also in adjacent Colombia and Peru.

63. Strychnos brachistantha Standley, Field Mus. Publ. Bot. 12: 412. 1936.

Distribution: Mexico (Jalisco, Puebla, Veracruz and Tabasco); Belize (where common); Guatemala (Izabal, Huehuetenango, Alta Verapaz and Petén); Nicaragua (Zelaya); and Panama (Canal Zone). Known from 45 collections.

64. Strychnos nigricans Progel in Mart. Fl. Bras. 6(1): 280. 1868.

Distribution: Southeastern Brazil (Minas Gerais, Espírito Santo, Rio de Janeiro, São Paulo and Paraná). Known from 32 collections.

65. Strychnos mattogrossensis S. Moore, Trans. Linn. Soc. II. 4: 392. 1895.

Colombia: Chocó: munic. de Riosucio, H. León 638 (MO); Peru: San Martín: prov. Madre Mía, Jef. D. Boeke 1327 (MO); Brazil: Bahia: Belmonte, T. S. Santos 3141.

These are the first records of the species from Chocó

(Colombia) and San Martín (Peru).

Distribution: Colombia (Chocó, Guajiro, Magdalena, Bolivar), Venezuela (Zulia, Yaracuy, Tachira, Delta Amacuro, Bolivar, Amazonas), Peru (Loreto, San Martín, and Brazil where known from States of Pará, Amazonas (basins of Rio Madeira, Rio Negro, Rio Solimões, Rio Purús, Rio Juruá, Rio Japurá and Rio Ica), Mato Grosso, Maranhão, Ceará, Pernambuco, Rio Grande do Norte, Paraíba, and Bahia. Known from 72 collections.

66. Strychnos cerradoensis Krukoff & Barneby, Mem. N.Y. Bot. Gard. 20(1): 72. 1969.

Distribution: Known only from the type locality in Minas Gerais, Brazil. Known from 2 collections.

66a. Strychnos alvimiana Krukoff & Barneby, Photologia 27: 105. 1973.

Brazil: Bahia: Itacaré road, T. S. Santos 1757.

Distribution: Probably endemic to coastal Bahia, possibly extending to Espírito Santo. Known from 6 collections.

67. Strychnos schultesiana Krukoff, Mem. N.Y. Bot. Gard. 12 (1): 78. 1965.

Distribution: Amazonian Brazil (basin of Rio Solimões in State of Amazonas) and Venezuela (Mérida and Barinas). Known from 9 collections.

68. Strychnos malacosperma Ducke & Froes, Bol. Técn. Inst. Agrón. Norte 30: 43. 1955.

Distribution: Known only from the type locality in Pará, Brazil. Known from 5 collections.

69. Strychnos poeppigii Progel in Mart. Fl. Bras. 6(1): 282. 1868.

Distribution: Peru (basins of Rios Marañón, Ucayalí, Huallaga and Nanay in Loreto and San Martín), and Brazil (basin of the lower Rio Trombetas, Rio Tocantins and near Rio Branco de Obidos in State of Pará; basins of the lower and upper Rio Solimões and of the middle Rio Juruá in State of Amazonas; and basin of Rio Acre in State of Acre). Doubtless occurs also in adjacent Colombia and Bolivia. Known from 39 collections.

70. Strychnos tarapotensis Sprague & Sandw., Kew Bull. 1927: 131. 1927.

Peru: Madre de Dios: B. Foster 2501 (F), 3243 (F), 6158 (F).

Distribution: Peru (basin of Río Marañón in Loreto, and basin of Río Huallaga in San Martín, where it is common, Amazonas, Madre de Dios; Brazil (basin of the middle Rio Juruá, in the State of Amazonas and basin of the upper Rio Purús in

the State of Acre). Doubtless occurs also in Bolivia in the region adjacent to the State of Acre. Known from 49 collections.

71. Strychnos schunkei Krukoff & Barneby, Phytologia 25: 53. 1972.

Distribution: Known only from the type collection from Peru (San Martín).

We shall mention here also specimens which may represent new species and which we did not describe as they were sterile. These are as follows:

21. S. cf. diabolii Sandwith, Kew Bull. 1931: 486. 1931.

For details see Supplement VIII (Mem. NYBG 20: 35. 1969). The 6 Guiana sterile specimens are still unmatched; in fact we did not have any new collection from Guiana since 1969.

Strychnos sp. nov. (?) Sect. Strychnos

Another possible undescribed species was collected in Colombia near the border of Venezuela. We mention this collection in the paper published in Lloydia 35: 208. 1972.

Strychnos sp. nov. (?) Sect. Strychnos

Still another possibly new species was collected in primary rain forest \pm 500 m in Taisha, prov. Saotingo-Zamora, Ecuador. (Pennington & Cazalet 7514). It is represented by sterile sheets at K and NY. A single fruit which originally was with this collection apparently was lost at K as it was not found in the carpological collection or elsewhere in the Herbarium. The leaves of this collection cannot be matched with species known to occur in Ecuador and elsewhere. Below is a description of vegetative parts of this collection:

Macroscopic: branchlets blackish; petioles 1-1/2-2 cm long; blades usually elliptic, 15-18 cm long, 6-7.5 cm broad, obtuse to cuneate at base, usually long acuminate at apex, usually dull on both surfaces, chartaceous, 3-plinerved with the inner pair opposite and usually diverging at base, primary nerves impressed above, secondaries and veinlets not distinct, primary, secondaries and veinlets prominent below.

Microscopic: branchlets, petioles and blades (especially nerves) softly pubescent with curved hairs, blades essentially glabrous and without tubercles above.

APPENDICES

Appendices I to IV (inclusive) will be of interest to collectors as well as to workers on this genus, and Appendices V to VIII (inclusive) primarily to a future monographer.

APPENDIX IRegions where new species are expected

New species of Strychnos are not expected from the West Indies, Mexico and Central America in spite of the fact that at least Nicaragua is very poorly collected. Species of Strychnos are essentially lowland plants of rather broad distribution and endemics from high elevations are not expected.

New species are expected from the Amazon basin in Bolivia, Ecuador, Peru and Colombia, in Brazilian Amazonia largely from the southern part. The rain forest of poorly collected Chocó and of the western coast of South America in Colombia, Ecuador and Peru also might yield new species. Venezuela is amazing as time and again we find there species which were thought to be confined to the Amazon basin. This is probably largely due to Julian Steyermark who seems to pick up interesting localities.

APPENDIX IISpecies known from one collection (or two collections from the same plant)

17. S. krukoffiana Ducke (type from Flores near Manaus, Brazil).
30. S. lobeliodes Krukoff & Barneby (type from Vaupés, Colombia).
44. S. goiasensis Krukoff & Barneby (type from Goiás, Brazil; as it is Glaziou collection, the provenance is not certain).
- 44a. S. cayennensis Krukoff & Barneby (type from Saul, French Guiana).
45. S. duckei Krukoff & Monachino (type from Tabatinga, Amazonas, Brazil).
51. S. progeliana Krukoff & Barneby (type from Rio Japurá, Amazonas, Brazil).
62. S. neglecta Krukoff & Barneby (type from Rio Japurá, Amazonas, Brazil).
66. S. cerradoensis Krukoff & Barneby (two different collections) (type from Viçosa, Minas Gerais, Brazil).
71. S. schunkei Krukoff & Barneby (type from San Martín, Peru).

APPENDIX III

Species of which flowers (or at least corolla) are not yet known

- 28. S. solimoesana Krukoff (upper Rio Solimões and Rio Tonantins, Brazil, and Amazonas, Colombia).
- 32a. S. croatii Krukoff & Barneby (Panama, south of Canal Zone and Colombia, Chocó).
- 51. S. progeliana Krukoff & Barneby (known only from Rio Japurá, Brazil).
- 66a. S. alvimiana Krukoff & Barneby (coastal Bahia, Brazil).

APPENDIX IV

Species of which fruits are not yet known

- 5. S. romeu-belenii Krukoff & Barneby (coastal Bahia, Brazil).
- 17. S. krukoffiana Ducke (Flores, Manaus, Brazil).
- 30. S. lobeliodes Krukoff & Barneby (Vaupés, Colombia).
- 38a. S. ecuadoriensis Krukoff & Barneby (Napo, Ecuador).
- 44. S. goiasensis Krukoff & Barneby (Goiás, Brazil).
- 45. S. duckei Krukoff & Monachino (Tabatinga, Amazonas, Brazil).
- 51. S. progeliana Krukoff & Barneby (Rio Japurá, Amazonas, Brazil).
- 57a. S. recognita Krukoff & Barneby (Bahia and Espirito Santo, Brazil).
- 62. S. neglecta Krukoff & Barneby (Rio Japurá, Brazil).
- 71. S. schunkei Krukoff & Barneby (San Martín, Peru).

In addition to these mature and well preserved fruits are needed of 5 species.

- 13. S. tabascanana Sprague & Sandwith (Eastern Mexico and Central America).
- 28. S. solimoesana Krukoff (basin of the upper Rio Solimões, Rio Tonantins, Rio Purús and Rio Negro in Brazil, and Amazonas, Colombia).
- 35. S. bredemeyeri (Schultes) Sprague and Sandwith (Trinidad, Venezuela, Guiana and Brasil (Roraima)).
- 44a. S. cayennensis Krukoff & Barneby (Saúl, French Guiana).
- 55. S. rubiginosa DeCandolle (Eastern Brazil - Piauí, Ceará, Pernambuco, Bahia, Minas Gerais, Mato Grosso and Paraná).

APPENDIX V

Species under which many synonyms, basionyms, etc. are listed

Taxonomic problems relating to the three species listed below were well thrashed out in correspondence with Sandwith and

Ducke and there was no disagreement among us that they are best treated as in our first monograph. We concluded that it is not advisable to separate even forms in these variable and polymorphic species:

- 39. S. guianensis (Aublet) Martius
- 56. S. parvifolia DeCandolle
- 59. S. brasiliensis (Sprengel) Martius

Under S. guianensis are listed 18 synonyms, basionyms, etc.

Under S. parvifolia are listed 12 synonyms, basionyms, etc. This is also a polymorphic species with distribution in certain specific habitats on the Amazon as well as in northeastern Brazil, which fact was a matter of correspondence with Ducke and his field study. We finally agreed that even forms cannot be separated in this polymorphic species. We maintained, however, as a distinct species, the related S. rubiginosa A. DeCandolle.

S. brasiliensis with 13 synonyms, basionyms, etc., is one of the most variable species of American Strychnos as far as vegetative characters are concerned.

APPENDIX VI

Closely related species

- 63. S. brachistantha Standley
- 64. S. nigricans Progel
- 65. S. mattogrossensis S. Moore
- 66. S. cerradoensis Krukoff & Barneby

The members of this complex cannot be distinguished on vegetative characters. The critical differences are found some in flower, others in fruit and they may be summarized as follows:

- | | |
|---|--|
| 63. <u>S. brachistantha</u>
(Mexico & Central America) | calyx-lobes 1-2x0.45-0.7 mm,
lanceolate to narrowly ovate,
(length-width ratio $\pm 2-3:1$);
corolla-tube ¹ ± 0.6 mm, less
than half as long as lobes,
these ± 1.4 mm long;
filaments ± 0.3 mm; anthers 0.6x
0.4 mm, glabrous;
fruits large (6-7 cm in diam),
shell very thick (± 6 mm thick). |
|---|--|

¹Characters shown in italics do not occur in other species.

64. S. nigricans
(Southeastern Brazil
Minas Gerais, Espírito
Santo, Rio do Janeiro,
São Paulo and Paraná)
calyx-lobes deltate, 0.7-0.9x
0.6-0.9 mm (length-width
ratio $\pm 1:1$);
corolla-tube $\pm 1.3-1.4$ mm, not
or not much shorter than its
lobes, these 1.3-1.7 mm long;
filaments 0.2-0.3 mm long;
anthers 0.7-0.8x0.4-0.6 mm,
barbate at base;
fruits large (± 5.5 cm in diam;
shells very thick (± 5 mm thick)).
65. S. mattogrossensis
(Basins of the Amazon
and Orinaco, also in
Colombia (Chocó,
Guajire), Venezuela
(Zulia, Yaracuy;
Tachira), and Brazil
(Maranhão, Ceará, Rio
Grande do Norte,
Paraiba and Bahia).
calyx-lobes lanceolate to ovate-
acuminate, 0.9-1.5x0.4-0.5 mm
(length-width ratio $\pm 2-3:1$);
corolla-tube 0.75-0.9 mm, little
more than half as long as the
lobes (these $1/3-1.5$ mm long);
filaments 0.3-0.5 mm long;
anthers 0.55-0.6x0.35-0.45 mm,
glabrous;
fruits very small (± 1.5 cm in
diam) shell very thin (± 0.5 mm
thin).
66. S. cerradoensis
(Minas Gerais).
calyx-lobes lanceolate, 1.6-1.8
mm x 0.6 mm;
corolla-tube ± 0.6 mm, less than
half as long as lobes, these
 ± 2 mm long;
filaments 0.3 mm; anthers 0.8x
0.5 mm, glabrous;
mature fruits not seen; shells
very thick (± 5 mm thick).

REMARKS:

1. The distribution is of great help in the identification of specimens of S. brachistantha, S. mattogrossensis and S. cerradoensis as their ranges do not overlap.
2. S. mattogrossensis is the only one which can be immediately distinguished by the fruits.
3. S. nigricans has 3 floral characters distinguishing it from other species in this complex: deltoid calyx-lobes, relatively long corolla-tube, and basally hairy anthers.

6. S. rondeletiioides Spruce
7. S. macrophylla Barbosa Rodrigues

These are closely related species and Ducke and I agreed, even before finding excellent characters in fruits, to recognize as separate species. S. rondeletiioides is mostly found on the varzea land along the shores of the rivers. Its leaves are narrower and usually dry an olive-ocher yellow. Furthermore, its fruit is very characteristic, ovoid or pyriform, wrinkled like a prune on drying, whereas S. macrophylla is usually found on terra firme, has leaves usually drying brownish with blackened petioles and its fruit is globose, larger, with thicker shells and not wrinkled on drying. For other differences between these two species, see Key (9:211) also Ducke's paper (5:20).

69. S. poeppigii Progel
70. S. tarapotensis Sprague & Sandwith

These two species cannot be distinguished on vegetative and fruit characters but there is no difficulty whatsoever once flowers are available. Inflorescences of S. poeppigii are congested cymes spherically clustered, and its calyx lobes are extremely long, usually ± 2.5 m. In S. tarapotensis, inflorescences are in loosely flowered paniculate cymes not congested, and its calyx lobes are usually not longer than 1.5 m and only occasionally up to 2 m. Once we know more about their ranges of distribution, these likely will also be helpful in identification.

12. S. panamensis Seemann
13. S. tabasacana Sprague & Sandwith

I believe that they should best be left as distinct species rather than treating S. tabasacana as a subspecies. The extreme form of S. panamensis with a large glabrous corolla and large thin-shelled fruits are especially common in Panama. S. tabasacana with smaller pubescent corolla and probably in average smaller fruits with thicker shells are especially common in the State of Tabasco, Mexico. S. panamensis is a western species found from Mexico (Sinaloa) down to Panama, Colombia (Chocó, Magdalena, Santander, Antioquia and Caldas), and Venezuela (Zulia, Falcón, Mérida, Barinas and Apure).

S. tabasacana, on the other hand, is an eastern species found in Mexico from Veracruz down to Belize, Guatemala, Honduras and Costa Rica. It is doubtful that it extends to Panama but likely soon will be collected in Nicaragua. Identifying sterile collections from regions where these two species approach their boundaries is very difficult. I have no record however of any locality where the two species are found together.

39. S. guianensis (Aublet) Martius
S. bicolor Progel

As lately as 1972 (9:235) S. bicolor was easily separated from closely related S. guianensis by leaf-blades beneath densely fulvous-velutinous, above grey-glaucous with conspicuous fulvous line on midrib. Their ranges were thought to be distinct, S. bicolor occurring in Minas Gerais, Goiás, the Federal District, Mato Grosso and São Paulo in central Brazil, whereas S. guianensis was known to be well distributed in the basin of the middle and upper Orinoco and throughout the entire Amazon basin. Abundant recent collections from Mato Grosso, Goiás, the Federal District and Minas Gerais indicate that the concept of S. bicolor has to be somewhat changed. Leaves of some specimens are almost glabrous beneath but still grey-glaucous above, and others almost glabrous beneath and even not grey-glaucous above. In Supplement XVI I suggested that eventually with the collection of abundant material in the critical area (northern limit of its distribution in the States of Mato Grosso and Goiás, etc.) S. bicolor might yet be reduced to the synonymy of S. guianensis or retained as a form with a much restricted range in the State of São Paulo and adjacent regions. I added that I was unable to do this as even though 25 collections of S. bicolor were seen by me, only a few are deposited at NY. Furthermore, field work is needed before this problem can be satisfactorily resolved.

Since then I studied this problem further and found probably the clue to the solution which should be further investigated in the field and by new collections. S. bicolor in critical areas seems to be confined to the cerrados and comparatively high mountains such as Serra do Cipó. We may find that in critical areas where the ranges of the two species overlap they are confined to the different ecological habitats. It is admitted that in these critical areas we likely will find plants with characters of these two distinct entities not so well marked as in the centers of their distribution. The same is found in the "critical" areas of S. panamensis and S. tabascanana and of other closely related species.

33. S. gardneri A. DeCandolle
34. S. pubiflora Krukoff

The corolla of S. gardneri is glabrous but that of S. pubiflora is pubescent without. As in the case with S. bicolor and S. guianensis (which are closely related) it is likely that these also are confined to two different ecological habitats. S. pubiflora is common in cerrados and/or on the lower parts of mountains in the State of Minas Gerais (Serra do Cipó, Serra de

Cabral, etc.) whereas S. gardneri has a very extensive range in eastern and central Brazil in dry virgin and secondary forests. Fruits of S. pubiflora should be checked by new collections, as on the insufficient material, both Ducke (5:30) and I suggested that perhaps those of S. pubiflora are smaller.

55. S. rubiginosa A. DeCandolle

56. S. parvifolia A. DeCandolle

Back in 1969 (7:63) we mentioned that we needed abundant new collections and also fruits of S. rubiginosa and we still lack them. We now have, however, definite indications that these two species are confined to different ecological habitats, S. rubiginosa being found in Eastern Brazil in sertão (cerrados, chapada, etc.) and on mountains such as Serra de Acuruá (Bahia), the type locality. For the ecological habitat of S. parvifolia see Appendix V of this paper. These two species, of course, are easily distinguished on vegetative characters. Blades of S. rubiginosa are densely pilosulous with fine and soft or moderately stiff, mostly erect but distally incurving hairs less than 0.7 mm long, the pubescence often being dense on both sides. In S. parvifolia the blades beneath are glabrous or subsetulose on midrib (wads of dense indumentum sometimes persistent), above glabrous or with curved hairs along midrib. For other differences see 9:246-247.

67. S. schultesiana Krukoff

68. S. malacosperma Ducke & Froes

S. malacosperma is known from 5 collections from the type locality, Colonia de Mulata near Monte Alegre, Pará, Brazil, and after many years of attempts we have given up hope of having additional topotypes.

S. schultesiana is known from 8 collections. The type is from Amazonas (Igarapé Belém), Brazil and the other collections are from Venezuela (Mérida and Barinas). We hope before long to obtain good fruiting and flowering material of this species and decide whether or not these species are distinct.

Fruit characters in Sect. Breviflorae are very important. Several pairs of species indistinguishable by vegetative and floral characteristics are easily distinguished by fruits. It is important to check whether the fruit characters of specimens collected in Venezuela will permit separation of S. schultesiana from S. malacosperma. I separated them in a Key (9:257) as follows:

Pericarp \pm 3 mm thick; fruits 5-8 (10) cm in diam; seeds 20-25. -

S. malacosperma

Pericarp 1 mm thick; fruits \pm 8 cm in diam; seeds many - S.

schultesiana

APPENDIX VIISpecies poorly understood

Two species, Strychnos progeliana and Strychnos neglecta, are known from the type collections made by Martius on Rio Japurá, Amazonas, Brazil, represented by specimens only at M. These are rather poor, the fruits are unknown, and these species were never recollected because Rio Japurá was not visited either by Ducke, myself, Fróes, Prance or other recent collectors. It would be most interesting to recollect these two species, especially in fruit. Incidentally, I consider the Japurá basin to be very rich in species of Strychnos as is the region of the Upper Rio Solimões near the Colombian border.

APPENDIX VIIISpecies described since the last extensive paper published in 1972 (Lloydia 35. 193-271)

- 32a. S. croatii Krukoff & Barneby, Suppl. #14 - Phytologia 33:313. 1976.
- 38a. S. ecuadoriensis Krukoff & Barneby, Suppl. #16 - Phytologia 39:276. 1978.
- 44a. S. cayennensis Krukoff & Barneby, Suppl. #13 - Phytologia 27:101. 1973.
- 53a. S. setosa Krukoff & Barneby, Suppl. #17 - Phytologia 1978.
- 57a. S. recognita Krukoff & Barneby, Suppl. #13 - Phytologia 27:103. 1973.
- 66a. S. alvimiana Krukoff & Barneby, Suppl. #13 - Phytologia 27:105. 1973.
- 71. S. schunkei Krukoff & Barneby, Suppl. #12 - Phytologia 27:53. 1972.

List of Exsiccatae

The first list of Exsiccatae covering papers on *Strychnos*, including Supplement XI, was published in *Lloydia* 35(3): 262-270. 1972, the second covering Supplements XII, XIII and XIV in *Phytologia* 33: 319-322. 1976, the third covering Supplements XV and XVI in *Phytologia* 39: 281-282. 1978 and the present list covers Supplement XVII. Only numbered collections and those of which the dates of collection are recorded have been listed. Collections identified with doubt are not listed. If a collector gathered his collection together with others, only his name is cited in this list. Collections with Dr. Prance's numbers are cited under Prance.

Almeida, J., 128 (15).

Boeke, Jef. D., 1327 (65).
Burger, William, 10655 (12).

Cardona, F., 1228 (35).
Croat, T. B., 24206 (31), 40194 (12), 41877 (12), 43838 (12),
44412 (12).
Forero, E., 1489 (39), 1524 (32a).
Foster, Robin, 2501 (70), 3243 (70), 5007 (4), 6158 (70).

Gentry, Al., 1952 (12), 15643 (23), 18343 (39), 18416 (38),
18471 (39), 18530 (32).

Klein, R. M., 6/988 (11).

LeClezio, 1 (12).
León, H., 638 (65).
Liesner, R. L., 3135 (12), 3206 (31).

Maas, P. J. M., 2533 (21).
Martinez, C. G., 2297 (13).
Montgomery, Gene, s.n. (6/4-1976) (12).

Neill, David, 3012 (12).

Plowman, T., 6678 (38), 6694 (38).
Prance, G. T., 23153 (61).

Revilla, Juan, 1490 (36a), 1857 (39).
Rodriguez, Hector, 68 (53).

Santos, T. S., 165 (57a), 727 (57a), 1250 (53a), 1757 (66a),
2055 (57a), 2281 (54), 3012 (54), 3141 (65).

Ule, E. H. G., 97 (11), 1209 (11).

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1. Ducke, Adolpho. O. gênero Strychnos L. na Amazonia Brasileira. Bol. Téc. do Inst. Agr. do Norte, 3:1-23. 1945.
2. " " Plantas novas ou pouco conhecidas da Amazonia. Bol. Téc. do Inst. Agr. do Norte, 19:20-39. t. 7-9. 1950.
3. " " O gênero Strychnos no Rio de Janeiro, Bol. do Museu Nacional, 13. 1951.
4. " " A new curare-plant from the Brazilian Amazon. An. Acad. Bras. Ciências 23, 2:209-212. 1951.
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