Supplementary notes on the American species of Strychnos-X

B.A. Krukoff[1] and R.C. Barneby[2]

Contents

Introduction 1
Chromosome numbers 1
Pollen Studies 1
Discussion of spp. of Longiflorae 2
" " " " Intermediae 6
" " " " Breviflorae Subsection Breviflorae 7
" " " " " " Eriospermae 8
Appendix VII (supplement) Changes in the identifications 8
Corrections 9
Bibliography 9

1. Consulting Botanist of Merck Sharp & Dohme Research Laboratories, Rahway, New Jersey
2. Honorary Curator of Western Botany, The New York Botanical Garden

Introduction

Since the last serial paper was submitted for publication 132 new collections were examined, largely old collections deposited with Museum d' Histoire Naturelle, Paris and recent collections in Panama of botanists associated with Missouri Botanical Garden. An extensive collection of Romeu P. Belem made in the State of Bahia, Brazil early in 1968 is of particular interest. On this trip he made 36 collections which belong to 10 species. The earlier Froes' collection on which we reported in 1943 (2:21-24), the first Belem collections (on which we reported in 1969 (7b) and the present Belem collection give us fairly good information as to what species are found in this interesting area. It is to be recalled that some of the Amazonian species venture into the high riverine forests of eastern Bahia; species confined to caatingas of central Brazil, occur in the western part of the State and species of the southern coastal forests reach Bahia along the coast. It is regrettable that due to organizational difficulties Belem' trip was delayed by approximately 3 months. If he had started on this trip in January he would have collected many species of Strychnos in flower, rather than sterile or in fruit.

The newly examined collections extend our knowledge of some species previously known from incomplete material; extensions of ranges are noted for 12 species, 1 species (namely S. longisepala Krukoff) is reduced to synonymy, and the name Strychnos pedunculata (A. DeCandolle) Bentham was replaced by the earlier name Strychnos bredemeyeri (Schultes) Sprague & Sandwith.

Chromosome Numbers

Considerable progress has been made in the studies of chromosome numbers in Strychnos. Twenty two species (1 American and 21 African and Asiatic) have been studied by Gadella: 2n = 44 (20 species) and 2n = 88 (2 species). In the opinion of Gadella it is likely that only one basic number occurs in the genus Strychnos: x = 22. The determination of the chromosome numbers was based on the study of roottip-mitoses. Roottips of the plants were fixed in Karpechenko, embedded in paraffin, sectioned at 15 micron and stained according to Heidenhain's haematoxylin method. (Th. W. J. Gadella. Some cytological observations in the Loganiaceae IV. Meded. Bot. Mus. Herb. Rijks. Utr. #265. 302-304. 1967).

Pollen Studies

Slides of pollen of 5 species prepared at the N. Y. Botanical Garden were sent to Polynological Laboratories, Stockholm for studies; pollen descriptions, as they were prepared by Dr. Siwert Nilssen of that laboratory are given below. From these descriptions it is evident that the pollens are very similar. Taking into consideration that the pollens were of one species each of section Longiflorae and Intermediae, and of subsections Breviflorae and Eriospermae of section Breviflorae also of S. parviflora which has no close relatives in the section Breviflorae, it is possible to conclude that specific differences, if such could be established on the basis of pollen, would require a very considerable amount of work.

Pollen descriptions:

Strychnos ramentifera (NY 1021) Ducke 1763 - Pollen grains 3-colpate or 3-colp-orate; largest diameter about 40 μ. Apocolpia diameter about 12 μ. Exine about 2.5 μ thick. Sexine as thick as nexine, finely reticulate with relatively wide muri.
NPC: 343 (345)

S. guianensis (NY 1023) Pires 48564 - Pollen grains 3 colp-orate (colp-oroidate), prolate-spheroidal (24 x 23μ). Amb rounded-triangular. Apocolpia diameter about 7 μ.
Exine about 1 μ thick. Sexine as thick as nexine. Sexine pattern ± ulmoid (LO-pattern).
NPC: 345 (343)

S. brasiliensis (NY 1022) Hassler 9645 - Pollen grains 3-colp-orate, oblate-spheroidal - prolate spheroidal (23 x 22 μ). Amb rounded-triangular. Apocolpia diameter about 8 μ.
Exine thickness about 1 μ. Sexine as thick as nexine, or thinner. Mesocolpia with LO-pattern. Apocolpia finely reticulate (lumina <0, 5 μ), or provided with a faint OL-pattern.
NPC: 345

S. schultesiana (NY 1025) Breteler 3973 - Pollen grains 3-colp-orate, oblate-spheroidal (17 x 21 μ). Amb ± triangular. Apocolpia diameter about 8 μ.
Exine about 1 m thick. Sexine as thick as nexine. Mesocolpia with LO-pattern. Apocolpia very finely reticulate, or provided with OL-pattern. Cf. S. brasiliensis.
NPC: 345

S. parviflora (NY 1024) Froes 21461 - Pollen grains 3-colp-oroidate, ± spheroidal (17 x 18 μ). Apocolpia diameter about 9 μ.
Exine about 1,5 μ thick. Sexine as thick as nexine, or sexine > nexine, finely reticulate.
NPC: 343-345

Longiflorae

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

Costa Rica: Puntarenas: open forest 1 mile due south of San Vito de Java, ± 3500 ft., Raven 21903 (F) (fr. Aug.).

This collection is welcome as it comes from the fourth locality in Costa Rica where this species was located. This is the first record of the species from the province of Puntarenas.

The fruits of this collection almost mature are ± 2.2 cm in diam. and shells about 9 mm thick. This confirms our earlier observation that shells of fruits of S. chlorantha, in proportion to the size of fruits, are thicker than those of all known American species of Strychnos, including shells of fruits of S. froesii.

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

Brazil: Para: Belem: Ipean, Agua Preta, high forest on terra firme, Pires & Silva 11192. Maranhao: alto Turi, Tovares 1093 (US).
This is the first record of the species from the State of Maranhao.

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

Brazil: Acre: mun. Sena Madureira, Prance et al. 7598.

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

Brazil: Bahia: Romeu Belem 3504, 3506 & 3509 (all from Marau, mata litoranea), 3710 (Una, mata costeira).
Fruits are said to be 10 cm in diam. The presence of tendrils in this species is now confirmed on the actual specimen.

6. Strychnos rondeletioides Spruce ex Bentham, Jour. Linn. Soc. 1:104. 1856.

Brazil: Amazonas: Rio Urubu, Prance et al. 5074.

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

Brazil: Fritz Muller s.n. (P); Bahia: Romeu Belem 3573 (Pontal dos Ilheus); 3725 (Itabuna); Rio de Janeiro: Nadeaud s.n. (Sept. 1862) (P); Sta. Catarina: Nadeaud s.n. (Nov. 1862) (P).

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

Panama: Canal Zone: Tyson & Blum 3570 (MO), Sister M. Victoria Hayden 17 (MO), Stoutamire 2109 (MICH), Croat 6028 (MO), 6694 (MO), 6826 (MO), 7266 (MO), 8189 (MO); Panama: Bartlett & Lasser 16425 (MO), Kirkbride & Duke 1652 (MO); Darien: Rio Chucanaquo, Duke 4987 (MO); Venezuela: Zulia: J. de Bruijn 1220, 1424.

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

Brazil: Bahia: Romeu-Belem 3484, 3500, 3510 & 3537 (Marau), 3581 (Pontal dos Ilheus), 3714 (Itabuna, Jucari), 3681 & 3706 (Una), 3472; Froes 12732 (munic. Ilheos, Bahia of Rio Santa Ana).

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

French Guiana: Fleuve Approuague, Aldeman 2404 (P, U).
This is the first record of this species from French Guiana.

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

Brazil: Para: Rio Jari, E. Oliveira 4229.

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

Panama: Canal Zone: Croat 6766 (MO), 6825 (MO), 7278 (MO), 8558 (MO); San Blas: Elias 1747 (MO).
This is the first record of this species from the poorly collected San Blas.

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

Surinam: near Jodensavanne, Vreden 11667 (U). French Guiana: Barbier s.n. (1847) (P), Lemoine 7939.

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

Brazil: Rio de Janeiro: cult., Herb. Glaziou 9515 (P).

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

Brazil: Crevaux s.n. (P); Para: "Taperinha bei Santarem", Ginzberger 604 (FI); Amazonas: basin of Rio Tonantins, Jobert s.n. (P-type) (photo of Field Museum #38943). Colombia: Putumayo: Rio Putumayo, Schultes 3428 (GH). Peru: Huanuco: Mathias & Taylor 3988 (LA).
Local names: se-he-pa (Kofan).
Schultes states on the label: "bark of roots is strongest ingredient in Kofan curare poison". On the label of Jobert' specimen is written: "Curare de Kawichanes, extrait d' un groupe de Strychnos envoye du Bresil a M. Bert". This is the first record of this species from Huanuco, Peru.

25. Strychnos pseudo-guina A. St. Hilaire, Mem. Mus. Paris 9:340. 1822.

Brazil: Minas Geraes: Glaziou 15234 (P).

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

Brazil: Territ. Amapa: Rio Jari, Nilo T. Silva 1299.
The first record of the species from the Territory of Amapa.

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

Brazil: Bahia: Romeu Belem 3503 (Marau, mata litoranea), 3703 (Una, mata costeira).

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

Costa Rica: 48 km SE from San Isidro, Alfonzo Jimenez M. 3761 (F). Venezuela: Amazonas: Rio Casiquiare, B. Maguire et al. 41941, Wurdack & Adderley 43362. Brazil: Ferreira s.n. (P); Bahia: Romeu Belem 3470 (Marau, mata litoranea), 3576 (Pontal dos Ilheus).

32. Strychnos erichsonii Richard Schomburg, ex Progel in Mart. Fl. Bras. 6(1):274. 1868.

Panama: Darien: Duke 8782 (MO) (Rio Balsa), 14576 (MO), international highway ca 1 mile SE of Rio Tuira. Colombia: Valle: Rio Calima, Cuatrecasas 17531 (F); Amazonas/Vaupes: Rio Apaporis, Garcia-Barriga 14021. Peru: Loreto: near Contamana, Schunke 917 (F). Surinam: near Jodensavanne, Vreden 11707 (WAD), 11744. French Guiana: Lemoine 7858 (P) (Riviere Tampoc), J. Lenormand 1, Oldeman B-995 (P) (Fleuve Approuague). Brazil: Para: Belem, Ipean, "reserva Mocambo, Q 12-16", Pires & Silva 10643. Bahia: Marau: R. Belem 3460, 3497.

Local name: Taki-taki (Parouichaton, French Guiana).

This is the first record of this species from Panama, Valle (Colombia) and Peru. For identification of Ducke 1972 and 2032 see under S. mitscherlichii var. amapensis.

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

Brazil: Rio de Janeiro: Glaziou s.n. (Sept. 10, 1878) (P).

35. Strychnos bredemeyeri (Schultes) Sprague & Sandwith, Kew Bull. 1927: 128. 1927.
Lasiostoma bredemeyeri Schultes, Mant. Syst. 3:64. 1827.
Rouhamon bredemeyeri A. DeCandolle in DeCandolle, Prodr. 9:18. 1845.
Rouhamon pedunculatum A. DeCandolle in DeCandolle Prodr. 9:561. 1845.
Strychnos schomburgkiana Klotzsch ex Richard Schomburgk, Reisen 3: 1144. 1848. nomen.
Strychnos pedunculata (A. DeCandolle) Bentham, Jour. Linn. Soc. 1:105. 1856.
Strychnos trinitensis Grisebach, Fl. Brit. W. Ind. 407. 1861.
Strychnos bredemeyeri (Schultes) Badillo in Pittier et al., Cat. Fl. Venezolana 2:287. 1947. (3rd Conf. Interam. Agric. Caracas).

Recently we received a letter from Botanisher Garten und Museum, Berlin-Dahlem informing us that there is no specimen in Willdenow herbarium of Strychnos collected by Jacquin in Venezuela which could be considered as the type of Lasiostoma bredemeyeri Schultes. Under the circumstances Bredemeyer s.n. (Hb. Jacq.) (W) must be considered as the type of Lasiostoma bredemeyeri Schultes. In 7a:50 we already stated that the above referred to specimen unquestionably is conspecific with S. pedunculata.

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

Surinam: Jodensavanne, Vreden 11734. Brazil: Territ. Rondonia: France et al. 8850 (savanna forest). Peru: Loreto: prov. Coronel Portillo, Schunke 2789 (F).

This is the first collection of this variety from Peru, and from Territ. Rondonia, Brazil.

Reference is made to the extensive chemical studies of bark, supposedly of S. mitscherlichi, by Karrer, Schmid and their coworkers. (7a:53). The authors give the following information on the procurement and identification

of the sample and botanical specimen (86) "Durch die Freundlichkeit von Padre Antonio Giacone (Brasilien) erhielten wir Rinde einer Strychnosart, die Herr Prof. A. Frey-Wyssling, Zurich Eid. Techn. Hochschule, als der S. mitscherlichii-Gruppe angehorend identizierte".

At my request, Dr. H. Hurlimann of Ciba Limited, Basle, Switzerland, talked with Prof. Frei-Wyssling who does not remember having identified any Strychnos for Prof. Karrer and he is quite definite that he has never studied any herbarium specimen of this genus. He suggested that it might have been possible that he looked at a bark sample, comparing the anatomical characters with other material which they may have had in their collection of fruits, wood, etc.

Inasmuch as on my visit to Zurich in 1968, I failed to find any herbarium material of Strychnos which could be a voucher for a sample of bark studied by Karrer, Schmid and their coworkers - the conclusion must be reached that no voucher is available, and also that the identity of this plant is doubtful.

36c. Strychnos mitscherlichii var. amapensis Krukoff & Barneby, Brittonia 20(1):48. 1969.

Brazil: Para: Belem, Ipean, Pires & Silva 10779.

Ducke 1972 and 2032 are cited under this species (7b:49). It should be noted here that two different collections were labelled as "1972", one made on 26/9-1944 and another on 24/5-1946; two collections also were labelled as "2032", one made on 26/10-1944 and another on 26/11-1946. We have seen material of S. mitscherlichii var. amapensis distributed under two above referred to numbers and we also have seen material of S. erichsonii distributed under the two above referred to numbers, sometimes on a single sheet. Ducke apparently did not know S. erichsonii, which is obvious from his own statement (31:29): "E. erichsonii e uma das poucas especies amazonicas que nao conheco em estado vivo, apesar de ocurrer com frequencia em Sao Miguel do Guama, nao muito longe de Belem".

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

Costa Rica: Puntarenas: peninsula de Osa (swampy forest), Alfonzo Jimenez M. 3026 (F).

Intermediae

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

French Guiana: Oldeman 947 (P) (Fleuve Approuague), Francis Halle 735 (P) (R. Mana). Venezuela: Amazonas: Farinas M. et al. 680 (Rio Casiquiare), Wurdack & Adderley 42659 (Rio Atabapo). Brazil: Territ. Rondonia: basin of Rio Madeira, Prance et al. 5568, 5933, 8810.

This is the first record of this species from the Territory Rondonia.

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

Venezuela: S. Martin s.n. (1879) (P). Brasil: Para: Rio Jari, E. Oliveira 4198.

On the label of the specimen from Venezuela is stated that the plant is used in Curare.

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

Panama: Panama: Blum et al. 2271 (MO), Dwyer 7092 (MO), Correa & Dressler 725 (halfway between Cerro Jefe and La Eneida), Dwyer et al. 7287 (MO) and 7373 (MO) (Cerro Jefe, ± 2900 ft.). Brazil: Acre: Sena Madureira, Prance et al. 7860. Peru: Loreto: near Neschuya, Schunke 897 (F), 6650 (MO). Venezuela: Amazonas: Rio Orinoco, Wurdack & Adderley 43072.
This is the first record of this species from Panama.

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

Brazil: Para: Belem, Pires 8113 (cult.).

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

Surinam: Borsboom 12036 (WAD), Lanjouw and Lindeman 2775 (U).

Breviflorae Subsection Breviflorae

52. Strychnos oiapocensis Froes, Bol. Tecn. Inst. Agron. Norte 36:143. 1959.

French Guiana: Francis Halle 1135 (P) (Mont. Cacao), Louis Claude Richard s.n.
This is the first record of this species from French Guiana.

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

Brazil: Bahia: Itabuna, Jucari, Romeu Belem 3712, 3722, 3723, 3724, 3726.
All these collections are from erect shrubs 3 to 5 m high with trunks armed with long straight spines and with the branchlets provided with woody hook like tendrils.

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

Brazil: Bahia: Romeu Belem 3607 & 3622 (margem do Rio Pardo), 3704 (Una, margem do Rio Raphael); Rio de Janeiro: "pres d'Aldeia de S. Pedro, Herb. Glaziou s.n. (Sept. 1881) (P); Sao Paulo: Dedecca 583 (UC).

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

Brazil: Bahia: vale do Rio Mucuri, Romeu Belem 3880; Espirito Santo: Linhares, vale do Rio Doce, Romeu Belem 3808, 3811.
This is the first record of the species from Bahia.

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

Brazil: Fritz Muller 45 (US), s.n. (P); Minaes Geraes: Schwacke 6265 (P); Rio de Janeiro: Glaziou 2708 (P); Sao Paulo: Dedecca 583 (UC); Parana: Curituba, Hatschbach 16086 (F); Sta. Catarina, Ule 1529 (P). Argentina: Missiones: Candelaria, Montes 27489. Bolivia: Santa Cruz: San Ignacio do

Velasco, Cardenas 5642 (US).

Breviflorae Subsection Eriospermae

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

Brazil: Bahia: Romeu Belem 3512 (Marau, mata litoranea), 3708 (Una, mata costeira), 3713 (Jucari, Itabuna, mata pedrigosa), 3874 (vale do Rio Mucuri, mata de terra firme); Rio de Janeiro: Corcovado, Nadeau s.n. (P).

65. Strychnos mattogrossensis S. Moore, Trans. Linn. Soc. II. 4:302. 1895.

Venezuela: Zulia: Perija district, J. de Bruijn 1217.

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

Chromosome numbers: 2n=44. Voucher: Breteler 5193 (Wageningen) from Venezuela, near La Azulita, State Merida (Th. W. J. Gadella, Meded. Bot. Mus. Herb. Rijks Utr. #265, p. 303. 1967). We accept the identification of this plant by Breteler without reservation as he knew this species and collected specimens of it (Breteler 3973, 4940 & 4591 (7b:74).

69. Strychnos poeppigii Progel in Martius. Fl. Bras. 6(1):282. 1868.
Strychnos longisepala Krukoff, Brittonia 4:317. 1942.

Brazil: Acre: munic. Sena Madureira, Prance et al. 7834.

With the acquisition of more material the supposed differences in the calyx of S. poeppigii and S. longisepala has broken down. Length and discoloration are no longer correlated. No further inflorescence with peduncle as long as that of the original S. poeppigii has been seen, but it seems doubtful whether the character is significant, weighed in balance against the resemblances in corolla, calyx, and fruit. Collectively S. poeppigii and S. longisepala, which should now bear the former name, have a wide distribution in the upper Amazon basin. Although the calyx varies somewhat in length, the lobes seem to be decisively longer than in the otherwise very similar and closely related S. tarapotensis. The less closely related S. malacosperma and S. schultesiana may be distinguished at anthesis by their looser inflorescences and even more certainly by the much larger, thick-shelled fruits.

Appendix VII (Supplement) (Cont'd)

Changes in the identifications

	Cited originally as	Cited later as
Froes 12732 (sterile)	S. trinervis (2:22)	S. bahiensis (10th suppl.)
Belem 3706 (sterile)	S. trinervis (7c:96)	S. bahiensis (10th suppl.)
Duke 14576	S. peckii (7b:42)	S. erichsonii (10th suppl).

Inasmuch as S. longisepala was reduced to synonymy under S. poeppigii in this paper, all collections originally cited under S. longisepala (17 collections) were renamed as S. poeppigii.

Corrections

1:302 (Panure by the Rio Uaupes) not "Panura".
7a:81 Edmundo Sesmero not "Edmundo Gesmero".
7b:6 8. S. barnhartiana not "8. S. baenhartiana".
7b:29 omit "from the State of Bahia" (under S. divaricans).
7b:49 G.B. Marini-Bettolo not "G.B. Matini-Bettolo".
7b:55 Narino (in two places) not "Marino".
7b:58 50. S. castelnaeana Weddell in Castelnau not Weddell ex Castelnau.
7b:77 S. atlantica (in two places) not "S. littoralis".
7b:78 S. atlantica not "S. littoralis".
7b:82 (type coll.) not "(type cell.)".
7b:86 omit "divaricans" under State of Bahia.
7b:86 (11 + 0) under State of Bahia, not "(12 + 0)".
7b:87 11 under State of Bahia, not "12".
7b:88 S. atlantica not "S. littoralis".
7c:96 18. S. medeola Sagot ex Progel not "Sagot (Progel)".
7c:98 41. S. subcordata Spruce ex Bentham not "(Spruce) Bentham".
7c:99 56. S. parvifolia not "57. S. parvifolia".

Bibliography

(In order to conserve space, we are citing here only the papers which are not cited in Supplements #VII, VII & IX).

7b. Krukoff, B.A. & R.C. Barneby. Supplementary notes on the American species of Strychnos VIII. Mem. N.Y. Bot. Gard. 20(1):1-93. 1969.

7c. Krukoff, B.A. & R.C. Barneby. Supplementary notes on the American species of Strychnos IX. Mem. N.Y. Bot. Gard. 20(1):94-99. 1969.