

A REVISION OF DENDROPHTHORA
(LORANTHACEAE)

JOB KUIJT

(*Botanical Museum and Herbarium, Utrecht*¹)

(received March 15th, 1961)

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¹) Present address: University of British Columbia, Department of Biology and Botany, Vancouver, Canada.

PART I
GENERAL CONSIDERATIONS

A REVISION OF DENDROPHTHORA (LORANTHACEAE)

INTRODUCTION

There comes a time in the history of nearly every genus when it becomes almost immoral to add new species without first having surveyed the genus as a whole. *Dendrophthora* has reached this state. From the time of its first recognition as a separate entity to the present, new species have been described, often on very tenuous grounds, and usually without an indication of infrageneric relationships, until today we are faced with a staggering mass of specific epithets in complete chaos. The genus has not been comprehensively studied for more than half a century, and no balanced attempt has as yet been made to establish natural divisions within.

Having become interested in the morphology of this and the related genus *Phoradendron* (KUIJT, 1959), I was naturally led on to some taxonomic considerations. My stay in Europe in 1958-1959 enabled me to visit the major European herbaria, and the notes and sketches accumulated there soon pointed the way to the present work.

My conservative attitude in this work, I think, needs little apology. Surely it is the only sensible attitude in handling the genus *Dendrophthora* at this stage. I am convinced that much contemporary taxonomy suffers from a lack of appreciation of variability in tropical species. If I have erred on the conservative side, at least such a treatment will not have the paralytic consequences, taxonomic and nomenclatural, of a more radical one. Indeed, I am the first to realize the many imperfections in this work. If I shall be able to separate the spurious nomenclatural difficulties from those of a truly taxonomic nature in this group, however, my main objective will have been fulfilled.

The difficulties in separating *Dendrophthora* from *Phoradendron* continue to haunt my work as it has haunted that of even such people as Eichler, Urban, and Trelease, each of whom misplaced some species. *Dendrophthora* supposedly has unilocular, *Phoradendron* bilocular anthers. This is an utterly impractical difference from a herbarium point of view, for the flowers of the *Phoradendreae* are usually very small. Only time can tell whether this generic distinction can be upheld. In the meantime, little more than lip service has been paid to this difference. There is no indication in Trelease's monograph that he ever looked at the anthers of his genus, and the same can be said for most species descriptions in *Dendrophthora*, including many in the present revision. The only rationalization that I can offer is that one develops an intuitive feeling of relationships after scrutinizing a large number of species, a feeling which allows one to be reasonably sure that a certain specimen belongs in *Dendrophthora* and not in *Phoradendron*. Such a procedure is quite justifiable, I think, as most taxonomic decisions are, after all, largely intuitive. Most of the species of subgenus *Eudendrophthora*, fortunately, can hardly be confused with *Phoradendron* as a

2a inflorescence is unknown from the latter. The difficulties lie in subgenus *Paradendrophthora*. It will be observed that I have kept an artificial category (*Incertae Sedis*), a sort of "tertium quid" to which I relegate several species which at present I cannot handle properly. Among these species there are those about which I am not certain as to generic status; their particular difficulties are discussed individually.

GENERIC AND SUBGENERIC RELATIONSHIPS

On the generic relationships within the *Viscoideae* I am hardly qualified to speak. Indeed, this topic has received scant attention. ENGLER (1894) subdivided the *Viscoideae* in the following way:

I. EREMOLÉPIDÉAE

Eremolepis

Eubrachion

Antidaphne

Lepidoceras

Tupeia (later transferred to *Loranthoideae*)

II. VISCEAE

Viscum (incl. *Korthalsella*)

Arceuthobium

Ginalloa

Notothixos

III. PHORADENDREAE

Phoradendron

Dendrophthora

It is not easy to follow VAN TIEGHEM's erratic path through mistletoe taxonomy. In 1895 three series of genera are recognized, *Phoradendreae*, *Ginalloaeae*, and *Arceuthobieae*. In 1896 he speaks of *Ginalloeae*, *Bifarieae*, *Phoradendreae*, and *Visceae*. As van Tieghem's generic concepts in many cases are difficult to reconcile with obvious natural relationships, a discussion of the groupings proposed by him would add little to the present work.

In the "Nachträge zu III. 1" ENGLER in 1911 made considerable changes, at least partly under the influence of Van Tieghem's work. He presented the following organization of the *Viscoideae*:

EREMOLÉPIDÉAE

Eremolepidinae

Eremolepis

Antidaphne

Eubrachion

Lepidoceratinae

Lepidoceras

PHORADENDREAE

Phoradendrinae

Phoradendron

Dendrophthora

Korthalsellinae

Korthalsella

Ginalloinae

Ginalloa

ARCEUTHOBIEAE

Arceuthobium

VISCEAE

Viscum

Notothixos

This arrangement was left unchanged in ENGLER and KRAUSE (1935).

It seems to me that these taxonomic arrangements have rather obscured the affinities of the genus *Notothixos* with the *Phoradendreae*. A closer relationship is indicated especially by each inflorescence unit in *Notothixos* which consists of a fertile internode bearing about 5 flowers per bract in longitudinal series much like the 2a inflorescence in *Dendrophthora*. In general habit, *Notothixos* shows similarities in branching and the presence of cataphylls on lateral branches. Its stamen morphology is again nearer that of *Dendrophthora*, and not at all like the peculiar situation in *Viscum*. Perhaps, therefore, *Notothixos* is the nearest relative of the *Phoradendreae*; possibly it should even be included in it.

The subgeneric division of *Dendrophthora* into *Foliatae*, *Subfoliatae*, and *Squamatae*, which ENGLER (1894) derived from EICHLER (1868), was unrealistic from the beginning, as it did not indicate natural relationships at all. Van Tieghem, in contrast, utilized inflorescence characters as the basis for the following arrangement:

Dendrophthora sect. *Diantha* – one flower per bract.

sect. *Disira* – a single series of flowers, both staminate and pistillate, per bract.

sect. *Hexasira* – three series of flowers per bract, with several flowers in each series.

Distichella – distichous phyllotaxy: *D. opuntioides*.

This system again is unsatisfactory for many reasons (cf. URBAN, 1896). ENGLER (1911) seems to have accepted Van Tieghem's innovations, although he must have been aware of Urban's critique. ENGLER and KRAUSE (1935) attempted to combine Urban's and Van Tieghem's views, and proposed the following system:

Sect. I *Eudendrophthora* – appendages decussate.

1. *Medianae* – basal appendages in a median position.

2. *Transversales* – basal appendages in a transverse position.

Sect. II *Distichella* – appendages in one plane.

It may be pointed out here also that nomenclaturally the above systems are not acceptable, as the type species (*D. opuntioides*) is not contained in subgenus *Eudendrophthora*.

The classification which to me seems to reflect most satisfactorily the relationships within the genus involves a primary dichotomy into *Eudendrophthora* and *Paradendrophthora*, subgenera delimited on the basis of flower seriation:

Eudendrophthora – flowers basically in a single series above each fertile bract.

Paradendrophthora Kuijt, n. subgen. –

Flores more in seriebus tribus supra quamque bracteam fertilem dispositi.

– flowers basically in three series above each fertile bract.

I shall not pretend that such a dichotomy clearly relegates all species to their proper position. In species which develop only one flower per bract one has to search for characters relating that species to others in which there is no doubt as to subgeneric position. *D. buxifolia* is frankly embarrassing as its pistillate spikes appear to be of the 2a type, the staminate 1a. The inflorescence of *D. ambigua*, where 1b and 2a types may be found even on the same internode, is nothing short of astonishing. Several other species are of a rather aberrant inflorescence type (*D. tetrastachya*, *D. dittae*, for example). As I have stated above, many of these difficult species are temporarily placed in the artificial group "Incertae Sedis" which procedure, I hope, will attract the attention of botanists who are able to study these species in greater detail than I. I am convinced, notwithstanding these irregularities, that the two subgenera here maintained represent natural groups.

I do not attach much significance to the groupings of species within the two subgenera as indicated on p. 20. In some cases (for example, *D. tetrastachya* – *D. sessilifolia*; *D. cupulata* – *D. epiviscum*; the remaining portion of *Paradendrophthora*) the alliances are clear. It is quite possible, however, that other species will later be inserted between groups, bridging them. The present groupings should thus be treated as suggestions only.

SUPPLEMENTARY MORPHOLOGICAL NOTES

Some of the viewpoints set forth in my previous paper (KUIJT, 1959) are now in need of a critical re-examination. The following items are intended to correct or supplement the above-mentioned article.

The first question in need of discussion is the matter of phyllotaxy. Is there anything taxonomically significant in the variations in phyllotaxy first described by URBAN (1896)? Apparently not on the subgeneric level, as my two subgenera each include species with both types of phyllotaxy. *D. tetrastachya* apparently may have both phyllotactic patterns even on the same individual. Below the subgeneric level species affinities are not sufficiently understood to allow a parallel to be drawn with phyllotaxy. I would, nevertheless, like to focus the attention of the reader onto a striking coincidence of phyllotaxy and geographical distribution in subgenus *Eudendrophthora*. All species of this subgenus which have their basal appendages in a transverse position (i.e., in the same position as the prophylls below) are insular. The continental species all show basal appendages of a median orientation. The only possible exceptions to these generalizations are in *D. opuntiioides*, *D. cubensis*, *D. constricta*, *D. ternata*, and *D. tetrastachya*. The remaining 27 species fit the pattern outlined. It is entirely possible, then, that groups may eventually be circumscribed below the subgenera in which phyllotactic variation will play an important role. There is an intriguing parallel situation in *Phoradendron* where northern and southern members of the Boreales show precisely the same differences in phyllotaxy described for *Eudendrophthora* (cf. KUIJT, 1959).

COINCIDENCE OF PHYLLOTAXY AND GEOGRAPHICAL DISTRIBUTION IN
EUDENDROPHTHORA(x = basal appendages in median plane; || = basal appendages in
transverse plane)

<i>Insular species</i>	<i>Continental species</i>
? <i>opuntoides</i>	x <i>eichleriana</i>
? <i>cubensis</i>	x <i>lindeniana</i>
x <i>constricta</i>	x <i>paucifolia</i>
	x <i>squamigera</i>
<i>serpyllifolia</i>	x <i>stricta</i>
<i>remotiflora</i>	x <i>mexicana</i>
<i>brachylepis</i>	x <i>ferruginea</i>
<i>martinicensis</i>	x <i>peruviana</i>
<i>flagelliformis</i>	x <i>terminalis</i>
<i>lanceifolia</i>	x <i>roraimae</i>
<i>glauca</i>	x <i>urbaniana</i>
<i>mancinellae</i>	
<i>cupressoides</i>	
<i>arcuata</i>	
<i>bonaniae</i>	
<i>marmeladensis</i>	
<i>domingensis</i>	
<i>hians</i>	
<i>laxiflora</i>	
? <i>ternata</i>	
x <i>tetrastachya</i>	
<i>sessilifolia</i>	

Under the original circumscription of the inflorescence type 1a I remarked that *Dendrophthora aequatoris* alone in its genus has this type; and I forthwith relocated that species in *Phoradendron*, its original position. I am certainly not withdrawing from doing so. I have since encountered a couple of species of *Dendrophthora*, however, which have a 1a inflorescence. The clearest example seems to be *D. carnosae*. In *D. cupulata* at least the staminate spike is 1a; the pistillate bears only a single flower per bract and can, therefore, not be judged. In the former species I am not really positive that it has been correctly assigned to *Dendrophthora*. But surely *D. cupulata* is a *Dendrophthora*, because of its obvious affinities to *D. epiviscum*. The third case in point is the staminate spike in *D. buxifolia*, also a 1a inflorescence. We therefore have at least two cases of this inflorescence type in our genus.

At the time that I wrote my morphological paper on the *Phoradendreae* I was not acquainted with any species in which the staminate spike was of one type, the pistillate of another. In *D. buxifolia*, however, we do seem to have an exception to this rule. The pistillate spikes are quite clearly 2a, but the staminate ones are either 1a or 1b.

The unique inflorescence of *D. ambigua* seems to provide a bridge between the subgenera. Staminate flowers always occur in 1b, pistillate ones in 2a seriation, usually on the same spike. In some cases an internode is staminate (1b) on the abaxial, pistillate (2a) on the adaxial side! It seems quite impossible to assign the species to either subgenus.

I have also since that time noted more cases of occasional irregularities in seriation in *D. clavata*, *D. constricta*, *D. hexasticha*, and *D. opuntioides*. Probably in many more species such lateral proliferations will be spotted once in a while. I am convinced, nevertheless, that these variations are of no more than a teratological nature.

D. tetrastachya requires a few words. The interesting additional seriation of the staminate spike, first of all, is described in the taxonomic treatment. When I first saw a pistillate plant of this species at Leiden (v. Tuerckheim 3108) I was struck by the terminal proliferations of several older spikes, each forming a young spike which looked normal. My illustration, unfortunately, is based on such a specimen. It was not until later that I saw duplicates of this collection at Brussels, Stockholm, Kew, and other collections elsewhere, none of which specimens had any evidence of such proliferations. In all probability, therefore, the Leiden specimen represents a teratological deviation.

Intercalary flowers are present in several species, particularly of the *D. cupressoides* complex. But I am inferring this only from the cup-like structures found on older parts of plants. The curious fact is that I have not as yet seen a single flower in such a position. Could it be that all intercalary flowers are staminate? They would fall away soon after flowering. If any of the intercalary flowers were pistillate, we would surely find berries on older branches? Even on plants bearing fruits in other positions, I have discovered only the empty cups on older vegetative internodes.

An inflorescence type which I have not seen mentioned anywhere is that of *D. dittae*. The flowers of this species develop in four series, only in lateral positions, each series having but one flower. It is as if in the 1a type the apical flower and entire median series completely fail to develop. In others the apical flower falls away very early, but there at least a scar remains. I have been unable to discover such a scar in *D. dittae*. It is, of course, tempting to suppose that the apical flower aborts very early in its ontogeny. It is quite possible, on the other hand, that the median series has been dropped out completely in this species.

In my earlier, morphological article I alluded to several instances of inflorescences in other genera which were reminiscent of *Dendrophthora* spikes. The most strikingly parallel situation doubtlessly exists in *Stichianthus minutiflorus* Valetton (WINKLER, 1931). In this rubiaceaeous plant from Borneo one finds fertile internodes with long series of flowers above the axils of leaves. Even a sterile internode is in evidence at the base of lateral branches. Winkler's article contains many other examples of serial repetition of axillary flowers.

ORIGIN OF THE GENUS

Any hypothesis as to the place of origin of *Dendrophthora* at present is little more than an echo of the geographical facts known. The conspicuous concentration of species on Cuba and Hispaniola indicates that much of the recent evolution within the genus has taken place in that area. According to DARRAH (1945) the "area embracing southern Mexico, Central America and the Antilles presents the most intricate geological history and complex physical geography known." It is therefore unlikely that the known geology of that area can provide a ready understanding of the migrations resulting in the present geographical distribution of *Dendrophthora*. The Greater Antilles (Cuba, Hispaniola and Puerto Rico) were interconnected during the Oligocene, with probable connections to North America by way of southern Mexico. The Oligocene may, therefore, well have been a crucially important time in the history of the genus, allowing both for differentiation in the Cuban area and for invasions of (or from) the mainland. POTONIÉ and GOTHAN (1921) refer to fossil leaves of *Phoradendron* from the Tertiary of Ecuador and Chili. These surely could equally well have been species of *Dendrophthora* (if the two genera were indeed distinct at that time) as I doubt that fossil leaves of the two genera can be distinguished with any certainty. The Andean *D. ambigua* may easily represent a primitive species, as it demonstrates inflorescence characters of both subgenera. Such an inference, however, hardly allows us to pinpoint the place of origin of the genus.

ECONOMIC IMPORTANCE

I have not met any reference in the literature to damage done by species of *Dendrophthora* to economically important trees. Such damage, indeed, is not likely to occur because of the altitudinal preference of the genus. Conversely, these mistletoes do not appear to contribute anything positive to human welfare. A Venezuelan collection of *D. elliptica* (Steiermark 58602), however, bears a notation to the effect that stems and leaves of the plant are used in treatment of cuts and tumors.

ILLUSTRATIONS

The absence of acceptable illustrations of all but a fraction of the species of *Dendrophthora* has perhaps been the main deterrent to critical work. I have, therefore, taken seriously the task of providing photographs and drawings of diagnostic value. I have attempted throughout, though not always with success, to use either holo- or isotypic material for the illustrations. Where none was accessible material determined by the author of that species had a high priority. Only in a few cases was it necessary to rely on the taxonomic judgement of others or of myself.

I sincerely hope that the great number of illustrations will not confer onto this treatment the stifling weight of authority which has befallen others. An abundance of illustrations sometimes tends to divert the attention away from the faults within the text. I have no desire to do so. When I recall the frustrations which I experienced in searching for patterns of relationship in such complexes as *D. cupressoides*, *D. opuntiioides*, and *D. clavata* there is no doubt in my mind at all that I must have misinterpreted many a specimen. It is not my wish to apologize for such mistakes (which are almost unavoidable in work of this sort), but rather to warn botanists who do me the honour of using my revision.

ACKNOWLEDGEMENTS

When I now pause for a moment, after completing the main body of this work, and reflect on the manifold efforts of others who have contributed to it, it is surely not unnatural that my thoughts first turn to the courageous early botanical explorers of the unknown and dangerous parts of Tropical America. It is they who risked their lives and fortunes in collecting specimens which we who make use of them all too frequently take for granted. To list all undaunted collectors who were indispensable for the elaboration of this monograph would amount to writing a botanical history of Tropical America. Suffice it, therefore, to honor the name of Erik L. Ekman, the greatest of the Caribbean collectors. Without his magnificent collection of plants, the major part of which is preserved at Stockholm, a taxonomic treatment of *Dendrophthora* would have been well-nigh impossible at this stage.

I am very grateful for the cooperation extended to me at a large number of herbaria both in Europe and in North America, especially those at Chicago, Kew, Paris, Utrecht and Stockholm, which supplied a number of important photographs. Publication of this work was supported in part by the President's Committee on Research of the University of British Columbia; the Koninklijke Nederlandse Botanische Vereniging made the publication possible; the National Research Council of Canada made it possible to visit personally herbaria in Canada and the United States. A word of thanks is due to Prof. Dr. J. Lanjouw under whose auspices the work was initiated. The Latin diagnoses were contributed by my good friend Dr. Karel U. Kramer. To all, my grateful thanks.

RECIPROCAL GEOGRAPHICAL INDEX

1. *albescens* – Hispaniola.
2. *ambigua* – Ecuador, Colombia.
3. *arcuata* – Cuba.
4. *basiandra* – Colombia ?, Venezuela.
5. *bonaniae* – Cuba.
6. *brachylepis* – Hispaniola.
7. *brachystachya* – Hispaniola.
8. *buxifolia* – Cuba, Hispaniola.
9. *carnosa* – Hispaniola.
10. *chrysostachya* – Colombia, Ecuador, Peru.
11. *clavata* – Bolivia, Colombia, Ecuador, Venezuela.
12. *confertiflora* – Cuba.
13. *constricta* – Cuba.
14. *costaricensis* – Costa Rica, Panama.
15. *cubensis* – Cuba, Hispaniola.
16. *cupressoides* – Cuba, Hispaniola, Jamaica.
17. *cupulata* – Hispaniola.
18. *dittae* – Hispaniola.
19. *domingensis* – Cuba, Hispaniola, Puerto Rico.
20. *eichleriana* – Venezuela.
21. *elliptica* – Bolivia, Brasil, British Guiana, Colombia, Venezuela.
22. *epiviscum* – Cuba.
23. *excisa* – Cuba.
24. *ferruginea* – Peru.
25. *flagelliformis* – Cuba, Hispaniola, Puerto Rico.
26. *glauca* – Cuba.
27. *grandifolia* – Cuba.
28. *guatemalensis* – Guatemala.

29. *hexasticha* – Peru.
30. *hians* – Cuba, Hispaniola.
31. *lanceifolia* – Cuba.
32. *laxiflora* – Cuba.
33. *lindeniana* – Colombia, Peru, Venezuela.
34. *mancinellae* – Cuba, Hispaniola.
35. *marmeladensis* – Cuba, Hispaniola.
36. *martinicensis* – Martinique.
37. *mesembryanthemifolia* – Bolivia, Peru, Venezuela.
38. *mexicana* – Mexico.
39. *mornicola* – Hispaniola.
40. *opuntioides* – Jamaica.
41. *paucifolia* – Bolivia, Colombia, Peru.
42. *peruviana* – Peru.
43. *remotiflora* – Cuba, Hispaniola.
44. *roraimae* – British Guiana, Venezuela.
45. *serpyllifolia* – Cuba, Hispaniola.
46. *sessilifolia* – Cuba.
47. *squamigera* – Colombia, Costa Rica, Guatemala, Panama, Venezuela.
48. *stricta* – Colombia.
49. *subtrinervis* – Bolivia, Colombia.
50. *terminalis* – Costa Rica.
51. *ternata* – Hispaniola.
52. *tetrastachya* – Cuba, Hispaniola.
53. *urbaniana* – Peru.

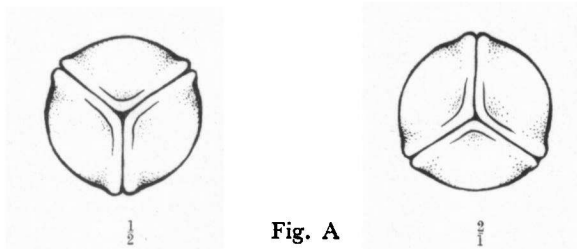
- Bolivia: *clavata, elliptica, mesembryanthemifolia, paucifolia, subtrinervis.*
- Brasil: *elliptica.*
- Peru: *chrysostachya, ferruginea, hexasticha, lindeniana, mesembryanthemifolia, paucifolia, peruviana, urbaniana.*
- Ecuador: *ambigua, chrysostachya, clavata.*
- British Guiana: *elliptica, roraimae.*
- Venezuela: *basiandra, clavata, eichleriana, elliptica, lindeniana, mesembryanthemifolia, roraimae, squamigera.*
- Colombia: *ambigua, basiandra?, chrysostachya, clavata, elliptica, lindeniana, paucifolia, squamigera, stricta, subtrinervis.*
- Panama: *costaricensis, squamigera.*
- Costa Rica: *costaricensis, squamigera, terminalis.*
- Guatemala: *guatemalensis, squamigera.*
- Mexico: *mexicana.*
- Martinique: *martinicensis.*
- Puerto Rico: *domingensis, flagelliformis.*
- Jamaica: *cupressoides, opuntioides.*
- Hispaniola: *albescens, brachylepis, brachystachya, buxifolia, carnosae, cubensis, cupressoides, cupulata, dittae, domingensis, flagelliformis, hians, mancinellae, marmeladensis, mornicola, remotiflora, serpyllifolia, ternata, tetrastachya.*

- Cuba: *arcuata*, *bonaniae*, *buxifolia*, *confertiflora*, *constricta*, *cubensis*, *cupressoides*, *domingensis*, *epiviscum*, *excisa*, *flagelliformis*, *glauca*, *grandifolia*, *hians*, *lanceifolia*, *laxiflora*, *mancinellae*, *marmeladensis*, *remotiflora*, *serpyllifolia*, *sessilifolia*, *tetrastachya*.

GLOSSARY

Because of the many structural peculiarities in *Dendrophthora* a series of terms or expressions are used which should be clearly understood if ambiguities are to be avoided. Possibly some of the definitions here provided do not suit other groups, as they are defined within the context of the *Phoradendreae*.

- apical flower*: the most distal flower above a fertile bract. It occupies a median position.
- basal appendages*: the first leaves or scale leaves formed beyond the prophylls on a lateral branch. In position they may be *transverse* (in same plane as the prophylls) or *median* (in the plane formed by the main axis and the lateral axis).
- branching asymmetrical*: the unequal development of the two primary lateral branches of one node, one branch aborting or being suppressed.
- cataphylls*: scale-like leaves on lateral vegetative branches and spikes, between the prophylls and the foliage leaves or fertile bracts, respectively. For an exceptional case, see under *intercalary cataphylls*.
- dichasial habit*, *dichasial branching*: a "dichotomy" of growth achieved when a terminal spike is formed and the two axillary buds of a lower node continue the vegetative growth of the plant (e.g., *D. constricta*, fig. 13).
- fertile bract*: a scale leaf of an inflorescence subtending a fertile internode.
- fertile internode*: an internode bearing flowers.
- flower area*: the internodal area above a fertile bract which is occupied by flowers. The term is hardly applicable to the 2b inflorescence.
- flowers* $\frac{1}{2}$, $\frac{1}{3}$: Eichler's symbolic notation of flower orientation with respect to the inflorescence axis as illustrated by the following diagrams:



inflorescence types 1a, 1b, 2a, 2b: an inflorescence typology on the basis of flower seriation on each fertile internode (cf. КУЙТ, 1959). The following diagrams summarize these types in *Dendrophthora* (fertile bracts in heavy black):

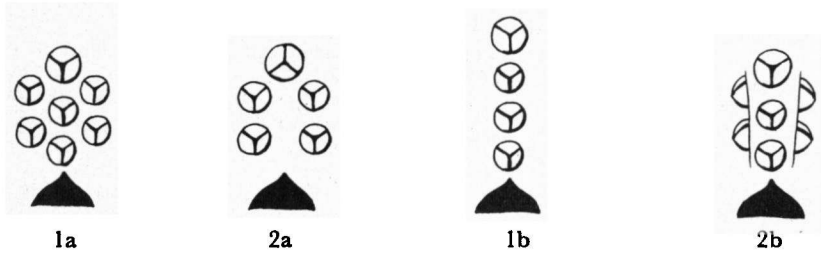


Fig. B

intercalary cataphylls: cataphylls alternating regularly with other leaf-like structures along percurrent axes (e.g., many individuals of *D. serpyllifolia*).

intercalary flowers: flowers inserted along axes not otherwise specialized as inflorescences, the axes continuing into further growth (e.g., *D. cupressoides*).

intermedian flowers, intermedian series: the flowers or series which are found directly above the sinuses of the fertile bracts in 2b inflorescences.

lateral flowers, lateral series: the flowers or series which are present alongside the median series in 1b, or in a corresponding position in 1a inflorescences.

median flowers, median series: the flowers or series which develop above a fertile bract in its median plane.

proliferating: said of an inflorescence or series of fertile internodes when the apical meristem produces further growth, either vegetative or reproductive; or of flower series when the regularity is disturbed by irregularly placed additional flowers or series.

prophyll: the first pair of appendages of a lateral axis. They are almost always of a transverse position, and sometimes exceedingly small.

squamate: provided with scale leaves only.

sterile internode: any of the internodes of a spike which do not bear flowers.

terminal flower: the first flower to be initiated in any series. That of the median series is also referred to as the *apical flower*.

vagina cataphyllaris: Eichler's term for a pair of cataphylls which are fused into a conspicuous, often somewhat tubular structure.

vegetative laterals: all lateral branches except inflorescences.

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PART II
TAXONOMIC TREATMENT

DENDROPTHORA Eichler, Fl. Bras. 5 (2): 102. 1868.

Flores dioici, raro monoici, 3-(4-2)meri. *Masc.* Stamina petalis adnata; antherae in medio petalorum sessiles, loculis confluentibus, subuniloculares, rima unica transversa dehiscentes. Discus rel. *Phoradendri*. Flores fem. et fructus *Phoradendri*.

Vegetatio Phoradendri saepius tamen stirpes "aphyllae" occurrent, vaginis cataphyllaribus rarioribus. Spicae typo Phoradendri supererectae, simplices et compositae, floribus vero supra singulam bractem solemniter 1-seriatis, petalorum positione $\frac{1}{2}$ (in 3-meris normalibus; in 4-meris $\frac{2}{3}$, in 2-meris $\frac{1}{2}$) rarissime typo 2 x 3-seriali Phoradendri ordinatis; plerumque numerosiores, seriebus femineis saepius ad unicum florem redactis.

Rather small bushes of olive green or yellowish color, glabrous, parasitic on a great variety of trees and shrubs. Hosts dicotyledons, rarely gymnosperms. Leaves simple, with very short or no petiole, often somewhat fleshy, in many species reduced to scale leaves in part or all of the plant. Many species with one or several pairs of cataphylls at the base of lateral branches and/or inflorescences. Phyllotaxy generally opposite and decussate. Stem terete and usually articulate, but in some species winged or ridged or quite compressed. Haustorial attachment apparently simple, i.e., no great lateral expansion by way of the endophytic system and no aerial shoots produced by the latter; epicortical roots unknown. Inflorescences either singly in the axils of various appendages, or in organized groups forming compound inflorescences; in a few species single, terminal inflorescences are known. The inflorescence basically a spike with one or several basal sterile internodes as a peduncle, and one or more terminal internodes bearing flowers in depressions along the axis. These flowers inserted in one of a number of different arrangements in a definite relationship to the bract below, inconspicuous and usually of the same color as the remainder of the plant. Corolla absent, calyx almost invariably 3-partite, persistent in fruit; style very short or absent, stigma scarcely differentiated. Ovary inferior, uniloculate; ovules not differentiated, the embryo sacs developing in a terminal ovarian papilla or mamelon. Anthers sessile on calyx lobes, basal or median in position, presumedly unilocular throughout the genus and dehiscing by a transverse slit. Both monoecious and dioecious species occur, the former with various patterns of sex distribution on the spikes. Fruit a berry, a layer of fleshy tissue surrounding the single seed. Endosperm almost completely surrounding the undifferentiated embryo, a bright green.

About 53 species in tropical America. Concentrated especially in eastern Cuba and on Hispaniola; some species on Jamaica, Martinique, and Puerto Rico; others along the Cordilleran axis of the continent from southern Mexico through Central America and in the Andes south to Bolivia. It is a notable fact that almost all continental mistletoes of this genus and the great majority of the insular ones are restricted to mountainous areas.

Origin of name: from δένδρον, tree, and φθείρω, to spoil, an allusion to the presumed detrimental effect on the trees which are parasitized.

Generic synonymy:

- Arceuthobium* Bieberstein; Grisebach, Fl. Br. W. Ind. 315. 1864. (in part)
Distichella van Tieghem, Bull. Soc. Bot. Fr. **43**: 185. 1896. (in part)
Ozarthris Rafinesque, Fl. Tellur. **4**: 92. 1836. (1838) (in part)
Phoradendron Nuttall, of various authors. (in part)
Razoumofskya Hoffmann, Hortus Mosquensis. 1808. (in part)
Viscum L., of various authors. (in part)

Type species:

- Dendrophthora opuntioides* (L.) Eichler, Fl. Bras. **5** (2): 102. 1868.

PRIMARY SUBDIVISION OF THE GENUS

(see p. 7)

<i>Eudendrophthora</i> (flowers basically in a single series above each fertile bract)		<i>Paradendrophthora</i> (flowers basically in three series above each bract)
<i>opuntioides</i>	<i>peruviana</i>	<i>costaricensis</i>
<i>cubensis</i>	<i>hians</i>	<i>hexasticha</i>
<i>constricta</i>	<i>laxiflora</i>	<i>chrysostachya</i>
	<i>eichleriana</i>	<i>buxifolia</i>
<i>serpyllifolia</i>	<i>mexicana</i>	<i>grandifolia</i>
<i>remotiflora</i>	<i>lindeniana</i>	<i>clavata</i>
<i>brachylepis</i>	<i>urbaniana</i>	<i>mesembryanthemifolia</i>
<i>martinicensis</i>	<i>paucifolia</i>	<i>elliptica</i>
<i>flagelliformis</i>	<i>squamigera</i>	<i>subtrinervis</i>
<i>lanceifolia</i>	<i>ferruginea</i>	<i>mornicola</i>
<i>glauca</i>	<i>stricta</i>	<i>confertiflora</i>
<i>mancinellae</i>	<i>roraimae</i>	<i>albescens</i>
<i>bonaniae</i>		<i>basiandra</i>
	<i>ternata</i>	
<i>cupressoides</i>		<i>cupulata</i>
<i>arcuata</i>	<i>tetrastachya</i>	<i>epiviscum</i>
<i>marmeladensis</i>	<i>sessilifolia</i>	
<i>domingensis</i>		<i>brachystachya</i>
<i>terminalis</i>		

Incertae Sedis

- ambigua*
carnosa
dittae
excisa
guatemalensis

KEY TO THE SPECIES OF DENDROPHTHORA

1. leaves and scale leaves in whorls of 3 *D. ternata*
1. leaves or scale leaves in pairs, decussately, rarely distichously arranged 2.
2. no more than 2 flowers per fertile internode 5.
2. three or more flowers per fertile internode 3.
3. inflorescence type 1a or 1b (see glossary) 4.
3. inflorescence type 2a or 2b (see glossary) 6.
4. plants squamate 28.
4. plants foliaceous 30.
5. stem terete 8.
5. stem ridged, winged, or compressed 25.
6. inflorescence 2a 46.
6. inflorescence 2b 7.
7. leaves oblanceolate to broadly obovate, often mucronate, up to 70 mm long *D. tetrastachya*
7. leaves oblanceolate to lanceolate, often acute, never mucronate, up to 20 mm long *D. sessilifolia*
8. foliaceous, though leaves may be very small 19.
8. squamate 9.
9. prophylls, especially on young branches, conspicuous, scarious-margined 65.
9. prophylls not so 10.
10. lateral spikes with cataphylls 11.
10. lateral spikes without cataphylls 14.
11. lateral spikes with less than 2 pairs of cataphylls, more than 4 fertile internodes per spike 12.
11. lateral spikes with more than 2 pairs of cataphylls, less than 4 fertile internodes per spike 13.
12. slender, profuse; spikes nearly straight *D. brachylepis*
12. coarse, sparse; spikes somewhat arched *D. arcuata*
13. axillary spikes short and stout, rarely more than 2 fertile internodes; floral cups conspicuous; fertile internodes about 4 mm *D. marmeladensis*
13. axillary spikes rather slender, usually of more than 3 fertile internodes; no conspicuous floral cups; fertile internodes about 7 mm *D. glauca*
14. all spikes terminally proliferating; i.e., intercalary flowers common *D. cupressoides*
14. not so 15.
15. Martinique *D. martinicensis*
15. elsewhere 16.
16. Jamaica *D. opuntioides*
16. elsewhere 17.
17. even lowest lateral spikes without cataphylls 18.
17. lowest lateral spikes with cataphylls 13.
18. compound inflorescence; fruit with closed sepals; spike longer than adjacent internode of main

- axis *D. bonaniae*
18. spikes axillary only; fruit with reflexed sepals; spike shorter than adjacent internode of main axis *D. brachystachya*
19. extremely finely branched, leaves less than 3 mm long or less than 5 mm wide; continental 20.
19. not finely branched, leaves larger; insular 21.
20. leaves less than 3 mm long; spikes very short; Central America *D. guatemalensis*
20. leaves more than 3 mm long; spikes very long and slender; Peru *D. urbaniana*
21. more than 6 fertile internodes per spike; Martinique *D. martinicensis*
21. less than 6 fertile internodes per spike; elsewhere 22.
22. slender, with branching frequently asymmetrical; leaves thin, almost sessile *D. cubensis*
22. coarser, branching more regular; leaves often somewhat fleshy *D. buxifolia*
23. leaves smaller than 10 × 25 mm, always fleshy 24.
23. leaves larger than 10 × 25 mm, not always fleshy *D. buxifolia*
24. cataphylls rare; leaves adhering for long distances along stem; placental cups not flaring *D. hians*
24. cataphylls always present, though small; leaves not adhering for long distances; placental cups flaring *D. constricta*
25. squamate 26.
25. foliaceous 27.
26. stem 4-winged, pistillate spikes with cataphylls, these on flattened internodes *D. cupulata*
26. stem not 4-winged, spikes without cataphylls *D. opuntioides*
27. spike with at least 3 pairs of cataphylls; flower almost sessile in axil of subtending bract *D. excisa*
27. spike with no more than one pair of cataphylls; flowers on upper part of internodes *D. hians*
28. stem terete or very slightly ridged *D. brachystachya*
28. stem winged or ridged conspicuously 29.
29. staminate inflorescence 1a; of a rather loose habit *D. cupulata*
29. staminate inflorescence 1b; stem wings very conspicuous; of a rather dense habit; on other Viscoideae *D. epiviscum*
30. continental 31.
30. insular 39.
31. staminate flowers restricted to the first fertile internode, pistillate flowers to the distal ones, both in 1b seriation; basal appendages transversely oriented; sepals of berries reflexed. *D. basianandra*
31. no such sex distribution unless a) pistillate flowers are in a 2a seriation or b) basal appendages in a median position, sepals of berries inflexed 32.

32. pistillate flowers in 2a, staminate ones in 1b seriation, even on same internode or spike *D. ambigua*
32. seriation 1b throughout for both sexes 33.
33. vegetative laterals with one pair of cataphylls 35.
33. vegetative laterals without cataphylls 34.
34. prophylls long, extending laterally; no striking sexual spike dimorphism*D. mesembryanthemifolia*
34. prophylls inconspicuous; staminate spike or internode very slender, pistillate ones swollen clavately; bushy habit *D. clavata*
35. spikes with no more than one fertile internode *D. elliptica*
35. spikes with 2 or more fertile internodes 36.
36. terminal 3 flowers of fertile internodes staminate, others pistillate; Central America *D. costaricensis*
36. not so; Andean region 37.
37. stem terete throughout 38.
37. stem flattened below nodes, especially in age *D. subtrinervis*
38. plants dioecious; stems often muricate *D. hexasticha*
38. plants monoecious; stems glabrate *D. chrysostachya*
39. spikes shorter than the subtending leaves 41.
39. spikes longer than the subtending leaves 40.
40. prophylls conspicuous and persistent; inflorescence 1a, axillary only *D. carnosa*
40. prophylls inconspicuous; inflorescence regularly 2a, axillary and terminal *D. constricta*
41. each fertile internode with 4 lateral series, median series (incl. apical flower) absent; leaves thin, lanceolate *D. ditae*
41. apical flowers and/or median series present, leaves not lanceolate 42.
42. sterile internode half as long as or less than the first fertile one 44.
42. sterile internode more than half as long as the first fertile one 43.
43. leaves thin, long-oblongate, more than twice as long as their axillary spikes; Cuba *D. confertiflora*
43. leaves rather thick, obovate, less than twice as long as the axillary spikes; Hispaniola *D. mornicola*
44. nodes conspicuously flattened just below leaves, especially in young branches *D. albescens*
44. stems terete throughout 45.
45. young stems slightly ridged below leaves; leaves with golden-brown margin when dry; spikes less than half as long as the subtending leaves *D. grandifolia*
45. stems terete; leaves without conspicuously marked margin; spikes more than half as long as the subtending leaves *D. buxifolia*
46. basal appendages in median plane; continental 47.
46. basal appendages in transverse plane; insular 61.

47. squamate 48.
 47. foliaceous 50.
 48. terminal spikes predominantly or exclusively;
 prophylls conspicuous and acute; staminate
 flowers yellow-orange *D. terminalis*
 48. axillary spikes predominantly; prophylls incon-
 spicuous; staminate flowers not brightly col-
 ored 49.
 49. spikes of 4-5 fertile internodes *D. eichleriana*
 49. spikes of less than 3 fertile internodes *D. squamigera*
 50. spikes in axils of scale leaves; foliage leaves few,
 obovate, with truncate apex *D. eichleriana*
 50. spikes in axils of foliage leaves; the latter pre-
 dominant, though sometimes small 51.
 51. staminate flowers in 1b seriation, on same spike
 or internode as pistillate flowers (which are
 2a); leaves broadly obovate, with distinct,
 arching petiole *D. ambigua*
 51. not so 52.
 52. cataphylls present on vegetative branches 53.
 52. cataphylls absent from vegetative branches 58.
 53. inflorescence longer than subtending leaves 55.
 53. inflorescence shorter than subtending leaves 54.
 54. sterile internode at least 8 mm long, slender;
 leaves thin *D. stricta*
 54. sterile internode less than 3 mm long, stout; leaves
 rather fleshy *D. roraimae*
 55. compound inflorescences, within which leaf size
 decreases gradually acropetally; more than
 3 fertile internodes per spike *D. paucifolia*
 55. inflorescences axillary only; no decrease in leaf
 size except through age differences; 2 fertile
 internodes or less per spike 56.
 56. leaves linear and thin; sterile internodes at least
 as long as first fertile one *D. stricta*
 56. leaves elliptic or obovate; sterile internode shorter
 than first fertile one 57.
 57. apices of leaves and spikes acute, scale leaves
 spine-like; southern Mexico *D. mexicana*
 57. not so; northern Andean region *D. lindemiana*
 58. two fertile internodes or less per spike; sterile
 internode shorter than or equal to lower fertile
 one 59.
 58. three or more fertile internodes per spike; sterile
 internode longer than lowest fertile one *D. ferruginea*
 59. leaves with conspicuous petioles, oblanceolate,
 up to 70 mm long *D. peruviana*
 59. leaves sessile, lanceolate to ovate, no longer than
 20 mm. 60.

60. spikes extremely slender; dioecious *D. urbaniana*
60. spikes rather stout, bearing flowers of both sexes *D. lindemiana*
61. squamate 62.
61. foliaceous 71.
62. Jamaica *D. opuntioides*
62. elsewhere 63.
63. Martinique *D. martinicensis*
63. elsewhere 64.
64. prophylls, especially on young branches, conspicuous, fused, scarious-margined 65.
64. prophylls not so 66.
65. plants coarse, grooved when dry; 4 prophylls of each node fused into a single structure; spikes symmetrical *D. domingensis*
65. plants slender, prophylls fused in 2's above each lateral; the 2 series of an internode unequally developed, one series often absent *D. remotiflora*
66. flowers 3-6 per bract, closely appressed as if in longitudinal groove *D. mancinellae*
66. if more than 3 flowers per bract, these widely spaced 67.
67. two flowers or less per fertile internode 68.
67. three flowers or more per fertile internode 69.
68. lowest spikes of compound inflorescence with no more than one pair of cataphylls; intercalary flowers often present; terminal fertile internode with one flower per bract only *D. glauca*
68. lowest spikes of compound inflorescences with up to 6 sterile internodes; terminal staminate internode with several flowers per bract *D. brachylepis*
69. spikes without cataphylls *D. flagelliformis*
69. at least some spikes with cataphylls 70.
70. plants dark, coarse, rather sparse; spikes somewhat arched; Cuba *D. arcuata*
70. plants light green, profusely branched, spikes not conspicuously arched; Hispaniola *D. brachylepis*
71. leaves longer than the spikes subtended by them 72.
71. leaves shorter than the spikes subtended by them 75.
72. branching strikingly asymmetrical, one lateral at a node usually suppressed; inflorescence with one pair of small cataphylls; staminate spike with 2 or less fertile internodes; leaves thin *D. cubensis*
72. branching mostly symmetrical; inflorescence without cataphylls (except rarely in *D. hians*); staminate spike of 3 fertile internodes; leaves thick 73.
73. fertile internodes flattened *D. laxiflora*
73. fertile internodes terete 74.

74. only exceptionally 2a spikes; leaves not adhering for great distances along the stem *D. buxifolia*
74. always 2a spikes; leaves adhering for great distances along the stem *D. hians*
75. spikes in axils of scale leaves 76.
75. spikes in axils of foliage leaves 78.
76. spikes always without cataphylls 77.
76. spikes usually with cataphylls *D. serpyllifolia*
77. plants small; foliage leaves grading into scale leaves; 2-3 flowers per bract *D. lanceifolia*
77. plants rather large; no transitional leaf forms between foliage leaves and cataphylls; 4-6 flowers per bract *D. flagelliformis*
78. Martinique *D. martinicensis*
78. elsewhere 79.
79. leaves narrowly elliptical, very acute; cataphylls absent *D. lanceifolia*
79. leaves obtuse or ovate; cataphylls present or absent 80.
80. leaves adhering for great distances along stem; spikes axillary only, secondary ones common *D. hians*
80. leaves not adhering for great distances along stem; spikes axillary and terminal; secondary spikes only exceptionally 81.
81. plant greenish; berries usually 2 per internode, sepals closed; habit not forked *D. serpyllifolia*
81. plant dark when dry; berries one per internode only; terminal spikes often resulting in forked habit *D. constricta*

ALPHABETIC TREATMENT OF SPECIES

1. **D. albescens** Urban & Ekman, Ark. Bot. **23A** (5): 68. 1930.

Illustrations: Fig. 1; Plate I.a.

A medium size leafy species. Leaves obovate with short petiole, about 25×12 mm, with thick brown-grey margin and conspicuous midrib especially on lower surface. Stems very flat just below the leaves, almost terete just above the nodes, and in age. Vegetative laterals with one or two basal cataphylls, inflorescence without. Basal appendages median in position. Inflorescences axillary only, 1b, with short (2 mm) sterile internode, 3 fertile internodes about equal in length, the entire spike about 20 mm long in fruit; about 7 flowers per bract. Berries ovate, ca. 2×3 mm, sepals closed.

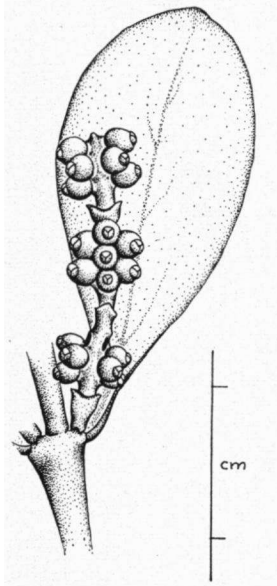


Fig. 1. *D. albescens*: Ekman H-7784, S.

HOLOTYPE: Ekman H-7784, Hispaniola, Haiti, Massif de la Selle, Croix-des-Bouquets, Badeau, 1500 m, on *Ocotea* (S).

In general habit reminiscent of *D. tetrastachya*, but more likely related to the *D. costaricensis*-group, especially *D. mornicola*.

2. **Dendrophthora ambigua** Kuijt, n. sp.

Folia obovata, 25 mm lata et 50 mm longa. Ramuli steriles paribus cataphyllorum singulis magnis; inflorescentiae cataphylla carentes. Flores feminei dispositione more 2a, usque ad 7 pro bractea; flores masculi dispositione more 1b, usque ad 54 pro bractea. Dispositio florum masculorum et femineorum

variabilis, internodium unum vel inflorescentiam unum vel inflorescentias segregatas obsidentes, sed semper dispositione monoecia. Bacca globosa, diametro circiter 5 mm.

Illustrations: Fig. 2; Plate I.b.

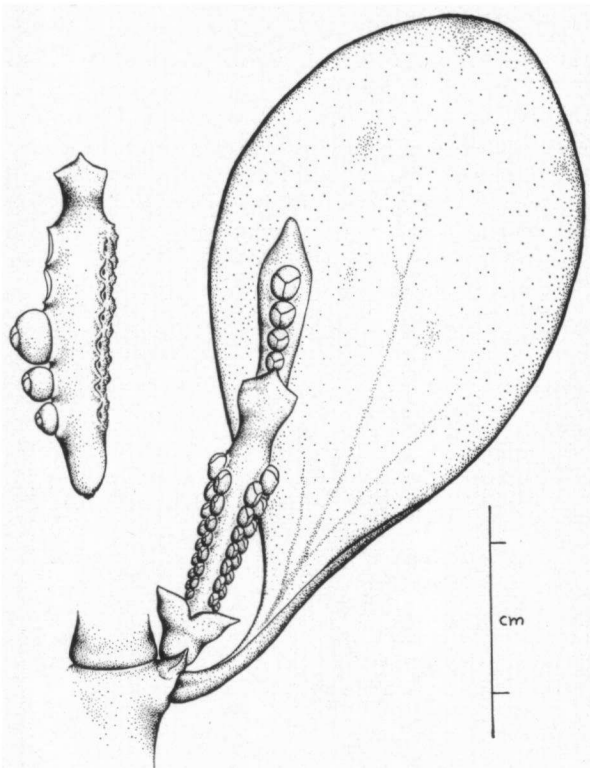


Fig. 2. *D. ambigua*: Cuatrecasas 18902, F (basal fertile internode at left).

A coarse, leafy species, very dark when dry. Leaves petiolate, obovate, 25×50 mm, with rounded apex and leathery margin. Stems terete when old; a slight flattening is present just below the node on young stems. Vegetative laterals with one pair of large cataphylls 5–15 mm above the axil, inflorescences without. Basal appendages in median plane. Secondary branching common. Inflorescence with sterile internode ca. 7 mm long, and 2–4 fertile internodes up to 25 mm long each. No completely staminate spikes seen. When a spike is entirely pistillate it is of the 2a type, with 5–7 flowers per bract. Some spikes, however, have one or two staminate basal internodes followed by one or two pistillate ones; rarely another staminate internode terminates the spike. Staminate internodes of the 1b type, with up to 54 flowers per bract. Mixed internodes occur where pistillate flowers are situated on the distal, staminate flowers on the proximal half of an internode; or where the adaxial side of the lowest fertile

internode is pistillate, the abaxial side staminate, the two spikes of one node being mirror images of each other. In all cases pistillate and staminate flowers are inserted in the 2a and 1b patterns, respectively. Berry spherical, about 5 mm in diameter.

TYPE: Cuatrecasas 18902, Colombia, Dep. del Cauca, Cordillera Central, vertiente occidental. Cabeceras del Río Palo, quebrada del Río López: Alto del Duende, matorrales y bosquecillo de páramo, 3300–3350 m (F, GH, US). Holotype at F.

Specimens seen:

Cuatrecasas 20425, Colombia, Dep. del Valle, Cordillera Central, hoya del Río Tuluá, entre Las Vegas y La Ribera, 3300–3450 m (F).
 Dryander 1731, Colombia, Dep. El Cauca, Pedro Piso, Puracé, 3900 m (US).
 Killip & Smith 17782, Colombia, Eastern Cordillera, Dep. Santander, western slope of Páramo Rico, 3300–3600 m (US).
 Rose, Pachano & Rose 23142, Ecuador, vicinity of Zaragura (GH, NY, US).

A unique species because of its extraordinary spike structure. The anthers are clearly unilocular, and we must therefore include the species in *Dendrophthora*. Because of the variation in spike morphology it is at present impossible to relegate this species to either of the subgenera; in fact, it seems to provide a bridge between them.

3. ***D. arcuata*** Sauvalle, Anal. Acad. Ci. Méd. Fís. Nat. Habana 7: 346-347. 1870.

(reprinted in Wright & Sauvalle, Flora Cubana. Habana, 1873.)

Illustrations: Fig. 3; Plate I.c.

A rather coarse, dark, squamate mistletoe, because of its brittleness often badly fragmented in herbaria. Usually entirely decussate, but some with ternate branches (Ekman 17672). Flowers often along normal, percurrent branches. Stems terete. Ultimate spikes in compound inflorescences. Dioecious. Pistillate spike with one to 3 sterile, about 6 fertile internodes, the latter with only one flower per bract. Berries spherical, implanted in the middle of the internode, sepals closed. Staminate spike of 6 or 7 fertile internodes, up to 6 flowers per bract in 2a seriation. Both spikes somewhat arched, from which feature the epithet is derived. Basal appendages of a transverse orientation.

TYPE: Wright 3671, Cuba (GH, US). Holotype at GH.

Specimens seen:

Ekman 6624, Cuba, Prov. Oriente, near Puerto Rico, on *Drypetes* sp. (G, NY, S).
 ——— 17198a, Cuba, Prov. Matanzas, Ceiba Mocha, west of Pan de Matanzas (S).
 ——— 17384, Cuba, Prov. Pinar del Río, Morillo, on *Drypetes micronata* (G, K, NY, S).
 ——— 17672, Cuba, Prov. Pinar del Río, Taco-taco, Charco del Toro, on *Mimusopsis jaiquiqui* (G, NY, S).
 Wright s.n., Cuba (NY, S).

See the discussion under *D. cupressoides*.

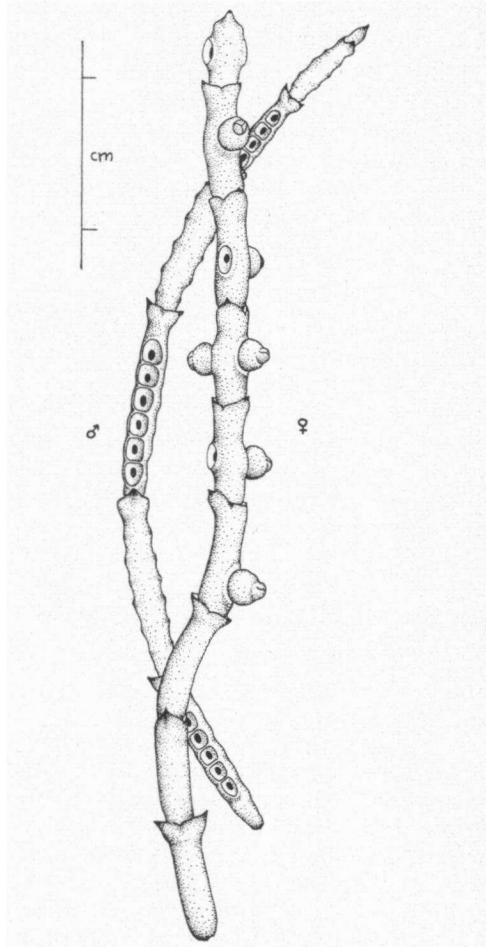


Fig. 3. *D. arcuata*: Ekman 17672, S (behind), Ekman 17384, K (in front).

4. *Dendrophthora basiandra* Kuijt, n. sp.

Caules fere teretes, folia late elliptica; rami laterales paribus cataphyllorum magnis basalium singulis. Spicae internodiis fertilibus minime quaternis. Flores in seriebus tribus supra quemque bracteam fertilem. Internodium fertile inferius tenue, flores masculos in excavationibus superficialibus gerens. Internodia fertilia reliqua ut videtur tantum floribus feminis profunde immersis. Flores masculini in quaque serie circiter viginti, femini circiter duodecim.

Illustrations: Fig. 4.

Trelease, *Phoradendron*, plate 115. 1916.

Heterotypic synonym:

Phoradendron polygynum (Karst.) Eichl., sensu Trelease, *Phoradendron*, p. 85. 1916.

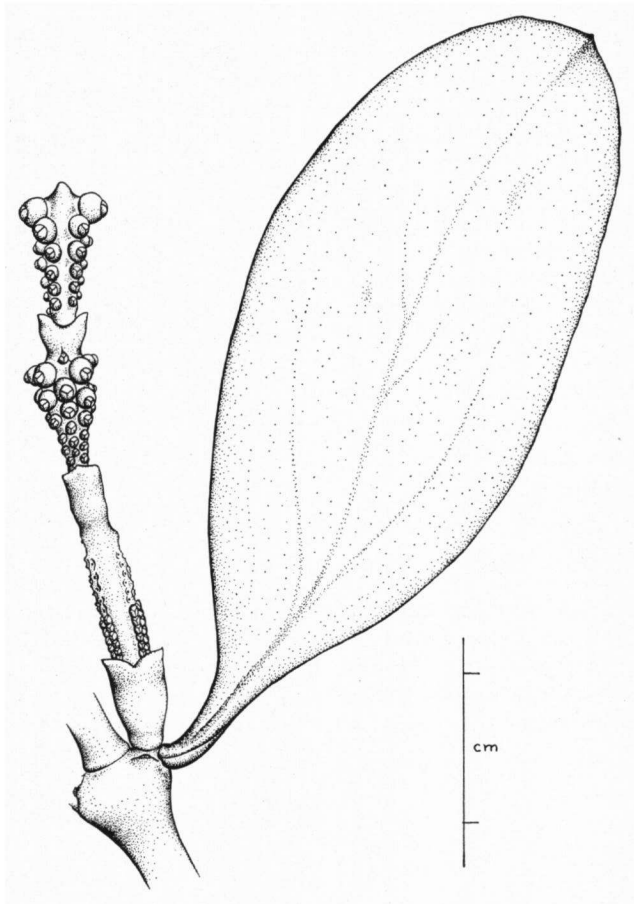


Fig. 4. *D. basiandra*: Fendler 1104, GH.

A stout plant with somewhat fleshy leaves. Leaves obovate to elliptic, nearly acute, short-petiolate, up to 25×60 mm; 3 inconspicuous veins are visible. Internodes terete below, slightly flattened below the nodes, 30–40 mm long, 3–4 mm thick. Basal appendages in median plane. Spikes without cataphylls, the single sterile internode no more than 7 mm long. Scale leaves of spike conspicuous and fused. The proximal fertile internode always staminate, with at least 60 flowers per bract in 1b seriation, 20 mm long. This staminate internode followed by 2–4 equally long pistillate ones, each with about 35 flowers per bract in 1b arrangement. Placental cups of pistillate flowers very conspicuous through swelling of the axis; apical flower usually abortive. Berries near-spherical, about 3 mm in diameter when mature, with closed sepals. The entire spike may be 110 mm long. TYPE: Fendler 1104, Venezuela, prope coloniam Tovar, 6500 ft (GH, K). Holotype at GH.

Specimen seen:

? Rusby & Pennell 704, Colombia, Dep. Huila, "Balsillas" on Rio Balsillas, 2100-2200 m (NY).

: A species remarkable for its sex distribution. The type is listed and figured as *Phoradendron polygynum* (Karst.) Eichl. in Trelease's monograph. From Karsten's beautiful illustration of the latter species (*Flora Columb.* 1 (2): 73. Plate 36. 1860.) and indeed from the type specimen at Leningrad which was kindly loaned to me it is obvious that Fendler's specimen has nothing to do with Karsten's species. Furthermore, Fendler's collection bears unilocular anthers, and I therefore relegate it to *Dendrophthora* subgenus *Paradendrophthora*. The Rusby and Pennell specimen, also with unilocular anthers and an identical sex distribution but with much larger leaves (up to 100 mm long) is included here tentatively.

5. *D. bonaniae* (Griseb.) Eichler, *Fl. Bras.* 5 (2): 103. 1868.

Homotypic synonym:

Arceuthobium bonaniae Grisebach, *Cat. Pl. Cub.* 121. 1866.

Illustrations: Fig. 5; Plate I.d.

A small, squamate species. Basal appendages of laterals transverse in position. Stem terete. Inflorescence probably 2a, but only one flower per bract, inserted at the middle of the internode. Sterile internode one, as long as the first fertile one; of the latter there are 5 or 6 per spike. Berries spherical, sepals closed. Spikes arranged in compound

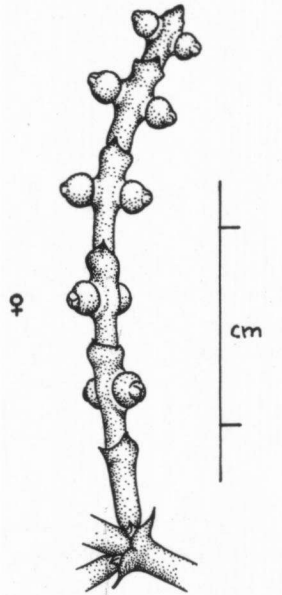


Fig. 5. *D. bonaniae*: Wright 2653, K.

inflorescences. Only one collection known with certainty, this being wholly pistillate; the species is probably dioecious.

TYPE: Wright 2653 p.p., Cuba (BM, G, K, MO). At BM and K this collection also contains the type of *D. oocarpa* (= *D. domingensis*). Holotype at K.

Specimen seen:

? Britton, Britton & Wilson 14064, Cuba, Prov. Matanzas, Tetas de Camarioca (NY).

Closely related to the *D. arcuata* – *D. marmeladensis* group; apparently different at least from the former in having only one sterile internode per spike. See also the discussion under *D. cupressoides*.

6 ***D. brachylepis*** Urban, Ark. Bot. **17** (7): 31. 1922.

Heterotypic synonym:

D. longipes Urban, Fedde Rept. **21**: 56. 1925?

Illustrations: Fig. 6; Plate II.a.

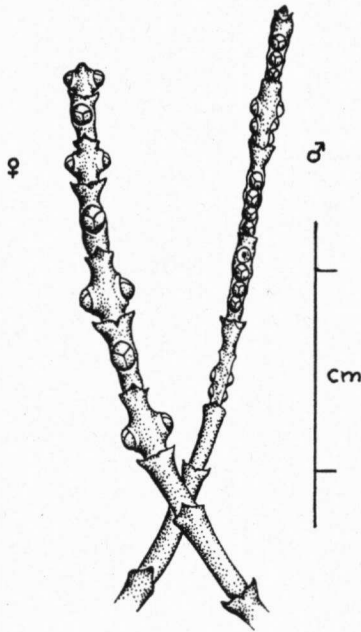


Fig. 6. *D. brachylepis*: Ekman 9421 (left) and H-8937 (right), both S.

A large, slender, profuse species, apparently quite squamate, in habit much like *D. flagelliformis*. Stem terete. Basal appendages transverse in position. The slender spikes arranged in loose compound inflorescences. The lower spikes in such a compound inflorescence with up to 6 sterile internodes, the penultimate ones with one only. Stam-

inate spike up to 6 fertile internodes, 2–4 flowers per bract, ca. 5 mm long. Pistillate spike up to 5 fertile internodes, one flower per bract, each internode ca. 4 mm long. Berries elliptic, 4 × 2.5 mm, inserted at about the middle of the internode. Some intercalary flowers present on plants of both sexes.

HOLOTYPE: Ekman H-535, Hispaniola, Haiti, Dép. du Sud, near Port-à-Piment, at Grande Passe, on *Coccoloba* (S).

Specimens seen:

- Ekman H-5781, Hispaniola, Dom. Rep., Prov. Azua, Llanura de San Juan, between Comendador and Las Matas, on *Mimusops albescens*, 400 m (G, S, US).
 ----- H-6112, Hispaniola, Haiti, Massif des Cahos, Hinche, Morne Vallecite, 900 m (S).
 ----- H-8751, Hispaniola, Haiti, Ile la Gonave, road from Pte.-à-Raquettes to Les Abricots, on *Mimusops albescens*, 300 m (GH, S).
 ----- H-8917, Hispaniola, Haiti, Grande Caïmite, Anse-à-Maçon, towards Source-Fantastique (S, US).
 ----- H-8937, Hispaniola, Haiti, Grande Caïmite, near Les Abricots, on *Randea aculeata*, 150 m (S, US).
 ----- H-9421, Hispaniola, Haiti, Massif du Nord, St. Michel de l'Atalaye, slope of Morne La Cidre, near Védrine, on *Rapanea guianensis*, 550 m (S, US).
 ----- H-9596, Hispaniola, Haiti, Ile la Gonave, Les Abricots (S).
 ----- H-14809, Hispaniola, Dom. Rep., Prov. de Samaná, Peninsula de Samaná, Sanchez, on *Mimusops balata*, 200 m (S, US).
 ?Ekman 17423, Cuba, Prov. Pinar del Río, Toscano, at Las Calaveras, on *Mabea crassinervis* (type of *D. longipes*; S).
 Eyerdam 234, Hispaniola, Haiti, Gonave Island, on *Mimusops albescens* (F, GH, MO, NY, US).
 ----- 288, Hispaniola, Haiti, Grande Cayemite, on *Mimusops* (F, GH, NY, US).
 Leonard 8457, Hispaniola, Haiti, Dép. du Nord, near St. Michel de l'Atalaye, 6 mi. north of N.W. Indies Co. plantation, 350 m (US).
 ----- & Leonard 13665, Hispaniola, Haiti, slope south of Jean Rabel (US).
 Moscoso, Gonzales, Marcano, & Jiménez 3531, Hispaniola, Dom. Rep., Prov. Benefactor, La Guazara, 900 m, on *Tabebuia berterii* (US).
 von Tuerckheim 2975, Hispaniola, Dom. Rep., Constanza, on *Cestrum*, 1200 m (B; determined as *D. brachystachya* by Urban).

Apparently endemic to Hispaniola (Ekman 17423 is fragmentary and probably does not belong here). The plants are likely to be pendulous. A species showing affinities with several others; the pistillate spike is much like that of *D. bonaniae*, but in general habit the plants resemble *D. flagelliformis*. Its nearest relative is probably *D. remotiflora*, from which it is distinct by way of its more symmetrical spikes, and in the absence of the peculiarly fused prophylls which characterize the latter species.

7. *D. brachystachya* Urban, Symb. Ant. 5: 335. 1907.

Illustrations: Fig. 7; Plate II.b.

Anexceedingly slender and diffuse squamate species, often of a golden-green coloration. Stem terete, rarely somewhat ridged; basal appendages transverse. No differentiated cataphylls on inflorescences or vegetative laterals. Spikes axillary only. Staminate spike of 2 or 3

fertile internodes, the proximal ones with 3 flowers per bract apparently in la arrangement, the distal ones with one flower per bract; flowers somewhat reddish brown. Pistillate spike one flower per bract, but otherwise similar. Pistillate spike difficult to separate from other species; I therefore list the sexes separately, the pistillate collections only tentatively under this species. Berries long-elliptic, 3–5 mm long at maturity. Dioecious.

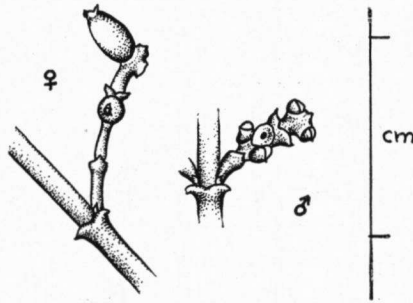


Fig. 7. *D. brachystachya*: v. Tuerckheim 3016, B (left), Howard & Howard 9296, GH (right).

TYPE: Buch 811, Hispaniola, Haiti, Morne Belanse, 1000 m, on *Coccoloba* sp. (not seen). As this specimen is probably no more extant, I suggest as neotype Howard & Howard 9296, Hispaniola, Dom. Rep., Prov. San Juan, Hondo Valle, Juan Santiago, El Cercado, 3500 ft., on *Miconia laevigata* (GH, K, NY, S, US). This collection contains both staminate and pistillate elements at least at S, all agreeing with the original description. Holotype at GH.

Specimens seen (staminate):

- Abbott 1877, Hispaniola, Dom. Rep., Prov. Barahona, Polo, Loma la Haut, 600–1300 m (US).
 Ekman H-4412, Hispaniola, Haiti, Massif du Nord, Anse-à-Foleur, Morne Chêneau, on Myrtaceae, 800 m (S).
 ----- H-6402, Hispaniola, Dom. Rep., Prov. de Azua, Cordillera Central, on *Meliosma herbertii*, 750 m (GH, S, US).

Specimens seen (pistillate):

- Abbott 1877, (as above) (US).
 Ekman H-4899, Hispaniola, Haiti, Massif du Nord, Gros-Morne, top of Morne Belanse, on *Meriania*, 1200 m (S, US).
 ----- H-4908, Hispaniola, Haiti, Massif du Nord, Gros-Morne, Morne Belanse, on *Coccoloba*, 1100 m (S, US).
 ----- H-7743, Hispaniola, Haiti, Massif de la Selle, Gauthier, Pays-Pourri, near Gobert, on *Coccoloba neurophylla*, 1700 m (G, S, US).
 ----- H-9208, Hispaniola, Haiti, Massif de la Hotte, group Morne Rochelois, Miragoane, at Quatre-Chemins, on *Mecranium*, 1000 m (S, US).
 ----- H-10385, Hispaniola, Haiti, Massif de la Hotte, western group, Jérémie, Morne Pain-de-Sucre, on Melastomaceae, 1450 m (S).
 Fuertes 1465b, Hispaniola, Dom. Rep., Prov. Barahona, in cacumine Noche Buena, 1800 m (GH).
 von Tuerckheim 3016, Hispaniola, Dom. Rep., Constanza, 1250 m (B, G).
 Weir s.n., Hispaniola, Haiti, Mt. Pilboreau, 3100 ft. (B, GH, P, US).

This species appears to be yet another endemic to Hispaniola. The difficulties in identification should not be taken to indicate uncertainty as to its validity as a species. The staminate plants, when in flower, are very distinct indeed, and unlike any other known species. The only possible relatives seems to be *D. opuntioides*, though it is very different in inflorescence.

The species should not be nomenclaturally confused with *Phoradendron brachystachyum* (DC) Trelease, *Phoradendron*, p. 47. 1916, which is a leafy mistletoe from Mexico.

8. ***D. buxifolia*** (Lam.) Eichler, Fl. Bras. 5 (2): 105. 1868.

Basionym: *Viscum buxifolium* Lamarck, Enc. Méth. 3: 56. 1789.

Homotypic synonym:

Phoradendron buxifolium (Lam.) Grisebach, Mem. Amer. Acad. Arts & Sci., n.s., 8: 191. 1861. (Nuttall, Jour. Acad. Phil., n.s., 1: 185. 1847 proposed, but did not actually make the combination).

Heterotypic synonyms:

P. buxifolium (Lam.) Griseb. var. *rotundata* Grisebach, Cat. Pl. Cub. p. 120. 1868.

D. buxifolia (Lam.) Eichl. var. *rotundata* (Griseb.) Urban, Bot. Jahrb. 24: 67. 1898.

Illustrations: Fig. 8; Plate II.c.

A leafy species. Leaves obovate to nearly round, with short petioles or almost sessile, up to 35 × 25 mm, rather thick. Stem terete. Vegetative laterals with one pair of cataphylls up to 8 mm above axil; spikes usually without. Basal appendages of laterals median in position.

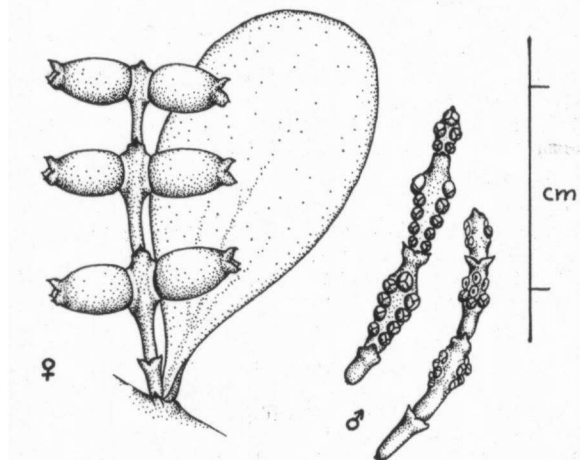


Fig. 8. *D. buxifolia*: Wright 2649, K (left), Ekman H-3865, S (center), Wright 220a GH (right).

Spikes axillary, rarely terminal, secondary ones common. Dioecious. Pistillate inflorescence up to 4 fertile internodes, one or 2 flowers per bract in 2a seriation. Fertile internodes up to 8 mm when in fruit, berries elliptic, 2 × 4 mm, with spread sepals, in rather large cups well above the middle of the internode. Staminate spike, in contrast with pistillate one, of 1a, 1b, rarely 2a (Alain, et al., 5364) type: fertile internodes 3 or sometimes 4, up to 5 mm long, with at most 9 flowers per bract.

TYPE: No specimen is cited in Lamarck's description, and a neotype must be chosen: Wright 220a, in Cuba Orientali (B, G, GH, K, MO, NY, PH). Holotype at GH.

Specimens seen:

- Alain, Acuna & López Figueiras 5364, Cuba, Prov. Oriente, Sierra de Cristal, Mayarí, Loma los Mulos, 500 m (NY).
 Clement & Chrysogone 4322, Cuba, Prov. Oriente, near Aserrio de Moa (US).
 ? Duss 3852, Guadeloupe (F).
 Eggers 5175, Cuba, La Clarita (F, GH, K, US).
 Ekman H-3865, Hispaniola, Haiti, Massif du Nord, St. Louis du Nord, Morne Baron, on *Sloania ilicifolia*, 800-950 m (G, S).
 ——— H-4340, Hispaniola, Haiti, Massif du Nord, Anse-à-Foleur, top of Morne Colombeau, 900 m (S, US).
 ——— H-5147, Hispaniola, Haiti, Massif du Nord, Port-de-Paix, Haut-Piton, on *Magnolia domingensis*, 1100 m (S).
 ——— 7064, Cuba, Prov. Oriente, Sierra Maestra, La Bayamesa, between Río Oro and Río Yao, on *Ternstroemia*, 1100-1400 m (F, S).
 ——— 9779, Cuba, Prov. Oriente, Sierra de Nipe, on *Magnolia cubensis* (G, NY, S).
 ——— H-12818, Hispaniola, Dom. Rep., Cordillera Central, Prov. Monte Cristi, Mancion, ridge between Río Cenobi and Río San Juan, on *Cyrilla racemiflora*, 1900 m (S, US).
 ——— 14451, Cuba, Prov. Oriente, Sierra Maestra, divide between Río Yara and Río Palmamocho, 1300 m (K, S).
 ——— 15211, Cuba, Prov. Oriente, Sierra de Nipe, base of Loma Mensura, on *Ilex hyponeura* (G, NY, S).
 ——— 16189, Cuba, Prov. Oriente, Peninsula de Cabo Cruz, at Río Nuevo, on *Drypetes* (F, G, K, NY, S).
 Linnaean specimen 1166.5 (see discussion; LINN).
 Leon 8002 & 8013, Cuba, Las Villas, Sierras de Banao, La Gloria (US).
 ——— 10217 & 12339, Cuba, Prov. Oriente, Sierra Maestra, Loma del Gato (US; US, NY).
 ——— 20824, Cuba, Prov. Oriente, Punta Gorda (US).
 ——— 20912, Cuba, Prov. Oriente, Cayoguan, south of Punta Gorda (US).
 Leon, Clement & Roca 10217, Cuba, Sierra Maestra, Cobre Range, vicinity of Loma del Gato (NY).
 Leon & Roca 8002 & 8013, Cuba, Prov. Santa Clara, Banao Mountains, Gloria Hill, 900 m (NY).
 Marie-Victorin, Clement & Alain 21548, Cuba, Prov. Oriente, Moa, near Cananova (MT).
 Morton & Acuna 3788, Cuba, Prov. Oriente, crest of Sierra Madre between Pico Turquino and La Bayamesa, 1350 m (US).
 Shafer, 3325, Cuba, Prov. Oriente, Sierra de Nipe, along trail Piedra Gorda to Woodfred, 400-500 m (F, GH, NY, US).
 ——— 4191, Cuba, Prov. Oriente, Río Yamanigüey to Camp Toa, 400 m (NY).
 Wright 219, in Cuba Orientali, Monte Verde (B, G, GH, K, MO).
 ——— 221, p.p., in Cuba Orientali (B, P, with hyperparasitic *D. epiviscum*; K).
 ——— 222, in Cuba Orientali (G).
 ——— 2649, Cuba, edge of savanna at S.F. de Buena Vista (G, GH, K, MO).

This species throws sand into the eyes of the morphologist in no less than two ways. First of all, the staminate inflorescence often is 1a, a feature known only from two other species, *D. carnosa* and *D. cupulata*. The staminate spike may also be 1b, however. Secondly, the sexual dimorphism of the spikes bridges the two primary inflorescence categories. I am nevertheless of the opinion that *D. buxifolia* belongs in subgenus *Paradendrophthora*, possibly related to *D. costaricensis*.

The species seems to be unsatisfactorily delimited, as pistillate specimens can often not be distinguished properly from those of *D. constricta*. The flaring placental cup of the latter species may be suggested as a good differentiating character. Even more difficult frequently is the distinction between *D. buxifolia* and *D. cubensis*. The latter has thin leaves, and tends to be much more slender; its a symmetrical branching pattern is also typical. Staminate plants of *D. cubensis* are always of the 2a type, those of *D. buxifolia* never completely.

There appears to be a complete transition from round to obovate leaves, and the var. *rotundata* probably has little taxonomic meaning.

In the Linnaean Herbarium, under no. 1166.5, there is a mixed collection part of which belongs in *D. buxifolia*. The sheet is labelled "*Viscum purpureum*". The specimen on the left side of the sheet doubtlessly is an *Oryctanthus* (possibly *O. ferrugineus*?). The remainder belongs in the present species, and in fact is annotated "*buxifolium*" in Smith's handwriting.

9. ***D. carnosa*** Urban & Ekman, Ark. Bot. **23A** (5): 66. 1930.

Illustrations: Fig. 9; Plate II.d.

Fairly large plants of short (ca. 10 mm) internodes, of knobby appearance because of persistent, prominent prophylls and associated axillary buds which are retained long after the leaves have been dropped. Leaves rather thick and dark, up to 20 × 15 mm, obovate to round, with light, conspicuous margins as in *D. ternata*. Stem terete. Vegetative laterals with one or 2 pairs of cataphylls, inflorescence with one pair or without. Basal appendages of laterals of a median orientation. Probably dioecious. Spikes axillary only, secondary ones common, of the 1a type; each with 3 or 4 fertile internodes about 5 mm long, with 7-9 flowers per bract.

HOLOTYPE: Ekman H-7484, Hispaniola, Haiti, Massif de la Hotte, western group, top of Morne Formon, 2225 m, on *Ternstroemia barkeri* (S).

I am not certain that this species belongs in *Dendrophthora*; if it does, it should probably be placed in *Paradendrophthora*. It is unorthodox in its 1a inflorescence type, known otherwise only from *D. buxifolia* and *D. cupulata*. Yet it surely is not related to either of these species. In general habit is it not unlike *D. ternata*, though of course widely different in inflorescence.

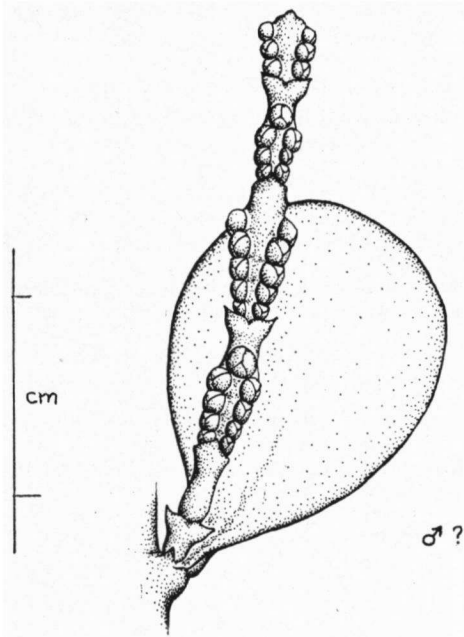


Fig. 9. *D. carcosa*: Ekman H-7484, S.

10. ***D. chrysostachya*** (Presl) Urban, Ber. Deutsch. Bot. Ges. **14**: 285. 1896.

Basionym: *Viscum chrysostachyum* Presl, Epim. Bot. pp. 254-255. 1849 (1851).

Homotypic synonym:

Phoradendron chrysostachyum (Presl) Eichler, Fl. Bras. **5** (2): 107. 1868.

Heterotypic synonyms:

Viscum globuliflorum Presl, Epim. Bot. p. 251. 1849 (1851).
Phoradendron globuliflorum (Presl) Eichler, Fl. Bras. **5** (2): 107. 1868.

Illustrations: Fig. 10; Plate III.a.

A leafy species, leaves sometimes with undulating margin, elliptic to oblanceolate, up to 50 mm long, petiolate, rather thin when dry. Stem terete. Vegetative laterals with one pair of cataphylls up to 20 mm above the axil; spikes without. Secondary spikes and other laterals common. Inflorescences with 2 fertile internodes, rarely a short third, axillary only; up to 12 flowers per bract, fertile internodes up to 10 mm long, sterile internode of same length as first fertile one, sometimes longer. Inflorescence type 1b. Sex distribution unknown; at least the apical flowers of fertile internodes are pistillate ones which

become "rather pointed, transparent-white berries, to $\frac{1}{2}$ in. diam., growing usually in pairs" (Balls 7265).

TYPE: Haenke? not seen. Balls 7265 may supply the neotype if the original type is no longer extant. Then, holotype at UC.

Specimens seen:

Arbeláez & Cuatrecasas 5911, Colombia, Dep. Cauca, De Puracé al volcán, matorrales en Chiquíu, 3100-3200 m, on *Miconia* (US).

Balls 7265, Ecuador, Quito, Prov. Pichincha, east slopes of Mt. Pichincha, 12000 ft. (K, UC, US).

? Cuatrecasas 18790, Colombia, Dep. del Cauca, Cordillera Central, vertiente occidental, cabaceras del Río Palo, quebrada del Río López, Alto del Duende, 3300-3350 m (F).

Killip & Smith 22286, Peru, Dep. Ayacucho, between Huanta and Río Apurimac, 2800 m, on *Cavendishia* (US).

Lechler 1927, Peru (G, K).

? Macbride 3950, Peru, Muña, 7000 ft. (F, GH, NY, US; the staminate of this species?).

Rose, Pachano & Rose 23313, Ecuador, between Loja and Portovelo (US).

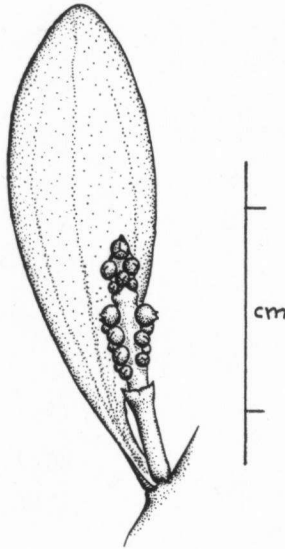


Fig. 10. *D. chrysostachya*: Lechler 1927, K.

A poorly understood species. Some of the plants cited here may turn out to belong to *D. hexasticha* which, however, is dioecious. For the present I leave them as separate entities. Apart from *D. hexasticha* the nearest relatives surely are *D. mesembryanthemifolia* and *D. clavata*, separable by the peculiar prophylls of the former and the inflorescence variability of the latter.

11. **D. clavata** (Benth.) Urban, Ber. Deutsch. Bot. Ges. **14**: 285. 1896.
 Basionym: *Viscum clavatum* Bentham, Pl. Hartw. pp. 189–190. 1845.

Homotypic synonym:

Phoradendron clavatum (Benth.) Eichler, Fl. Bras. **5** (2): 107. 1868.

Heterotypic synonyms:

Viscum crassuloides Presl, Epim. Bot. 252. 1849 [1851].

Phoradendron crassuloides (Presl) Eichler, Fl. Bras. **5** (2): 107. 1868.

Dendrophthora crassuloides (Presl) Urban, Ber. Deutsch. Bot. Ges. **14**: 285. 1896.

D. striata Rusby, Descr. New Sp. S. Amer. Pl., pp. 13–14. 1920

Illustrations: Fig. 11; Plate III.b.

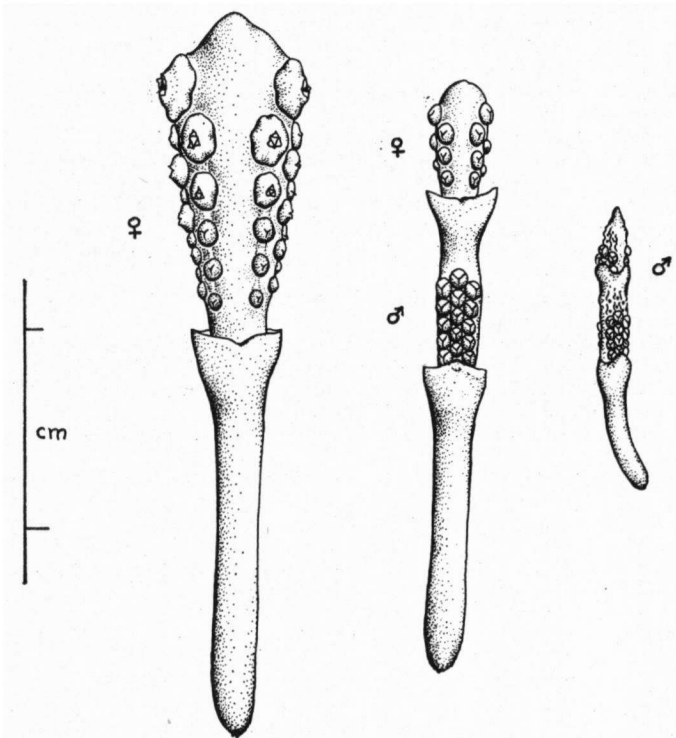


Fig. 11. *D. clavata*: Hartweg 1044, K.

Stout plants with lanceolate to spatulate leaves with distinct petioles, 60 × 25 mm at most. The very first appendages of a plant appear to be scale-like (Balls 5730, K). Stem somewhat flattened below leaves, sometimes terete. Basal appendages transversely oriented. Vegetative laterals only rarely with one pair, and spikes always without cataphylls. Spikes axillary only, secondary ones common, of three kinds: staminate, pistillate, and mixed, all of which may be found on the same individual.

Staminate spike slender and small, without thickening, most often in a secondary position, otherwise like: Pistillate spike with one to 3 fertile internodes, each no longer than 15–20 mm, ca. 20 flowers per bract. Pistillate fertile internodes swollen clavately, flowers sunk into conspicuous pits; berries white, apparently flattened and lobed somewhat like those of *D. costaricensis* subsp. *costaricensis*. On mixed spikes the basal fertile internode is always staminate, the terminal one pistillate. Inflorescence 1b throughout, but series of staminate internodes often proliferating laterally so that both flower areas meet.

TYPE: Hartweg 1044, Colombia, Prov. Popoyán, Pitayo (“in sylvis Pitayo, juxta Popoyan”) (B, F, G, K, P). Holotype at K.

Specimens seen:

- Agredo, Molina & Barkley s.n., Colombia, Dep. Cauca, zona de los Tres Cruces en los alrededores de Popoyán (US).
 Anthony & Tate 200, Ecuador, Chillo Valley, Santa Rosa, 9600 ft. (US).
 Ariste-Joseph s.n., Colombia (US).
 Asplund 6213, Ecuador, Prov. Pichincha, 15 km south of Quito along highway to Tambillo, 2800 m, on *Cestrum* sp. (NY).
 Balls 5730, Colombia, Dep. Cundinamarca, 9800 ft. (K, US).
 Barriga 5113, Colombia, Intendencia del Meta, Llanos Orientales, Sabana de Barranca de Upia (US).
 Barriga & Schultes 13522, Colombia, Dep. Cundinamarca, Cordillera Oriental, Páramo de Guasca, 2800–3300 m, on *Clusia* sp. (US).
 Brooke 6152, Bolivia, Sta. Elena Valley behind Choro, Lagunillas, 7000 ft., on *Solanum* (NY).
 Buchtien 2818, Bolivia, region andina, Unduavi, 3200 m (GH, US; type of *D. striata*).
 ——— 2819, Bolivia, region andina, Unduavi, 3300 m (NY, US).
 ——— 7269, Bolivia, on the road to Tipuani, 1400 m (US).
 Cardenas 4314, Bolivia, Dep. Cochabamba, Chapare, near Incachaca (US).
 Cristianos s.n., Colombia, Bogotá (PH).
 Cuatrecasas 5391, Colombia, Macizo de Bogotá, Quebrada de Chicó, 2750–2890 m (F, US).
 ——— 5719, Colombia, Dep. Cundinamarca, Macizo de Bogotá, Quebrada del Rosal, 3200 m (F, US).
 ——— 20221, Colombia, Dep. del Valle, Páramo de Bavaya, Corrales, 3450–3520 m (F).
 ——— 20861, Colombia, Dep. del Valle, Bugalagrande River, Barragán, cerro de la Laguna, 2920–2950 m (F).
 Daniel & Tomás, Colombia, Dep. Antioquía, Jericó (US).
 Ewan 15735, Colombia, Dep. Antioquía, Quebrada Naranjal, tributary Rio Aures, 2740 m (US).
 ——— 15742, Colombia, Dep. Antioquía, Alto Capiro, above Sonsón-Abejorral road, 2800 m (US).
 ——— 16005, Colombia, Dep. Narino, north slope of Volcán de Chiles, camino to Mayasquer, 3100 m (US).
 Fagerlind & Wibom 1368, Ecuador, Prov. Carchi, between Chota and El Pun (S).
 ——— & ——— 1543, Ecuador, Prov. Imbabura, Lago de Cuichocho (S).
 Fendler 1114, Venezuela, prope coloniam Tovar (B, G, GH, K, MO, PH).
 Firmin 462, Ecuador, Prov. Pichincha, Hacienda San Isidro, 2810 m (F, US).
 Haenke s.n., Peru (PR; type of *Viscum crassuloides*).
 Haught 5097, Colombia, Dep. Cauca, Cordillera Central, road to Mendez, northeast of Siluia, 2800 m (B, US).
 Hawkes & Barriga 49, Colombia, Dep. Cundinamarca, San Miguel, near Sibate, 2850 m, on *Miconia ligustrina* (US).
 Heinrichs 970, Ecuador, near Hacienda San Rafael de Pilopata, 3700 m (G, NY).
 Holton 658, “New Grenada” (G, GH, K, PH).

- Jahn 908, Venezuela, Páramo de Canaguá, Mérida, 2000 m (GH, NY, US).
 Killip, 6526, Colombia, Dep. Cauca, "Canaan", Mt. Puracé, 3300-3400 m, on *Tournefortia* (PH).
 ----- 6706, Colombia, Dep. Cauca, "Canaan", Mt. Puracé, 3100-3300 m (GH, NY, PH, US).
 ----- 9789, Colombia, Dep. Caldas, new Quindio trail to summit of Cucarronera, Cordillera Central (GH, NY, PH, US).
 ----- & Hazen 9108, Colombia, Dep. Caldas, old Quindio trail, Salento to Laguneta, Cordillera Central, 2500-2800 m (GH, NY, PH, US).
 ----- & ----- 9414, Colombia, Dep. Caldas, old Quindio trail, Laguneta to Magana, 3000-3300 m (GH, NY, PH, US).
 ----- & ----- 9453, Colombia, Dep. Caldas, Magana, old Quindio trail, (GH, NY).
 ----- & Smith 18221, Colombia, Dep. Santander, eastern Cordillera, Páramo de las Puentes, above La Baja, 3500-3700 m (GH, NY, US).
 ----- & ----- 19686, Colombia, Dep. Norte de Santander, between Mutiscua and Pamplona, 2700-3400 m, on *Miconia* (GH, US).
 ----- & ----- 19741, Colombia, Dep. Norte de Santander, eastern Cordillera, between Mutiscua and Pamplona, 3400 m, on *Miconia ligustrina* (GH, NY, US).
 Mandon 1467, Bolivia, Prov. Larecaja, near Sorata, 2500 m (GH).
 Mexia 7604, Ecuador, Prov. Carchi, Canton Tulcan, trail Pun to Río Chimbal, 2895 m (F, GH, MO, UC, US).
 ----- 7606, Ecuador, Prov. Carchi, Canton Tulcan, trail Pun to Río Chimbal, 2926 m (F, GH, UC, US).
 Penland & Summers 769, Ecuador, Prov. Imbabura, Lake Cuichocha, 3100 m (F).
 Pennell 2453, Colombia, Dep. Cundinamarca, mountain south of Sibate, 2900-3000 m (NY).
 ----- 3114, Colombia, Dep. Tolima, "Rosalito" near Páramo de Ruiz, 2900-3200 m (NY).
 ----- 7136, Colombia, Dep. Cauca, Cordillera Central, "Calaguala", Coconuco, 2500-2800 m (GH, US).
 ----- 7504, Colombia, Dep. Cauca, Mount El Derrumbo, 2700-3000 m (GH, PH).
 ----- & Killip 6526, Colombia, Dep. Cauca, "Canaan", Cordillera Central, Mt. Puracé, 3300-3400 m, on *Tournefortia* (GH, NY, US).
 Prescott 978, Ecuador, Volcán Antisana, 10,500-11,000 ft. (NY).
 Prieto P-73, Ecuador, Prov. Canar, region of San Marcos about 10 km north-east of Azogues, 9500 ft. (NY, US).
 Pring 238, Colombia, Andes of Bogotá, on *Viburnum* (MO).
 Rose & Rose 22782, Ecuador, near Azogues (NY, US).
 Rusby 1540, Bolivia, Yungas, 6000 ft. (F, PH, US).
 ----- 1541, Bolivia, Ingenio del Oro, 10,000 ft. (F, NY, MO, US).
 Schneider 49, Colombia, Dep. Cundinamarca, Usaguén (S).
 Schultes & Villareal 8029, Colombia, Narino, Pasto, near Base of Volcán El Galeras, above Ibonuco, 2700-2950 m (MO).
 von Sneidern 1143, Colombia, Dep. Cauca, El Tambo, near Munchique, 3000 m (S).
 ----- 3002, Colombia, Dep. Caldas, Laguneta, Salento, 2800 m (S).
 Steyermark 55288 & 3088, Venezuela, State of Lara, Las Sabanetas above Los Apocentos, west of Humocaro Bajo, 2530 m (F, NY, US).
 Stork & Horton 10359, Peru, Dep. Huancavelica, Prov. Tayacaja, Quebrada, 1 km east of Surcubamba (F, G, US).
 Tate 701, Bolivia, Cordillera Real, Río Aceramarca, 10,800 ft. (NY).
 Tracey 119 & 470, Colombia, Dep. Cundinamarca (K).
 Triana 2780 & 4584, Colombia, Andes de Bogotá, ca. 2800 m (K).
 Triana s.n., Colombia, Andes de Bogotá, 2700 m (G).

An exceedingly variable plant in inflorescence, leaf size, and leaf shape. It is often very reminiscent of *D. costaricensis* though somewhat more dense and strict. Doubtlessly, *D. clavata* is closely allied to *D.*

costaricensis and its near relatives. This alliance is interesting particularly for the variation its members show in sex distribution; these features also supply some of the most useful distinguishing characters. *D. striata* appears no more than a narrow-leaved variant of *D. clavata*, and otherwise fits the latter's description. The type of *D. crassuloides* characterizes plants which have rather small inflorescences, but which do not seem to be sufficiently different to deserve a separate specific name. See also the discussion under *D. elliptica*.

12. ***D. confertiflora*** Krug & Urban, Ber. Deutsch. Bot. Ges. **14** (8): 285. 1896.

Illustrations: Fig. 12; Plate III.c.

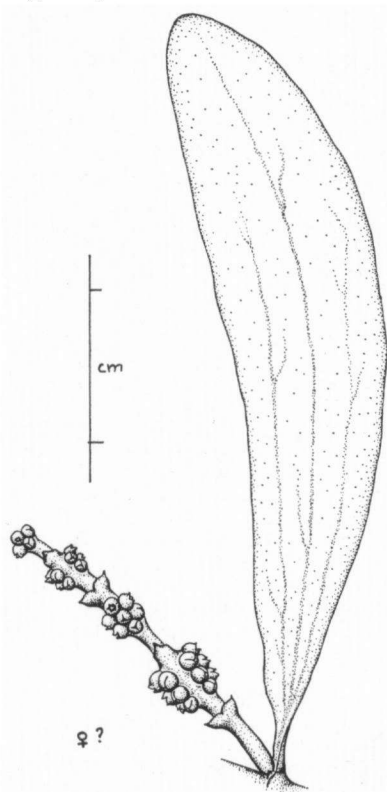


Fig. 12. *D. confertiflora*: Ekman 7016, S.

A rather slender, leafy species with terete internodes up to 50 mm long; nodes swollen in age. Leaves rather thin, oblanceolate with rounded apex, sometimes obovate, about 50×12 mm, nearly sessile. Vegetative laterals with 1–3 pairs of cataphylls, inflorescences usually without, but rarely with one pair. Basal appendages median in position, up to 15 mm above axils on vegetative branches. Monoecious

(according to Urban). Inflorescence up to 4 fertile internodes each 5–8 mm long, bearing 7–10 flowers per bract; berries 4×2 mm. Seriation basically 1b, but sometimes lateral proliferation resulting in fused flower areas; then flower orientation quite irregular.

TYPE: Wright s.n., Cuba. As I have not encountered this collection anywhere, I propose as neotype: Ekman 7016, Cuba, Prov. Oriente, Sierra Maestra, Finca La Reunion, 650 m, on *Laplacea* (G, K, NY, S). Holotype at S.

Specimens seen:

Ekman 14488, Cuba, Prov. Oriente, Sierra Maestra, northern spur of Pico Turquino, 1800 m, on *Cleyera* (S).
 ——— 15645, Cuba, Prov. Oriente, Sierra Maestra, Loma del Gato, Loma Barbi, 700 m, on *Laplacea urbani* (S).

A species of rather unusual appearance, probably allied to *D. mornicola*. It is early distinguished by its long leaves; plants are likely to be somewhat pendulous in nature.

13. ***D. constricta*** (Wright ex Griseb.) Eichler, Fl. Bras. 5 (2): 104. 1868.

Basionym: *Phoradendron constrictum* Wright ex Grisebach, Mem. Amer. Acad. Arts & Sci., n.s., 8: 192. 1861.

Heterotypic synonym:

Phoradendron testifolium Wright ex Grisebach, Cat. Pl. Cub. p. 120. 1866.

Illustrations: Fig. 13; Plate III.d.

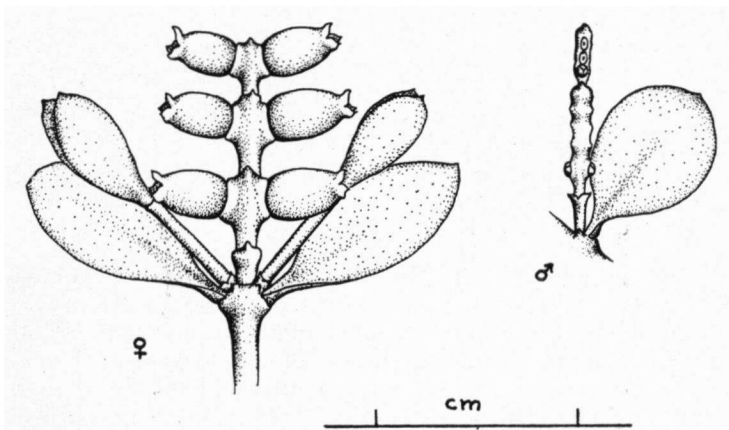


Fig. 13. *D. constricta*: Wright 220b, K (left), Ekman 3707, K (right).

Plants rather dense, dark when dry, fragile. Leaves small (5×10 to 10×25 mm), obovate to orbicular, fleshy. Stem terete. Cataphylls always present, but often very near the base of a branch and very

inconspicuous. Basal appendages in median plane. Dioecious. Staminate spike 2a, fertile internodes 2–3, with 4–7 flowers per bract. Pistillate spike 2–3 fertile internodes, one flower per bract. Berries elliptic, about 3 mm long, sepals reflexed; placental cup often flaring. Irregularities include laterally proliferating series in Ekman 4044 (staminate), 1a or 1b inflorescences in Ekman 15955, intercalary flowers and berries in Wright 220b (K). Spikes usually axillary, but also terminal, resulting in a dichasial habit.

TYPE: Wright 220b, in Cuba Orientali, prope Monte Verde, on Rubiaceae (B, G, GH, K, MO, P, PH). Holotype at K.

Specimens seen:

- Clement & Chrysogone 4431, Cuba, Prov. Oriente, Sierra de Moa, Monte de la Breña, 500 m (US).
 Ekman 3707, Cuba, Prov. Oriente, Taco Bay near Baracoa (S).
 ——— 3785, Cuba, Prov. Oriente, Minas de Iberia, Taco Bay, 800 m (S).
 ——— 4044, Cuba, Prov. Oriente, Maravi near Baracoa, on *Ternstroemia* (S).
 ——— 4420, Cuba, Prov. Oriente, Sierra Azul, 500–700 m, on *Cyrilla* (S).
 ——— 5296, Cuba, Prov. Oriente, Sierra Maestra, Pico Turquino, on *Ternstroemiaceae*, 1725 m (G, S).
 ——— 5513, Cuba, Prov. Oriente, Pico Turquino, 2040 m (NY, S).
 ——— 6857, Cuba, Prov. Oriente, Sierra de Cristal, on *Ilex crystalcus*, 1200–1300 m (S).
 ——— 10264, Cuba, Prov. Oriente, Guantanamo, Monte Libanon, San Fernandez, on *Cyrilla*, 700 m (F, S).
 ——— 14321, Cuba, Prov. Oriente, Sierra Maestra, top of Punta de Palmamocha, south of Yara, 1400 m (NY, S).
 ——— 14490, Cuba, Prov. Oriente, Sierra Maestra, northern spur of Pico Turquino, 1800 m, on *Ternstroemia* (S).
 ——— 14492, Cuba, Prov. Oriente, Sierra Maestra, northern spur of Pico Turquino, 1800 m, on *Ternstroemia* (G, S).
 ——— 15954, Cuba, Prov. Oriente, Sierra Cristal, northern branch of Río Lebisa, 600 m (S).
 ——— 15955, Cuba, Prov. Oriente, Sierra Cristal, on *Ilex* (S).
 Leon, Clement, Chrysogone & Alain 22572, Cuba, Prov. Oriente, Sierra de Moa, Monte de la Breña, on *Cyrilla* (US).
 Shafer 4058, Cuba, near Camp San Benito Oriente, 900 m (GH, NY, MO, US).
 ——— 4099, Cuba, Prov. Oriente, Camp La Barga to Camp San Benito, 450–900 m (NY).
 ——— 8082, 8229, 8197, Cuba, Prov. Oriente, Camp La Gloria, south of Sierra Moa (MO, NY; NY; MO, NY).
 Wright 2648, Cuba (G, GH, K, MO, P).

A Cuban endemic. A very distinct species, possibly related to *D. cubensis*. Confusion is possible with *D. buxifolia*, especially in the case of pistillate plants; the staminate ones differ conspicuously in inflorescence type. In addition, the fleshiness of the leaves of *D. constricta* frequently leaves no doubt as to its identity. There seems to be an abnormally high percentage of staminate plants in herbaria, pistillate ones being very few; a difference for which I cannot account.

14. ***D. costaricensis*** Urban, Ber. Deutsch. Bot. Ges. **14** (8): 285. 1896.

Illustrations: Fig. 14; Plate IV.a.

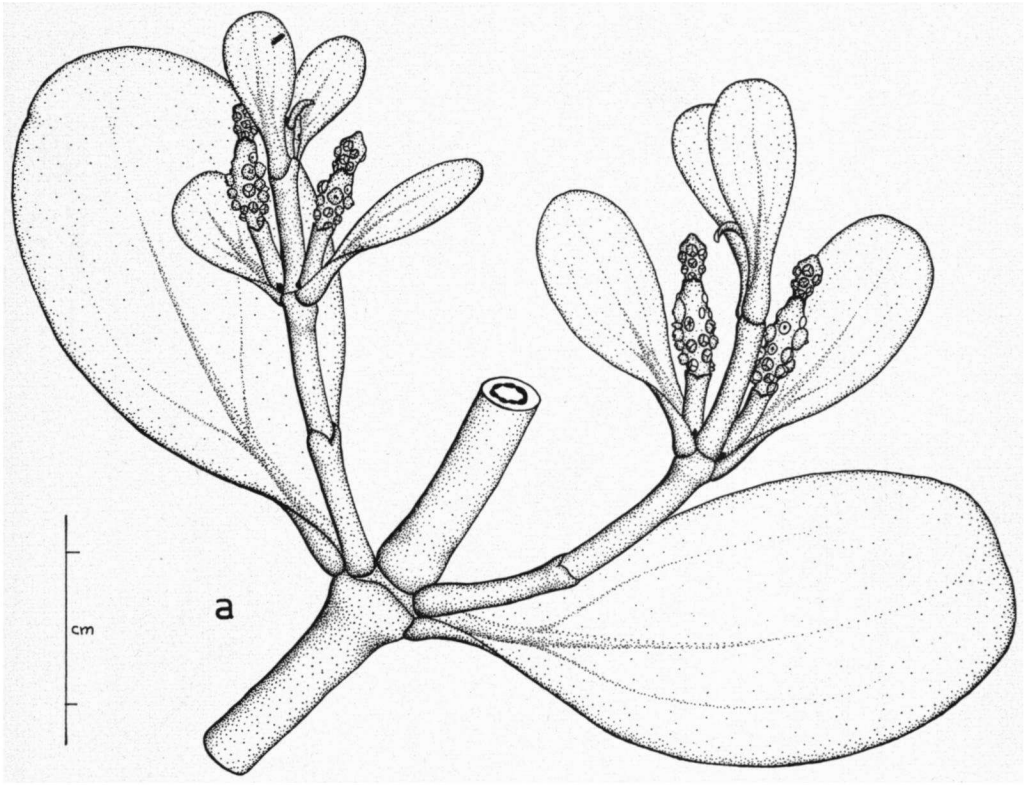


Fig. 14. (See following page)

Heterotypic synonym:

Phoradendron flavescens Kuntze, Rev. Gen. 2: 587. 1891, non Nuttall.

A rather large leafy species. Leaves succulent, broadly obovate and rather stiff, 3–4 cm long, with three prominent veins. Stem terete. Vegetative laterals with one, rarely with two pairs of cataphylls, up to 15 mm above the axil; spikes without cataphylls. Prophylls inconspicuous, frequently obliterated when secondary spikes develop in their axils. Basal appendages in median plane. Plants monoecious, both staminate and pistillate flowers usually occurring on the same internode. Urban (1896) already noticed that the staminate ones are distal on any fertile internode. In material from Costa Rica (Kuijt 1531, 1533) the three terminal flowers are staminate, the remainder pistillate. Only apical flowers regularly ♀, others variable in orientation. Spikes with 2 or 3 fertile internodes, 8–15 flowers per bract. Inflorescence type 1b. Fruit opaque white, flesh pulpy but not viscid.

HOLOTYPE: Hoffmann 706, Volcán Irazú, Costa Rica. This specimen was burned in World War II, and as a substitute I propose:

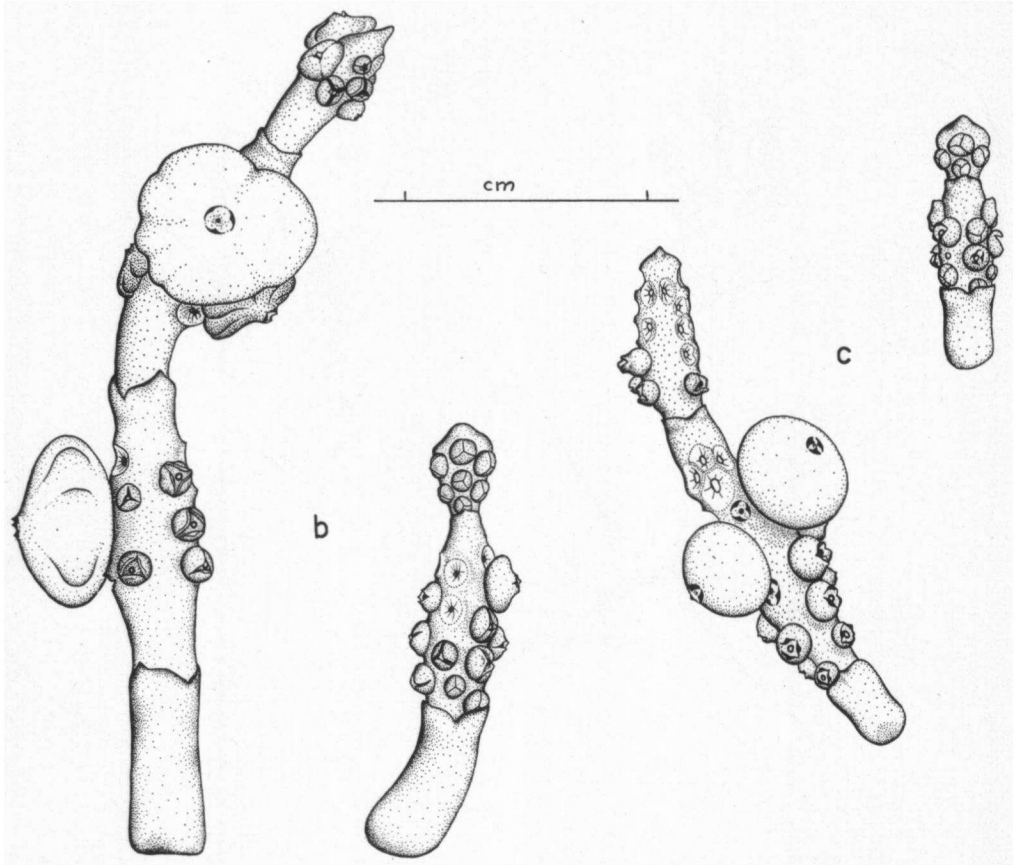


Fig. 14. *D. costaricensis*, a. & b.: subsp. *costaricensis*, Kuijt 1531, CR, c.: subsp. *poasensis*, Kuijt 1533, CR.

Kuijt 1531, Costa Rica, Volcán Irazú, about midway between Hotel Robert and summit, on *Escallonia poasense* Donn. Smith (CR).

Two subspecies are recognizable:

D. costaricensis Urban subsp. **costaricensis** (Fig. 14a, b)

Berries compressed-turbinate, the margins thus formed lobed, the deepest sinuses coincident with those of the perianth. Known from Volcán Irazú only.

Specimens seen: the type only.

The shape of the fruit can best be compared to that of a summer squash. Especially the immature, green fruits display the flattened and lobed condition.

D. costaricensis Urban subsp. **poasensis** Kuijt, n. subsp.

Bacca fere globosa, margine haud lobata.

HOLOTYPE: Kuijt 1533, Costa Rica, Volcán Poás, near old deserted dairy just below south-west rim of crater, on *Gaultheria*, but also seen on *Cavendishia* locally (CR). (Fig. 14c).

Specimens seen:

Davidson 369, Panama, Prov. Chiriquí, Boquete District, Bajo Chorro, 6000 ft. (F, GH, MO).

Jiménez & Rodríguez 400, Costa Rica, Volcán Poás, upper slopes (UC).

Pittier 816, Costa Rica, summit of Volcán Poás, 2600 m (B).

Tonduz 10791, Costa Rica, Volcán Poás, forests of Achiote, 2200 m (B).

vc.. Tuerckheim 2045, Guatemala, Dep. Alta Verapaz, Cobán, 1350 m, on *Rondeletia* (B).

The Pittier and Tonduz specimens have no fruit and are listed under this subspecies because of their provenance.

A species populating the tops of volcanoes in Central America. It is a close relative of the *D. clavata-mesembryanthemifolia* group, differing in sex distribution, cataphylls, geographic distribution, etc. The only other species, to my knowledge, which has lobed berries is *D. clavata* (e.g., Hartweg 1044 and others).

Since I have observed this species in the field I might be allowed to add a few more descriptive details. Kuntze confuses this species with *Phoradendron serotinum* (Raf.) Johnston (= *P. flavescens*), and indeed the resemblance in habit is striking. The largest plants I have seen were about 4 ft. in diameter. A peculiarity of the spike is the fact that the most distal pistillate flowers on an internode open before the terminal, staminate flowers, which are older. The staminate flowers show a conspicuous vestigial style, but pistillate flowers are without staminal vestiges. The anther is somewhat kidney-shaped and unilocular, thus confirming a crucial generic character. Seriation is difficult to discern in older spikes because of the unequal development of the fruits: usually a single berry, the uppermost one, matures at a time per internode, the others being in gradually earlier stages of growth. The endosperm is dark green. The seed is rather small (1 × 1.5 mm) and produces a tiny radicle, becoming clavate when encountering an obstacle. The radicle bears stomata. Ericaceae seem to be preferred as hosts, but other hosts probably occur also. On Volcán Irazú I have seen only a few plants, which were quite green. On Volcán Poás, especially along the trail to Laguna Poás, the species is very abundant, and also very conspicuous because of its yellowish color.

15. **D. cubensis** Eichler, Fl. Bras. 5 (2): 104. 1868.

Heterotypic synonyms:

(*D. myrtilloides* (Willd.) Trelease, *Phoradendron*, p. 218. 1916; *Phoradendron myrtilloides* (Willd.) Grisebach, Mem. Amer. Acad. Arts & Sci., n.s., 8: 191. 1861; and *Viscum myrtilloides* Willdenow, Sp. Pl. 4 (2): 739. 1797 (1806) are regarded as

synonyms of *Phoradendron trinervium* (Lam.) Grisebach by Trelease, *Phoradendron*, p. 103. 1916. As Trelease has seen the type of *V. myrtilloides* (Isert, 1787, Trelease's Plate 144a) and especially since the earlier *V. trinervium* refers to the same specimen, the epithet *myrtilloides* should not be accorded nomenclatural standing in *Dendrophthora*. Many herbarium specimens of *D. cubensis* are at present labelled *D. myrtilloides*).

D. azuensis Urban & Ekman, *Ark. Bot.* **23A** (5): 65. 1930.

D. maëstrensis Urban, *Fedde Rept.* **21**: 59. 1925.

Illustrations: Fig. 15; Plate IV.b.

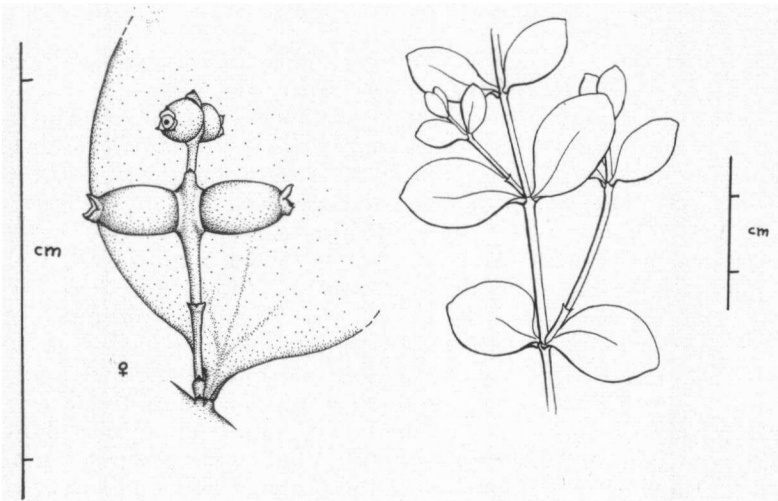


Fig. 15. *D. cubensis*: Morton & Acuna 3391, K.

A leafy species; leaves very thin, almost sessile, elliptic to ovate, 5–20 mm long. Very often only one lateral branch develops at a node, giving the plant a characteristically asymmetrical appearance. Stems slender, terete. Vegetative laterals with one pair of small cataphylls up to 4 mm above the axil. Basal appendages in a transverse or median position? Inflorescences axillary only, often with one very low pair of cataphylls. Dioecious. Staminate spike of one or 2 fertile internodes 2 or 3 mm each, 2 or 3 flowers per bract in 2a seriation. Pistillate spike often extremely small (6–8 mm when in fruit), usually 2 fertile internodes with one, sometimes up to 4 flowers per bract in 2a arrangement. Fruit elliptic, sepals reflexed; implanted on distal part of fertile internode, white (Ekman 11233, 12876).

TYPE: a collection of Ramón de la Sagra which I have been unable to locate. As lectotype the best choice is Linden 2003, Cuba, St. Yago de Cuba, Mogote (B, G, P), as it is the only other collection cited in the original description. Holotype at G.

Specimens seen:

- ?Acuna 6745, Cuba, Sierra Maestra, summit of Pico Turquino, 5960 ft. (NY).
 Britton & Wilson 5356, Cuba, Prov. Santa Clara, Trinidad Mountains, El Porvenir to Aguacate, 700–900 m (NY, US).
 ?Bucher 16, Cuba, summit of Pico Turquino (NY).
 Clement 15995, Cuba, Prov. Oriente, Santiago region (NY).
 ———, Chrysozone & Alain 2255, 4440, 4441, Cuba, Prov. Oriente, Sierra de Moa, Monte de la Breña, 500 m (US).
 Eggers 5159, Cuba, La Clarita, (F, GH, K, P, US), on Melastomaceae.
 Ekman 1623, Cuba, Prov. Oriente, Sierra Maestra, near La Gran Piedra, on Melastomaceae, 1000 m (K, S).
 ——— 3871, Cuba, Prov. Oriente, between Navas and Sierra de Buena Vista, on Rubiaceae, 400 m (S).
 ——— H-6413, Hispaniola, Dom. Rep., Prov. Azua, Cordillera Central, Loma de Ravine-Sale, on Melastomaceae, 900 m (G, S, US; type of *D. azuensis*).
 ——— 6880, Cuba, Prov. Oriente, Sierra de Cristal near Río Levisa, 650 m, on Melastomaceae (G, NY, S).
 ——— 8091, Cuba, Prov. Oriente, Sierra Maestra, above Daquiri, 1000 m, on Melastomaceae (G, K, S).
 ——— 8747, Cuba, Prov. Oriente, near Firmeza, 750 m, on Melastomaceae (F, NY, S).
 ——— 9925, Cuba, Prov. Oriente, Sierra de Nipe, Loma Mensura, 725 m, on *Miconia prasina* (G, K, NY, S).
 ——— H-11233, Hispaniola, Dom. Rep., Cordillera Central, Prov. Sto. Domingo, Villa Altigracia, on Melastomaceae (GH, S).
 ——— H-12876, Hispaniola, Dom. Rep. Cordillera Central, Prov. Monte Cristo, Lagunas de Cenobi, 1100 m, on *Miconia* (G, S, US).
 ——— 13992, Cuba, Prov. Santa Clara, mountains of Trinidad, slopes of Pico Potrerillo, 700–900 m (S).
 ——— 14327, Cuba, Prov. Oriente, Sierra Maestra, top of Punta de Palamocha, south of Yara, 1400 m (S; type of *D. maestrensis*).
 ——— 14816, Cuba, Prov. Oriente, Sierra Maestra, An. Yiminez (part of Río Plata) (S).
 ——— 15219, Cuba, Prov. Oriente, Sierra de Nipe, base of Loma Mensura, 725 m, on Rubiaceae (NY, S).
 ——— 16260, Cuba, Prov. Santa Clara, Lomas del Banao, Los Guineos, on Melastomaceae (S).
 Figueiras 835, Cuba, Prov. Oriente, Santiago de Cuba, en la Loma de la Gran Piedra (MT).
 Gonzales, Marcano & Jiménez 2895, Hispaniola, Dom. Rep., La Leonor, 600 m, on *Maytenus domingensis* (US).
 Hióram 4092, Cuba, La Prenda (NY).
 Imray 425, Hispaniola, Dom. Rep. (K).
 Jack 7014, Cuba, Prov. Santa Clara, Buenos Aires, Trinidad Hills, 2500–3500 ft., on *Miconia* (GH, NY).
 ——— 8056, Cuba, Prov. Santa Clara, Buenos Aires, Trinidad Hills, 2500–3500 ft., (GH, NY).
 Jiménez 1107, Hispaniola, Dom. Rep., Prov. Santiago, 500 m, on Rubiaceae (US).
 ——— 3588, Hispaniola, Dom. Rep., Prov. Santiago, Rincón de Piedra, 800 m, on *Miconia* (US).
 León 5384, Cuba, Las Villas, Loma la Jagua, Sierras de Banao (US).
 ——— 10733, Cuba, Pico Turquino region (NY).
 ——— 10832, Cuba, Sierra Maestra ridge (NY).
 ——— 11001, Cuba, Sierra Maestra (NY).
 ——— 11043, Cuba, Sierra Maestra (NY).
 ——— 19060, Cuba, Las Villas, Trinidad Mountains, Topes de Collantes (US).
 ——— 19766, Cuba, Prov. Oriente, Sierra de Nipe, headwaters of Río Guayabo (US).
 León & Clement 5384, Cuba, Prov. Santa Clara, Banao Mountains, Loma los Helechales (NY).

- & ————— 6511, 6543, Cuba, Prov. Santa Clara, Sancti-Spiritus Mts. (NY).
 —————, ————— & Alain, 22551, Cuba, Prov. Oriente, La Breña, Moa (GH, US).
 —————, ————— & Roca 10366, Cuba, Cobre Range of Sierra Maestra, near Loma del Gato (NY).
 ————— & Roca 7873, Cuba, Prov. Santa Clara, top of Loma las Divisiones, 850 m, on *Psychotria* (NY).
 ————— & ————— 7979, Cuba, Prov. Santa Clara, Loma de la Gloria, 900 m (MT).
 López 835 & 2776, Cuba, Prov. Oriente, Sierra Maestra, Cordillera de la Gran Piedra (US).
 Luna 174, Cuba, Prov. Santa Clara, Lomas de Banao, on Melastomaceae (NY).
 Morton & Acuna 3178, Cuba, Prov. Oriente, crest of Sierra Nipe, on *Psychotria* (F, GH, MO, NY, S, UC, US).
 ————— & ————— 3391, Cuba, Prov. Oriente, northern spur of Sierra Maestra west of Río Yao, 300–700 m (F, GH, K, MO, NY, S, UC, US).
 ? Roig & Bucher 6660 & 6690, Cuba, Sierra Maestra, ca. 3800 ft. (NY).
 Shafer 3191, Cuba, Prov. Oriente, Sierra Nipe, near Woodfred (NY).
 ————— 3502, Cuba, Prov. Oriente, Sierra Nipe, near Woodfred (MO, NY).
 ————— 4464, Cuba, Prov. Oriente, trail Navas to Camp Buena Vista, 650 m (K, MO, NY).
 ————— 8593, Cuba, Prov. Oriente, La Perla to Santa Ana, 660 m (NY, US).
 Seifritz 1111, Cuba, Prov. Oriente, summit of Pico Turquino, 2000 m (US).
 Wright 1253, Cuba, Prov. Oriente, near Monte Verde (B, G, GH, K, MO, P, PH, S).
 —————, Parry & Brummel 461, Hispaniola, Dom. Rep. (GH, P).

A species of uncertain position within the genus; possibly near *D. constricta* and *D. opuntioides*. Its taxonomic difficulties are increased by its similarity to *Phoradendron trinervium* (see, for example Trelease's Plates 144 and 145) from which I cannot at present distinguish it satisfactorily. *P. trinervium* only rarely branches asymmetrically, and has more petiolate leaves; and in general is larger than *D. cubensis*. Separation from *D. buxifolia* is also not always clear; see the discussion under that species. *D. cubensis* is restricted to eastern Cuba and Hispaniola.

16. ***D. cupressoides*** (Macf.) Eichler, Fl. Bras. 5 (2): 103. 1868.

Basionym: *Viscum cupressoides* Macfadyen, Flora of Jamaica 2: 197. 1838–1850.

Homotypic synonym:

Arceuthobium cupressoides (Macf.) Grisebach, Fl. Br. W. Ind. 315. 1864.

Heterotypic synonyms:

D. cupressoides (Macf.) Eichl. var. *polyarthra* Urban, Ark. Bot. 23A (5): 63. 1930.

Razoumofskya cupressoides (Macf.) Kuntze, Rev. Gen. 2: 587. 1891.

D. selleana Urban & Ekman, Ark. Bot. 20A (15): 26. 1926.

Phoradendron serpyllifolium Griseb. *aphyllum* Gray, in Grisebach, Mem. Amer. Acad. Arts & Sci., n.s., 8: 192. 1861.

Illustrations: Fig. 16; Plate IV. c.

Hooker, Icon. P. 23, t. 2221. 1892.

A slender, squamate species, well described by its specific epithet. Stem terete, no cataphylls apparent. Basal appendages transverse in position. Spikes of 3-6 fertile internodes each about 2 mm long, one flower per bract, probably of the 2a type. The spikes usually proliferate,

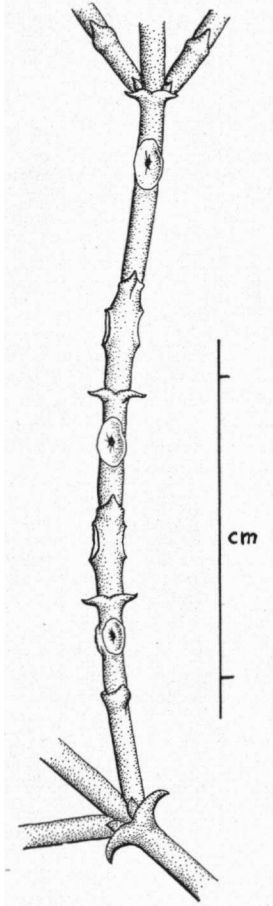


Fig. 16. *D. cupressoides*: Morris s.n., K.

and empty flower cups are present on older branches; the entire plant thus becoming a compound inflorescence. Inflorescence without cataphylls.

TYPE: a type specimen has never been designated. As holotype I suggest Morris s.n., Jamaica (K), the basis for Hooker's as well as my own drawing.

Specimens seen:

Britton 68, 76, Jamaica, St. Helen's Gap near Cinchona (F, NY; NY).
Clement & Chrysogone 4434, Cuba, Prov. Oriente, Sierra de Moa, Monte de la Breña, 500 m, on *Podocarpus ekmanii* (US).

- Cummings s.n., Jamaica, near Cinchona (NY).
 Ekman H-1331, Hispaniola, Haiti, Massif de la Selle, Pétionville, Morne Franchant, 1800 m, on *Alophyllus crassinervis* (GH, S).
 ——— H-3141, Hispaniola, Haiti, Massif de la Selle, high plateau of Morne de la Selle, above Badeau, 2100 m, on *Juniperus* (G, S, US; type of *D. selleana*).
 ——— 3831, Cuba, Prov. Oriente, Minas de Iberia, near Taco Bay, 800 m, on *Podocarpus* (S).
 ——— H-4889, Hispaniola, Haiti, Massif du Nord, Port-de-Paix, Haut-Piton, 1000 m, (G, S, US).
 ——— 5222, Cuba, Prov. Oriente, Sierra Maestra, River Yara, 1400 m (S).
 ——— H-5273, Hispaniola, Haiti, Massif de la Hotte, western group, Torbec, above La Mare-Proux, 1300 m (S).
 ——— 5422, Cuba, Prov. Oriente, Sierra Maestra, Pico Turquino, 1750 m, on *Ternstroemia* (S).
 ——— 6190, Cuba, Prov. Oriente, Bayate, banks of Cauto River, on *Sarcomphalus* (G, NY, S).
 ——— H-6323, Hispaniola, Dom. Rep., Cordillera Central, Prov. Azua, Loma Nalga de Maco, 1880 m, on *Coccoloba azuensis* (S; type of var. *polyarthra*).
 ——— H-7713, Hispaniola, Haiti, Massif de la Selle, Croix-des-Bouquets, on Morne Badeau, 2100-2200 m, on *Juniperus* (S).
 ——— H-10057, Hispaniola, Haiti, Massif de la Selle, Marigot, Jardin Bois-Pin near Source-Cresson, 2100 m, on *Juniperus* (S).
 ——— 14491, Cuba, Prov. Oriente, Pico Turquino, 1800 m, on *Torralsbasia* (S).
 ——— 14631, Cuba, Prov. Oriente, Sierra Maestra, between Río Yara and Río Palmamocha, 1100-1200 m, on *Torralsbasia cuneifolia* (G, NY, S).
 ——— 15974, Cuba, Prov. Oriente, Sierra del Cristal, at tributary of Río Lebisa, on *Podocarpus ekmanii* (G, NY, S).
 Hamilton 162, Cuba, Santiago (NY).
 Harris s.n., Jamaica, Cinchona (F).
 ——— 6205, Jamaica, near Cinchona, on *Miconia* (G, P, US).
 Harris & Lawrence 15122, 15491, Jamaica, Cinchona, leeward slopes of Blue Mountains (NY, US; NY, UC).
 Hart s.n., Jamaica (F, NY).
 Hióram 6637, Cuba, Prov. Oriente, Loma del Gato (US).
 Howard & Howard 8567, Hispaniola, Dom. Rep., Prov. Barahona, Montiaada Nueva, southeast of Polo, on *Didymopanax tremulus* (GH, NY, S, US).
 Hunnewell & Griscom 14304, Jamaica, Surrey Co., St. Thomas Parish, 6500 ft (GH).
 León 10773, Cuba, southern Oriente and Pico Turquino, Loma Redonda, 1800 m (NY).
 ——— 12258, Cuba, southern Baracoa region, crest of Punton del Mate, Sierra de Imias, 1230 m, (NY, US).
 Leonard 3989, Hispaniola, Haiti, near Mission, Fonds Varettes ca. 1000 m (GH, NY, US).
 ——— 9540, Hispaniola, Haiti, Dép. l'Artibonite, near Ennery, Pilboreau Pass, 325-900 m (US).
 Maxon 1200, Jamaica, near Cinchona, 5000 ft., on Melastomaceae (US).
 ——— 9806, Jamaica, Portland Gap and vicinity, 1550-1650 m (GH, NY, US).
 ——— & Killip 622, Jamaica, near St. Helen's Gap, St. Andrew, 1475 m (F, GH, NY, US).
 ——— & ——— 925, Jamaica, below New Haven Gap, 1500-1600 m (F, GH, NY, US).
 Morton & Acuna 3652, Cuba, Prov. Oriente, crest of Sierra Madre between Pico Turquino and La Bayamesa, 1350 m (UC, US).
 ——— & ——— 3736, Cuba, Prov. Oriente, crest of Sierra Madre between Pico Turquino and La Bayamesa, 1350 m (US).
 Nichols 168, 169, Jamaica, Cinchona, 5000 ft. (GH; F, MO, NY, US).
 Philipson s.n., Jamaica (BM).
 Rothrock 20, Jamaica, Blue Mountains, 4000-6000 ft. (F).
 Seifritz s.n., Jamaica, New Haven Gap trail (PH).

- Shafer 3442, Cuba, Prov. Oriente, Sierra Nipe, near Woodfred, 450-550 m, on *Podocarpus* (NY).
 ——— 4085, Cuba, Prov. Oriente, near Camp San Benito, 900 m, on *Podocarpus* (NY).
 ——— 8110, Cuba, Prov. Oriente, Camp La Gloria, south of Sierra Moa, on *Podocarpus* (NY).
 Wright 224, Cuba, Prov. Oriente, La Guinea (G, GH, MO, P, PH).

D. cupressoides and its near relatives constitute an exceedingly knotty taxonomic problem, and I do not pretend to be infallible in the positions I assign to the various specimens. There seems to be a gradient from *D. cupressoides* through *D. marmeladensis*, *D. picotensis*, *D. purpurascens*, *D. arcuata*, and into *D. domingensis*, the plants becoming less branched and more coarse in this series. In an effort to avoid a treatment which is either too radical or too conservative I am maintaining the following taxa:

- D. cupressoides* (Macf.) Eichl. (incl. *D. selleana* Urb. & Ekm.)
D. marmeladensis Urb. (incl. *D. picotensis* Urb. and
D. moniliformis Urb.)
D. arcuata Sauvalle
D. domingensis (Spreng.) Eichler (incl. *D. ekmanii* Urb. and
D. oocarpha Urb.)

It is extremely difficult to find differential characters in *D. cupressoides*, *D. marmeladensis*, and *D. arcuata*. The typical *D. cupressoides* is strikingly slender; *D. arcuata* is larger, coarser, and has several flowers per bract in the staminate spike. *D. marmeladensis* is intermediate in size and appearance, and tends to have rather short spikes and long vegetative internodes. There are, however, many herbarium specimens which are difficult to place. The fact that plants belonging to these species are brittle and often fragmented badly adds considerably to an already difficult problem. The species here recognized may thus be thought of as convenient points of reference until better known. It is my hope that botanists better qualified than I may some day shed light on this perplexing group.

As listed here, the species *D. cupressoides* is native to eastern Cuba, Hispaniola, and Jamaica. Future taxonomic work may make more sense out of this disjunct distribution. The frequent host preference for Gymnosperms is an interesting feature of this species.

In the present confusion there seems little justification for a var. *polyarthra*. The type at S is perhaps somewhat denser than most *D. cupressoides*, and has rather conspicuous intercalary flowers, but scarcely deserves a separate name.

17. ***D. cupulata*** (DC) Eichler, Fl. Bras. 5 (2): 102. 1868.

Basionym: *Viscum cupulatum* DC, Prodr. 4: 285. 1830.

Heterotypic synonym:

Viscum vaginatum Sprengel, Syst. 1: 487. 1825, non Willd.

Illustrations: Fig. 17; Plate IV.d.

A squamate species, the stem with 4 narrow wings. Basal appendages in the transverse plane. Vegetative branches without cataphylls. Inflorescences both axillary and terminal, forming compound inflorescences within which the lowest axillary spikes may have up to 4 sterile internodes, the upper ones only two. When several sterile

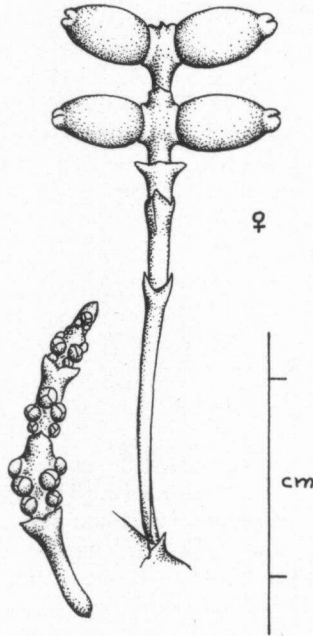


Fig. 17. *D. cupulata*: Eggers 1883, K (left), Ekman H-7124, S (right).

internodes are present, the lowest one usually 4–5 times as long as the upper one. Pistillate spikes of 2–5 fertile internodes, one flower per bract, ca. 4 mm long in fruit. Berry elliptic, ca. 5 mm long, sepals inflexed. Staminate inflorescence up to 5 fertile internodes, with about 5 flowers per bract in 1a seriation. Dioecious.

TYPE: a Bertero specimen, according to the original description. According to a photograph at GH, the Delessert Herbarium has a specimen of this species labelled Bertero, Hispaniola, Dom. Rep. At MO a Bertero 921, without data, may be a duplicate of the same collection. Both specimens may be regarded as type material for our purposes, the MO specimen considered the holotype.

Specimens seen:

Allard 16419, Hispaniola, Dom. Rep., La Cumbre between Constanza and Jara-bacoa, 3400–3500 ft. (GH, S, US).

Eggers 1883, Hispaniola, Dom. Rep. (K).

Ekman H-471, Hispaniola, Haiti, Dep. du Sud, Morne de la Hotte, near Douyette, 800 m (S).

- H-1324, Hispaniola, Haiti, Massif de la Selle, Fourcy, Morne Tranchant, on *Ocotea foeniculacea*, 1750 m (S, US).
- H-1951, Hispaniola, Haiti, Massif de la Selle, Morne Tranchant, near Godet, on *Hufelandia pendula*, 1600 m (S, US).
- H-4694, Hispaniola, Haiti, Massif du Nord, St. Louis du Nord, Morne Baron, 950 m (S).
- H-5277, Hispaniola, Haiti, Massif de la Hotte, western group, Torbec, above La Mare-Proux, on *Langeria hotteana*, 1300 m (S).
- H-5532, Hispaniola, Haiti, Massif de la Selle, Pétionville, Rivière Froide, between Chapelle Fessard and Etang du Jonc, on *Clusia picardae*, 650 m (G, GH, S, US).
- H-7124, Hispaniola, Haiti, Massif de la Selle, Port-au-Prince, Morne de l'Hôpital, at Chapelle St. Roch, on *Ilex*, 400 m (S, US).
- H-10390, Hispaniola, Haiti, Massif de la Hotte, western group, Jérémie, Morne Pain-de-Sucre, on *Chimarrhis*, 1400 m (S).
- H-11977, Hispaniola, Dom. Rep., Sierra de Ocoa, Prov. Azua, San José de Ocoa, between Los Corozos and Bojucal, on *Ilex krugii*, 1300 m (S, US).
- H-15289, Hispaniola, Dom. Rep., Peninsula de Samaná, near Hato Viejo, 275 m (S).
- Holridge 1980, Hispaniola, Haiti, Marie Claire, Morne des Commissaires (F, GH, NY, US).

An endemic to the island of Hispaniola. At first glance reminiscent of *D. domingensis*, but in its major characteristics quite different, especially in scale leaves, inconspicuous prophylls, staminate inflorescence, and winged stem. Closely related to *D. epiviscum*, the two forming an isolated group; possibly *D. brachystachya* is also related.

18. **D. dittae** Urban & Ekman, Ark. Bot. **23A** (5): 65-66. 1930.

Illustrations: Fig. 18; Plate V.a.

Foliaceous, large species, leaves lanceolate with distinct petiole and acute apex, up to 15 × 50 mm, quite thin, with 3 conspicuous veins. Sparsely branched, but the spikes usually secondary. Internodes flattened in plane of upper leaves. Vegetative laterals with one, sometimes 2 pairs of cataphylls, spikes without. Basal appendages in median position. Monoecious? (the type bears fruit). Inflorescence with 3-4 fertile internodes, 2 flowers per bract representing the lateral floral series only. Berries 2 × 4 mm.

TYPE: Ekman H-10354, Hispaniola, Haiti, Massif de la Hotte, western group, Les Anglais, Morne l'Étang, on *Ditta myricoides*, 1500 m (S, US). Holotype at S.

A strikingly different species known from only a single collection. Its inflorescence is unique in the absence of median series. I have not been able to find a trace of median flowers. I am uncertain as to where in *Dendrophthora* this species belongs. Indeed, its generic status is by no means secure. If apical flowers were present it might be linked to the *D. clavata*-assemblage.

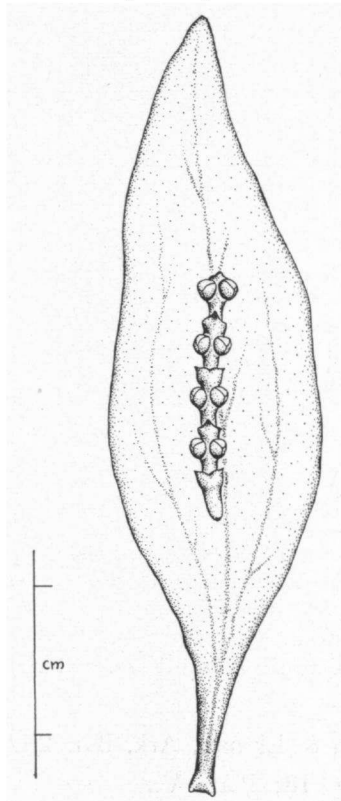


Fig. 18. *D. ditiae*: Ekman H-10354, S.

19. ***D. domingensis*** (Spreng.) Eichler, Fl. Bras. **5** (2): 103. 1868.
 Basionym: *Viscum domingense* Sprengel, Syst. **1**: 487. 1825.

Homotypic synonym:

Arceuthobium domingense (Spreng.) Grisebach, Cat. Pl. Cub. 121.
 1866.

Not to be nomenclaturally confused with *Phoradendron domingense*
 (Desvaux) Trelease.

Heterotypic synonyms:

D. ekmanii Urban, Fedde Rept. **21**: 56. 1925.

D. oocarpha Urban, Ber. Deutsch. Bot. Ges. **14** (8): 291. 1896.

Illustrations: Fig. 19; Plate V.b.

КУЙТ, Acta Bot. Neerl. **8**: 510. Fig. 2b. 1959.

Rather coarse, completely squamate. Prophylls very conspicuous, with scarious white margins, the four prophylls of each node fused into a single structure (see КУЙТ, 1959). Scale leaves also scarious-margined. Stems round, conspicuously furrowed when dry. Vegetative

laterals without distinct cataphylls. Basal appendages transverse. Spikes terminal and axillary, associated in compound inflorescences, terminal ones often producing a dichasial growth habit. Lower lateral spikes may have up to 5 sterile internodes of normal length, except the last one which is greatly abbreviated. Terminal spike without

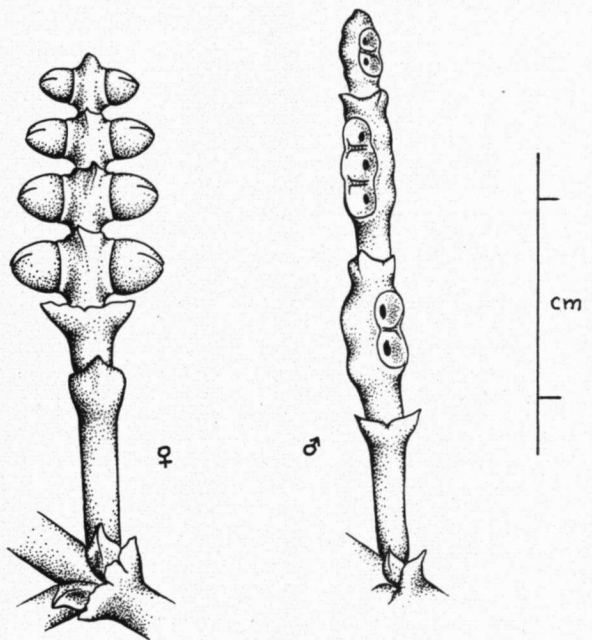


Fig. 19. *D. domingensis*: Wright 225, K (left), Combs 293, K (right).

cataphylls. Dioecious. Staminate spike of 2–4 fertile internodes, with 3–10 flowers per bract in 2a, the median series sometimes proliferating laterally for a short distance at the very base of old internodes. Pistillate spike of 3–5 fertile internodes, one flower per bract. Berries rather large, elliptic.

TYPE: Bertero s.n., without data (MO) may constitute part of the type. Should a neotype be selected, I suggest Wright 225, Cuba, Prov. Oriente, near River Santa Cruz (B, G, GH, K, MO, NY, P, S, US); holotype at K.

Specimens seen:

- Alain 1600, Cuba, Prov. Las Villas, savannas southeast of Sancti Spiritus (US).
 Britton 2155, Cuba, Guantanamo Bay, Conde Beach, on *Macrightia* (F, NY, US).
 ——— & Britton 7367, Puerto Rico, Rubias, north of Yauco, 800 m (GH, NY, US).
 ——— & ——— 7831, Puerto Rico (NY, US).
 ———, ——— & Cowell 9758, Cuba, Prov. Pinar del Rio, near Guane (F, GH, K, MO, NY, US).
 ———, ——— & ——— 12449, Cuba, Prov. Oriente, Antilla (NY).

- _____, _____ & _____ 13099, Cuba, Prov. Camaguey, savannas near Camaguey (NY, US).
 _____, _____ & Wilson 5576, Cuba, Prov. Santa Clara, Trinidad, Río Toyaba (GH, NY, US).
 _____, Earle & Gager 6676, Cuba, Prov. Pinar del Río, San Diego de los Baños (NY).
 _____, Stevens & Hess 2563, Puerto Rico, Maricao to Monte Alegreillo, 750 m (F, GH, NY, US).
 _____ & Wilson 5599, Cuba, Prov. Santa Clara, Casilda (NY, US).
 Combs 293, Cuba, Prov. Santa Clara, Distr. Cienfuegos, Cieneguita (F, GH, K, MO, NY, P, US).
 Eggers 1808, Hispaniola, Dom. Rep. (K).
 Ekman H-337, Hispaniola, Haiti, Dep. du Sud, near Etang Pénélé at Port-au-Piment, on *Coccoloba pubescens* (S).
 _____ H-386, Hispaniola, Haiti, Dep. du Sud, between Aux Anglais and Chardonnières, on *Coccoloba pubescens* (S).
 _____ H-1060, Hispaniola, Haiti, Montagnes du Trou d'Eau, north of Glore on Etang Saumâtre, on *Coccoloba laurifolia*, 1700 m (G, GH, S, US).
 _____ H-5102, Hispaniola, Haiti, Massif du Nord, Gros-Morne, edge of Rivière Blanche, on *Thouinia trifoliata*, 300 m (S).
 _____ H-6021, Hispaniola, Haiti, Plaine Centrale, Hinche, Savanne Papaye, on *Coccoloba*, 250 m (S).
 _____ H-6906, Hispaniola, Haiti, Massif de la Selle, group Morne des Commissaires, Anse-à-Pitres, near Fête d'Eau, on *Paralabatia* (S).
 _____ H-6960, Hispaniola, Dom. Rep., Peninsula de Barahona, Prov. Barahona, Mare-à-Chat, a. on *Jacquinia*, b. on *Bumelia* (S).
 _____ 7358, Cuba, Prov. Oriente, Antilla at Nipe Bay, on *Guettarida* (G, F, S).
 _____ H-7467, Hispaniola, Haiti, Massif de la Hotte, western group, Torbec, Morne Formon, on *Miconia plumerii*, 1900 m (S).
 _____ 8732, Cuba, Prov. Oriente, near Santiago de Cuba, Playa Siboney (NY, S).
 _____ H-9585, Hispaniola, Haiti, Ile de Gonave, main ridge towards Fond-des-Nigres, on *Paralabatia fuertesii*, 250 m (NY, S).
 _____ 9895, Cuba, Prov. Oriente, Sierra de Nipe at Loma Mensura, on *Coccoloba*, 725 m (S).
 _____ H-13044, Hispaniola, Dom. Rep., Cordillera Central, Prov. Monte Cristi, Manción, near Durán, on *Exostema spinosum*, 400 m (S, US).
 _____ H-13392, Hispaniola, Dom. Rep., Valle de San Juan, Prov. Azua, San Juan at Río Jinova, on *Sarcomphalus domingensis* (S, US).
 _____ 13768, Cuba, Prov. Pinar del Río, Sierra de los Organos, group Rosario, between Peña Blanca and Loma Ballestena, on *Hebestigma cubensis* (G, S).
 _____ 14155, Cuba, Prov. Oriente, between Zarzal and Nagua (S).
 _____ 16164, Cuba, Prov. Oriente, Peninsula de Cabo Cruz, south of Niquero (F, G, NY, S).
 _____ 16707, Cuba, Prov. Pinar del Río, Viñales, near Sitio del Infierno, on *Lucuma serpentaria* (S; the type of *D. ekmanii*).
 _____ 17198b, Cuba, Prov. Matanzas, Ceiba Mocha, west of Pan de Matanzas, on *Coccoloba armata* (S).
 _____ 18184, Cuba, Prov. Pinar del Río, edge of Cienaga La Tumba, on *Lucuma serpentaria* (G, NY, S).
 _____ 18886, Cuba, Prov. Santa Clara, Casilda, on *Brya* (S).
 Fuertes 286, p.p., Hispaniola, Dom. Rep., Prov. Barahona (G, GH, NY).
 _____ 360, Hispaniola, Dom. Rep., Prov. Barahona (G, GH, K, NY, P, US).
 _____ 987, Hispaniola, Dom. Rep., (F, G, GH, K, NY, P, S, US).
 _____ 1857, Hispaniola, Dom. Rep., Prov. Azua, Las Cañitas, 1300 m (G, GH, K, NY, P, US).
 Grosourdy 18, Puerto Rico (P).
 Hióram s.n., Puerto Rico, Bayamón, Finca Santa Ana (NY, P).
 _____ 2638, Cuba, Las Ninfas (NY).
 _____ 3948, Cuba, Boca del Guantánamo (US).
 Jiménez 2673, Hispaniola, Dom. Rep., Prov. Monte Cristi, near Manción (US).

- 3212, Hispaniola, Dom. Rep., Prov. Santiago, Jaiqui Picao, on *Beureria succulenta* (US).
- Johnston 2042, Puerto Rico, Moca (NY, US).
- León 12004, Cuba, Prov. Oriente, rocky banks of lower Jauco (US).
- León, Clement & Roca 10199, Cuba, Cobre Range of Sierra Maestra, Loma del Gato, 900 m, on *Coccoloba* (NY).
- Leonard 4228, Hispaniola, Haiti, Etang Saumâtre, near Fond Parisien (NY, US).
- 7425, Hispaniola, Haiti, Dép. du Nord, near St. Michel de l'Atalaye, northern slope of Mt. La Cidre, 350 m (MO, US).
- 8033, Hispaniola, Haiti, Dép. du Nord, northern slope of Mt. La Cidre, near St. Michel de l'Atalaye (GH, NY, UC).
- Morton & Acuna 3038, Cuba, Prov. Oriente (GH, K, MO, NY, UC, US).
- Roig 3561, Cuba, Prov. Pinar del Rio, Peña Blanca Mountains (NY).
- 3905, Cuba, Prov. Pinar del Rio, El Cayuco, Remates de Guare, on *Hebestigma cubensis* (NY).
- Shafer 365, Cuba, savanna north of La Gloria, Camaguey (F, NY, US).
- 3029, Cuba, Prov. Oriente, Sierra Nipe, near Woodfred, 500–650 m (MO, NY, US).
- 3877, Cuba, Prov. Oriente, Plancha trail, Mensura to Woodfred (MO, NY).
- 10526, Cuba, Prov. Pinar del Rio, base of Sierra Guane (MO, NY, US).
- 12369, Cuba, Prov. Oriente, Yara to Manzanilla, on savanna (NY, US).
- 13743, 13745, Cuba, Prov. Pinar del Rio, La Guira, north of Sumidero (F, US; F).
- Sintenis 221, Puerto Rico, Maricao, Mt. Alegrillo (G, GH, PH, P, S, US).
- 2075, Puerto Rico, near Cayey (F, G, GH, MO, NY, P, S, US).
- Wilson 11352, Cuba, Prov. Pinar del Rio, Sierra de Anafe (NY).
- Wright 522, Cuba, Prov. Oriente (S).
- 2653, p.p., Cuba (BM, K, US; type of *D. oocarpa*).

A species apparently fairly common on Hispaniola and Cuba, but also on Puerto Rico. It is one of the very few *Dendrophthoras* occurring at low altitude, a fact possibly connected with its wide distribution. The species is related to *D. remotiflora*, *D. brachyclada*, and the *D. marmeladensis* group; see the discussion under *D. cupressoides*.

20. **D. eichleriana** Urban, Ber. Deutsch. Bot. Ges. 14 (8): 287. 1896.

Illustrations: Fig. 20; Plate V.c.

Rather large plant, of rather strict habit, showing a conspicuous leaf dimorphism without transitional leaf forms. Young stems often flattened below the nodes, becoming terete in age. Foliage leaves up to 15 × 30 mm, short-petiolate, obovate, apex truncate, in series of several pairs on the lower part of the plant, sometimes a single pair higher up among the inflorescences. Compound inflorescences with terminal spikes occur, but may not be the rule. Most spikes are axillary, subtended by scale leaves, which are usually the only leaf-form in the upper parts of the plant. Basal appendages in median position; cataphylls one pair, up to 20 mm above axil. Spikes with or without cataphylls, of 4–5 fertile internodes, these each up to 17 mm long, with about 8 flowers per bract in 2a arrangement. Berries spherical, about 3 mm in diameter, present on distal part of some fertile internodes on this plant; lower flowers staminate?

TYPE: Fendler 1101, Venezuela, near Colonia Tovar (GH, K, MO, PH). Holotype at K.

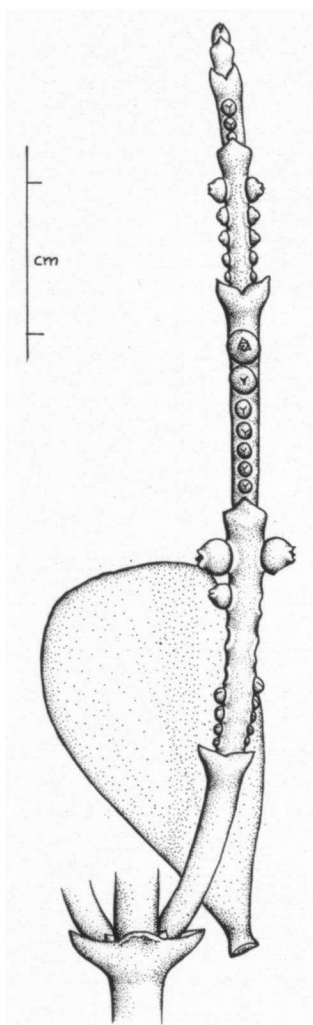


Fig. 20. *D. eichleriana*: Fendler 1101, K.

Specimen seen:

Pittier 9989, Venezuela, Colonia Tovar, 2100-2200 m (GH, NY).

A very distinct species known only from 2 collections, both from the same locality. It appears to be a large leafy relative of the *D. squamigera* group.

21. ***D. elliptica*** (Gardn.) Krug & Urban, Ber. Deutsch. Bot. Ges. **14** (8): 285. 1896.

Basionym: *Viscum ellipticum* Gardner, Lond. Jour. Bot. **4**: 106. 1845, non Presl, Epimel. Bot. p. 254. 1849 (1851).

Homotypic synonym:

Phoradendron ellipticum (Gardn.) Eichler, Fl. Bras. 5 (2): 119. 1868.

Heterotypic synonyms:

D. elliptica (Gardn.) Krug & Urban var. *elliptica* ("var. *genuina*"), var. *platyphylla* Krug & Urban, var. *stenophylla* Krug & Urban, Bot. Jahrb. 24: 69. 1897.

? *Phoradendron pearcei* Rusby, Bull. Torrey Bot. Club 27: 136. 1900.

D. rubicunda Ule, Notizbl. Bot. Gart. Berl. 6: 289. 1915.

Illustrations: Fig. 21; Plate V.d.

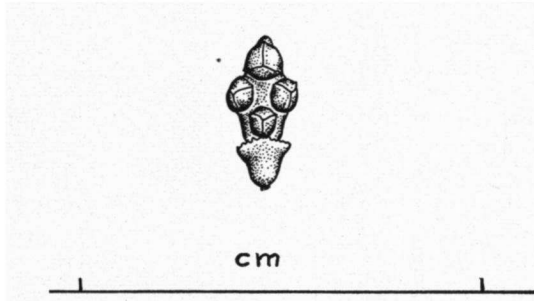


Fig. 21: *D. elliptica*: Glaziou 3642, K.

Leafy plants of *D. buxifolium*-like habit. Leaves exceedingly variable in size and shape, usually 10–14 mm long, broadly oblanceolate. Cataphylls one pair on vegetative laterals, up to 5 mm above the axil. Basal appendages in median plane. Internodes slightly flattened and expanded at upper end, especially when young. Secondary branches frequent. Inflorescences lateral only, without cataphylls, extremely small, of one fertile internode 2–5 mm in length, 3–5 flowers per bract in 1b arrangement. Fruit "gray-white, globose" (Steiermark 59636).

TYPE: Gardner 437, Brasil, open rocky places on the Organ Mountains, about 5000 ft., on *Gaylussacia* (G, K). Holotype at K.

Specimens seen:

Brade 64141, Brasil, Estado de Spirito, Castelo (MO, NY).

Fendler 1116, Venezuela, near Továr, 7500 ft. (G, GH, MO, PH).

———— 2623, Venezuela, near Továr, 6000 ft. (GH).

Fosberg 22086, Colombia, Dep. Meta, Buenavista, hills above Villavicencio, 1200–1230 m, on *Remyia pedunculata* (US).

Gardner 5727, Brasil, open rocky places in the Organ Mountains, about 5000 ft., on *Gaylussacia* (G, K).

Glaziou 1585, Brasil, Caldas (P).

———— 2880, Brasil, Rio de Janeiro (B, P).

———— 3642, Brasil, Serra dos Orgãos (B, K, P).

———— 6894, Brasil, Rio de Janeiro (K, P).

———— 8726, Brasil, Rio de Janeiro (G, K, P).

———— 17023, Brasil, Rio de Janeiro (B, F, K, P, US).

Guillemin 886, Brasil, Serra dos Orgãos (G).

- Lawrence 804, Colombia, State of Boyaca, region of El Humbo, 130 mi. due north of Bogotá, 4000 ft. (F, G, GH, S).
 Lindberg 251, Brasil, Prov. Minas Geraes, Caldas (B, S).
 Mosén 1862, Brasil, Prov. Minas Geraes, Caldas, on *Clethra brasiliensis* (S).
 Regnell 1585, Brasil, Prov. Minas Geraes, Caldas (S).
 Steyermark 58195, Venezuela, Territoria Federal Amazonas, summit of Serra Duida, Brocchinia Hills, towards Caño Negro, 1700–1980 m (F).
 ————— 58602, Venezuela, State of Bolívar, Mount Roraima, southwest facing slopes bordered by hilly savanna, 1030–1150 m (F, US).
 ————— 59499, Venezuela, State of Bolívar, Ptari-tepuí, on “Cave Rock” above “Cave Camp”, 1810 m (F).
 ————— 59560, Venezuela, State of Bolívar, Ptari-tepuí, densely forested steep south-facing slopes, 2285–2405 m (F, NY).
 ————— 59636, Venezuela, State of Bolívar, Ptari-tepuí, scrubby forest on rocky open portion of plateau on southeast-facing slopes, 1600 m (F, NY, US).
 Tate 783, Venezuela, Savanna Hills, Laterite Valley, Mount Duida, 4400 ft. (NY).
 Im Thurn 276, British Guiana, Mt. Roraima, path to upper savanna (US).
 Ule 8601, Roraima, 1300 m (K; type of *D. rubicunda*).
 Williams 846, Bolivia, below Tolapampa, 8500 ft. (K).

I am dissatisfied with the grouping involved in this species: it will probably break up into 2 or 3 species when better known. Surely the plants of the Andes are not conspecific with those of the Brazilian lowlands! I have been unable, however, to find taxonomic differences between the plants here listed, and as a temporary expedient place them all under *D. elliptica* to which they are in any case closely related. Some specimens identified as the var. *stenophylla* may actually belong in *D. mesembryanthemifolia*, as they have no cataphylls; I have not, however, seen the type of the variety. The complex belongs in *Paradendrophthora*.

The difficulties in this complex frequently lie in the extreme reduction in inflorescences; in much of the high-altitude material it is often impossible to be sure of the inflorescence type. It would indeed require proper anatomical work before many specimens could be securely placed in the genus. I have experienced some difficulty in keeping apart very small specimens of *D. mesembryanthemifolia* and *D. clavata* from *D. elliptica* in the broad sense. Possibly “*Phoradendron*” *pearcei* is transitional between some of these species? I have therefore not attempted to force all material into categories, but have left unidentified material at various herbaria, often in *D. pearcei* folders.

22. ***D. epiviscum*** (Griseb.) Eichler, Fl. Bras. 5 (2): 103. 1868.

Basionym: *Arceuthobium epiviscum* Grisebach, Mem. Amer. Acad. Arts & Sci., n.s., 8: 192. 1861.

Illustrations: Fig. 22; Plate VI. .

A rather small leafless species with stems strongly four-winged, the wings directly above leaf-scale axils being the most conspicuous. Vegetative internodes often somewhat oblanceolate in outline, 10–20 mm long. Cataphylls absent. Spikes axillary and terminal, of 2–3 fertile internodes about 4–5 mm long each, about 6 flowers per bract in 1b arrangement. Rarely the first fertile internode is flattened in the

upper half, the lower half being occupied by a small number of flowers (Wright 221, UC). Compound inflorescences. Possibly dioecious; spikes apparently unisexual.

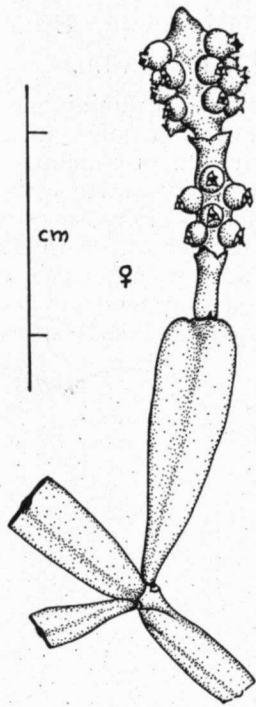


Fig. 22. *D. epiviscum*: Wright 221, K.

TYPE: Wright 221, p.p., in Cuba Orientali, on *Dendrophthora buxifolia* (G, GH, K, MO, P, S, UC, US). Holotype at K.

Specimens seen:

- Britton & Wilson 4885, Cuba, Prov. Santa Clara, Trinidad Mountains, Siguaneca, 400 m (NY).
 Eggers 5180, Cuba, La Clarita (P).
 Ekman 14505, Cuba, Prov. Oriente, Sierra Maestra, north spur of Pico Turquino, 1800 m (S).
 ——— 15921, Cuba, Prov. Oriente, Sierra de Micara, on *Phoradendron*, 750 m (NY, S).
 ——— 15965, Cuba, Prov. Oriente, Sierra del Cristal, tributary of Río Lebisa, on *Dendrophthora*, 600–1100 m (G, NY, S).
 Hióram 7597, Cuba, Prov. Oriente, Alcachofa, east of Guantanamo (US).

A Cuban endemic of very distinct appearance. It is interesting especially for its hyperparasitism: as the specific epithet indicates, it parasitizes other mistletoes, perhaps only *Phoradendron* and *Dendrophthora*. Although undoubtedly a *Dendrophthora*, its exact position in the genus is a mystery. According to its inflorescence type it belongs in

Paradendrophthora, but its compound inflorescences place it in an isolated position in that subgenus. *D. cupulata* is the only close relative, sharing the character of compound inflorescence.

23. *D. excisa* Urban, Fedde Rept. 21: 59. 1925.

Illustrations: Fig. 23; Plate VI.b.

A large leafy species of a habit reminiscent of *D. tetrastachya*. Leaves thick, round, with short, stout petioles, apex rounded or mucronate, up to 30 × 35 mm. Stem with prominent ridges below leaves, lesser ridges at right angles, becoming terete with age. Vegetative laterals with 1-3 pairs of cataphylls, inflorescences with 3-5. Spikes axillary only, secondary ones common; fertile internodes ca. 5, very much condensed, the single flower for each bract almost sessile in it. Entire spike about 10 mm long. Basal appendages in median plane. Dioecious. Berries 2 × 3 mm, with conspicuously spread perianth.

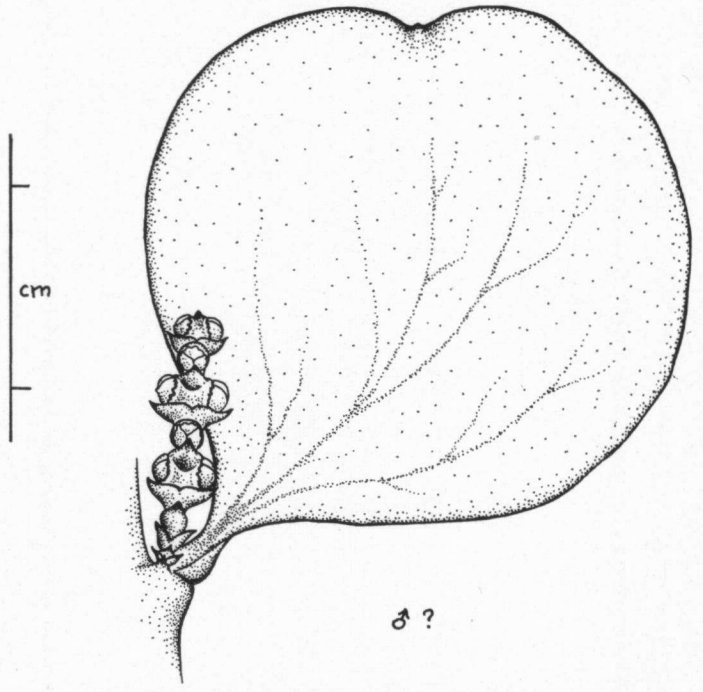


Fig. 23. *D. excisa*: Ekman 14324, S.

HOLOTYPE: Ekman 14324, Cuba, Prov. Oriente, Sierra Maestra, top of Punta de Palmamocho, south of Yara, 1400 m, on *Mettenia* (S).

Specimen seen:

Morton & Acuna 3794, Cuba, Prov. Oriente, crest of Sierra Maestra between Pico Turquino and La Bayamesa, 1350 m, on *Clusia* (US).

Known only from two collections, one (the type) perhaps staminate, the other definitely pistillate. Since only one flower is present per bract its inflorescence type cannot be determined, and its taxonomic position is uncertain. The superficial similarity to *D. tetrastachya* may very well be based on true relationship.

24. *D. ferruginea* Patschovsky, Bot. Jahrb. 45: 441. 1911.

Illustrations: Fig. 24; Plate VI.c.

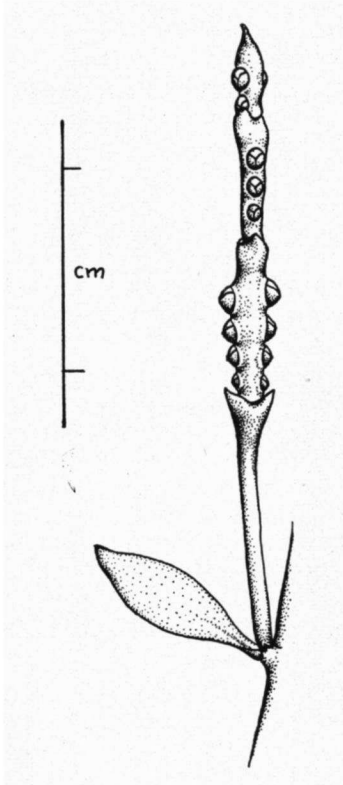


Fig. 24. *D. ferruginea*: Woytkowski 34314, F.

A long, slender, strict species, with small, lanceolate leaves 3×10 mm, apex acute. Stem terete, internodes up to 30 mm long, with sandpaper-like surface texture. Vegetative laterals and inflorescences without cataphylls; basal appendages in median plane. Spikes with sterile internodes about 12 mm long, fertile internodes 3 or 4 of up to 10 mm long; up to 5 or 6 flowers per bract in 2a arrangement. Inflorescence apex acute. Spikes axillary and primary only. Probably dioecious, the only collection seen apparently staminate. Berries translucent white.

TYPE: Weberbauer 3382, Peru, Dep. Huanuco, Prov. Huamalies, mountains southwest of Monzón, 3300–3500 m (not seen; probably destroyed in Berlin in 1945). As neotype may be regarded: Wyotkowski 34314, Peru, Dep. Huanuco, Saria-pampa, 3600 m, on Ericaceae? (F, G, MO, UC). Holotype at F.

A distinct species closely allied to the *D. squamigera* assemblage. It is easily distinguished by the large number of fertile internodes in each spike, and by the small leaves.

25. ***D. flagelliformis*** (Lam.) Krug & Urban, Ber. Deutsch. Bot. Ges. **14**: 287. 1896.

Basionym: *Viscum flagelliforme* Lamarck, Enc. Méth. **3**: 56. 1789.

Heterotypic synonyms:

Viscum gracile DC, Prodr. **4**: 285, 1830.

Arceuthobium gracile (DC) Grisebach, Fl. Br. W. Ind. 315. 1864; non Engelmann, Mem. Amer. Acad. Arts & Sci., n.s., **4** (4): 59. 1849.

Dendrophthora gracilis (DC) Eichler, Fl. Bras. **5** (2): 103. 1868.

Dendrophthora gracilis Sauvalle, Anal. Acad. Ci. Méd. Fís. Nat. Habana **7**: 346. 1870.

Razoumofskya gracilis (DC) Kuntze, Rev. Gen. **2**: 587. 1891.

Viscum leptostachyum Sprengel, in DC, Prodr. **4**: 280.

Phoradendron leptostachyum (Spreng.) Index Kew. **3**: 502. 1894.

D. leptostachya (Spreng.) Eichler, Fl. Bras. **5** (2): 104. 1868.

Viscum macrostachyum Sprengel, Syst. **1**: 487. 1825.

Phoradendron macrostachyum (Spreng.) Grisebach, Cat. Pl. Cub. p. 120. 1864.

D. macrostachya (Spreng.) Eichler, Fl. Bras. **5** (2): 104. 1868. (type only)

D. pendula Krug & Urban, Ber. Deutsch. Bot. Ges. **14** (8): 290. 1896.

D. wrightii Eichler, Fl. Bras. **5** (2): 103. 1868.

Illustrations:

Fig. 25; Plate VII.d.

Plumier, Pl. Amer. Ed. Burm. Pl. 258, fig. 1. 1760.

de Wildeman, Pl. Nov. Herb. Hort. Thenensis **2**: 692. Pl. 88. 1907.

A very attractive, slender species, probably pendulous in nature. Fertile parts of plant squamate; below, without transitional leaf-forms, thin, linear to broadly lanceolate leaves occasionally up to 80 mm in length. Leaves possibly deciduous? because most herbarium specimens leafless. Stem terete. Cataphylls absent. Basal appendages transverse in position. Spikes sinuous, arranged in loose compound inflorescences, in axils of scale leaves only, of seemingly indeterminate growth; frequently 10–12, rarely up to 20 fertile internodes of up to

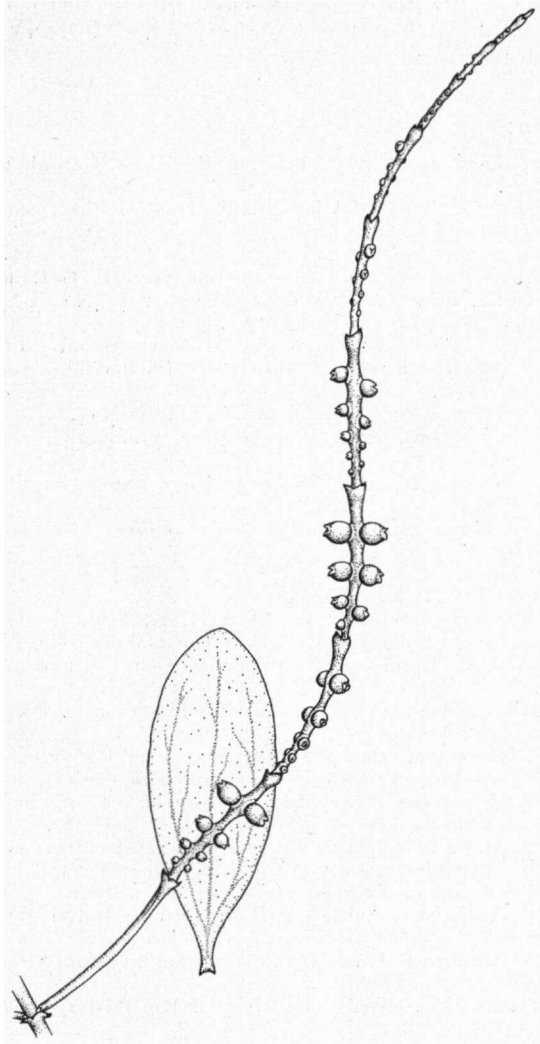


Fig. 25. *D. flagelliformis*: Sintenis 6418, K. Natural size.

30 mm long, often 5–6 flowers per bract in 2a arrangement. Upper fruits on an internode frequently ripe when lowest flowers still unopened, and distal internodes still unexpanded when proximal ones already bearing fruit. Individual flowers of the two series of an internode opposite to one another when young, becoming staggered along the internode when older. Fruits ovate, rather widely spaced. Monoecious; pistillate flowers may be above or below staminate ones on the same internode.

TYPE: no specimen is cited in the original description, and it appears

necessary to designate one as type: Sintenis 6418, Puerto Rico, near Utuado at Cayuio (F, G, GH, K, MO, NY, P, S, UC, US). Holotype at K.

Specimens seen:

- Abbott 2009, Hispaniola, Dom. Rep., Prov. de Barahona, Cabrál, 15–30 m (GH, NY, US).
- Alaín 1789, Cuba, Prov. Pinar del Río, Bahía Honda, Finca San Antonio, on *Tabebuia pentaphylla* (US).
- Bertero s.n., without data (MO).
- Britton 2137, Cuba, Prov. Oriente, Guantanamo Bay (F, GH, NY, PH, US).
- 2143, Cuba, Prov. Oriente, Guantanamo Bay (NY, US).
- & Britton 8964, Puerto Rico (NY).
- & ————— 10069, Puerto Rico, San German, on *Petitia* (NY, US).
- , ————— & Brown 6018, Puerto Rico, El Tandál, Coamo River, on *Petitia* (F, G, NY, US).
- & Cowell 1002, Puerto Rico, near Utuado (NY).
- , ————— & Brown 4346, Puerto Rico, Guanajibo, near Mayaguez (NY, US).
- , ————— & ————— 4572, Puerto Rico, Punta Guaniquilla (F, NY, US).
- , Stevens & Hess 2399, Puerto Rico, Coconut Grove, Cabo Rojo to Joyuda (F, MO, NY, US).
- Clement 3452, Cuba, Prov. Oriente, Guama (US).
- Combs 333, Cuba (F, GH, K, MO, NY).
- 715, Cuba, Prov. Santa Clara (F, GH, K, MO, NY, P).
- Cuesta 627, Cuba, Prov. Pinar del Río, Costa de Galafre (NY).
- Eggers 1954, Hispaniola, Dom. Rep., Tamboril, 250 m, on *Catalpa longisilica* (F, G, P).
- Ekman H-315, Hispaniola, Haiti, Dep. du Sud, Figuier near Port-à-Piment, on *Catalpa longissima* (S).
- H-667, Hispaniola, Haiti, Dep. du Sud, near Randelle, on *Petitia* (S).
- 2007, Cuba, Prov. Oriente, Bayate near Río Piedra, on *Tabebuia* (S).
- H-2297, Hispaniola, Haiti, Montagnes du Trou d'Eau, between Trianon and Fond-des-Oranges, on *Tabebuia berterii* (GH, S).
- H-3032, Hispaniola, Haiti, Port-au-Prince, Monfleury, on *Punica* (S).
- H-3419, Hispaniola, Haiti, Massif du Cahos, Petit Rivière de l'Artibonite, Perodin, on *Cestrum laurifolium*, 900 m (S).
- H-4850, Hispaniola, Haiti, Massif du Nord, Le Borgne, near Pet.-Bourg du Borgne, on *Sapium jamaicensis* (G, S, US).
- H-5118, Hispaniola, Haiti, Ile la Tortue, main ridge, Montry, on *Petitia domingensis*, 250 m (S).
- 5917, Cuba, Prov. Oriente, Bayate near Río Piedra, on *Tabebuia pentaphylla* (S).
- 9317, Cuba, Prov. Oriente, Bayamita near Sevilla, on *Petitia domingensis* (NY, S).
- 9318, Cuba, Prov. Oriente, Bayamita near Sevilla, Tecoma (G, S).
- 10018, Cuba, Prov. Oriente, Sierra de Nipe at Río Piedra, on *Tabebuia pentaphylla*, 200 m (G, NY, S).
- H-12165, Hispaniola, Dom. Rep., Prov. Saybo, Llano Costero, on *Petitia* (S, US).
- Fuertes 286, p.p., Hispaniola, Dom. Rep., Prov. Barahona, near Barahona, 50 m (F, GH, NY, S).
- 374, Hispaniola, Dom. Rep., Prov. Barahona, banks of Duvergé river, 50 m (G, GH, NY, P, U, US).
- Garber 122, Puerto Rico, at Yauco (GH, K).
- Holdridge 1152, Hispaniola, Haiti, west of Port-au-Prince, on *Catalpa longissima* (NY, US).
- Jack 5782, Cuba, Prov. Santa Clara, San Blas (GH, P, US).

- Jiménez 1429, Hispaniola, Dom. Rep., Santiago de los Caballeros, El Castillo, 200 m, on *Catalpa longissima* (US).
- León 14152, Cuba, Prov. Habana, Batabano (US).
- 14582, Cuba, San Francisco east of Batabano, on *Tabebuia pentaphylla* (NY, US).
- 21067, Cuba, Prov. Las Villas, Sierras de Banao, Sancti Spiritus (US).
- & Alain 5027, Cuba, Prov. Havana, Origuanabo River (NY).
- Leonard 4072, Hispaniola, Haiti, vicinity of Fond Parisien, Etang Saumâtre (GH, NY, US).
- 9828, Hispaniola, Haiti, Dép. l'Artibonite, northeast of Gros Morne, 235 m (GH, MO, NY, UC, US).
- & Leonard 11391, Hispaniola, Haiti, south slope of table land east of La Vallée, Tortue Island (GH, NY, US).
- & ———— 12400, Hispaniola, Haiti, Tortue Island, near Basse Terre, near La Roche Valley (US).
- Miller 180, Hispaniola, Haiti, San Michel (US).
- Nash 387, Hispaniola, Haiti, Bayeux to Borgne, sea level (F, NY).
- 565, Hispaniola, Haiti, Borgne to Petit Borgne, about 100 ft. (F, NY).
- 979, Hispaniola, Haiti, Port-au-Prince to Pétionville, 600 ft. (NY).
- Picarda 128, Hispaniola, Haiti (F).
- 1628, Hispaniola, Haiti, near Petit Rivière (S).
- Plée 249, Puerto Rico (P).
- Poiteau s.n., Hispaniola, Dom. Rep. (G, P).
- Proctor 10943, Hispaniola, Haiti, Dep. l'Artibonite, Plateau Central, 6 mi. north of Hinche, 900 ft., on *Petitia domingensis* (US).
- Rehder 1132, Cuba, Prov. Santa Clara, San Blas, 800 ft (GH, S).
- Richard s.n., Hispaniola, Dom. Rep. (P).
- Rose 22097, Hispaniola, Haiti, Port-au-Prince (GH, NY, US).
- , Fitch & Russell 3937, Hispaniola, Haiti, Azua (GH, NY, US).
- Rugel 269, 809, Cuba (GH, K, MO, NY; NY).
- Shafer 595, Cuba, Camaguey, Río Maximo (NY).
- 1079, Cuba, Prov. Camaguey, Jatovieja, Cayo Sabinál (MO, NY).
- 1336, Cuba, Prov. Oriente, valley of Río Matamoros south of Holguin (F, GH, NY, US).
- 1996, Puerto Rico, Guayanilla to Tallahoa (F, GH, NY, US).
- Sintenis 1271, Puerto Rico (PH).
- 3175, Puerto Rico (G, GH, K, UC).
- 3837, Puerto Rico, near Guanica (MO, NY).
- 5855, Puerto Rico, near Lares, at Callejones (GH, US).
- Stevens 1000, Puerto Rico, Mayaguey (NY).
- Taylor 243, Cuba, Sevilla Estate, near Santiago, Río Grande (NY).
- 399, Hispaniola, Dom. Rep., Prov. Seibo, Higüey (NY).
- von Tuerckheim 2615, Hispaniola, Dom. Rep., Prov. La Vega, on the way to Esperilla (B, F, G, GH, MO, NY, P, S, U, US).
- Underwoods & Griggs 217, Puerto Rico, Joyna (F, NY, US).
- & ———— 345, Puerto Rico, 13 km north of Cayey (US).
- & ———— 467, Puerto Rico, near Cayey (US).
- Valeur 116, Hispaniola, Dom. Rep., Prov. Monte Cristi, Distr. Monción (G, US).
- Weir s.n., Hispaniola, Haiti, Port-au-Prince (B, G, P, US).
- Wright s.n., Cuba, Prov. Oriente, on Bignoniaceae (GH, NY).
- 223, Cuba (G, K, GH, MO, US; type of *D. wrightii*).
- 2647, Cuba, Santo Espirita, Villa Clara (BM, G, GH, MO, NY, P, S, US).
- 3672, Cuba, Vuelta Abajo, Los Manglares near Las Pozas (GH, US; type of *D. gracilis* Sauvalle, and of *D. pendula*).
- 21147, Cuba (K).

A species found at low elevations in Cuba, Hispaniola, and Puerto Rico. As in the case of *D. domingensis*, a preference for low altitudes seems to be joined to a wide geographical distribution. The record cited under *D. leptostachya* in Eichler, Fl. Bras. (Sieber 257) from

Trinidad awaits confirmation, as the genus is otherwise not known from the island.

The type of *D. wrightii* (Wright 223) definitely belongs to *D. flagelliformis*. The specimens determined as *D. wrightii* in some herbaria form a rather discordant lot, and I have distributed them over *D. flagelliformis* and *D. serpyllifolia*, but not always to my complete satisfaction. See the discussion under *D. serpyllifolia*. The nearest relatives of *D. flagelliformis* appear to be *D. lanceifolia*, *D. serpyllifolia*, and *D. glauca*.

26. ***D. glauca*** (Griseb.) Eichler, Fl. Bras. 5 (2): 103. 1868.

Basionym: *Arceuthobium glauca* Grisebach, Cat. Pl. Cub. p. 121 1864.

Homotypic synonym:

D. purpurascens Krug & Urban, Bot. Jahrb. 24: 57-58. 1898

Heterotypic synonyms:

D. corymbosa Urban, Fedde Rept. 21: 54. 1925 ?

D. nipensis Urban, Fedde Rept. 21: 55. 1925 ?

Illustrations: Fig. 26; Plate VII.a.

A small, squamate species, somewhat glaucous. Stem terete, basal appendages in transverse plane. Spikes in compound inflorescences, the

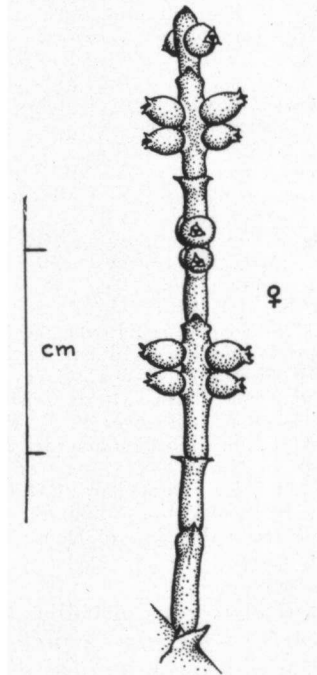


Fig. 26. *D. glauca*: Wright 2651, K.

lowest spikes often with one pair of cataphylls on a sterile internode of normal length, upper spikes without. Spikes of 2–4 fertile internodes about 7 mm long each, one or 2 flowers per bract in 2a, terminal internode usually only one flower per bract. Fruits ovate, closely appressed at upper end of internode; perianth reflexed. Dioecious?

TYPE: Wright 2651, Cuba (G, GH, K, MO, P; also the type of *D. purpurascens*). Holotype at K.

Specimens seen:

- Britton, Britton & Wilson 5574, Cuba, Prov. Santa Clara, Río Toyaba, Trinidad (K, NY).
 ———, Earle & Wilson, 5969, Cuba, Prov. Santa Clara, Río San Juan (GH, NY).
 Clement 7050, Cuba, Prov. Oriente, Santiago de Cuba, coastal cliffs near Sardinero, (MT; det. as *D. corymbosa*).
 ———, Chrysogone & Alain 3820, Cuba, Prov. Oriente, Moa, Cayo Chiquito (US).
 ?Ekman 2471, Cuba, Prov. Oriente, Sierra de Nipe, Carbeza de Nipe (G, NY).
 ——— 15180b, Cuba, Prov. Oriente, Sierra de Nipe, high cascades of Río Piloto, on *Exostema*, 700 m (S; det. as *D. nipensis*).
 ——— 15257, Cuba, Prov. Oriente, Sierra de Nipe, on *Coccoloba*, 500 m (S; type of *D. nipensis*).
 ——— 18899, Cuba, Prov. Santa Clara, Casilda, Maria Aguilar, forest on coastal reef (G, NY, S; type of *D. corymbosa*).
 Jack 5717, Cuba, Prov. Santa Clara, Gavilan, Soledad, on *Tabebuia* (GH, NY).
 León 12040, Cuba, southern Baracoa region, between Jauco and Cajobabo, dry slope of Loma del Esparto (NY).
 ——— 13132, Cuba (NY).
 León 19178, Cuba, Prov. Oriente, Sierra de Nipe, Cayo la Plancha, near airport (US).
 Rehder 1103, Cuba, Prov. Santa Clara, Gavilan, on *Tabebuia* (GH).
 ?Seifriz 1132, Cuba, Hicacos Peninsula, north coast (US).

A Cuban endemic; perhaps more than one species are represented by the collections here listed. From the material available I cannot differentiate *D. corymbosa* and *D. nipensis* from *D. glauca*, and therefore include the first two as synonyms for the time being. *D. mancinellae* is also closely related.

27. ***D. grandifolia*** Eichler, Fl. Bras. 5 (2): 105. 1868.

Illustrations: Fig. 27; Plate VII.b.

A rather stout, leafy species. Leaves up to 60 mm long and 34 mm wide, fairly thick, ovate to broadly lanceolate, with heavy golden-brown margin when dry. Young stems with ridges below leaves, older ones terete. Vegetative laterals with one pair of cataphylls up to 4 mm above axil, inflorescences without. Basal appendages in median plane. Spikes axillary only, usually 3 fertile internodes above a very short single sterile internode; basal fertile internode with about 8 flowers per bract, terminal internode with only one. Inflorescence type 1b.

TYPE: Wright 218, p.p., in Cuba Orientali, prope Monte Verde, on *Guettarda* (MO?, P; also contains the type of *D. tetrastachya* at P). Holotype at P.

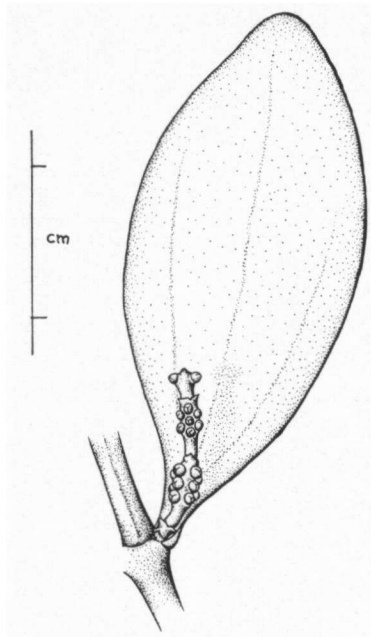


Fig. 27. *D. grandifolia*: Wright 218, P.

Undoubtedly a distinct species, although known only from the type collection. Some confusion may arise through the fact that Wright 218 is a mixed collection, at least at P. The type at MO is immature, and cannot be relegated securely to the present species. The nearest relatives of *D. grandifolia* may be *D. clavata* and *D. hexasticha*.

28. ***D. guatemalensis*** Standley, Pub. Field Mus., Bot. Ser., 22: 17. 1940.

Illustrations: Fig. 28; Plate VII.c.

An exceedingly diffuse and finely branched species. Leaves no longer than 3 mm, but fleshy, often dropping off early, flat adaxially but bulging abaxially. Only older stems thicker than 1 mm, always terete. Vegetative laterals with one pair of inconspicuous cataphylls about 8 mm above axil; inflorescences without. Basal appendages of a median orientation. Spikes axillary and primary only, at most 4 mm long. Sterile internode at least half the total length of the spike; fertile internodes one, rarely two, with one flower per bract. One flower of an internode may abort, the remaining one then occupying a pseudo-terminal position.

HOLOTYPE: Wilson 204, Guatemala, Dep. Alta Verapaz, mountain slopes above Finca Seamay (F).

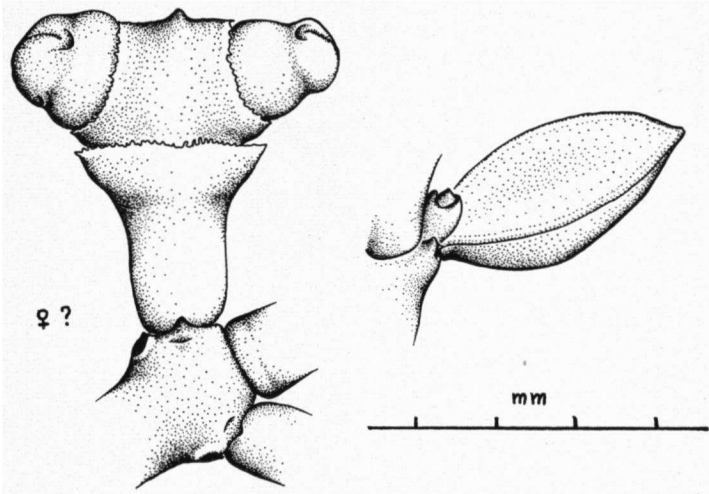


Fig. 28. *D. guatemalensis*: Wilson 204, F.

Specimens seen:

Steyermark 35249, Guatemala, Dep. Suchitepéquez, in vicinity of Montecristo, southeast of Santa María de Jesús, 1200–1300 m (F).

————— 44613, Guatemala, Dep. Alta Verapaz, Cerro de Agua Tortuga (Sahacoc), vicinity of Cubilgütz, 350–450 m (F, US).

It is quite impossible to confuse this striking species with other species of *Dendrophthora*. Since the inflorescence is greatly reduced I am at a loss as to where to place it. It may possibly represent the ultimate in reduction of the 2a inflorescence type of *Eudendrophthora*.

29. ***D. hexasticha*** van Tieghem, Bull. Soc. Bot. Fr. **43**: 181. 1896.

Illustrations: Fig. 29; Plate VII.d.

Leaves lanceolate to elliptic, up to 23×50 mm, somewhat cuneate at base. Stem terete, often muricate. Vegetative laterals with one pair of cataphylls up to 14 mm above axil, inflorescences without. Basal appendages in median plane. Spikes axillary only, with sterile internode longer than first fertile internode in staminate spike, shorter in pistillate spike. Staminate spike about 30 mm long, with up to 4 fertile internodes, ca. 30 flowers per bract. Pistillate spike 15 mm long, of 2 fertile internodes, ca. 18 flowers per bract; internodes with young fruits of a rather clavate shape. Inflorescence type basically 1b, but 2 additional series frequently result in 5 series above each bract. Dioecious.

HOLOTYPE: Dombey 576, Peru (P).

Specimens seen:

Vargas 326, Peru, Dep. Cuzco, Prov. Paucartambo, 3100 m (F, MO).

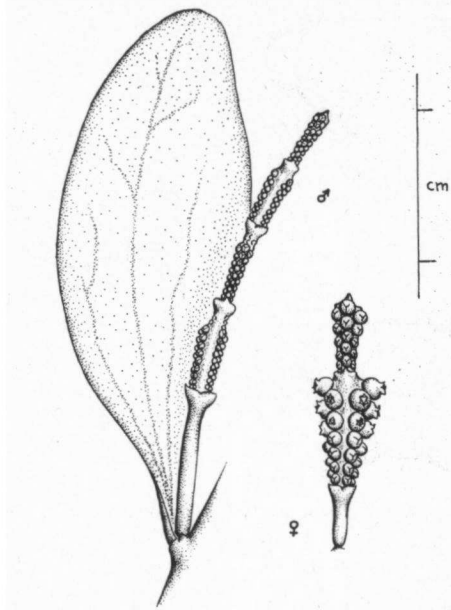


Fig. 29. *D. hexasticha*; Dombey 576, P.

The pistillate spikes of this species are similar in shape to the spikes of *D. chrysostachya*, and therefore possible nomenclatural complications may arise with regard to *D. portulacoides* when type material of this species becomes available. In general habit the plant is much like *D. costaricensis*. Not to be confused with *Phoradendron hexastichum* (DC) Grisebach, a Caribbean mistletoe.

30. ***D. hians*** Urban, Ark. Bot. **20A** (5): 28. 1926.

Heterotypic synonyms:

Phoradendron lamprophyllum Urban, Fedde Rept. **21**: 54. 1925.

D. lamprophylla (Urban) Urban, Ark. Bot. **23A** (5): 67. 1930.

Illustrations: Fig. 30; Plate VIII.a.

A leafy species; leaves adhering for long distances along the stem, slightly fleshy, obovate with short petiole, ca. 12 × 20 mm, apex obtuse. Stem slightly ridged when dry, terete when old. Vegetative laterals and spikes almost always without cataphylls, rarely one pair present on each. Basal appendages in median plane. Spikes axillary only, secondary ones common, 2–5 fertile internodes ca. 15 mm long each when in fruit, one, rarely 2 flowers per bract in 2a. Perianth members conspicuously spread when in fruit, large; berry ovate-oblong, at least 3 mm long. Staminate spike of about 3 fertile internodes 2–3 mm long each, with 1–3 flowers per bract in 2a arrangement.

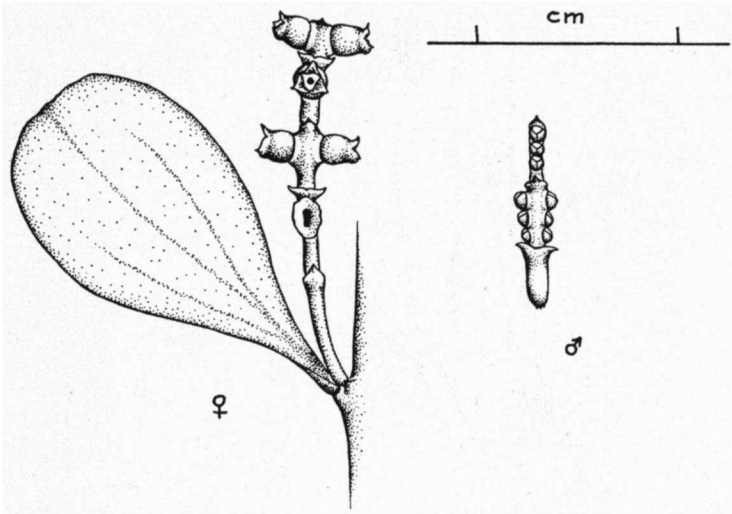


Fig. 30. *D. hians*: Ekman H-3142, S (left) and US (right).

TYPE: Ekman H-3142, Hispaniola, Haiti, Massif de la Selle, Morne de la Selle, above Badeau, on *Lyonia*, 2100 m (G, S, US). Holotype at S.

Specimens seen:

Ekman 15983, Cuba, Prov. Oriente, Sierra del Cristal, top of Sierra del Cristal, on *Clusia tetragyna*, 1100–1325 m (S; type of *D. lamprophylla*).
Shafer 8227, Cuba, Prov. Oriente, Camp La Gloria, south of Sierra Moa, on *Clusia* (NY).

A species of uncertain affinities, perhaps distantly related to *D. laxiflora*. As I can find only a very slight difference between the two Ekman specimens cited (Ekman 15983 has slightly more ovate leaves) I am combining the two species, although one is from Cuba, the other from Hispaniola.

31. ***D. lanceifolia*** Urban, Fedde Rept. 21: 58. 1925.

Illustrations: Fig. 31; Plate VIII.b.

A small and slender species of much the same habit as *D. flagelliformis*. Leaves few and basal, lanceolate, the largest seen 2 × 9 mm, acute, grading into the scale leaves of the compound inflorescence above. Stem terete. Basal appendages transversely oriented, cataphylls absent. Intercalary flowers present on some branches. Inflorescence of at least 4 fertile internodes, these each with 2–3 flowers per bract in 2a arrangement. Said to be monoecious by Urban.

HOLOTYPE: Ekman 9227, Cuba, Prov. Oriente, Santiago de Cuba, Río Aguadores, on *Caesalpinia pauciflora* (S).

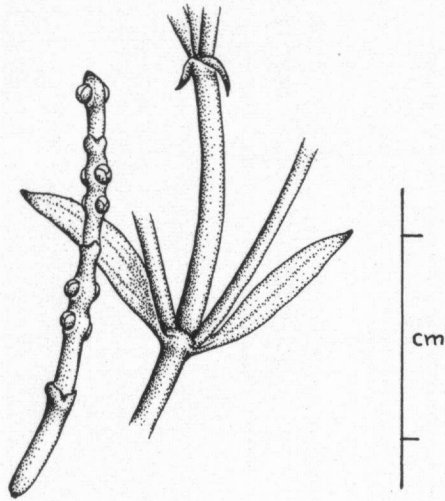


Fig. 31. *D. lanceifolia*: Ekman 9227, S.

Known only from the type collection. It is most closely related to *D. flagelliformis*, from which it differs in size and its transitional leaf forms.

32. ***D. laxiflora*** Urban, Fedde Rept. **21**: 58. 1925.

Illustrations: Fig. 32; Plate VIII.c.

Foliaceous, leaves spatulate, up to 35 mm long, minutely mucronate, golden green. Stem terete, but rather deeply grooved when dry. Basal appendages in transverse plane. Vegetative laterals with or without one pair of cataphylls, inflorescence without. Spikes of 3 fertile internodes up to 10 mm long each with 2 flowers per bract in 2a seriation. Fertile internodes very flat in axillary plane. Fruit a spherical berry, sepals reflexed.

TYPE: Ekman 18185, Cuba, Prov. Pinar del Río, Sierra Caliente, on *Chuncoa intermedia* (G, NY, S). Holotype at S.

Specimen seen:

Ekman 17649, Cuba, Prov. Pinar del Río, Sierra de los Organos, Grupo del Rosario, at Río Santa Cruz, on *Chuncoa intermedia* (K, S).

An unusual species: I am not certain as to its nearest relatives, but *D. hians* is a possible candidate. Not to be confused with *Phoradendron laxiflorum* Ule, a mistletoe from Brasil.

33. ***D. lindeniana*** van Tieghem, Bull. Soc. Bot. Fr. **43**: 181. 1896.

Illustrations: Fig. 33; Plate VIII.d.

A rather dense leafy species, with lanceolate, elliptic, or ovate

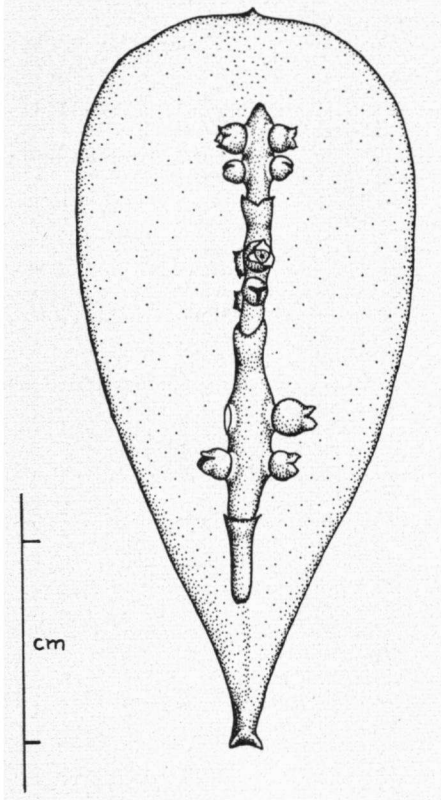


Fig. 32.

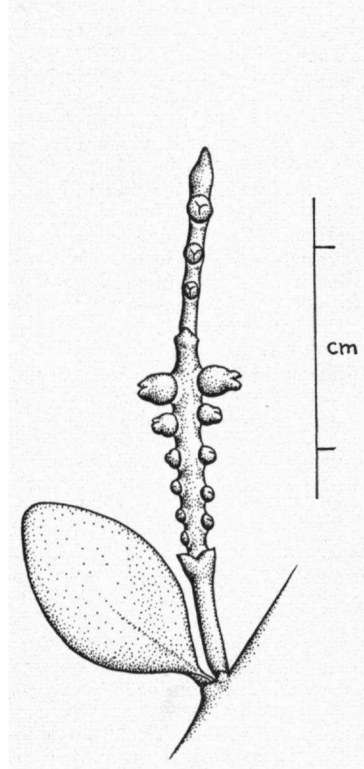
D. laxiflora: Ekman 17649, K.

Fig. 33.

D. lindeniana: Fendler 1113, K.

leaves up to 18 mm long, obtuse or acute. Vegetative laterals may have as basal appendages cataphylls (these often subtending spikes), foliage leaves, or intermediate leaf forms; they are always in a median position. Stem terete, often with short, stout hairs producing a rough, brownish surface. Secondary vegetative laterals often profusely developed. Inflorescences often divaricate, axillary only, without cataphylls, commonly of one or 2 fertile internodes each 15 mm long, flowers up to 10 per bract in 2a arrangement. Said to be monoecious by Urban. Berries white (Gehringer 319).

TYPE: Linden 797, Colombia, near Bogotá, 1360 ft. (G, P). Holotype at P.

Specimens seen:

Apolinar-Maria 259, Colombia, Dep. Antioquia, San Pedro (F).
Black 46-402, Colombia, Dep. Cundinamarca, Quebrada Chicó, Bogotá (US).
Charetier 79, Colombia, near Medellín (US).

- Cuatrecasas 5087, Colombia, Dep. Cundinamarca, Macizo Bogotá, Quebrada de San Cristobal, 2850–2900 m, on *Cavendishia cordifolia* (NY, US).
 5420, Colombia, Dep. Cundinamarca, Macizo de Bogotá, Quebrada de Chicó, 2750–2890 m (F, US).
- Daniel 572, Colombia, Dep. Antioquia, Pueblo Rico (US).
 ——— 3298, Colombia, Dep. Antioquia, Alto de la Unión, on *Thibaudia* (F, US).
 ——— & Thomas 2094, Colombia, San Pedro (F).
- Fassett 25700, 25705, Colombia, Dep. Santander, headwaters of Quebrada Chirviti, ridge back of “La Victoria”, west of Galán, 9000 ft. (US).
 ——— 25729, Colombia, Dep. Santander, headwaters of Quebrada Chirviti, Cerro el Guiche, west of Galán, 8500 ft. (US).
- Fendler 1113, Venezuela, prope coloniam Tovar (K).
 Gehriger 319, Venezuela, Mucuruba, 2600–2750 m (F, GH, MO, NY, US).
 Goudot s.n., Colombia, Bogotá, on *Thibaudia* (P).
 Haight 1964, Colombia, Dep. Santander, Cerro Armas, 1000 m, “climbing a fern” (US).
- Herrera 2122, Peru, Valle de Santa Ana, Alturas del Chaco (US).
 Hodge 6544, Colombia, Dep. Antioquia, Cordillera Central, road between Medellín and El Retiro, 2500 m (GH).
 ——— 6742, Colombia, Dep. Antioquia, Cordillera Central, Santa Elena, road between Medellín and Río Negro, 2300–2500 m (F, GH).
- Killip & Smith 15872, Colombia, Dep. Santander, vicinity of Las Vegas, 2600–3000 m, on *Pernettya* (F, GH, NY, US).
 ——— & ——— 17783, Colombia, Dep. Santander, western slope of Páramo Rico, 3300–3600 m (NY, US).
- Macbride 5135, Peru, Vilcabamba, Hacienda on Río Chinchao, 6000 ft. (F, US).
 Pennell 2591, Colombia, Dep. Cundinamarca, Mount Chuscal, west of Zipaquirá, 3200–3300 m (GH, MO, US).
 ——— 4325, Colombia, Dep. Bolívar, below Páramo de Chaquiro, Cordillera Occidental, 2800–3100 m, on *Thibaudia* (GH, NY, US).
- Pring 229, Colombia, Sabana de Bogotá, hills of Chapinero (MO).
 Schiefer 462, Colombia, Bogotá, south side of canyon back of National Park (GH, UC).
- Schultes & Villareal 7522w, Colombia, Putumayo, Laguna La Cocha, Ciudadela, above lake on road to Sibunoy near Páramo de Bordoncillo, 2800–3000 m (US).
- Steyermark 56590, Venezuela, State of Merida, steep forested slopes above “La Isla” above Tobay, 2285–2745 m (F, MO, NY, US).
- Woytkowski 34290, Peru, Dep. Huanuco, Sariapampa, 3600 m (MO).

A variable species of the northern Andes, with close affinities to *D. urbaniana*, *D. squamigera*, *D. paucifolia*, *D. eichleriana*, and *D. mexicana*.

34. ***D. mancinellae*** (Griseb.) Eichler, Fl. Bras. 5 (2): 103. 1868.

Basionym: *Arceuthobium mancinellae* Grisebach, Cat. Pl. Cub. p. 121. 1866.

Illustrations: Fig. 34; Plate IX.a.

Reminiscent of *D. flagelliformis*, but squamate from the base. Vegetative laterals without cataphylls, inflorescences sometimes with up to 2 pairs, probably depending upon position in compound inflorescence. Basal appendages in a transverse position. Inflorescence 2a, 5–6 fertile internodes of 10–15 mm each, the terminal about half that length; 3–6 flowers per bract, the terminal internode 2 or 3. Flowers so closely appressed as to appear standing in a longitudinal groove. All internodes of a spike in the same stage of development; on one internode, the oldest flower little larger than the youngest one.

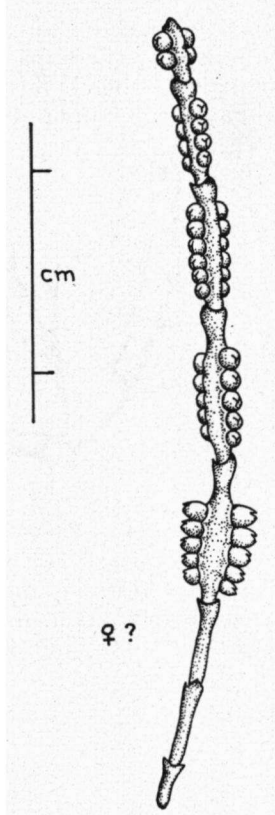


Fig. 34. *D. mancinellae*: Ekman 17390, K.

TYPE: Wright 2646, Cuba (G, GH, K, MO, P). Holotype at GH.

Specimens seen:

Ekman 17390, Cuba, Prov. Pinar del Río, Morillo, towards Toscano, on *Hippomare mancinella* (G, K, NY, S).

Leonard & Leonard 15022, Hispaniola, Haiti, vicinity of Bassin Bleu, slope of Morne Haut Piton, 630–1500 m (GH, K, NY, UC, US).

Closely related to *D. glauca*. The plants seen have a very distinct appearance because of the crowded condition of their spikes, and because of the even maturation of flowers along an internode; the individual internodes also bear more berries than those of *D. glauca*.

35. ***D. marmeladensis*** Urban, Fedde Rept. **17**: 156. 1921.

Heterotypic synonyms:

D. brachyclada Urban, Fedde Rept. **21**: 55, 1925.

D. moniliformis Urban, Fedde Rept. **21**: 57. 1925.

D. picotensis Urban, Fedde Rept. **21**: 57. 1925.

Illustrations: Fig. 35; Plate IX.c.

A rather stout and much branched plant, squamate, very brittle. Vegetative internodes rather long (as compared to those of *D. cupressoides*), terete, sometimes slightly ridged. Basal appendages in transverse position. Spikes probably in compound inflorescences; axillary

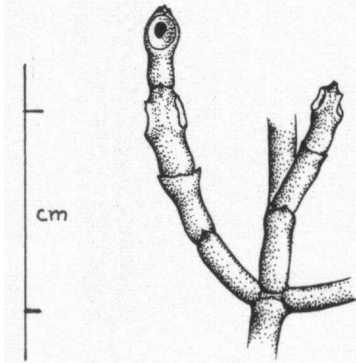


Fig. 35. *D. marmeladensis*: Ekman 2265, S.

ones short, with one or 2 prominent sterile internodes. One to 3 fertile internodes per spike; one flower per bract, inserted at the distal end of the internode, the latter about 4 mm long. Floral cups conspicuous. Dioecious according to Urban.

HOLOTYPE: Nash and Taylor 1250, Hispaniola, Haiti, Marmelade, Camp No. 4 (US).

Specimens seen:

- Ekman H-1191, Hispaniola, Haiti, Massif de la Selle, between Morne Tranchant and Morne Brouet, on *Tabebuia berterii*, 1450-1500 m (S, US).
- H-1841, Hispaniola, Haiti, Massif de la Selle, Fourcy, Rivière Pénaud, on *Tabebuia berterii*, 1000 m (G, S, US).
- 2265, Cuba, Prov. Oriente, Sierra de Nipe, Loma de Estrella, on *Tabebuia* (S; the type of *D. brachyclada*).
- H-4841, Hispaniola, Haiti, Massif du Nord, Borgne, between Poste Marie Congo and Morne Fourney, slopes of Morne Beaubrun, on *Pachira emarginata*, 750 m (GH, S, US).
- 6673, Cuba, Prov. Oriente, Sierra de Nipe at Río Piloto, on *Tetralix nipensis* (S; the type of *D. moniliformis*).
- 9154, Cuba, Prov. Oriente, Bayate, Picote, 550 m (G, S).
- H-12600, Hispaniola, Dom. Rep., Prov. Monte Cristi, Cordillera Central, Manción, on *Tabebuia berterii*, 375 m (S, US).
- H-13192, Hispaniola, Dom. Rep., Prov. Santiago, Cordillera Septentrional, Santiago, Loma Diego de Ocampo, on *Coffea arabica*, 900 m (S).
- H-13385, Hispaniola, Dom. Rep., Prov. Azua, Cordillera de Negba, El Cercado, on *Atrophyllus crassinervis*, 700 m (S).
- H-15179, Hispaniola, Dom. Rep., Prov. Samaná, Peninsula de Samaná, slope of Pan de Azucar, on *Vitex integrifolia*, 400 m (S).
- H-15505, Hispaniola, Dom. Rep., Prov. Samaná, Cordillera Central, Los Haitises, on *Linociera* (S).
- 15610, Cuba, Prov. Oriente, Bayate, Picote, western top of mountain, 550 m (F, G, K, NY, S; the type of *D. picotensis*).
- Howard & Howard 8847, Hispaniola, Dom. Rep., Prov. San Juan, north of San Juan (GH, K, NY, S, US).

Leonard 9584, Hispaniola, Haiti, Dep. l'Artibonite, near Ennery, 325-900 m (GH, US).
 Wright, Parry & Brummel 454, 455, Hispaniola, Dom. Rep. (US).

As this species seems to be intermediate in very many respects between *D. cupressoides* and *D. arcuata* it may not represent a valid species. The relatively short axillary spikes may, however, be a sufficiently consistent character to maintain its specific status.

36. *D. martinicensis* Kuijt, n. sp.

Planta tenuis, flava. Folia oblanceolata, usque ad 20 mm longa. Spicae ex axillis foliorum frondosorum semper provenientes, internodiis fertilibus circiter 10; floribus masculis 8-10, femineis 1-2 pro bractea. Ramuli laterales steriles paribus cataphyl-

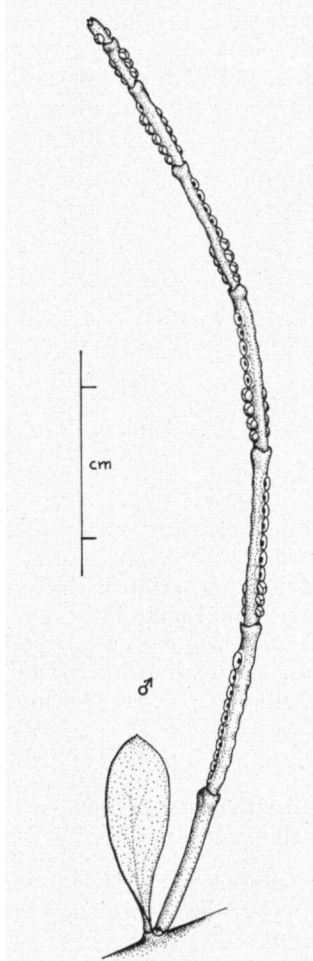


Fig. 36. *D. martinicensis*: Hahn 298, K.

lorum singulis; inflorescentiae cataphylla carentes, dispositione florum more 2a.

Heterotypic synonyms:

D. macrostachya auctt.

Viscum verticillatum Sieber, Plant. Mart. 226, non L, non Audubon, Birds of America, vol. 4. pl. 369; quarto ed. vol. 3 pl. 143.

Illustrations: Fig. 36; Plate IX.d.

A golden-green species, leaves sometimes deciduous, oblanceolate, up to 20 mm long. Stem terete; basal appendages in median plane. Vegetative laterals with one pair of cataphylls 6–20 mm above the axil, inflorescences without. Spikes axillary only to foliage leaves. Staminate spike up to 10 fertile internodes, the oldest one 12 mm long, the terminal one scarcely expanded, about 8–10 flowers per bract. Pistillate spike with about as many internodes, up to 15 mm long when in fruit with one or 2 flowers per bract, those of one internode often inserted at different levels.

TYPE: Hahn 298, Martinique, Macouba, on Melastomaceae (G, K, P). Holotype at K.

Specimens seen:

Belanger 268, 422, Martinique (P).

710, Martinique (G).

Duss 1371, 4416, Martinique, Bois-des-Deux-Choux (NY; NY, P).

Hahn 380, Martinique (P).

Sargent s.n., Martinique, 1000–2000 ft. (GH).

Sieber 226, Martinique (G, MO).

357, "Isle de la Trinité"; presumably near the town of Trinité on Martinique (G).

Stehlé & Stehlé 4914, Martinique (P).

An endemic of the island of Martinique. Closely related to *D. remotiflora*, *D. brachylepis*, and *D. flagelliformis*, none of which grow on Martinique. Much herbarium material of the species at present rests under the name of *D. macrostachya* Eichl. The type of the latter, however, belongs in *D. flagelliformis* and a new name becomes necessary for the Martinique species. It may be distinguished from its relatives by the fact that spikes originate only in the axils of foliage leaves, although the latter may drop off early.

37. ***D. mesembryanthemifolia*** Grisebach ex Urban, Ber. Deutsch. Bot. Ges. 14: 285. 1896.

Basionym: *Phoradendron mesembryanthemifolium* Grisebach, nom. nud., in Lechler, Berberides Americae Centrales, p. 59. Stuttgart, 1857 (not seen).

Illustrations: Fig. 37; Plate IX.b.

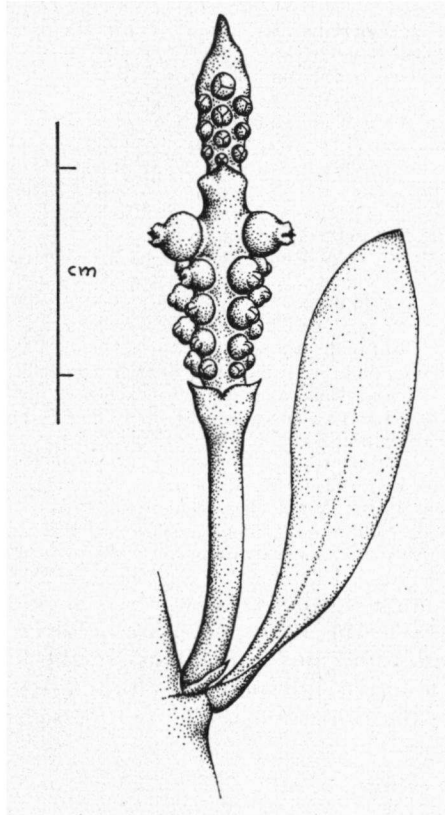


Fig. 37. *D. mesembryanthemifolia*: Mandon 1466, K.

Plants of rather strict habit, leaves oblanceolate, acute, up to 20 mm long. Prophylls conspicuously long, extending laterally. Stem nearly terete. Inflorescences axillary only, often secondary, without cataphylls. Vegetative laterals only exceptionally with one pair of cataphylls (Mandon 1466). Basal appendages in median plane. Spikes of 2–3 fertile internodes on a long sterile one, 10–15 mm each in fruit, then often swollen; old staminate spikes often longer. Inflorescence type 1b, the median series below the apical flower sometimes lacking. Irregularities in flower position frequent. Apex of spike usually acute. Berries spherical, “translucent-white” (Macbride & Featherstone 1606).

TYPE: Lechler 1893, Peru, near Agapata, on *Salvia* (K, P). Holotype at K.

Specimens seen:

Balls B6895, Peru, Dep. Apurimac, 10,500 ft. (K, UC, US).

Bang 1926, Bolivia (F, GH, MO, NY, PH, US).

——— 2035, Bolivia, near Cochabamba (NY, US).

- ?Beraudi 1256, Venezuela, State of Mérida, Páramo de los Conejos, 3500 m (NY).
 Brooke 5981, Bolivia, Dep. Cochabamba, about 100 mi. northwest of Cochabamba, above Cocopata River, Choro, 9800 ft., on *Alnus jorullensis* (NY).
 Cárdenas 3249, Bolivia, Dep. Cochabamba, Prov. Ayopaya, Sailapata, 2700 m, on *Polylepis* (F).
 ———— 5484, Bolivia, Dep. Cochabamba, "Cerveceria Taquiña", 2567 m, on *Escallonia mandonii* (US).
 Cook & Gilbert 655, Peru, Ollantaytambo, 3000 m (US).
 Ferreyra 3742, Peru, Prov. Tarma, Dep. Junin, Arriba de Carpapata, 2300–2400 m (US).
 Herrera s.n., Peru, Dep. Cuzco, Apurimac Valley (F).
 Killip & Smith 24350, Peru, Dep. Junin, Carpapata, above Huacapistana, 2400 m (US).
 Macbride 3477, Peru, Cani, Pueblo 7 mi. northeast of Mito, 8500 ft. (F, GH, NY, US).
 ———— 4383, Peru, Tambo de Vaca, 13000 ft. (F, G, NY).
 ———— & Featherstone 1606, Peru, Mito, 9000 ft. (F, GH, NY).
 Mandon 1466, Bolivia, Prov. Larecaja, near Sorata, 2700 m (GH, P, S).
 Rusby 1537, Bolivia, Prov. Larecaja, near Sorata, 8000 ft. (F, GH, K, NY, PH, US).
 Soukup 463, Peru, near Puno, 4000 m (F).
 Steyermark 56275, Venezuela, State of Mérida, Páramo de Pozo Negro, between San José and Beguilla, 2590–3220 m (F, US).
 Stork, Horton & Vargas 10640, Peru, Dep. Apurimac, Prov. Abancay, upper Río Marino, 2800–3000 m, on *Prunus capulin* (F, UC).
 ?West 3683, Peru, Dep. Apurimac, near Chincheros, 2930 m, on *Alnus jorullensis* (UC).

A species of the high northern Andes. It is a close relative of *D. clavata* and its allies. Possibly two species are involved, as I have seen both monoecious and dioecious individuals. In the former cases, the apical flowers of a fertile internode are pistillate, the lower ones staminate. See also the discussion under *D. elliptica*.

38. *D. mexicana* Kujit, n. sp.

D. squamigera affinis, differt habitu folioso; folia lanceolata, usque ad 4 mm lata et 12 mm longa. Inflorescentiae dispositione florum more 2a; spicae omnes laterales, internodiis fertilibus binis. Ramuli laterales steriles paribus cataphyllorum singulis; spicae cataphylla carentes.

Illustrations: Fig. 38; Plate IX.e.

Slender foliaceous plant of strict habit, 30–40 cm high. Leaves lanceolate, up to 4 × 12 mm. Vegetative laterals with one pair of cataphylls up to 10 mm above the axil, these spreading and spine-like when dry. Stem terete. Spikes axillary only, of 2 fertile internodes and one rather long (ca. 8 mm) sterile internode, without cataphylls. Inflorescence type 2a, the lower fertile internode up to 10 mm long with 3 or 4 flowers per bract, the second about half as long with 1–2 flowers per bract; apex pointed. Basal appendages in a median position. Sex distribution perhaps as in *D. squamigera*? though no berries seen on this plant.

HOLOTYPE: Quarles van Ufford 263, "Niquihuil", Mexico, 2700 m, on *Ternstroemia* (U).

I have not been able to pinpoint Niquihuil. According to the notebooks of Quarles van Ufford at Utrecht, he was at Tapachula before, and in Comitán after collecting this mistletoe. Both are in the state of Chiapas, and Niquihuil is thus likely to be in the same state, possibly between Comitán and Tapachula.

The species belongs in the *D. squamigera* group and is very closely related to the Andean *D. lindeniana*, from which it differs in its very acute leaf- and spike apices, its spine-like scale leaves, and the regularity of cataphyll occurrence. This is the most northerly collection in *Dendrophthora* known to me.

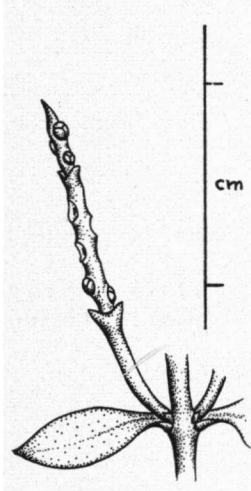


Fig. 38.

D. mexicana:
Quarles v. Ufford 263, U.

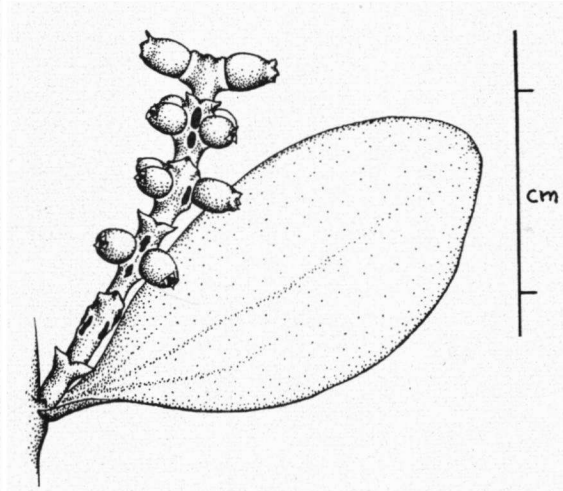


Fig. 39.

D. mornicola: Ekman H-4901, S.

39. ***D. mornicola*** Urban, Ark. Bot. **23A** (5): 67. 1930.

Illustrations: Fig. 39; Plate XX.a.

A medium-sized leafy species. Leaves obovate, often somewhat asymmetrical, rather fleshy, up to 15×30 mm, obtuse. Stem terete. Vegetative laterals with one pair of cataphylls up to 6 mm above the axil, spikes without. Basal appendages of a median orientation. Spikes axillary only, secondary ones common, about 20 mm long with 3–6 fertile internodes; these with 3–4 flowers per bract, except the terminal internode which has only one flower per bract. Inflorescence type 1b. Fruit an ovate berry, 1.5×3 mm, sepals inconspicuous.

TYPE: Ekman H-4901, Hispaniola, Haiti, Massif du Nord, Gros Morne, Morne Belanse, on spur towards Labraude, on *Laplacea cymatoneura*, 1100 m (S, US). Holotype at S.

Although known only from the type collection, doubtlessly a valid species. It belongs in *Paradendrophthora*, but does not seem to be

closely related to any other species except *D. albescens*, also from Hispaniola.

40. ***D. opuntioides*** (L.) Eichler, Fl. Bras. 5 (2): 102. 1868.

Basionym: *Viscum opuntioides* L, Sp. Pl. 1023. 1753.

Homotypic synonyms:

Arceuthobium opuntioides (L.) Grisebach, Fl. Br. W. Ind. p. 315. 1864.

Distichella opuntioides (L.) van Tieghem, Bull. Soc. Bot. Fr. 43: 185. 1896.

Ozarthris opuntioides (L.) Rafinesque, Fl. Tellur. 4: 92. 1836 (1838).

Razoumofskya opuntioides (L.) Kuntze, Rev. Gen. 2: 587. 1891.

Viscum opuntioides ramulis compressis Sloane, Cat. p. 168 (1696), Jam. 2: 93. 1707–1725.

Heterotypic synonyms:

Dendrophthora danceri (v. Tiegh.) Krug & Urban, Ber. Deutsch. Bot. Ges. 14: 285. 1896.

Distichella danceri van Tieghem, Bull. Soc. Bot. Fr. 43: 185. 1896.

Dendrophthora monstrosa Bertero ex Fawcett & Rendle, Fl. Jam. 3: 100–101. 1914.

Dendrophthora opuntioides (L.) Fawcett & Rendle, Fl. Jam. 3: 101. 1914.

Viscum opuntioides L. *angustinus* DC., Prodr. 4: 284. 1830.

Distichella gracilis van Tieghem, Bull. Soc. Bot. Fr. 43: 185. 1896.

Razoumofskya jamaicensis Hoffmann, Hortus Mosquensis (unpagged). 1808.

Illustrations:

Fig. 40; Plate X.c.

Brackett, Plant World 8 (11): 272. 1905.

Fawcett & Rendle, Fl. Jam. 3: pl. 4. 1914.

Sloane, A voyage to . . . Jamaica, etc. 2: pl. 201, fig. 1. 1707–1725.

York, Bot. Gaz. 61: 94. 1913.

Completely squamate plants of a greenish-brown color. Internodes varying from almost terete to flat and ribbed, or clavate with cuneate base, always terete in age. Phyllotaxy frequently distichous, especially when internodes greatly flattened; decussate in other instances, as in many spikes, and in narrow-jointed forms. The same individual may be decussate below, distichous above. Scale leaves and prophylls barely discernable, and their positions difficult to establish. In the broad-jointed forms prophylls appear situated between percurrent axis and lateral axis; each pair of prophylls possibly fused into a minute single structure. When secondary spikes are formed, only one on each side of the axis. However, sometimes tertiary spikes are

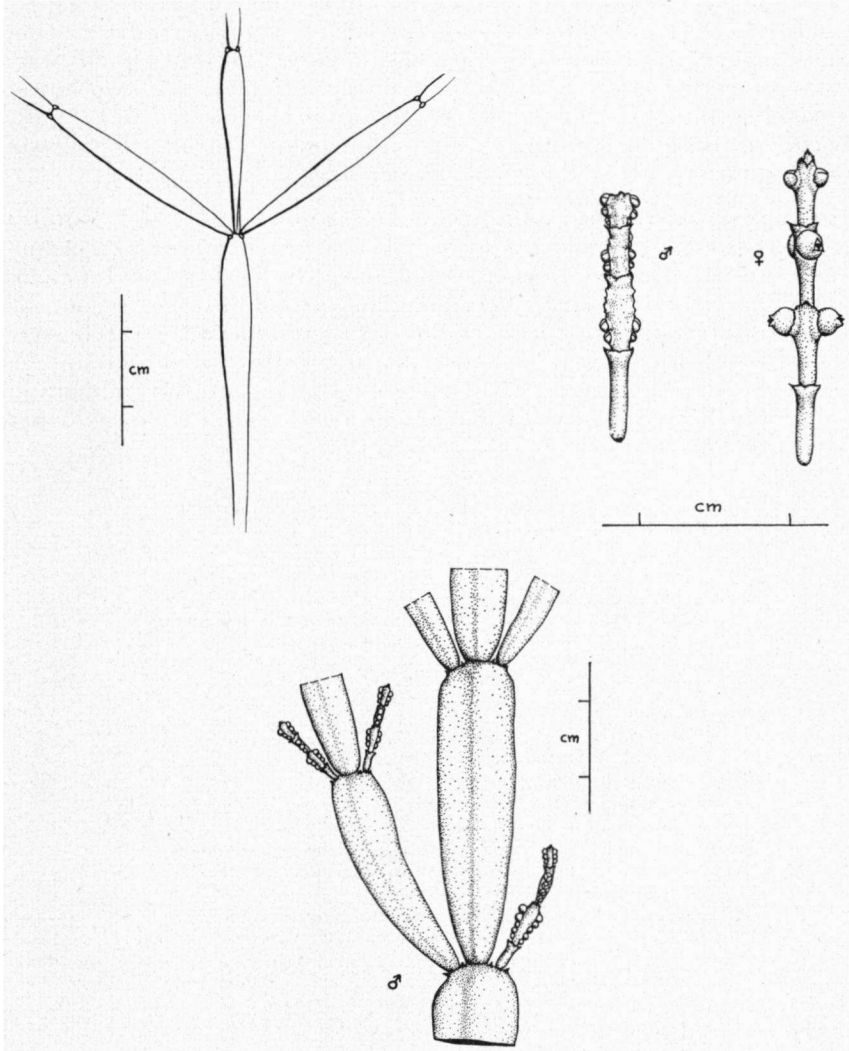


Fig. 40. *D. opuntioides*: Linnaean specimen 1166.7 (above, left), spikes of Purdie s.n. and Nichols 110 (above, center and above, right, both K), Prior s.n., K (below).

formed *above* the secondary ones; the subtending appendages, if any, could not be discovered. In at least some plants, basal appendages in median plane; both patterns may, however, be seen on a single individual in many cases. Vegetative laterals and inflorescences without cataphylls. Spikes axillary, rarely terminal, usually 3, sometimes up to 5 fertile internodes. Staminate fertile internodes 5–8 mm long, becoming shorter acropetally, 5–6 flowers per bract; pistillate 7–8 mm in fruit, lower internodes sometimes with 2, others with one flower

per bract. Berries short-ovate, up to 6 mm long, inserted at top of internode, bright red-orange. Inflorescence type normally 2a, but many irregularities are common. The single series above each bract may proliferate laterally at the base of the internode, the two flower areas becoming confluent. Rarely seriation begins as 1a, rapidly becoming irregular through proliferation below. In all cases flower orientation seems to be normal. Dioecious.

HOLOTYPE: The illustration in Sloane's *Voyage . . . and Natural History of Jamaica* is to be taken as the holotype. According to Mr. Dandy, Keeper of Botany, British Museum, Linnaeus never saw Sloane's specimen and based his species on the illustration. The specimen has been reproduced very accurately in Sloane's figure, and is still in excellent condition in the Sloane Herbarium. Mr. Dandy kindly supplied the photograph of Sloane's figure. Origin of the collection: Liguane, banks of the Hope River.

Specimens seen:

- Britton 69, Jamaica, near Cinchona, St. Helen's Gap, on *Oreopanax* (F, NY).
 ——— 265, Jamaica, near Cinchona, John Crow Peak (NY).
 ——— 662, Jamaica, Cockpit County, on *Byrsonima* (F, NY, US).
 ——— 2714, Jamaica, Moneague to Mount Diablo (NY).
 ——— 3826, 3827, Jamaica, Blue Mountains, near Clydesdale (NY; NY, US).
 ——— 3861, Jamaica, Blue Mountains, summit of Sir John Peak (NY).
 Dancer s.n., Jamaica (G).
 Eggers 3625, Jamaica, Catherine's Peak, 4500 ft. (G, P, UC).
 Fawcett s.n., Jamaica (K, NY).
 Hansen s.n., Jamaica (MO, NY).
 Harris 6200, Jamaica, near Cinchona, 5000 ft. (F, NY).
 ——— 6206, Jamaica, near Morse's Gap, 5000 ft. (NY).
 ——— 6338, Jamaica, Strawberry Hill, on *Rhytidophyllum* (F, G, US).
 ——— 6343, Jamaica, near Portland (NY, S, UC, US).
 ——— 6355, Jamaica, Strawberry Hill, on *Oreopanax capitatum* (US).
 ——— 9436, Jamaica, Troy, 1600 ft., on *Byrsonima* (F, K, NY, US).
 ——— 10139, Jamaica, Greenwich Woodland (F, NY, P, US).
 ——— & Lawrence 15123, 15153, 15180, 15284, Jamaica, Cinchona, leeward slopes of Blue Mountains (US; US; UC; NY).
 ——— & ——— 15196, 15509, Jamaica, near Cinchona, John Crow Peak (NY).
 Hart 620, Jamaica (F, NY).
 Hitchcock s.n., Jamaica, Blue Mountain Peak (MO).
 Hunnewell & Griscom 14303, Jamaica, Surrey County, Parish of St. Thomas, near top of Blue Mountain Peak (GH).
 Linnaean specimen 1166.7 (LINN)
 Markle 191, Jamaica, near Cinchona, New Haven Gap (NY).
 Maxon 916, Jamaica, Second Breakfast Spring, near Tweedside (NY, US).
 ——— 934, Jamaica, slopes above Tweedside, 2000–3000 ft. (NY, US).
 ——— 8679, Jamaica, Port Royal Mountains, near Flamstead (GH, S, US).
 ——— 9520, Jamaica, Maccasucker Bump, St. Thomas (GH, S, US).
 ——— 9641, Jamaica, lower eastern ridge of Mossman's Peak, 1600–1700 m (GH, NY, UC).
 ——— 10012, Jamaica, Blue Mountain Peak, 6000 ft. (S, GH, US).
 ——— & Killip 685, Jamaica, trail from Morces Gap to Vinegar Hill, 1175–1500 m (F, GH, NY, US).
 ——— & ——— 835, Jamaica, Portland, near Vinegar Hill, 1175 m (US).
 ——— & ——— 1087, Jamaica, near Farm Hill plantation (F, GH, NY, US).

- & ————— 1090, Jamaica, near Portland Gap, 1650 m (F, GH, NY, US).
- Nichols 55, Jamaica, Cinchona (F, GH, K, MO, NY, US).
- 110, Jamaica, Blue Mountain Peak, 6000 ft. (F, GH, K, MO, NY, US).
- Orcutt 3577, Jamaica, Farm Hill (UC).
- 5497, Jamaica, Cinchona (G).
- Philipson 831, Jamaica, Blue Mountains, John Crow Peak, 5500 ft., on *Cyrilla racemiflora* (F, NY).
- 929, Jamaica, Blue Mountains, Sir John Peak, 6000 ft., on *Eugenia alpina* (NY).
- 1122, Jamaica, Blue Mountains, near New Haven Gap, 5000 ft (MO).
- Prior s.n., Jamaica, Moneague (K).
- Proctor 5969, Jamaica, St. Andrew, Port Royal Mountains, above Rose Hill, Dicks Pond trail, 3000–3500 ft. (US).
- 9618, Jamaica, Portland Parish, north slope of Portland Gap (NY).
- 10620, Jamaica, Trelawny Parish, near Ramgoat Cave, 1500 ft., on *Oreopanax* (GH, MO).
- Purdie s.n., Jamaica (K).
- Rehder s.n., Jamaica, Blue Mountains, peak below summit, 6500 ft. (GH).
- s.n., Jamaica, Blue Mountains, near Portland Gap, 5500 ft. (GH).
- s.n., Jamaica, Blue Mountains, near Content Gap, 3000 ft., on *Oreopanax* (GH).
- Seifriz s.n., Jamaica, New Haven Gap (PH).
- Shreve s.n., Jamaica, Blue Mountains, Morces Gap (S).
- Webster & Wilson 4892, Jamaica, St. Andrew, Long Mountain, back of Kingston, 750–1300 ft., on *Tabebuia* (GH).
- West & Arnold 105, 695, Jamaica, St. Andrew, Newcastle, Hardwar Gap, 4380 and 5000 ft. (GH).
- Yuncker 17413, Jamaica, near Bellevue, St. Andrew, on *Oreopanax capitatum* (F, S).
- 17694, Jamaica, Mt. Horeb, St. Andrew, on *Rhytida* (S).

An endemic of Jamaica (the report from Nicaragua, in Goyena, *Flora Nicaragüense* 2: 745. 1909, needs confirmation).

An abominable confusion reigns in the taxonomy and nomenclature of this species. A discussion of the situation up to 1914 may be found in Fawcett and Rendle's *Flora of Jamaica*. They claim, in effect, that Eichler, Grisebach, Urban, and others have misapplied the Linnaean name *opuntioides*. This epithet was originally based on a specimen in the herbarium of Sloane, and illustrated by this author in his *Voyage*. Fawcett and Rendle redescribe *D. opuntioides* in accordance to their interpretation of its early circumscription, and create a new species, *D. monstrosa*, containing those specimens not agreeing with their concept of *D. opuntioides*. Their descriptions of these two species may here be quoted.

“*D. opuntioides* nob. (non Eichl.); dioecious; the internodes more or less flattened or the inferior terete, 3–1 cm. l. to 3 or 4 mm br.; male flowers forming a single or double row on each edge of the spike, 8–20 in each joint; female flowers in 2 rows, 2 or 4 in each joint; when two, inserted under apex of joint. — Type in B.M.”

“*D. monstrosa* nom. nov.; dioecious; all the internodes flattened, phyllodelike, oblong-linear with rounded apex, sometimes becoming cuneate, 5–2 cm. l. to 2 cm. br.; male flowers 10–24 in each joint in 2–8 rows; female flowers in 2 rows, 2–6 in each joint.—”

Indeed, these descriptions are scarcely sufficient for the determination of many specimens one way or the other. The fact is that the variation of the plants involved has not been sufficiently charted to be expressed in a workable nomenclatural formula. This may, in fact, not be possible, as apomixis seems to occur in *D. opuntoides* (York, 1913). I therefore suggest a conservative attitude by including all these plants in a single species. Indeed Fawcett and Rendle admit that this may be a better procedure. I recommend this mistletoe to the attention of Jamaican botanists, as only further collections with accurate data can lead us to a reasonable position. Anyone contemplating nomenclatural changes in the future should also take into account the synonym *Razoumofskyia jamaicensis* Hoffm. This name has priority over all other synonyms of *D. opuntoides*, but was not accounted for in Fawcett and Rendle's treatment.

Considerable additional confusion has arisen through van Tieghem's epithet *gracilis*. The type of *Viscum gracile* DC. at the Delessert Herbarium doubtlessly is a *D. flagelliformis*, and van Tieghem's epithet becomes a synonym of *D. opuntoides*.

The affinities of *D. opuntoides* are obscure. Possibly *D. domingensis* is the nearest relative?

41. ***D. paucifolia*** (Rusby) Kujit, Acta Bot. Neerl. **8**: 545. 1959.

Basionym: *Phoradendron paucifolium* Rusby, Bull. N.Y. Bot. Club **6**: 501. 1910.

Illustrations: Fig. 41; Plate X.d.

Leaves varying from lanceolate through broadly elliptic to near-orbicular, up to 15 mm long, decreasing acropetally in size and grading into scale leaves. Vegetative laterals with one pair of cataphylls at about 15 mm above the axil. Basal appendages median in position. Stem terete. Probably monoecious. Spikes in compound inflorescences, the individual spikes without cataphylls, up to 6 fertile internodes each 15–20 mm long, bearing up to 18 flowers per bract in 2a seriation.

TYPE: Williams 1530, Bolivia, Cargadira, 8000 ft. (K, NY, UC).
Holotype at UC.

Specimens seen:

?Buchtien 143, Bolivia, Unduavi, 3200 m (GH, US).

Fosberg 20965, Colombia, Cordillera Oriental, Int. del Meta, confluence of Río Arroz with Río del Nevado, south slope of Páramo de Sumapaz, on Ericaceae (US).

————— 22240, Colombia, Cordillera Oriental, Dep. Boyaca, Buenavista, headwaters of Río Pauto, ridge east of Quebrada Laja, 30 km e.s.e. of Socha, 2700 m, on Ericaceae (US).

Julio 453, Bolivia, Unduavi Valley, 2000–2700 m (US).

?Killip & Smith 20057, Colombia, Eastern Cordillera, Dep. Norte del Santander, near Toledo, 1700–1900 m (GH, NY, US).

Pennell 2206, Colombia, Dep. Cundinamarca, Cerro de Focha, near Bogotá, 3100–3200 ft. (NY).

————— 14098, Peru, Dep. Cuzco, Pillahuata, Cerro de Cusilluyoc, on Myrtaceae, 2800–2900 m (F, GH, NY, PH, S, US).

?Tate 313, Bolivia, Cordillera Real, Cocopunco, 10,000 ft. (NY).
 Vargas 327, Peru, Cuzco, Paucartambo, Pillahuata, 3100 m (F, MO).

An Andean species peculiar because of the gradient in the size of its leaves. Its nearest relatives are perhaps *D. squamigera*, *D. lindeniana*, and *D. ferruginea*, from which species it differs in its variation in leaf size, and in its terminal spikes.

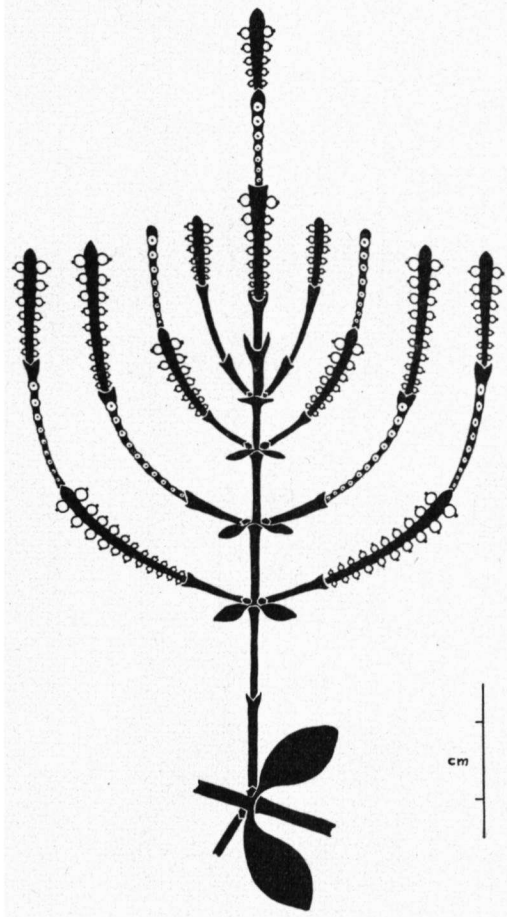


Fig. 41. *D. paucifolia*: Williams 1530, UC.

42. ***D. peruviana*** Kuijt, n. sp.

Caulis subfuscus, teres; folia longe petiolata, obtusa, usque ad 70 mm longa et 20 mm lata, inconstanter oblanceolata. Cataphylla carentia; appendices basales positione media. Spicae omnes axillares, ex internodiis fertilibus binis sterilibusque singulis compositae; flores distributione monoecia, usque ad 9 pro bractea, dispositione modo 2a.

Illustrations: Fig. 42; Plate XI.a.

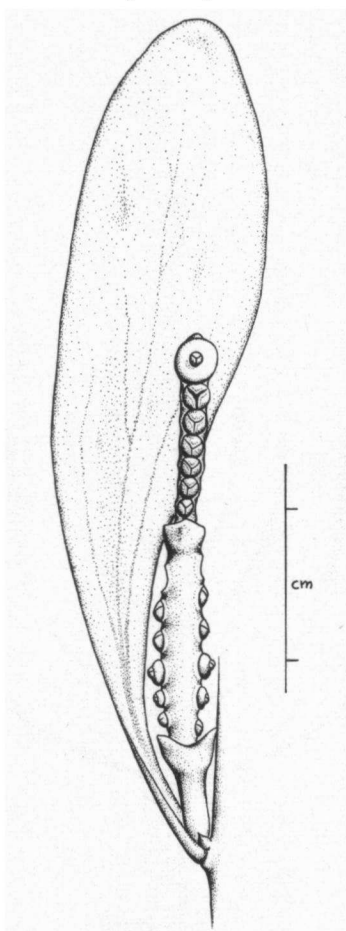


Fig. 42. *D. peruviana*: Stork & Horton 10075, F.

A large species with brownish stems, these somewhat flattened when young, terete in age. Leaves long-petiolate, obtuse, up to 70 mm long and 20 mm wide, variably oblanceolate, rather thin. Cataphylls absent from branches of any sort. Basal appendages in a median position. Inflorescence axillary only. Spike of 2 fertile internodes each longer than the sterile one, about 30 mm long, up to 9 flowers per bract in 2a arrangement. Monoecious, the staminate flowers greatly in the majority.

TYPE: Stork & Horton 10075, Peru, Prov. Chota, Cajamarca, pass south of Conchan, 2500 m (F, UC). Holotype at UC.

An exceedingly distinct species, undoubtedly part of *Eudendrophthora*, but of a rather isolated position.

43. *D. remotiflora* Urban, Symb. Ant. 7: 205. 1912.

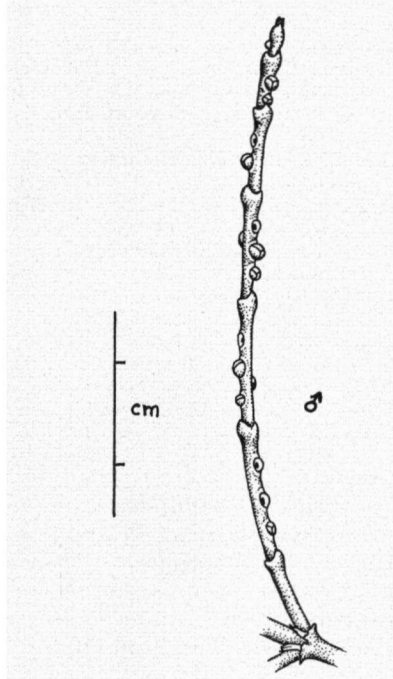
Heterotypic synonyms:

D. fuertesii Urban, Symb. Ant. 7: 505. 1913.*D. versicolor* Urban & Ekman, Ark. Bot. 23A (5): 63-64. 1930.

Illustrations:

Fig. 43; Plate XI.b.

Kuijt, Acta Bot. Neerl. 8: 510. Fig. 2a (in part) 1959.

Fig. 43. *D. remotiflora*: v. Tuerckheim 2916, K.

A squamate species of very attenuate and fine structure. All foliar appendages, including prophylls, with white membranaceous margins. Prophylls conspicuous, fused to form a single structure, either notched or entire, in a "monocotyledonous" position, i.e., between the percurrent and lateral axes (cf. Kuijt, 1959). No cataphylls evident on either vegetative or reproductive laterals. Basal appendages transversely oriented. Compound inflorescences; spikes of 6 or more fertile internodes, each ca. 15 mm in fruit or in flower, with 1-4, rarely up to 10 flowers per bract. Inflorescence 2a, but usually one series of an internode bearing a number of flowers, the other series only one flower or none. Staminate series rarely proliferating laterally somewhat, at base of internode. Dioecious. "Berry black" (Jiménez 3184), about 3 mm in diameter, spherical, with spread perianth.

TYPE: von Tuerckheim 2916, Hispaniola, Dom. Rep., near Constanza, 1250 m, on Melastomaceae, *Coccoloba pauciflora*, etc. (B, F, G, GH, K, MO, P, S, U, US). Holotype at K.

Specimens seen:

- Ekman 7054, Cuba, Prov. Oriente, Sierra Maestra, La Bayamesa, between Río Oro and Río Yao, on *Graffenrieda chrysandra*, 1100–1400 m (G, K, NY, S).
 ——— 7056, Cuba, Prov. Oriente, Sierra Maestra, La Bayamesa, between Río Oro and Río Yao, on Melastomaceae, 1100–1400 m (G, NY, S).
 ——— H-7553, Hispaniola, Haiti, Massif de la Hotte, western group, Torbec, top of Morne Formon, on *Miconia hybnioides*, 2225 m (G, S, US; type of *D. versicolor*).
 ——— H-11708, Hispaniola, Dom. Rep., Sierra de Ocoa, Prov. Azua, San José de Ocoa, Cuchilla del Pino Altravesado, on *Miconia*, 2400 m (S).
 ——— H-11889, Hispaniola, Dom. Rep., Sierra de Ocoa, Prov. Azua, San José de Ocoa, Bejucal, at Río del Canal, on Melastomaceae, 1000 m (G, S, US).
 ——— H-14046, Hispaniola, Dom. Rep., Cordillera Central, Prov. La Vega, top of Loma La Vieja, on *Miconia*, 2075 m (S, US).
 ——— 14429, Cuba, Prov. Oriente, Sierra Maestra, Río Yara-Río Palmamocha divide, 1300 m (G, K, NY, S).
 ——— 14450, Cuba, Prov. Oriente, Sierra Maestra, between Río Yara and Río Palmamocha, on *Graffenrieda*, 1300 m (S).
 Fuertes 1858b, Hispaniola, Dom. Rep., Azua ad las Cañitas, 1300 m (G, GH, NY, P; type of *D. fuertesii*).
 Jiménez 3184, Hispaniola, Dom. Rep., around Hotel Nueva Suiza, Constanza (US).
 León 10785, Cuba, region of Pico Turquino (NY, US).
 Marcano & Jiménez 3086, Hispaniola, Dom. Rep., Prov. Barahona, Cabo Rojo (US).
 Morton & Acuna 3669, 3720, 3721, Cuba, Prov. Oriente, crest of Sierra Maestra between Pico Turquino and La Bayamesa, 1350 m, on Melastomaceae (US; US; GH, K, MO, NY, UC, US).

A very slender species of the *D. flagelliformis* – *D. brachylepis* alliance, unique in its unilateral or asymmetrical seriation. Known only from eastern Cuba and Hispaniola, and apparently attacking Melastomaceae only. The type of *D. fuertesii* seems to be no more than a rather stout specimen of the present species — indeed, the collection at P was determined as *D. remotiflora* by Urban himself.

44. **D. roraimae** (Oliv.) Ule, Bot. Jahrb. **52**, Beibl. **115**: 49. 1914.

Basionym: *Phoradendron roraimae* Oliver, Timehri **5**: 201–202. 1886.

Illustrations: Fig. 44; Plate XI.c.

A strict plant with lanceolate to linear leaves up to 20 mm long, acuminate, rather thick. Basal appendages transversely oriented. Vegetative laterals with one pair of cataphylls, up to 10 mm above the axil, inflorescences without. Spikes 2a, axillary only, about half as long as the subtending leaf, with one, sometimes 2 fertile internodes of 3 or 4 flowers per bract. Sterile internode ca. 2 mm long. Fruit a spherical, white berry, with perianth reflexed.

TYPE: im Thurn 323, British Guiana, ledge and summit of Mt. Roraima, on dwarf shrubs: *Vaccinium*, *Baccharis*, etc. (K, US). Holotype at K.

Specimens seen:

McConnell & Quelch 82, 680, British Guiana, Mt. Roraima, 8600 ft. (K).
 Steyermark 58831, Veuezuela, summit of Mt. Roraima, northwest portion, 2620-
 2740 m (F, NY, US).

Ule 8599, British Guiana, Mt. Roraima (K).

A highly localized species obviously related to *D. paucifolia*, *D. lindeniana*, *D. squamigera*, etc. It is unmistakable because of its dense habit and small inflorescence with one fertile internode only.

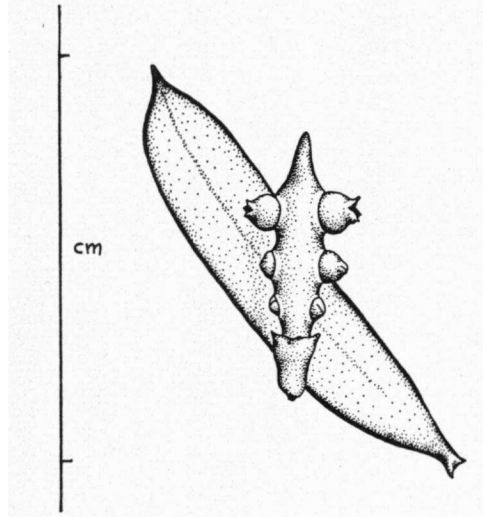


Fig. 44. *D. roraimae*: McConnell & Quelch 82, K.

45. ***D. serpyllifolia*** (Griseb.) Krug & Urban, Ber. Deutsch. Bot. Ges. **14**: 287. 1896.

Basionym: *Phoradendron serpyllifolium* Grisebach, Mem. Amer. Acad. Arts & Sci., n.s., **8**: 192. 1861.

Heterotypic synonyms:

Phoradendron macrostachyum Griseb. f. *parvifolia* Grisebach, Cat. Pl. Cub. 120. 1866.

D. biseriata Urban, Symb. Ant. **7**: 505. 1913.

D. grisebachii Eichler, Fl. Bras. **5** (2): 104. 1868.

D. wrightii auctt.

Illustrations: Fig. 45; Plate XI.d.

Relatively small plants with conspicuous and variable heterophylly, no transitional leaf forms being present. Leaves up to 10 mm long, obovate, mucronate. Lowest leaves of the plant squamate, expanded foliage from about the 4th node up to the 8th node; thence scale leaves into the compound inflorescence, but the node supporting the terminal

spike often with expanded leaves, and sometimes with several pairs immediately below. High up in the plant the basal appendages of lateral branches usually are cataphylls, followed by foliage leaves; in lower parts, expanded leaves may be the first appendages. One pair of foliage leaves may have a pair of scale leaves directly below and one above, as in figure 45. Rarely a plant has expanded foliage only (Wright 2652). Basal appendages always of a transverse position. One pair of cataphylls on vegetative laterals as a rule; lowest spikes of a compound inflorescence with 1-3 pairs, upper ones without. In older plants terminal spikes may result in a dichasial habit. When several sterile internodes per spike, the lowest one is 2-4 times as long as the distal sterile one. Inflorescence 2a, 3 or 4 fertile internodes of 4-5 mm each, with 2-3 flowers per bract. Monoecious?

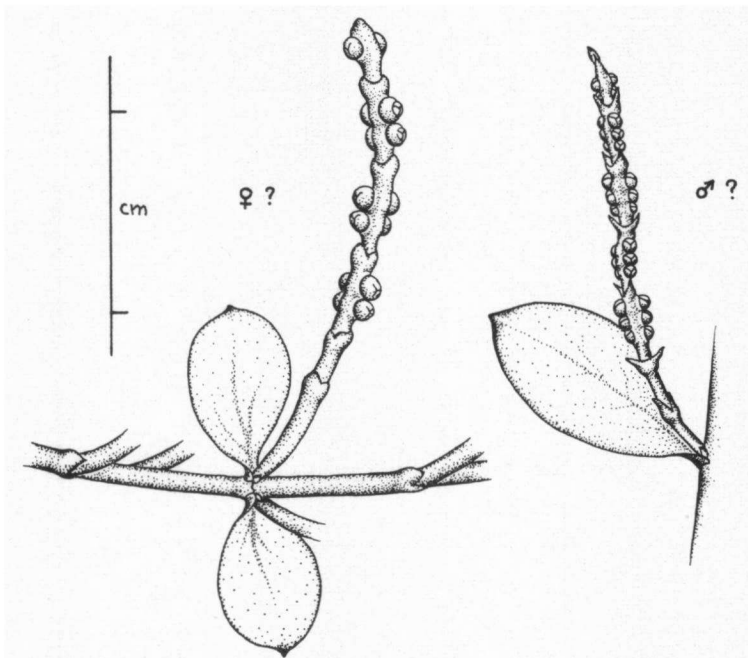


Fig. 45. *D. serpyllifolia*: Wright 2652, K (left), Fuertes 1465, U (right).

TYPE: Wright 1254, Cuba, near Monte Verde, on Euphorbiaceae? (G, GH, K). Holotype at GH.

Specimens seen:

Britton 2239, Cuba, Prov. Oriente, Guantanamo Bay, on *Bucida* (NY, US).

——— & Cowell 9998, Cuba, Prov. Pinar del Rio, Cortes, on *Mimusops* (NY, MO, K, US).

Combs 710, Cuba, Prov. Santa Clara, Distr. Cienfuegos (F, GH, MO, P).

Ekman H-1160, Hispaniola, Haiti, Massif de la Selle, Morne Tranchant, on *Hyptiodaphne crassifolia*, 700 m (S, US).

- H-1398, Hispaniola, Haiti, Massif de la Selle, Morne la Visite, on *Gesneria bullata*, 1800–1900 m (S).
 ———— H-1594, Hispaniola, Haiti, Massif de la Selle, north slope of Morne Cabayo, on *Micromeria*, 1900 m (S, US).
 ———— H-1628, Hispaniola, Haiti, Massif de la Selle, Marigot, Jardins Bois-Pin, on *Hyptiodaphne*, 1900 m (G, S, US).
 ———— H-2844, Hispaniola, Haiti, Massif du Nord, Bayeux, Morne Brigand, on *Podocarpus angustifolius*, 800 m (S, US).
 ———— H-4681, Hispaniola, Haiti, Massif du Nord, St. Louis du Nord, Morne Baron, on *Podocarpus angustifolius*, 950 m (S).
 ———— 6259, Cuba, Prov. Oriente, Bayate at Río Piedra, on *Bucida* (G, K, NY, S).
 ———— 6426, Cuba, Prov. Oriente, Sierra de Nipe at Loma de la Estrella, on *Pera* (F, G, K, NY, S).
 ———— H-6446, Hispaniola, Haiti, Massif de la Selle, Pétionville, on *Dipholis salicifolia*, 600 m (S, US).
 ———— H-6585, Hispaniola, Haiti, Massif de la Hotte, eastern group, Petit-Gonave, Fort-Gary, on *Sapium buchii*, 1175 m (S).
 ———— H-6882, Hispaniola, Haiti, Massif de la Selle, group Morne des Commissaires, Grand-Gosier, on *Croton angustatus*, 1675 m (S).
 ———— H-7438, Hispaniola, Haiti, western group of Massif de la Hotte, Torbec, on *Scolosanthus densiflorus*, 1500 m (S).
 ———— H-7728, Hispaniola, Haiti, Massif de la Selle, Croix-des-Bouquets, Badeau, on *Cestrum*, 1650 m (GH, S, US).
 ———— H-8739, Hispaniola, Haiti, Ile la Gonave, Morne Fort-Coeur, on *Dipholis salicifolia*, 500 m (S).
 ———— H-8935, Hispaniola, Haiti, Grande Caimite, near Les Abricots, on *Dipholis salicifolia*, 150 m (S, US).
 ———— 10177, Cuba, Prov. Oriente, Guantanamo, near Playa de Cuzco, on *Bucida* (G, S, NY).
 ———— H-11976, Hispaniola, Dom. Rep., Sierra de Ocoa, Prov. Azua, San José de Ocoa between Los Corozas and Bejucal, on *Exostema elegans*, 1300 m (S).
 ———— 17437, Cuba, Prov. Pinar del Río, Toscano (F, G, K, NY, S).
 ———— 18949, Cuba, Prov. Santa Clara, Siguanea-Trinidad Mountains, Pico Potrevillo, on *Tabebuia*, 1000 m (K, S).
 Eyerdam 327, Hispaniola, Haiti, Grande Cayemite, Les Abricots (F, GH, MO, NY, US).
 Fuertes 1465, Hispaniola, Dom. Rep., Prov. Barahona, in cacumine Nocha Buena, 1800 m (G, GH, P, U) the type of *D. biseriata*.
 Hióram 4268, Cuba, Prov. Oriente, Camino de Cannanera (NY).
 Holdridge 1959, Hispaniola, Haiti, Morne des Commissaires, Boncan Chat, 1575 m, on *Eugenia* (US).
 Jack 7897, Cuba, Prov. Santa Clara, Las Lagunas, Buenos Aires, 2500 ft. (GH, NY).
 ———— 8591, Cuba, Prov. Santa Clara, Buenos Aires, Trinidad Hills, 2500–3500 ft. (NY).
 León 11558, Cuba, Havana, Loma de la Pita San Miguel de Casanova, on *Harpalyce cubensis* (NY, US).
 Leonard 4379, Hispaniola, Haiti, near Furcy, top of Mt. Tranchant, 1800 m (NY, US).
 ———— & Leonard 15172, Hispaniola, Haiti, Haut Piton ridge near Bassin Bleu, 630–1500 m (NY, US).
 Ramon de la Sagra s.n., Cuba ? (P).
 Wright 2652, Cuba (G, GH, K, MO, NY, P, S, US).

There are some uncertainties in the above determinations. Most of the Ekman specimens had been determined as *D. wrightii*, the type of which, however, belongs in *D. flagelliformis*. The main difficulty, perhaps, in the identification of this species is the fact that it often loses its leaves and then becomes difficult to separate from such a species as *D. cupressoides* or even *D. flagelliformis*. Indeed, *D. serpyllifolia*

seems to be intermediate in many respects between these two species. It is an interesting fact that Ekman 2844 & 4681 (which appear leafless) have gymnospermous hosts, *Podocarpus*, as in many collections of *D. cupressoides*. The type and other collections of *D. biseriata* seem to have no greater differences from the present species than more slender, acute scale leaves, and can almost surely be regarded as conspecific. Known only from Cuba and Hispaniola.

46. ***D. sessilifolia*** (Griseb.) Krug & Urban, Ber. Deutsch. Bot. Ges. **14**: 285. 1896.

Basionym: *Phoradendron sessilifolium* Grisebach, Mem. Amer. Acad. Arts & Sci., n.s., **8**: 191. 1861.

Heterotypic synonym:

D. amoebandra Sauvalle, Anal. Acad. Ci. Méd. Fís. Nat. Habana **7**: 345-346. 1870.

Illustrations: Fig. 46; Plate XI.e.

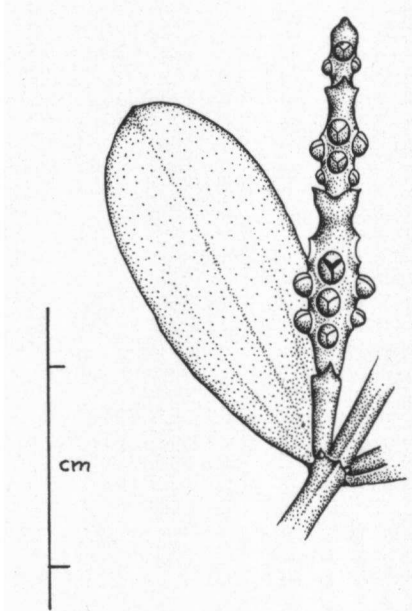


Fig. 46. *D. sessilifolia*: Wright s.n., K.

Leaves sessile, elliptic to narrowly obovate, acute to slightly mucronate, somewhat leathery, up to 15 × 30 mm. Stem 4-winged, the largest wings directly below the leaves. Vegetative laterals with one pair of cataphylls up to 11 mm above the axil, sometimes 2 pair very near the axil, rarely without; inflorescence without. Basal appendages in transverse plane. Spikes axillary only, of at least 3 fertile internodes

each 6–8 mm in flower. Inflorescence type 2b, the median series often initiated at a higher level than the median one. Dioecious?

TYPE: Wright 1301, Cuba, near La Perla, on *Ternstroemia* (G, GH, K, MO, P, PH, S, US). Holotype at GH.

Specimens seen:

Ekman 15179, Cuba, Prov. Oriente, Sierra de Nipe, high cascades of Río Piloto, 700 m (G, NY, S).

Wright s.n., Cuba, Prov. Pinar del Río, Bahía Honda, Las Pozas (K, NY, S, US; to be regarded as the type of *D. amoebandra*).

—— 3670, Cuba (GH; possibly the same as the previous collection).

A very distinct species apparently very near *D. tetrastachya*. These two are the only known species with a 2b inflorescence, and are therefore difficult to relate to the rest of the genus at present. *D. sessilifolia* is a Cuban endemic.

47. ***D. squamigera*** (Benth.) Kuntze, Rev. Gen. p. 585. 1891.

Basionym: *Viscum squamigerum* Benth., Plantae Hartw. p. 190. 1845.

Homotypic synonym:

Phoradendron squamigerum (Benth.) Oliver, Vidensk. Meddel. (1864): 176.

Heterotypic synonyms:

D. biserrula Eichler, Fl. Bras. 5 (2): 104. 1868.

D. geniculata Rizzini, Rodriguésia 18-19: 219–220. 1956.

Illustrations:

Fig. 47; Plate XII.a.

Rizzini, Rodriguésia 18-19: 219–220. 1956.

Rizzini, Ann. Miss. Bot. Gard. 47: 263–290, fig. 78. 1960.

A squamate, strict species. Stem terete. At least in the Costa Rican material, the very base of the plant bears 2 or 3 pairs of small foliage leaves, grading into scale leaves above. These basal leaves up to 12 mm long, lanceolate, fleshy. Vegetative laterals and inflorescences without cataphylls. Prophylls small, dark, tooth-like. Basal appendages median in position. Monoecious; in Costa Rican material lowest flowers of an internode staminate, upper ones pistillate; vestigial styles visible in the former. Berries spherical to slightly flattened, pearly white, up to 7 mm in diameter. Spikes of one to 2, rarely up to 4 fertile internodes; sterile internode up to 13 mm, fertile one 5–40 mm, at most 20 flowers per bract, becoming flattened to 4 mm wide. Spikes arising from one node often exact mirror images of one another. Inflorescences arranged into compound ones, but terminal spikes seen only in the Guatemalan specimen. Inflorescence type 2a, series sometimes proliferating at base of old fertile internodes.

HOLOTYPE: Hartweg 1046, Colombia, Prov. Popóyan, Pitayo (K).

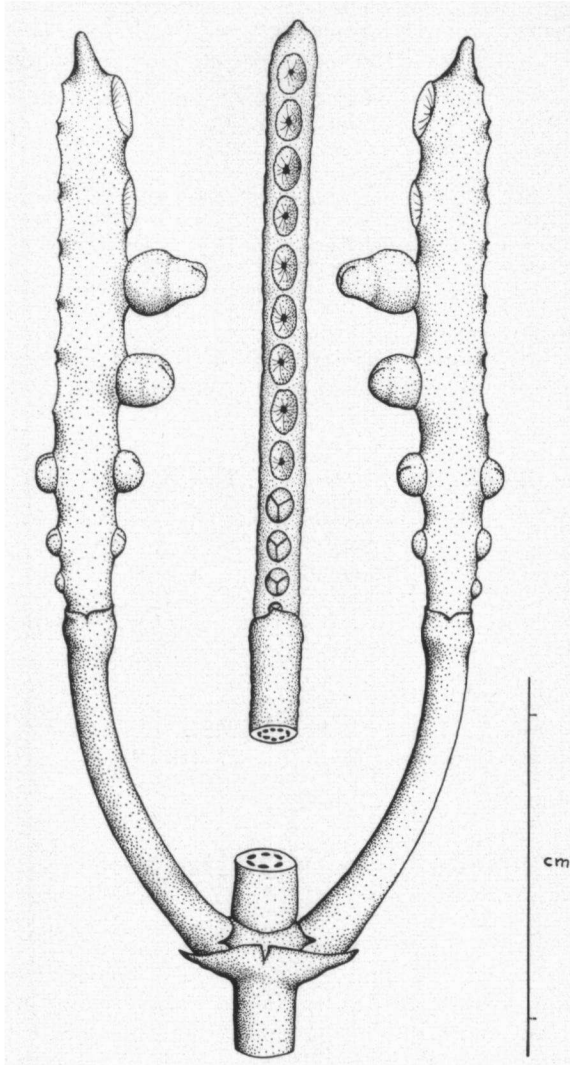


Fig. 47a. (See following page)

Specimens seen:

Agredo 504, Colombia, El Tambo, Munchique (F).

Allen 5402, Costa Rica, upper slopes, Volcán Irazú, near Finca Coliblanco, 8000–9000 ft. (G, US).

André 43330, Cisne ? (K).

Biolley 974 (see Pittier 974).

Brenes 17, Costa Rica, Prov. Llanurus, summit of Volcán Irazú, 3400 m (NY).

Cuatrecasas 20618, Colombia, Dep. del Valle, Bugalagrande River, Cuchilla de Barragán, 3250–3270 m (F).

————— & Barriga 10226, Colombia, Dep. Norte de Santander, Pamplona, 2770 m (F, US).

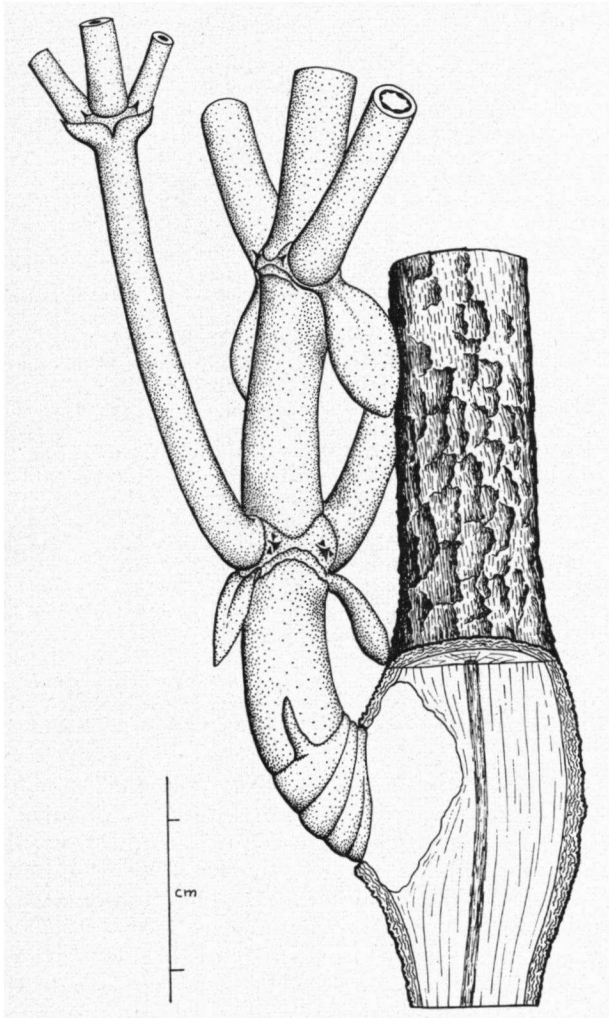


Fig. 47b. *D. squamigera*: Kuijt 1532.

Fassett 25944, Colombia, Dep. Norte de Santander, valley of Río Chitaga, 10 km south of Pamplona, paramo at Sarare road, 8500 ft (NY, US).

Friedrichsthal s.n., Guatemala (K).

Grant 9402, 9403, Colombia, Dep. Cundinamarca, Cordillera Central, Cerro Negro, Hato Grande, ridge east of Río Muchindote, 15 km east of Gacheta, on *Vaccinium* (US).

Hatch 191, Costa Rica, southern ridge of Irazú (F).

Holm & Iltis 587, Costa Rica, Prov. Cartago, Cordillera de Talamanca, Pan-American Highway, 5 km above Millsville, on *Clethra*, 3400–3500 m (F, G, NY, MO, U).

Killip 9788, Colombia, Dep. Caldas, New Quindio trail to summit of Cucarronera, Cordillera Central (GH, NY, PH, US).

——— & Hazen 9433, Colombia, Dep. Caldas, Magaña, old Quindio trail, Cordillera Central, 3200–3300 m (GH, NY, PH, US).

- & Smith 20740, Colombia, eastern Cordillera, between Toledo and Pamplona (F, GH, K, NY, US).
- Kuijt 1532, Costa Rica, about 1 mi. below rim of Volcán Irazú, on *Holodiscus argenteus* and *Vaccinium consanguineum* (CR).
- Kuntze 2360 ?, no legible data (NY).
- Linden 1349, Colombia, Pamplona (G, P).
- Niederlein s.n., Costa Rica, Volcán Irazú, 3300 m (US).
- Pennell 2431, Colombia, Dep. Cundinamarca, 2-4 mi. southwest of Sibate, 2700-2800 m (F, GH, MO, NY, US).
- Pittier 974, Costa Rica, Volcán Irazú (P).
- 3073, Panama, Chiriquí Volcano, around El Potrero Camp, 2800-3000 m (GH).
- 14118, Costa Rica, Volcán Irazú, La Playita, 3300 m, on Myrsinaceae (US).
- Quiros 807, 863, Costa Rica, Volcán Irazú (F).
- von Sneidern 1144, Colombia, Distr. Cauca, El Tambo, near Munchique (F, NY, S).
- Standley 35057, Costa Rica, Volcán de Turrialba (F, US).
- & Valerio 43891, 44019, Costa Rica, Prov. San José, Cerro de las Vueltas, 2700-3000 m (F, US).
- Steyermark 55609, Venezuela, Distr. Federál, Cordillera del Avila, between Los Venados and Pico Oriental, 1675-2640 m (F, GH, MO, NY, US).
- Stork 2386, Costa Rica, Irazú, La Pastora, 9000 ft (F).
- 2899, Costa Rica, Volcán Irazú, 10,500 ft (F).
- Terry 1333, Panama, Prov. Chiriquí, near Volcán de Chiriquí, Boquete District, 11,200 ft. (F, GH, MO).
- Torres s.n., Costa Rica, summit of Volcán Irazú (US).
- Williams 10909, Venezuela, Distr. Federál, El Avila, 2000 m, on Flacourtiaceae (VEN; type of *D. geniculata*).
- 16004, Costa Rica, near summit of Volcán Irazú, 3200 ft. (F).
- 16301, Costa Rica, Prov. Cartago, Cordillera de Talamanca, summit of Cerro de la Muerte above cloud forest, 3300 m (F).
- & Molina 13934, Costa Rica, summit of Volcán Irazú, 3500 ft. (F).

The only difference between *D. biserrula* and the Andean plants of *D. squamigera* appears to be the greater frequency of spikes with two fertile internodes in the latter; these are rare in the Costa Rican and Guatemalan plants. Plants from Costa Rica seem somewhat more robust than many southerly individuals. The Guatemalan collection (Friedrichsthal s.n.) is very slender and profuse. *D. geniculata* is a name applied to the Venezuelan plants with branches widely spread, not strict as in typical *D. squamigera*, but surely not specifically distinct from it. Possibly *D. squamigera* may be divided into distinct subspecies when better known. Closest relatives: *D. paucifolia*, *D. lindeniana*, *D. roraimae*, etc. A species restricted to high altitudes in the northern Andes, and in more isolated populations on volcano tops and table lands elsewhere into Central America.

As I have sectioned material of this species I can testify to the unilocular condition of the anther; the major generic character is thus once more validated.

48. **D. stricta** Rusby, Descr. three hundr. n. spec. S. Am. pl., etc., pp. 13-14. Publ. by author, New York, 1920.

Illustrations: Fig. 48; Plate XII.b.

A leafy species of slender appearance, probably pendulous in nature.

Leaves linear, up to 25 mm long. Stem nearly terete. Vegetative laterals with one pair of cataphylls 4–7 mm above axil; inflorescence without. Basal appendages in median plane. Spikes axillary only, sterile internode long (up to 10 mm), followed by one or 2 fertile internodes 4–10 mm long each, up to 8 flowers per bract in 2a arrangement. Berries spherical.

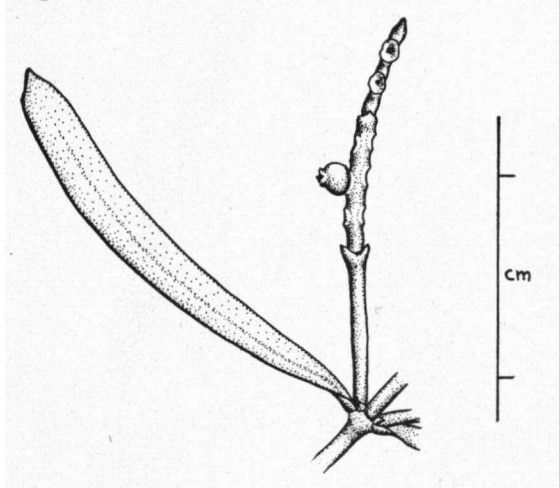


Fig. 48. *D. stricta*: Smith 1289, K.

TYPE: Smith 1289, Colombia, Santa Marta, top of San Lorenzo ridge, 7500 ft., and Horqueta Mountain, on ridge, 7500 ft. (GH, K). Holotype at K.

A species quite near *D. lindeniana*, *D. urbaniana* and others, but very distinct in its leaf shape and slender habit. Known from the type only, a collection apparently representing two different localities.

49. ***D. subtrinervis*** Urban, Ber. Deutsch. Bot. Ges. **14**: 285. Oct. 1896.

Homotypic synonym:

Phoradendron subtrinervis Rusby, Mem. Torrey Bot. Club **6**: 117–118. Nov. 1896.

Illustrations: Fig. 49; Plate XII.c.

A rather coarse plant; leaves spatulate to obovate, obtuse, thin, up to 40 mm long. Base of vegetative internodes terete, upper end flattened and expanded in plane of leaves above, especially in age. Vegetative laterals with one pair of cataphylls up to 10 mm above the axil; inflorescence without. Basal appendages of a median orientation. Spikes axillary only, with conspicuously long sterile internode. Staminate spike of more than 3 fertile internodes up to 20 mm each, perhaps 60 flowers per bract in 1b arrangement, densely crowded.

Pistillate spike of about 2 fertile internodes 7 mm long each, about 9 flowers per bract. Berries 2.5 mm in diameter, compressed, white when fresh (Killip & Smith 18379). Dioecious.

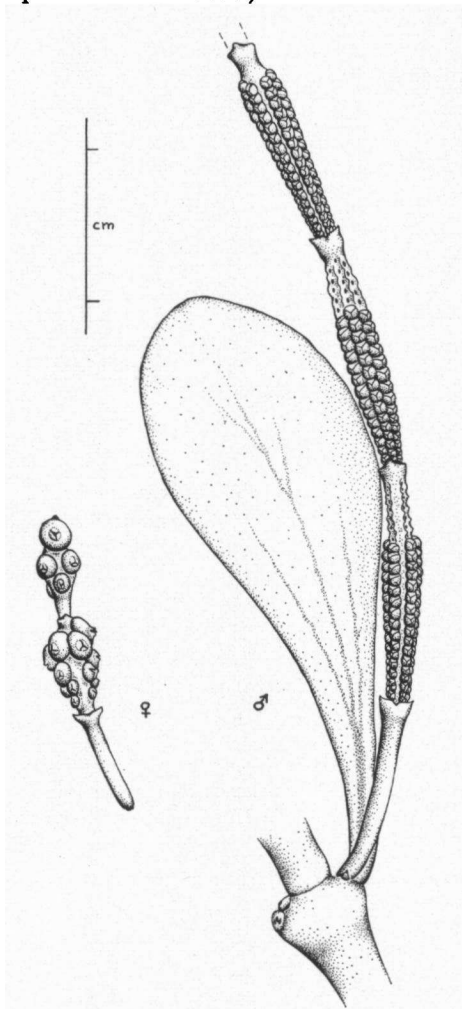


Fig. 49. *D. subtrinervis*: Bang 1549, F (left) and K (right).

TYPE: Bang 1549, Bolivia, Mapiri (F, G, GH, K, MO, NY, PH, US).
Holotype at K.

Specimens seen:

Bang 2553, Bolivia (NY, US).

Daniel 917, Colombia, Dep. Antioquía, San Pedro (US).

Killip & Smith 18085, Colombia, Dep. Santander, near La Baja, 3500 m (US).

_____ & _____ 18379, Colombia, Dep. Santander, eastern slope of Páramo de las Coloradas, above La Baja, 3300 m (US).

This species is easily distinguished by its large staminate spike, stout habit, and flattened nodes. It is one of the largest of the *Dendrophthoras*; the staminate spike is outstanding because of its prolific flower production. Nearest relatives: *D. clavata*, *D. costaricensis*, and others in *Paradendrophthora*.

50. ***D. terminalis*** Kuijt, n. sp.

Planta squamata, foliis squamuliformibus prophyllisque conspicue longis acutisque. Spicae omnes terminales?, dispositione florum more 2a, apicibus acutis; internodia fertilia circiter 3, floribus luteis 2-5 pro bractea. Ramuli laterales steriles proxime sub spicis provenientes.

Illustrations: Fig. 50; Plate XII.d.

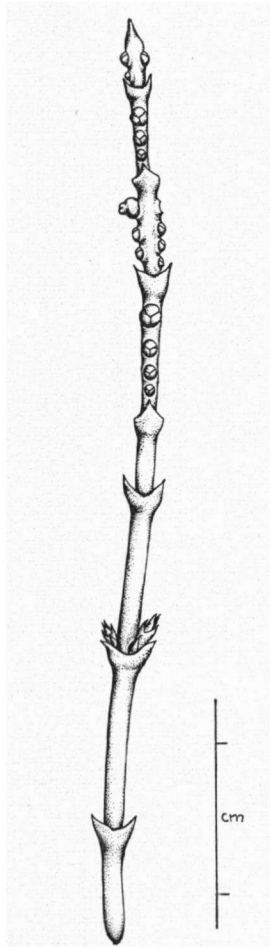


Fig. 50. *D. terminalis*: Skutch 3570, US.

A squamate species, about 20 cm high, superficially reminiscent of *D. squamigera*. Scale leaves conspicuously long and acute, widely spread when dry. Stem terete. Basal appendages in median plane. Prophylls strikingly long (2 mm) and acute, almost the size of regular scale leaves, remaining prominent in age. Only terminal spikes seen; these of 3 or 4 fertile internodes 5–10 mm long each with 2–5 flowers per bract in 2a seriation. Monoecious, but pistillate flowers apparently rare; staminate flowers about 1 mm in diameter, golden yellow. Apex of spike acute. One or two internodes below the proximal fertile internode lateral branches develop in the axils of scale leaves, producing a somewhat dichasial habit.

TYPE: Skutch 3570, Costa Rica, Vara Blanca de Sarapiquí, north slope of Central Cordillera, between Poás and Barba volcanoes, 1680 m, on *Clusia* (GH, US). Holotype at US.

Although I have seen only a single collection, I have no doubt that it represents an undescribed species, the third species from Costa Rica. At first sight it may be mistaken for one of the other local species, *D. squamigera*. It differs strikingly, however, in the apparent absence of axillary spikes and the presence of terminal ones. These features, as well as the prominent prophylls and the dichasial branching habit, make close relatives difficult to find, although there is no doubt as to its status within subgenus *Eudendrophthora*.

51. **D. ternata** Urban, Symb. Ant. 7: 506. 1913.

Illustrations: Fig. 51; Plate XIII.a.

Large leafy plants on an entirely ternate organization: each node has a whorl of 3 leaves or cataphylls, in position alternating with those of the next node. Leaves broadly elliptic to obovate, mucronate, with rather obvious veins when dry, rather thick, with conspicuous gray margins. Young stems triangular in cross-section, slightly winged; older ones terete. Vegetative laterals with one trio of cataphylls about 6 mm above the axil. Inflorescence a ternate form of 2a, axillary only, with sterile internode about 10 mm long; apex obtuse. Staminate spikes with 3 fertile internodes, the largest of which 18 mm with up to 15 flowers per bract. Pistillate also of 3 fertile internodes about 4 mm long each, only one flower per bract. Floral cups with fimbriate rims. Fruit spherical, 5 mm in diameter, with conspicuously reflexed perianth. Dioecious.

TYPE: Fuertes 1523, Hispaniola, Dom. Rep., Prov. Barahona, in forest at Arroyo Secco, 400 m, staminate (F, G, GH, K, P, U, US). Holotype at U.

Specimens seen: (all pistillate)

Ekman H-9082, Hispaniola, Haiti, Plaine Centrale, St. Michel de l'Atalaye, near Diègue, on *Byrsonima lucida*, 450 m (G, S).

——— H-10430, Hispaniola, Haiti, Massif de la Hotte, western group, Les Roseaux, Hab. Léger, on *Byrsonima tenuifolia*, 400 m (GH, S, US).

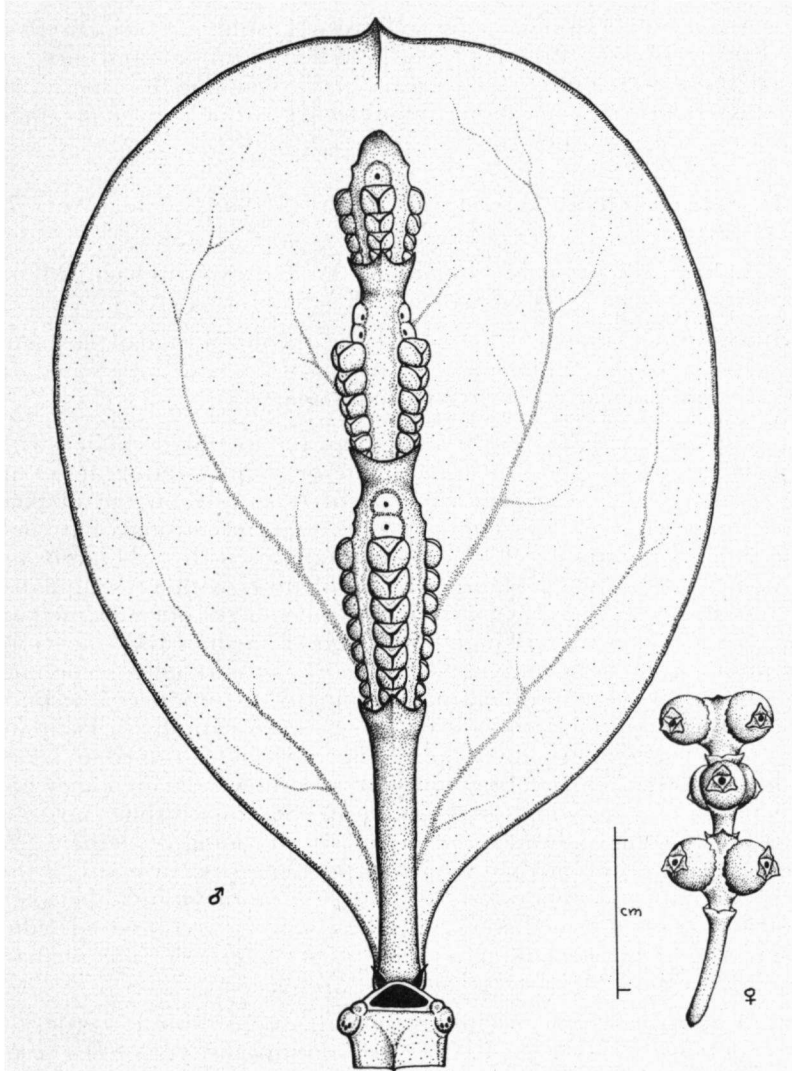


Fig. 51. *D. ternata*: Fuertes 1523, U (left, $\times 4$) Ekman H-13345, S (right).

- H-10750, Hispaniola, Haiti, Massif de la Hotte, western group, Corail, at Dutreuil, on *Byrsonima tenuifolia*, 250 m (S, US).
 ———— H-13345, Hispaniola, Dom. Rep., Prov. Santo Domingo, Llanos Costero, Cuenca, on *Amomis caryophyllacea* (S, US).

The ternate organization of this species is so unique that, until visiting the Stockholm herbarium, I suspected the type to be a teratological specimen of another species. Such doubts are quite removed by the Ekman collections, which also supply information on the structure of pistillate plants. The species is known from Hispaniola

only. I have discovered no close relatives. Possibly *D. tetrastachya* is the nearest species; although greatly different in inflorescence, in general habit it resembles *D. ternata*. I am assigning the species to subgenus *Eudendrophthora*, as the inflorescence is really no more than a ternate edition of the 2a type.

52. **D. tetrastachya** (Wright ex Griseb.) Urban, Symb. Ant. 7: 205-206. 1912.

Basionym: *Phoradendron tetrastachyum* Wright ex Grisebach, Mem. Amer. Acad. Arts & Sci., n.s., 8: 191. 1861.

Illustrations: Fig. 52; Plate XIII.b. (the illustration of the pistillate spike is an unfortunate choice, as it appears to be based on a teratological spike; cf. Introduction)

Large plants with leaves broadly obovate to oblanceolate, with conspicuous gray margin and mucronate or slightly retuse apex, up to 70 mm long. A heavy midrib evident especially on the abaxial surface. Stem with 2 sharp ridges below leaves, rarely strongly flattened (Eggers 5174, Fuertes 1259). Vegetative laterals with 1-3, rarely up to 5 pairs of cataphylls. Inflorescences sometimes without cataphylls, more usually with about 3 pairs. Basal appendages often in median plane, but in some (e.g., Ekman 9540) of both median and transverse orientation on the same individual. Spikes 2b, axillary only, secondary ones common; rarely proliferating terminally to produce a second, younger spike, separated from the old one by a few cataphylls. Pistillate spike of 3-6 fertile internodes, about 5 mm each in fruit, median series one or 2 flowers each, intermedian series one flower. Fruit somewhat elliptic, 5 mm long, with spread perianth. Staminate spike up to 7 sterile and 5 fertile internodes, then ca. 40 mm long altogether, 2-4 flowers in each of the median and intermedian series. In many of the larger staminate internodes an additional seriation occurs: between the median and intermedian series other flowers are inserted, constituting 4 more series, making a total of 8 per internode. The median series usually highest. Dioecious.

TYPE: Wright 218, p.p., in Cuba Orientali, prope Monte Verde, on *Guettarda* (G, GH, K, P, PH; also contains the type of *D. grandifolia* at P). Holotype at GH.

Specimens seen:

- Clement & Chrysogone 4430, Cuba, Prov. Oriente, Sierra de Moa, Monte de la Breña, 500 m (US).
 ——— & ——— 4478, Cuba, Prov. Oriente, Sierra de Moa, near Río Cayoguán, (US).
 ———, & Alain 3953, Cuba, Prov. Oriente, Punta Gorda, Vega Cayogán, (US).
 Eggers 5174, Cuba, La Clarita, 700 m (F, GH, K, P, US).
 Ekman 2517, Cuba, Prov. Oriente, Sierra de Nipe near Río Piloto, on Rubiaceae (S).
 ——— 3154, Cuba, Prov. Oriente, Sierra de Nipe, foot of Loma Mensura (G, S).
 ——— 3349, Cuba, Prov. Oriente, Sierra de Nipe, El Taller at Río Piloto (G, NY, S).

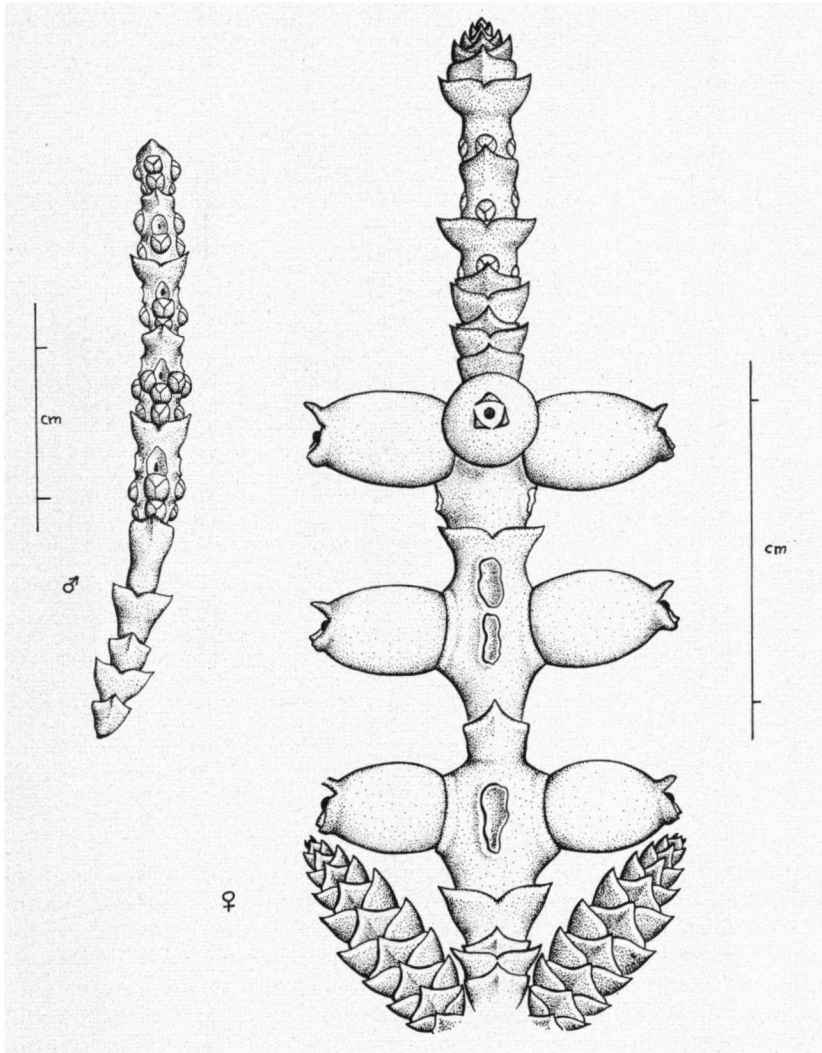


Fig. 52. *D. tetrastrachya*: Ekman H-8317, S (left), v. Tuerckheim 3108, L (right).

- 3735, Cuba, Prov. Oriente, between Taco and Nibuyon (F, NY, S).
- 4134, Cuba, Prov. Oriente, Baracoa (S).
- H-4660, Hispaniola, Haiti, Massif du Nord, St. Louis du Nord, Morne Baron, on Rubiaceae, 950 m (GH, S, US).
- 6142, Cuba, Prov. Oriente, Sierra de Nipe, Loma de la Estrella, on Rubiaceae, 450 m (S).
- H-7541, Hispaniola, Haiti, Massif de la Hotte, western group, Port-à-Piment, northwest of Morne Formon, on *Thibaudia*, 2200 m (S).
- H-8317, Hispaniola, Haiti, Massif du Nord, Marmelade, on *Exostema elegans*, 800 m (S).
- 9342, Cuba, Prov. Oriente, Sierra Maestra, Mamacal near Sevilla, on *Rheedia*, 1000 m (F, S).

- 9540, Cuba, Prov. Oriente, Sierra de Nipe, at Río Piloto, on *Croton nipens* (F, G, K, NY, S).
- H-10593, Hispaniola, Haiti, Massif de la Hotte, western group, Tiburon, Morne Sentier, on *Rheedia*, 800 m (S, US).
- H-11822, Hispaniola, Dom. Rep., Prov. Azua, Sierra de Ocoa, San José de Ocoa, Bejucal, on *Clusia domingensis*, 1400 m (G, S, US).
- H-11975, Hispaniola, Dom. Rep., Prov. Azua, Sierra de Ocoa, San José de Ocoa, between Los Corozos and Bejucal, on *Priamasia*, 1300 m (S).
- H-13378, Hispaniola, Dom. Rep., Prov. Azua, Cordillera de Neyba, El Cercado, on *Xylosma lineolatum*, 700 m (S, US).
- H-14786, Hispaniola, Dom. Rep., Peninsula de Samaná, Punta Arena, on *Calyphantes* (S).
- 15284, Cuba, Prov. Oriente, Sierra de Nipe, Woodfred, on *Guettarda* (G, NY, S).
- 19132, Cuba, Prov. Oriente, Sierra de Nipe, at Río Piedra, 200–300 m (S).
- Fuertes 1295, Hispaniola, Dom. Rep., Prov. Barahona (G, NY, P).
- León 9993, Cuba, Prov. Oriente, Loma del Gato (NY, US).
- 12139, Cuba, region of Baracoa, Sierra de Imías, Orillas del Assoya Trio on *Guettarda*, 950 m (NY).
- 12148, Cuba, southern Baracoa region, Sierra de Imías, Río del Medio (NY).
- , Clement & Alain 22520, Cuba, Prov. Oriente, Sierra de Moa, Monte de la Breña, 500 m (US).
- Morton & Acuna 3228, Cuba, Prov. Oriente, crest of Sierra Nipe, south of lumber camp, on *Eugenia*, 600–700 m (US).
- Shafer 3114, Cuba, Prov. Oriente, Sierra Nipe, along trail Piedra Gorda to Woodfred, 400–500 m (F, US).
- 4004, Cuba, Prov. Oriente, trail to Río Yamanigüey to Camp Toa (NY).
- ? ————— 8129, Cuba, Prov. Oriente, Camp La Gloria, south of Sierra Moa (NY, US).
- von Tuerckheim 3108, Hispaniola, Dom. Rep., Constanza, 1200 m (B, G, K, L, NY, S, US).
- Wright 1300, p.p., Cuba (a mixed collection: contains another element at P; not this species, perhaps *Phoradendron rubrum* at S; *D. tetrastachya* at G, K, NY, PH, US. Trelease (*Phoradendron*, p. 107. 1916.) gives Wright 1300b as the type of *P. spathulifolium* Krug & Urban, a synonym of *P. rubrum*).

Apparently a fairly common species in eastern Cuba and on Hispaniola, to which islands it is restricted. Only in *D. tetrastachya* and *D. sessilifolia* do we encounter the 2b inflorescence, which represents a very remarkable deviation from the rest of the genus. In the staminate spikes of *D. tetrastachya* it is as if the tendency for intermedian seriation has gone one step further and produced the "secondary intermedian" series between each two of the four series of an internode. The position of these additional series is similar to that of the lateral series of 1a and 1b spikes, but the series are otherwise probably not comparable. Flower position in all series is $\frac{1}{4}$. The median series is initiated first, the "secondary intermedian" is lowest on any internode.

While *D. tetrastachya* and *D. sessilifolia* are closely related, no others seem to be allied. The possibility of affinity to *D. ternata* has already been pointed out, and indeed was mentioned by Urban in his early description of that species. Perhaps the 2b inflorescence is also a modification of the 2a type ? in which case these two anomalous species may be placed in *Eudendrophthora*.

Some confusion has resulted from *Phoradendron tetrastachyum spathulifolium* Grisebach, Cat. Pl. Cub. p. 120. 1866, which according to

Trelease (*Phoradendron*, p. 107, 1916.) is really *Phoradendron rubrum* (L.) Grisebach. Perhaps following Grisebach, Hitchcock (Ann. Rept. Mo. Bot. Gard. 4: 125. 1893) lists a *Phoradendron tetrastichus* Grisebach which is likely to be a *P. rubrum*.

Shafer 8129 is a most unusual specimen because of its very slender and small spikes and its large fleshy leaves. Possibly it represents an undescribed species. Its inflorescences are intriguing. While most internodes are of the 2b type, some terminal ones are 2a. This fact in itself seems sufficient justification for inclusion of plants with 2b inflorescences in subgenus *Eudendrophthora*.

53. ***D. urbaniana*** Patschovsky, Bot. Jahrb. 45: 440-441. 1911.

Illustrations: Fig. 53; Plate XIII.c.

A small leafy species. Leaves oblanceolate with short distinct petiole, up to 15×4 mm, obtuse. Stem terete. No cataphylls present on either inflorescences or vegetative laterals. Basal appendages in a median position; prophylls rather conspicuous. Spikes axillary only, secondary ones common; very slender, of one sterile and one fertile

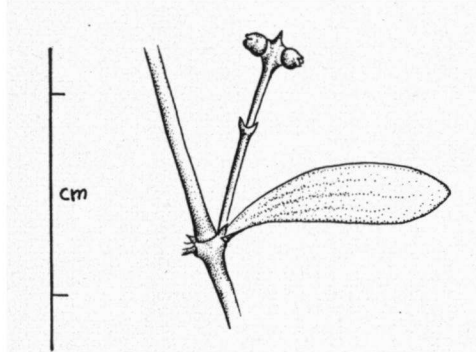


Fig. 53. *D. urbaniana*: Weberbauer 4388, G.

internode only. Sterile one up to 5 mm long. Fertile internode 3–6 mm long, with one, rarely 2 flowers per bract at the very end of the internode. Inflorescence type 2a. Dioecious. The type probably pistillate, with spherical flowers 1 mm in diameter, perianth reflexed.

HOLOTYPE: Weberbauer 4388, Peru, Dep. Amazonas, Prov. Chachapoyas, east of Chachapoyas, Tambo Ventillas, 2400–2600 m (G).

Known only from the type collection. An exceedingly distinct species because of its peculiarly slender and elongated spikes. It belongs in subgenus *Eudendrophthora* and may be related to *D. lindeniana* and *D. stricta*.

Properly speaking, Weberbauer 4404 is the type. As it does not seem to be extant any more, Weberbauer 4388 becomes the lectotype.

According to the original description the staminate plant has 1-2 fertile internodes with 6-9 flowers per bract. Berries are said to be globose, 4×3 mm at maturity.

Nomenclatural confusion is to be avoided with *Phoradendron urbanianum* Ule, a broad-leaved mistletoe also from Peru.

REJECTED SPECIES
SPECIES AND SPECIMENS OF UNCERTAIN STATUS

D. aequatoris (Urb.) Trelease, *Phoradendron*, p. 217. 1916.

Basionym: *Phoradendron aequatoris* Urban, Bot. Jahrb. 23 (5): 10. 1897. As I have pointed out previously (Acta Bot. Neerl. 8: 529. 1959) I can see no reason for inclusion of this species in *Dendrophthora*, since Urban clearly speaks of the bilocular condition of the anther. Perhaps it embarrassed Trelease's system to have a member of his "Boreales" in Ecuador! (the species lacks cataphylls).

D. fasciculata Patschovsky, Bot. Jahrb. 45: 441. 1911.

"fruticulus in *Euphorbia* crescens, rami numerosi, dense fasciculati, abbreviati, teretes vel quadranguli, usque 5–6 cm longi, in sicco plicato aphylli. Spicae ad nodos fasciculatae 4–5 cm longae, 5–7-articulatae, articulis 0,5–1 cm longis. Flores in eadem spica monoeci, saepe superiores masculi, inferiores feminei, ferruginei, 4-seriati, praeterea 2 impares subapice articuli seriem quintam et sextam formantes, in articulo quovis 8–12. Bacca alba (in sicco nigra), 0,7–1 cm longa, 0,3 cm crassa.

Peru: Unterhalb Ponto (Dep. Ancachs, Prov. Huari). Beschaffenheit des Standorts: aus Kräutern (Gräser zahlreich, aber überwiegend einjährig oder doch rasch vergänglich), Cacteen, Bromelia und Sträuchern gemischte, durchaus offene Formation 2700–2800 m (Weberbauer n. 3300.– Blühend im Juli).

No specimens seen.

D. inaequidentata (Rusby) Trelease, *Phoradendron*, p. 218. 1916, based on *Phoradendron inaequidentatum* Rusby, Bull. Torrey Bot. Club 27: 137. 1900. The type, Rusby 1544 (GH) is a *Phoradendron* closely allied to *P. piperoides*. In fact it was annotated as *Phoradendron* by Trelease himself, who later made the transfer without comment or apparent reason.

D. leucocarpa (Patsch.) Trelease, *Phoradendron*, p. 218. 1916, based on *Phoradendron leucocarpum* Patschovsky, Bot. Jahrb. 45: 438–439. 1911. The type specimen, Weberbauer 2193, from Peru, was destroyed in the Berlin holocaust in World War II. An excellent photograph survives, however, and may be seen at F, GH, and possibly other herbaria. The unreasoned transfers by Trelease are to be handled very cautiously. In this case again, there is no known reason for such a transfer. It is probably safer to leave the species in *Phoradendron* for the time being. Not to be nomenclaturally confused with *Viscum leucarpum* Rafinesque, Fl. Ludov. p. 79. 1817, a synonym of *P. serotinum* (Raf.) Johnston.

D. linearifolia Patschovsky, Bot. Jahrb. 45: 440. 1911.

“frutex glaber, in *Croton parasiticus*; rami teretes vel compresso-quadranguli, internodiis 3 cm longis. Folia sessilia, linearia, apice obtusa, 3–5,5 cm longa, 0,4 cm lata, nervis e foliorum basi abeuntibus, versus apicem evanescentibus. Spicae in axillis foliorum solitariae, sessiles, 0,5 cm longa, inarticulatae. Flores lateritii in eadem spica monoici, superiores masculi, inferiores feminei, 4-seriati, praeterea 2 apice spicae seriam quintam et sextam formantes impares. Bacca alba, 0,5 cm longa, 0,3 cm crassa.

Peru: in Gesträuch bei Sandia 2100–2300 m (Weberbauer n. 539.– Blühend im März).

No specimens seen.

D. negeriana Patschovsky, Bot. Jahrb. 45: 440. 1911.

“frutex gracilis, rami (saltem superiores) compressi, papilloso-scabriusculi, internodiis 3 cm longis. Folia opposita, minuta, subcoriacea, lanceolato-ovata, apice acuminata, basi in petiolum 0,2 cm longum angustata, 0,8–1,5 cm longa, 0,3–0,5 cm lata subcoriacea, nervis tenuibus e foliorum basi abeuntibus et versum apicem evanescentibus. Spicae ex axillis foliorum solitariae, 1–2,5 cm longe pedunculatae, 2–5 cm longae, 3-articulatae. Flores in eadem spica monoici, rhachidi semiimmersi, ferruginei, 2 seriati, in articulo 2–8.

Peru: in Hartlaubgesträuch mit einzelnen Bäumen der Berge östlich von Huacapistana (Dep. Junin, Prov. Tarma) 2500–2600 m (Weberbauer n. 2138.– Blühend im Januar).

No specimens seen.

D. nodosa Patschovsky, Bot. Jahrb. 45: 439–440. 1911.

“frutex gracilis, rami papilloso-scabriusculi, internodiis 2–2,5 cm longis. Folia lanceolata, apice obtusa, basi in petiolum 1 cm longum angustata, 4–6 cm longa, 1–2 cm lata, subcoriacea, nervis prominentibus, e foliorum basi apicem versus evanescentibus. Spicae axillares solitariae; spicae masculae 0,6 cm longe pedunculatae, 4 cm longae, 3-articulatae, filiformes, tenues. Flores dioici, rhachidi ± immersi, flavo-virides, 6-seriati, in articulo cr. 42, minuti. Stamina petalis adnata, anthera in petali medio sessili, per rimam transversam dehiscente. Spicae femineae 2 cm longae, 2-articulatae; flores 2–5 seriati, in articulo 4–15.

Peru: in Gesträuch zwischen Tambo Ischubamba und Tambo Yuncacoya (Weg von Sandia nach Chunchusmayo) 1800–2600 m (Weberbauer n. 1078.– Blühend im Juni).”

No specimens seen.

D. pavonii van Tieghem, Bull. Soc. Bot. Fr. 43: 182. 1896.

At G, P there are specimens consisting of a single or a few fertile internodes, without any data but determined *D. pavonii* by van

Tieghem. The inflorescence type is 2a, but it could belong to any of half a dozen species. I have not been able to locate any other specimens with this name at Madrid or elsewhere. This name can therefore probably be ignored.

D. pedicellata van Tieghem, Bull. Soc. Bot. Fr. **43**: 182. 1896.

The only specimen I have seen is Karwinsky 289, Mesa Crica (country?) at P. Leaves oblanceolate, ca. 10 × 30 mm. Vegetative laterals with 2 pairs of cataphylls, spikes with one inconspicuous pair. Spikes with two fertile internodes, one flower per bract; berries pedicellate. I am not at all convinced that this specimen belong to *Dendrophthora*: it looks much like a *Phoradendron* of the *P. cheirocarpum* alliance.

Dendrophthora poeppigii = *Phoradendron poeppigii* (Van Tieghem) Kuijt, Acta Bot. Neerl. **10**: 199. 1961.

D. portulacoides (Presl) Urban, Ber. Deutsch. Bot. Ges. **14**: 285. 1896.

Basionym: *Viscum portulacoides* Presl, Epim. Bot. p. 252. 1849 (1851).

“*Viscum portulacoides*; ramis ramulisque oppositis teretibus, foliis oppositis obcordatis enerviis in petiolum angustatis, spicis masculis axillaribus solitariis binisve ternisve folio longioribus aequantibusque arcuato-reflexis uni-biarticulatis, articulis floridis cylindraceutis basi floriferis, bracteis connatis cupulaeformibus, floribus trifidis rarissime quadrifidis. — Habitat in republica Ecuador. — Simile et affine praecedenti ‘(this refers to *Viscum crassuloides*)’; differt foliis obcordatis, pedunculis usque semipollicaribus crassis arcuatis in qualibet axilla solitariis vel binis ternisve; spicis quinque usque decemlinealibus ex articulis cylindricis basi floriferis uno-duobus constructis. — Articuli spicarum fusci, usque sesquilineam crassi, exsiccatione inaequaliter rugosi et scrobiculati, basi flores masculos gerentes, caeterum nudi, bractea cupulaeformi integra unam lineam longa intercepti.”

I have been unable to inspect Presl's herbarium at Prague, and can therefore not pass judgement on this species. The description does not clearly apply to one species to the exclusion of others. This name will perhaps someday replace one or more names recognized in this treatment; it may also, in turn, be replaced by the name *D. crassuloides* if the latter be separated from *D. clavata*.

D. ramosa Patschovsky, Bot. Jahrb. **45**: 440. 1911.

“frutex valde ramosus, internodiis 2 cm longis. Folia sessilia, minuta spathulata, apice angustata, 0,5 cm longa, 0,2 cm lata, integerrima, subcoriacea, nervis lateralibus utrinque tenuiter prominulis, e foliorum basi abeuntibus et versus apicem evanescentibus. Spicae in axillis foliorum solitariae, 1–1,3 cm longe pedunculatae, 1–2,7 cm

longae, 1-rarissime 2-articulatae. Flores (masculi solummodo visi) ferruginei, 4-seriati (in spicis superioribus praeterea 2 sub apice articuli seriam quintam et sextam formantes impares) 40–82 in articulo.

Peru: in Gesträuch stellenweise unterbrochen durch Moor oder Grassteppe der Berge südwestlich von Mozon (Dep. Huanuco, Prov. Huamalies) 3300–3500 m (Weberbauer n. 3369. — Blühend im Juli)."

No specimens seen.

Phoradendron rehderianum Urban, Ark. Bot. **23A** (5): 62. 1930. in the herbaria of K, P, S is determined as *Dendrophthora*. The recombination has never been made, nor does it appear to be justifiable: the collection involved is Rehder 1209, the type.

Dendrophthora repanda Heinricher, Bot. Arch. **15**: 323. 1926. A misspelling of *Dendrophthoë repanda* Blume.

D. rusbyi (Britton) Trelease, *Phoradendron*, p. 218. 1916, is based on *Phoradendron rusbyi* Britton, Bull. Torrey Bot. Club **27**: 136–137. 1900, is probably better left in *Phoradendron* for the present. Unfortunately, the type at NY was not accessible, but Rusby 1273, Bolivia, Rurrenabaque, 1000 ft., may belong to the same species, as it is determined *D. rusbyi* (NY). If the type and Rusby 1273 are conspecific we are definitely concerned with a *Phoradendron*, perhaps of the *P. crassifolium* alliance.

D. willtreleasei Stehlé, Bull. Soc. Bot. Fr., Mém. **1953-54**: 32. 1954.

"Planta parasitica pallida flavido-viridula, propendens, aphylla, glabra, ramis teretibus, internodiis 0,5–1,2 cm. longis; spicis masculis 3–6 mm longis, 1–2 articulatis, articulo inferiore 4 + 2 seriatis, 6 floro 3 mm longo, superiore vel solitario 2–6 floro, 1,5–2,5 mm longo; foveac margine circa bacca basim manifeste producto; antheris ad basim perianthii laborum affixis; baccis ellipticis vel ovali-ellipticis, 4,5 mm longis, 1,5 a 3,5 mm diametro.

Typus: H. et M. Stehlé: no 3379, in sylvis humidis, supra *Eugenia* sp., locis "Vallée du Lorrain" dicatis, alt. 480 m., Tracé des Jésuites, 12 Août 1939."

I have not been able to inspect the specimen upon which this new species is based, and can therefore not comment upon it. It is certain that these plants are not related to the only other species known from Martinique, *D. martinicensis*. Unfortunately, Stehlé does not refer to the structure of the anther and thus leaves some lingering doubts as to generic status of his specimen.

Haught 2437, Colombia, Tolima, Doima, 700 m, on low trees and shrubs (US), bearing an unpublished Treleasean herbarium epithet of *Phoradendron*, in all probability is an undescribed species of *Dendroph-*

thora. It is a rather large, slender, foliaceous plant. Stems slightly flattened below nodes, terete above nodes. Leaves with cuneate petioles, up to 80 mm long and 20 mm wide. Basal appendages in transverse plane. Spikes axillary only, secondary ones present. Staminate spikes 1b, without cataphylls, sterile internode 5 mm long, fertile internodes 3-4, up to 20 mm long each, bearing 40-60 flowers per bract. Dioecious; pistillate plant not seen.

I am not describing this collection as a new species as I am not entirely certain of its generic affinities. The long vestigial style seems to have produced a lobing in the anthers, making it difficult to establish the uni- or bilocular condition. If this plant turns out to be a *Dendrophthora* it belongs in *Paradendrophthora*, possibly near *D. subtrinervis* or *D. hexasticha*.

Penland & Summers 538, 600 (Ecuador, Prov. Bolivar, Simiatung, Hacienda Talahua, 3200 and 3100 m, F) and Rusby 1539 (Bolivia, Unduavi, 8000 ft, F) are specimens which may conceivably belong to an undescribed species of either *Phoradendron* or *Dendrophthora*. Plants are rather dense, with spatulate to elliptic leaves no longer than 15 mm. Stems terete or slightly flattened at the nodes. Vegetative laterals usually with one pair of cataphylls 5 or 6 mm above axil (Rusby 1539) or quite without (the other specimens); inflorescences without cataphylls. Basal appendages of a transverse orientation. Spikes axillary only, secondary ones present. Flower seriation apparently quite irregular, at least some spikes 1a, but some series absent at times. Spike of one fertile internode only, possibly both pistillate and staminate flowers on the same internode, the former terminal. The Rusby specimen somewhat more fleshy than the others.

I have not been able to study the anther morphology, and therefore am undecided as to the generic status of these specimens. The position of the basal appendages seems to rule out an affinity with *Dendrophthora* subgenus *Eudendrophthora*. Possibly related to *D. elliptica*.

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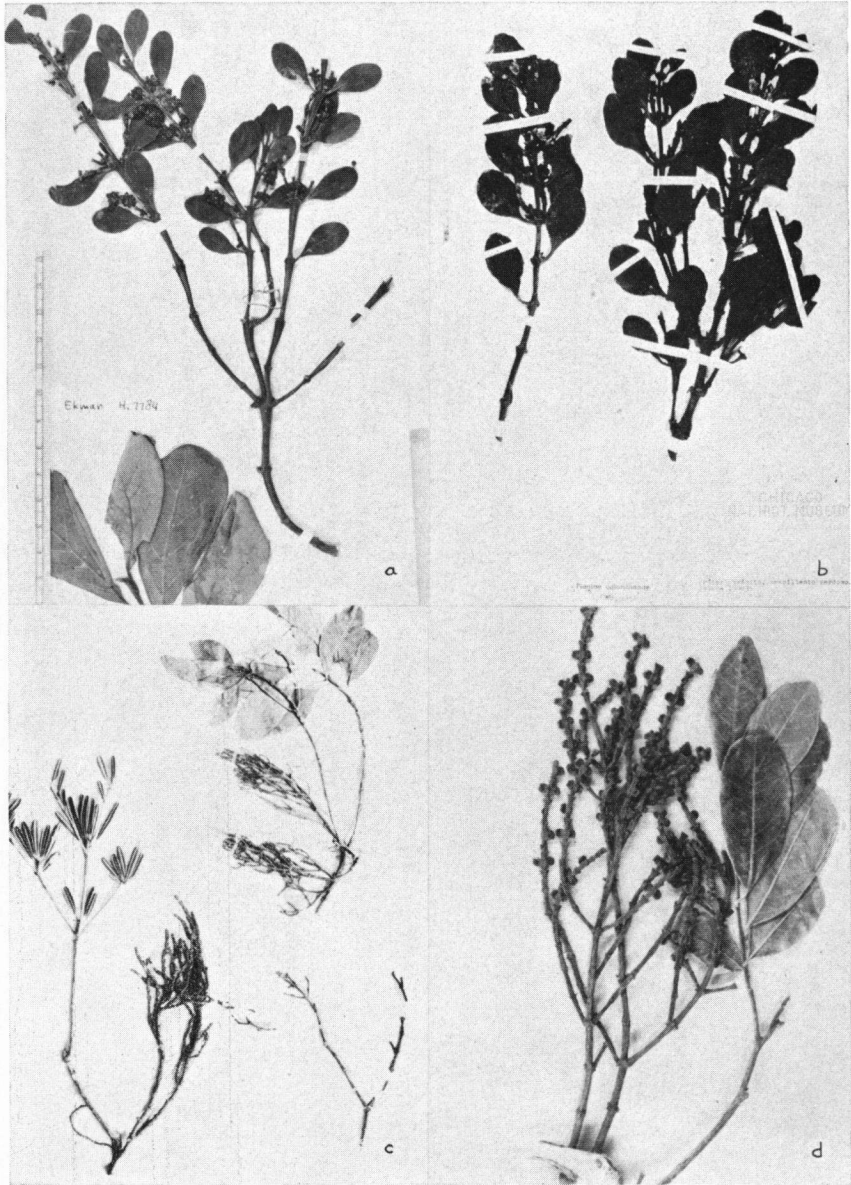


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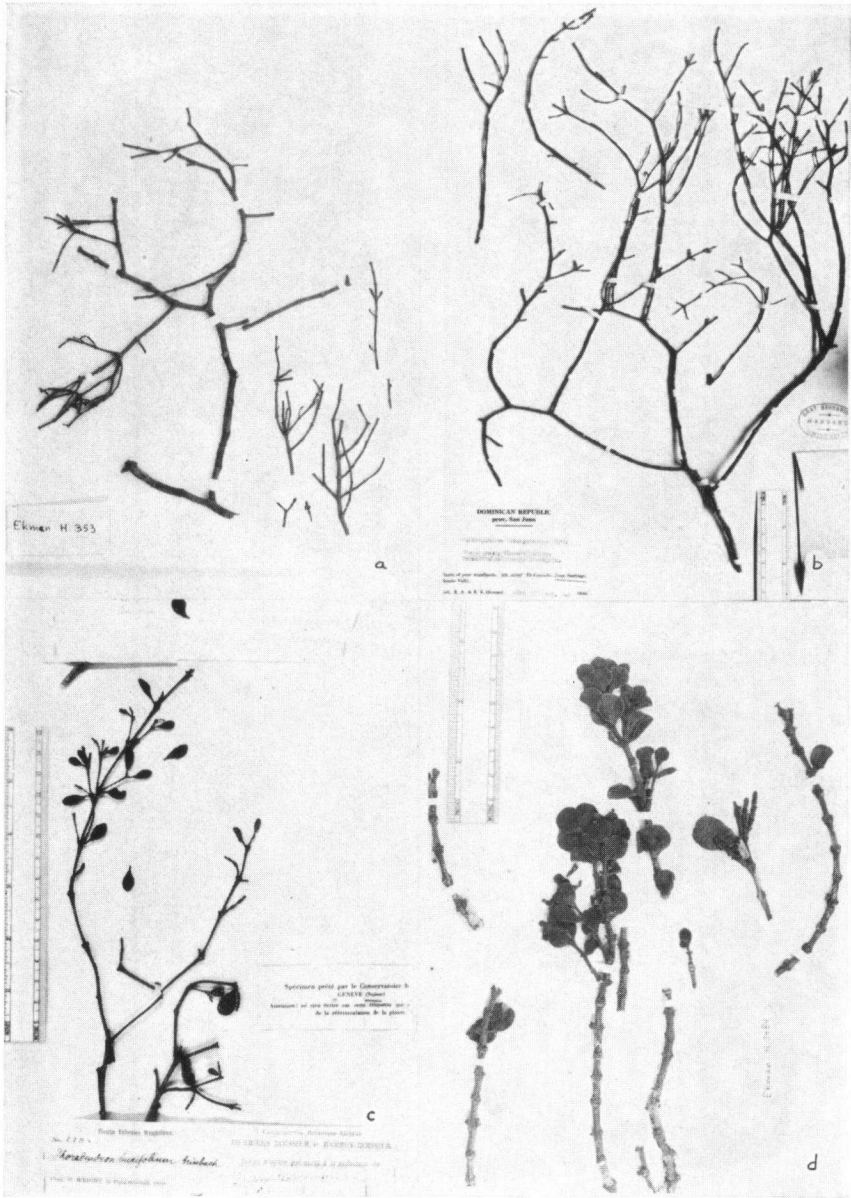


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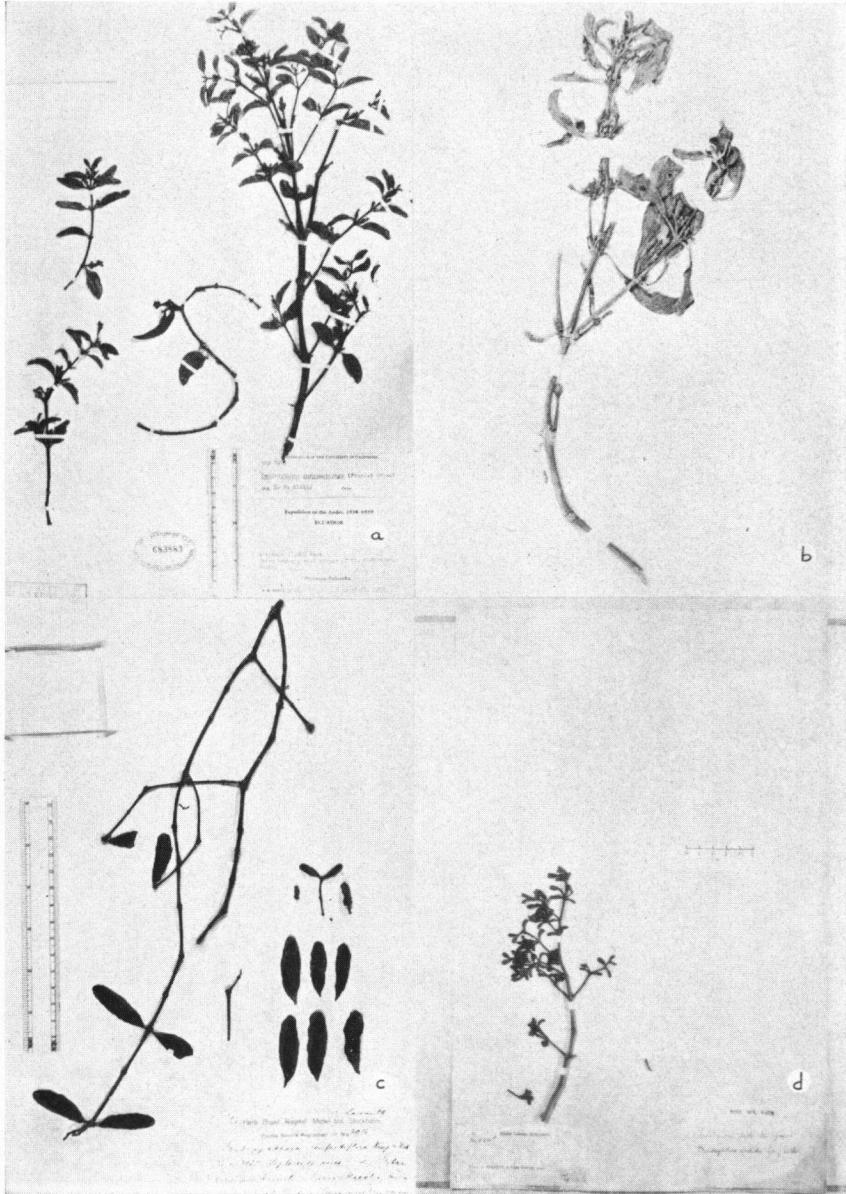


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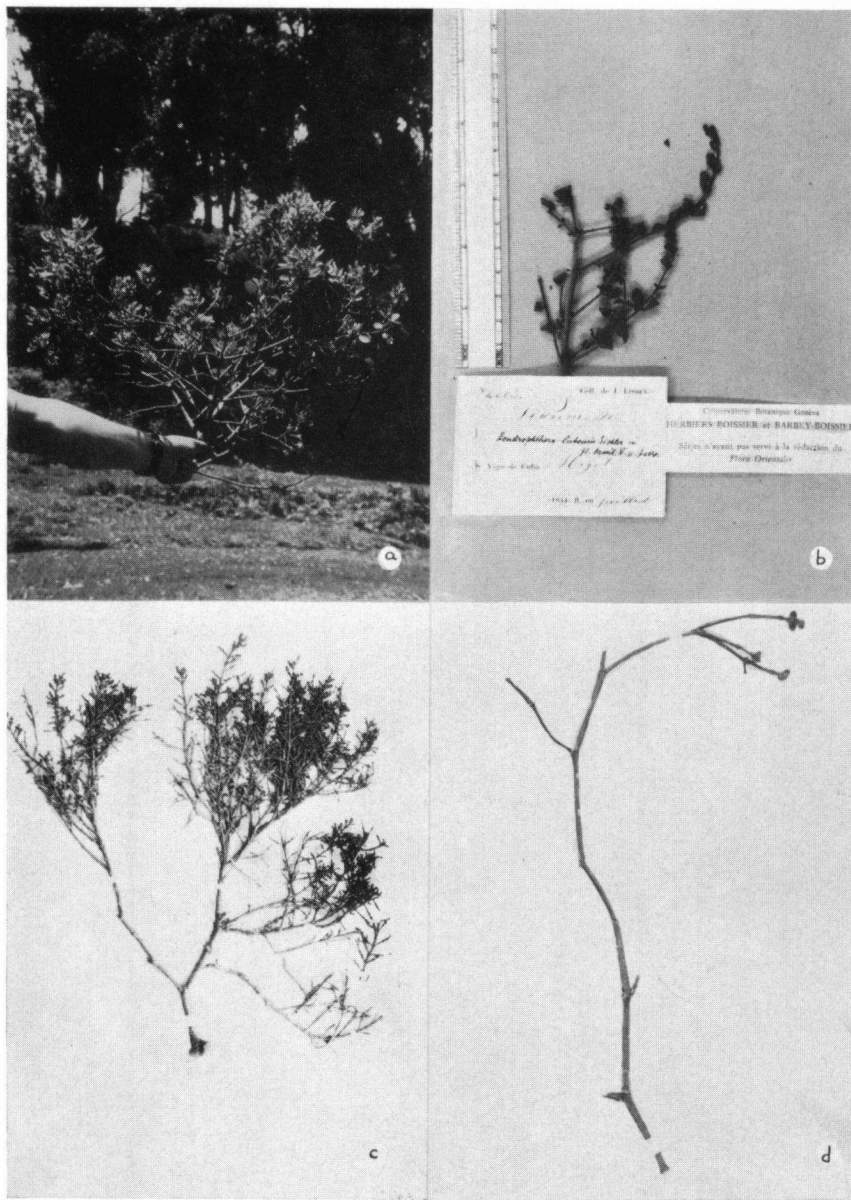


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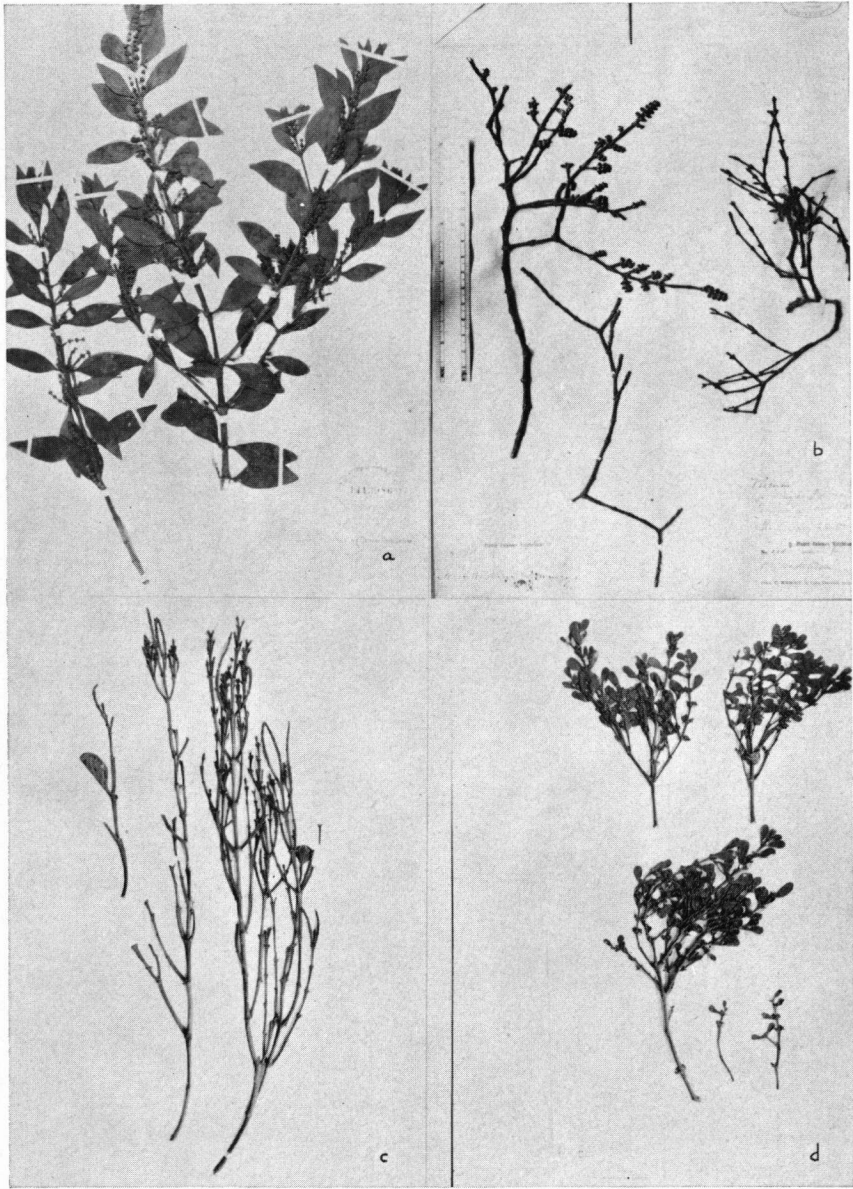


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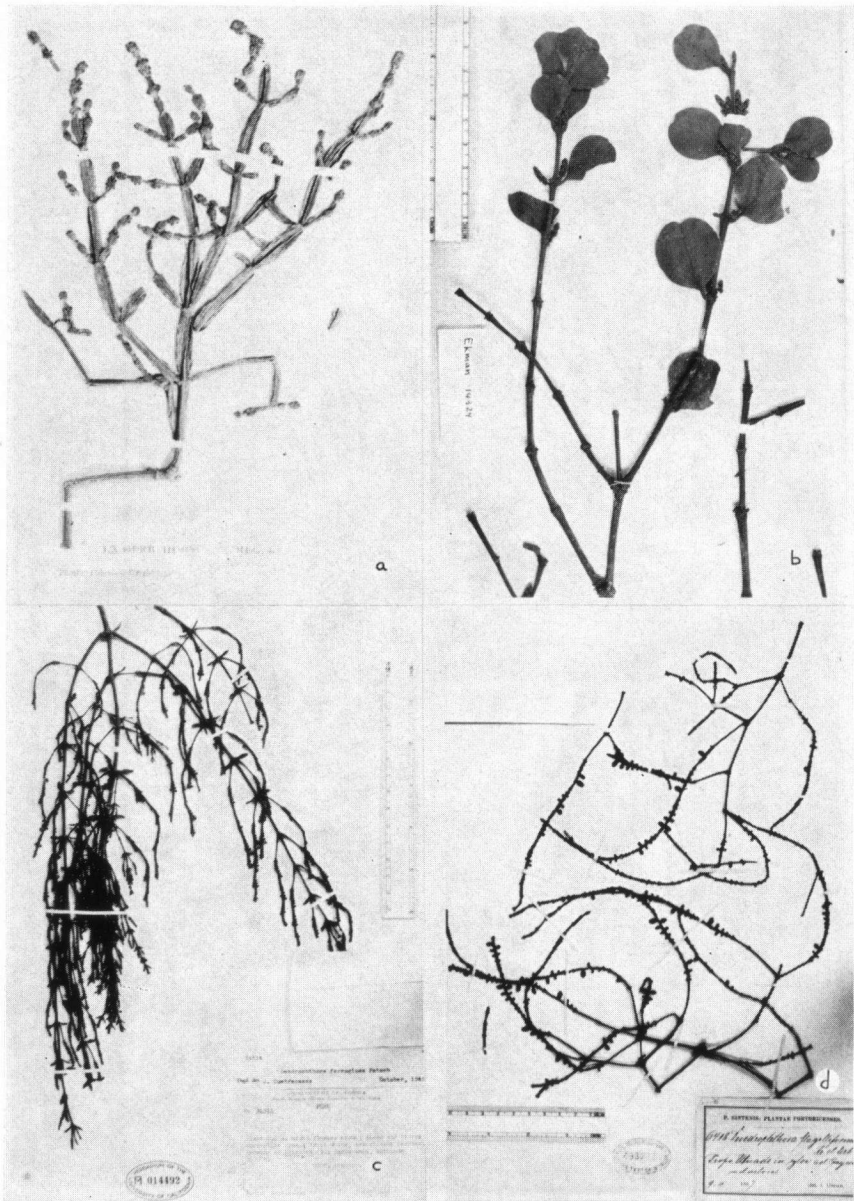


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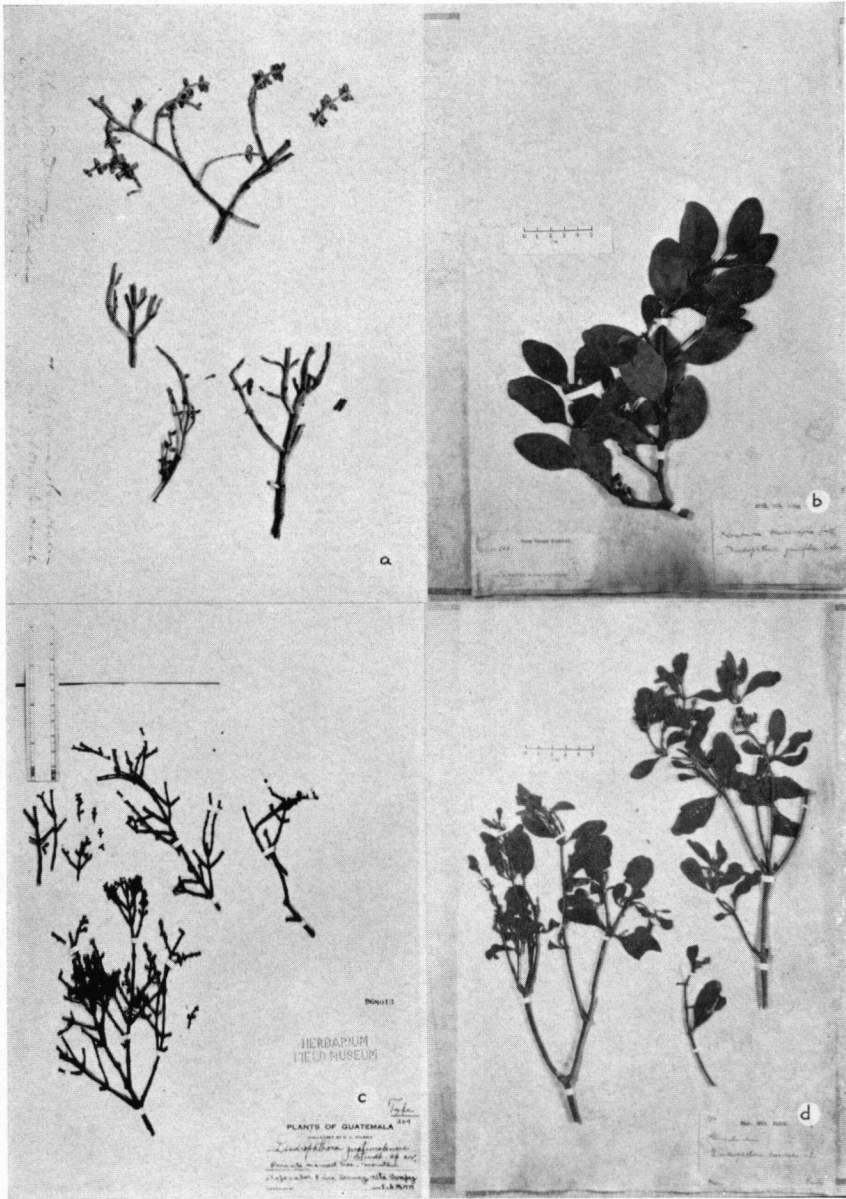
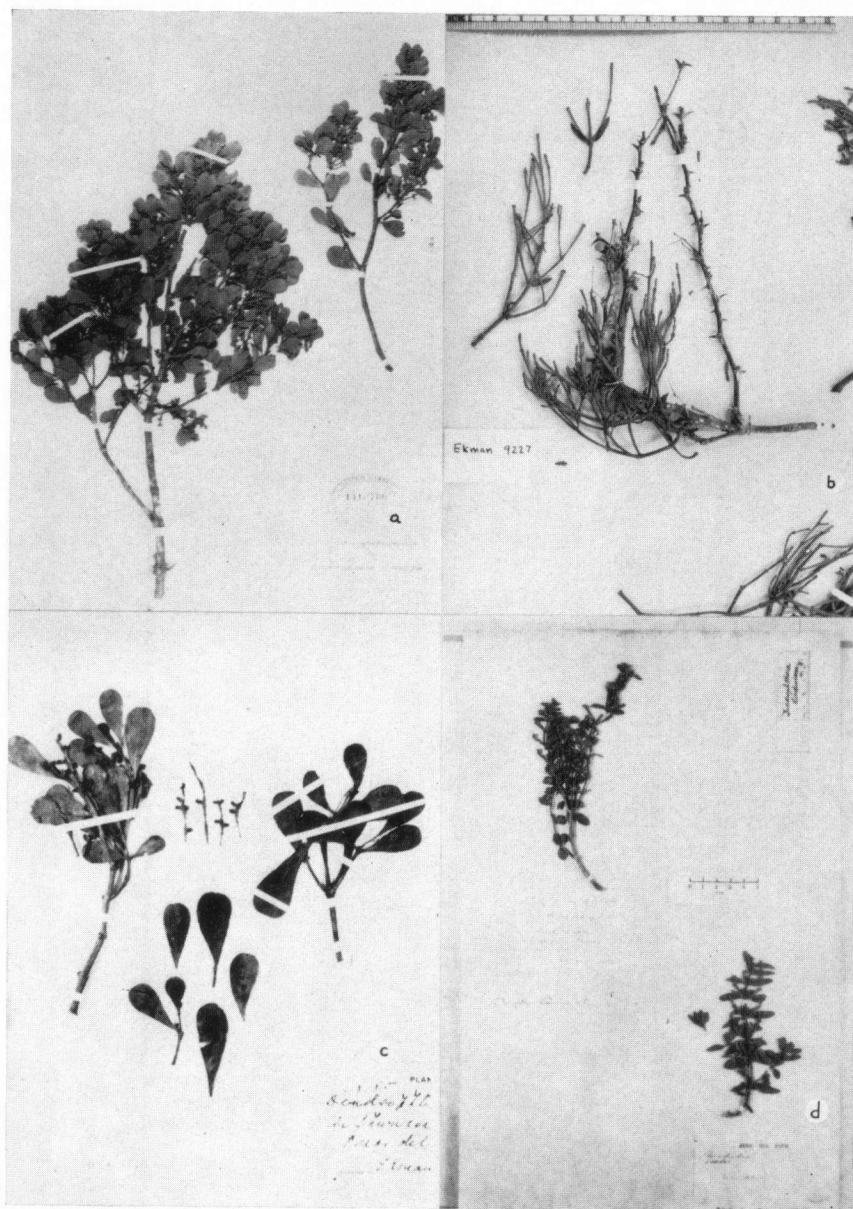


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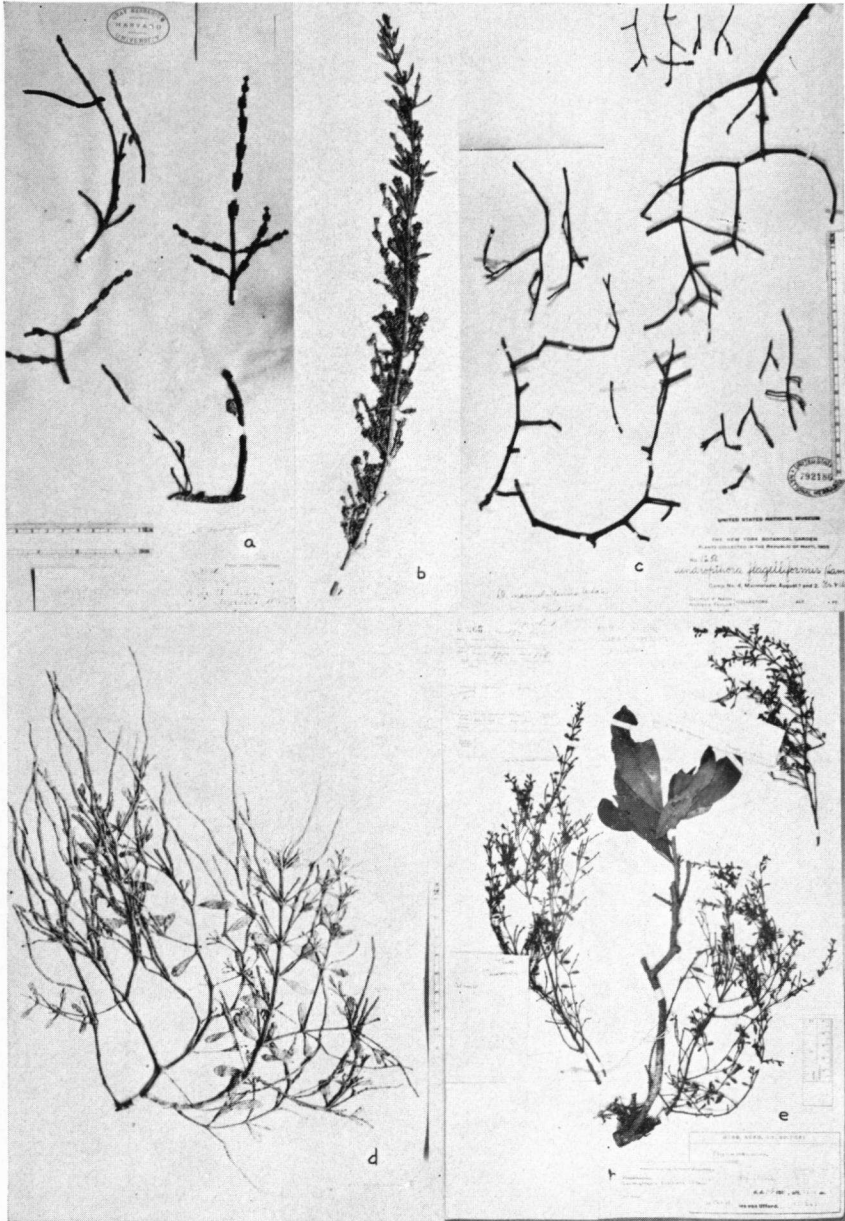


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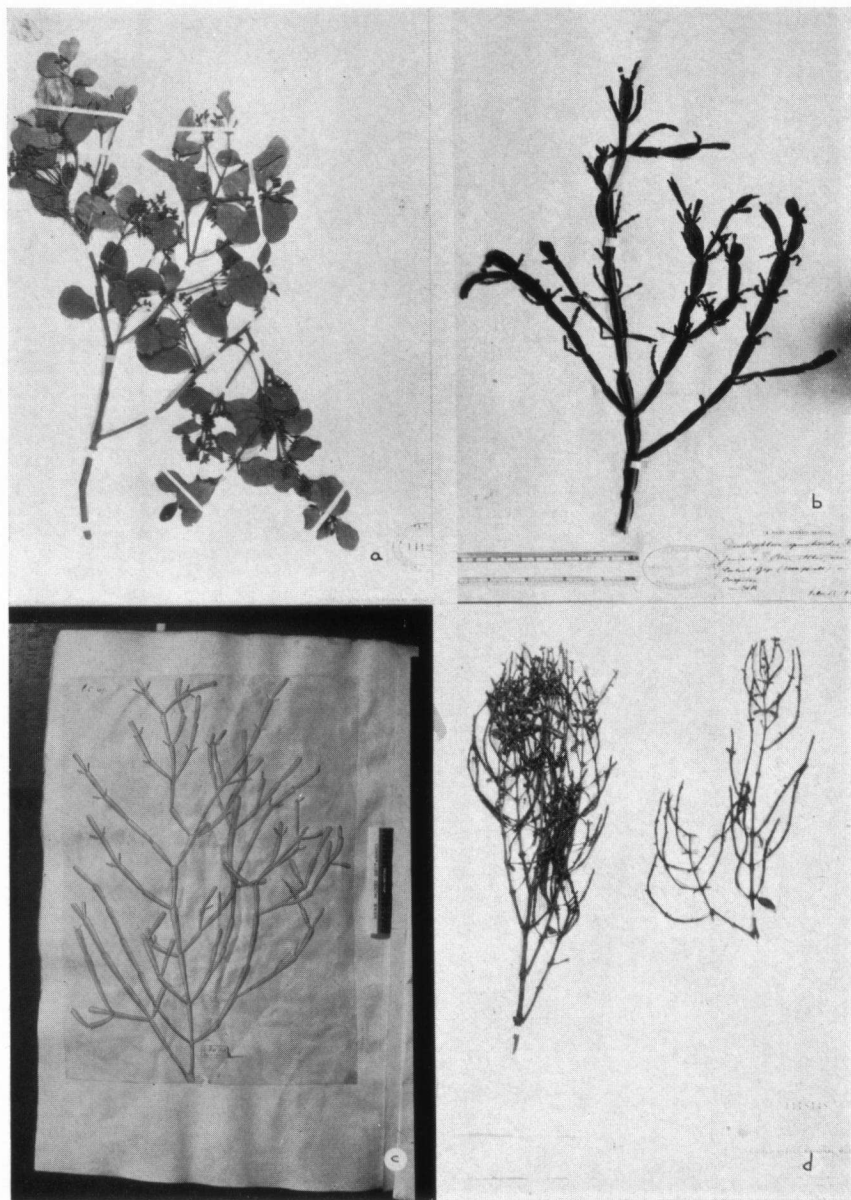


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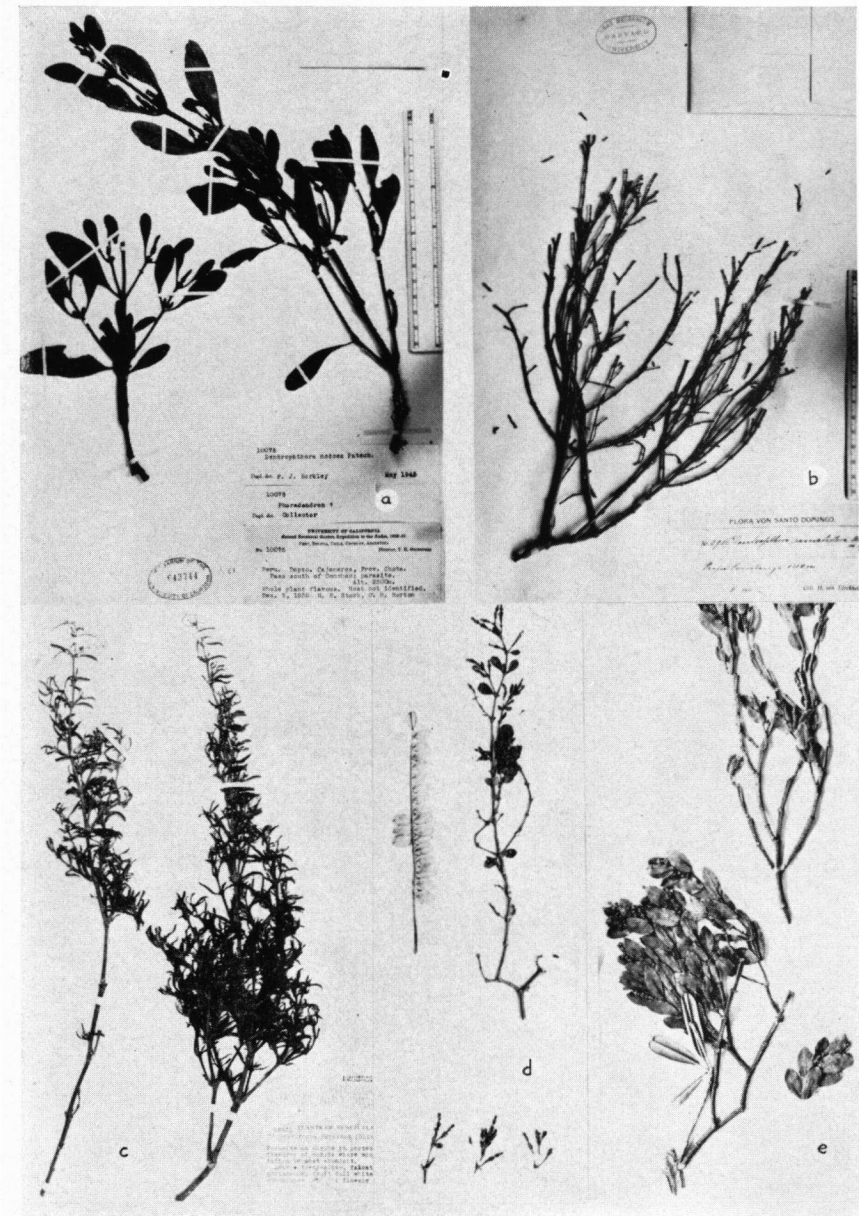


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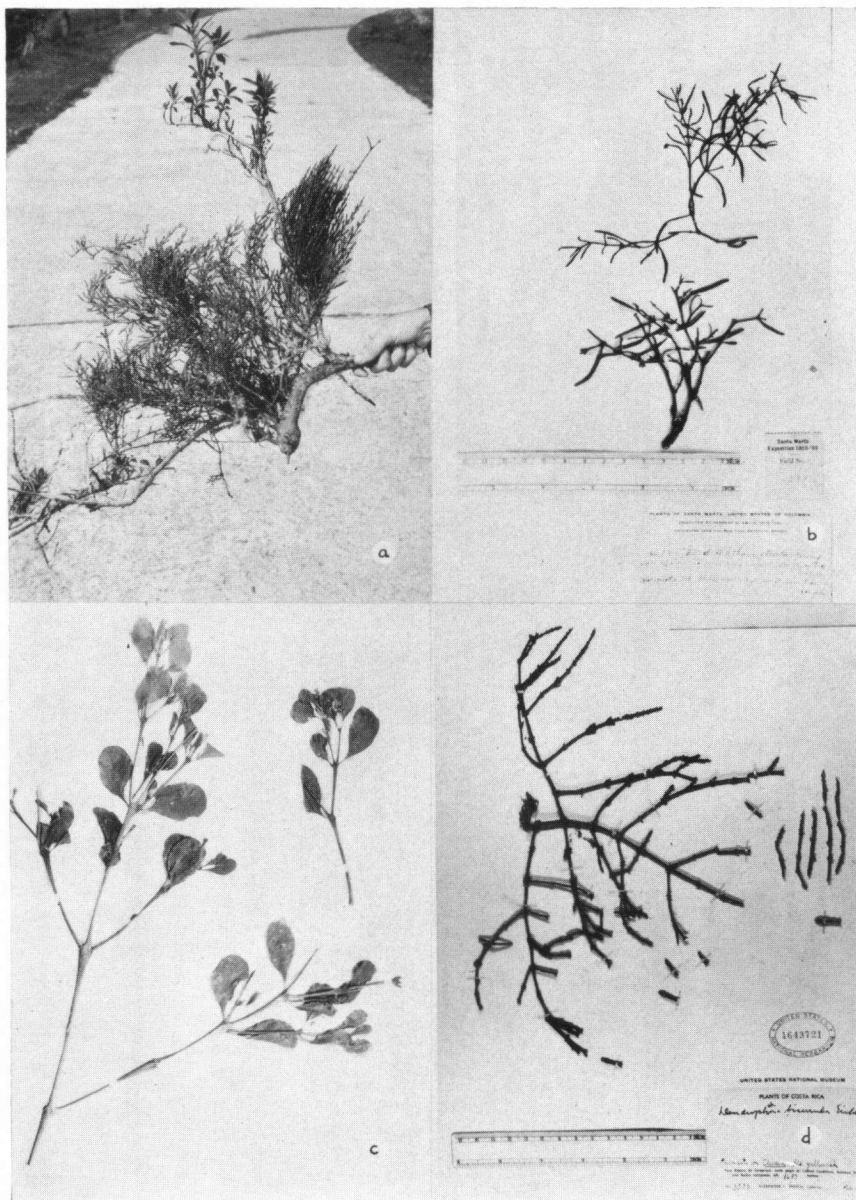


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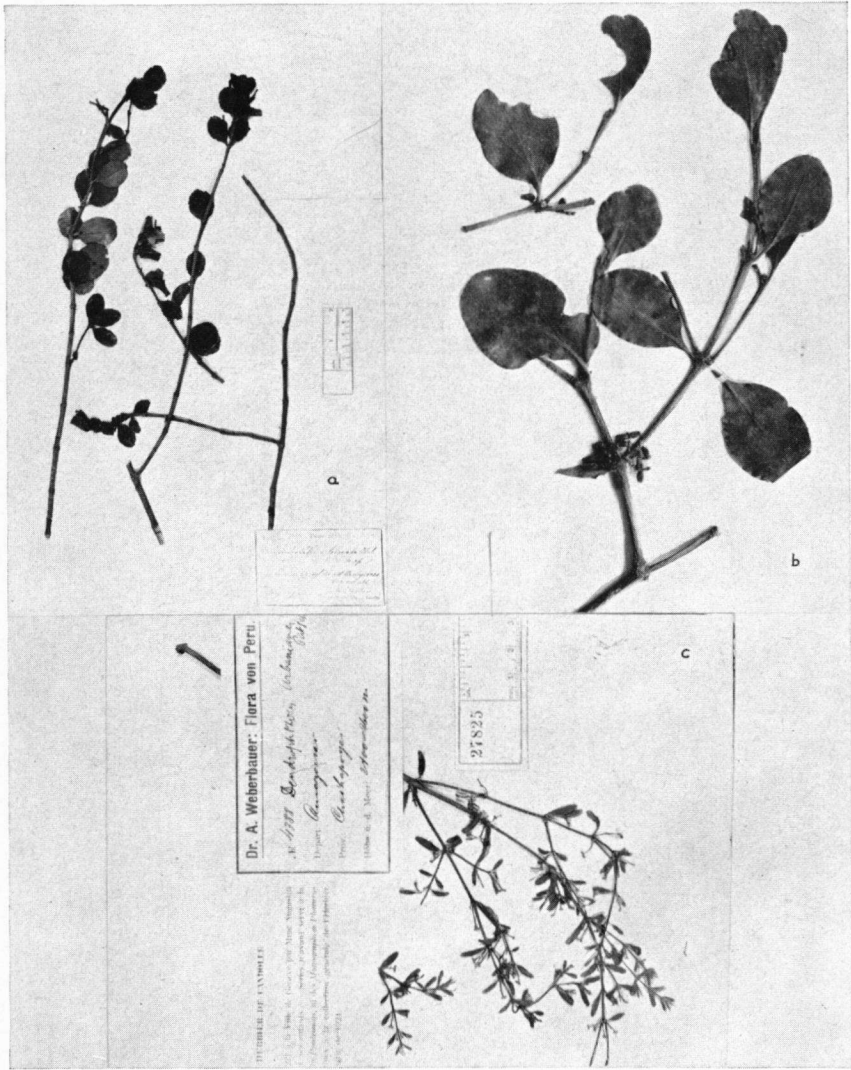


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