

**STUDIES IN THE GENUS MICRANDRA II\***

Miscellaneous Taxonomic and Economic Notes

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During the course of monographic studies on the euphorbiaceous genus *Hevea*, source of most natural rubber of commerce, related genera—*Micrandra* (including *Cunuria*), *Vaupesia* and *Joannesia*—have been investigated in the field and herbarium. Sundry notes of interest from the viewpoints of taxonomy, floristics or economic value of these genera have accumulated. The following notes concerning various species of *Micrandra* are offered towards an eventual monographic treatment of the genus.

Little is known about the commercial value of the latex of *Micrandra*. It has therefore seemed appropriate to publish a short survey of the possible utilitarian importance of the genus based upon studies of the literature, field work and significant notes on herbarium specimens.

During my taxonomic studies, numerous herbarium collections have turned up which, for one reason or another, merit special citing. Amongst these specimens are those of the late Paul H. Allen who worked in the Colombian Vaupés on rubber in the early 1940's during the shortage of this commodity due to the war emergency. Allen's collections are notable because of his extremely detailed field notes.

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**UTILIZATION OF MICRANDRA AS A SOURCE OF RUBBER**

As a source of commercial rubber, *Micrandra* is of very secondary, if any real, importance. That rubber is produced from these trees at the present time is doubtful, but an appreciable amount from several species may have found its way into

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commerce in the past, especially during periods of feverish need to increase production.

To judge from the literature, one might assume that *Micrandra* had enjoyed a relatively major role in the world rubber supply. Most literature reports of the exploitation of *Micrandra* for rubber are either without foundation or else are erroneous repetitions of one or more of the earlier botanical explorers who noted this exploitation as an isolated observation not connected with a critical economic study of the industry as a whole.

In the earlier literature, it seems that there are but two reports on *Micrandra* by field botanists with first hand experience and whose statements should, for this reason, carry greater weight than most other literature references. Richard Spruce, who collected the type material of the genus *Micrandra* (including *Cunuria*) in the Rio Negro basin of Amazonian Brazil, failed to mention the utilization of *Micrandra* latex in commercial rubber production, an industry which, during his sojourn in the region (1851-1854), was beginning its great development on the basis of seringa or *Hevea*. In his posthumously published notes, he wrote (Spruce, R.: [ed. A. R. Wallace] "Notes of a botanist on the Amazon and Andes" 1 (1908) 508): "On the Vaupés, I met with two trees (2427, 2479 hb.) of a genus apparently not far removed from *Siphonia* [*Hevea*], which yield pure rubber and are also called by the Indians *xeringui* . . ." E. Ule, who carried out extensive surveys on rubber plants in the Amazon regions in the early years of the present century, stated (Ule, E.: "Veranlassung und Verlauf von Ules Expedition nach den Kautschukgebieten des Amazonenstromes" in *Tropenpflanz. Beih.* 6 (1905) 1) that, although *Micrandra* produces a good rubber, the trees are seldom exploited because the latex cannot be mixed with that of *Hevea* and because it is too troublesome for the rubber tappers to cut it to the exclusion of *Hevea*. In another report on his rubber studies, Ule (Ule, E.: "Die Kautschukpflanzen der Amazonas Expedition und ihre Bedeutung für die Pflanzengeographie" in *Engler Bot. Jahrb.* 35 (1905) 670) reported merely that *Micrandra siphonioides* is found to be frequent in the rubber forests of the Rio Negro and elsewhere.

From these two references, apparently, has stemmed a flood of reports, occasionally highly misleading, in both popular and

technical literature. Some include *Micrandra* in lists of rubber-yielding species. While this is strictly correct, the unfortunate impression is often given that *Micrandra* should be counted amongst the commercial sources of rubber (Clouth, F.: "Rubber, gutta-percha and balata" (1903) 30; Walle, P.: "Au pays de l'or noir, le caoutchouc de Brésil," ed. 2 (1912) 124; Carneiro, A. J. de Souza: "Rubber in Brazil" (1913) 8; Ferguson, Jr. ed. 3: "All about rubber and gutta-percha" (1899) iii, clxxxiv). This last source states that it grows along the most "steamy valleys" of the Amazon and is indiscriminately cut by the natives "to furnish Pará rubber"! Others definitely assert that *Micrandra*-rubber was actively exploited and entered into commerce either alone or as an adulterant of *Hevea*-rubber (Morris, D.: "Plantes produisant le caoutchouc du commerce" in Bull. Soc. Etudes Colon. no. 5 (1899) 178; Ehrhardt, K.: "Die geographisch Verbreitung der für die Industrie wichtigen Kautschuk- und Guttaperchapflanzen" (1903) 26; Seeligmann, T., G. Lamy-Torrilhon & H. Falconnet: "Indian rubber and gutta-percha," ed. 2 (1910) 15; Ramondt, A. S.: "Caoutchouc, guttah-pertja en balata (1907) 6). Still others quite correctly assert that rubber from *Micrandra* is said to enter the trade, passing as a grade of Pará rubber (*Hevea*), but that no precise information on this point can be cited to substantiate the report (Warburg, O.: "Les plantes à caoutchouc et leur culture" (1902) 21, 48; Jumelle H.: "Les plantes à caoutchouc et à gutta" (1903) 60; Reintgen, P.: "Die Geographie der Kautschukpflanzen" (1905) 25; Schidrowitz, P.: "Rubber" (1911) 33; ed. 2 (1916) 33; Brown, H.: "Rubber, its sources, cultivation and preparation" (1914) 33). Occasionally, a report will credit *Micrandra* with producing in the *Hevea*-rubber districts of the Amazon the most highly esteemed grade of rubber (Pontio, M.: "Analysis du caoutchouc et de la gutta-percha" (no date) 8).

During my twelve-year study of lacticiferous plants in the Amazon Valley—especially in northwestern Brazil and southeastern Colombia—I saw no evidence of exploitation of *Micrandra* trees for their rubber. This was true even in areas where *Micrandra* was extremely abundant and easily accessible. Furthermore, I saw no evidence, such as scars on the bark, that such exploitation had been carried on in the past, although former

workers may well have felled the trees for ringing and would, therefore, have left no traces.

The period of my field work (1941-1953) coincided with a renaissance of the wild rubber industry with high prices due to the world shortage of the commodity during and immediately after the war. I paid very special attention to *Micrandra*, since I was collecting material for a monographic study of *Hevea* and its relatives, such as *Micrandra*. Had any tapping of *Micrandra* been under way or had it formerly been carried out in the northwest Amazon, I believe that some indication of it could not have escaped my ken. The late Dr. Adolfo Ducke, much of whose half century of botanical exploration in the Amazon of Brazil was dedicated to the study of latex-yielding trees, failed to mention on any of his field labels or in his writings the use of *Micrandra* as a commercial source of rubber. It would seem, therefore, that we are wholly justified in assuming that *Micrandra* is not now, and probably has not in the past been, exploited in either the Colombian or the Brazilian sectors of the Amazon basin as a major source of rubber.

Fortunately, however, we now have definite and reliable information concerning the former use of *Micrandra* as a rubber tree. It appears that *Micrandra* was tapped in Venezuela, in localities where the trees abound and where rubber-yielding species of *Hevea* are lacking. Two reports from field technicians to Mr. Oliver E. Nelson, Special Representative of the Rubber Development Corporation in Caracas, give valuable information on *Micrandra* in Venezuela. Copies of these reports are preserved in the National Archives in Washington, D. C. and in the Botanical Museum of Harvard University.

On May 4, 1943, Mr. Harry J. Fuller, writing on his exploratory trip to the Paragua-Caurá area of southern Venezuela, stated:

Caracas to Ciudad Bolivar by air, thence to La Paragua on the Paragua River by truck, thence by boat up the Paragua River. First *Micrandra* at the Auraima rapids. Río Oris enters the Paragua at Auraima and was ascended for some distance. Thick stands of *Micrandra*. Continued up Paragua. Numerous small caños enter the Paragua. *Micrandra* much more numerous on these caños than on banks of Paragua itself. Two days above the Oris reached Río Torono. About 300 yards wide at confluence. A half day up the

Torona is an abundance of *Micrandra*. Established camp and started experiments.

Expt. I. 2 men with machetes tapped 10 trees in 3½ hours, on one side up to 7 ft. 475 grams of rubber after 3 weeks air drying. Men walked a total of 350 yds. Fuller thinks that tapping to 20 or 30 ft. with spurs for climbing would make it possible for one man to produce 1 to 1½ kilos per day.

Expt. II. Two Indians tapped 8 trees in 3 hours to a height of 5½ ft. 350 kg. rubber after 3 weeks air drying.

Expt. III. 75-foot tree felled. Diam. 19 in. at 3 ft. Two men made transverse cuts on trunk with machetes at 3-inch intervals, extending about 2/3 circumference. Cuts extended to main branches, about 45 ft. from ground. Three hours required. Less than 1 kg. rubber (after air drying) collected next day.

Continued up Paragua. Major rivers with large concentrations of *Micrandra* are: Río Carapo and its tributaries. Río Carúm and its tributaries. Río Marí which is only 1 km. from the Río Capapaipa, an important tributary of the Caurá. The best way of reaching the upper Caurá is by way of the Paragua and its tributary, the Marí, from which, by 1 km. portage, Caurá basin may be reached.

*Micrandras* grow close to rivers and caños, rarely at distances greater than 300-400 yds. Number of *Micrandras* increases as one ascends the Paragua. Not scattered but commonly grow in groups of 5 to 25 or 30 trees, possibly the offspring of a single seed, developing from root sprouts. Seldom found isolated. Individual trees in a group 10 to 50 yds. apart.

Fuller did not get into the upper Caurá but had reliable information that *Micrandra* was the only rubber tree there and is present in considerable quantity.

On July 8 of the same year, Mr. William O. Hansen, reporting on his studies of *Micrandra* in the Territorio Federal del Amazonas in Venezuela, had the following data to offer:

Rubber known locally by several names:

1. "Caucho de Gauca" because the Gauca or Guacamaya (macaw parrot) eats the fruit.
2. "Caucho de Invierno" (wet season rubber), because it yields best in the wet months.
3. "Arara Seringa" which seems to be the Portuguese or Yeral Indian equivalent for Caucho de Guaca. Reported used commonly in Brazil.
4. "Seringa Irarí." Used from Manáos north to the Colombian and Venezuelan borders wherever the Yeral Indian dialect is spoken. The word "Irarí" means unreal or imitation and is used to distinguish *Micrandra* from *Hevea*, the real rubber.

*Micrandra* is said to exist in most parts of the territory. In groups of 20 to 50. Mostly in low land flooded yearly. Reported along the Orinoco, Casiquiare, Guainía and Río Negro. The greatest concen-

trations are reported in the areas around Maroa, San Carlos, the Desecho de San Miguel (Casiquiare) and the Caño de Guami (Río Negro near Santa Rosa de Amanadona).

Some of the men who worked rubber 1900-1914, said they exploited *Micrandra*. Trees felled and ring-tapped every 3 ft. Latex collected as tree scrap. After 2 to 3 weeks, when the leaves were wilted, trees ring-tapped again at 2 to 3 inch intervals and the latex collected in gourdes of leaves. A tree 3 ft. in diam. would give about 1 gal. latex. Fairly stable. Coagulate in 5 to 10 hours.

Various tapping tests tried mostly with low yields. In a few cases fair yields were obtained. One tree 24" DBH gave 1 1/4 quarts latex at one tapping. This tree was just beginning to bud and other trees that gave good yields were just starting to grow.

The latex coagulates rapidly on the addition of water.

A native said that her father collected *Micrandra* rubber and always found a large lump of rubber at the base of the trees. Used a sharp stick to probe for the rubber. The lumps weighed 5 or 6 kg. each.

Average yield about 150 gms. air dry scrap of lump per tree per day. An expert tapper with climbing equipment can tap about 10 trees per day.

It is interesting to note that the first of these reports does not mention exploitation but that the second maintains that *Micrandra* was exploited from 1900 to 1914. The trees were felled, ringed and the latex allowed to coagulate as scrap on the trees. This was undoubtedly the so-called *Caurá rubber* formerly exported from the Orinoco basin of Venezuela. Neither of these reports indicates that *Micrandra* was in production in the 1940's, and I have been unable to find any data which would support the belief that these trees were ever used to any extent during the recent war-shortage of rubber.

Unfortunately, I have been unable to find voucher herbarium specimens upon which these foregoing reports might have been based. In the Venezuelan region concerned two closely related species are known to occur: *Micrandra minor* and *M. siphonioides*.

Allen, who carried out surveys for the Rubber Reserve Corporation in Colombia at the same time, has recorded on voucher specimens exceedingly interesting notes concerning the type of rubber and its possible exploitation. All of his observations on *Micrandra* were made amongst the Tukano Indians on the Río Papurí, an affluent of the Río Vaupés, which forms part of the boundary between Brazil and Colombia. Of *Micrandra minor*,

he reported (*Allen 3061*): "Latex pale yellow, seldom flowing freely, usually coagulating in the cuts in a manner reminiscent of *Castilla*. This scrap can be removed after an interval of about three days, usually being wound into balls. Tensile strength excellent, considerably better than weak fine *Hevea*. Some resin content." On a separate label (*Allen 3061*), Allen noted: "Coagulated latex has much higher tensile strength than the best Acre *Hevea*. Yield very variable, but averages less than a quarter pound from felled trees. Cannot be tapped daily as *Hevea*." He similarly states of *M. siphonioides*: "Latex pale yellow, seldom flowing freely, usually coagulating in the cuts in the manner reminiscent of some species of *Castilloa* [sic], being removed after an interval of about three days as scrap, which is wound into balls. Tensile strength excellent, being considerably better than Acre Fine *Hevea*."

Allen offered notes also on the latex of other species of *Micrandra*. Of *M. Spruceana*, he wrote: "Bark very thin . . . with scanty latex which coagulates with difficulty, producing a non-elastic gum." *Micrandra Sprucei*, he annotated, had: "Latex yellowish, scant, coagulating to a non-elastic gum." For *M. Rossiana*, he reported: "Latex very scanty, coagulating to a gummy non-elastic mass." Although Allen's notes suggest the possible exploitation along the Río Papurí of *M. minor* and *M. siphonioides*, there is every indication that the other three species which he collected could not be worked and gave too little rubber or rubber of no commercial value.

The latex of all species of *Micrandra* is white, or cream-coloured, except for some individuals of *M. Rossiana*, where it may often be yellowish. Ule's statement (Ule, E. in *Tropenflanz. Beih.* 6 (1905) 1) that *Micrandra* milk may be distinguished from that of *Hevea* by its orange colour must be an error, for of the thousands of trees which I examined only a few had even a slightly yellowish latex. It is usually thick and slow-flowing. In taste, it is somewhat sweet, quite unlike the burning and bitter taste of most *Hevea* latex. It coagulates slowly on the trees, remaining tacky and resinous for weeks. The addition of river-water causes *Micrandra* latex to coagulate; whether or not this is due to some mineral or organic constituent present in this impure water is not known. Most rubber tappers whom I ques-

tioned maintain that *Micrandra* latex cannot be mixed with that of the rubber-yielding species of *Hevea*, the acid-coagulation of which it prevents. This unexpected effect is brought about likewise if the latex of *Hevea nitida* Mart. ex Muell-Arg. be added to that of species, such as *H. guianensis* Aubl., which furnish good rubber (Schultes, R. E.: "The genus *Hevea* in Colombia" in Bot. Mus. Leaflet, Harvard Univ. 12 (1945) 11; Seibert, R. J.: "A study of *Hevea* (with its economic aspects) in the Republic of Peru" in Ann. Mo. Bot. Gard. 34 (1947) 268).

In quantity (and perhaps also in quality of rubber), latex varies from tree to tree, but we do not yet have precise data on this phenomenon, as we do for some species of *Hevea*. *Micrandra minor*, growing along or very near water courses, yields much more latex than does *M. siphonioides*, an inhabitant of higher, well drained sandy savannahs situated well back from streams. The latex of the former species is thinner and freer flowing than that of the latter. For this reason, we might justifiably assume that, if *Micrandra* has ever been commercially exploited, it was *M. minor* which was cut usually in preference to *M. siphonioides*, especially so since it is a much more abundant tree and much more accessible by canoe along the river banks.

Little indeed is known about the rubber from *Micrandra*. According to Spruce, *Micrandra* yields "pure rubber." Ule, likewise, stated that *Micrandra* rubber is of good quality. Allen's visual evaluation of the rubber of *M. minor* and *M. siphonioides* likewise suggests that it is of good quality.

There is very little chemical information available on this rubber. Mr. A. V. McMullan of the United States Department of Agriculture reported (letter to R. E. Schultes, June 16, 1949) the following data after studying an air-dried specimen of rubber from *Micrandra minor* (Schultes et Murça Pires 9075a): "Resins (acetone extract) 3.78%; rubber hydrocarbon (benzene extract) 87.08%; insolubles 9.14%. Appeared to be somewhat softer and weaker than *brasiliensis*. This sample very difficult to enter solution which may indicate a high polymer rubber. Merits more study." Rubber from the leaves and bark of two trees of *M. Lopezii* were examined—Schultes et López 9638: (bark) Resins 5.40%, rubber hydrocarbons 2.06%, "excellent rubber, clear, strong and elastic"; (leaves) resins 13.93%, rubber hydrocarbons

0.18%, "typical leaf rubber". *Schultes et López 9663*: (bark) resins 4.24%, rubber hydrocarbons 0.83%, "sticky and weak, not near the quality of above sample"; (leaves) resins 13.65%, rubber hydrocarbons, 0.21%, "typical leaf rubber". For *M. Spruceana* (*Schultes et López 9641*), the following results were recorded for bark rubber: Resins 3.92%, rubber hydrocarbons 1.31%; "poor, soft, sticky." *Micrandra Sprucei* (*Schultes et López 9640*) gave the following data: (bark) Resins 5.63%, rubber hydrocarbons 5.51%, "poor, soft and sticky"; (leaves) resins 16.84%, rubber hydrocarbons 0.16%, "typical leaf rubber."

An analysis of specimens sent in from Venezuela (probably by one of the expeditions the reports of which are quoted above) had a rubber content of 85.74 (Polhamus, L. G.: "Rubber content of miscellaneous plants" U.S.D.A. Prod. Research Dept., No. 10 (1957) 22). The species from which the sample was taken is stated to have been *Micrandra siphonioides*, but this identification is open to some doubt. If the specimen were collected by either Fuller or Hansen who prepared the reports, its provenience was more probably *Micrandra minor*: the trees grew "in low land flooded annually" and "close to rivers . . . rarely at distances greater than 300-400 yards": this is precisely the habitat of *M. minor*, not of *M. siphonioides*.

A somewhat more complete chemical study appeared in 1956 (Wisniewski, A.: "Borrachas amazônicas pouco conhecidas" in Bol. Técn. Inst. Agron. Norte 31 (1956) 301) in which, nonetheless, the author confessed to a lack of knowledge of *Micrandra* rubber in general. Wisniewski's samples were air-dried. He had an average of five samples, and he compared *Micrandra* rubber to a piece of Acre Fina (the highest grade of rubber from *Hevea brasiliensis*) in the following summary:

	<u>CR kg./cm.<sup>2</sup></u>	<u>AM</u>	<u>Resin</u>
Micrandra	266	760	4.86
Acre Fina	210	805	2.53

TAXONOMIC AND FLORISTIC NOTES

<sup>144</sup> *Micrandra elata* (Didr.) Mueller-Argoviensis in Linnaea 34 (1865) 142.

<sup>143</sup> *Micrandra bracteosa* Mueller-Argoviensis in Martius Fl. Bras. 11 (1873) 290.

<sup>145</sup> *Micrandra Glaziovii* Pax in Engler Pflanzenr. iv, 147 1910 Euphorbiaceae-Jatropheae) 20.

<sup>5,22</sup> *Micrandra brownsbergensis* Lanjouw, Euphorbiaceae of Surinam (1931) 34, t. 7, 8.

<sup>5,23</sup> *Micrandra santanderensis* Croizat in Journ. Arn. Arb. 24 (1943) 169.

BRAZIL: São Paulo, Mogy das Cruzes, in forest. 1876-77.

*A. Glaziou 1847a* (*M. Glaziovii* TYPUS). São Paulo, Araracuara. September 18, 1888.

*Loefgren 920*. Bahia. *Martius s.n.* (*M. bracteosae* TYPUS). Rio Paraná. July 1834. *Riedel 23* (*M. elatae* TYPUS).

COLOMBIA: Departamento de Santander, Barranca Bermeja, between Sogomoso and Carare Rivers. Alt. 100 m. October 9, 1936. *O. Haught 2011*. — Between Carare and Magdalena River, Puerto Berrio, Dorado Creek, 5 km. south of Raizubo. April 30, 1937. *Haught 2189* (*M. santanderensis* TYPUS).

FRENCH GUIANA: Montagne de Kaw. Alt. 250-270 m. "Tree 7 m. tall. Fls. pale green. Fruit green. Occasional in forest on bauxite." December 14, 1954. *R. S. Cowan 38815*.

PERU: Departamento del Loreto, Provincia de Maynas, Iquitos, Río Nanay, Picuruyacu. Alt. c. 150-180 m. "Sandy upland, partially disturbed forest. 20 m. Fr. green. Sap milky." September 24, 1975. *S. McDaniel et M. Rimachi Y. 20204*. — Iquitos, Río Nanay, Carreteroado Picuruyacu. Alt. c. 150-180 m. "Upland. 10 m. Sap white. Fr. black. *Shiringarana*." March 16, 1976. *S. McDaniel, M. Rimachi Y. et J. Folsom 20533*.

SURINAM: Surinam River, Brownsberg Forest Reserve. Tree No. 1146. HBW No. 6687, October 31, 1924, FLORIS TYPUS; HBW No. 4267, February 24, 1919, FRUCTUS TYPUS.

It is clear that these four binomials are referable to the widely distributed *Micrandra elata*. Although the species is most abundant along the coastal regions of Brazil and the Guianas, it has appeared in the Magdalena Valley of Colombia (from which locality it was described as a distinct species) and has recently been found far inland in the Estado do Pará in Brazil and as far west as Iquitos, Peru. This representation of *Micrandra* in the Departamento de Santander in Colombia is the only record of

the genus west of the Andes; it is undoubtedly a coastal intrusion that proceeded inland up the Magdalena Valley.

*Micrandra bracteosa*, described from material collected in Bahía, Brazil, was presumed to differ from *M. elata* by lacking glands at the base of the leaves or of having them only weakly developed and by having a panicle shorter than the leaves. Both are unreliable characters, and it seems advisable to treat *M. bracteosa* as a synonym of the widespread and variable *M. elata*.

The distinguishing characters between *Micrandra elata* and the Surinam material described as *M. brownsbergensis* are of a minor and inconstant nature. Lanjouw did not distinguish *M. brownsbergensis* from *M. elata* when he described the concept. He did distinguish it from the very distinct *M. siphonioides*. Thanks to the very active Dutch collectors in Surinam, there is a wealth of herbarium material from the Brownsberg Forest Reserve. Careful examination of this ample material fails to provide one with any major character of distinction. The leaves are occasionally larger than is expected in *M. elata* and there are often fewer secondary nerves, but these and other fine differences are too trivial to separate *M. brownsbergensis* even as a variety.

Perhaps the most interesting collections of *Micrandra* are those made in 1936 and 1937 by O. Haught in Colombia and described by Croizat as *M. santanderensis*. When these collections are viewed alone, they do look different; their distinction fades, however, when one has the whole series of collections from Colombia to southern Brazil along the coastal lowlands. Croizat stated that this species was distinct from all other known species because of its "differently colored foliage, but there are no floral differences. The conspicuously axillary tufts of hairs on the leaves of this new species are not found on *M. elata* Muell.-Arg. or . . . *M. siphonioides* Benth., to judge from the photographs of the type specimens . . ." *Haught 2189*, the type of *M. santanderensis*, is, indeed, a good match for the type of *M. brownsbergensis*, although its leaves are somewhat larger; in *Haught 2011*, however, the leaves are very similar in size, shape and colouration to those of the type of *M. brownsbergensis*.

We should point out the inexactness in several points of the

drawing of *Micrandra elata* provided by Pax (loc. cit., t. 5). The illustration which is published with this text has been prepared after careful study of ample material assembled from European, American and South American herbaria and represents, we believe, a more accurate and complete record of the species.

The collections *McDaniel et Rimachi Y. 20204* and *McDaniel, Rimachi Y. et Folsom 20533* are noteworthy as being the first from Peru. They represent also the material collected far within the Amazon—some 2000 miles upstream on the Amazon—of this species which is usually found nearer the coastal areas.

*Cowan 38815* represents the first collection of *Micrandra elata* from French Guiana.

***Micrandra Lopezii* R. E. Schultes var. *microcarpa* R. E. Schultes  
var. nov.**

Arbor usque ad 25 pedes alta, a *Micrandra Lopezii* capsula semineque multo minoribus (valvis siccitate ad 20 mm. longis) principaliter differt.

BRAZIL: Estado do Amazonas, Rio Aiary Jabarú, Içana. "Caatinga. Arvore, 7 ms. 35 cms. Latex branco, coagulante rápido, espresso, forte e abundante." November 8, 1947. *Ricardo de Lemos Fróes 21364* (Typus in Herb. Instituto Agrônomico do Norte 16829).

In addition to the significant difference in size of the fruit (28 mm. long in dried condition in *Micrandra Lopezii*, 20 mm. or less in this new variety), the leaves appear to be generally subcuneate instead of conspicuously rounded or even strongly cordate at the base.

***Micrandra Rossiana* R. E. Schultes in Bot. Mus. Leaflet, Harvard Univ. 15 (1952) 211.**

COLOMBIA: Comisaría del Vaupés, Río Papurí, vicinity of Monfort Mission. Alt. c. 200 m. "Slender, infrequent trees averaging 25-30 m. in height and 50 cm. in diameter. Bark grey, thin and hard and difficult to tap. Latex very scanty, coagulating to a gummy, non-elastic mass. Small tri-spermate capsule, resembling that of the *arara-siringa* [*Micrandra siphonioides*] but considerably elongated. Not well known, one or two individuals hesitatingly advancing either *maha-wakpuh* or *buhawakpuh* [*Micrandra minor*] but it is doubtful if either would be generally recognized as applicable to this species." August 28, 1943. *P. H. Allen 3109*.

This collection of Allen was the first made in Colombian territory. The astuteness of Allen and his native informants in recognizing this as a different species is extraordinary. Later collections have shown that it is not a rare species in the northwest Amazon of Brazil and Colombia.

*Micrandra Rossiana* has been known from Brazil, Colombia and Venezuela. Intensive studies of *Micrandra* have indicated that the distribution of *M. Rossiana* is much wider and more abundant in the Colombian Vaupés—especially in the Río Apaporis and its affluents—than in any other area of the northwest Amazon.

*Micrandra siphonioides* *Benth* in Hooker, Bot. Journ. 6 (1854) 371.

COLOMBIA: Comisaría del Vaupés, Río Papurí, Macú-Paraná. Alt. c. 200 m. "Trees averaging 25 m. in *manchas* but with numerous isolated specimens measuring 35 m. when felled. Average diameter about 75 cm above the often prominently developed buttresses, which in large specimens often extend upward for 3-4 m. from the ground. Flowers greenish yellow, on axillary new growth. Bark reddish brown, of varying thickness, that on the trunk often 2-3 cm. while on the buttresses it seldom exceeds 1 cm. Latex pale yellow, seldom flowing freely, usually coagulating in the cuts in the manner reminiscent of some species of *Castilloa* [sic], being removed after an interval of about three days as scrap, which is wound into balls. Tensile strength excellent, being considerably better than Acre Fine Hevea. Known locally as *arara siringa* or *buhawakpuh* (Tucano)." August 11, 1943. *P. H. Allen* 3050.—Same locality. "Tall trees, averaging 25 m. tall in *manchas* on margins of low sandy caatinga, but with numerous isolated specimens on clay ridges reaching 35 m. Average diameter about 75 cm. above the often prominently developed buttresses, which in old specimens often extend upward for 3-4 m. from the ground. Flowers greenish yellow, on axillary new growth. Bark reddish brown, of varying thickness, that on the trunk often 2-3 cm., while on the plank buttresses it seldom exceeds 1 cm. Latex pale yellow, seldom flowing freely, usually coagulating in the cuts in a manner reminiscent of *Castilla*. This scrap can be removed after an interval of about three days, usually being wound into balls. Tensile strength excellent, considerably better than weak fine Hevea. Some resin content. Known locally as *arara-siringa* (Geral) and *bu-ha-wak-puh* (Tucano). See pickled fruits, which resemble those of Hevea." August 15, 1943. *Allen* 3061.

*Micrandra siphonioides* is a very abundant species in the northwest Amazon. Seldom, however, have such detailed field notes been appended to voucher specimens. For this reason, it

seems advisable to quote the notes on *Allen 3050* and *3061*. The collection *Allen 3061* has been identified erroneously as *M. minor* Benth.

524 *Micrandra Spruceana* (Baillon) R. E. Schultes in Bot. Mus. Leafl., Harvard Univ. 15 (1952) 217.

COLOMBIA: Comisaría del Vaupés, Río Papurí, Santa Terecita Mission. Alt. c. 200 m. "Tall trees, averaging 35 m. in height and 80 cm. in diameter above the conspicuously developed, nearly unique stilt buttresses which are produced to a height of 3-4 m. as laterally compressed board-like flanges which act as 'flying-buttresses' often high enough to allow a man to stand beneath them. Leaves simple, with two basal disk-like glands. Inflorescences of small green flowers from axillary new growth. Large tri-spermate seed capsule typical of *Hevea*. Bark very thin (6-8 mm.) with scanty latex which coagulates with difficulty, producing a non-elastic gum. Seeds collected for food. Known locally as *wak-puh* (Tucano)." August 15, 1943. P. H. Allen 3063.

PERU: Departamento de Loreto, Provincia de Maynas, Río Ampiyacu, Pebas and vicinity. April 10, 1977. T. Plowman, R. E. Schultes et O. Tovar 6735. — Puca Urquillo and vicinity. "Tree 65 m. tall with large buttresses, forming interwoven props at base. Growing in upland primary forest. Latex white, sparse. Fruit green. Seeds brilliant, smooth, red-brown." April 27, 1977. Plowman, Schultes et Tovar 6951.

Although a very abundant element of the flora of the north-west Amazon, little has been known about the latex of *Micrandra Spruceana*. *Allen 3063* has an unusually detailed set of notes which have not hitherto been published.

The two Peruvian collections appear to be the first from Peru. They were made during Phase VII of the Alpha Helix Amazon Expedition 1976-1977.

*Plowman, Schultes et Tovar 6951* is the voucher collection for Dragendorff spot test for alkaloids made in the Alpha Helix laboratory during the expedition: the species was found to be alkaloid-negative.

*Micrandra Sprucei* (Muell.-Arg.) R. E. Schultes in Bot. Mus. Leafl., Harvard Univ. 15 (1952) 218.

COLOMBIA: Comisaría del Vaupés, Río Papurí, vicinity of Piracuara Mission. Alt. c. 200 m. "Tall trees, slightly buttressed, averaging 30 m. in height and 60 cm. in diameter. Bark thin, averaging less than 1 cm. Latex yellowish, scant, coagulating to a non-elastic gum. Tri-spermate, *Hevea*-like capsule. Known locally as *wak-so-ne-ne* (Tucano)." August 18, 1943. P. H. Allen 3068.

Little has been known of this curious caatinga species of *Micrandra*. The collection *Allen 3068* has been cited and its notes quoted in full because of their significance to our understanding of the genus.

VERNACULAR NAMES REPORTED FOR MICRANDRA

arara-seringa Río Vaupés, Brazil and Colombia *M. minor*;  
*M. siphonioides*

arvore de mammora Río Paraná, Brazil *M.*  
*elata*

bartabalie balli (Arawak) Dutch Guiana *M. elata*

boo-ha'-wa-puch (Tukano) Río Vaupés, Colombia *M.*  
*Rossiana*

bo-wápuch (Tukano) Río Vaupés, Colombia *M. Rossiana*

bu-ha'-wak-puh (Tukano) Río Papurí, Colombia *M. Rossiana*

caucho Río Caurá, Venezuela *M. minor*

caucho de guaco Territorio Federal, Venezuela *M. minor* and/  
or *M. siphonioides*

caucho de invierno Territorio Federal, Venezuela *M. Minor*  
and/or *M. siphonioides*

caucho kunudi (Maquiretare) Río Orinoco, Venezuela *M. si-*  
*phonioides*

cauchorana Río Solimões, Brazil *M. minor*; *M. siphonioides*

caucho tomoro Río Caurá, Venezuela *M. siphonioides*

cunurí Amazonas, Brazil and Colombia *M. Spruceana*

cunurí da caatinga Amazonas, Brazil *M. Sprucei*

efacone (Witoto?) Río Igaraparaná, Colombia *M. minor*

huermega (Witoto) Río Igaraparaná, Colombia *M. minor*

ka-ro-a (Yukuna) Río Miritiparaná, Colombia *M. siphoni-*  
*oides*

koedi biosé balli (Arawak) Dutch Guiana *M. elata*

ko-no-ko (Miraña) Río Caquetá, Colombia *M. Spruceana*

ma-ha'-puch (Tukano) Río Vaupés, Colombia *M. minor*

ma-ha'-puh (Tukano) Río Vaupés, Colombia *M. minor*

ma-ha'-ree (Taiwano) Río Kananarí, Colombia *M. minor*

ma-ha-wa-he ("macaw seed") (Makuna) Río Piraparaná,  
Colombia *M. minor*

ma-ha'-wa-hö ("macaw seed") (Barasana) Río Piraparaná,  
Colombia *M. minor*

- ma-há-wö-he ("macaw seed") (Makuna) Río Popeyacá,  
 Colombia *M. siphonioides*  
 ma-há-wa-pö-kö (Barasana) Río Piraparaná, Colombia *M.*  
*Rossiana*  
 ma-há-wa-pö-kö (Gwanano) Río Vaupés, Colombia *M.*  
*Rossiana*  
 man-jé-ka (*man* = macaw) (Kubeo) Río Vaupés, Colombia  
*M. minor*  
 ma-poó-a (Tanimuka) Río Miritiparaná, Colombia *M. siphonioides*  
 moereidam (Karib) Dutch Guiana *M. elata*  
 momofi (Waika) Territorio do Roraima, Brazil *M. siphonioides*  
 ö-bai-me-ko (seringa de la sabola) (Miraña) Río Miritiparaná,  
 Colombia *M. siphonioides*  
 pai-re (Puinave) Río Apaporis, Colombia *H. minor*  
 pai-root (Puinave) Río Apaporis, Colombia *H. minor*  
 peñ (Makú) Río Piraparaná, Colombia *M. Spruceana*  
 py-root (Puinave) Río Apaporis, Colombia *M. minor*  
 seringá irarí Río Negro, Brazil *M. minor* and/or *M. siphonioides*  
 seringarana Río Solimões, Brazil; Río Amazonas, Peru *M.*  
*minor; M. siphonioides; M. elata*  
 suru-wai-yek Bolivar, Venezuela *M. glabra*  
 topoeloe alomé (Karib) Dutch Guiana *M. elata*  
 wa-hö (Makuna) Río Piraparaná, Colombia *M. Spruceana*  
 wah-puch (Tukano) Río Vaupés, Colombia *M. Spruceana*  
 wakati-erwicheri (Bora?) Río Igaraparaná, Colombia *M.*  
*minor*  
 wa-so-né-né (Tukano) Río Vaupés, Colombia *M. Sprucei*  
 was-so-roo-re (Gwanano) Río Vaupés, Colombia *M. Sprucei*  
 wer-meger (Witoto) Río Igaraparaná, Colombia *M. minor; M.*  
*siphonioides*  
 woo-sheeni (Puinave) Río Apaporis, Colombia *M. minor*  
 yé-cha (Yukuna) Río Miritiparaná, Colombia *M. Spruceana*  
 yé-ka (Kuripako) Río Guainía, Colombia *M. Spruceana*

PLATE 23



Plate 23. Flowering branch of *Micrandra siphonioides*. Rio Apaporis, Comisaría del Vaupés, Colombia. Photograph: R. E. Schultes.

PLATE 24



Plate 24. Extensively buttressed roots are typical of *Micrandra Spruceana*. La Pedrera, Comisaría del Amazonas, Colombia. Photograph by R.E. Schultes.

**MICRANDRA *elata***  
(*Diétrichs*) *Muell.-Arg.*

