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REDACTORES
PROF. DR. A. FERNANDES
Director do Instituto Botânico
DR. J. BARROS NEVES
Professor catedrático de Botânica

COIMBRA
1959

Composição e impressão das Oficinas
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A NEW *ENTADA* FROM TROPICAL AFRICA

by

F. WHITE
Imperial Forestry Institute

Entada bacillaris F. White sp. nov.; inter species africanas erectas ecirrhosas inermas ob legumina magna prope *E. africanam* Guill. & Perr. et *E. abyssinicam* Steud. ex A. Rich. tantum ponenda ; ab ambabas habitu fruticoso haud arborescenti, pilis aureis foliorum et ramulorum novellissimorum, ab illa praeterea leguminibus subumbonatis nec valde umbonatis, foliolis basi minus asymmetricis, nervis lateralibus et rete venularum prominentioribus, ab hac pinnis et foliolis multo paucioribus, foliolis apicem versus subaequalibus satis distincta ; ab *E. nanam* Harms indumento foliolorum subaequalium longiorium, habitu fruticoso nec suffruticoso, leguminibus multo longioribus et latioribus facile distinguenda. — (Pl. I).

E. nana Harms var. *pubescens* R. E. Fr., Wiss. Ergebn. Schwed. Rhod.-Kongo Exped. 1911-12, 1, 64-65 (1914).

Frutex erectus, parvus, 1.2-1.8 m. altus, inermis, ecirrhosus, caulibus simplicibus vel parum ramosis. *Ramuli* et folia juventute pilis aureis patentibus dense pubescentes. *Folia* pro genere magna; petiolus et rhachis pubescentes, illus 6.5-11.5 cm. longus, hic 12-29.5 cm. longus, ultra par terminale pinnarum in appendiculum 0.4-0.7 cm. longum desinens; pinnae 3-4-jugae, 12-19.5 cm. longae, ultra par terminale foliolorum in appendiculum 0.2-0.4 cm. longum desinente, rhachidibus pinnarum pubescentibus supra pulvinum par appendiculorum subpersistentium filiformium ferentibus ; foliola 10-13-juga, oblongo-elliptica, 3.1 × 0.9-4.5 X 1.6 cm., apice rotundata subtruncata vel emarginata, basi leviter asymmetrica, supra fere glabra vel sparse puberula, subtus costa media sparse vel dense puberula aliter pilis paucis, costa media subcentrali, nervis lateralibus venisque prominentibus. *Racemi* axillares, solitarii vel 2-3-nati, 8-17 cm. longi, 1.3-4 cm. longe pedunculati, pedunculo velut axi inflorescentiae dense pubescenti. *Pedicelli* 0.1-0.15 cm. longi, sparse pubescenti. *Calyx* circiter 0.2 cm. longus ; tubus glaber, apice 5-dentato, dentibus triangularibus, acutis, 0.05 cm. longis, margine et apicem versus puberulis. *Tubus* corollae 0.1 cm. longus; lobae 0.25-0.35 cm. longae. *Stamina* filamenta 0.5-0.6 cm. longa. *Ovarium* glabrum, 0.2-0.35 cm. longum, stylo circiter 0.3-0.55 cm. longo. *Legumina* subumbonata, maturitate chartacea, subfalcata, 26 X 8-36 X 9 cm., margine leviter crenata, stipite 1.5-3.5 cm. longo. *Semina* 9-13, circiter 1.2-1.3 × 0.9 cm.

Note: the number of pinnae given in the description refers to the maximum number found on a specimen ; the number of leaflets was taken from the penultimate pinnae ; the dimensions of the leaflets were measured on the fifth pair of leaflets from the distal end of the penultimate pinnae.

TYPUS. *Mrs. H. M. Richards* 9986 (K, Holotypus, frt.).

TANGANYIKA

UFIPA DISTRICT. Karema, on coast of Lake Tanganyika, 850 m. alt., fairly frequent on rocky hills clothed with *Brachystegia longifolia* (*'holtzii'*), Apr. 1936, *B. D. Burtt* 6056 (K, unripe frt.).

NORTHERN RHODESIA

ABERCORN DISTRICT. Kalambo Falls, Nov. 1952, *Angus* 749 (FHO, fls.). Between Mpulungu and Abercorn, in woodland with *Brachystegia longifolia, Swartzia, Anisophyllea,* etc. on shallow, rocky soil, Oct. 1947, *Brenan & Greenway* 8167 (K, fls.). Id., Chizungu Escarpment, 1350 m. alt., in *Brachystegia* woodland, Oct. 1936, *B. D. Burtt* 6054 (K, fls.). Between Abercorn and Katwe, on rocky slopes, *R. E. Fries* 1215 (UPS, fls., Holotype of *Entada nana* var. *pubescens,* FHO & K, photo.). Chilongowelo, Apr. 1952, *Mrs. H. M. Richards* 1395 (K, unripe frt.). Id., Oct. 1954, *Mrs. H. M. Richards* 1909 (K, fls.). Near Lunzua Falls, Apr. 1955, *Mrs. H. M. Richards* 5346 (K, unripe frt.). Near Makoma, Apr. 1955, *Mrs. H. M. Richards* 5421 (K, unripe frt.). Kambole Escarpment, June 1957, *Mrs. H. M. Richards* 9986 (K, frt., Holotype).

MPOROKOSO DISTRICT. Near Lake Chishi, in escarpment woodland, Sept. 1958, *Fanshawe* 4826 (FHO, fls.). Id., Sept. 1956, *Mrs. H. M. Richards* 6268 (K, fls.).

Distribution and ecology. *E. bacillaris* is probably confined to the escarpment country at the southern end of Lake Tanganyika and that fringing the Mweru Wantipa depression; it most frequently occurs in woodland dominated by species of *Brachystegia* occupying rocky slopes. More precise information on its ecology is not available.

Variation and relationships. *E. bacillaris* appears to be most closely related to *E. africana,* which is a small tree occurring north of the Equator from Senegal to Uganda, and is not known to occur within 950 km. of the range of *E. bacillaris.* Although very different in habit and indumentum, it closely resembles *E. africana* in its leaves, flowers and fruits. Both species are similar in having rather few large pinnae and leaflets.

The specimens cited above are reasonably uniform in number of pinnae and leaflets and in size and shape of the latter. There are, however, five gatherings from Abercorn District in Northern Rhodesia, which differ from the cited material in having up to 8 pairs of pinnae and up to 24 pairs of much smaller, more asymmetric and more acute leaflets (see Table 1); the indumentum on the young parts is also greyish and not golden. At present it is not possible to assess the status of these specimens.

E. bacillaris may eventually prove to be more variable than is here conceived. On the other hand it is possible that these anomalous gatherings may be descended from hybrids between *E. bacillaris* and *E. abyssinica,* the only other related *Entada* known to overlap in geographical range with *E. bacillaris.* At first sight this hypothesis seems unlikely — *E. abyssinica* is a small tree with 12-15 pairs of pinnae and usually with more than 30 pairs of very small, more or less acute, very asymmetric leaflets. It is, however, very similar to *E. bacillaris* in floral and fruit characters, and hybrids between species with a strikingly different number and size of leaflets are not unknown in other leguminous genera (e. g. *Brachystegia).*

BRENAN (Kew Bull., 1955, 165-168) tabulates the number of pairs of pinnae and leaflets and size of the latter for *E. africana* as circumscribed by him. A comparison of BRENAN's table with the one reproduced here shows that the range for *E. africana* closely corresponds to that of *E. bacillaris* together with the five anomalous specimens. KEAY [Fl. W. Trop. Afr., ed. 2, 1, 492 (1958)] mentions that hybrids are suspected between *E. africana* and *E. abyssinica* which overlaps it widely in range, but he gives no details. *Eggeling* 806 (in FHO from the Imatong Mountains in Uganda near the Sudan border) with 17 pairs of pinnae and about 30 pairs of rather large leaflets is an intermediate and may be a hybrid. If *E. africana* and *E. abyssinica* do, in fact, hybridize, it is possible that the range of variation of the former has been extended through hybridity, and that the specimens cited by BRENAN as having more than 5 pairs of pinnae may be hybrid derivatives.

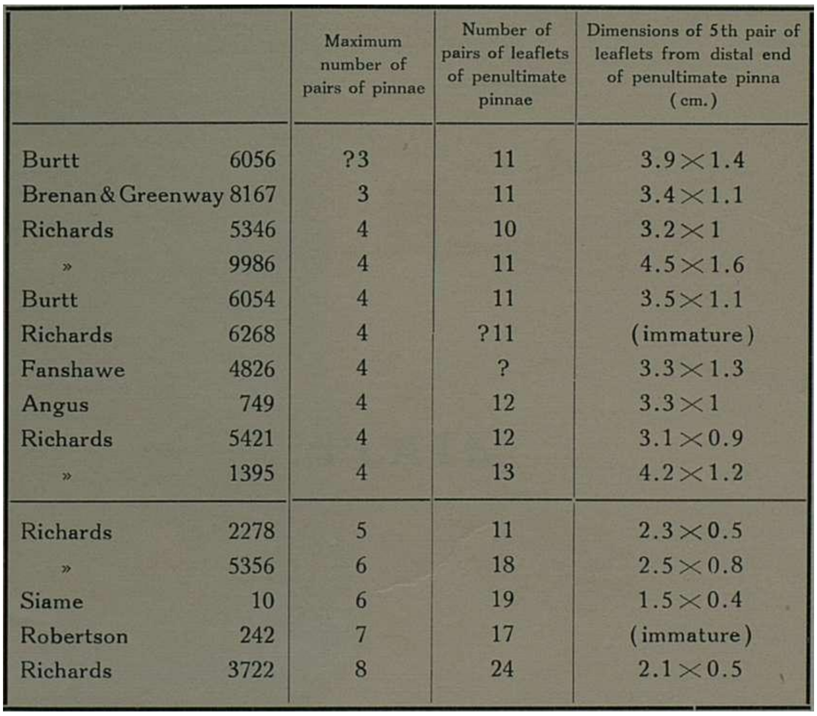
From the limited material and information available it is not at present possible to decide what the true situation is. Hybrids should be looked for and samples of populations collected from localities where *E. abyssinica* and *E. africana,* and *E. abyssinica* and *E bacillaris* occur together.

The five anomalous gatherings of *E. bacillaris* are cited below.

NORTHERN RHODESIA

ABERCON DISTRICT. Inono Valley, nr. Inono stream, Nov. 1954, *Mrs. H. M. Richards* 2278 (K, fls.). Near source of Inono stream, Dec. 1954, *Mrs. H. M. Richards* 3722 (K, fls.). Road to Lunzua Falls, Apr. 1955, *Mrs. H. M. Richards* 5356 (K, immature frt.). Between Abercorn and Kawimbe, Nov. 1952, *Robertson* 242 (K, fls.). Abercorn, Nov. 1951, *Siame*10 (K, fls.).

TABLE I



		Maximum number of pairs of pinnae	Number of pairs of leaflets of penultimate pinnae	Dimensions of 5th pair of leaflets from distal end of penultimate pinna (cm.)
Burtt	6056	?3	11	3.9×1.4
Brenan & Greenway	8167	3	11	3.4×1.1
Richards	5346	4	10	3.2×1
»	9986	4	11	4.5×1.6
Burtt	6054	4	11	3.5×1.1
Richards	6268	4	?11	(immature)
Fanshawe	4826	4	?	3.3×1.3
Angus	749	4	12	3.3×1
Richards	5421	4	12	3.1×0.9
»	1395	4	13	4.2×1.2
Richards	2278	5	11	2.3×0.5
»	5356	6	18	2.5×0.8
Siame	10	6	19	1.5×0.4
Robertson	242	7	17	(immature)
Richards	3722	8	24	2.1×0.5

Number of pinnae, number of leaflets and size of leaflets based on the cited specimens of *Entada bacillaris* and on 5 anomalous specimens. The five citations below the horizontal line refer to anomalous specimens which are dicussed in the text.

The author wishes to thank Mr. J. P. M. BRENAN for making some helpful suggestions, the Director, Royal Botanic Gardens, Kew for sending material on loan, and Miss JANET CHANDLER for producing the drawings at very short notice.

PLATE

PLATE I

Entada bacillaris F. White

A — Longitudinal section of flower ×12 (*Angus* 749).
B — Part of pod (*Richards* 9986).
C — One 'joint' of pod with exocarp removed (*Richards* 9986).
E, F — Leaflets (*Richards* 9986 and 5421 respectively).
G — Leaflet of anomalous specimen (*Richards* 3722).

Entada nana Harms

H — Leaflet (*O. M. Miller* 185)

Entana abyssinica Steud. ex A. Rich.

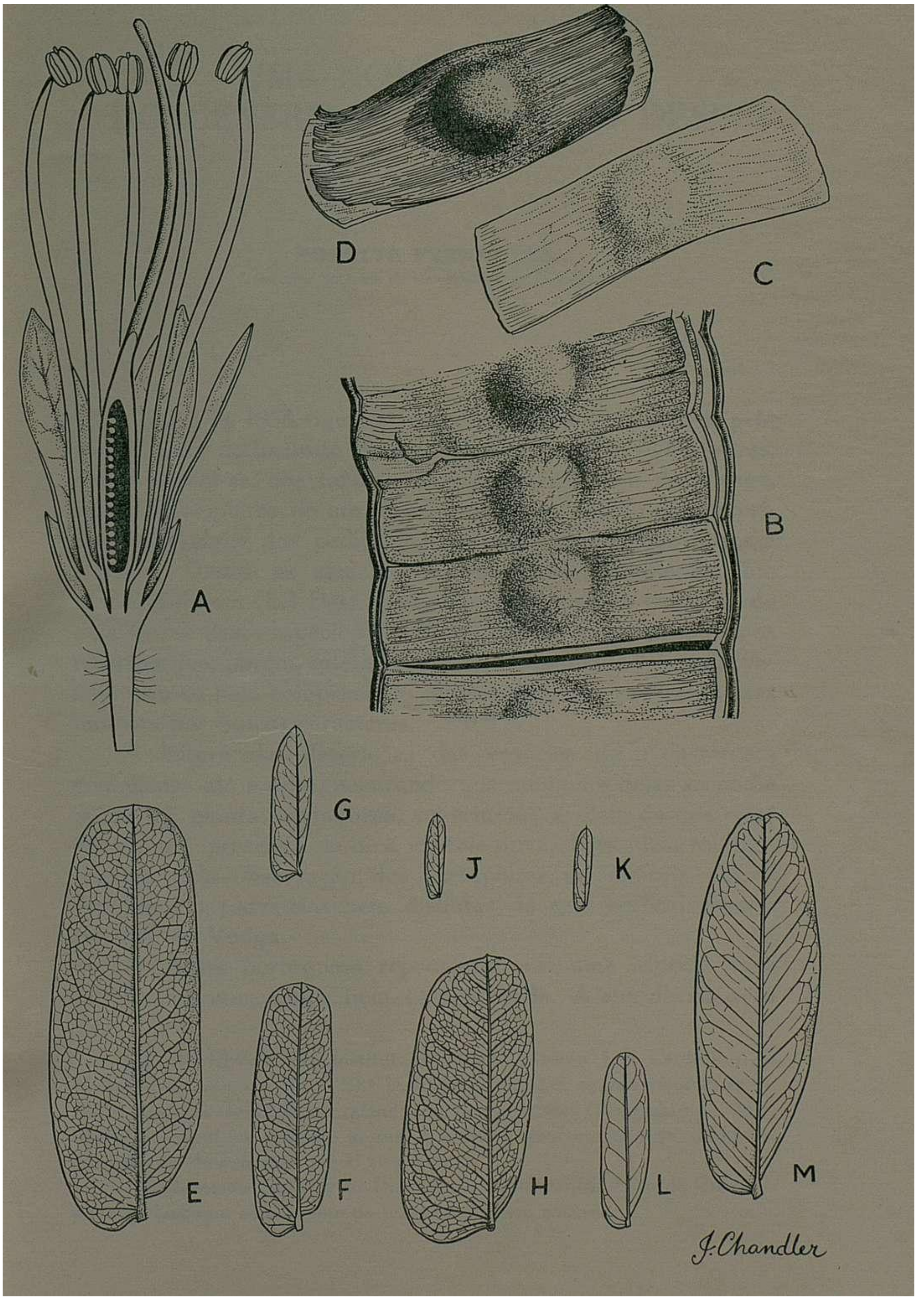
J, K — Leaflets (*Holmes* 227 and 1068 respectively).

Entada africana Guill. et Perr.

D — One 'joint' of pod (*Hoyle* 401).
L, M — Leaflets (*Eggeling* 1496 and *Vigne* 1704 respectively).

Note: the pods are reproduced at one third less than, and the leaflets at one third more than natural size. Leaflets selected for drawing were those from the fifth pair from the distal end of a penultimate pinna.

PL. I



UMA NOVA ESPÉCIE
DO GÉNERO *ANARRHINUM* DESF.

por

ROSETTE FERNANDES
Instituto Botânico da Universidade de Coimbra

EM Junho de 1958, numa exploração botânica organizada pelo Director do Instituto Botânico de Coimbra, Dr. A. FERNANDES, herborizaram-se, nos taludes da estrada do Vale do Vouga, alguns exemplares de um *Anarrhinum* que, devido ao comprimento invulgar dos pedicelos, chamaram desde logo a nossa atenção. Dadas as semelhanças aparentes da planta com *A. bellidifolium* (L.) Desf., pensámos, a princípio, tratar-se de uma forma desta espécie. O estudo ulterior a que procedemos mostrou-nos, porém, que a planta se distinguia de *A. bellidifolium* não só pelo comprimento muito maior dos pedicelos, mas também por outros caracteres.

A leitura das descrições das espécies de *Anarrhinum* conhecidas até à data, mostrando que nenhuma delas se podia aplicar à planta portuguesa, sugeriu-nos a ideia de que estaríamos em presença de uma espécie nova. Esta ideia foi confirmada pela observação dos exemplares da maioria dessas espécies todas elas bem distintas da que herborizáramos no Vale do Vouga.

A planta portuguesa representa, pois, uma espécie nova de *Anarrhinum*, muito bem caracterizada. A sua distribuição

(¹) Ao Director do Instituto Botânico António José Cavanilles, de Madrid, bem como à Ex.ma Sr.a D. ELENA PAUNERO, agradecemos as facilidades que nos concederam quando da nossa estadia (Novembro de 1958) naquela instituição, durante a qual tivemos a oportunidade de estudar a colecção de *Anarrhinum* que aí se encontra.

Agradecemos também ao Director do Instituto Botânico da Universidade de Lisboa o empréstimo do material daquele género.

parece estar limitada ao Vale do Vouga, sendo, no entanto, de esperar que se estenda para fora desta faixa, possivelmente para o Vale do Agueda. E interessante notar que, já em 1955, tinham sido colhidos espécimes do novo taxon pelo pessoal da Estação de Melhoramento de Plantas de Elvas, instituição que oferecera ao Instituto Botânico de Coimbra um exemplar determinado como *A. bellidifolium* (L.) Desf.

Anarrhinum longipedicellatum sp. nov. (Tab. I-V)

Herba biennis usque ad 90 cm alta, uni- vel pluricaulis, plus minusve, praecipue ad racemos, atroviolaceo-tincta, undique (parte basilare excepta) minutissime papillosa. *Caules* erecti, dense foliati, simplices vel superne ramosi vel virgato-ramosissimi. *Folia* carnosula, basilaria obovata, spathulato- vel obovato-lanceolata, 2-11 cm longa (adjecto petiolo) et 0,6-2,2 cm lata, ad basin sensim attenuata, crenata, duplicato-ser rata, vel subpinnatipartita, glabra; caulina 7-3-pedatisecta vel 7-3-palmatisecta, segmentis lanceolatis, acutis, integris vel raro pauci-dentatis, intermedio longiore. *Racemi* graciles, simplices vel paniculatim compositi, usque 30 cm longi, plerumque breviores, laxiflori, saepe unilaterales. *Bracteae* inferiores 5-3-pedatisectae vel 5-3-palmatisectae, foliis caulinis superioribus similes sed minores, mediam partem pedicellorum raro attingentes; superiores minimae, lanceolatae vel lineari-lanceolatae, pedicellis multo breviores, omnes subulatae, minutissime papillosae. *Pedicelli* tenues fere capillacei, atroviolacei, patuli vel ascendentes, apice incurvi, 5-10 mm longi, floribus aequantes vel ca. duplo longiores. *Calycis segmenii* lanceolato-lineares, subulati, 2-3 mm longi. *Corolla* 5,5-6 mm longa, intense coeruleo-violacea, labio inferiore in palato bicristato, cristis papillosis, calcari paulo incurvo, 1,5 mm longo. *Capsula* compresso-globosa, ca. 2,5 mm, apice emarginata, calyci aequans vel paulo excedens. *Semina* pallida, oblonga, echinato-muricata.

Species insignis, longitudine et tenuitate pedicellorum, sicut colore recemorum inter omnia distincta. Affinis *A. bellidifolio* (L.) Desf. a quo segmentis foliorum caulinorum latioribus, calycibus et corollis majoribus, tubo corollae porportionaliter longiore et angustiore, palato bicristato neque plano, et, praecipue, pedicellis multo longioribus, differt.

Plantae locis humidis caules elatiores, folia tenuiora et longiora, paniculam ramosiorem, pedicellos, calyces et corollas leviter longiores habent.

Fl. Apr.-Jun.

Fr. Jun.

Habitat in declivibus viae secus fluvium Vacuam, locis siccis vel humidiusculis et umbrosis, in Lusitania.

Specimina: pr. Vale Maior, no começo da subida do Vale do Vouga, nos taludes da estrada, 11-VI-1958, *A. Fernandes, R. Fernandes & J. Matos* 6212 (COI, typus); estrada do Vale do Vouga, a ca. 1 km de Foz, nos taludes, 11-VI-1958, *A. Fernandes, R. Fernandes & J. Matos* 6216 (COI); Vale do Vouga, entre Angeja e Viseu, pr. do rio, 29-IV-1956, *Malato-Beliz* 2337 (COI; ELVE).

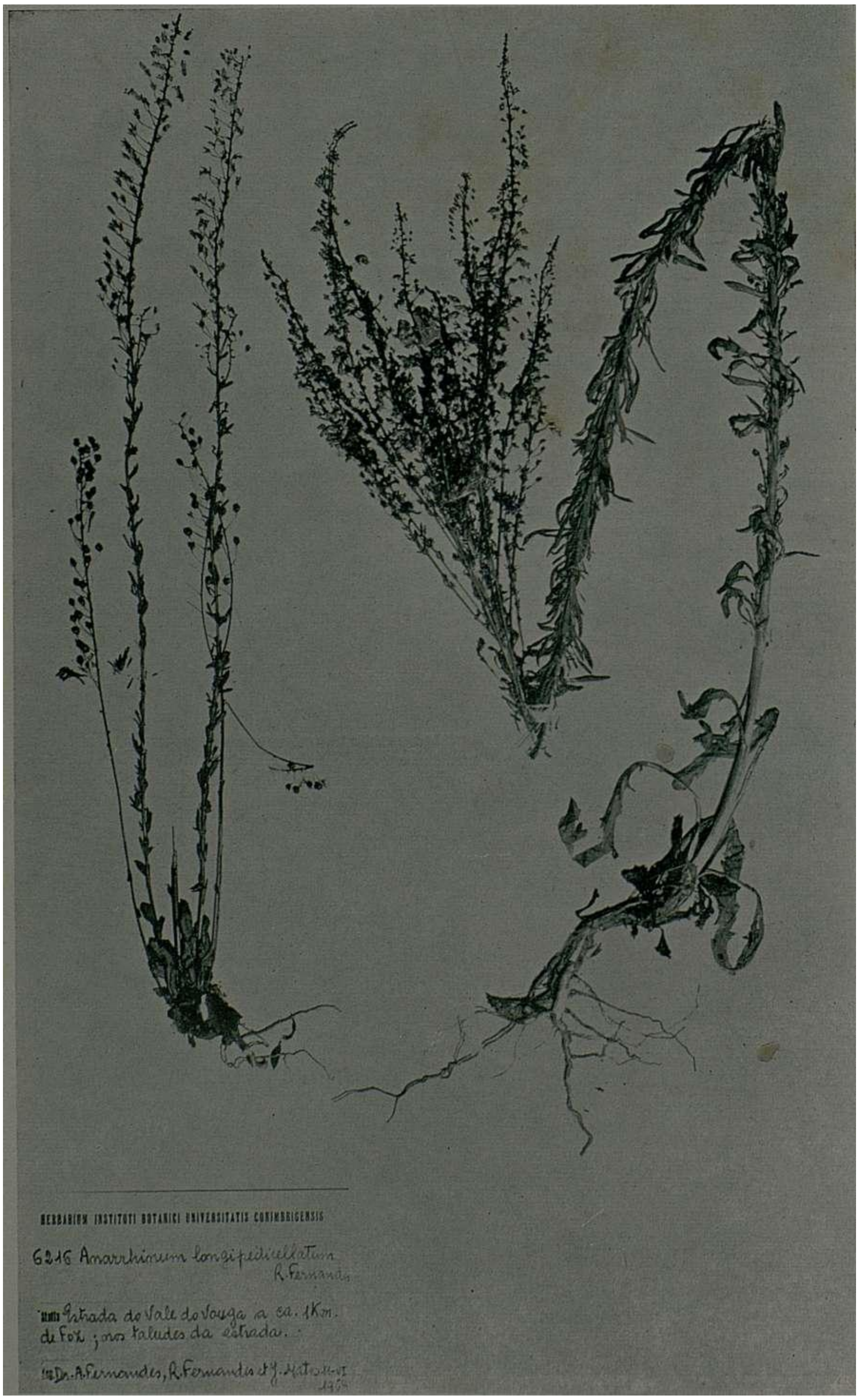
TABULAE

TAB. I

Anarrhinum longipedicellatum R. Fernandes

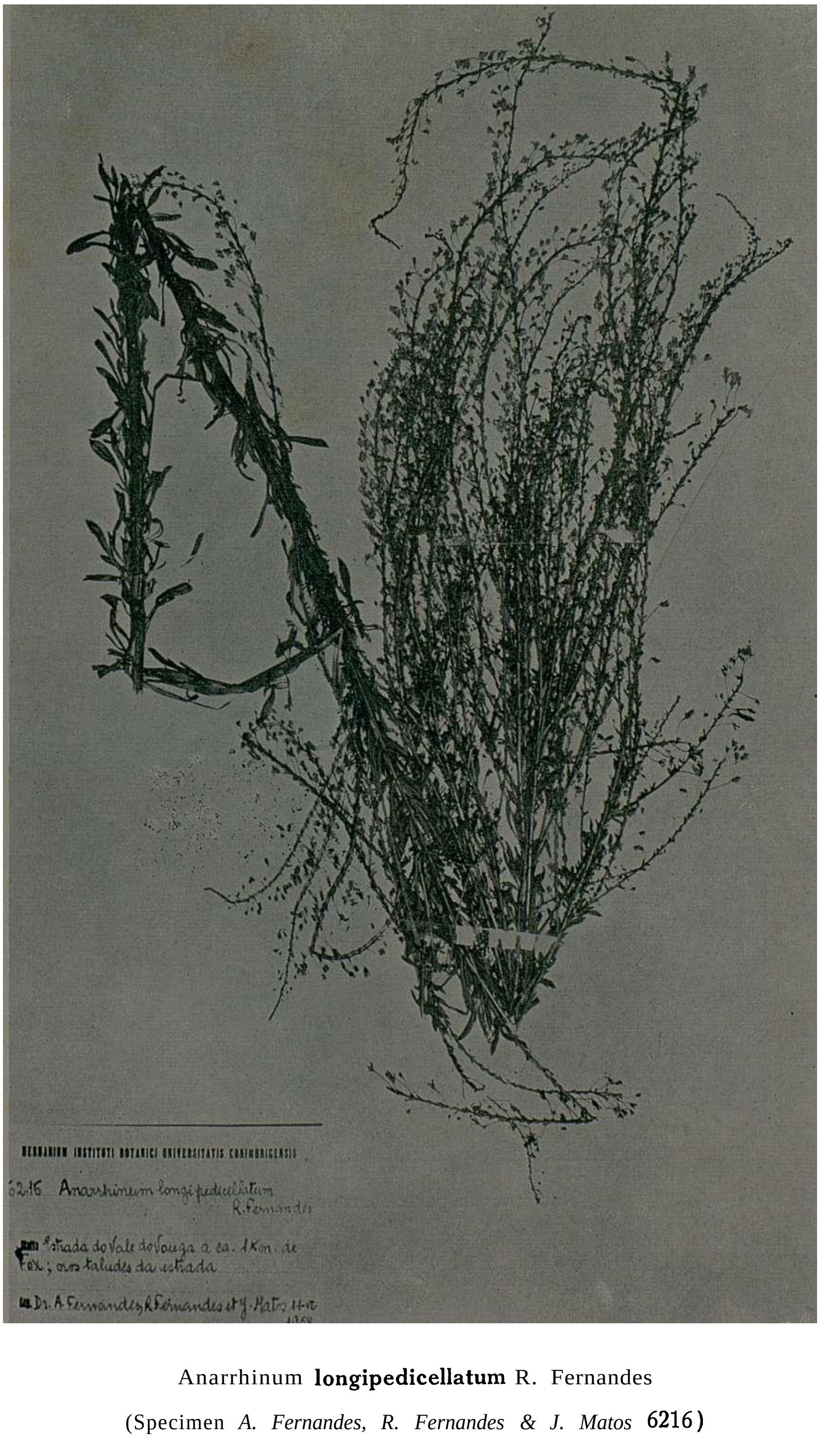
(Specimen *A. Fernandes, R. Fernandes & J. Matos* 6212, typus)

TAB. II



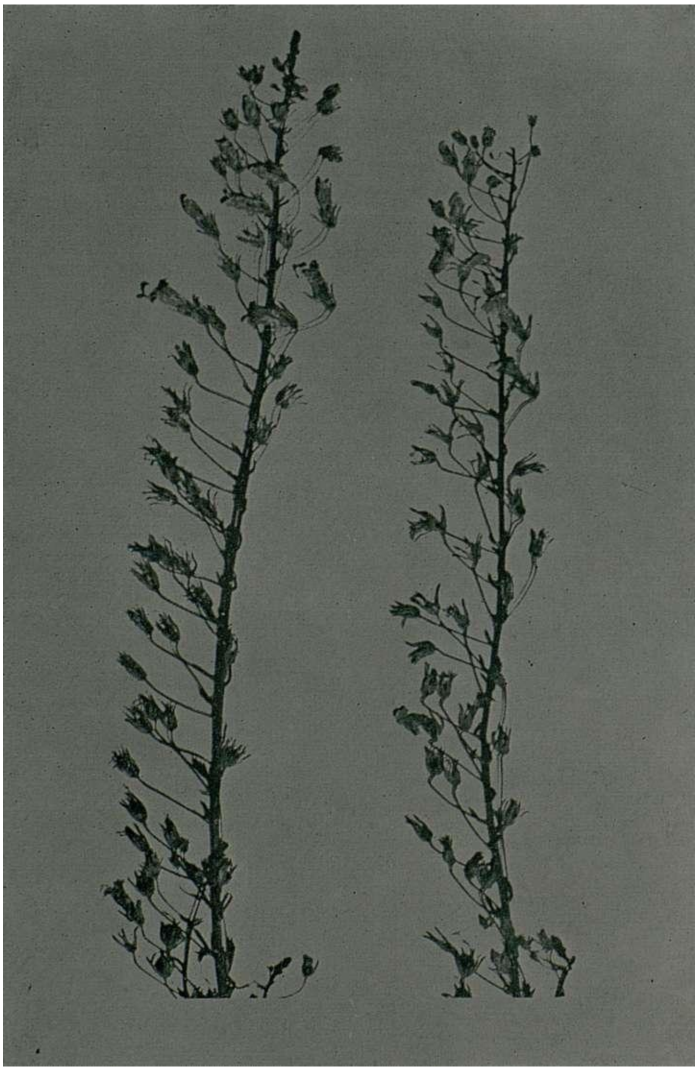
Anarrhinum longipedicellatum R. Fernandes

(Specimen *A. Fernandes, R. Fernandes & J. Matos* 6216)



Anarrhinum **longipedicellatum** R. Fernandes

(Specimen *A. Fernandes, R. Fernandes & J. Matos* 6216)



Anarrhinum longipedicellatum R. Fernandes

Racemorum partes terminales

TABULA V

Anarrhinum longipedicellatum R. Fernandes

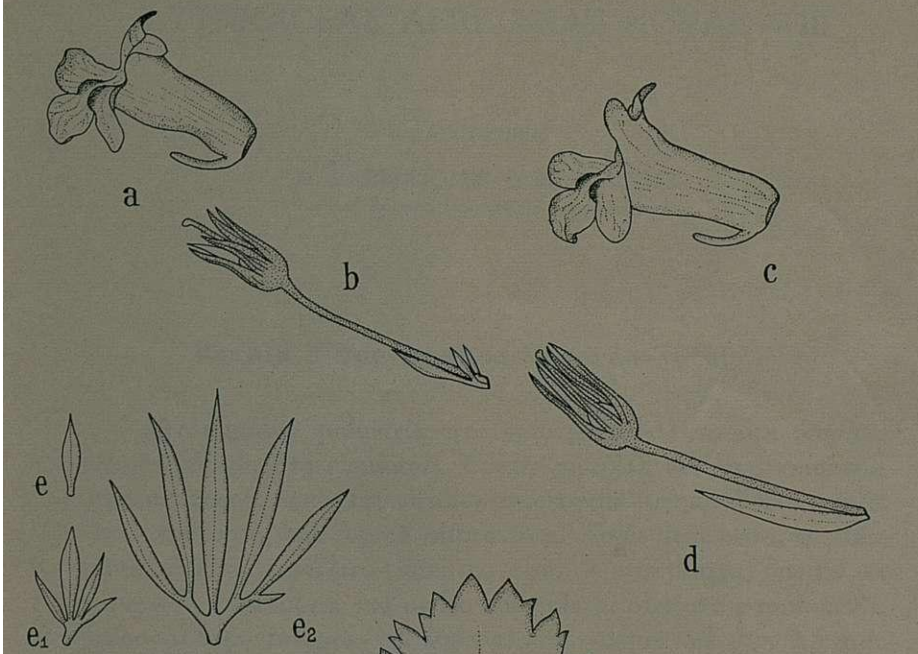
a, c — Corollae. X 5.
b, d — Pedicelli cum calyce, pistillo et bractea. X 5.
e — Bractea superior. X 5.
e_1-e_2 — Bracteae inferiores. X 5.
f — Folium basilare. X 2.
f_1 — Folium caulinum. X 2.

(c, d, e_2 — ex planta locis umbrosis, omnibus partibus majoribus).

Anarrhinum bellidifolium (L.) Desf.

g — Corolla. χ 5.
h — Pedicellus cum calyce et pistillo. X 5.
i — Bractea inferior. χ 5.

TAB. V



Rosette Fernandes del.
S. Figueira adj.

LYTHRACEAE AFRICANAE NOVAE —III

AUCTORIBUS

A. FERNANDES & M. A. DINIZ
Instituti Botanici Universitatis Conimbrigensis

Rotala **Milne-Redheadii** sp. nov. (Tab. 1)

Herba annua, palustris, erecta, usque ad 11 cm alta. *Radices* tenues, albidae, fasciculatae. *Caulis* simplex vel basi ramosus, crassus, tener, exalatus, viridis; internodia usque 8 mm longa, foliis breviora, sub apice abbreviata. *Folia* decussata, sessilia, laete viridia, inferiora linearia circ. 9 mm longa, media et superiora lanceolata vel ovato-lanceolata, obscure penninervia, apice obtusa integra vel emarginata, usque ad 9 X 2,5 mm. *Flores* 4-meri, rubescentes, axillares, solitarii, subsessiles, basi bibracteolati, bracteolis scariosis, subulatis, $^1/_2$ calycis aequantibus (circ. 0,5 mm longis). *Calyx* campanulatus, circ. 1 mm longus, exappendiculatus; lobi ovato-apiculati, 0,45 mm alti, enerves. *Petala* nulla. *Stamina* 2-3, paullo supra medium tubum inserta, antheris apicem loborum vix attingentibus. *Ovarium* globosum, circ. 0,5 mm diam., 2-lobatum, 2-loculare. *Stylus* brevis, circ. 0,2 mm longus, stigmate capitato. *Capsula* globosa circ. 0,6 mm diam., 2-valvis.

Fl. et fr.: Jan.-Feb.

Habitat in Rhodesia septentrionale, *Mwinilunga* districto, loco dicto *Kalenda Plain,* in paludosis, 30-1-1938, *E. Milne-Redhead* 4414 (COI; K, holotypus).

« Kalenda Plain, in damp hollow in peaty soil near Water-hole B, 30-Jan., n.° 4414: — Erect annual; stems fat, soft, green; leaves bright green; flowers minute, crimson ».

Affinis R. Dinteri Koehne (subsect. Suffreniopsis Koehne, series 1 Koehne) a qua caulibus usque ad 11 cm nec 4-6 cm altis; foliis latioribus; floribus semper 4-meris nec 3- vel 4-meris;

calycibus brevioribus (1 nec 1,5-2 mm); calycis lobis ovato-apiculatis nec stricte triangularibus; petalis semper nullis; etc., differt (vide Tab. II).

Species in honorem Cl. Vir. Domini E. MILNE-REDHEAD, botanici Kewensis perillustris et collectons eximii florae Africae, nominata.

Ammannia linearipetala sp. nov. (Tab. III)

Herba annua, palustris. *Radix* alba, fasciculata. *Caulis* rubescens, crassus, stricte erectus, usque ad 25 cm altus, inferne (ob internodia submersa plus minusve longe denudatus) 4-gonus, superne conspicue 4-alatus, interdum simplex, plerumque a basi vel a medio ramosus, ramis simplicibus, erectiusculis, gracilibus. *Folia* patentia, internodiis multo longiora, usque ad 45×13 mm, omnia auriculato-cordata, oblonga vel sublinearia, apice acuta, superne viridia, subtus pallidiora, nervo mediano infra prominente, rubescente. *Stipulae* utrinque 3-4, subulatae, brunneae, circ. 1 mm longae. *Dichasia* axillaria, numerosa, 5-multiflora, laxiuscula (in fructo densa); pedicellus medius 3-4 mm longus, tetragonus; pedicelli laterales circ. 1,5 mm longi, basi bracteolati, bracteolis linearibus, scariosis, usque ad 1,25 mm longis. *Calyx* 4-merus, circ. 1 mm longus, e basi turbinata, latiuscule campanulatus, fructifer rubescens, semiglobosus ; lobi triangulares, apiculati, subconniventes, tubum dimidium aequantes ; appendices parvae, patentes, lobiis multo breviores. *Petala* 4, saepe persistentia, alba, linearia interdum fere subulata, circ. 0,5 mm longa. *Stamina* 4, paullo infra medium tubum inserta, lobos aequantia vel paullo superantia. *Ovarium* globosum, circ. 0,5 mm diam. *Stylus* circ. 1/3 mm longus, stigmate capitato. *Capsula* globosa, circ. 1,5 mm diam., rubra, calyce semivestita. *Semina* numerosa, brunnea, circ. 0,3 mm longa.

Fl. Feb. et fr. Jun.

Habitat in *Tanganica* (Africa orientale), *Songea* districto, pr. locum dictum *Mshangano,* in paludosis alvei fluminis *Luhira,* alt. 1030 m, 18-II-1956, *E. Milne-Redhead et P. Taylor* 9239 (COI; K, holotypus, fl.), 15-VI-1956, *E. Milne-Redhead et P. Taylor* 9239A (K, fr.).

« Waterfall on R. Luhira near Mshangano fish ponds N. of Songea in small pools in rocky river bed : 1030 m.

Annual herb ; stems red, fleshy; roots white ; leaves spreading, green above, paler beneath; midrib reddish; calyx pale green ; lobes tinged reddish ; petals white ; stigma cream ; anthers yellow, 18-II-1956, *E. Milne-Redhead et P. Taylor* 9239 ».

« Waterfall on R. Luhira near Mshangano fish ponds N. of Songea in small pools in rocky river bed : 1030 m.

Fruiting material; fruits red. 15-VI-1956, *E. Milne-Redhead et P. Taylor* 9239 A ».

Affinis A. Prieurianae Guill. et Perr. a qua habitu generaliter humiliore (caulibus usque ad 25 nec usque ad 60 cm altis), foliis brevioribus et latioribus (usque ad 45 × 13 nec usque ad 68 × 9 mm), stipulis utrinque 3-4 nec 1-2, dichasiis longioribus et multifloribus, petalis albis, linearibus interdum subulatis saepe persistentibus nec pallide violaceis, obovatis, fugacissimis, stylo breviore (circ. 1/3 nec circ. 1/2 mm), etc., differt.

TABULAE

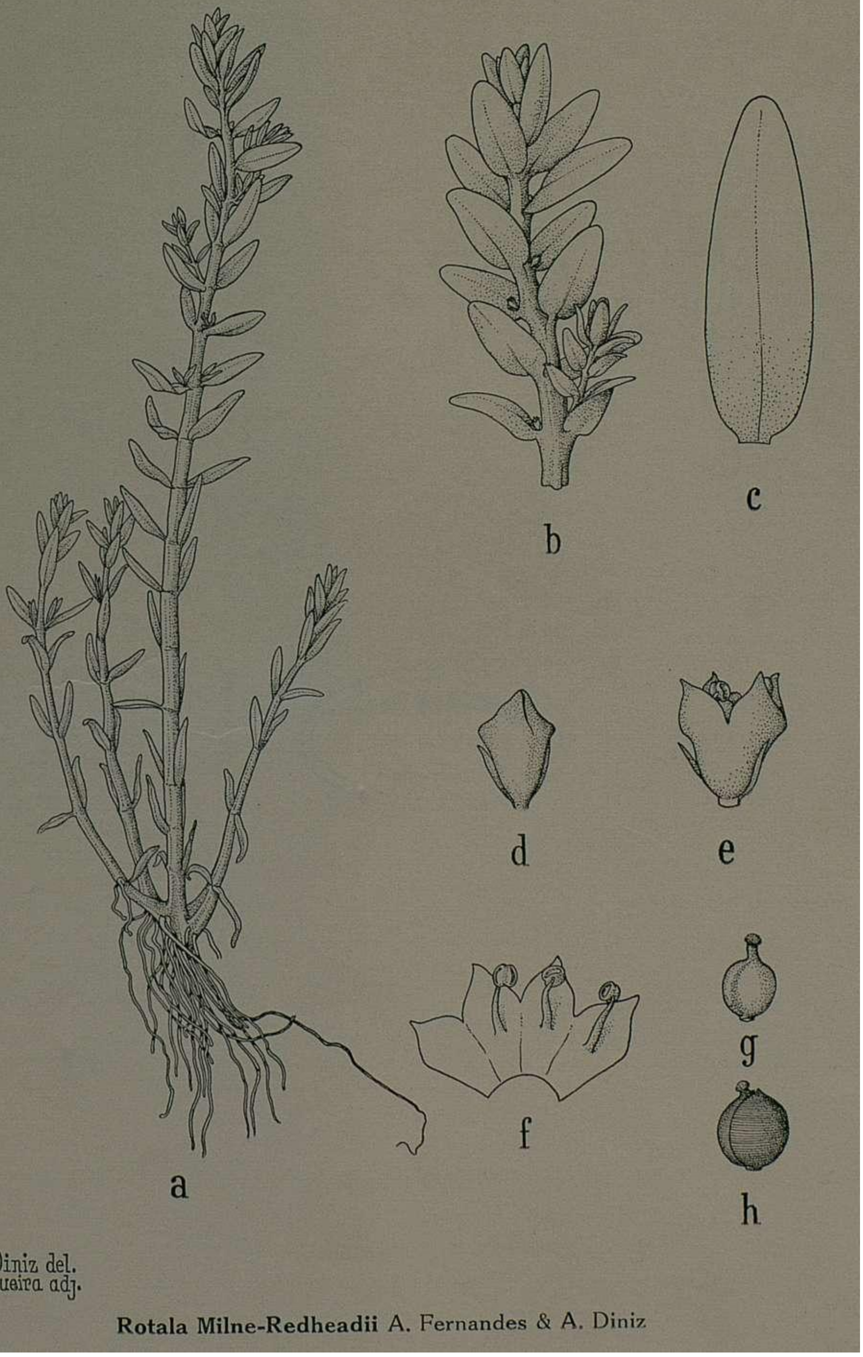
TABULA I

Rotala Milne-Redheadii A. Fernandes & A. Diniz

a — Habitus. × 1.
b — Pars terminalis caulis cum ramulo. × 3.
c — Folium superum. X 6.
d — Flos in alabastro cum bracteolis. X 16.
e — Flos apertus cum bracteolis. X 16.
f — Calyx explanatus. X 16.
g — Ovarium cum stylo et stigmate. X 16.
h — Capsula. × 16.

(Specimen *E. Milne-Redhead* 4414)

TAB. I



A.Diniz del.
.Figueira adj.

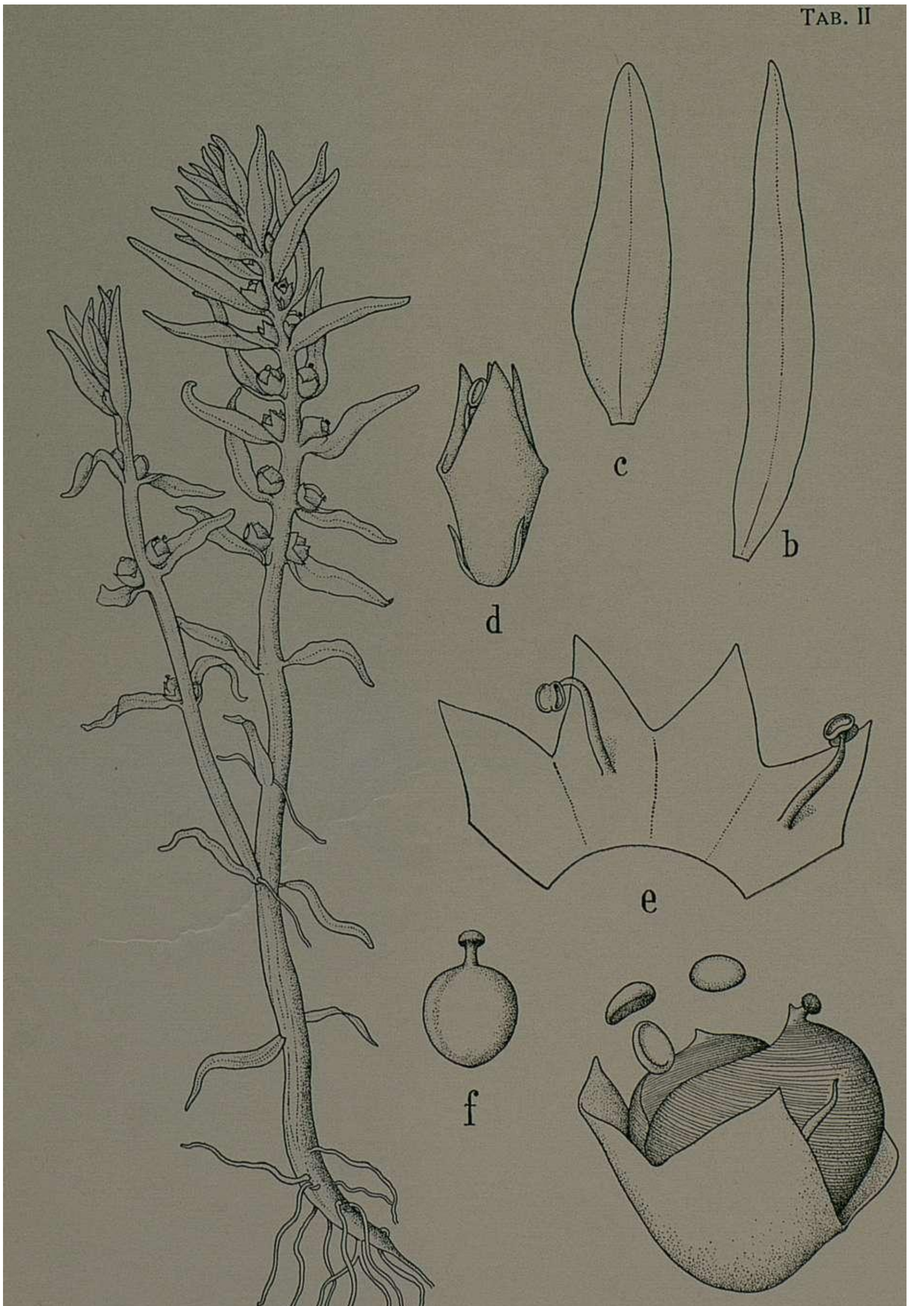
Rotala Milne-Redheadii A. Fernandes & A. Diniz

TABULA II

Rotala Dinteri Koehne

a — Habitus. X 3.
b — Folium inferum. X 10.
c — Folium superum. X 10.
d — Flos cum bracteolis. X 30.
e — Calyx explanatus. X 30.
f — Ovarium cum stylo et stigmate. X 30.
g — Capsula dehiscens. X 30.

(Specimen *Rehmann* 7298)



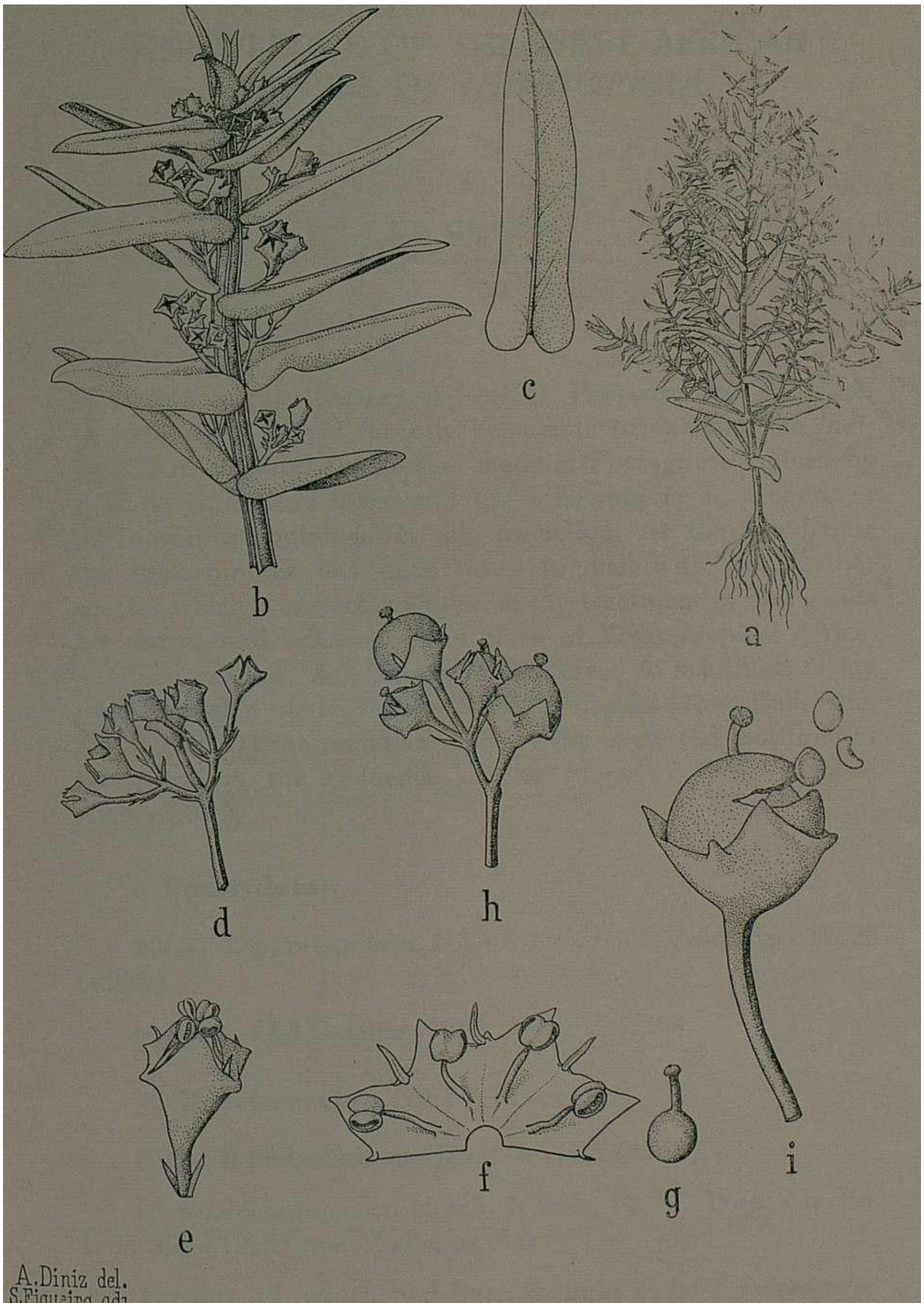
Rotala Dinteri Koehne

TABULA III

Ammannia lineariperala A. Fernandes & A. Diniz

a — Habitus. X 0,25.
b — Caulis pars terminalis. X 4.
c — Folium. X 1.
d — Dichasium floriferum. X 6.
e — Flos. × 15.
f — Calyx explanatus. X 15.
g — Ovarium cum stylo et stigmate. X 15.
h — Dichasium fructiferum. X 6.
i — Capsula dehiscens. X 15.

(*a-g*, specimen *E. Milne-Redhead et P. Taylor* 9239; *h-i*, specimen *E. Milne-Redhead et P. Taylor* 9239 A)



Ammannia linearipetala A. Fernandes & A. Diniz

ADDITIONS TO OUR KNOWLEDGE OF THE WEST AFRICAN SPECIES OF *INDIGOFERA*

by

J. B. GILLETT
Royal Botanic Gardens, Kew

THANKS to the courtesy of Prof. A. FERNANDES and Dr. F. A. MENDONÇA I have recently been able to examine the *Indigoferae* in a splendid collection made in Portuguese Guinea by J. V. da G. ESPÍRITO SANTO and the following is an account of the novelties contained in this collection. At the same time the opportunities has been taken to deal with two further species which were not included in my treatment of the genus for the second edition of the Flora of West Tropical Africa.

The sections and subsections referred to are those of my recent revision of the tropical African species [Kew Bull. Add. Ser. 1 (1958)] the numbers indicate the preferred position of the taxon in the sequence of the Flora of West Tropical Africa Ed. 2.

§ Paniculatae

10/A. **I. paracapitata** Gillett, Kew Bull. Add. Ser. 1: 28 (1958).

NIGERIA. Old Calabar, 1866, *Milne* s. n. BM.

§§ Brevi-erectae (or §§ Viscosae)

33/A. **I. andrewsiana** Gillett, 1. c. 38 (1958).

[*I. heterocarpa* sensu Hutch. & Dalz, Fl. W. Trop. Afr. Ed. 1, 1: 391 (1928) non Welw. ex Bak.].

Parsons 12, which had been thought to be *I. heterocarpa* Welw. ex Bak. in the first edition of the Flora of West Tropical

Africa, could not be found when the second edition was prepared. It and a second specimen of the same species have now come to light and prove to be conspecific with *I. andrewsiana,* but differ from the published description of that species in having a few long multicellular hairs on the stems and leaf rhachises. However a closer examination shows traces of such hairs on one or two of the Sudanese specimens of *I. andrewsiana* also and it would seem that this, like *I. dyeri* Britten and *I. hilaris* E. & Z., is a species which sometimes possesses such hairs and sometimes does not. The flowers in the Nigerian plants are rather smaller than those of the type (stamens 3 instead of 4 mm. long).

N. NIGERIA. Lokoja, 21st Sept. 1907, *Parsons* L. 12; Bauchi plateau, Aug. 1930, *Lely* P. 642.

§§ Centrae (or §§ Psiloceratiae)

35. **I. omissa** Gillett var. **trifoliolata** Gillett var. nov.

A var. *omissa* foliis semper trifoliolatis, fructibusque sparse et appresse strigulosis differt.

PORT. GUINEA. Gabu district: Nhampassare, cracks in rocks, prostrate herb, 26 Oct. 1955, *Espírito Santo* 3530 COI, LISC holotype.

Since this species was treated in Fl. W. Trop. Afr. Ed. 2, var. *omissa* has been found in Ghana, Damongo scarp, *Adams* 3941 and Barufo plateau near Lawra, *Adams* 4030.

§§ Viscosae

48/A. **I. brevifilamenta** Gillett, nom. et stat. nov.

I. secundiflora Poir. var. *oubanguiensis* Tisserant, Bull. Mus. Hist. Nat. Par. 2nd Sér. 3: 166 (1931), non *I. oubanguiensis* Tiss. ibid. p. 164.

[*I. barteri* sensu Tisserant, ibid. p. 270 p. p., Gillett, Kew Bull. Add. Ser. 1: 67 (1958) p. p. non Hutch. & Dalz.].

[*I. secundiflora* var. *rubripilosa* sensu Gillett, ibid. 69 p. p. non De Wild.].

Related to *I. secundiflora* and *I. barteri,* from which it differs as follows:

Character	*I. secundiflora*	*I. barteri*	*I. brevifilamenta*
Multicellular hairs on stems.	Copious, mainly short (under 0.5 mm.) sometimes some longer ones as well. In var. *rubripilosa* copious, long (up to 2 mm.)	Sparse, short.	Plentiful, 1-2 mm. long
Multicellular hairs on pods	Usually present	Absent	Absent
Style length	2-3 mm.	c. 2 mm.	c. 1 mm.
Filament length	c. 3 mm.	c. 3 mm.	c. 2 mm.
Length of pod	4-7 mm.	6-10 mm.	c. 3 mm.
No. of seeds	2-4	5-6	2-4
Width of pod	c. 2 mm	c. 1.5 mm.	?
Length of peduncle	6-25 mm.	3-10 mm.	3-7 mm.

In addition *I. brevifilamenta* is a more slender plant than *I. secundiflora* and its racemes are laxer. The specimens from Portuguese Guinea differ from those coming from further east in having fewer leaflets (9-11 instead of 11-17) and shorter, fewer-flowered racemes. TISSERANT, when describing *I. secundiflora* var. *oubanguiensis,* remarked that, when more material became available, it would very likely prove desirable to raise it to specific rank. The constancy of the characters listed in the material cited below confirms this expectation though unfortunately the type remains the only specimen to show mature fruit. Flowers almost as short as those of the present species occur in *I. milne-redheadii* and *I. colutea* var. *linearis,* but, besides other differences, especially their much longer fruits, these species have leaflets several times as long as wide whereas those of *I. brevifilamenta* are elliptic and not more than twice as long as wide.

PORT. GUINEA. Gabu: between Pitche and Canquelifa, grassy plains with laterite soils, annual herb with red flowers, 18 Sept. 1950, *Espirito Santo* 2772 LISC; 4 Oct. 1951, *Espírito Santo* 2952 COI, LISC, K.

N. NIGERIA. Bauchi Plateau, plains, Aug. 1930, *Lely* P 645; Vom, 900-1350 m., 1922, *Dent Young* 47.

OUBANGUI. Bambari district: Les Maroubas, on laterite, 15 Oct. 1923, *Tisserant* 1250 P holo, K photo; Sibut, 11 Oct. 1903, *Chevalier* 5703.

The following very immature specimen from the Sudan republic, Equatoria Prov. Abu Sattu hills N. of Tambura, 17 July 1937, *Myers* 7147 may belong here but has almost orbicular leaflets up to 21 in number and its multicellular hairs are few and short as in *I. barteri.*

§§ Alternifoliolae

68. **I.** spicata Forsk var. brevicarpa Gillett var. nov.

A var. *spicata* fructibus 2-4-spermis, ad 10, vel rarius 12 mm. longis, paulo sursum curvatis, differt. Foliola superne ad centrum glabra, versus marginem strigulosa.

PORT. GUINEA. Gabu district: Bajucunda, cut grassland on dry ground, prostrate spreading herb, 17 Nov. 1952, *Espirito Santo* 3164 COI, LISC holo, K isotype. Between Pitche and Canquelifa, grassy plains, prostrate perennial with red flowers, 18 Sept. 1950, *Espírito Santo* 2774 COI, LISC.

GHANA. N. Territory, Tamale area, near Ziong in water course in Sawannah, procumbent, 12 Dec. 1953, *Morton in GC* 9881.

This variety in its upcurved fruits and leaflets tending to be glabrous above shows some approach to *I. oxalidea* Welw. ex Bak.

NEW AND LITTLE KNOWN SPECIES FROM THE FLORA ZAMBESIACA AREA

VII

by

H. WILD
Senior Botanist, Federal Dept. of Agriculture, Salisbury,
S. Rhodesia

STERCULIACEAE

Dombeya greenwayi Wild, sp. nov.

D. wittei De Wild. & Staner affinis séd foliorum nervis subtus prominentibus, venis prominentibus reticulatis foliis ambitu saepe leviter trilobatis, margine irregulariter dentatis.

Frutex laxus c. 2.6 m altus, ramulis stellato-pilosis atque sparse glanduloso-pilosis demum glabrescentibus, cortice purpureo-brunneo. *Folia* petiolata, petiolo ad 6.5 cm longo, dense stellato-piloso atque sparse glanduloso-piloso ; lamina 5.5-8.5 X 4-6.5 cm, latissime ovata, integra vel leviter trilobata, apice acuminata, basi 7-nervosa profunde cordata sinu 1.5-2.0 cm alto, margine irregulariter dentata, supra velutino-stellato-tomentella venis reticulato-impressis, subtus discolorata albido-stellato-tomentella, nervis venisque prominentibus; stipulae ad 1 cm longae, anguste lanceolatae, acuminatae, stellato-pilosae atque glanduloso-pilosae. *Inflorescentiae* axillares umbelliformes, 2-3-florae; pedunculus ad 7.5 cm longus, dense stellato-pilosus atque glanduloso-pilosus ; pedicelli similes ad 2.5 cm longi ; bracteolae ad 1 cm longae, caducae, lineari-lanceolatae, acuminatae, utrinque dense stellato-pilosae atque glanduloso-pilosae. *Flores* conspicui, c. 3.5 cm diam.; alabastra c. 1.4 × 0.7 cm, anguste ovoideo-acuminata. *Calyx* ad basin fere 5-partitus, lobis ad 2 X 0.4 cm anguste lanceolatis apicibus subulato-acuminatis extra stellato-tomentosis vel stellato-pilosis atque glanduloso-pilosis intus glabris. *Petala* 5, saturata rosea, c. 2.2 X 2.2 cm, oblique rotundato-triangulata, basi late cuneata, nervis siccitate prominentibus. *Stamina* 15 per tria cum staminodiis 5 alternantia; triadis staminum lateralium alterum breve, alterum longum, stamen medium breve; filamentorum tubus c. 2.5 mm longus; staminum filamenta ad partem liberam subulata, ea longiora 6-7 mm longa, ea breviora c. 3.5 mm longa; antherae 3 mm longae, lineares; staminodia c. 1.1 cm longa, spathulato-linearia. *Ovarium* late ovoideum, tomentosum, 5-loculare, ovulis 4 pro loculo, loculis intus stellato-pilosis; stylus c. 0.9 cm longus, inferne dense stellato-pilosus, superne glaber, stigmatibus 5 c. 2 mm longis recurvatis. *Capsula* matura adhuc ignota.

NORTHERN RHODESIA. Northern Province: Shiwa Ngandu, with *Dodonaea viscosa, Bersama* sp., *Harungana madagascariensis* and *Syzygium cordatum* near the banks of a stream, 1660 m, 26.VII.1938, *Greenway* 5527 (EA; K, type); 48 km S. of Shiwa Ngandu, at edge of evergreen forest, *Angus* 874a (FHO).

This species belongs to the subgenus *Dombeya* (subgen. *Eudombeya* K. Schum.) and is rather like *D. wittei* De Wild. & Staner in general appearance. Apart from the differences from this species listed above in the diagnosis the buds of *D. greenwayi* are also more acuminate and the ovary tomentose rather than densely hirsute. *D. greenwayi* is also near *D. parvifolia* K. Schum. but in the latter species the bracteoles are much broader, the flowers are smaller (c. 2 cm in diam.) and the leaves are densely greyish-pubescent not whitish-tomentellous below.

Melhania acuminata var. **agnosta** (K. Schum.) Wild, comb. nov.

Melhania agnosta K. Schum. in Engl., Mon. Afr. Pflanz.-Fam.-Gatt. **5**, Stercul.: 11 (1900). — Burtt Davy, Man. Fl. Pl. Transv. & Swazil. **1**: 261 (1926).

Melhania obtusa N. E. Br. in Kew Bull. **1906**: 99 (1906).

BECHUANALAND PROT. **Southeastern Division** : Kanye, f 1. *Miller* 586 (PRE).

NORTHERN RHODESIA. **Southern Province** : Livingstone, fl. 6.IV.1956, *Robinson* 1440 (K).

SOUTHERN RHODESIA. **Northern Division**: Mrewa, fl. & fr. V.1956, *Davies* 1936 (K; SRGH). **Western Division:** near Bulawayo, fl. XI.1899, *Cecil* 94 (K, type of *M. obtusa*); Matobo, between World's View and Silozwe, fl. 14.IV.1955, *Exell, Mendonça & Wild* 1503 (BM; LISC; SRGH). **Eastern Division**: Umtali, Dora Ranch, fl. 7.I.1951, *Chase* 3703 (K; SRGH). **Southern Division** : Beit Bridge Rd., S. of Lundi R., 15.XI.1955, *Exell, Mendonça & Wild* 373 (BM; LISC; SRGH).

MOZAMBIQUE. **Manica e Sofala:** Beira, fl. II.1912, *Rogers* 5952 (K).

TRANSVAAL. Makapansberg, Streydpoort, fl. *Rehmann* 5490 (K; Z, type of *M. agnosta).*

This variety is distinguished from *M. acuminata* var. *acuminata* by its obtusely oblong rather than ovate or ovate-oblong leaves, flowers which are somewhat smaller, and dark brown rather than golden stellate hairs scattered among the pale greyish stellate hairs on the bracts, sepals and branches of the inflorescence. Leafshape is sometimes not very trustworthy in trying to separate this variety from the type variety [i. e. in *Eyles* 962 (K; SRGH) from Bulawayo] and the dark brown hairs of the inflorescence vary in density, so it was not thought desirable to retain var. *agnosta* as a distinct species. The range of distribution of var. *agnosta* is roughly the same as that of var. *acuminata* although the former appears to be particularly frequent in the Bulawayo and Matobo Districts of S. Rhodesia.

M. acuminata Mast. was considered synonymous with *M. velutina* Forsk. by EXELL & MENDONÇA in Consp. Fl. Angol. 1, 2: 190 (1951). However, *M. acuminata* always has a style of from 0.7-1.1 cm in length whilst that of *M. velutina* is from 1-3 mm in length. Although other characters separating the two species are not so reliable (the ovate, acuminate epicalyx segments and densely villous sepals of *M. velutina* as against the cordate, abruptly acuminate or caudate-acuminate epicalyx segments and shortly tomentose sepals of *M. acuminata)*, in combination with style length they give a clear cut separation of the two species and they should be considered distinct.

Hermannia torrei Wild, sp. nov.

H. helianthemo K. Schum. affinis sed foliis late obovatis valide serratis, petalis intus basi pubescentibus.

Herba perennis vel suffrutex ad 50 cm altus, ramulis primo stellato-tomentosis demum pubescentibus glandulis intermixtis; cortex purpureo-brunneus. *Folia* petiolata, petiolo ad 8 mm longo stellato-tomentoso vel dense pubescenti glandulis intermixtis; lamina 0.7-1.5 × 0.4-1 cm, obovata vel late obovata, apice truncata vel rotundata, basi late cuneata, utrinque breviter griseo-stellato-tomentosa et glandulosa, parte marginis superiore valde serrata, parte inferiore integra, nervis lateralibus utrinsecus 2-4 supra immersis subtus prominentibus; stipulae patentes, ovatae, acutae, tomentosae, +2 mm longae. *Flores* ad apices ramulorum in axillis solitarii, nutantes; pedunculus tenuis, +1.2 cm longus stellato-tomentosus, apicem versus articulatus et bracteatus, bracteis 1-2 subulatis tomentosis +0.3 mm longis. *Calyx* campanulatus, dense stellato-pubescens et glandulosus, 6-7 X 6-7 mm, lobis anguste triangularibus, acuminatis ± 4.5 mm longis. *Petala* verisimiliter coccinea, anguste obovata, apice rotundata, margine ad basin sensim involuta, intus ad basin pubescentia, +1 X 0.4 cm. *Stamina* calycem paullo superantia, filamentis anguste oblanceolatis margine superne minute ciliolatis +3.5 mm longis, antheris ciliolatis +5 mm longis. *Ovarium* breviter stipitatum, oblongo-ovoideum, apice minute 5-corniculatum, stellato-tomentosum et glandulosum, loculis ± 12-ovulatis; styli ad medium puberuli, +4 mm longi. *Capsula* oblongo-ovoidea, +8 X 6 mm, apice 5-corniculata, cornibus 0.5-1 mm longis, breviter stellato-tomentosa et glandulosa, seminibus brunneis subreniformibus rugosis 1.5 X 1 mm.

MOZAMBIQUE. **Sul do Save:** Guijá, Posto do Alto Changano, 3 km from Maqueze, fl. & fr. 14.VII.1948, *Torre* 8071 (LISC, type): — shrublet of sandy brackish flats on the banks of the Changano R.

This attractive species belongs to Subgen. *Acicarpus* Harv. and is named in honour of Sr. ROCHA DA TORRE whose magnificent collections from Mozambique have so added to our knowledge of the flora of that country.

Cola mossambicensis Wild, sp. nov.

C. microcarpae Brenan affinis sed pedicellis exarticulatis, androphoris dense stellato-pubescentibus, fructus carpellis dense stellato-tomentosis basi breviter angustatis.

Arbor ad 27 m alta, ut videtur sempervirens et plerumque dioica, ramulis juvenilibus rigidis crassis valde sulcatis primo dense ferrugineo-tomentosis, demum glabrescentibus 3-7 mm diam.; cortex albidus. *Folia* spiraliter disposita, coriacea, petiolata, petiolo ad 12 cm longo primo dense ferrugineo-tomentoso demum glabrescenti sed pulvinis persistentibus puberulis; lamina 6-22 X 3.3-9.5 cm, anguste obovata vel obovato-elliptica, apice abrupte acuminata, basi late cuneata vel rotundata, margine plana vel leviter undulata, utrinque glabra, opaca, costa et nervis lateralibus supra subprominentibus subtus prominentibus, nervis lateralis utrinsecus 12-15, venis reticulatis subtus prominentibus. *Stipulae* caducissimae, lanceolato-lineares, tomentosae, ad 7.5 mm longae. *Flores masculi* in axillis foliorum persistentium necnon delapsorum in ramulis annotinis 5-12-fasciculati; pedicelli ferrugineo-tomentosi, ut videtur exarticulati, +1 cm longi, bracteis basalibus ferrugineo-tomentosis ad 2 mm longis. *Calyx* rotato-campanulatus, profunde 5-6-Iobatus, extra dense ferrugineo-tomentosus; tubus brevissimus, 1.5 mm longus, intus basi androphori excepto glaber; lobi 3.5-6 ×2.5-3 mm, anguste ovati, apice acuti, crassiusculi, in parte superiore intus stellato-pubescentes, parte inferiore papillosii, papillis minimis subglobosis. *Androphorum* 3 mm longum, stellato-pilosum, pilis ad androphori basin longe brachiatis, aliter pilis breviter brachiatis, apice antheris 5 coronatum thecae uniseriatae. *Carpella* **rudimentaria** 4, medio **inter** coronam antherarum demersa. ***Perianthium*** floris foeminei ei **masculo** persimili. *Carpella* 4, dense stellato-tomentosa, biovulata, superne in **stylum** 1.5 mm longum tomentosum subito angustata; stigma leviter recurvum, papillosum, ± 1 X 0.75 mm ; carpella **basi antheris** 5-7 circumcincta. ***Monocarpia*** 1-2, subsessilia, **obovoideo-globosa,** basi **breve** angustata, dense **ferrugineo-tomentosa,** **1.3-1.4 × 1.3-1.7** cm; **semina** 1-2, irregulariter **ellipsoidea,** brunnea, leviter rugosa, ± 1.2 × **0.9 cm**; cotyledones 2, **valde** crassae.

MOZAMBIQUE. **Zambezia:** Milange, fr. 10.IX.1942, *A. J. W. Hornby* 2794 (K; LM; PRE; SRGH): — **tree** of 27 m. **Manica e Sofala:** Espungabera, Gogoi Mt., 600 m, fl., 12.VI.1942, *Torre* 4308 (LISC, type): — tree of 6-8 m associated with *Khaya* sp. ; without precise locality, fl. VIII.1946, *Simão* 839 (K; LM); Moribane, 4 km on road to Sanguene, fr. 5.X.1953, *Gomes Pedro* 4219 (LMJ; PRE):— **evergreen** tree of 25 **m.** Chindao name « Mushipirabungo ».

This species is very near *C. microcarpa* Brenan, in no character **is** it outstandingly different but the total of minor correlated differences is quite large. Apart from its hairy androphore, inarticulated pedicels and more densely tomentose fruit, the leaves are often rounded rather than cuneate at the base, the fruiting carpels are more commonly reduced by abortion to two rather than one, there is a slight tendency for them to be narrowed at the base into an incipient stipe and the pericarp **is** rather tough and thick rather than very thin and brittle. The type is monoecious but this is presumably unusual.

It appears to be a species of rather low-altitude evergreen forest. The sterile specimens *Mendonça* 2303 (LISC) from between Mutuali and Milange on the borders of the Zambezia and Niassa Provinces of Mozambique and *Clements* 67 (FHO; K) from Zomba in Nyasaland should perhaps be referred to *C. mossambicensis.*

BOMBACACEAE

Bombax oleagineum (Decne.) A. Robyns in Bull. Jard. Bot. Brux. **29**: 26 (j1959).

Pachira oleaginea Decne, in Fl. des Serres **23**: 49 (1880) « oleagina ». — Bakh. in Bull. Jard. Bot. Buitenz., Sér. 3, **6**: 173 (1924). Type a specimen cultivated in the Jardin du Hamma, Algiers, origin unknown (P, holotype).

Bombax kimuenzae De Wild. & Th. Dur. in Bull. Herb. Boiss., Sér. 2, **1**: 740 (1901). — Ulbr. in Engl., Bot. Jahrb. **49**: 545 (1913). — Exell & Mendonça, C. F. A. **1**, 1: 145 (1937). — A. Robyns in Bull. Jard. Bot. Brux. **27**: 666 (1957). Type a cultivated or introduced plant from the Belgian Congo.

Pachira affinis sensu Bakh., tom. cit.: 171 (1924) pro parte quoad syn. *P. kimuenzae.*

Bombax affine sensu Ducke in Arch. Jard. Bot. Rio de Jan. **5**: 162 (1930) quoad descr. excl. comb. nov.

Bombax sessile sensu Keay, F. W. T. A. ed. 2, **1**, 2: 335 (1958).

The nomenclature of this species has caused considerable trouble in the past due largely to the fact that, although K. SCHUMANN [Mart., Fl. Bras. **12**, 3: 232 (1886)] reduced *Carolinea affinis* Mast. to synonymy with *Pachira insignis* (Sw.) Sav., this was not taken up by BAKHLUIZEN (tom. cit.: 171) who retained the former taxon as a distinct species *Pachira affinis* (Mast.) Decne. Re-examination of the type of *Carolinea affinis* shows that SCHUMANN was right and also that it has nothing to do with our plant. Moreover, it is evident from BAKHUIZEN's key to the genus *Pachira* (tom. cit.: 170) in which he described *P. affinis* as « calyx... pilis stellatis sparse obductus » that he is not referring to *P. affinis* (Mast.) Decne in the true sense but to our species, as the type of *P. affinis* has a tomentellous calyx. The type of *Pachira oleaginea* has been examined and it is evident that here we have the earliest known name for our material although it is unfortunate that, like the type of *Bombax kimuenzae,* it is a cultivated or introduced specimen whose country of origin is unknown. In the absence of reliable evidence it is impossible to say more than that *Bombax oleaginea* may possibly be of tropical American origin, but is now known with certainty only as a cultivated or introduced plant throughout Africa and in tropical America and Asia.

BURSERACEAE

Commiphora africana (A. Rich.) Engl. in A. & C. DC, Mon. Phan. **4:** 14 (1883); Bot. Jahrb. **48:** 484, fig. 3N (1912); in Engl. & Prantl, Nat. Pflanzemfam. ed 2, 19a: 438 (1931).

Heudelotia africana A. Rich. in Guill., Perr. & Rich., Fl. Senegamb. Tent. **1:** 150, t. 39 (1832).

Balsamodendron africanum (A. Rich.) Arn. in Ann. Nat. Hist. **3:** 87 (1839).

Balsamea pilosa Engl., Bot. Jahrb. 1: 41 (1880).

Commiphora pilosa (Engl.) Engl. in A. & C. DC, Mon. Phan. **4:** 12 (1883).

Commiphora nkolola Engl., Bot. Jahrb. **34:** 308 (1904).

Commiphora sambesiaca Engl., Bot. Jahrb. **44:** 146 (1909).

Commiphora calciicola Engl., Bot. Jahrb. **44:** 147 (1909).

Var. **africana**

Calyx extrinsecus glaber.

Widely distributed throughout tropical Africa. Also in the Transvaal and SW. Africa.

Var. **rubriflora** (Engl.) Wild, comb. nov.

Commiphora rubriflora Engl., Bot. Jahrb. **30:** 336 (1901); op. cit. **48:** 490 (1912); in Engl. & Prantl, Nat. Pflanzenfam. ed. 2, 19a: 440 (1931).

Calyx extrinsecus pilosus.

UGANDA. Moroto, fl. & fr. *Brasnett* 76 (K).

TANGANYIKA. Unyika Plateau, 40 km SW. of Lake Rukwa, fr. *Goetze* 1406 (B, holotype of *C. rubriflora* †, K). Mbugwe, fl. 1.VIII.1950, *Bullock* 3057 (K). Mpwapwa, fr. 17.I.1930, *H. E. Hornby* 163 (EA; K).

NORTHERN RHODESIA. **Northern Province:** Kalambo Falls, fl. 2.XI.1951, *Robertson* 205 (K; PRE).

SOUTHERN RHODESIA. **Western Division:** Bulawayo, fl. X.1930, *Eyles* 6626. **Eastern Division:** Umtali, fl. 29.IX.1954, *Chase* 5303 (BM; SRGH).

MOZAMBIQUE. **Niassa Province:** between Muatua and Angoche, fl. & fr. 7.XI.1936, *Torre* 980 (COI).

Chase 5303 is a somewhat intermediate specimen as the hairs on the calyx are very sparse. There are no other significant differences between these two taxa, other than the presence or absence of hairs on the calyx. In addition the range of distribution of var. *rubriflora* is entirely included within that of var. *africana* so they are not worthy of more than varietal rank. The list of records cited above is a partial one.

Commiphora pyracanthoides Engl., Bot. Jahrb. 26: 368 (1899); op. cit. 48: 481, fig. 2 U (1912); in Engl. & Prantl, Nat. Pflanzenfam. ed 2, 19a: 437 (1931). — Brenan in Kew Bull. 1953: 104 (1953).

Subsp. **pyracanthoides**

Calyx extrinsecus glaber.

SOUTHERN RHODESIA. **Southern Division**: Beit Bridge, fr. 16.II.1955, *Exell, Mendonça & Wild* 458 (BM; LISC; SRGH).

SW. AFRICA. **Hereroland:** Otjimbingwe, *Fischer* 168 (B, holotype †); Little Karas Mountains, fr. 19.I.1916, *Pearson* 9747 (K, neotype of *C. pyracanthoides* designated by BRENAN loc. cit.).

TRANSVAAL. **Soutpansberg:** st. 12.IV.1934, *Schweickerdt & Verdoorn* 512 (K; PRE); Dongola Reserve, st. 28.IV.1948, *Codd* 4101 (K; PRE); Potgietersrust Distr. fr. 22.I.1929, *Hutchinson* 2650 (K).

NATAL. **Zululand:** Nduma Game Reserve, fr. 1.XII.1938, *Gerstner* 3148 (K; PRE).

SWAZILAND. Nsoko-Maloma, fr. 10.XII.1931, *Pole Evans* 3404 (K; PRE).

Subsp. **glandulosa** (Schinz) Wild, comb. nov.

Commiphora glandulosa Schinz in Bull. Herb. Boiss., Sér. 2, **8:** 633 (1908).— Brenan in Kew Bull. **1953:** 106 (1953).

Commiphora lugardae N. E. Br. in Kew Bull. **1909**: 99 (1909).

Commiphora seinen Engl., Bot. Jahrb. **44**: 145 (1910).

Calyx extrinsecus glandulosus.

BECHUANALAND PROT. **Northern Division**: Kwebe Hills, fl. & fr. 1.IX.1897, *Mrs. Lugard* 23 (K, holotype of *C. lugardae).*

NORTHERN RHODESIA. **Barotseland,** Sesheke, fl. & fr. 5.X. 1906, *Seiner* 57 (B, holotype of *C. seineri*f). **Southern Province:** Kafue Flats, fl. 7.X.1930, *Milne-Redhead* 1223 (K).

SOUTHERN RHODESIA. **Northern Division**: Mtoko, fl. 10.X. 1955, *Lovemore* 443 (K; SRGH). **Western Division:** Victoria Falls, fr. 18.XI.1949, *Wild* 3080 (K; SRGH). **Southern Division:** Lower Sabi, fr. 29.I.1948, *Wild* 2442 (K; SRGH).

MOZAMBIQUE. **Tete**: Mudsi R., fl. 26.IX.1948, *Wild* 2642 (K; SRGH).

SW. AFRICA. **Amboland:** Ombandja, fl. 29.IX.1885, *Schinz* 767 (Z, holotype of *G. glandulosa).* **Damaraland:** Nankluft Mts., st. 31.XII.1915, *Pearson* 9109 (K).

TRANSVAAL. **Soutpansberg**: Dongola Reserve, st. 28.IV. 1948, *Codd* 4102 (K; PRE); Hamilton Farm, st. 29.IV.1948, *Codd* 4115 (K; PRE); Waterberg Distr., fr. 26.XII.1934, *Smuts* 352 (K; PRE) (1).

The evidence available to BRENAN (loc. cit.) in 1953, i. e. that *C. glandulosa* was always a small tree with glandular calyces and *C. pyracanthoides* always a low spreading bush with glabrous calyces seemed quite sufficient to retain these two taxa as distinct species. In the light of recent observations made by Dr. H. MERXMÜLLER in SW. Africa, however, which show that the differences in habit are by no means reliable in that territory, it is necessary to reconsider the position. In addition, *C. glandulosa* sometimes has glands near the leaf-

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(1) For further records see BRENAN (loc. cit.).

bases and sometimes not. The density of glands on the calyx is also very variable. It would therefore seem much better to consider these two taxa at an infraspecific level. The situation is obviously rather analogous with that of the two varieties of *C. africana* dealt with above. In this case however, there is some difference in geographical distribution although the two taxa do overlap quite considerably. For this reason they are considered as Subspecies with Subsp. *pyracanthoides* having a more southerly distribution in the Transvaal, Zululand, Swaziland and SW. Africa, only just penetrating S. Rhodesia across the Limpopo and subsp. *glandulosa* occurring in SW. Africa and the Transvaal like subsp. *pyracanthoides* but also extending northwards into Angola, S. Rhodesia, N. Rhodesia and Mozambique.

ERRATA

Pag.	Lines	For	Read
41	4, 30	Decne	Decne.
41	22, 25, 30	Mast.	Mart.
42	2	*oleaginea*	*oleagineum*
44	22	**Soutpansberg**	**Zoutpansberg**
45	8	Subspecies	subspecies
45	8	Subsp.	subsp.

ON THE ORIGIN
OF *NARCISSUS CANTABRICUS* DC.

by

ABÍLIO FERNANDES
Botanical Institute, Coimbra University

INTRODUCTION

After the comparative study of the chromosome complements, we had arrived, in a previous work (FERNANDES, 1957), to the conclusion that *Narcissus cantabricus* DC. must have been originated from *N. bulbocodium* L. through structural changes of the chromosomes, possibly acting in conjunction with mutation of genes. In order to either confirm or invalidate this point of view and to best precise the mentioned structural changes in the case of our conclusion being valid, we studied the meiosis of the hybrid obtained from the cross of the two species. We herewith present the result of the observations effected and the conclusions obtained.

MATERIAL AND METHODS

In the Spring of 1951, a plant of *N. cantabricus* DC. from our cultures (N° 930), gathered in the Sierra de las Filabres, Almeria, in Spain, produced a flower the pollen of which was used to fertilize several flowers of *N. bulbocodium* L. gathered in Valongo (N° 384). The pistil of plant N° 930 was subsequently fecundated with pollen of another plant from culture N° 384. From these crosses 112 hybrids were obtained, some of them producing flowers, the anthers of which, presenting several stages of meiosis, were fixed in acetic alcohol (1:3). The anthers were afterwards squashed in drops of aceto-carmine and the slides were made permanent in accordance with the technique described by LA COUR (1937).

OBSERVATIONS

In a previous work (**Fernandes**, 1957), we had the opportunity of showing that the chromosome complements of *N. bulbocodium* L. (fig. 1*a*) and *N. cantabricus* DC. (fig. *lb)* can be respectively represented by the following formulas (1):

$$2\,\mathrm{lm}\,(A_b)+2\,\mathrm{Lp}_1\,(B_b)+2\,\mathrm{Lp}_2\,(C_b)+2\,\mathrm{Lp}_3\,(D_b)+2\,\mathrm{PP}\,(E_b)+2\,\mathrm{PP}\,(F_b)+2\,\mathrm{Pp'}\,(G_b)$$

$$2\,\mathrm{lm}\,(A_c)+2\,\mathrm{Lp}_1\,(B_c)+2\,\mathrm{lp'}\,(C_c)+2\,\mathrm{Lp}_3\,(D_c)+2\,\mathrm{PP}\,(E_c)+2\,\mathrm{PP}\,(F_c)+2\,\mathrm{PP}\,(G_c)$$

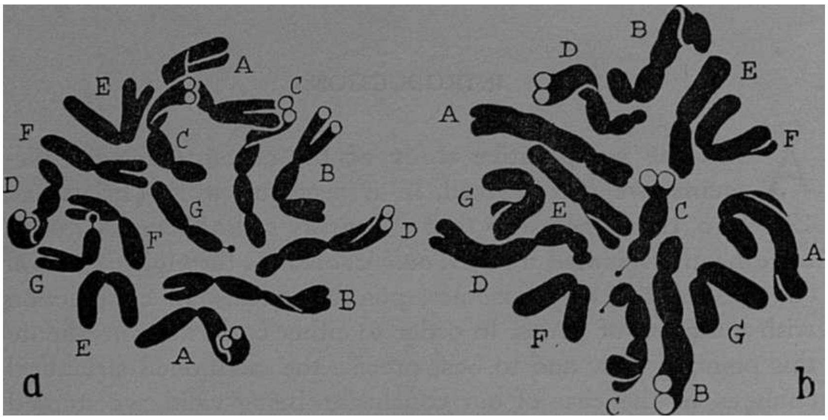

Fig. 1. — *a,* Metaphase plate in a cell of a root-tip of *N. bulbocodium* L. *b,* ditto of *N. cantabricus* DC. The chromosome pairs are indicated by letters A-G. X 3200.

Comparison of these complements and the analysis of the metaphase plates of the hybrids (fig. 2) shows that the elements of each of the pairs A_bA_c, D_bD_c, E_bE_c and F_bF_c were very similar and that those of *N. bulbocodium* could not be distinguished from those of *N. cantabricus.* On the contrary, in pairs B_bB_c, C_bC_c and G_bG_c we noticed that B was distinguishable from B_b because its L arm was longer; that C_c was distinguishable from C_b because it possessed a satellite in the proximal extremity and the long arm was much shorter (l instead of L); and that G_c was distinguishable from G_b for having no satellite and for both arms having almost the same length.

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(1) In this work the chromosomes of *N. bulbocodium* L. and of *N. cantabricus* DC. are represented by the letters A-G, provided, respectively, with indices *b* and *c.*

The prophase of the first division of meiosis is rather difficult to study using the technique we followed, owing to the fact that the chromosomes have wide zones which are scarcely coloured and the figures obtained are not clear. For this reason we limited our observations to metaphase I and to ulterior stages.

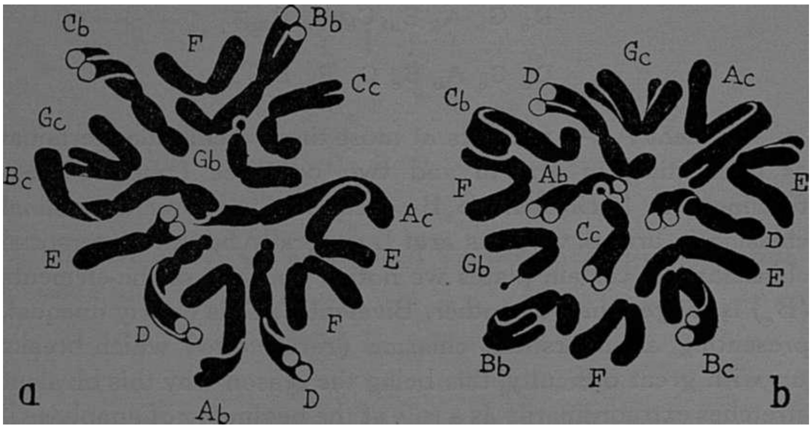


Fig. 2. — *N. bulbocodium* × *N. cantabricus.* Polar views of metaphases plates in cells of the root-tips of two plants. X 3200.

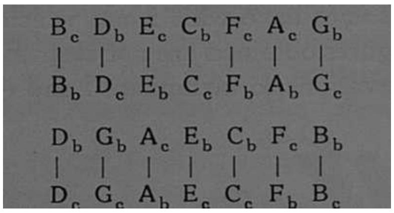
We give in Table I the data obtained through the analysis of the side views of 70 metaphases of the first division.

TABLE I

Type of association	7_{II}	$6_{II}+2_{I}$	$5_{II}+4_{I}$	$4_{II}+6_{I}$	$1_{III}+5_{II}+1_{I}$	$1_{III}+4_{II}+3_{I}$	
N° of cases	40	17	5	1	5	2	70
Percentage	57.15	24.28	7.15	1.42	7.15	2.85	100

The percentage of 57.15 % for the metaphases with 7_{II} is possibly exaggerated, and this exaggeration may have resulted from the great difficulty there is in interpreting the other configurations. In the plates with 7 bivalents we notice as a rule pairing of chromosomes A-G of *N. bulbocodium* L. with the corresponding ones of *N. cantabricus* DC. Therefore figs. 1

and 2, Plate I, can, respectively, be interpreted along the following schemes (¹):

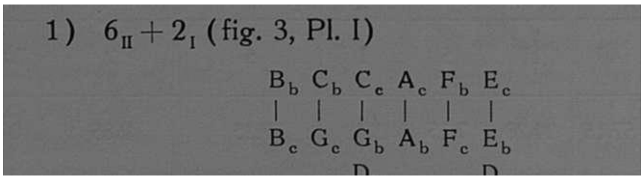


$$\begin{array}{ccccccc} B_c & D_b & E_c & C_b & F_c & A_c & G_b \\ | & | & | & | & | & | & | \\ B_b & D_c & E_b & C_c & F_b & A_b & G_c \end{array}$$

$$\begin{array}{ccccccc} D_b & G_b & A_c & E_b & C_b & F_c & B_b \\ | & | & | & | & | & | & | \\ D_c & G_c & A_b & E_c & C_c & F_b & B_c \end{array}$$

Bivalent A_bA_c presents at most times a chiasma (terminal or interstitial) in arm m and two or three (one of them terminal) in 1. Bivalent B_bB_c occasionally shows a terminal chiasma in arm p, whereas arm L generally has two interstitial chiasmata. In certain plates we notice that one of the elements (B_c) is longer than the other. Bivalent C_bC_c is clearly unequal, presenting an interstitial chiasma (rarely two) which breaks up with great difficulty, this being the reason why this bivalent stretches extraordinarily as a rule at the beginning of anaphase I. Bivalent D_bD_c is similar to that constituted by B elements, from which it is distinguishable for because it is not unequal and for being slightly shorter. Pair E_bE_c generally forms a ring with two terminal chiasmata. Pair F_bF_c at most times possesses an interstitial chiasma and a terminal one. Finally, elements G_bG_c originate a heteromorphous bivalent with an interstitial chiasma and a terminal one in one of the arms.

Among the other configurations observed the following deserve special mention:



1) $6_{II} + 2_I$ (fig. 3, Pl. I)

$$\begin{array}{cccccc} B_b & C_b & C_c & A_c & F_b & E_c \\ | & | & | & | & | & | \\ B_c & G_c & G_b & A_b & F_c & E_b \end{array}$$

(¹) In these schemes and in the subsequent ones the side views of the metaphase I plates are represented as if the figures were completely plane and observed from left to right. The letters joined by dashes represent bivalents, trivalents or chains. The single letters correspond to the univalents. The order in which the bivalents and univalents appear in the photographs is maintained in the representation. In the case of homomorphic bivalents the orientation of chromosomes to the poles was arbitrarily done.

The analysis of this plate shows that in bivalent B_bB_c element B_c is longer than B_b; that elements of pair C_bG_c are joined by a very extended filament starting from the end of the short arm of C_b; and that in the heteromorphous pair C_cG_b, C_c is found to be very much stretched.

2) $6_{II} + 2_I$ (fig. 4, Pl. I)

$$\begin{array}{ccccccc}
 & & & & & & B_b \\
C_b & G_c & E_c & F_b & D_b & A_c & \\
| & | & | & | & | & | & \\
B_c & G_b & E_b & F_c & D_c & A_b & \\
 & & & & & & C_c
\end{array}$$

In bivalent B_cC_b we noticed the presence of one terminal chiasma only.

3) $6_{II} + 2_I$ (fig. 5, Pl. I)

$$\begin{array}{ccccccc}
 & A_b & B_c & D_b & C_b & E_b & F_c \\
G_c & | & | & | & | & | & | \\
 & A_c & B_b & D_c & C_c & E_c & F_b \\
 & G_b & & & & &
\end{array}$$

This configuration appears in a percentage of 11.42 %, which means that the G elements do not often pair, even in cases where there seems to be no competition from other chromosomes with which they have homology.

The unequal bivalent C_bC_c possesses in this plate two interstitial chiasmata.

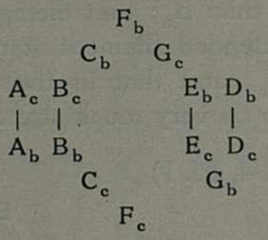
4) $5_{II} + 4_I$ (fig. 6, Pl. I)

$$\begin{array}{cccccc}
 & G_c & & G_b & C_c & \\
B_b & A_c & F_b & D_c & E_b & \\
| & | & | & | & | & \\
B_c & A_b & F_c & D_b & E_c & \\
 & & & & & C_b
\end{array}$$

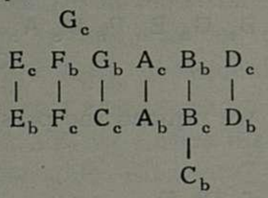
5) $5_{II} + 4_I$ (fig. 7, Pl. I)

$$\begin{array}{cccccc}
 & D_b & B_b & A_c & C_b & E_c \\
G_c & | & | & | & | & | \\
 & D_c & B_c & A_b & C_c & E_b \\
 & F_b & G_b & F_c & &
\end{array}$$

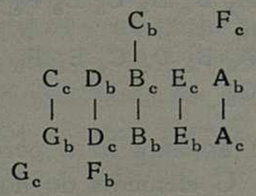
6) $4_{II} + 6_{I}$ (fig. 8, Pl. I)



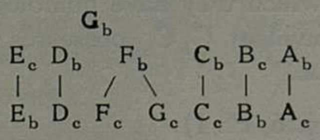
7) $1_{III} + 5_{II} + 1_{I}$ (fig. 9, Pl. I)



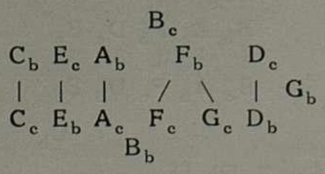
8) $1_{III} + 4_{II} + 3_{I}$ (fig. 1, Pl. II)



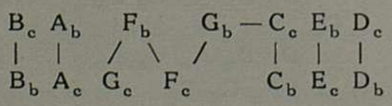
9) $1_{III} + 5_{II} + 1_{I}$ (fig. 2, Pl. II)



10) $1_{III} + 4_{II} + 3_{I}$ (fig. 3, Pl. II)



11) 4_{II} + chain of 6 (fig. 4, Pl. II)



The disjunction of the chromosomes at anaphase I is not generally synchronic, there being bivalents which are more precocious than others and this agrees evidently with the number and distribution of chiasmata (the bivalents whose chiamata terminalised are more easily and quickly separated than those in which interstitial chiasmata occurred at metaphase).

In some cases there are no anomalies, there being 7 chromosomes to each pole (figs. 5 and 6, PL II). Examination of these chromosomes shows that at times one or two of them are found consisting of unequal chromatids. These chromosomes (figs. 5 and 6, Pl. II) undoubtedly correspond to the disjunction of bivalents B_bB_c and C_bC_c which, as we have seen, are constituted by unequal elements.

In the cases where interstitial chiasmata occurred in bivalents B_bB_c and C_bC_c, the chromosomes stretch extraordinarily (figs. 7 and 8, PI. II), it being probable that they end by breaking up, as fig. 9, PL II suggests. Besides, bridges resulting from inversion are frequently found. In most of the pollen mother cells we notice only one bridge with a fragment (figs. 1-4, Pl. III). In others, however, two bridges were observed with their respective fragments (fig. 5, Pl. III). We noticed at times the simultaneous existence of bridges and univalents (figs. 1 and 3, Pl. III).

The maximum number of bridges in the same cell is two and there is no doubt that they both come from long chromosomes. Unfortunately, owing to the fact that is not easy to distinguish in anaphase I the short arms of long chromosomes, it was not possible for us to identify the two elements bearing inversions. It is however most likely that they may be chromosomes A and D. We have not observed bridges formed by smaller chromosomes.

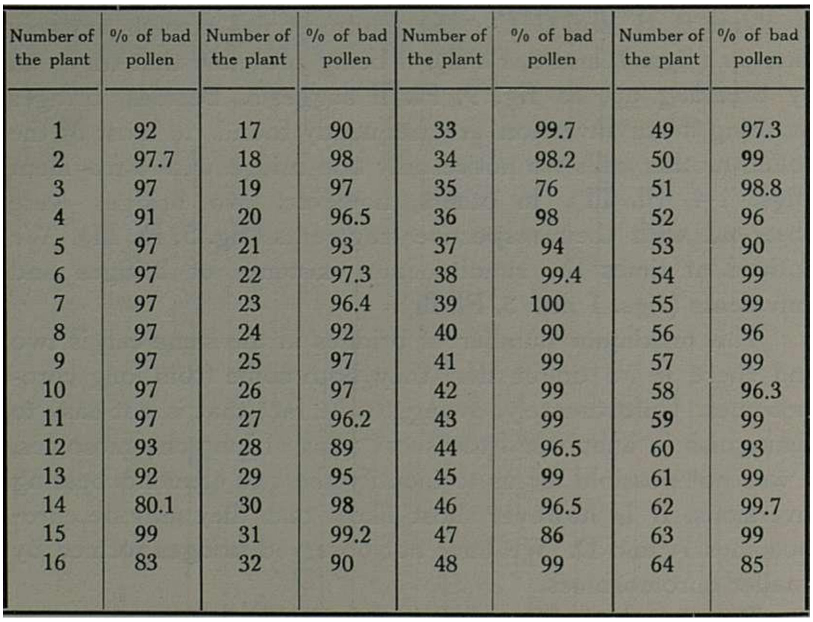
The univalents (figs. 1, 3 and 6, Pl. III) behave according to the well known classical scheme (in the case of *Narcissi* see for instance FERNANDES, 1939).

In the second division metaphase plates with 7 chromosomes can appear (fig. 7, Pl. III), and these, through normal anaphases, will originate pollen grains also with 7 chromosomes. Frequently, however, as the univalents which were divided in division I are not as a rule arranged on the equatorial plane (fig. 8, PI. III), nor do they divide and behave as lagging chromosomes (fig. 9, Pl. III) which are frequently eliminated, the anaphases are irregular. Joined to the irregularities produced by the univalents are in certain cases those irregularities from the bridges which were formed in anaphase I. Thus many of the pollen grains will retain anormal complements.

The percentage of bad pollen produced by hybrids is very high, as we can see in Table II where we have gathered the data referring to 64 plants.

TABLE II

Percentage of bad pollen produced by 64 plants of the hybrid *N. bulbocodium X N. cantabricus*



Number of the plant	% of bad pollen	Number of the plant	% of bad pollen	Number of the plant	% of bad pollen	Number of the plant	% of bad pollen
1	92	17	90	33	99.7	49	97.3
2	97.7	18	98	34	98.2	50	99
3	97	19	97	35	76	51	98.8
4	91	20	96.5	36	98	52	96
5	97	21	93	37	94	53	90
6	97	22	97.3	38	99.4	54	99
7	97	23	96.4	39	100	55	99
8	97	24	92	40	90	56	96
9	97	25	97	41	99	57	99
10	97	26	97	42	99	58	96.3
11	97	27	96.2	43	99	59	99
12	93	28	89	44	96.5	60	93
13	92	29	95	45	99	61	99
14	80.1	30	98	46	96.5	62	99.7
15	99	31	99.2	47	86	63	99
16	83	32	90	48	99	64	85

DISCUSSION

The most relevant facts which the study of the meiosis of the hybrid *N. bulbocodium* X *N. cantabricus* renders evident are as follows:

1) Formation of unequal bivalents by chromosomes C_b and C_c;
2) Occasional pairing of C_c with G_b and of C_b with G_c and consequent formation of their respective unequal bivalents;
3) Formation, although rare, of bivalents by chromosomes B_c and C_b;
4) Eventual appearance of trivalents formed by chromosomes B_b, B_c and C_b;
5) Eventual formation of trivalents by chromosomes F F_b and G_c;
6) Occasional appearance of chains formed by chromosomes G_c, F_b, F_c, G_b, C_c and C_b;
7) A more frequent occurrence of univalents resulting from the non-pairing of the elements of pair G_bG_c;
8) Formation of bridges by two long chromosomes, probably A and D.

The facts stated above show the following:

1) In relation to C_b, chromosome C_c possesses a large deficiency in the long arm, and this accords with its morphology;
2) The short arm of C_c is homologous, partly at least, of arm p' of G_b, and this accords with the fact that C_c is the chromosome with satellite of *N. cantabricus,* whereas G_c has no satellite. There must have been a reciprocal translocation between the short arms of chromosomes C and G during differentiation of the chromosome complement of *N. cantabricus.* Part of the short arm of C_b is, therefore, homologous with the distal end of one the arms of G_c;
3) The relatively long segment which is missing in the long arm of chromosome C_c passed over to the long arm of B (occasional formation of bivalents B_cC_b and of trivalents $B_bB_cC_b$). This change might have appeared by two processes: a) reciprocal translocation between the longer arms of chromosomes C and B, where C may have given a rather long segment of the distal end and received a very short segment;

b) chromosome C might have lost a long intercalar segment of its arm L (a large part of the arm located beyond the secondary constriction) which might have been intercalated in arm L of chromosome B. Presently we do not possess elements which could enable us to decide between these two possibilities (the first of which is given in fig. 3);

4) The extremity of the arm of chromosome G_c, which was not been envolved in the translocation with C, is homologous with chromosome F (eventual formation of trivalents $F_c F_b G_c$, occasional formation of chains and a more frequent occurrence of univalents G_b and G_c). There was therefore a reciprocal translocation between the extremity of a chromosome F and a G one;

5) Existence of inversions in the long arms of two long chromosomes (probably A_c and D_c). Unfortunately it was not possible for us to identify with precision the elements bearing the inversions. Besides, the two bridges were of a very similar type and we could not distinguish the one from the other. We could not therefore determine the percentages in which they appeared. So we could not obtain exact data which would enable us to make an idea of the extension of the inverted segments. The fact, however, that the bridges are relatively frequent leads us to think that these segments must have a considerable extension. On the other hand, the particularity of the accompanying fragments being rather long tends to show that the inversions must occupy a position in the half distal of arm L and very near the middle of this arm.

In a previous work (FERNANDES, 1957), we arrived to the conclusion that *N. cantabricus* DC. must have become differentiated from *N. bulbocodium* L. before the opening of the Straits of Gibraltar through structural changes of the chromosomes (reciprocal translocation between arm ρ of a Lp_2 chromosome and arm p' of a Pp' chromosome, and translocation between arm L of chromosome Lp_2 and arms 1 and L of two other chromosomes lm and Lp_1), probably followed by mutations of genes among which we should point out the one which caused the interruption of the chain of reactions which led to the synthesis of the pigment of the plastids that produces the yellow colour of the flower (it is evidently possible that this mutation may be a consequence arising from some of the structural changes).

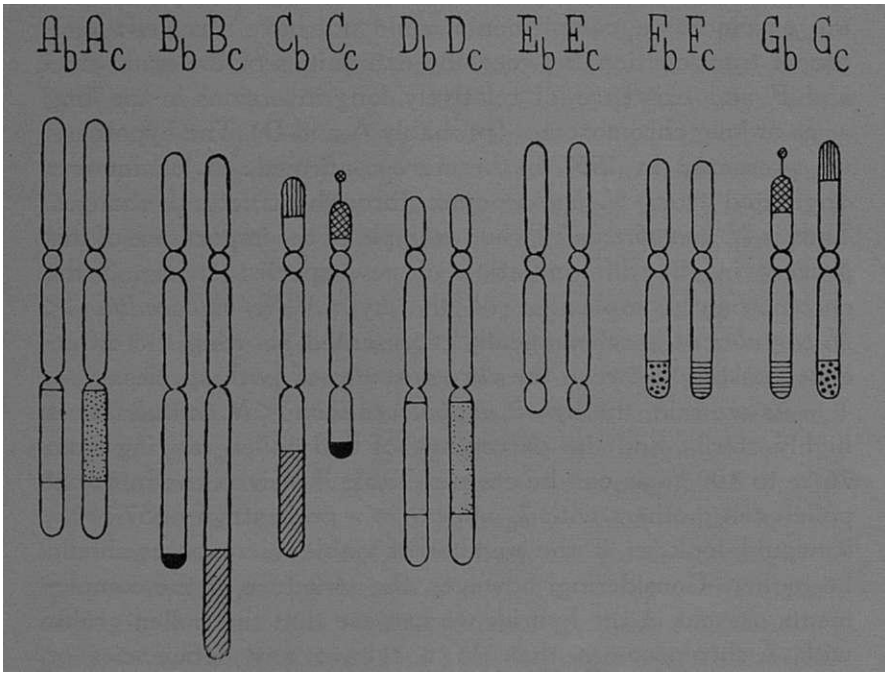


Fig. 3.—Schematical representation of the chromosome complements of *N. bulbocodium*(A_b-G_b) and of *N. cantabribus*(A_c-G_c) according to data given by the meiosis of the hybrid between the two species. The centromeres are represented by circles. The dotted regions correspond to the inversions, whereas those marked in full, by dashes or thick lines, etc. represent homologous zones of different chromosomes resulting from reciprocal translocations.

The data obtained from the study of the meiosis of the hybrid *N. bulbocodium* X *N. cantabricus* absolutely confirm the existence of translocations between arm ρ of a Lp_2 chromosome and arm p' of a Pp' chromosome (translocation between C and G, according to the nomenclature we adopt in this work), as well as between arm L of chromosome Lp_2 (C) and arm L of Lp_1 (B). Present observations, however, do not confirm that there might have been translocation between arm L of Lp_2 (C) and arm 1 of lm (A). Besides, the study of the meiosis brought out other structural changes which comparison of the chromosome complements could not have revealed: reciprocal translocation between the extremities of the arms of G and F and existence of relatively long inversions in the long arms of long chromosomes (probably A and D). The hypothesis we presented in 1957 is therefore confirmed: *N.. cantabricus* originated from *N. bulbocodium* through structural changes. Thus is *N. cantabricus* another example of the importance of this process in the differentiation of new species. In fig. 3 the chromosome complement of the hybrid *N. bulbocodium* X *N. cantabricus* is schematically represented, showing the differences existing between the chromosomes of both species.

As we said, the hybrid *N. bulbocodium* ×*N. cantabricus* is highly sterile, and the percentage of bad pollen ranging from 76 % to 100 % as can be seen in Table II. Given the fact that pollen cell mothers with 7_{II} appear in a percentage of 57.14 %, it would look as if the number of viable microspores should be higher. Considering, however, the structure of the complements present in the hybrid, we can see that the pollen grains with 7 chromosomes that do not have any deficiencies or duplications are very few. And so, besides the microspores that the haploid complements might be of either *N. bulbocodium* or *N. cantabricus,* the possibility of formation of which is rather small, the viable combinations are very few considering that the deficiencies and duplications can be lethal. It is evident that the pollen cell mothers where univalents and bridges are formed will not originate viable pollen grains. It is therefore understandable that the percentage of good pollen is very low and that the hybrid is consequently sterile.

SUMMARY

The study of the meiosis of the hybrid between *N. bulbocodium* and *N. cantabricus* has shown the existence of unequal bivalents formed either by chromosomes C_b and C_c, or by C_c

and G_b, or C_b and G_c, or still by B_c and C_b; the eventual formation of trivalents consisting of $B_bB_cC_b$ and $F_cF_bG_c$; the occasional appearance of chains of 6 elements originating from chromosomes G_c, F_b, F_c, G_b, C_c and C_b; the occurrence of several univalents, the most frequent of which are formed by chromosomes G_b and G_c; and the formation of anaphasic bridges by two long chromosomes, probably elements A and D. These data show that the differentiation of the chromosome complements of the two species resulted from the following structural changes : 1) reciprocal translocation between arm L of chromosome C and arm L of chromosome B; 2) reciprocal translocation between arm ρ of chromosome C and arm p' of chromosome G; 3) reciprocal translocation between arm P of G and arm P of F; 4) relatively long inversions in the long arms of chromosomes A and D (it was not possible to establish with accuracy whether these are the actual elements possessing these inversions). As the characteristics of the external morphology and of the geographical distribution show that *N. bulbocodium* is the older and must have originated *N. cantabricus* (vide FERNANDES, 1957), the conclusion holds that the latter species was differentiated from the former through the structural changes mentioned above. The study of the meiosis of the hybrid has thus confirmed our hypothesis contained in a previous work (FERNANDES, 1957) on the origin of *N. cantabricus.* As we said in that work, it is possible that the structural changes may have been accompanied by mutations of genes.

The pollen of the hybrid presents a very high percentage of bad grains. This particularity means that viable combinations can rarely be formed (those constituted by complete complements of either *N. bulbocodium* or *N. cantabricus* and some others), and that the deficiencies and duplications resulting from an incidental distribution of the chromosomes of the two structurally different complements, and also appearing in consequence of the formation of univalents and bridges, must have a lethal influence on the microspores.

The infertility of the hybrids is therefore due to the structural changes of the chromosomes. These changes have created a barrier of sterility between *N. bulbocodium* and *N. cantabricus,* and the latter should thus be established as a distinct species.

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PLATES

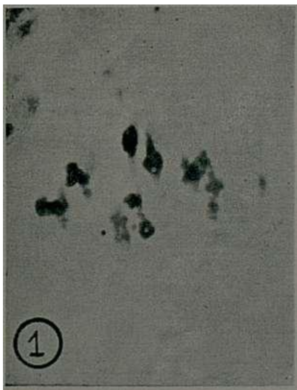
PLATE I

Narcissus bulbocodium X N. cantabricus

Fig. 1. —Side view of metaphase I showing 7 bivalents.
Fig. 2. — Ditto.
Fig. 3. — Ditto, with configuration $6_{II} + 2_{I}$.
Fig. 4. — Ditto, with $6_{II} + 2_{I}$.
Fig. 5. — Ditto, showing $6_{II} + 2_{I}$.
Fig. 6. — Ditto, with $5_{II} + 4_{I}$.
Fig. 7. — Ditto, with $5_{II} + 4_{I}$.
Fig. 8. —Ditto, with $4_{II} + 6_{I}$.
Fig. 9. — Ditto, showing 1_{III} (arrow) + $5_{II} + 1_{I}$.

(A detailed explanation is contained in the text)

PL. I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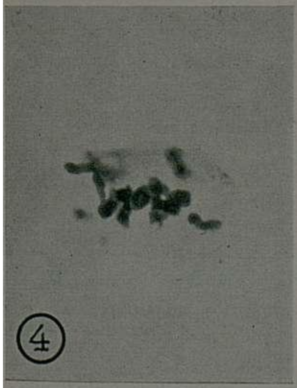
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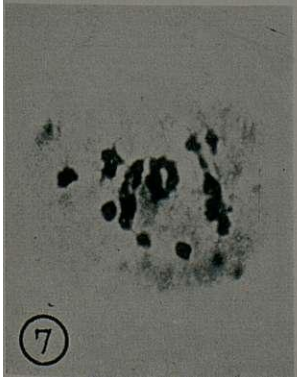
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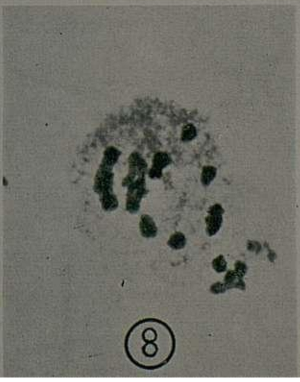
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PLATE II

Narcissus bulbocodium X N. cantabricus

Fig. 1. — Side view of the metaphase I showing 1_{III} (arrow) -f - 4_{II} $+ 3_{I}$.

Fig. 2. — Ditto, with 1_{III} (arrow) $+ 5_{II} + 1_{I}$.

Fig. 3. — Ditto, in which 1_{III} (arrow) $+ 4_{II} + 3_{I}$ can be observed.

Fig. 4. — Ditto, with a chain of 6 chromosomes $+ 4_{II}$.

Fig. 5. — Anaphase I showing separation of 7 chromosomes towards each pole. The arrow shows a chromosome constituted by unequal chromatids.

Fig. 6. — A slightly more advanced stage than that of the previous figure, also showing a chromosome (arrow) constituted by unequal chromatids.

Fig. 7. — Beginning of anaphase I in a cell with 7 bivalents, some of which are very much stretched.

Fig. 8. — A more advanced stage than that of the previous figure showing the extraordinary stretch of a bivalent.

Fig. 9. — Breaking of a bivalent probably in consequence of distention.

(A detailed explanation is contained in the text)


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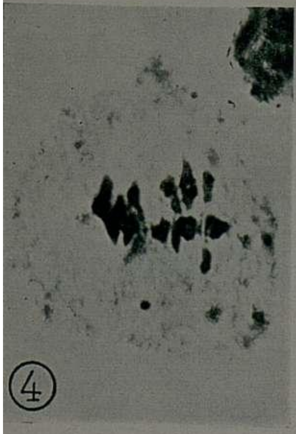
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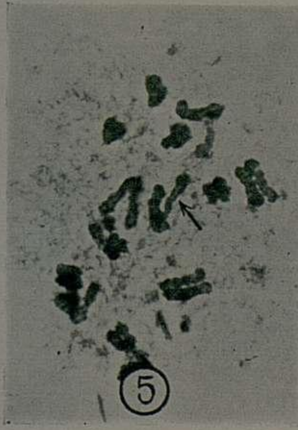
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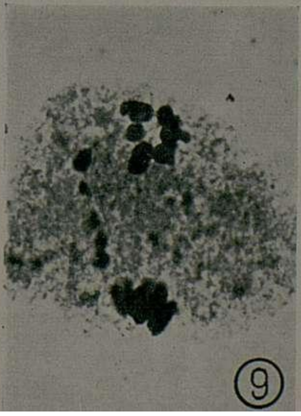
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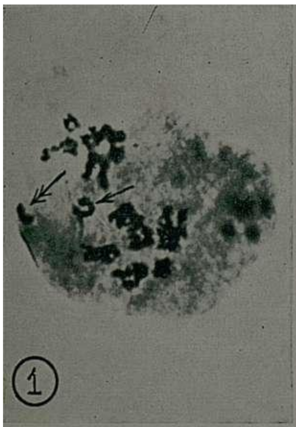
PLATE III

Narcissus bulbocodium X N. cantabricus

Fig. 1. —Anaphase I showing 1 univalent (double arrow) and a bridge with its fragment (single arrow).
Fig. 2. — Anaphase I with bridge and fragment.
Fig. 3. — Anaphase I with chromatids (double arrow) derived from the division of a univalent, and also with a long bridge and corresponding fragment (single arrow).
Fig. 4. — Beginning of telophase I showing remains of a broken bridge and a fragment which remained on the equatorial plane.
Fig. 5. — Beginning of telophase I with two bridges and their respective fragments (single arrow).
Fig. 6. —Beginning of telophase I showing a univalent on the equatorial plane.
Fig. 7. — Metaphase II with 7 chromosomes.
Fig. 8. — Metaphase II showing chromosomes out of the equatorial plane (elements resulting from the division of the univalents in anaphase I).
Fig. 9. — Anaphase II where a lagging chromosome can be seen.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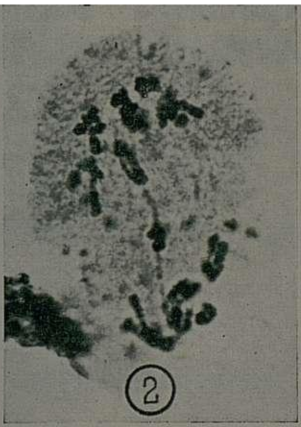
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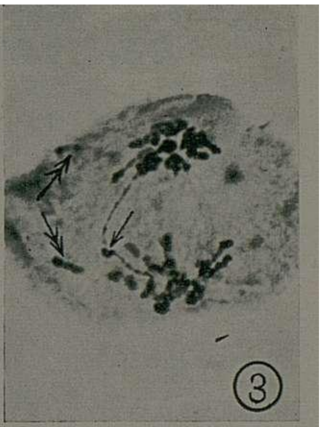
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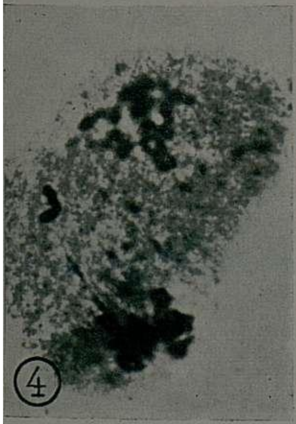
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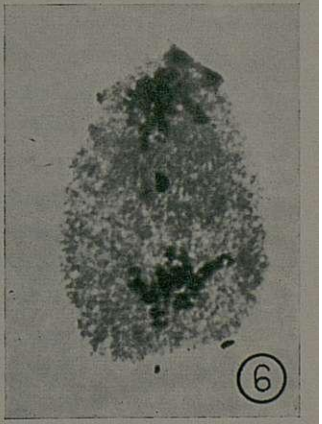
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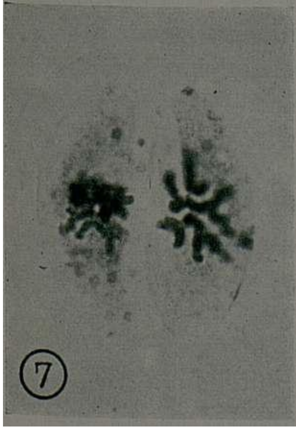
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A REVISED CLASSIFICATION
OF THE GENUS *COMMIPHORA* JACQ.

by

H. WILD

Senior Botanist, Federal Dept. of Agriculture, Salisbury, S. Rhodesia

INTRODUCTION

THE first author to publish a classification of *Commiphora,* either under this name or one of its synonyms, was apparently BERG (Bot. Zeit. 20: 161, 1862) who divided 13 species of *Balsamodendrum* Kunth into two sections based on whether the inflorescences were pedunculate, or glomerate and subsessile, and on the type of calyx. He also suggested various subsections based on the precocity or otherwise of the flowers, the degree of division of the leaves and whether their margins were entire or otherwise. Although diagnoses were published, BERG did not provide any of his sections or subsections with names. In 1883 ENGLER (in A. & C. DC, Mon. Phan. **4**: 7) divided 35 species of *Commiphora* into 2 sections based on those of BERG and 18 subsections based usually on leaf-characters or more rarely on calyx-characters. Once again diagnoses of the sections and subsections were provided but they were not given names. In 1896 ENGLER (in ENGL. & PRANTL, Nat. Pflanzenfam. 3, 4: 251) republished this classification but with 63 species. Finally, ENGLER in 1912 published (Engl., Bot. Jahrb. 48: 451) a much more elaborate classification of 129 species of *Commiphora* dividing the genus into 43 sections which he validly published with names and diagnoses. In the Pflanzenw. Afr. 3, **1**: 786 (1915), and ENGLER & PRANTL, Nat. Pflanzenfam. ed. 2, **19a**: 429 (1931), he published repetitions of the 1912 classification with no further significant modifications. This final ENGLER classification is based, as is shown by his key, on leaf-characters alone, i. e. leaflet-shape, whether the leaves are glabrous or variously hairy, whether unifoliolate, trifoliolate or pinnate and whether the leaf-margins are entire or variously serrate. Surprisingly enough this very elementary system in practice provides a quite efficient means of keying out the species known to ENGLER. SPRAGUE [Hook., Ic. Pl.: tt. 3105-3112 (1927)] and CHIOVENDA (1) [Fl. Somala **2**: 53 (1932)] adopted ENGLER's classification without significant change. Unfortunately it soon becomes clear to the user of this system that the resultant classification is a most artificial one and provides practically no guide at all to the true relationships of the species. Furthermore, the fact that *Commiphora* species very often flower before their leaves appear and that consequently flowering and fruiting material of the same species can only be related to each with considerable difficulty, has meant that this genus has so far been regarded as a difficult one. It has therefore become urgent that a more natural classification be evolved so that difficult species can be studied in association with those of near affinity and the genus as a whole be better understood.

GENERAL DESCRIPTION OF THE REVISED CLASSIFICATION

The first obvious step was to search for characters in *Commiphora* more fundamental that the type of leaf and its possession or lack of indumentum. ENGLER himself realised that the pseudoaril which usually clasps the endocarp varies from species to species in a most remarkable fashion, as is shewn by his illustrations of this character [Engl., Bot. Jahrb. **48**: 455, 457, 461, (1912)]. Indeed, he sometimes describes the pseudoaril in his sectional diagnoses but he usually has more

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(1) CHIOVENDA's Series *Glabrae* Sects. *Integrifoliolatae* and *Serratifoliolatae* and Series *Piliferae* Sects. *Integrifoliolatae* and *Subintegrifoliolatae* [Chiov., tom. cit.: 53, 62, 88, 114 (1932)] were published as names only with no diagnoses or the designation of types. They need not be taken up therefore and in any case divide the genus *Commiphora* according to indumentum and the form of the leaflet-margins only, characters of no significance above the species level.

than one type included in a single section, showing that their variation is unrelated to his leaf-characters. Furthermore, if a study of floral characters is made, it can be shewn that a definite and natural relationship exists between the type of flower and the type of the fruit, with the pseudoaril as the most significant fruit character. Good flowering material is often difficult to find but the standard, of African collections particularly, has so improved of recent years that the examination of the flowers of a good proportion of the species known to date has been possible in this study. In the case of Asiatic species the material available is not so good but the number of species in this region is relatively small, whilst for Madagascan species there is fortunately available the excellent descriptions and figures in PERRIER DE LA BÂTHIE's treatment of the *Burseraceae* in the Flore de Madagascar et des Comores (1946). The classification given below is therefore based primarily on floral and pseudoaril characters in combination. It has meant a considerable reduction in ENGLER'S unwieldy division into 43 sections and in general cuts across his sections in the most radical manner. In spite of this difficulty an attempt has been made, in conformity with the International Code, to retain ENGLER'S sectional names both in order to avoid the publication of a rather large number of new names but also in recognition of ENGLER'S very considerable contribution to our knowledge of the genus, artificial though this system may have been.

The relationships of the sections (Fig. 1)

In the attempt to find a more natural classification an assessment has been attempted as to what may constitute the more fundamental characters and also what may have been the general lines of evolution of the genus. The tentative conclusions that have been drawn are as follows :

Firstly, *Commiphora gileadensis* (L.) Christ. and a few related species have a pericarp which splits at maturity into four longitudinal valves. The remaining members ot the genus have pericarps which split into two valves. In addition, the eight stamens of *C. gileadensis* and its allies are not noticeably in two series of four long stamens alternating with four short, as is the case with the other species (although a careful examination reveals that there is a slight tendency to alternation in size). These are considered to be characters of subgeneric importance and it is interesting to note that the subgenus containing *C. gileadensis* [Subgen. *Opobalsamum* (Engl.) Wild] is confined to the northeastern part of Africa, the Middle East and Socotra.

Secondly, the division of the genus into species with either scarcely developed disk-lobes or eight small disk-lobes rather than four disk-lobes is most important, and this character, associated with the type of pseudoaril, is used to distinguish the sections. Subgenus *Opobalsamum* is not further divided but subgenus *Commiphora* is divided into 5 sections in which the disk-glands are either 8, or undeveloped, or 4. The pseudoaril is either cup-like, subentire and fleshy and covering about 1/3 of the endocarp, or, somewhat spreading at the upper margin and covering a greater proportion of the endocarp (Sect. *Spondioides* with 8 or 0 disk-lobes), or entirely absent (Sect. *Coriaceae* with 8 or 0 disk-lobes), or completely enveloping the endocarp (Sect. *Rostratae* with 4 disk-lobes), or apparently absent and the endocarp rugose (Sect. *Africanae* with 4 disk-lobes but these are sometimes bifid at the apex, and therefore slightly intermediate in this character shewing an affinity with Sect. *Commiphora* with 8 or 0 lobes), or with the pseudoaril variously subdivided into usually four elongated arms (Sect. *Commiphora).* At the subsectional level the less important characters of the degree of reduction from pinnate to unifoliolate or simple leaves, the shape and degree of lobing of the calyx, minor modifications in the endocarp and aril, and the degree of reduction from an elongated paniculate cyme to a much reduced and abbreviated cyme are taken into account. The presence or absence of indumentum on the calyx and petals is only of specific or infraspecific significance.

It is suggested from this classification that the various characters have envolved from primitive to more derived forms along the following lines :

1. from pinnate to trifoliolate, unifolioiatate or simple leaves.
2. from elongated paniculate cymes to progressively more reduced cymes.
3. from a scarcely developed to an 8-lobed disk and finally to a 4-lobed disk.
4. from a fleshy pseudoaril covering the lower 1/3 of the endocarp to forms in which it encloses the whole endocarp or becomes so intimately associated with the endocarp that it appears to be absent [Sect. *Coriaceae* and Sect. *Africanae* (1)] and finally to forms with four variously developed arms.

These suggestions lead to the following hypothesis as far as the evolution of the genus is concerned. Subsection *Cupulares* represents the most primitive forms as far as present day species are concerned. This subsection is widely distributed throughout Africa and Madagascar and its species shew a tendency to be more common in either forests, forest-margins or in woodland. The subgenus *Opobalsamum* is probably only rather distantly connected with subsect. *Cupulares* through a common ancestral form. Because of its lack of pseudoaril it shews some affinities with Sect. *Coriaceae.* Its modern representatives are all species of desert or very dry conditions in the Middle East, Northeastern Africa and Socotra. Subsections *Pruinosae* and *Glaucidulae* are very close to the *Cupulares,* shewing only minor modifications in the pseudoaril and progressive reduction of the pinnate leaves and primitive type of inflorescence. These latter developments are perhaps a response to the more rigorous climatical conditions of South West Africa and North East Africa where they most commonly occur. The Madagascan representatives of the *Glaucidulae* and *Pruinosae* may very likely have been derived independently from the *Cupulares* of Madagascar. They shew a greater

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(1) In Sect. *Africanae* the pseudoaril is usually apparently absent but sometimes, i. e. now and then in *C. africana* (A. Rich.) Engl , the pseudoaril does not entirely enclose the endocarp and shews a lobulate margin towards the endocarp apex whilst nearer the base a cross section shews that the pseudoarillar layer is not distinguishable from the remainder of the endocarp.

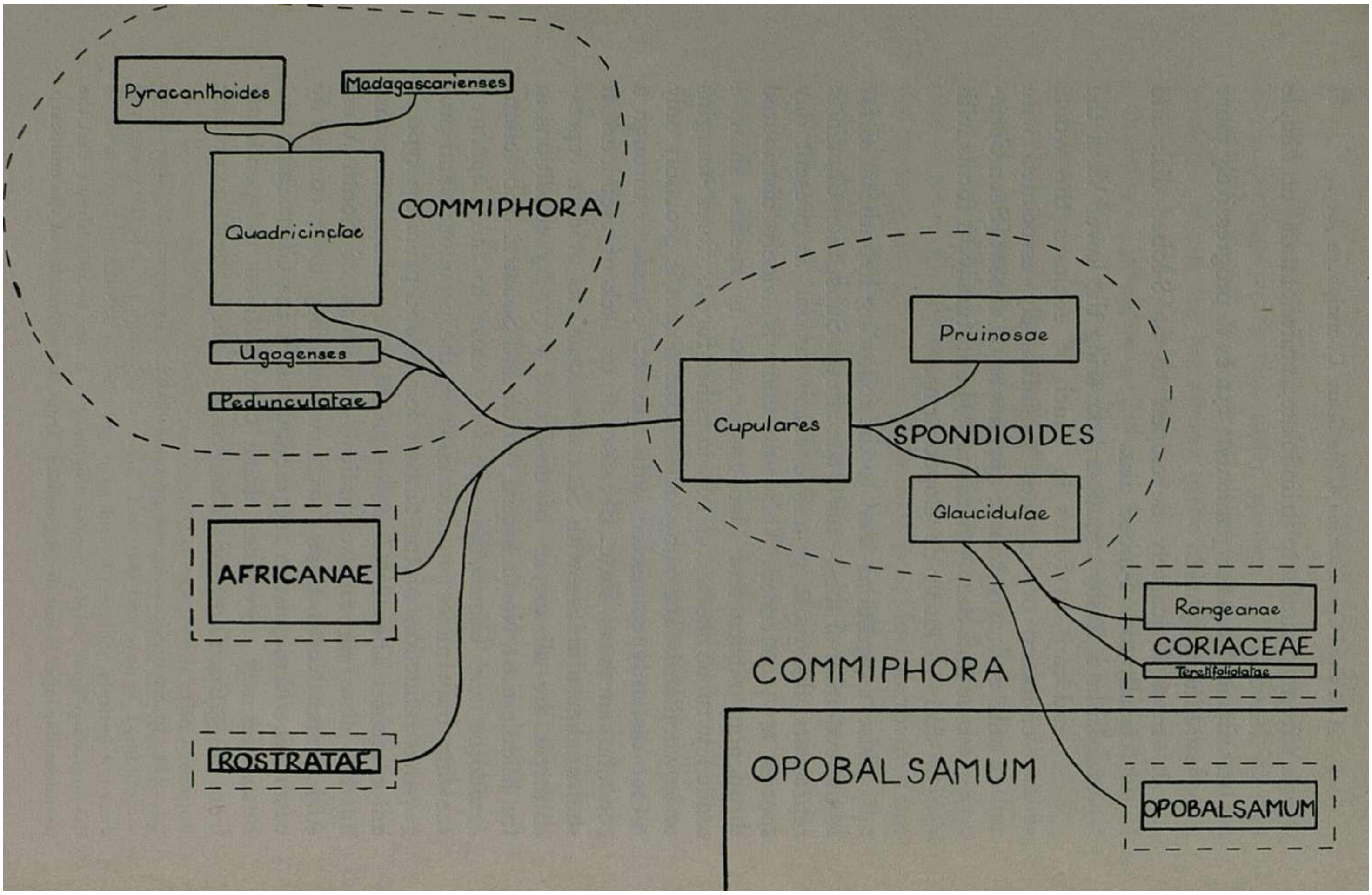
Pyracanthoides
Madagascarienses
Quadricinctae
COMMIPHORA
Ugogenses
Pedunculatae
Pruinosae
Cupulares
SPONDIOIDES
Glaucidulae
AFRICANAE
Rangeanae
CORIACEAE
Teretifoliolatae
COMMIPHORA
ROSTRATAE
OPOBALSAMUM
OPOBALSAMUM

Fig. 1

tendency to retain the pinnate-leaved character than the African members of these subsections.

The *Coriaceae,* which are entirely confined to the semi-desert regions of South West Africa and North East Africa, are perhaps derived from ancestors akin to the *Glaucidulae* in which the spreading out of the pseudoaril over the whole endocarp has caused the pseudoarillar tissue to thin out (as can be seen to some extent in the *Glaucidulae)* and finally to be completely incorporated in the normal endocarp tissues.

The remaining sections, *Commiphora, Africanae* and *Rostratae* are probably more closely related to each other (note the 4-lobed disk) than they are to the *Cupulares* although the *Africanae* with its sometimes bifid disk-lobes may provide an intermediate link.

The *Africanae* are widely distributed through Africa, the *Rostratae* are a small section confined to North East Africa and Sect. *Commiphora* is composed of numerous species distributed throughout the range of the genus. All the subsections of Sect. *Commiphora* are closely related and are not always easy to distinguish. The largest, subsection *Quadricinctae,* itself shews some variation i. e. some species like *C. harveyi* Engl., and *C. puguensis* Engl. have very acuminate fruits. In some, i. e., *C. mollis* (Oliv.) Engl. and *C. quadricincta* Schweinf. the endocarp has at least one very convex face whilst in others such as *C. caudata* Engl. the faces are somewhat flatter, but it has not so far been found possible to subdivide this subsection further using these or other characters. Of the subsections of Sect. *Commiphora* the *Quadricinctae* are distributed throughout the range of the genus, the *Ugogenses* and *Pedunculatae* consist of tropical African and Madagascan species of fairly high rainfall woodland or forest-margins, the *Madagascarienses,* with considerably reduced leaves and inflorescences, are widely represented through the whole range of the genus and are found in drier conditions than subsects. *Ugogenses* and *Marlothiae.* The *Pyracanthoides* are very closely related to the *Madagascarienses* and also on the whole are dry-country species but are confined to Africa.

The type species of the genus Commiphora

The type species *C. madagascariensis* Jacq. is said by its author to be a plant of Madagascar and Mauritius although the specimen from which the plant was described was a cultivated plant. It has never apparently been re-collected in either Madagascar or Mauritius. In addition, its identity has for long remained in doubt although there has never been any question as to its generic position. ENGLER [in Nat. Pflanzenfam. ed. 2, **19 a**: 436 (1931)] says that it is obviously closely related to *C. agallocha* (Roxb. ex Engl.) Engl. and this in its turn to *C. habessinica* (Berg) Engl. ARNOTT in his description of ***Balsamodendrum roxburghii*** Arn. [= *C. agallocha* (Roxb. ex Engl.) Engl.] in Ann. Nat. Hist. **3**: 86 (1839) says:

« There can be little doubt of *Commiphora* being the same as the present genus [*Balsamodendrum*], but I feel less certain that *C. madagascariensis* is the species described by ROXBURG [*C. agallocha*]. My principal objection arises from the distance between the localities where the two species are said to be indigenous. As, however, no succeeding botanist appears to have received it from Madagascar, JACQUIN may have been accidentally led into an error on that point ».

It is clear that ARNOTT would have considered the two plants synonymous but for the fact that *C. madagascariensis* was supposed to be indigenous in Madagascar. Bearing these facts in mind I have examined the material available at Kew of *C. habessinica* (Berg) Engl. and *C. agallocha* (Roxb. ex Engl.) Engl. (including the Herb. Rottler specimen seen by Roxburgh) and it is clear in my opinion that both are the same species. Furthermore I consider them to be conspecific with the plant described and illustrated by JACQUIN under *C. madagascariensis* and consequently the identity of the type species no longer remains in doubt. The type of the species is the illustration 249 in JACQUIN's Hortus Schoenbrunniensis Vol. 2 (1797).

One further point of interest arises in connection with the type species. The specimens seen by ROXBURGH were cultivated plants grown in the Madras Mission gardens. The species was therefore in cultivation in India at an early date (1799) on Roxburgh's evidence and as *Commiphora* species have been much in demand for their resins from the earliest times it may be that the type species was widely cultivated in the past. It could easily have been in cultivation in Mauritius or Madagascar before 1797, when Jacquin described it, and so perhaps his statement as to the origin of his specimens was correct.

Excluded species

One of the principal reasons for the apparently difficult taxonomy of the genus *Commiphora* is that authors have described far too many species from inadequate material. In a few cases it appears as though some authors have assumed that because a sterile specimen from Africa was described by its collector as having a papery or very smooth bark and had pinnate leaves (or even occasionally simple leaves) it simply had to be a *Commiphora* sp. The list given below will shew how far from the truth this assumption can be. As this revised classification of the genus is based on a combination of flower and fruit characters an undescribed species cannot be fitted with certainty into this classification unless complete material is available. This it is hoped will discourage any additions to this list.

1. *C. tomentosa* Engl., Bot. Jahrb. **34**: 308 (1904) is *Lannea iriphylla* (Hochst.) Engl.
2. *C. taborensis* Engl., op. cit. **44**: 153 (1909) is *Lannea tomentosa* (Engl.) Engl.
3. *C. holstii* Engl., Pflanzenw. Ost. Afr. **C**: 229 (1895) is *Combretum aculeatum* Vent.
4. C. *subglauca* Engl., op. cit.: **48**: 469 (1912) is *Sclerocarya caffra* Sond.
5. *C. acutidens* Engl., op. cit.: **44**: 153 (1910) is *Sclerocarya caffra* Sond.
6. *C. fraxinoides* (Hiern) K. Schum. in Just., Jahresber. **27**,1: 480 (1901) is *Zanha golungensis* Hiern
7. *C. foliolosa* (Hiern) K. Schum., loc. cit is *Haplocoelum foliolosum* (Hiern) Bullock

8. *C. bricchettii* Chiov., Fl. Somala **2**: 58 (1932) is *Boswellia bricchettii* (Chiov.) Chiov.
9. *C. voensis* Engl., Bot. Jahrb. 34: 312 (1904) is *Platycelyphium voensis* (Engl.) Wild

With regard to this last named species it is most unfortunate that Engler's name, based on sterile material, should prove to antedate Harms' excellent description and figure of *Platycelyphium cyananthum* published a year later. However, after consultations with my friends J. P. M. Brenan and J. B. Gillett, for whose help I am very grateful, both they and I are agreed that there is no doubt that the two species are conspecific and a new combination becomes necessary (1).

COMMIPHORA JACQ. NOM. CONSERV.

Commiphora Jacq., Hort. Schoenbrunn. 2: 66, t. 249 (1797). — Engl. in A. & C. DC, Mon. Phan. **4**: 7 (1883); Engl. & Prantl, Nat. Pflanzenfam. 3, 4: 251 (1896); Bot. Jahrb. **48**: 448 (1912); Pflanzenw. Afr. 3, 1: 786 (1915); Engl. & Prantl, Nat. Pflanzenfam. ed. 2, 19a: 429 (1931). — Schweinf. in Bull. Herb. Boiss. 7, Append. 2: 283 (1899). — Christ. in Dansk. Bot. Arkiv. 4, 3: 18 (1922). — Sprague in Hook., Ic. Pl.: tt. 3105-3112 (1927). — Hutch. & Dalz., Fl. W. Trop. Afr. **1**: 488 (1928). — Chiov., Fl. Somala 2: 123 (1932). — B. D. Burtt in Kew Bull. **1935**: 101 (1935). — Mattick in Notizbl. Bot. Gart. Berl. 12: 656 (1935). — Perrier, Fl. Madag. Burserac: 5 (1946).

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(1) Platycelyphium voensis (Engl.) Wild, comb. nov.

Commiphora voensis Engl., Bot. Jahrb. 34: 312 (1904); op. cit.: 48: 471 (1912).

Type: Tanganyika Territory, Taita region, Voi, *Engler* 1958 (B, holotype f; K, one leaf removed from holotype).

Platycelyphium cyananthum Harms in Engl., Bot. Jahrb. **38**: 74, fig. 1 (1905).

Type: Tanganyika Territory, foot of Pare & Ugueno Mts., between Sadani and Kwagogo, *Engler* 1661 (B, holotype †).

Although the type of HARMS' species is no doubt destroyed, the plant is so characteristic and well figured in the original publication that there is no doubt as to what it is.

—Brenan & Greenw., Check-Lists For. Trees Brit. Emp. Tangany. Terr. **2**: 79 (1949).—Exell & Mendonça, Consp. Fl. Angol. **1**, 2: 298 (1951).—Verdoorn in Bothalia **6**, **1**: 214 (1951).—Keay, Fl. W. Trop. Afr. ed. 2, **1**, 2: 694 (1958).—Troupin, Fl. Cong. Belg. **7**: 133 (1958).

Niotoutt Adans., Fam. **2**: 162 (1763).

Amyris sensu L., Mant.: 65 (1767) non Browne.—Forsk., Fl. Aegypt.-Arab.: CX, 80 (1775).—Vahl, Symb. Bot. **1**: 28, t. 11 (1790).—Roxb., Fl. Ind. **2**: 244 (1832).

Balsamea Gled. in Schr. Ges Naturf. Fr. Berl. **3**: 127 (1782).

Balessam Bruce, Trav. **5**: t. 25 (1790).

Balsamus Stackh., De Liban, Not.: 11 (1814).

Balsamodendrum Kunth in Ann. Sci. Nat. **2**: 348 (1824).—DC, Prodr. **2**: 76 (1825).—Sond. in Harv. & Sond., Fl. Cap. **1**: 526 (1860).—Marchand in Adansonia **8**: 34, 67 (1867).—Oliv., Fl. Trop. Afr. **1**: 324 (1868).—Hook. f., Fl. Brit. Ind. **1**: 529 (1875).—Balf. f. in Trans. Roy. Soc. Edinb. **31**: 52 (1888).—Deflers, Voy. Yemen: 120 (1889).

Hemprichia Ehrenb. in Linnaea **4**: 396 (1829).—Marchand, tom. cit.: 69 (1867).

Heudelotia A. Rich. in Guill., Perr. & Rich., Fl. Senegamb. Tent. **1**: 150, t. 39 (1832).

Protium sensu Wight & Arn., Prodr. Fl. Pen. Ind. Or. **1**: 176 (1834) non Burm. f. (1768).—Harv. in Harv. & Sond., Fl. Cap. **2**: 592 (1862).

Protoniopsis Blume, Mus. Bot. Lugd. Batav. **1**: 229 (1850). *nom. nud.*

Hitzeria Klotzsch in Peters, Reise Mossamb. Bot. **1**: 89 (1861).

Balsamophloeos Berg in Bot. Zeit. **20**: 163 (1862).

Type Species: *C. madagascariensis* Jacq., loc. cit. Type: plate 249 in Hort. Schoenbrunn. 2 (1797).

Subdivisions of the Genus Commiphora

Note 1. In order to see the pseudoaril of *Commiphora* species satisfactorily it is necessary to boil the dried fruit for at least 15 mins. until the whole pericarp is soft, otherwise in removing the pericarp the pseudoaril will be damaged and its characteristic features obliterated. Also in old fruits it is probably necessary to make some allowance for the drying up and consequent shrinking of the pseudoaril.

In the case of the flowers, male flowers (or the occasional bisexual flowers) should be used for examination as female flowers usually have less well developed parts, the disk-lobes and petals especially as well of course as the stamens themselves.

Note 2. As good illustrations, especially of the pseudoaril, are very useful in determining individual species, as well as in the use of this classification, a list is given here of the principal works containing illustrations of the genus.

1. Engl., Bot. Jahrb. 48: 455, 457 and 461 (1912).
2. Engl., in Engl. & Prantl, Nat. Pflanzenfam. 3, 4: 251 (1896); ed. 2. 19a: 429 (1931).
3. Engl., Pflanzenw. Afr. 3, 1: 786 (1915).
4. Sprague in Hook., Ic. PL: t. 3105-3112 (1927).
5. Chiov., Fl. Somala 2: fig. 17-87.
6. Perrier, Fl. Madag., Burserac. : 5 (1946).

This study does not claim to be a revision of the genus. Synonyms have been indicated where possible but others will undoubtedly come to light as collections improve. The figures in parentheses are those of ENGLER'S classification [Bot. Jahrb. 48: 449 (1912)]. The 21 species at the end of the list are those that cannot be placed so far, usually because they were described from inadequate material.

Key to the subdivisions

Pericarp splitting at maturity into 2 valves; stamens with 4 distinctly shorter than the remaining 4; disk-lobes 4 or 8 (Subgen. *Commiphora*):

Pseudoaril divided into (3) 4 well defined arms; disk-lobes always 4 (Sect. 1. *Commiphora*):

Endocarp bearing a vertically elongated hump or protuberance on the slightly convex face, other face strongly convex; leaves simple or unifoliolate; inflorescences of much reduced 1-2-flowered cymes . . . . Subsect. *Pyracanthoides*

Endocarp not as above :

Endocarp with one very convex face and the other shallowly convex; leaves simple or unifoliolate or trifoliolate with minute lateral leaflets; inflorescence of very reduced 1-2-flowered cymes . . . . Subsect. *Madagascarienses*

Endocarp with both faces equally convex or nearly so ; leaves trifoliolate or pinnate ; inflorescences of + elongated cymes or of much reduced 1-2-flowered cymes :

Endocarp surface not lumpy or rugose :

Endocarp from cordiform to oblong-ellipsoid : pseudoaril-arms not flattened and with + straight margins ; inflorescence of + elongated cymes or of much reduced cymes . . Subsect. *Quadricinctae*
Endocarp discoid ; pseudoaril-arms rather flattened with noticeably wavy margins ; inflorescence of + elongated cymes . . . . . Subsect. *Latifoliolatae*

Endocarp surface lumpy or rugose :

Disk-lobes glabrous . . . . Subsect. *Ugogenses*
Disk-lobes hairy . . . . Subsect. *Pedunculatae*

Pseudoaril present or absent, if present not divided into distinct arms; disk-lobes 4, 8 or absent:

Pseudoaril with 4 acutely angular longitudinal ridges, completely enveloping the smooth endocarp ; fruit and endocarp long-acuminate; disk-lobes 4; leaves simple or unifoliolate . . . . Sect. 3. *Rostratae*

Pseudoaril present or absent, if readily visible, not completely enclosing the endocarp ; disk-lobes 4 or 8 :

Pseudoaril present, cup-like and ± fleshy, enclosing about 1/3 of the endocarp or becoming thinner above and enclosing about $^{3}/_{4}$ of the endocarp; endocarp smooth; disk-lobes 8 or absent (Sect. *Spondioides*):

Leaves always pinnate; inflorescences always + elongated paniculate cymes; pseudoaril fleshy, cuplike and clasping about $^{1}/_{3}$ of the endocarp, upper margin often + sinuate . . . . Subsect. *Cupulares*

Leaves simple or unifoliolate, trifoliolate or pinnate; inflorescences of + elongated paniculate cymes or of reduced + abbreviated cymes; pseudoaril covering about $^{3}/_{4}$ of the endocarp or if cup-like and enclosing about $^{1}/_{3}$ of the endocarp then leaves simple or unifoliolate or trifoliolate (if very rarely leaves pinnate then leaflets glaucous and leathery and endocarp blackish at maturity:

Pseudoaril covering about $^{3}/_{4}$ of the endocarp, becoming thin above . . . . . . Subsect. *Glaucidulae*

Pseudoaril cup-like and covering about $^{1}/_{3}$ of the endocarp; endocarp often blackish at maturity . . . . Subsect. *Pruinosae*

Pseudoaril apparently absent or if visible then enclosing almost all the noticeably rugose or lumpy endocarp and with its margins lobulate; disk-lobes 4, 8 or absent:

Endocarp ± rugose, at least on one face; disk-lobes 4; leaves trifoliolate . . . . Sect. *Africanae*

Endocarp smooth; disk-lobes 8 or absent; leaves simple, unifoliolate, trifoliolate or pinnate (Sect. *Coriaceae*):

Leaves simple or trifoliolate . . . Subsect. *Rangeanae*

Leaves pinnate with linear, terete leaflets . . . . Subsect. *Teretifoliolatae*

Pericarp splitting at maturity into 4 valves; stamens with 4 only very slightly shorter than the remaining 4; disk-lobes 8 . . . . Subgen. *Opobalsamum*

Subgen. I **Commiphora**

Calyx shortly or deeply lobed. Stamens in two series (4 distinctly shorter ones alternating with 4 longer ones). Disk-lobes 4 or 8 or scarcely developed. Pericarp splitting longitudinally into 2 valves at maturity. Pseudoaril well developed or more rarely absent.

Sect. 1. **Commiphora**

Leaves simple or unifoliolate, trifoliolate or pinnate. Inflorescences of + elongated cymes or of very short, reduced cymes. Calyx shortly or deeply lobed. Disk-lobes 4 (5), the stamens arising from behind the lobes. Endocarp smooth or variously rugose. Pseudoaril with (3) 4 arms spreading from the base and at right angles to each other, clasping the endocarp.

Subsect. 1. **Madagascarienses** (Engl.) Wild, comb. nov. Tab. I B.

[Sect. *Madagascariense* Engl., Bot. Jahrb., tom. cit.: 459 (1912)].

Leaves simple (or unifoliolate) or trifoliolate with two very reduced lateral leaflets. Inflorescences of much reduced, 1-2-flowered axillary cymes with short pedicels, clustered on abbreviated fertile side-shoots. Calyx shortly divided or divided about half-way. Endocarp with one very convex face and a second only slightly convex face which lacks a pronounced hump or protuberance, remainder of endocarp surface smooth.

Type species: *C. madagascariensis* Jacq.

African species

1. C. madagascariensis Jacq. (65)
   [C. habessinica (Berg) Engl. (68); C. subsessilifolia Engl. (74); C. salubris Engl.; C. agallocha (Roxb.) Engl.; C. roxburghii (Arn.) Engl. (69). Also in India]
2. C. ellenbeckii Engl. (76)
3. ?C. hodai Sprague (fruit not seen)

Madagascan species

4. ?C. simplicifolia Perrier

Subsect. 2. Pyracanthoides Wild, subsect. nov. Tab. IA.

[Sect. *Subsessilifolia* Engl., Bot. Jahrb. **48:** 460 (1912) pro parte excl. *C. subsessilifolia* Engl. et *C. flaviflora* Engl.].

Folia simplicia, unifoliolata vel trifoliolata. *Inflorescentia* plerumque abbreviatissima, cymae plerumque 1-2-florae; pedicelli brevissimi. *Calyx* campanulatus, breviter lobatus. *Pseudoarillus* laciniatus, laciniis 4 linearibus ; endocarpium leve, biconvexum, hinc valde convexum, ultro leviter convexum ad medio gibberosum, gibbo recte elongato.

Leaves simple, unifoliolate or trifoliolate. Inflorescences usually much reduced 1-2-flowered cymes with short pedicels clustered on abbreviated fertile side-shoots. Calyx campanulate, shortly lobed. Endocarp with one very convex face and a second only slightly convex face bearing a somewhat vertically elongated hump or protuberance (near its centre) remainder of endocarp surface smooth.

Type species: *C. pyracanthoides* Engl.

African species

5. C. pyracanthoides Engl. (78)
   [C. seinen Engl. (72); C. berberidifolia Engl. (73); C. glandulosa Schinz; C. lugardae N. E. Br.]
6. C. lindensis Engl. (12)
7. C. virgata Engl. (14)
8. ?C. gowllelo Sprague (fruit not seen)
9. C. atramentaria Chiov.
10. C. ruahensis Mattick
11. ?C. candidula Sprague (fruit not seen)
12. C. crenulata (Terracc.) Chiov.
13. C. merkeri Engl. (77)
14. C. spathulata Mattick
15. C. oddurensis Chiov.
16. C. sennii Chiov.

17. C. incisa Chiov.
(1) 18. C. viminea Burtt Davy

Subsect. 3. Quadricinctae (Engl.) Wild, comb. nov.
Tab. 1C.

[Sect. *Quadricinctae* Engl., tom. cit.: 459 (1912).—Sect. *Trilobulata* Chiov., Fl. Somala **2**: 84 (1932)].

Leaves trifoliolate or pinnate. Inflorescences of more or less elongated dichasial cymes or of much reduced usually 1-2-flowered axillary cymes. Calyx campanulate (often broadly so) divided about half-way, rarely more than half-way. Endocarp often with both faces rather shallowly convex or more strongly convex on one or both sides, remainder of endocarp surface smooth.

Type species : *C quadricincta* Schweinf.

African species

19. C. quadricinta Schweinf. (66)
(C. airica A. Chev.)
(2) 20. C. eminii Engl. (51)
21. C. puguensis Engl. (52)
(C. kyimbilensis Engl.)
22. ?C. acuminata Mattick (fruit not seen)
23. C. riparia Engl. (42)
24. C. karibensis Wild, sp. nov.

C. ripariae Engl. affinis sed foliolis lanceolatis vel anguste ovatis apicis acutis vel acuminatis basi late cuneatis vel rotundatis, endocarpio cordiformi.

Arbor ad 14 m alta; truncus saepe longitudinaliter late striatus vel angulatus, cortice pallide griseo; ramuli glabri striati, cortice rubro-griseo lenticellis rubro-flavis. *Folia* ad 17 cm longa, imparipinnata, 3-6-jugata, petiolo ad 4.5 cm longo dense piloso; foliola ad 7 X 3.3 cm, lateralia lanceolata vel anguste

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(1) Since going to press it has become evident that this species is synonymous with *C. merkeri* Engl.

(2) *C. multijuga* (Hiern.) K. Schum. should be inserted after species n.º 20.

ovata, terminalia anguste obovata, omnia apice acuta vel acuminata, basi praecipue rotundata aliquando late cuneata, margine integra, utrimque nervis venisque pilosis, nervis lateralibus utrinsecus c. 7 utrinque prominulis, venis subtus praesertim reticulatis, petiolulo 0.5-1 mm longo, dense piloso, rhachide dense pilosa. *Inflorescentia* axillaris, cymosa, floribus ad apices ramulorum secundariorum congestis; pedunculus ad 6 cm longus tenuis glaber; bracteae ad 6 × 2.5 mm, foliatae, lanceolatae, apice acutae, basi rotundatae, utrinque pilosae, petiolo ad 4 mm longo dense piloso; pedicelli ad 5 mm longi, c. 5 subfasciculati glabri; bracteolae 2-3 mm longae, subulatae, pilosae, caducae. *Flores masculi:* calyx c. 2 × 1.75 mm, late campanulatus, extus longe pilosus, $^{3}/_{4}$ lobatus, lobis lanceolatis acutis; *petala* flavo-viridia c. 4 mm longa, anguste oblonga, apice acuta, mucronata, glabra; *stamina* 2-serialia, 4 longiora quam petala paullum breviora, antheris obtusis, stamina 4 breviora antheris mucronatis; discus 4-lobatus. *Flores feminei* masculis similes sed calyce et petalis paullum brevioribus; stamina sterilia 2-serialia, 4 longiora c. 1 mm longa. *Ovarium* c. 2 mm longum, urceolatum; stigma subsessile obtuse 4-lobatum. *Fructus* c. 1.2 X 1 cm, ovoidea, pericarpio carnoso 2-valvato, endocarpio c. 9 X 9 mm cordiformi biconvexo; pseudoarillus laciniatus, laciniis 4 linearibus 2 lateralibus endocarpio fere aequantibus aliis brevioribus.

N. RHODESIA. Central Province: Kafue Gorge, fr. 20.III. 1952, *White* 2312 (FHO; K). Southern Province: st. 1931, *Stevenson* 185/31 (FHO; K). Mazabuka, st. I.1933, *Trapnell* 1157 (K); st. III.1934, *Trapnell* 1425 (K). Gwembe Valley, fr. 1.IV. 1952, *White* 2391 (FHO; K). Livingstone, fr. 2.I.1953, *Angus* 1086 (FHO; K).

S. RHODESIA. Western Division: Sebungwe, Kariangwe, fl. 6.XI.1951, *Lovemore* 155 (K; SRGH). Northern Division: Urungwe, Mensa pan, fl. 25.XI.1952, *Lovemore* 307 (K; SRGH); Msukwe R., fl. 18.XI.1953, *Wild* 4159 (K, holotype; SRGH); Kariba, fl. I.1956, *Phelps* 95 (K; SRGH).

C. karibensis is closely related to *C. riparia* Engl. from Kenya but the latter species has fewer pairs of oblanceolate or narrowly obovate leaflets with subobtuse apices and markedly cuneate bases. The endocarp of *C. riparia* is also oblong-ellipsoid and much more strongly biconvex than in our species.

C. karibensis has been found so far in dense woodland or thickets in the valley of the Zambezi between Livingstone and Chirundu and in the lower Kafue valley. Lake Kariba will have recently engulfed many individuals of this species, hence the choice of name.

25. C. ulugurensis Engl.
26. C. scheffleri Engl. (108)
    [C. glabrata Engl. (83)]
27. C. sarandensis B. D. Burtt
28. ?C. fragariifolia Mattick (fruit not seen)
29. C. gurreh Engl. (18)
    (?C. crassispina Sprague)
30. C. horrida Chiov.
31. C. reflexa Chiov.
32. C. albiflora Engl. (39)
33. C. paolii Chiov.
34. C. enneaphylla Chiov.
35. C. sphaerocarpa Chiov.
36. C. cyclophylla Chiov.
37. C. guidotii Chiov.
38. C. missionis Chiov.
39. C. pteleifolia Engl. (9)
40. C. mildbraedii Engl. (10)
41. C. mombassensis Engl. (104)
42. C. dalzielii Hutch.
43. C. mollis (Oliv.) Engl. (27)
    [C. krausei Engl. (31); C. welwitschii Engl. (32); C. dekindtiana Engl. (33); C. cinerea Engl. (34); C. montana Engl. (35); C. boehmii Engl. (29); C. stuhlmannii Engl. (41); C. heterophylla Engl. (45); C. ndemfi Engl.; ?C. iringensis Engl. (28) fruit not seen]
44. ?C. anfractuosa Chiov. (fruit not seen)
45. ?C. velutina Chiov.
46. C. harveyi Engl. (53)

47. C. neglecta Verdoorn
48. C. schlechten Engl. (55)

Madagascan species

49. C. orbicularis Engl. (15)
    [C. grevearia (Baill.) Gillaumin]

Asiatic species

50. C. mukul (Hook.) Engl.
51. C. berryi (Arn.) Engl. (84)
52. C. pubescens (Wight & Arn.) Engl. (24)
    [C. stocksiana Engl. (40)]
53. C. caudata Engl. (7)

Subsect. 4. Latifoliolatae (Engl.) Wild, comb. nov.
Tab. ID.

[Sect. *Latifoliolatae* Engl., tom. cit. 454 (1912)].

Leaves trifoliolate or pinnate. Inflorescence of more or less elongated dichasial cymes. Calyx usually rather broadly campanulate, lobed about half-way. Endocarp discoid with two slightly convex faces. Psudoaril-arms broad and with + wavy margins, side-arms reaching almost to the apex of the endocarp, remainder of pericarp smooth.

Type species: *C. fischeri* Engl. (a synonym of *C. mossambicensis* Engl.).

African species

54. C. mossambicensis Engl.
    [C. fischeri Engl. (23); C. stolzii Engl.]
55. C. zimmermannii Engl. (49)
56. C. campestris Engl. (47)

Subsect. 5. Ugogenses (Engl.) Wild, comb. nov. Tab. IE.

[Sect. *Ugogenses* Engl., tom. cit.: 462 (1912)].

Type species: *C. ugogensis* Engl.

Leaves pinnate. Inflorescence of + elongated dichasial cymes or of reduced cymes on abbreviated fertile side-shoots.

Calyx campanulate, lobed less than half-way. Endocarp discoid with rather shallowly convex faces, surface lumpy rugose. Pseudoaril-arms broad and with + wavy margins, side-arms reaching almost to the apex of the endocarp.

African species

57. C. ugogensis Engl. (92)
58. C. hildebrandtii Engl. (119)
    (approaches subsect. *Latifoliolatae*)

Subsect. 6. Pedunculatae (Engl.) Wild, comb. nov. Tab. 1F.

[Sect. *Pedunculatae* Engl., tom. cit.: 463 (1912); Sect. *Rosifoliae* Engl., tom. cit.: 463 (1912) pro parte quoad *C. marlothii* Engl.)]

Leaves pinnate. Inflorescence of elongated paniculate cymes or of reduced cymes. Calyx broadly campanulate, lobed up to half-way. Disk hairy (not so in any other division of the genus). Endocarp suboblong-ellipsoid with rather shallowly convex faces, surface lumpy-rugose. Pseudoaril-side-arms almost reaching the apex of the endocarp.

Type species: *C. pedunculata* (Kotschy & Peyr.) Engl.

African species

59. C. pedunculata (Kotschy & Peyr.) Engl. (114)
60. ?C. mollissima Engl. (115) (fruit not seen)
61. ?C. ledermannii Engl. (116) (disk not seen)
62. C. marlothii Engl. (102)

Madagascan species

63. ?C. lasiodiscus Perrier (fruit not seen)

Sect. 2. **Africanae** Engl., tom. cit.: 462 (1912). Tab. 1G.

Leaves trifoliolate. Inflorescence of short reduced cymes. Calyx broadly campanulate, lobed less than half-way. Disk-lobes 4 (5) the longer stamens arising from behind the lobes, the lobes often slightly bifid at the apex. Endocarp always more yor less rugose on the more convex side. Pseudoaril apparentl absent but probably united too intimately with the endocarp (and enclosing it completely) to be visible (sometimes an obvious pseudoaril with a lobulate margin is visible as it does not completely enclose the endocarp).

Type species: *C. africana* (A. Rich.) Engl.

African species

64. C. africana (A. Rich.) Engl. (100)
    [C. pilosa Engl. (123); C. calciicola Engl. (124); C. sambesiaca Engl. (125); C. nkolola Engl. (126); C. rubriflora Engl. (127); C. loandensis Engl.]
65. C. schimperi (Berg) Engl. (62)
    [C. betschuanica Engl. (63)]
66. C. playfairii (Hook. f.) Engl. (71)
67. C. samharensis Schweinf. (61)
68. C. trothae Engl.
69. C. stolonifera B. D. Burtt
70. C. rugosa Engl. (128)
71. C. pilosissima Engl. (129)
72. C. serrulata Engl. (64)
73. ?C. rivae Engl. (82) (good fruit not seen)
74. ?C. arussensis Engl. (85) (good fruit not seen)
75. ?C. flabellulifera Chiov. (fruit not seen)
76. C. neumannii Engl. (87)
77. C. truncata Engl. (122)
78. C. tubuk Sprague
79. C. palmatifoliolata Chiov.
80. C. canan Chiov.
81. ?C. crenato-lobata Chiov. (fruit not seen)
82. C. obovata Chiov.
83. ?C. ruspolii Chiov. (fruit not seen)
84. C. microcarpa Chiov. (fruit not seen)
85. C. molmol (Engl.) Engl.

Sect. 3. Rostratae Engl., tom. cit.: 454 (1912), Tab. IIA.

Leaves simple or unifoliolate. Inflorescence of axillary cymes. Calyx campanulate, lobed less than half-way. Disk-lobes 4, the longer stamens arising behind the lobes. Endocarp tapering to an acuminate apex, smooth, totally enveloped by the pseudoaril which has 4 longitudinal acute ridges.

Type species: *C. rostrata* Engl.

African species

86. C. rostrata Engl. (19)
    [C. robecchi Engl. (20)]
87. C. swynnertonii B. D. Burtt
88. C. dancaliensis Chiov.
89. C. reghinii Chiov. (fruit not seen)

Sect. 4. Coriaceae Engl., tom. cit. **48**: 453 (1912) pro parte excl. *C. lindensis* Engl.

Leaves simple, unifoliolate, trifoliolate or pinnate. Inflorescences of short, much reduced cymes. Calyx lobed about half-way. Disk-lobes 8, small or scarcely developed. Inner surface of pericarp valves often reticulately veined. Endocarp smooth with two shallowly convex faces. Pseudoaril apparently completely absent.

Subsect. 1. Rangeanae Wild, subsect. nov. Tab. II B.

Folia simplicia, unifoliolata vel trifoliolata. *Inflorescentia* abbreviatissima cymae plerumque 1-2-florae. *Calyx* campanulatus, ad medium lobatus. *Endocarpium* leve; pseudoarillus nullus.

Leaves simple, unifoliolate, or trifoliolate. Inflorescences of much reduced cymes. Calyx campanulate, lobed about half-way.

Type species: *C. rangeana* Engl. [a synonym of *C. capensis* (Sond.) Engl.]

African species

90. C. capensis (Sond.) Engl. (16)
    [C. rangeana Engl. (89)]
91. ?C. guerichiana Engl. (88) (fruit not seen)
92. C. cuspidata Chiov.
93. C. ruquetiana Engl. (90)

94. C. coriacea Engl. (11)
    [C. playfairii (Hook. f.) Engl. var. benadirensis Chiov.]
95. C. drake-brockmanii Sprague
96. C. bruceae Chiov.

Subsect. 2. Teretifoliolatae (Heine) Wild, comb. nov. Tab. II C.

[Sect. *Teretifoliolatae* Heine, Senckenb. Biol. **37**: 493 (1956)].

Leaves pinnate, leaflets linear-terete. Inflorescence of short much reduced cymes. Calyx broadly campanulate, lobed about half-way.

Type species: *C. kraeuseliana* Heine.

African species

97. C. kraeuseliana Heine

Sect. 5. Spondioideae Engl., tom. cit.: 453 (1912) emend.

Leaves simple, unifoliolate, trifoliolate or pinnate. Inflorescence of elongated paniculate cymes or of + reduced cymes. Disk 0, or of 8 rather small lobes. Endocarp + smooth. Pseudoaril + fleshy when fresh (often very fleshy and thick) enclosing the lower part of the endocarp in a cup-like manner, upper margin straight or variously sinuate, extending about 1/3 of the way up the endocarp or thinning out and nearly reaching the apex.

Subsect. 1. Cupulares Wild, subsect. nov. Tab. II D.

[Sect. *Edules* Engl., tom. cit.: 456 (1912); Sect. *Spondioideae* Engl., tom. cit.: 453 (1912); Sect. *Rhoifoliae* Engl., tom. cit.: 458 (1912) pro parte quoad *C. woodii* Engl. et *C. serrata* Engl.; Sect. *Ararobbae* Engl., tom. cit.: 462 (1912); Sect. *Holosericeae* Engl., tom. cit.: 464 (1912)].

Folia pinnata. *Inflorescentia* paniculato-cymosa, elongata. *Calyx* campanulatus, + ad medium lobatus. *Pseudoarillus* cupularis endocarpium $^1/_3$ amplectens, margine saepe leviter sinuato.

Leaves pinnate. Inflorescence of ± elongated paniculate cymes. Calyx campanulate, lobed about half-way. Pseudoaril cup-like, enclosing c. $^1/_3$ of the endocarp, margin often rather sinuate.

Type species: *C. zanzibarica* (Baill.) Engl.

African species

98. C. zanzibarica (Baill.) Engl. (1)
    [C. spondioides Engl. (2)]
99. C. kerstingii Engl. (3)
100. C. erlangeriana Engl. (4)
101. C. sulcata Chiov. (fruit not seen)
102. C. morogoroensis Engl. (37)
103. C. trollii Mattick
104. C. edulis (Klotzsch) Engl.
    [C. chlorocarpa Engl. (126)]
105. C. woodii Engl. (48)
    (C. caryaefolia Oliv.)
106. C. serrata Engl. (54)
107. C. boiviniana Engl. (103)
    [C. holosericea Engl. (118)]
108. C. engleri Guillaumin
    [C. laxiflora Engl. non Bak. (101)]
109. C. ararobba Engl. (99)
110. C. agar Chiov.
111. C. tephrodes Chiov.
112. C. staphyleifolia Chiov.
113. C. hirtella Chiov. (fruit not seen)

Madagascan species

114. C. stellulata Perrier
115. C. aprevalii (Baill.) Guillaumin
116. C. tetramera Engl. (6)
117. C. pervilleana Engl. (50)
    (C. fraxinifolia Bak.)
118. ?C. leandriana Perrier

119. C. guillauminii Perrier
120. ?C. laxecymigera Perrier (fruit not seen)
121. ?C. pterocarpa Perrier

122. C. arafy Perrier

Subsect. Pruinosae (Engl.) Wild, comb. nov. Tab. II E.

[Sect. *Pruinosae* Engl., tom. cit.: 454 (1912)].

Leaves simple, unifoliolate, trifoliolate or more rarely pinnate (when pinnate leaflets rather glaucous and leathery). Inflorescence of ± elongated cymes or more rarely of reduced cymes. Calyx campanulate, lobed about half-way. Pseudoaril cup-like and enclosing c. $^1/_3$ of the endocarp, margin straight or slightly sinuate. Endocarp often black when ripe.

Type species: *C. pruinosa* Engl.

African species

123. C. pruinosa Engl. (21)
124. C. glaucescens Engl. (22)
    (C. hereroensis Schinz)
125. C. anacardiifolia Dinter & Engl. (44)
126. C. saxicola Engl. (79)
    (approaching subsect. *Edules)*
127. C. dinteri Engl. (86)
    (approaching subsect. *Glaucidulae)*
128. C. namaensis Schinz
    [?C. rotundifolia Dinter & Engl. (91)]
129. ?C. crenato-serrata Engl. (fruit not seen)
130. ?C. schultzei Engl. (111) (fruit not seen)
131. C. mulelame (Hiern) K. Schum
    [?C. antunesii Engl. (58)]

Madagascan species

132. C. lamii Perrier
133. C. sinuata Perrier
134. C. humbertii Perrier
135. C. marchandii Engl. (8)
    (C. pulverulenta Guillaumin)

Asiatic species

136. C. myrrha (Nees) Engl.

Subsect. 3. **Glaucidulae (Engl.)** Wild, comb. nov.
Tab. II F.

[Sect. *Glaucidulae* Engl., tom. cit.: 462 (1912); Sect. *Nigrescentes* Engl., loc. cit.].

Leaves trifoliolate or pinnate. Inflorescences of axillary cymes usually shorter than the leaves but not reduced as a rule to subfasciculate cymose clusters. Calyx with a rather deep funnel-shaped tube and rather short lobes. Stamen filaments flattened and broadened towards the base. Pseudoaril enclosing about 2/3 of the endocarp, becoming very thin above.

Type species: *C. angolensis* Engl.

African species

137. C. rehmannii Engl. (94)
[C. oliveri Engl. (95); C. nigrescens Engl. (97); C. kwebensis N. E. Br.].
138. C. angolensis Engl. (105)
[C. longibracteata Engl. (109); C. gossweileri Engl.]
139. C. tenuipetiolata Engl. (96)
140. C. caerulea B. D. Burtt
141. C. hornbyi B. D. Burtt
142. C. erythraea (Ehrenb.) Engl. (46) approaches subsect. *Pruinosae*
[C. gallaensis Engl. (113); C. lughensis Chiov.]
143. ?C. somalensis Engl. (110) (fruit not seen)
144. ?C. rosiflora Engl. (106) (fruit not seen)
145. ?C. rivae Engl. (82) (fruit not seen)
146. C. gorinii Chiov.

Asiatic species

147. C. kataf (Forsk.) Engl.

Madagascan species

148. C. coleopsis Perrier
149. C. mafaidoha Perrier

150. C. grandifolia Engl.
    (C. laxiflora Bak.)
151. ?C. cuneifolia Bak.

Subgen. II **Opobalsamum** (Engl.) Wild, comb. nov.
Tab. II G.

[Sect. *Opobalsamea* Engl., Bot Jahrb. 48: 454 (1913). — Sect. *Ancistrophora* Chiov., Fl. Somala **2**: 111 (1932). — Subsect. *Foliaceae* Chiov., tom. cit.: 94 (1932)].

Calyx shortly lobed. Stamens almost equal in size (4 only very slightly shorter than the remaining 4). Disk-lobes 8. Pericarp splitting longitudinally into 4 valves at maturity. Pseudoaril absent or apparently so.

Type species: *C. opobalsamum* (L.) Engl. [a synonym of *C. gileadensis* (L.) Christ.].

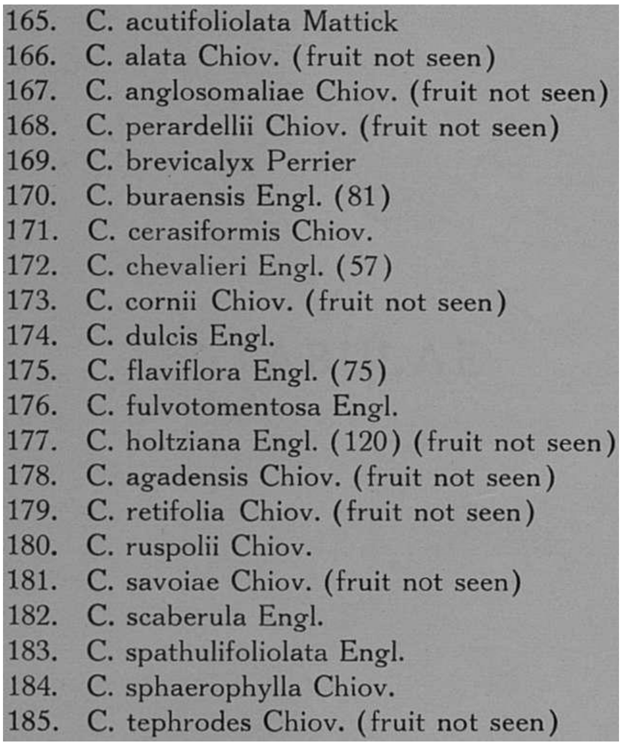
African species

152. C. gileadensis (L.) Christ.
    [C. opobalsamum (L.) Engl. (13), also in Socotra and Asia]
153. C. parvifolia (Balf. f.) Engl. (30), also in Socotra and Asia
154. C. suckertiana Chiov.
155. C. foliacea Sprague. Also in Asia
156. ?C. cornii Chiov.
157. C. julifera Chiov.
158. C. gillettii Chiov.
159. C. allophylla Sprague
160. C. coronillifolia Chiov.
161. ?C. agar Chiov. (Fruit not seen)
162. C. ancistrophora Chiov.

Socotran species

163. C. planifrons (Balf. f.) Engl. (117)
164. ?C. socotrana (Balf. f.) Engl. (17) (fruit not seen).

Species not so far placed



165. C. acutifoliolata Mattick
166. C. alata Chiov. (fruit not seen)
167. C. anglosomaliae Chiov. (fruit not seen)
168. C. perardellii Chiov. (fruit not seen)
169. C. brevicalyx Perrier
170. C. buraensis Engl. (81)
171. C. cerasiformis Chiov.
172. C. chevalieri Engl. (57)
173. C. cornii Chiov. (fruit not seen)
174. C. dulcis Engl.
175. C. flaviflora Engl. (75)
176. C. fulvotomentosa Engl.
177. C. holtziana Engl. (120) (fruit not seen)
178. C. agadensis Chiov. (fruit not seen)
179. C. retifolia Chiov. (fruit not seen)
180. C. ruspolii Chiov.
181. C. savoiae Chiov. (fruit not seen)
182. C. scaberula Engl.
183. C. spathulifoliolata Engl.
184. C. sphaerophylla Chiov.
185. C. tephrodes Chiov. (fruit not seen)

Acknowledgements

This work is largely based on the *Commiphora* material in the herbaria of Kew and the British Museum. I am very grateful to the directors of these two institutions for their kindness in making this material available to me.

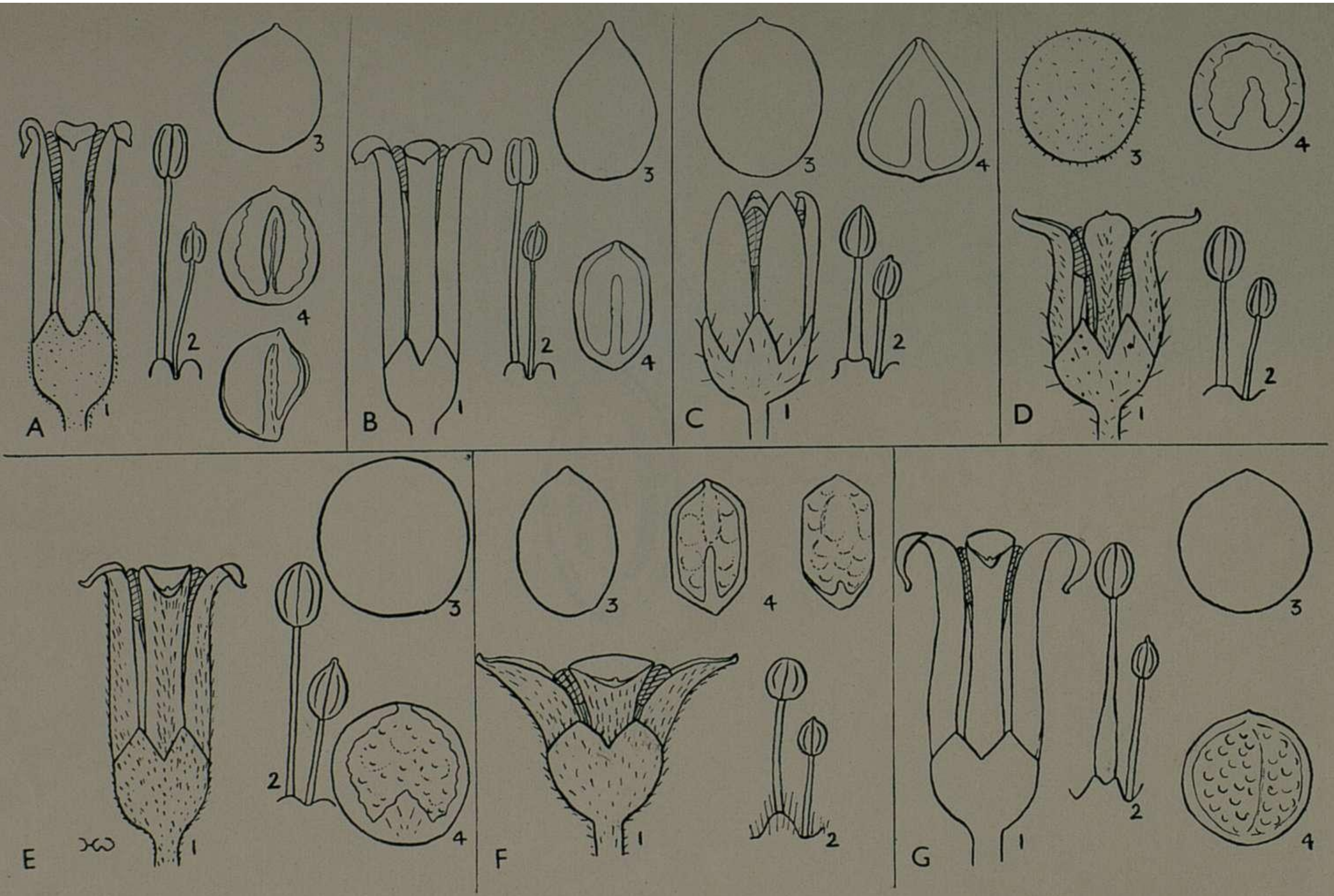
I would also like specially to thank Mr. J. B. GILLETT, whose knowledge of this genus in both the field and in the herbarium is very wide, for his advice and valuble criticisms, and Miss A. JAMES for help in preparing the diagram of the affinities of the subdivisions of the genus and in the preparation of many of the necessary flower dissections and pseudoaril examinations.

TABULAE

TAB. I

Subgen. Commiphora Sect. Commiphora, A. Subsect. *Pyracanthoides, C. glandulosa* Schinz; B. Subsect. *Madagascarienses, C. madagascariensis* Jacq.; C. Subsect. *Quadricinctae, C. karibensis* Wild, sp. nov.; D. Subsect. *Latifoliolatae, C. mossambicensis* Engl.; E. Subsect. *Ugogenses, C. ugogensis* Engl.; F. Subsect. *Pedunculatae, C. marlothii* Engl.; G. Sect. Africanae, C. *africana* (A. Rich.) Engl.

[1, flower × 6; 2, stamens and disk-lobes × 6; 3, fruit × 2; 4, endocarp and pseudoaril (sometimes lacking) × 2].

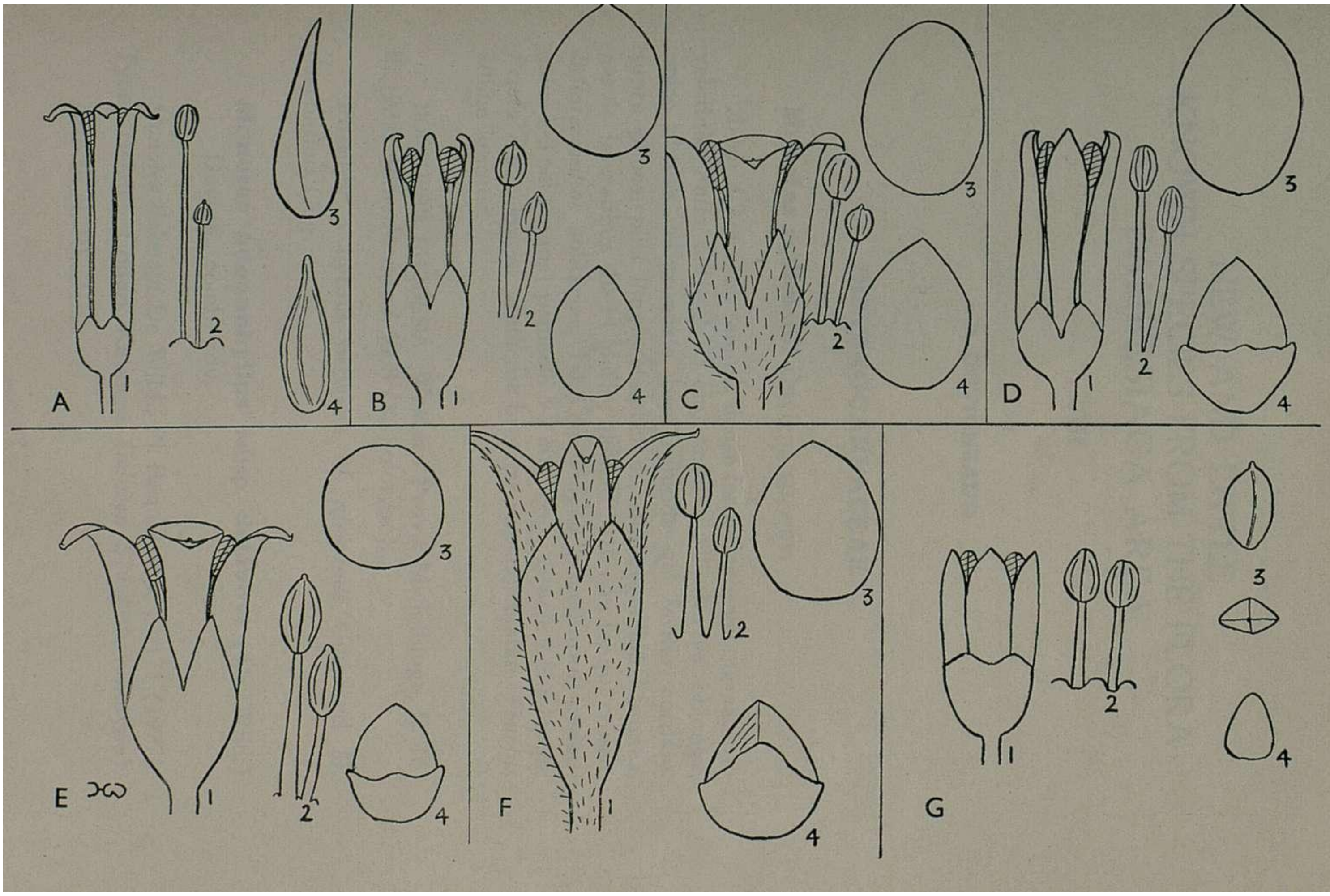


TAB. I

TAB. II

Subgen. Commiphora, A. Sect. Rostratae, *C. rostrata* **Engl.**; Sect. Coriaceae, B. Subsect. ***Rangeanae***, *C. rangeana* **Engl.**; C. Subsect. *Teretifoliolatae, C. kraeuseliana* Heine; Sect. Spondioides, D. Subsect. *Cupulares, C. zanzibarica* (**Baill.**) **Engl.**; E. Subsect. *Pruinosae, C. glaucescens* **Engl.**; F. Subsect. *Glaucidulae, C. angolensis* **Engl.**; G. Subgen. Opobalsamum, *C, gileadensis* (L.) Christ.

[1, **flower** × 6; 2, stamens and disk-lobes (**sometimes** not **developed**) × 6; 3, **fruit** × 2; 4, endocarp and **pseudoaril** (sometimes lacking) X 2].



TAB. II

NEW AND LITTLE KNOWN SPECIES FROM THE FLORA ZAMBESIACA AREA

VIII

by

P. DUVIGNEAUD

DIPTEROCARPACEAE

Monotes redheadii Duvign., sp. nov.

Arbor 4-7 m alta, ramulis dense ferrugineo- vel nigrescenti-velutinis. *Folia* 6-9 X 2-3.5 cm, anguste elliptica vel oblonga, apice obtusa vel truncata basi rotunda vel leviter cordata, supra pilosa, pilis longis simplicibus, subtus pallide brunnea, nervis lateralibus 10-14 paris; petiolo 7-10 mm longo, crasso. *Inflorescentiae* solitariae, 1-1.5 cm longae, pauciflorae; pedunculus 2-3 cm longus; pedicelli 5-7 mm longi. *Sepala* 2 mm longa. *Petala* 7 mm longa. *Antherae* breviter appendiculatae. *Fructus* adhuc ignotus.

NORTHERN RHODESIA. **Western Prov.**: Mwinilunga, fl. 16. II. 1938, *Milne-Redhead* 4608 (K, holotype).

Possibly a hybrid between *M. africanus* Gilg and *M. dasyanthus* Gilg.

Monotes adenophyllus subsp. **delevoyi** (De Wild.) Duvign., comb. nov.

Monotes delevoyi De Wild., Pl. Bequaert. 4, 2: 171 (1927). Type: Belgian Congo, Katanga, *Delevoy* 524 (BR, holotype).

Also in N. Rhodesia.

Monotes adenophyllus subsp. **subfloccosus** Duvign., subsp. nov.

A subsp. *adenophyllo* differt foliis subtus griseo-floccosis.

NORTHERN RHODESIA. Northern. Prov.: Fort Rosebery-Luingu road, fr. 19.V.1931, *Stevenson* 247/31 (FHO, holotype; NDO).

Monotes adenophyllus subsp. **homblei** (De Wild.) Duvign., comb. nov.

Monotes homblei De Wild. in Bull. Jard. Bot. Brux. 5: 55 (1915). Syntypes: Belgian Congo, Katanga, *Homblé* 1177 (BR), 1249 (BR).

Monotes magnificus var. *homblei* (De Wild.) Duvign. in Lejeunea, **13**: 55, t. 13, fig. a (1949). Lectotype: *Homblé* 1249 (BR).

Also in N. Rhodesia and Angola.

Monotes discolor var. **lanatus** Duvign., var. nov.

A var. *discolor* differt foliis subtus lanatis, nervis venisque pilis magis longioribus tectis.

NORTHERN RHODESIA. Western. Prov.: Mwinilunga, fl. & fr. 14.XI.1955, *Holmes* 1330 (K, holotype; NDO).

Monotes discolor var. **cordatus** (Hutch.) Duvign., comb. nov.

Monotes cordatus Hutch. in Kew Bull. **1931:** 246 (1931). Type: N. Rhodesia, Lusaka, *Hutchinson & Gillett* 3595 (K, holotype).

Monotes lukuluensis Hutch. tom. cit.: 247 (1931). Type: N. Rhodesia, Lukulu R., *Hutchinson & Gillett* 3741 (K, holotype).

ON THE ORIGIN
OF *NARCISSUS ROMIEUXII* BR.-BL. & MAIRE

by

ABÍLIO FERNANDES

Botanical Institute, Coimbra University

INTRODUCTION

Narcissus Romieuxii was described by BRAUN-BLANQUET & MAIRE in 1922 (in Bull. Soc. Hist. Nat. Afr. Nord, XIII: 192). The authors admit that it is a species near *N. Bulbocodium* L., from which, however, it is distinguishable by its long exserted stamens and style and very narrow perianth-segments.

In 1929, EMBERGER & MAIRE (Pl. Marocc. Nov.: 6) reduced *N. Romieuxii* to a subspecies of *N. Bulbocodium* L., and distinguished vars. *rifanus* Emb. & Maire and *albidus* Emb. & Maire. According to the authors, the first of these two varieties differs from type in its larger violet-brown ovoidal spathe, longer pedicel, corona slightly shorter than the perianth-segments, and in its golden-yellow anthers. The second variety differs from type by its whitish-yellow flowers, corona clearly shorter than the lanceolated-linear perianth-segments, violet-brown ovoidal spathe and golden-yellow anthers. On the other hand, var. *albidus* is separable from var. *rifanus* by its whitish flowers, shorter corona and wider perianth-segments.

JAHANDIEZ & MAIRE (Cat. Pl. Maroc, I: 138, 1931) also place *N. Romieuxii* under the category of subspecies, and distinguish in it var. *rifanus* only. MAIRE separates var. *albidus* from ssp. *Romieuxii* and considers it as a subspecies of *N. Bulbocodium* L.

In 1938, MAIRE, WEILLER & WILCZEK (in Bull. Soc. Hist. Nat. Afr. Nord, XXIX: 452) described var. *zaianicus* of ssp. *albidus* (Emb. & Maire) Maire, characterized, according to the authors, by very narrow perianth-segments (up to 1.5 mm), very odoriferous flowers, by the corona and perianth-segments with a very slight greenish-yellow shade, greenish-yellow tube, glaucescent scape and delicate green leaves about 1 mm wide.

As we can see, *N. Romieuxii* has been considered either as a distinct species or as a subspecies of *N. Bulbocodium*. Moreover, taxon *albidus* was originally included in *N. Romieuxii* as a variety and later separated as a subspecies of *N. Bulbocodium* L. Having had the opportunity of gathering material of some of the above mentioned taxa, we decided to pursue their kariological study for two purposes : to contribute towards the knowledge of the systematics of subgenus *Corbularia* of genus *Narcissus* L., and to find out the origin of these taxa.

MATERIAL AND METHODS

We are very grateful to the Directors of the Muséum National d'Histoire Naturelle in Paris and the Institut Scientifique Chérifien in Rabat for their valuable help (1) in enabling us to gather in Coimbra bulbs of the following plants, the names of which are preceded by the numbers they have in our cultures :

N° 54 — *Narcissus Bulbocodium* L. ssp. *Romieuxii* (Br.-Bl. & Maire) Emb. & Maire (sub *Corbularia monophyllos* Dur. var. *Romieuxii*) — Muséum National d'Histoire Naturelle, Paris.

N° 1220 — *Narcissus Bulbocodium* L. ssp. *albidus* (Emb. & Maire) Maire var. *zaianicus* Mair, Weiller & Wilczek: Zaiane : J. Mouchchène, rochers — Institut Scientifique Chérifien, Rabat.

N° 929 — *Narcissus Bulbocodium* L. ssp. *albidus* (Emb. & Maire) Maire var. *zaianicus* Maire, Weiller & Wilczek forma *lutescens* Sauv. & Vindt: Maroc, Moyen Atlas, Immouzer du Kundar — Institut Scientifique Chérifien, Rabat.

The bulbs, potted, produced root-tips, and this was the only material used in our studies, as the bulbs had not given flowers. These root-tips were fixed in Navashin and the transversal sections, 18 μ thick, were stained with gentian violet; the classical technique of embeding in paraffin was followed.

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(1) We are also grateful to Dr. Ch. SAUVAGE who arranged to have the bulbs sent to us from the Institut Scientifique Chérifien in Rabat and also identified the plants.

Unfortunately, the plants did not develop well nor did they flower. For this reason, we could not study the external morphology. The taxonomic considerations stated below are based on the descriptions of taxa presented by the authors who established them.

OBSERVATIONS

1. *N. Bulbocodium* L. ssp. *Romieuxii* (Br.-Bl. & Maire) Emb. & Maire (N° 54).

In the root-tips of this plant we counted 30 chromosomes, the morphology of which is given in the following formula, the letters between brackets showing the respective chromosomes in figures 1 *a* and 1 *b :*

$$2n=30=4\,lm\,(A)+4\,Lp_1\,(B)+2\,Lp_2\,(C_b)+2\,lp'\,(C_c)+4\,Lp_3\,(D)+4\,PP\,(E)+4\,PP\,(F)+2\,Pp'\,(G_b)+2\,PP\,(G_c)+2\,L.\,(H)$$

It is well known that the observation of the satellites is rather difficult, and the figures in which one can identify all the existing ones are quite rare. Thus, in fig. *1a* one only of the chromosomes C_c shows a satellite, whereas in pair G_b the satellite was observed in both. In fig. 1*b* it was only possible to distinguish this formation in one of chromosomes G_b.

The chromosomes of type L., indicated in the figures with the letter H, are supranumerary heterochromatic elements (B chromosomes), and their behaviour in mitosis and meiosis has already been analised by us in previous works (vide FERNANDES in Scientia Genetica, I: 141-166, 1939; in Bol. Soc. Brot. sér. 2, XX: 93-154, 1946; in Bol. Soc. Brot. sér. 2, XXII: 119-142, 1948). In justification of the interpretation attributed to these chromosomes, two voluminous chromocenters are found in the interphase and in the resting stage, which occasionally have the aspect of chromosomes.

WYLIE (in Heredity, VI: 139, 1952) states that she found 29 chromosomes in taxon *Romieuxii* and that the supranumerary was one of the normal elements of the complement. The appearance of plants with 30 chromosomes in which the supranumerary are heterochromatic shows that the extra element found by Wylie might possibly be a heterochromatinosome.

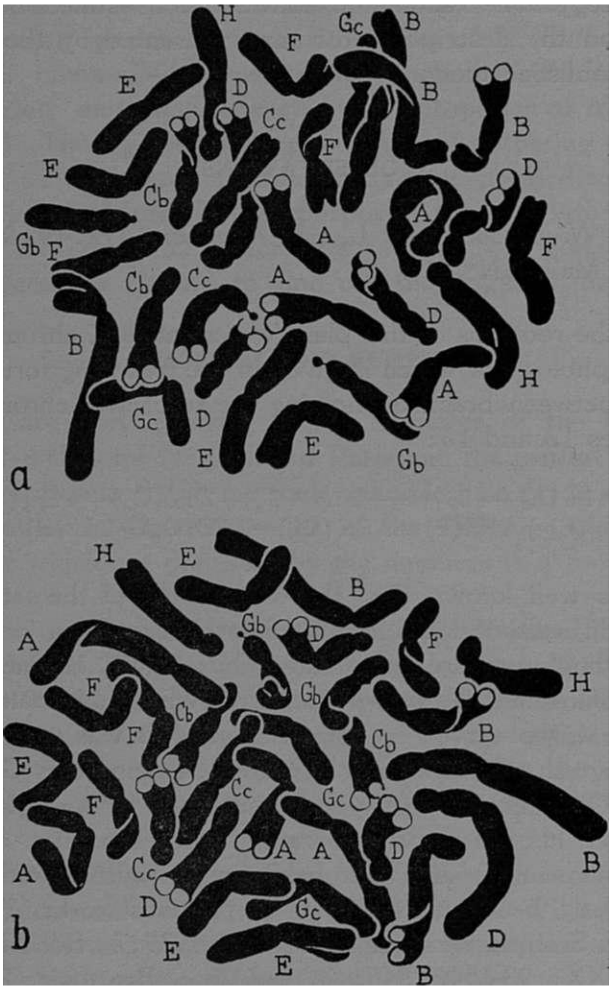

Fig. 1. — *a, b,* Equatorial plates in cells of root-tips of *N. Bulbocodium* L. ssp. *Romieuxii* (Br.-Bl. & Maire) Emb. & Maire, showing 30 chromosomes. Explanation in text. X 3200.

2. *Narcissus Bulbocodium* L. ssp. *albidus* (Emb. & Maire) Maire var. *zaianicus* Maire, Weiller & Wilczek (N° 1220).

We have counted 28 chromosomes in the root-tips of these plants. The morphological study (fig. 2) shows that this complement corresponds precisely to that of the previous plants as long as we consider as inexistent the two supranumerary heterochromatinosomes which come last in the formula. In accordance with the absence of these heterochromatinosomes, no chromocenters are noticed in the interphase and in the resting stage of the nucleus.

In the figure 2 one can see the satellites on the pair C_c only. In anothers plates, however, we have seen also the satellites of the pair (G_b).

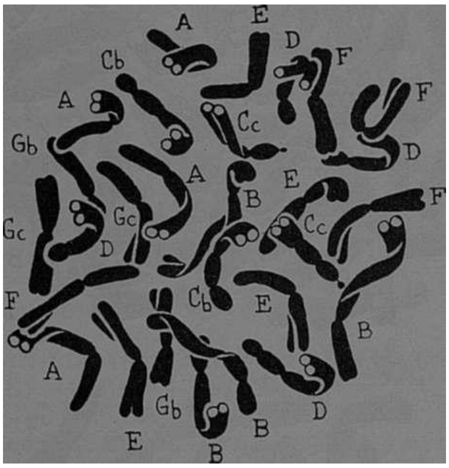

Fig. 2. — Polar view of an equatorial plate in a cell of the root-tip of *N. Bulbocodium* L. ssp. *albidus* (Emb. & Maire) Maire var. *zaianicus* Maire, Weiller & Wilczek, in which 28 chromosomes can be seen. ×3000.

3. *Narcissus Bulbocodium* L. ssp. *albidus* (Emb. & Maire) Maire var. *zaianicus* Maire, Weiller & Wilczek forma *lutescens* Sauv. & Vindt (N° 929).

We have counted 30 chromosomes in the polar views of the equatorial plates of the root-tips (fig. 3) and we have stated that the complement of this plant is similar to that of Nos. 54 and 1220 described in the formula. There are also two supranumerary heterochromatinosomes of type L. However, whereas those elements were morphologically similar in plant No. 54, they are different in this one, one being longer than the other (fig. 3α). The existence of two chromocenters is in accordance with the presence of two heterochromatinosomes.

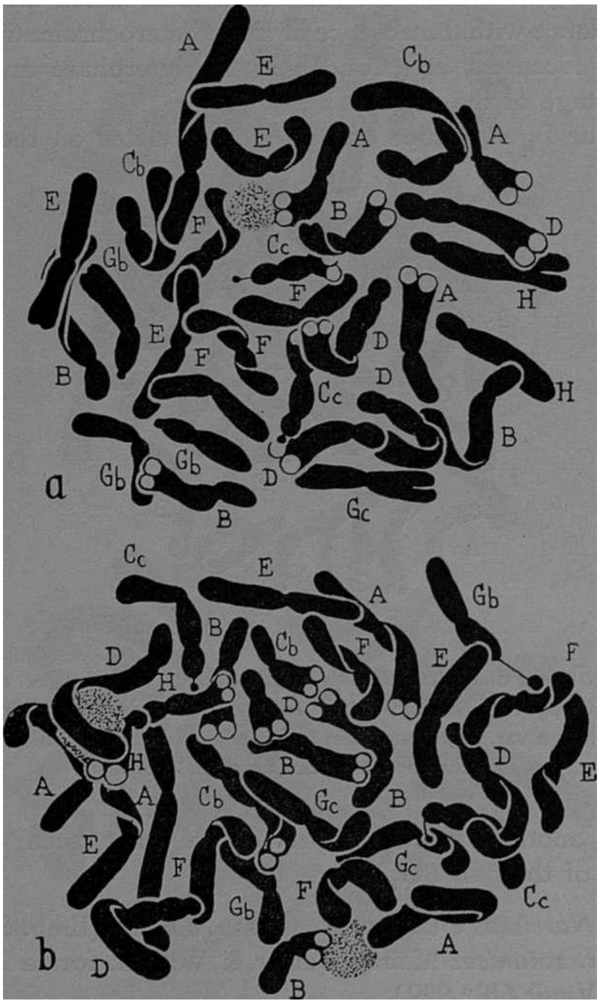

Fig. 3. — *a, b,* Polar views of somatic metaphases in cells of the root-tips of *N. Bulbocodium* L. ssp. *albidus* (Emb. & Maire) Maire var. *zaianicus* Maire, Weiller & Wilczek forma *lutescens* Sauv. & Vindt (No. 929), showing 30 chromosomes. X 3200.

In the root-tips of these plants we observed frequently occurrence of the nucleolus or nucleoli during metaphase, as we can see in the illustrations of fig. 3. Examination of those plates suggests that there are also nucleologenic regions in the distal extremities of some long chromosomes, considering that these extremities are joined to remainder of nucleoli. However, it was not possible to identify these chromosomes.

DISCUSSION

In a previous work (FERNANDES in Rev. Fac. Ciênc. Univ. Coimbra, XXVI: 71-94, 1957), we had the opportunity of establishing that the chromosome complements of *N. Bulbocodium* L. and *N. cantabricus* DC. can be represented by the following formulas, respectively:

$$2n = 14 = 2\ \mathrm{lm}\ (A) + 2\ \mathrm{Lp}_1 (B) + 2\ \mathrm{Lp}_2 (C_b) + 2\ \mathrm{Lp}_3 (D) + 2\ \mathrm{PP}\ (E) + 2\ \mathrm{PP}\ (F) + 2\ \mathrm{Pp'} (G_b)$$

$$2n = 14 = 2\ \mathrm{lm}\ (A) + 2\ \mathrm{Lp}_1 (B) + 2\ \mathrm{lp'}\ (C_c) + 2\ \mathrm{Lp}_3 (D) + 2\ \mathrm{PP} (E) + 2\ \mathrm{PP}\ (F) + 2\ \mathrm{PP} (G_c)$$

Adding the above formulas we obtain:

$$2n = 28 = 4\ \mathrm{lm} (A) + 4\ \mathrm{Lp}_1 (B) + 2\ \mathrm{Lp}_2 (C_b) + 2\ \mathrm{lp'} (C_c) + 4\ \mathrm{Lp}_3 (D) + 4\ \mathrm{PP}\ (E) + 4\ \mathrm{PP} (F) + 2\ \mathrm{Pp'} (G_b) + 2\ \mathrm{PP}\ (G_c)$$

One can see that this resulting formula precisely represents the complements we found in all the taxa we studied, abstracting from the 2 heterochromatinosomes occurring in plants Nos. 54 and 929. We thus arrive to the conclusion that both ssp. *Romieuxii* and ssp. *albidus* are amphidiploids (allotetraploids) originating through a cross of *N. Bulbocodium* L. with *N. cantabricus* DC.

The tetraploid forms of *N. Bulbocodium* L. are very frequent, particularly in the borders of the distribution area of the species (FERNANDES in Bol. Soc. Brot. sér. 2, XXV: 164, 1951), that is to say, in the western zone of Portugal, in France and in Morocco. On the other hand, tetraploid forms of *N. cantabricus* are also known, as for instance var. *foliosus* (vide FERNANDES in Rev. Fac. Ciênc. Univ. Coimbra, XXVI: 71-94, 1957) which occurs in Morocco. It is therefore highly probable that the amphidiploid may have originated through a cross between the gametes produced by tetraploid forms of *N. Bulbocodium* L. and of *N. cantabricus* DC, all the more so as these forms generally produce a high rate of viable diploid spores.

In the plants of cultures Nos. 54 and 929 there are two heterochromatinosomes of type L., these being in some cases similar and in others dissimilar. We have shown in previous works (FERNANDES in Bol. Soc. Brot. sér. 2, XXIII: 5-88, 1949; in Agron. Lusit. XII: 551-600, 1950) that supranumerary heterochromatic chromosomes frequently appear in the diploid forms of *N. Bulbocodium*, and that they have also appeared in *N. cantabricus* (vide FERNANDES in Rev. Fac. Ciênc. Univ. Coimbra, XXVI: 71-94, 1957).

In Narcissi tetraploidy generally results from the formation of gametes not reduced owing to irregularities occasionally occurring during meiosis (¹). We have also shown in previous works (vide FERNANDES in Scientia Genetica, I: 141-166, 1939; in Bol. Soc. Brot. sér. 2, XXII: 119-142, 1948) that the heterochromatinosomes of Narcissi have as a rule centromers assuring their permanence and that in mitosis of the pollen they behave like the other chromosomes even without differential disjunction. If the plants are provided with only one heterochromatinosome, this originates univalents, the behaviour of which has been described in another work (FERNANDES in Bol. Soc. Brot. sér. 2, XX: 93-154, 1946). When diploid pollen grains are formed, these as a general rule have only one extra element. When the plants are provided with two, the diploid gametes may have two elements, etc. From the fusion of diploid gametes provided with heterochromatinosomes, plants with 29, 30, 31, etc. chromosomes will result. The extra elements may be carried by one gamete only or by the two gametes.

In accordance with their heterochromaticity, these chromosomes are deprived of genetical activity or have a rather reduced activity (vide FERNANDES in Bol. Soc. Brot. sér. 2, XXV: 249-286, 1951) and have little or no influence on the morphology of the plants.

The characteristics of the external morphology do not oppose the conclusion reached in respect of the origin of taxa

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(¹) In section *Ganymedes* of genus *Narcissus* it has not been possible to date to discover any tetraploid form. As meiotic irregularities also occur in those plants, there is presumably in this section, and lacking in the other sections, some mechanism, probably of genic nature, which prevents the formation of polyploids.

Romieuxii and *albidus.* Actually, we see that *N. Bulbocodium* has yellow flowers, whereas *N. cantabricus* has white ones. As it would be expected, *Romieuxii* presents sulphur-yellow flowers and *albidus* whitish-yellow or white flowers with a slight greenish-yellow shade.

In a previous work (FERNANDES in Rev. Fac. Ciênc. Univ. Coimbra, XXVI : 71-94, 1957), we showed that white is dominant upon yellow. If we assume that the colour of the flower depends on one pair (B-b) of genes (¹), the variability of coloration can be explained, admitting that taxon *Romieuxii* results from a cross between a *N. Bulbocodium* homozygous plant, that is to say, with a bb constitution, and another heterozygous, Bb, of *N. cantabricus.* The resulting plants, with a Bbbb constitution, would present sulphur-yellow flowers. As regards taxon *albidus,* this would have resulted from the conjugation of two homozygous gametes, presenting therefore a BBbb constitution and producing flowers with a slight yellow shade.

At least some tetraploid forms of *N. cantabricus* have more than one leaf per bulb (3-8 in var. *foliosus*). Therefore, the number of leaves per bulb (3-5) also accords with the origin we attribute to taxa *Romieuxii* and *albidus.* The fact that the leaves are flexuous also accords, etc.

As it is well known, the amphidiploids, combining characteristics of the parents and occasionally presenting some new ones, are stable and fertile, considering that their meiosis is generally regular. Under these conditions, our opinion is that for *N. Romieuxii* the category of species, which originally was attributed to it by BRAUN-BLANQUET & MAIRE, should be maintained. Taxon *albidus* is also an amphidiploid of the same species. It should therefore, in our opinion, be included in *N. Romieuxii* ; this after all was what EMBERGER & MAIRE had in mind when they described it as a variety of ssp. *Romieuxii* of *N. Bulbocodium* L.

Considering therefore *N. Romieuxii* Br.-Bl. & Maire as an independent species and if we include in it ssp. *albidus,* accor-

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(¹) It may, however, happen that the coloration of the flowers, even of the diploid Narcissi, may be due to a series of factors, possibly to a series of multiple alleles.

ding to the data available in literature the following taxa can be distinguished in this species (¹):

Flowers sulphur-yellow; perianth-segments linear, 1-1.5 mm wide at the base. . . . . .ssp. *Romieuxii*
  Spathe whitish-scarious, sub-hyaline ; pedicel 2-3 mm long ; perianth-segments almost as long as the corona; anthers light yellow. . . . . .var. *Romieuxii*
  Spathe violet-brown ; pedicel longer than 3 mm ; perianth-segments longer than the corona ; anthers golden-yellow. . . . . .var. *rifanus*
Flowers whitish-yellow or white with a slight greenish-yellow shade ; perianth-segments 1.5-2.5 mm wide at the base . . . . .ssp. *albidus*
  Flowers whitish-yellow ; perianth-segments about 2.5 mm wide at the base, longer than the corona. . . . . .var. *albidus*
  Flowers white with a slight greenish-yellow shade ; perianth-segments about 1.5 mm wide at the base, shorter than the corona. .var. *zaianicus* (²)

The nomenclatural history of the taxa mentioned is as follows :

Narcissus Romieuxii Br.-Bl. & Maire in Bull. Soc. Hist. Nat. Afr. Nord, XIII: 192 (1922).

N. Bulbocodium L. ssp. *Romieuxii* (Br.-Bl. & Maire) Emb. & Maire, Pl. Marocc. Nov.: 6 (1929).—Jahandiez & Maire, Cat. Pl. Maroc, I: 138 (1931).

(¹) It is probable that, such as it happens with *N. Bulbocodium* L. and *N. cantabricus* DC, *N. Romieuxii* may be rather variable respecting size and colour of the spathe, length of the pedicel, width and length of the perianth-segments, relation between the length of the perianth-segments and corona, etc. In this way, it may be that the two varieties, *rifanus* and *zaianicus* are not consistent. Unfortunately, Narcissi become very easily deformed and the herbarium specimens are rather bad ; it is therefore very dificult to judge after these specimens the colorations that the flowers present in the natural conditions. This problem therefore can only be resolved by studies in the field.

(²) We have not been able to find the description of forma *lutescens* Sauv. & Vindt, so we therefore make no reference to it.

ssp. **Romieuxii**

var. **Romieuxii**

N. Bulbocodium L. ssp. *Romieuxii* (Br.-Bl. & Maire) Emb. & Maire var. *mesatlanticus* Maire in Emb. & Maire, Pl. Marocc. Nov.: 6 (1929).—Jahandiez & Maire, Cat. Pl. Maroc, I: 138 (1938); *op. cit.:* 871 (1934).—Emb. & Maire, Cat. Pl. Maroc, IV: 961 (1941).

var. **rifanus** (Emb. & Maire) A. Fernandes, comb. nov.

N. Bulbocodium L. ssp. *Romieuxii* (Br.-Bl. & Maire) Emb. & Maire var. *rifanus* Emb. & Maire, Pl. Marocc. Nov.: 6 (1929).—Jahandiez & Maire, Cat. Pl. Maroc, I: 138 (1931).

ssp. **albidus** (Emb. & Maire) A. Fernandes, comb. nov.

N. Bulbocodium L. ssp. *albidus* (Emb. & Maire) Maire in Jahandiez & Maire, Cat. Pl. Maroc, I: 138 (1931).—Emb. & Maire, Cat. Pl. Maroc, IV: 961 (1941).

N. Bulbocodium L. ssp. *Romieuxii* (Br.-Bl. & Maire) Emb. & Maire var. *albidus* Emb. & Maire, Pl. Marocc. Nov.: 6 (1929).

var. **albidus**

N. Bulbocodium L. ssp. *albidus* (Emb. & Maire) Maire var. *eu-albidus* Emb. & Maire, Cat. Pl. Maroc, IV: 961 (1941).

var. **zaianicus** (Maire, Weiller & Wilczek)
A. Fernandes, comb. nov.

N. Bulbocodium L. ssp. *albidus* (Emb. & Maire) Maire var. *zaianicus* Maire, Weiller & Wilczek in Bull. Soc. Hist. Nat. Afr. Nord, XXIX: 452 (1938).—Emb. & Maire, Cat. Pl. Maroc, IV: 961 (1941).

With regard to the origin of taxa *Romieuxii* and *albidus* we can assume that either: 1) *Romieuxii* first differentiated and afterwards originated *albidus*, or 2) *albidus* first differentiated and afterwards originated *Romieuxii*, or 3) both taxa originated independently.

According to JAHANDIEZ & MAIRE (Cat. Pl. Maroc, I: 138, 1931; *op. cit.* III: 871, 1934) and EMBERGER & MAIRE (Cat. Pl. Maroc, IV: 961, 1941), the geographical distribution of the taxa constituting *N. Romieuxii* Br.-Bl. & Maire is as follows (figs. 4 and 5).

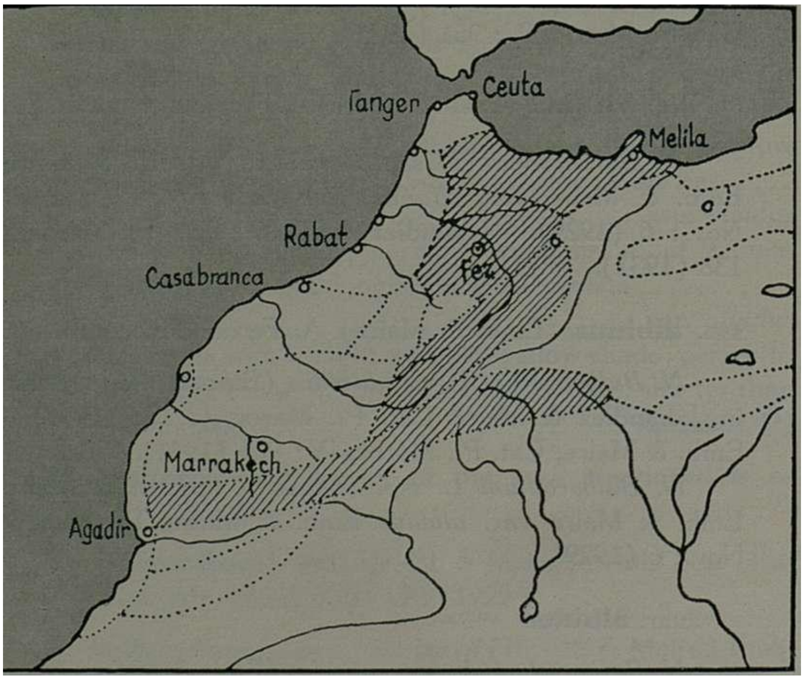

Fig. 4. — Geographical area of *N. Romieuxii* Br.-Bl. & Maire ssp. *Romieuxii*.

- var. *Romieuxii* — northern zone of central Morocco, Middle Atlas (including Mount Tazzeka) and Great Atlas.
- var. *rifanus* (Emb. & Maire) A. Fernandes — East and West Riff (from Moulouya to Oued Laou, including the Riffian Atlas) and central Middle Atlas.
- var. *albidus* — East and West Riff (from Moulouya to Oued Laou, including the Riffian Atlas).

var. *zaianicus* (Maire, Weiller & Wilczek) A. Fernandes—
Zainan mountains.
forma *lutescens* (Sauv. & Vindt)—Middle Atlas.

From this distribution we can see that although the areas of the two subspecies overlap in the Riff and Middle Atlas,

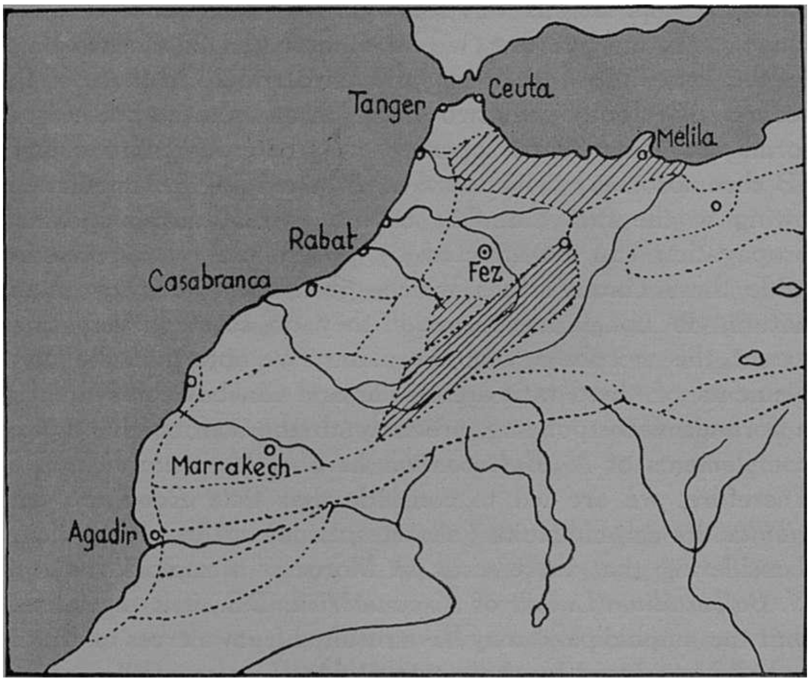

Fig. 5. — Geographical area of *N. Romieuxii* Br.-Bl. & Maire ssp. *albidus* (Emb. & Maire) A. Fernandes.

ssp. *Romieuxii* has a wider distribution, as it occurs in Great Atlas where ssp. *albidus* has not yet been found.

This distribution tends to show that ssp. *Romieuxii* is older than ssp. *albidus* and that the first subspecies originated the latter. Admitting that the colour of the flower depends only on a pair of factors we can suppose that *N. Romieuxii,* having a Bbbb constitution, might have originated male and female Bb gametes which would have produced BBbb plants with whitish-yellow flowers. These plants might have produced others with a BBBb constitution which would correspond to var. *zaianicus* where the flowers have a very slight greenish-yellow shade.

SUMMARY

Having studied from the karyological point of view the taxa known as *Narcissus Bulbocodium* ssp. *Romieuxii, N. Bulbocodium* ssp. *albidus* var. *zaianicus* and *N. Bulbocodium* var. *zaianicus* forma *lutescens,* we have numbered 30 chromosomes in the root-tips of the first and third and 28 in those of the second. We found that two of the chromosomes appearing in forms with $2n = 30$ are supranumerary heterochromatinosomes (B chromosomes) which are maintained in the populations owing to the fact that they have a normal mitosis and their propagation can be effected by pollen and ovules. Leaving aside these chromosomes which, given their heterochromatic nature, do not influence, or if they do so, to a very small extent, the morphology of the plants, we note that the complements of these taxa are similar and can be represented by a formula corresponding precisely to the sum of the diploid complements of *N. Bulbocodium* L. and *N. cantabricus* DC. Therefore, we are led to conclude that taxa *Romieuxii* and *albidus* are amphidiploids (allotetraploids) of these two species. Considering that there exist in Morocco tetraploid forms of *N. Bulbocodium* L. and of *N. cantabricus* DC, it is most likely that the amphidiploid may have resulted from a cross of diploid gametes produced by those tetraploids.

The characters of the external morphology shows that: 1) *N. Romieuxii* is an intermediary form between *N. Bulbocodium* and *N. cantabricus* as regards the colour of the flower! 2) According still to the same character, taxon *albidus* is nearer to *N. cantabricus,* having, however, a yellowish shade ; 3) Both taxa have 3-5 leaves per bulb and this number can be considered intermediary between *N. Bulbocodium* and *N. cantabricus.* This being so, we see that the characteristics of the external morphology are not opposed to our suggestion that taxa *Romieuxii* and *albidus* are amphidiploids of the species from which they show intermediary characters. The geographical distribution, showing that the areas of *N. Bulbo-*

codium and *N. cantabricus* overlap, also agrees with our conclusion.

As these amphidiploids possess intermediary characters among the parents besides other different ones as well, and as they are also stable and fertile due to their balanced chromosome constitution, our opinion is that taxa *Romieuxii* and *albidus* should be joined in a distinct species which should be called *N. Romieuxii* Br.-Bl. & Maire. As regards the origin of these two taxa we can assume that: 1) *Romieuxii* first became differentiated and then originated *albidus;* 2) *albidus* first became differentiated originating afterwards *Romieuxii*; 3) both taxa originated independently.

Admitting that the colour of the flowers depends only on the action of two genes (B, dominant, for the white colour, and b, recessive, for yellow), *Romieuxii,* with a Bbbb constitution, must have resulted from a cross between a heterozygous form of *N. cantabricus* and a homozygous form of *N. Bulbocodium;albidus,* with a BBbb constitution, could have originated from a cross between two homozygotes. Therefore, it seems that the two taxa must have had an independent origin. The fact, however, that their area is superposed to some extent does not favour that assumption.

The area of *Romieuxii* is much wider than that of *albidus,* considering that it occurs in the Great Atlas where the latter has not yet been found. This seems to show that *Romieuxii* is the older of the two and that therefore it must have first become differentiated and afterwards have originated *albidus.* The differentiation of *albidus* could have resulted from the segregation only of individuals of *Romieuxii* with the genetic constitution Bbbb as regards the colour of the flower, as these could first have originated BBbb plants with lighter yellow flowers and these could have originated others, BBBb, with almost white flowers.

Finally, we include the keys towards the identification of the infraspecific taxa distinguishable in *N. Romieuxii* Br.-Bl. & Maire as well as their nomenclatural history.

AS PLANTAS PORTUGUESAS DA SECÇÃO *ACINOS* (MOENCH) BRIQUET DO GÉNERO *SATUREJA* L.

por

ROSETTE FERNANDES
Instituto Botânico da Universidade de Coimbra

NTA «Lista das espécies representadas no Herbário Português» (pág. 119, 1913), em nota, SAMPAIO afirma que *Satureja alpina* (L.) Scheele se não encontra no nosso país e que as plantas que COUTINHO referiu a esta espécie se devem atribuir a *Clinopodium Arinos* [*Satureja Arinos* (L.) Scheele]. Segundo o mesmo autor, não existiriam também em Portugal nem a var. *granatensis* (Boiss. et Reut.) Briquet, nem a var. *patavina* (Jacq.) Briquet (1), igualmente citadas por COUTINHO.

Com o fim de esclarecermos a que *taxon* ou *taxa* pertencem as plantas da secção *Arinos* do género *Satureja* que se encontram em Portugal, reunimos todos os materiais que considerámos necessários. Os herbários consultados pertencem às seguintes Instituições :

Instituto Botânico da Universidade de Coimbra
Instituto Botânico da Universidade de Lisboa
Instituto Botânico da Universidade do Porto
Instituto Superior de Agronomia, Lisboa
Estação Agronómica Nacional, Sacavém
Conservatoire Botanique de Genève (Herbários de BOISSIER e de DELESSERT)

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(1) COUTINHO considera PERSOON como o autor do basónimo desta variedade, quando a verdade é que *Thymus patavinus* Jacq. foi publicado anteriormente (Obs. Bot. IV: 7, t. 87, 1771) a *Acinos patavinus* Pers. (Syn. Pl. II: 131, 1807).

Muséum d'Histoire Naturelle de Paris
Instituto Botânico António José Cavanilles, Madrid
Institut Scientifique Chérifien, Rabat (¹)

Dividimos o nosso estudo em duas partes: na primeira, analisamos as descrições e os caracteres fundamentais dos *taxa* atrás mencionados, bem como os de alguns outros que têm sido descritos posteriormente e que com aqueles se encontram relacionados, procurando, sempre que possível em face do exame dos tipos ou de outros exemplares dos locais clássicos, estabelecer as suas posições e afinidades; na segunda, fazemos a crítica às opiniões de SAMPAIO e de COUTINHO no que respeita às plantas portuguesas, com o fim de chegarmos à sua correcta identificacão.

ANÁLISE DOS TAXA

I) *Satureja Acinos* (L.) Scheele, descrita por LINEU sub *Thymus Acinos* (Sp. Pl. II: 591, 1753), é uma planta herbácea, anual, com numerosos caules suberectos, com flores não ultrapassando as folhas florais, de cálices relativamente pequenos, muito gibosos na base e na face anterior, prolongados acima da giba em tubo curto e bruscamente ampliado e com os dentes do lábio superior curtos, ligados entre si em linha quase recta, e corolas com cerca do dobro do cálice (fig. 1 c-$c_1$$d$-$d_1$).

II) *S. alpina* (L.) Scheele (*Thymus alpinus* L. *loc. cit.*) distingue-se fàcilmente de *S. Acinos* por ser vivaz, com cepa lenhosa de onde emergem caules débeis, flexuosos, prostrados e por vezes radicantes, e por possuir flores muito maiores, que ultrapassam as folhas florais e cujos cálices, menos pronunciadamente bojudos, se alongam em tubo relativamente mais comprido e direito, com os dentes do lábio superior linear-lanceolados, separados por sinus em V mais ou menos aberto (fig. 1 a-a_1, b-b_1).

III) *S. patavina* (Jacq.) Deg. s. str. foi descrita por JACQUIN (*loc. cit.*, sub *Thymus patavinus*), sobre plantas que obteve

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(¹) Aos Directores das Instituições que amàvelmente nos emprestaram os espécimes que nos permitiram efectuar o presente trabalho, deixamos aqui expresso o nosso profundo reconhecimento.

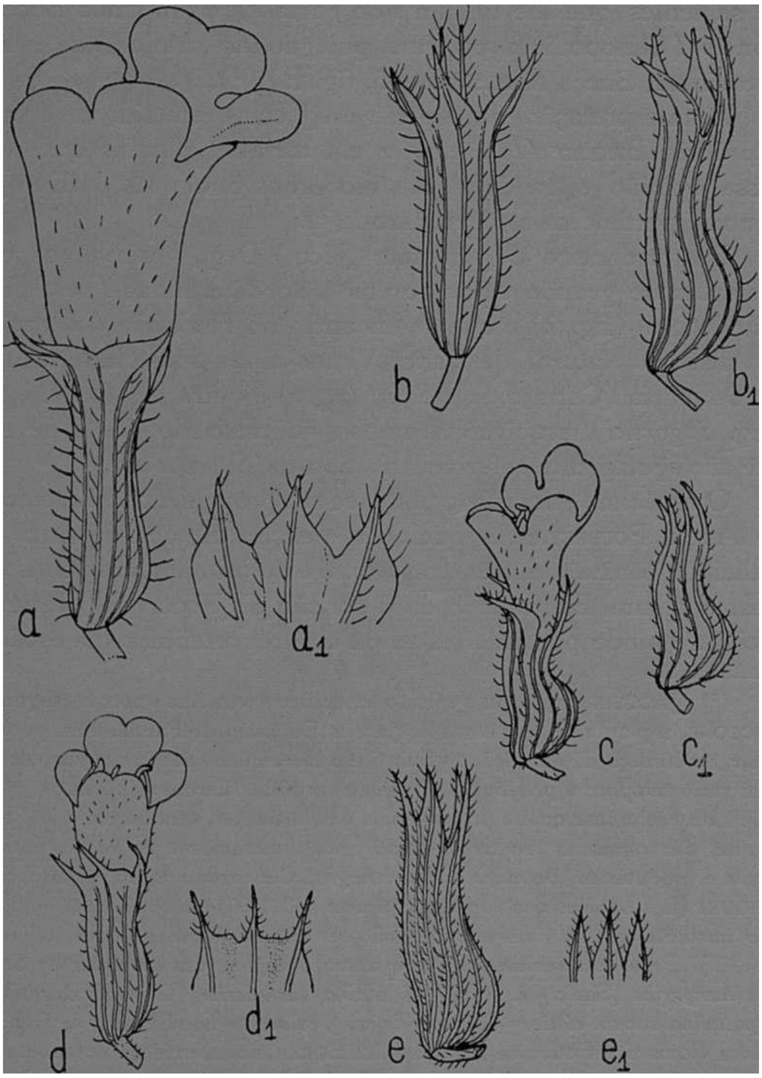

Fig. 1. — *a*, Flor de *Satureja alpina* (L.) Scheele; a_1, dentes do lábio superior do cálice separados por sinus em V; b-b_1, cálices de *S. alpina* (L.) Scheele vistos, respectivamente, pela face superior e de perfil; *c*, flor de *S. Acinos* (L.) Scheele vista de perfil; c_1, cálice após a queda da corola, visto de perfil; *d*, flor de *S. Acinos* (L.) Scheele, vista pela face superior; d_1, lábio superior do cálice com os dentes separados por sinus retusos; e, cálice de *S. patavina* (Jacq.) Deg. (exemplar do Museu de Paris, determinado por JACQUIN), com o lábio superior do cálice (e_1) de dentes separados por sinus em V muito agudo. X 5.

de sementes que lhe tinham sido enviadas « sub titulo Bocconiano » (Clinopodium perenne, pulegiiodore, Majoranae folio, Patavinum, Bocc, Mus.: tab. 45, fig. B)

A interpretação da espécie de JACQUIN tem sido diversa e o próprio BRIQUET *(loc. cit.)* a ela atribuiu plantas que, em nossa opinião e na de alguns modernos botânicos da Europa Central, pertencem a outro taxon (2).

Da verdadeira *S. patavina* (Jacq.) Deg., observámos um exemplar de grande valor por ter sido determinado pelo próprio JACQUIN (fig. 2) e que se encontra no Herbário do Museu de História Natural de Paris. Vimos ainda duas plantas, uma da Dalmácia (Cattaro, leg. *Saint Lager)* e outra de Montenegro (leg. *Sagorski),* arquivadas ambas no Herbário de Genève e que são igualmente referíveis ao tipo de *S. patavina.*

O espécime etiquetado por JACQUIN (proveniente da colecção do ABADE POURRET, sem qualquer menção de local ou data de colheita) consta de três fragmentos verosìmilmente todos da mesma planta. Em virtude da descrição de JACQUIN ser bastante sucinta e ainda porque a estampa que representa a sua espécie

(1) JACQUIN empregou o epíteto específico « patavina » porque, segundo BOCCONE, a planta era cultivada no Jardim Botânico de Pádua. Fez, porém, notar, no começo da descrição: « Sub titulo Bocconiano semina hujus plantae mihi vario tempore a pluribus Botanicis transmissa fuerunt ». Torna-se, pois, difícil de esclarecer qual a proveniência das sementes, sendo admissível que alguma das remessas lhe tivesse sido feita directamente da região onde a planta é espontânea (Dalmácia e Montenegro). Concordamos, no entanto, com BRIQUET (Les Labiées des Alpes Maritimes: 453, 1891) em considerar o adjectivo bastante infeliz, visto a planta não ser natural daquela cidade italiana.

(2) Para esclarecimento deste assunto veja-se um exemplar de *Satureja hungarica* (Simk.) s. str. [= 5. *alpina* var. *elatior* (Griseb.) Briquet = *S. patavina* subsp. *elatior* (Griseb.) Borza], existente no Herbário de Genève (Flora Romaniae Exsiccata), no qual AL. BORZA, numa extensa nota, estabelece as diferenças entre *S. hungarica* (Simk.) e o tipo de *S. patavina* (Jacq.) Deg. Tivemos ocasião de observar numerosos exemplares da primeira espécie provenientes da Europa Central e Oriental (Jugoslávia, Hungria, Bulgária, Roménia, Grécia) e verificámos que, pelo conjunto dos seus caracteres (folhas suborbiculares com os dentes da margem muito marcados, densamente revestidas nas duas páginas por pêlos capitado-glandulosos curtíssimos; e cálices com revestimento idêntico), não é possível incluí-los em *S. patavina* (Jacq.) Deg. Os espécimes de Banat, Transilvânia e Turquia europeia referidos por BRIQUET a *S. alpina* var. *patavina* não pertencem, pois, a este último taxon, mas a *S. hungarica.*

Fig. 2. — **Espécime** de *Satureja patavina* (Jacq.) Deg., existente no Herb do Museu de Paris e determinado por JACQUIN.

é pouco perfeita, faltando-lhe pormenores, achamos conveniente dar aqui uma descrição minuciosa deste espécime:

Caules lenhosos na base e relativamente espessos, esbranquiçados, muito ramificados, vilosos; folhas dos eixos principais suborbiculares (até 1,7×1,6 cm), pouco acunheadas na base e com pecíolo curto (2-3 mm), as dos ramos obovado-elípticas, mais acunheadas e agudas, as florais superiores ovado-lanceoladas ou lanceoladas, muito acunheadas e ainda mais agudas, todas ténues (o que resultaria de se tratar possìvelmente de planta cultivada), inteiras nos dois terços inferiores e só muito ligeiramente dentadas para cima, vilosas sobretudo na margem e nas nervuras, desprovidas de pêlos curtos capitado-glandulosos; verticilastros 5-10, bastante aproximados; flores menores ou iguais à folha floral; cálices com ca. de 8 mm, erectos ou patentes, gibosos na face anterior, com o tubo pouco arqueado acima da giba, pouco contraídos sob a fauce, com as nervuras bem marcadas, cobertas de sedas brancas, curvo-ascendentes, com ca. de 0,5 mm, mais espessas na base; dentes do lábio superior igualando os do inferior, lanceolados, separados por sinus agudos em V; secreções alaranjadas abundantes no cálice, que é coberto de pêlos capitado-glandulosos os quais existem também nos pedicelos; corolas medíocres, densamente pubescentes, quase lanosas exteriormente.

As afinidades de *S. patavina* (Jacq.) Deg. com *S. hungarica* (Simk.) são de tal modo grandes que tem sido confundida com ela. No entanto, a primeira separa-se da segunda pelo menor comprimento do pecíolo, pela forma e dentes da margem das folhas, pela ausência nestas do denso revestimento de pêlos capitado-glandulosos (cf. nota da pág. 122). Assemelha-se também a *S. alpina* (L.) Scheele pela forma do cálice (confrontar a fig. 1 a-a_1, b-b_1 com fig. 1 e-e_1), afastando-se dela por alguns caracteres, entre os quais há a salientar o porte erecto e a maior robustez.

IV) BOISSIER e REUTER, no Pugillus (pág. 94, 1892), descrevem *Calamintha granatensis* como « perennis multiceps, caulibus brevibus infernè prostratis vel ascendentibus... » etc., aproximando-a, pelo conjunto dos seus caracteres, de *Calamintha Acinos* (L.) Clairv., da qual diferiria, principalmente, pelas corolas maiores e por ser vivaz e não anual. Anteriormente (Voy. Bot. Midi d'Espagne: 497, 1839-45), porém, as plantas que serviram àqueles autores para estabelecer a sua espécie foram consideradas por BOISSIER como pertencendo a *Satureja alpina* (L.) Scheele [sub *Melissa alpina* (L.) Benth.]. Esses espécimes mereceram, no entanto, uma nota crítica do grande botânico suíço, na qual indicava os caracteres que os distinguiam dos indivíduos de *S. alpina* de outras regiões da Europa: « Ma plante a les tiges plus couchées et les feuilles et les fleurs un peu plus petites que celle des Alpes et du Jura, ce qui tient à la plus grande sécheresse du sol ».

Vê-se, assim, que, logo de início, BOISSIER reconheceu afinidades entre *Calamintha granatensis*, por um lado com *Satureja Acinos*, por outro com *S. alpina*, com a qual primeiramente a confundira.

WILLKOMM e LANGE (Prodr. II: 415, 1870) mantêm *Calamintha granatensis* como espécie independente, que consideram próxima de *Satureja Acinos* (« Species C. Acino magis affinis... »). No « Supplementum » ao « Prodromus » (pág. 148, 1893) passam a incluir a espécie de BOISSIER e REUTER em *Satureja Acinos*.

BRIQUET (*loc. cit.*: 450) dá a *Calamintha granatensis* a categoria de variedade, colocando-a, juntamente com outras variedades, dentro de *Satureja alpina* (L.) Scheele.

PAU (Bol. Soc. Arag. Cienc. Nat. XV: 170, 1916) admite igualmente a var. *granatensis* que introduz, porém, em *S. Acinos*. Um ano mais tarde (*loc. cit.* XVI: 61, 1917) apresenta a seguinte sinonímia (¹), pela qual se verifica que *Calamintha granatensis* Boiss. et Reut. foi interpretada pelo botânico espanhol diferentemente de BRIQUET:

> *Satureja Acinos* (L.) Scheele var. *purpurascens* (Pers.) Pau = *Acinos purpurascens* (Pers.) Pau = *Calamintha granatensis* Boiss. et Reut. = *C. alpina* β *erecta* Lange = *S. alpina* var. *viridis* Briquet.
>
> *Satureja alpina* (L.) Scheele var. *rotundifolia* (Pers.) Pau = *Acinos rotundifolius* Pers.? = *S. alpina* var. *granatensis* Briquet non *Calamintha granatensis* Boiss. et Reut.

(¹) A sinonímia de PAU será discutida mais adiante, após termos tratado da var. *erecta* Lange.

Finalmente, MAIRE (Cat. Pl. Maroc, III: 648, 1934) introduz *Calamintha granatensis,* como subespécie, em *Satureja alpina,* reconhecendo, como referiremos adiante, diversas variedades nessa subespécie.

Como vimos, BOISSIER e REUTER, para descreverem a sua espécie, serviram-se de indivíduos de caules curtos (fig. 3), colhidos em pontos elevados das montanhas do sul da Espanha (« Hab. in regione alpinâ montium Granatensium *Sierra de la Nieve, Sierra Tejeda* propè *Grazalema* »), a uma altitude de 1500 a 2000 m. Como caracteres importantes que permitiriam separar *Calamintha granatensis* de *Satureja alpina* referem (Pugillus, *loc. cit.)* o aroma diverso (semelhante ao de *Mentha Pulegium* L.), o cálice mais giboso, com os pêlos das nervuras curtos e aduncos e a forma dos dentes do lábio superior do cálice, separados por uma margem quase rectilínea (¹).

O exame dos tipos permitiu-nos verificar a exactidão das observações de BOISSIER, notando, todavia, que nalguns exemplares (Sierra de la Nieve, leg. *Reuter),* os caules são relativamente elevados, atingindo 25 cm de altura.

A intensificação das herborizações veio mostrar que a planta não se confinava às montanhas de Granada, mas que a sua área abrangia outras regiões de Espanha e também a Itália, Sardenha, Sicília (cf. WILLKOMM et LANGE, Suppl. Prodr., *loc. cit.),* Alpes Marítimos, Grécia, Turquia, Ásia Menor e Norte de África (cf. BRIQUET, *loc. cit.).* Nestas condições, era de esperar que a espécie, conhecida primeiramente apenas pelo reduzido número de exemplares do Herbário de BOISSIER, fosse ampliada no seu primitivo conceito, em virtude de os caracteres

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(¹) Uma nota da autoria de BOISSIER, que acompanha os espécimes da Sierra Tejeda (Herb. de BOISSIER), é do teor seguinte: « diffère de *C. alpina* par fl. pl. courtement pédonculées les calyces pl. gibbeux plus resserrés à la gorge munis de poils plus courbés *aduncil* les dents de la lèvre supérieure plus courtes et plus raides (*) l'inférieure à cils plus (ilegível) et plus serrées enfin à la corolle de moitié plus petite et couverte d'une pubescence plus serrée et plus courte — les feuilles moins larges et moins évidemment dentées — toute la plante a une odeur bien plus forte ressemblant à celle de Mentha Pulegium.

(*) « séparées entre elles par un bord large et tronqué qui se replie en dedans après l'anthèse et contribue à fermer plus exactement le calyce ».

apresentarem certa variabilidade. E assim que BRIQUET inclui na var. *granatensis* não apenas os indivíduos pequenos, de caules prostrados e fracos, mas outros de caules mais robustos e longos (até 40 cm), afirmando ainda que a planta varia no que respeita à maior ou menor curvatura dos pêlos calicinais, ao comprimento da corola e a outros caracteres («Tous les autres caractères indiqués par Boissier et Reuter sont sans valeur et se retrouvent chez la subsp. *alpina* — cf. BRIQUET, *loc. cit.:* 451).

A consulta dos Herbários de WILLKOMM, de BOISSIER e de DELESSERT levou-nos a verificar que as afirmações de BRIQUET são, em parte, correctas.

Assim, tanto da Sierra Tejeda como da Sierra de Guadarrama (1), existem, identificados como *Calamintha granatensis*, alguns indivíduos que correspondem ao tipo de BOISSIER e REUTER e outros, bastante mais elevados e robustos, não prostrados mas ascendentes ou suberectos, que só diferem daqueles pelo porte.

Do mesmo modo, as dimensões das flores variam dentro de certos limites, notando-se, de uma maneira geral, que nas plantas colhidas nos pontos mais elevados das montanhas elas são menores, operando-se também redução no tamanho das folhas (2).

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(1) Exemplares da Sierra Tejeda: leg. *Boissier* — Herb. BOISSIER — comprimento dos caules 15 cm; leg. *Modesto Laza* — Herb. Madrid — caules também curtos; leg. *E. Gros?* — Herb. Madrid — fragmento de um caule com 28 cm; etc.

Exemplares da Sierra de Guadarrama: leg. *Boissier?* — Herb. BOISSIER — caules de 12 cm; leg. *Sennen*, Navacerrada — Herb. DELESSERT — caules atingindo 50 cm de altura.

(2) Flores pequenas existem, por exemplo, no espécime do Marrocos Espanhol (in collibus arenaceis juxta collem Tizzi Iffni, Atl. Rhiphae 1800 m, leg. *Font Quer*). Mais pequenas são ainda as flores das plantas do Etna. Essas plantas foram consideradas por STROBL como constituindo espécie distinta, *Calamintha aetnensis* (in Oesterr. Bot. Zeitschr. XXIV: 29, 1874), que foi incluída por BRIQUET na sinonímia da sua var. *granatensis*. PAU *(loc. cit.:* 169), que concorda com este parecer (var. *granatensis* Briquet = *Calamintha aetnensis* Strobl), não admite a identidade desse *taxon* com *Calamintha granatensis* Boiss. et Reut. Tivemos ocasião de estudar um exemplar de *C. aetnensis* e de concluir que, pelos seus caracteres, ela se deve incluir em *C. granatensis* Boiss. et Reut., contràriamente, portanto, à opinião de PAU.

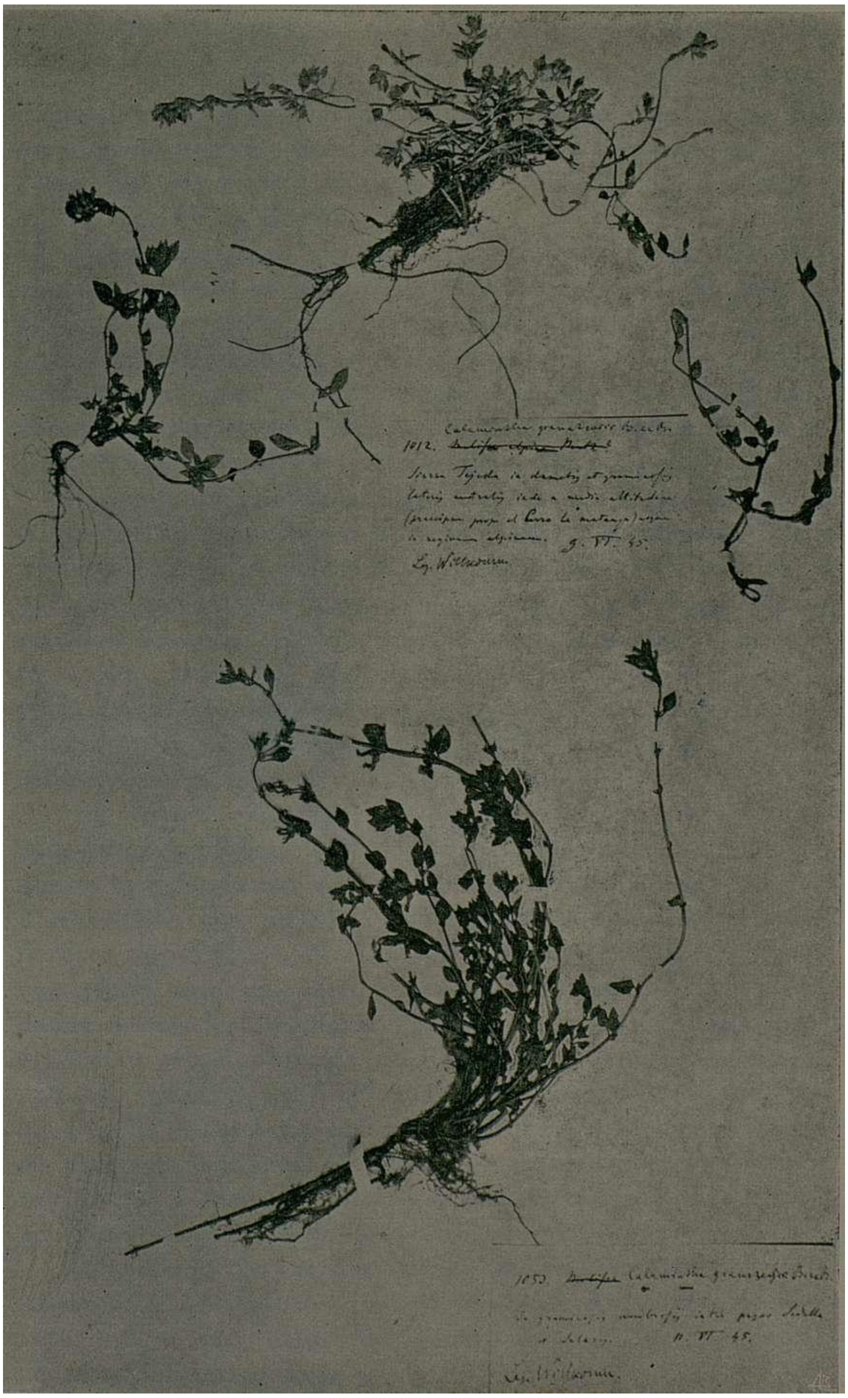

Fig. **3.** — Exemplares de *Satureja granatensis* (Boiss. et Reut.) R. Fernandes, existentes no Herbário de WILLKOMM, o primeiro colhido na Sierra Tejeda (local clássico). Notar as pequenas dimensões das plantas.

O comprimento e a curvatura dos pêlos calicinais não são também constantes, visto termos encontrado exemplares que os possuem bastante mais compridos que no tipo e não aduncos (Jaen, leg. *Blanco* 191, Herb. BOISSIER; Algérie, leg. *Reverchon*, alt. 1900 m, Herb. DELESSERT; etc.).

Há, no entanto, alguns caracteres que se mantêm fixos ou quase e que são as proporções relativas da giba e do colo do cálice, as suas curvaturas e principalmente a maneira como se ligam entre si os dentes do lábio superior. Esta última disposição, para a qual BOISSIER chamara a atenção e que BRIQUET parece ter desprezado, separa nitidamente *Calamintha granatensis* Boiss. et Reut. de *Satureja alpina* (L.) Scheele.

Calamintha granatensis situa-se entre *Satureja Acinos* e *S. alpina*: as dimensões das flores (cálice e corola) são intermediárias entre as destas duas últimas espécies; pela maior duração aproxima-se mais de *S. alpina*, pela forma do lábio superior do cálice está mais próxima de *S. Acinos* (comparar fig. 1 a-a_1, b-b_1, c-c_1, d-d_1 com fig. 4 a-a_1, b-b_1, c-c_1); pelo porte, os exemplares pequenos, de caules prostrados, são semelhantes a *S. alpina*, mas os de caules ascendentes e mais robustos assemelham-se a *S. Acinos*.

Em virtude da semelhança da espécie de BOISSIER e REUTER com *Satureja alpina* e com *S. Acinos*, PAU emitiu a opinião de que se trataria de um híbrido (Bol. Soc. Arag. Cienc. Nat. XI, 2: 41, 1912). Um híbrido entre essas duas espécies é referido para os Alpes (HEGI, Ill. Fl. Mittel Eur. V, 4: 2301, 1927) sem que tenha sido assimilado com *S. granatensis*. Além disso, dadas as suas fertilidade, estabilidade e larga distribuição geográfica, a origem híbrida de *Calamintha granatensis* só se poderia explicar por anfidiploidia. Como nos meristemas radiculares de C. *granatensis*, obtidos a partir de sementes oriundas de Marrocos, contámos 18 cromossomas, verifica-se que a hipótese de PAU se não confirma, pois que um dos presumíveis progenitores — *Satureja alpina* — possui também o mesmo número.

Atendendo às razões atrás expostas, concluímos que *Calamintha granatensis* deve ser considerada como espécie autónoma, a qual, dentro do género *Satureja*, será designada por *S. granatensis* (Boiss. et Reut.) R. Fernandes.

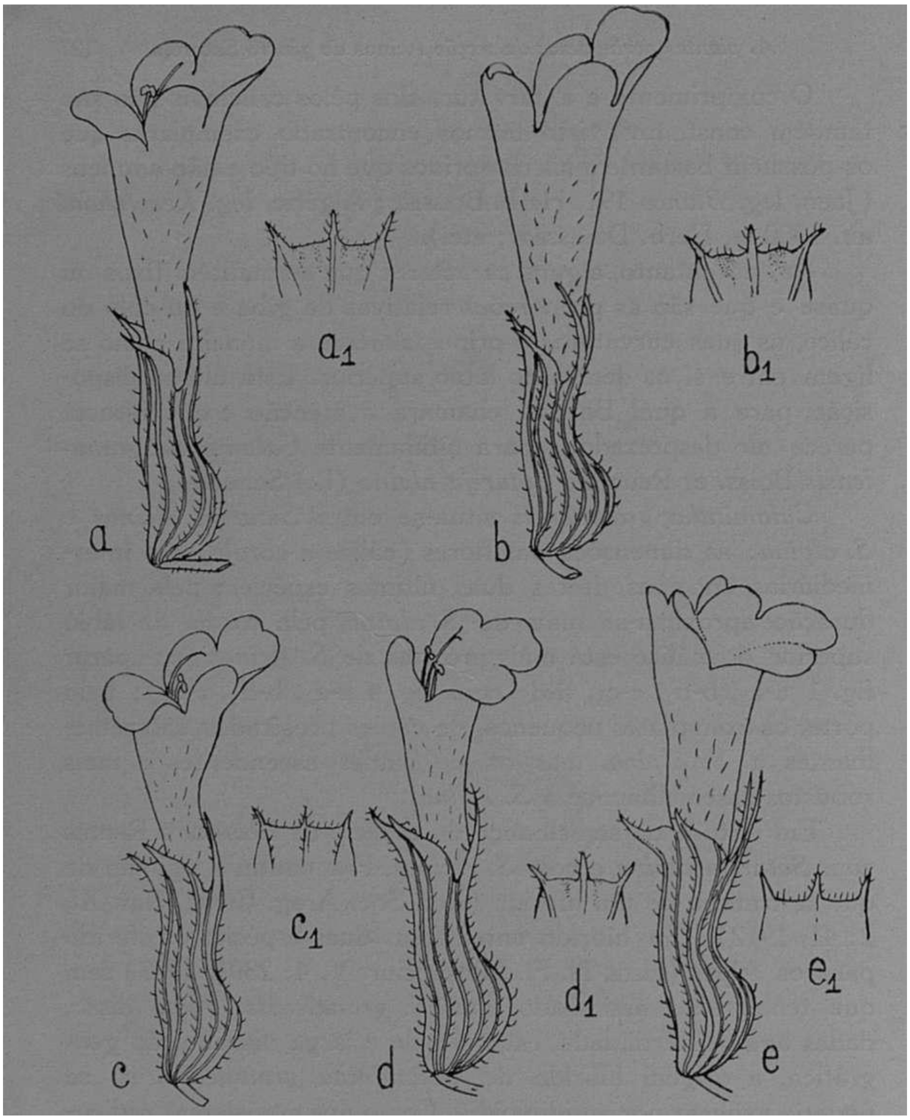

Fig. 4. — *a,* Flor de *Satureja granatensis* (Boiss. et Reut.) R. Fernandes (leg. *Reverchon* pr. Grazalema, loc. cláss.); a_1, lábio superior do cálice com os dentes separados por sinus retusos; *b,* idem (leg. *Willkomm,* Sierra Tejeda); b_1, lábio superior do cálice; c, idem (Sierra Nevada, ad pagum Quejar); c_1, lábio superior do cálice; *d,* flor de *S. granatensis* (Boiss. et Reut.) forma *erecta* (Lange) R. Fernandes (leg. *Winckler,* Sierra Nevada, Quejar) e o pormenor do lábio superior do cálice (d_1); *e,* flor de *S. granatensis* (Boiss. et Reut.) forma *erecta* (Lange) R. Fernandes do local clássico (El Escorial); e_1, lábio superior do cálice. Comparar d-d_1 e e-e_1 com a-a_1, b-b_1 e c-c_1 e notar que são idênticos a forma do cálice, o tamanho deste, a forma dos dentes do lábio superior do cálice e a maneira como se ligam entre si. Comparar também com os cálices das plantas portuguesas representadas na fig. 9. X 5.

V) LANGE (Pugillus: 176, 1863), estudando plantas dos arredores de Madrid, estabelece a var. *erecta* de *Satureja alpina* (sub *Calamintha alpina),* que separa do tipo pelo porte mais elevado, pelos caules erectos e pelas folhas ovado-elípticas glabrescentes. Apresenta como sinónimo provável desta variedade *Calamintha patavina* (Jacq.).

WILLKOMM e LANGE (Prodr., *loc. cit.:* 415) mantêm a var. *erecta* dentro de *S. alpina.*

BRIQUET *(loc. cit.:* 453), baseando-se nas descrições e não em espécimes por ele observados, considera a variedade de LANGE também como possível sinónimo da var. *patavina* (Jacq.) Briquet de *S. alpina.*

PAU *(loc. cit.)* passa a var. *erecta* Lange para a sinonímia da var. *purpurascens* (Pers.) Pau (= *Calamintha granatensis* sensu Pau).

MAIRE *(loc. cit.)* coloca a var. *erecta* Lange na subsp. *granatensis* Maire de *S. alpina.*

O estudo dos exemplares da var. *erecta* Lange do Herbário de WILLKOMM, bem como o de um espécime do Herbário de Madrid do local clássico (El Escoriai, leg. *J. D. Rodriguez)* mostrou-nos que se não podem estabelecer diferenças entre eles e *Satureja granatensis* no que respeita aos caracteres das folhas e das flores. Com efeito, a forma e as dimensões dos cálices, assim como os pêlos que os revestem, são semelhantes nesses dois *taxa,* não havendo também distinções sensíveis quanto ao tamanho e à forma da corola (comp. fig. 4 a-a_1, b-b_1, c-c_1 com fig. 4 d-d_1 e com fig. 9 e-e_1). A forma e dimensões das folhas e o comprimento do pecíolo sofrem igualmente oscilações semelhantes.

A distinção entre a var. *erecta* Lange de *Satureja alpina* e *S. granatensis* só poderá basear-se na diferença de porte. No entanto, mesmo este carácter deixa de ter um valor absoluto devido à existência de indivíduos cuja inclusão num ou noutro *taxon* tem sido perfeitamente arbitrária, o que se justifica pela dificuldade em estabelecer a partir de que ponto se pode deixar de considerar um caule como prostrado-ascendente, havendo as mesmas dúvidas para saber se, no campo, um determinado espécime de herbário possuia caules ascendentes ou erectos (¹). Assim, além dos exemplares de caules mais ou menos elevados a que atrás nos referimos, identificados como *S. granatensis* e que se encontram em lugares onde tem sido coligido o tipo deste *taxon*, podemos ainda mencionar um espécime determinado por C. Vicioso como var. *erecta* Lange (El Escoriai, leg. *J. D. Rodriguez)*, que compreende dois indivíduos, um deles identificável como var. *erecta* e outro que, pelo reduzido tamanho dos seus caules prostrados, se deveria antes incluir em *S. granatensis.* Por outro lado, no Herbário de WILLKOMM encontra-se, identificado como *Calamintha granatensis,* um indivíduo da *Sierra Nevada* (pr. Quejar, leg. *Fritze* — fig. 5) idêntico, embora de dimensões um pouco menores, a outro do mesmo local, incluído por WILLKOMM na var. *erecta* (fig. 6). Por tudo isto, podemos afirmar que a var. *erecta* deve ser introduzida em *Satureja granatensis* (Boiss. et Reut.), concordando, assim, com a opinião de MAIRE.

Como dissemos, WILLKOMM e LANGE admitiam que a var. *erecta* poderia ser sinónimo de *Satureja patavina,* hipótese que foi adoptada por BRIQUET. Outros autores, porém, entre eles BÉGUINOT (in Fl. Anal. Ital. III: 63, 1903-1904) e HEGI *(loc. cit.),* põem em dúvida essa sinonímia. Com efeito, aparentemente, certos indivíduos, identificados como var. *erecta* (fig. 6) e mesmo alguns determinados por BRIQUET como var. *granatensis* (fig. 7), pela maior robustez e pelo porte ascendente ou suberecto dos caules, pela maior vilosidade destes e pelo maior comprimento das sedas do cálice, poderiam ser confundidos com a verdadeira *S. patavina* (fig. 2). No entanto, a forma das folhas caulinares, proporcionalmente mais largas nesta última e, sobretudo, o tamanho maior das flores e a forma diferente do lábio superior do cálice, não permitem que se faça a fusão de *S. patavina* com a var. *erecta* Lange. Trata-se, pois, de dois *taxa* distintos.

Essas formas robustas da var. *erecta* Lange são também bastante semelhantes, no aspecto geral, a alguns indivíduos de

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(¹) Os caules longos e ascendentes de certos indivíduos tomam, depois de montados, o falso aspecto de erectos, pela dificuldade que o colector tem em os acomodar nas folhas do papel de secagem, onde forçosamente a planta não pode ocupar a superfície sobre que se projectava no solo.

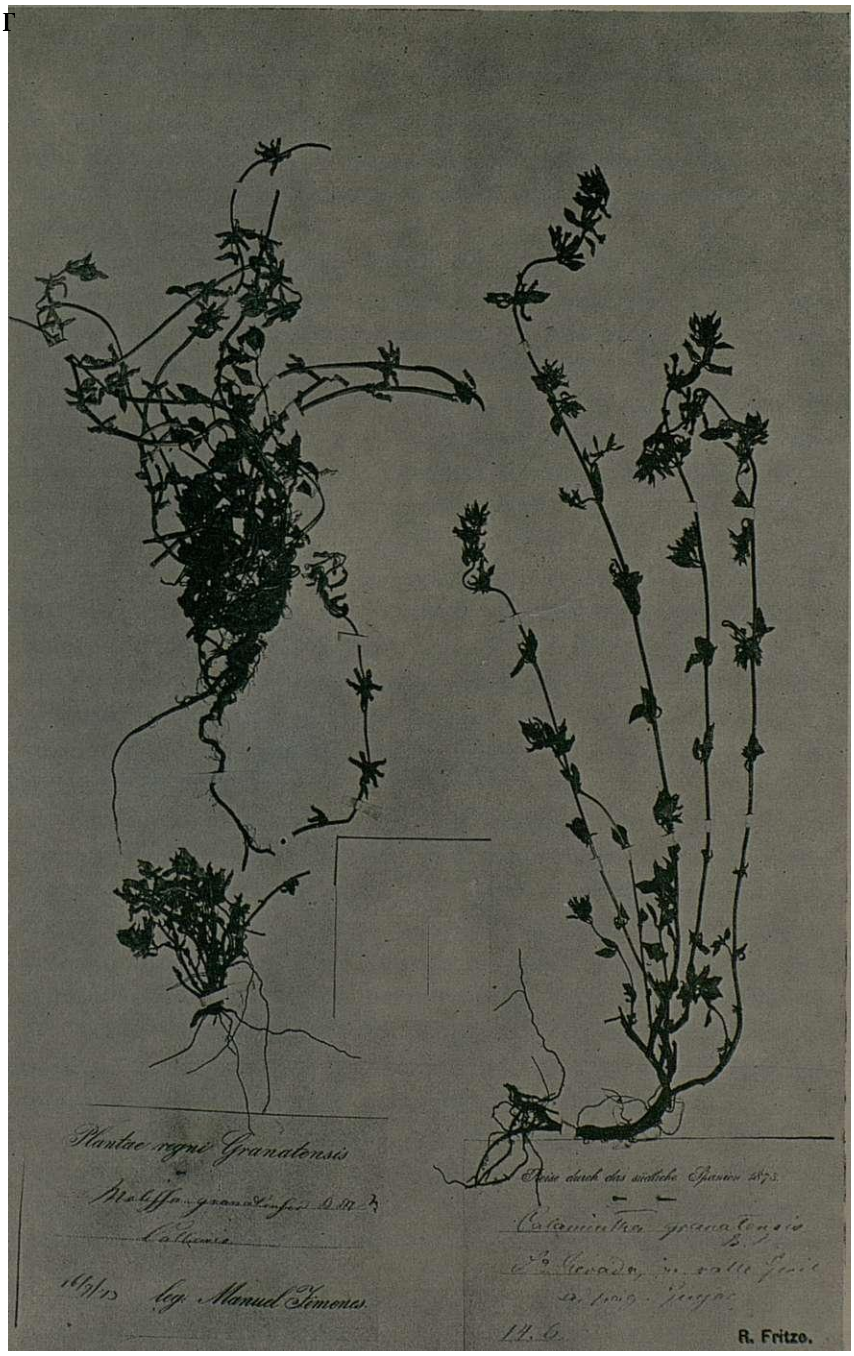

Fig. 5.— Exemplares de *Satureja granatensis* (Boiss. et Reut.) R. Fernandes existentes no Herbário de **WILLKOMM.** Os da esquerda apresentam o aspecto dos **espécimes-tipo**; o da direita possui caules mais alongados e ascendentes. Comparar este espécime, colhido em Quejar (cálice desenhado na fig. 4 c-c_1), com o da fig. 5, colhido no mesmo local, mas determinado por **WILLKOMM** como var. *erecta* (cálice desenhado na fig. 4 d-d_1).

S. hungarica, a qual, porém, se distingue daquelas pelas folhas suborbiculares, pelas maiores dimensões das flores e pelo revestimento denso e curtíssimo de pêlos capitado-glandulosos das folhas e cálices.

Quanto à sinonímia apresentada por PAU (ver pág. 124), temos a fazer algumas objecções. Supondo que, na verdade, *Acinos purpurascens* Pers. é idêntico a *Calamintha granatensis*, a combinação *Satureja Acinos* (L.) Scheele var. *purpurascens* (Pers.) Pau não é legítima, porquanto, na categoria de variedade, o epíteto mais antigo é o de LANGE (1860). Além disso, não podemos concordar que considere a var. *granatensis* Briquet diferente de *Calamintha granatensis* Boiss. et Reut., incluindo-a como sinónimo na var. *rotundifolia* (Pers.) Pau de *Satureja alpina* (¹). PAU não deve ter observado as plantas examinadas por BRIQUET. SÓ assim se explica que tenha apresentado semelhante opinião. BRIQUET, que teve à sua disposição não só o Herbário de BOISSIER mas várias outras colecções, pôde estudar a variabilidade das plantas de que nos estamos ocupando, variabilidade que justifica, como vimos, a amplitude que deu ao *taxon* de BOISSIER e REUTER.

Segundo BRIQUET, *Acinos rotundifolius* Pers. [= *Satureja rotundifolia* (Pers.)], de que vimos no Herbário de WILLKOMM alguns exemplares os quais não são considerados por PAU como o verdadeiro *Acinos rotundifolius* Pers., é uma planta anual muito diferente de *Satureja alpina*. Por outro lado, ainda segundo BRIQUET, *Acinos purpurascens* Pers. é uma variedade de *Acinos rotundifolius*. Só o exame dos tipos de PERSOON poderá esclarecer este problema, visto que as suas descrições, muito resumidas, não são suficientemente elucidativas.

No que se refere à var. *viridis* Briquet, que PAU introduz também na sinonímia da var. *purpurascens*, e que seria, portanto, idêntica a *S. granatensis* (Boiss. et Reut.), esclarecemos o seguinte: vimos no Herbário de Genève (Iter Thessalicum,

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(¹) A sinonímia de PAU é posta em dúvida por ele próprio, visto escrever (Bol. Soc. Arag. Cienc. Nat. XVI, 3: 61, 1917): «Quizás, consultando los tipos auténticos, se pudieran modificar nuestras teorias; pero de la *purpurascens* que debió herborizar mi paisano en Granada, no lo creemos probable; en la *rotundifolia* no se nos presenta con tanta claridad la resolución del problema».

leg. *Sintenis*) um exemplar, atribuído pelo próprio BRIQUET a essa variedade, o qual, pelas folhas estreitamente lanceoladas, muito acuminadas, e pelo cálice de dentes do lábio superior muito compridos, separados por sinus não retusos, não pode ser confundido com *S. granatensis* (ou com a var. *erecta* Lange). BRIQUET cita, efectivamente, um espécime de LANGE da var. *viridis*, colhido em Navacerrada. No Herbário de WILLKOMM encontra-se um exemplar herborizado por LANGE nesse local e que pertence ao tipo de *S. granatensis*. Por outro lado, também existem em Navacerrada indivíduos altos, atribuíveis à var. *erecta* Lange, conforme refere PAU (Bol. Soc. Arag. Cienc. Nat. XV: 169, 1916) e nós tivemos ocasião de verificar ao consultar o Herbário de DELESSERT. Portanto, das duas uma: ou a var. *viridis* se encontra em Navacerrada, ou ela aí não existe e BRIQUET se enganou ao incluir um espécime de LANGE nessa variedade. O que podemos afirmar é que a var. *viridis*, estabelecida sobre plantas gregas (Iter Thessal. — cf. BRIQUET, *loc. cit.* : 499) e da qual examinámos exemplares autênticos, não se pode identificar com *S. granatensis*. Por conseguinte, a sinonímia de PAU não é exacta no que se refere a esta variedade.

VI) CHABERT (Bull. Soc. Bot. Fr. XXXVIII: 388, 1891) descreve, sobre plantas argelinas, uma var. *erecta* de *Calamintha granatensis*, acerca da qual observa : « Elle constitue dans le type *granatensis* une variété parallèle au *C. alpina* var. *erecta* Lange, dont elle ne diffère que par la forme de la lèvre supérieure du calice». Julgamos, no entanto, que CHABERT não observou as plantas que os autores do «Prodromus Florae Hispanicae» referiram à var. *erecta* Lange, porquanto, se o tivesse feito, teria notado que os caracteres com que pretendeu distinguir a sua var. *erecta*, se encontram precisamente na var. *erecta* Lange. Supôs, segundo cremos, que, pelo facto de LANGE ter colocado a var. *erecta* na *Satureja alpina*, ela apresentaria cálices como os do tipo da espécie (1).

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(1) Pensamos que o facto de LANGE ter incluído a var. *erecta* em *S. alpina* resultou de ter identificado alguns espécimes de *S. granatensis* como *S. alpina (Calamintha alpina)*. Assim, um indivíduo por ele herborizado em Puerto de Navacerrada e citado no Pugillus como *Calamintha alpina* (L.) pertence a *Satureja granatensis*, como pudemos verificar ao estudarmos as plantas de *S. alpina* do Herbário de WILLKOMM. Não é

Fig. 6. — Exemplar de *Satureja granatensis* (Boiss. et Reut.) R. Fernandes forma *erecta* (Lange) R. Fernandes, existente no Herbário de WILLKOMM. Comparar com o espécime do lado direito da fig. 5.

MAIRE, que já anteriormente incluíra a var. *erecta* Lange na subsp. *granatensis,* dá mais tarde (Bull. Soc. Hist. Nat. Afr. Nord, XXIX: 444, 1938) à var. *erecta* Chabert o nome de var. *Chabertii.* Concluímos, porém, que esta não é morfològicamente distinta daquela e que, portanto, deve ser considerada como seu sinónimo.

Deverá a var. *erecta* Lange ser mantida ou assimilada ao *taxon granatensis?*

MAIRE, na subsp. *granatensis* de *S. alpina* (L.) Scheele, considera um número relativamente elevado de variedades: var. *erecta* (Lange) Maire e var. *Chabertii* (Chabert) Maire, ambas caracterizadas pelos caules erectos; var. *macrantha* (Lindb.) Maire (fig. 8); var. *parviflora* (Ball) Maire; var. *amplifoliata* (Pau) Maire; var. *subinodora* Maire; var. *kerstica* Maire et Weiller; var. *aurasiaca* Maire. Terão os caracteres sobre os quais estas variedades se basearam constância bastante? Não serão, pelo menos algumas delas, formas condicionadas pelo meio?

Do exame de numerosos espécimes de herbário, ficou-nos a convicção de que *S. granatensis* é uma planta extremamente polimorfa, variando pelo porte, desde plantas baixas e prostradas, até plantas elevadas com caules ascendentes ou erectos de 40-50 cm; pelas folhas, que podem ser de dimensões bastante reduzidas (fig. 3) em exemplares pouco desenvolvidos, até de limbo relativamente grande (fig. 8); pela vilosidade dos caules, que vai da pubescência até quase ao hirsutismo; pelos pêlos do cálice, tipicamente curtos, rígidos e gancheados, até mais ou menos longos e mais ou menos encurvados; pelo tamanho da corola; etc. (¹). As plantas baixas e prostradas, de folhas e flores menores, pubescência mais curta e coloração purpúrea, encontram-se, geralmente, nos sítios expostos e de

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pois, de admirar que tenha colocado a sua var. *erecta* na *S. alpina* com a qual confundiu exemplares de *S. granatensis* típicos.

(¹) A variação destes caracteres faz-se, muitas vezes, independentemente uns dos outros, de tal maneira que certos indivíduos que se poderiam atribuir por determinado carácter a uma variedade, por outro deveriam introduzir-se noutra. Por exemplo, a var. *aurasiaca é* descrita com pêlos calicinais compridos e caules difusos; mas nalguns exemplares, também com pêlos compridos nos cálices, os caules são ascendentes e mais alongados.

solo pobre dos pontos elevados das montanhas (« In glareosis regionis alpinae »). A espécie não se confina, no entanto, aos cumes, descendo pelas encostas até, possivelmente, um limite altitudinal. E, pois, natural que, em lugares de menor altitude, onde as condições climáticas são mais benignas, a planta cresça mais pujantemente. Por outro lado, mesmo em zonas altas, ou porque se lhe proporciona um solo mais rico ou porque, de qualquer modo, se encontre abrigada, ela pode desenvolver-se um pouco mais. Assim se poderia talvez explicar a coexistência, nos mesmos locais, de formas pequenas e de formas altas (¹). O facto de CHABERT *(loc.cit.)* afirmar que a sua var. *erecta* (= var. *Chabertii* Maire) não é mais do que uma variedade silvática de *Calamintha granatensis* confirma este nosso ponto de vista. È evidente que plantas vivendo no solo sombreado das florestas emitem os caules para cima em direcção à luz. Correlativamente, com melhor solo, mais humidade e menos luz, alongam-se os caules, espaçam-se os entrenós, a superfície foliar aumenta, as flores atingem o seu máximo (²).

Todavia, só explorações botânicas devidamente orientadas ou experiências culturais permitirão concluir até que ponto o *habitus* destas plantas está na dependência do meio ambiente. Por enquanto, resolvemos considerar a var. *erecta* Lange como forma de *S. granatensis,* a qual passará a ser designada por forma *erecta* (Lange) R. Fernandes.

Como resultado desta primeira parte do nosso estudo chegámos às seguintes conclusões :

1) *Calamintha granatensis* constitui uma espécie independente, de larga distribuição pelas montanhas da região medi-

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(¹) Veremos, ao estudar as plantas portuguesas, que esta nossa suposição tem o seu fundamento.

(²) E admissível ainda outra explicação: para certos espécimes não vem indicada a altitude do local da colheita e pode dar-se o caso de, precisamente, as plantas de maior porte existirem na encosta, abaixo do limite a partir do qual a vegetação é influenciada pelo clima alpino. Como, por vezes, se dá o mesmo nome a uma elevação desde a sua base até ao cume, assim se explicaria que da mesma montanha houvesse exemplares robustos e outros baixos, de características nìtidamente marcadas pela região alpina onde vivem.

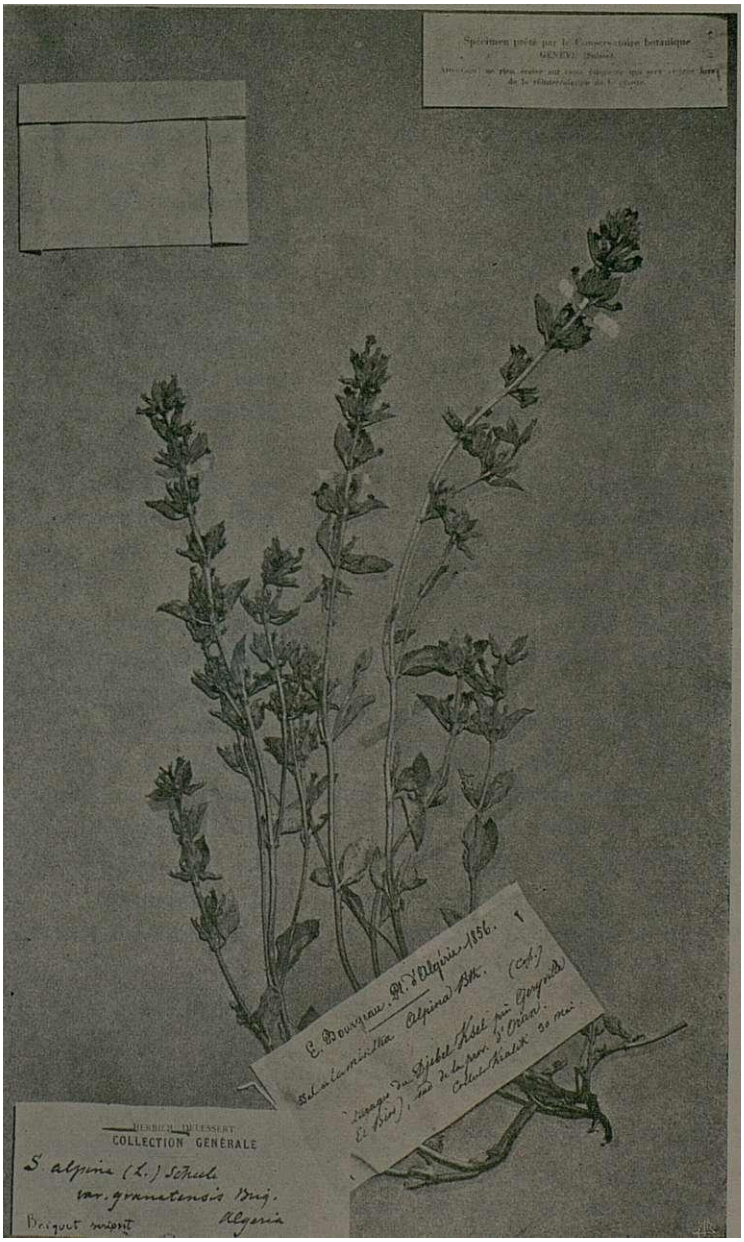

Fig. 7.— Exemplar de *Satureja granatensis* (Boiss. et Reut.)
R. Fernandes forma *erecta* (Lange) R. Fernandes
etiquetado por BRIQUET.

terrânica. Dentro do género *Satureja*, a combinação será *S. granatensis* (Boiss. et Reut.) R. Fernandes.

2) Não há motivo para se considerar a var. *erecta* Lange dentro de *S. alpina*; esse *taxon* deve ser incluído como forma em *S. granatensis*.

3) *Satureja patavina* (Jacq.) Deg. é distinta da var. *erecta* Lange e, portanto, de *S. granatensis*.

4) A var. *Chabertii* (Chabert) Maire (= var. *erecta* Chabert) não pode ser separada da var. *erecta* Lange e deverá, portanto, ser introduzida na sinonímia de *S. granatensis*.

5) A var. *viridis* Briquet de *S. alpina* é diferente da var. *erecta* Lange (e, portanto, de *S. granatensis*) e não idêntica, como pretende PAU.

6) A combinação de PAU, *S. Acinos* (L.) Scheele var. *purpurascens* (Pers.) Pau não é legítima, visto que, admitindo esse autor que a var. *erecta* Lange é sinónimo daquela, o epíteto mais antigo na categoria de variedade é o de LANGE. Além disso, não está provado que *Thymus purpurascens* se possa identificar com *S. granatensis*. Só o exame do tipo desse *taxon* poderá esclarecer este último ponto.

7) A var. *granatensis* Briquet é, em nossa opinião, sinónimo de *Calamintha granatensis* Boiss. et Reut. e não um *taxon* distinto, idêntico a *Thymus rotundifolius* Pers., como pretende PAU.

8) Consideramos de pouco valor sistemático o comprimento dos pêlos dos caules, das folhas e das nervuras dos cálices, as dimensões das folhas, o tamanho do cálice e da corola, em cuja variação tem sido baseada a criação de grande número de variedades, algumas das quais devem constituir apenas formas condicionadas pelo meio.

ESTUDO DAS PLANTAS PORTUGUESAS

COUTINHO, no estudo das Labiadas (Bol. Soc. Brot. sér. 1, XXIII: 102, 1907), atribui a maior parte do material português da secção *Acinos* do género *Satureja* à var. *granatensis* (Boiss. et Reut.) Briquet, determinando apenas os espécimes n.° 1656, colhidos por MOLLER na Serra de Rebordãos, como var. *patavina* Briquet. Desde já, a primeira afirmação de SAMPAIO (ver pág. 119) deixa de ter fundamento, pois que COUTINHO não considerou nenhum espécime português como pertencente ao tipo de *S. alpina* (L.) Scheele.

O confronto entre as plantas portuguesas e espécimes de *S. Acinos* (L.) Scheele mostrou-nos, por outro lado, que aquelas se não podem incluir no último *taxon*. Com efeito, as nossas plantas diferem de *S. Acinos* (fig. 1 c-c_1,d-d_1), entre outros caracteres, pelo facto de serem vivazes (ou bienais) e não anuais, pelo maior comprimento do cálice, cujo tubo é bastante prolongado acima da giba basilar e pelas corolas também maiores (fig. 9 a_1b-b_1, c, d). O tamanho das flores é de molde a não permitir a confusão dos exemplares portugueses com *S. Acinos*. Esta espécie não faz parte da flora do país, sendo, portanto, inexactas as citações de SAMPAIO ao referi-la tanto na obra atrás citada, como na Flora Portuguesa (pág. 514, 1947).

Todo o material português da secção *Acinos*, à parte diferenças no porte, é bastante homogéneo quer na forma e nervação das folhas, quer na forma e dimensões das flores, devendo, por isso, incluir-se num único *taxon*.

A sua comparação com espécimes de *S. granatensis* (comparar fig. 9 com fig. 4) mostrou-nos que é idêntico aos desta espécie. São particularmente as plantas dos pontos mais elevados da Serra de Rebordãos, do Monte de S. Bartolomeu, perto de Bragança e da Serra da Estrela as que possuem o aspecto da *S. granatensis* típica. Muitos outros exemplares do nosso país não apresentam, no entanto, o *habitus* prostrado e os caules curtos tal como são descritos por BOISSIER e REUTER, visto alguns deles possuírem caules de ca. de 50 cm de comprimento (fig. 10). Indivíduos da Serra de Rebordãos com estas características (*Moller* 1656), de caules robustos e relativamente elevados, foram incluídos por COUTINHO na var. *patavina* Briquet. Nesses exemplares, além do porte elevado, os pêlos do cálice, bem como os das outras partes das plantas, são mais longos, finos e densos do que é tìpicamente indicado para *S. granatensis*. Verifica-se, porém, que, no mesmo espécime, se encontram cálices com pêlos mais ou menos compridos. Sucede, ainda, que, em alguns exemplares de outras localidades (arredores de Almeida, leg. *M. Ferreira* 911 e Miranda do Douro, leg. *Mariz)*, podem observar-se pêlos do mesmo tipo que no mencionado espécime da Serra de Rebordãos, mas

Fig. 8. — Exemplar da var. *macrantha* Lindb. de *Satureja granatensis* (Boiss. et Reut.) R. Fernandes. Notar que, pela orientação dos ramos para o mesmo lado, os caules deviam ser prostrado-ascendentes. O afastamento dos nós, o aumento do limbo das folhas e o maior tamanho das flores devem resultar de a planta ter provavelmente crescido em sítio sombreado e de solo rico.

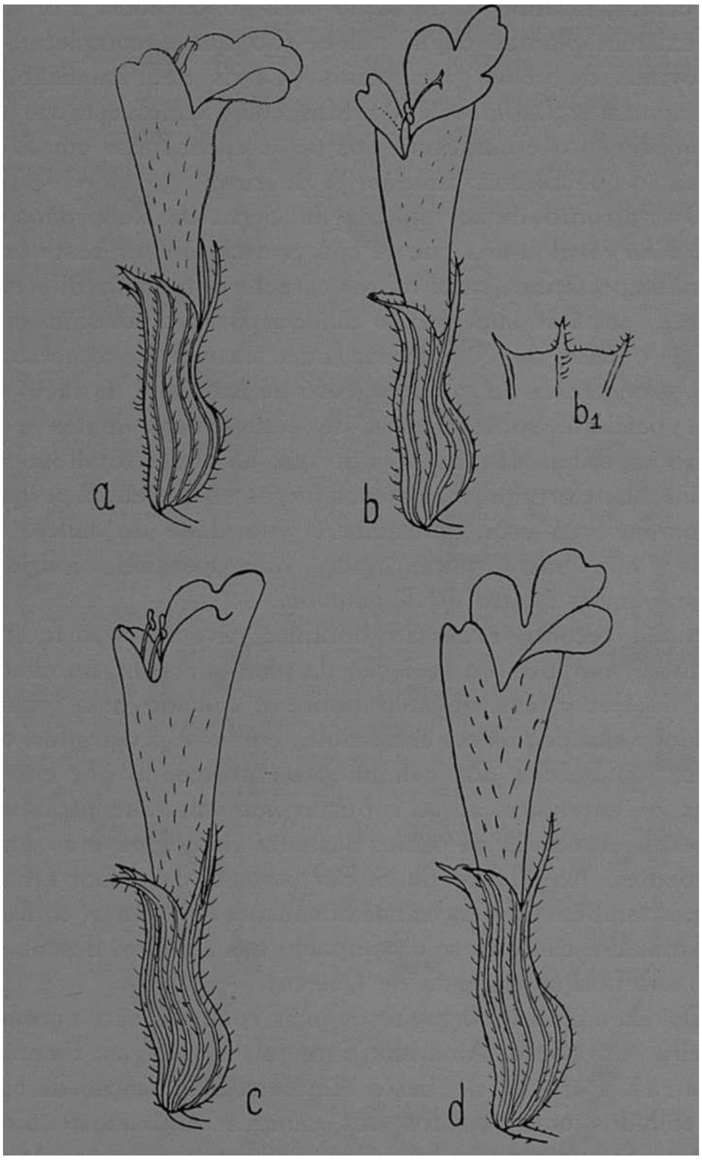

Fig. 9. — *Satureja granatensis* (Boiss. et Reut.) R. Fernandes. *a, b,* Flores de exemplares do Monte de S. Bartolomeu, pr. Bragança; *c,* flor do exemplar de Miranda do Douro (leg. *Mariz*); *d,* flor do exemplar de Carris de Famalicão, representado na fig. 10. χ 5.

mais curtos, fazendo a transição para gancheados. Por outro lado, existem plantas cujos cálices são quase completamente desprovidos de pêlos gancheados (Carris de Famalicão, leg. *R. Fernandes et J. Matos* 3760). Mas, como vimos, esta variação no comprimento e curvatura dos pêlos encontra-se em *S. granatensis,* o que BRIQUET também já referira.

O confronto desse número da Serra de Rebordãos com *S. patavina* revelou-nos que se não poderia incluir neste *taxon,* visto não apresentar, entre outros caracteres também diferentes, os dentes do lábio superior do cálice separados por sinus em V, como é o caso de *S. patavina,* mas sim em U, como sucede em *S. granatensis.* O número 1656 de MOLLER é de facto uma planta bastante robusta, mas de caules ascendentes e não erectos, as folhas são maiores do que na quase totalidade dos espécimes de Portugal, mas menos largas do que em *S. patavina.* De comum com esta, apresenta a vilosidade do cálice. Este carácter não basta, porém, para que possamos considerar aquelas plantas dentro de *S. patavina.*

Numa recente excursão botânica, tivemos oportunidade de estudar « in loco » a variação da planta. Assim, no cimo da Serra de Rebordãos, no solo pobre e calcado pelo gado, os indivíduos são pequenos, com caules curtos e prostrados. Mais abaixo, nos bordos dos caminhos ou crescendo por entre as moitas de carvalhos, a sua robustez aumenta, encontrando-se, por vezes, espécimes de caules bastante alongados, mas sempre ascendentes. No Monte de S. Bartolomeu, de menor altitude, notámos também diferenças nas dimensões e no porte, conforme as plantas cresciam no solo compacto das clareiras descobertas ou no sub-bosque da mata de *Quercus.*

Os exemplares portugueses mais robustos são, porém, os da Beira Alta (Seixo Amarelo; Sabugal; Manteigas; Famalicão da Serra). Para os de Seixo Amarelo, a indicação de terem sido colhidos nos « bordos dos campos cultivados » mostra nitidamente que o porte foi influenciado pela natureza do solo. Os de Famalicão, crescendo no sub-bosque de um souto, apresentam as características da variedade silvática de CHABERT, podendo dizer-se o mesmo dos de Manteigas ou do Poço do Inferno. No entanto, em quase todos estes indivíduos é bem nítido o encurvamento dos caules junto ao solo (fig. 10, 11),

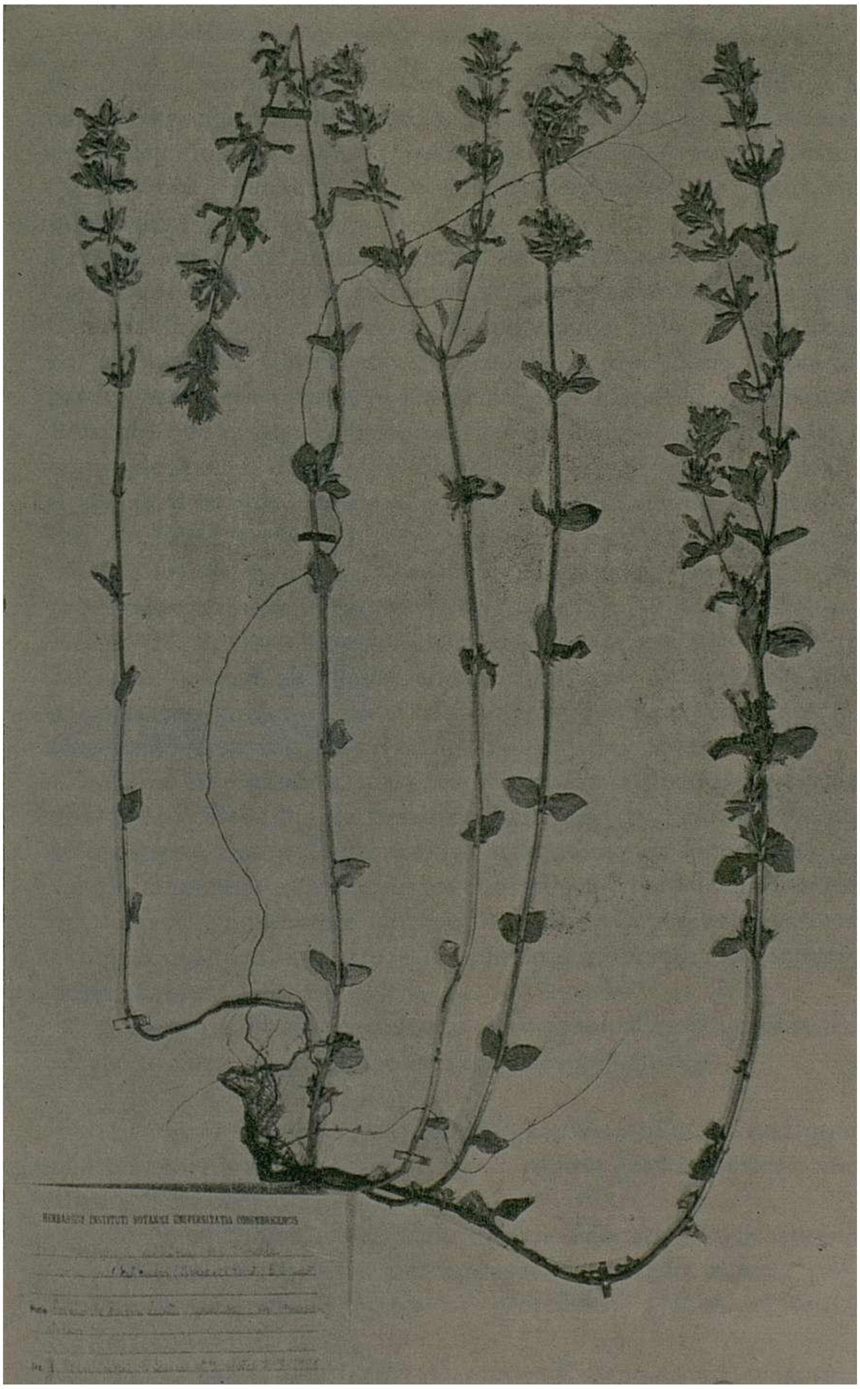

Fig. 10.—*Satureja granatensis* (Boiss. et Reut.) R. Fernandes forma *erecta* (Lange) R. Fernandes. Exemplar colhido nos sítios húmidos do sub-bosque de um souto em Carris de Famalicão. Comparar com as figs. 5-8. Notar que os caules são ascendentes.

mostrando, assim, também no que respeita à orientação dos caules, que eles se filiam em *S. granatensis*. Trata-se de formas de caules alongados, mas prostrado-ascendentes, cuja robustez resulta, possìvelmente, das condições favoráveis do meio em que vivem.

As analogias dessas plantas de porte suberecto com os indivíduos espanhóis da forma *erecta* (Lange) são muito grandes. Quando se comparam, porém, os indivíduos mais robustos com os exemplares típicos de *S. granatensis* da Serra Nevada, parece estar-se em presença de entidades distintas. Se se tiver presente que existe toda uma série de indivíduos intermediários que, pelo porte, dimensões de folhas e flores, etc., faz a transição entre os dois extremos, as diferenças tornam-se atenuadas. Em Portugal, onde a planta tem sido herborizada particularmente a altitudes pouco elevadas, não é de estranhar que predomine a forma *erecta*. O facto de termos notado que no Monte de S. Bartolomeu e na Serra de Rebordãos o aspecto das plantas está na dependência da altitude, natureza do solo e exposição, milita a favor do parecer que atrás emitimos de se considerar a var. *erecta* Lange como simples forma.

Seria interessante, no entanto, tentar cultivar esta forma nos pontos elevados da Serra da Estrela e verificar se tomava aí o aspecto que a *S. granatensis* apresenta nas montanhas do sul de Espanha e, além disso, cultivar na planície as plantas que crescem nos cumes. Só assim se poderia estabelecer, com maior segurança, a parte que o meio desempenha no aspecto deste *taxon*.

Como resultado do estudo das plantas portuguesas da secção *Acinos*, formulamos as seguintes conclusões:

1) Não é verdade que COUTINHO tenha atribuído quaisquer plantas portuguesas ao tipo de *S. alpina* (L.) Scheele, como afirma SAMPAIO.

2) *S. Acinos* (L.) Scheele não se encontra em Portugal.

3) Todas as plantas portuguesas da secção *Acinos* pertencem a um mesmo *taxon*: *S. granatensis* (Boiss. et Reut.) R. Fernandes.

4) *S. patavina* (Jacq.) Deg. (— *S. alpina* var. *patavina* Briquet) não existe no nosso país, como pretende COUTINHO.

5) O meio influencia fortemente o *habitus* de *S. granatensis*, a qual se apresenta nos cumes das montanhas mais elevadas com caules pequenos e prostrados e folhas e flores menores. A meia encosta ou em locais abrigados e de condições de solo mais favoráveis a planta atinge maiores dimensões, tornando-se os caules ascendentes ou suberectos. Plantas com estas características pertencem à forma *erecta* (Lange) R. Fernandes.

6) Notou-se uma seriação quase contínua desde plantas possuindo cálices quase desprovidos de pêlos gancheados, até outras em que os pêlos das nervuras dos cálices eram bastante mais compridos, abundantes e menos encurvados do que na *S. granatensis* típica. Parece-nos, pois, arriscado separar variedades baseadas na pilosidade do cálice.

Satureja granatensis (Boiss. et Reut.) R. Fernandes nov. comb.

Thymus Acinos Brot., Fl. Lus. I: 176 (1804) non *Thymus Acinos* L.

Acinos patavinus Hoffgg. et Link, Fl. Portug. I: 138 (1820) non *Acinos patavinus* (Jacq.) Pers.

Melissa alpina Boiss., Voy. Bot. Midi Esp. : 497 (1839-45) non *Melissa alpina* (L.) Benth.

Calamintha granatensis Boiss. et Reut., Pug.: 94 (1852).

Melissa granatensis Nym., Syll. Fl. Europ.: 101 (1854).

Calamintha alpina var. *erecta* Lange, Pug.: 176 (1860).

C. aetnensis Strobl in Oesterr. Bot. Zeitschr. XXIV: 29 (1874).

C. alpina var. *parviflora* Ball in Journ. Linn. Soc. XVI : 614 (1878).

C. meridionalis Nym., Consp. Fl. Europ.: 589 (1881).

C. granatensis var. *erecta* Chabert in Bull. Soc. Bot. Fr. XXXVIII: 388 (1891).

Satureja alpina (L.) Scheele var. *granatensis* (Boiss. et Reut.) Briquet, Lab. Alpes Marit.: 450 (1891); Cout. in Bol. Soc. Brot. sér. 1, XXIII: 102 (1907); Fl. Port. ed. 1: 517 (1913); *op. cit.* ed. 2: 613 (1939).

S. alpina var. *viridis* Briquet *loc. cit.* quoad spec. hispan. tantum ?

Fig. 11. — *Satureja granatensis* (Boiss. et Reut.) R. Fernandes. O fragmento que ocupa o centro pode atribuir-se à forma *erecta* (Lange). Os espécimes à esquerda (Vimioso, leg. *Mariz)* e à direita (Miranda do Douro, leg. *Mariz)* podem-se considerar pertencentes ao tipo de *S. granatensis.* O cálice do espécime da direita é representado na fig. 9 *c.*

S. alpina var. *patavina* Cout. *loc. cit.* non var. *patavina* Briquet (p. p. = *Thymus patavinus* Jacq.).

S. alpina var. *erecta* (Lange) Pau in Bol. Soc. Arag. Cienc. Nat. XI: 41 (1912).

S. alpina subsp. *granatensis* (Boiss. et Reut.) Maire in Bull. Soc. Hist. Nat. Afr. Nord, XXIX: 444 (1938).

S. Acinos (L.) Scheele var. *purpurascens* Pau in Bol. Soc. Arag. Cienc. Nat. XVI: 61 (1917) quoad syn. p. p. (=*Acinos purpurascens* Pers.?).

S. alpina var. *rotundifolia* Pau in Bol. Soc. Arag. Cienc. Nat. XVI: 61 (1917) quoad syn. p. p., non *Acinos rotundifolius* Pers.

Clinopodium Acinos Samp., Lista Esp. Herb. Port.: 119 (1913); Fl. Port.: 514 (1947) non *C. Acinos* (L.) O. Kunze.

RÉSUMÉ

SAMPAIO attribue toutes les plantes portugaises de la section *Acinos* du genre *Satureja* à *S. Acinos* (L.) Scheele, tandis que COUTINHO les considère comme appartenant à deux variétés distinctes (var. *patavina* et var. *granatensis)* de *S. alpina.* Dans le but d'éclaircir cette question, nous avons étudié les plantes de ce groupe existant dans les herbiers et nous avons fait aussi des observations dans la nature.

Nous avons divisé notre travail en deux parties: dans la première, nous faisons l'analyse des *taxa* ci-dessus mentionnés ainsi que d'autres voisins; dans la seconde, nous faisons la critique des points de vue de SAMPAIO et COUTINHO et présentons notre conclusion sur l'identification des plantes portugaises.

I

De la première partie de notre étude, nous avons conclu :

1) *Calamintha granatensis* Boiss. et Reut. est une espèce distincte avec une large dispersion sur les hautes montagnes de la région méditerranéenne. Dans le genre *Satureja,* l'espèce sera désignée par *S. granatensis* (Boiss. et Reut.) R. Fernandes.

2) On ne doit pas considérer la var. *erecta* Lange dans *S. alpina,* puisqu'elle n'est qu'une forme à tiges ascendantes plus ou moins robustes de *S. granatensis.*

3) *S. patavina* (Jacq.) Deg. est un *taxon* indépendant de la var. *erecta* Lange (et par conséquent indépendant aussi de *S. granatensis)* et non, comme WILLKOMM, LANGE et BRIQUET le supposaient, un synonyme de ce *taxon.*

4) La var. *Chabertii* (Chabert) Maire (= var. *erecta* Chabert) de *S. granatensis*, fondée par CHABERT sur des plantes à tiges un peu plus élevées et presque dressées, présente des calyces avec les dents de la lèvre supérieure liées par des sinus droits, ce qui montre qu'elle ne peut pas être séparée soit de la var. *erecta* Lange, soit de la *S. granatensis,* étant donné que, dans celles-ci, le calyce présente exactement les mêmes caractères.

5) La var. *viridis* Briquet de *S. alpina* est un *taxon* indépendant de la var. *erecta* Lange (et de *S. granatensis)* et non un synonyme de celle-ci comme PAU l'a affirmé.

6) La combinaison *S. Acinos* (L.) Scheele var. *purpurascens* (Pers.) Pau (voir pag. 124) n'est pas légitime, car, dans la catégorie de variété, l'épithète le plus ancien est celui de LANGE (var. *erecta).* En outre, on ne peut pas démontrer, sans avoir vu le type, que *Thymus purpurascens* Pers. soit *S. granatensis* (Boiss. et Reut.) comme PAU l'a prétendu.

7) La var. *granatensis* Briquet de *S. alpina,* comprenant des plantes petites des sommets des hautes montagnes méditerranéennes et d'autres un peu plus robustes des régions sous-alpines est, à notre avis, synonyme de *Calamintha granatensis* Boiss. et Reut. et non, d'après l'affirmation de PAU, un *taxon* distinct, identique à *Acinos rotundifolius* Pers.

8) *S. granatensis* est une espèce très polymorphe. Nous considérons comme ayant peu de valeur taxonomique les variations des dimensions des feuilles, de la longueur des poils des tiges, des feuilles et des calyces, des dimensions des fleurs, etc., caractères sur lesquels la création d'un grand nombre de variétés a été basée. A notre avis, la plupart de ces variétés ne représente que de simples formes écologiques conditionnées par le milieu.

II

Dans la seconde partie de notre travail, nous avons été amenés aux conclusions suivantes :

1) Il n'est pas vrai que COUTINHO ait attribué des plantes portugaises au type de *S. alpina,* comme SAMPAIO l'a affirmé.

2) *S. Acinos* ne se trouve pas au Portugal.

3) Toutes les plantes portugaises de la section *Acinos* appartiennent à un seul *taxon: S. granatensis* (Boiss. et Reut.) R. Fernandes.

4) *S. patavina* (Jacq.) Deg. (= *S. alpina* var. *patavina* Briquet) ne se trouve pas aussi au Portugal, comme COUTINHO l'affirme.

5) Les plantes plus robustes et à tiges presque dressées, ressemblant par son *habitus* à *S. patavina,* mais distinctes de ce *taxon* par les feuilles moins larges et par la forme différente de la lèvre supérieure du calyce, se trouvent, dans notre pays, au sous-bois des forêts à *Quercus pyrenaica* ou à *Castanea sativa,* à des altitudes inférieures à celles où se trouvent les formes petites et rabougries. On confirme donc ce que nous avons affirmé plus haut, c'est-à-dire l'*habitat* exerce une forte influence sur *Yhabitus* et la vigueur de ces plantes.

Les plantes les plus robustes doivent s'inclure dans la forma *erecta* (Lange) R. Fernandes.

SOBRE A POSIÇÃO SISTEMÁTICA DE *URGINEA MOURETII* BATT. ET TRAB. E DE ALGUMAS ESPÉCIES DE *ORNITHOGALUM* L.

por

J. BARROS NEVES
Instituto Botânico da Universidade de Coimbra

INTRODUÇÃO

BATTANDIER e TRABUT (1921) descreveram uma espécie de *Urginea*, baseando-se em plantas vivas provenientes dos bolbos colhidos pelo Tenente MOURET no Marrocos ocidental, denominaram-na *Urginea Mouretii* e consideraram-na próxima de algumas *Urginea* da África tropical, especialmente de *U. comosa* Welw.

Quando, há alguns anos, o Dr. ALVARO DEL AMO GILI realizava estudos cariológicos em espécies de *Urginea* no Instituto Botânico da Universidade de Coimbra, obteve alguns bolbos de *U. Mouretii* Batt. et Trab., a partir dos quais obteve plantas que correspondem inteiramente à descrição dada por BATTANDIER e TRABUT (*loc. cit.*). Já porque a guarnição cromossómica apresentada por estas plantas não correspondia ao cariótipo de *Urginea*, já por que, pelas próprias características da morfologia externa, estas plantas se assemelhavam a algumas espécies de *Ornithogalum* que já então possuíamos na nossa colecção, fez-nos entrega dos bolbos das referidas plantas para que os estudássemos. Verificámos, de facto, a existência de uma estreita semelhança entre as guarnicões cromossómicas de *U. Mouretii* Batt. et Trab. e de *Ornithogalum caudatum* Jacq. Paralelamente, confirmámos a existência de uma estreita concordância entre estas duas espécies no que respeita aos caracteres da morfologia externa. As pesquisas bibliográficas que fizemos sobre o assunto levaram-nos ao conhecimento da opinião formulada por JAHANDIEZ e MAIRE (1931), segundo a qual *U. Mouretii* «... est identique à l'*Ornithogalum caudatum*

Jacq., plante de l'Afrique australe souvant cultivée, ce qui explique qu'il n'est jamais été retrouvé ».

O desejo de contribuir com dados cariológicos para o esclarecimento deste problema, assim como para o da posição sistemática de *O. longibracteatum* Jacq. e de *O. scilloides* Jacq., remetidos pelos taxonomistas para a sinonímia de *O. caudatum* Jacq., são a razão do presente trabalho.

MATERIAL E TÉCNICA

A plantas estudadas são todas provenientes de jardins botânicos estrangeiros e encontram-se cultivadas em vasos no Jardim Botânico da Universidade de Coimbra. Ao tratarmos adiante de cada uma das espécies, mencionaremos o número de cultura e a proveniência dos exemplares.

Fizemos o estudo da mitose em células dos meristemas terminais de raízes fixados em Navachine (seg. Bruun), incluídos em parafina, seccionados com 18 μ e corados pelo violete de genciana. Recorremos, também, a preparações de material tratado pela reacção de Feulgen-Rossenbeck.

A meiose foi estudada nas células-mães de grãos de pólen, em anteras prèviamente fixadas em álcool acético (3:1) e coradas pelo carmim acético de Belling (1926).

Os desenhos foram executados com o auxílio de uma ocular Leitz. Nas gravuras, assim como nas fórmulas, os cromossomas são designados por símbolos de harmonia com a classificação de HEITZ (1926) modificada por FERNANDES (1931, 1934).

OBSERVAÇÕES

Urginea Mouretii Batt. et Trab.

As plantas estudadas constituem uma população de 29 indivíduos obtidos, por multiplicação vegetativa, de bolbos que nos foram cedidos pelo Dr. ALVARO DEL AMO GILI, que os havia recebido directamente da Africa do Norte.

Em todos os indivíduos encontrámos uma guarnição de 54 cromossomas somáticos (fig. 1*a*, 2) que distribuimos assim por tipos morfológicos :

18 cromossomas cefalobraquiais L.
18 » » P.
18 » » p.

Os cromossomas L. são todos providos de uma constrição secundária na porção proximal do braço L, sempre bem pronunciada. Alguns destes cromossomas possuem ainda uma outra constrição secundária, localizada distalmente no mesmo braço, mas não tão pronunciada como a primeira, pelo que, muitas vezes, não é observável. Nenhuma destas constrições secundárias deve ser nucleologénica, posto que o número máximo de nucléolos observados foi de 6 e a sua formação está relacionada com 6 dos cromossomas L., que possuem um satélite na extremidade proximal, e que designaremos por L.'.

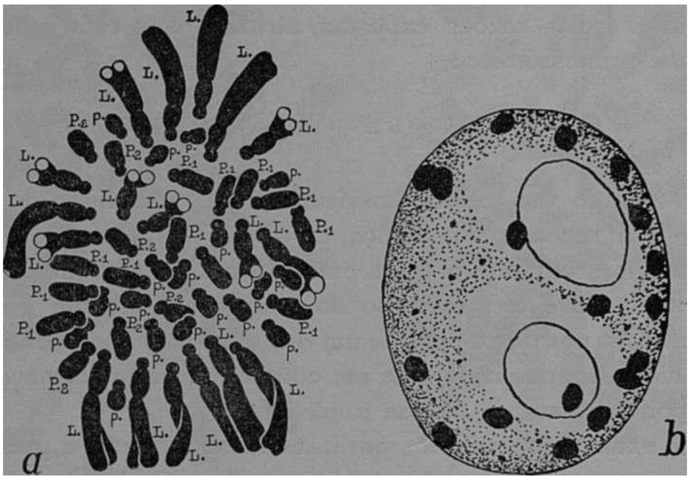

Fig. 1. — *Urginea Mouretii* Batt. et Trab. *a,* Placa equatorial em uma célula do vértice vegetativo da raiz: 54 cromossomas. *h,* Núcleo em intercinese mostrando 18 cromocentros maiores e alguns dos menores. Navachine-violete de genciana. X 3.200.

Dos 18 cromossomas cefalobraquiais P., 12 apresentam um comprimento total sensivelmente equivalente a um terço do comprimento dos cromossomas longos e foram designados por P.$_1$, enquanto que os restantes 6 são um pouco menores e foram designados por P.$_2$.

Os cromossomas p. são os mais pequenos da guarnição. Apresentam-se, também, em algumas figuras, de duas dimensões ligeiramente diferentes, mas, dada a sua pequenez, torna-se por vezes difícil apreciar essa diferença, pelo que não estabelecemos subtipos para eles.

A maneira como os cromossomas se repartem pelos tipos morfológicos estabelecidos, levou-nos a pensar que *U. Mouretii* Batt. et Trab. seja um poliplóide de base 9, o que, pode dizer-se desde já, foi confirmado pela ocorrência de polivalentes durante a meiose. Pelas razões expostas, atribuímos a esta espécie a fórmula cromossómica :

$$6n = 54 = 12\ L. + 6\ L.' + 12\ P._1 + 6\ P._2 + 18\ p.$$

O estudo das células meristemáticas radiculares do indivíduo I/13 revelou a presença, em todas as metafases, de um cromossoma satelitífero mais curto (fig. 2), o que mostra que esta planta deve ter resultado da conjugação de um gameto normal com um outro em que um dos cromossomas satelitíferos era mais curto, possivelmente em consequência da formação de uma ponte durante a meiose precedente.

O exame dos núcleos em intercinese mostrou a presença de cromocentros de duas grandezas (fig. 1*b*). Os maiores apresentam-se em número de 18 (número máximo) e as suas dimensões são sensivelmente iguais às dos cromossomas menores da guarnição (p.). Note-se que muito poucas vezes contámos menos que 18 destes cromocentros, o que mostra que não existe tendência para coalescerem. Esta observação levou-nos a pensar na possibilidade de os cromossomas p. serem supranumerários, totalmente heterocromáticos, semelhantes, portanto, aos que havíamos observado em algumas espécies de *Ornithogalum* L. (Neves, 1952). Para esclarecer este problema procurámos seguir a formação dos cromossomas durante a profase da mitose, mas não fomos bem sucedidos. O estudo da profase da primeira divisão meiótica mostrou-nos, porém, que estes cromocentros correspondem a porções heterocromáticas intercalares dos cromossomas longos (L. e L.'), posto que, no zigóteno, se podem observar 9 cromocentros grandes localizados na porção mediana dos cromonemata mais compridos (**fig.** 3), além de outros cromocentros de menores dimensões, que podem encontrar-se nestes e noutros cromonemata.

A observação da meiose nas **células-mães** dos grãos de pólen revelou a formação quase constante de 27 II (fig. 4 *a*). Porém, em bastantes figuras, pôde notar-se a presença de univalentes que, na maioria dos casos, são formados pelos cromossomas P. ou p. (**fig.** *4 b),* embora, ainda que raramente, possam ser também formados por cromossomas L.

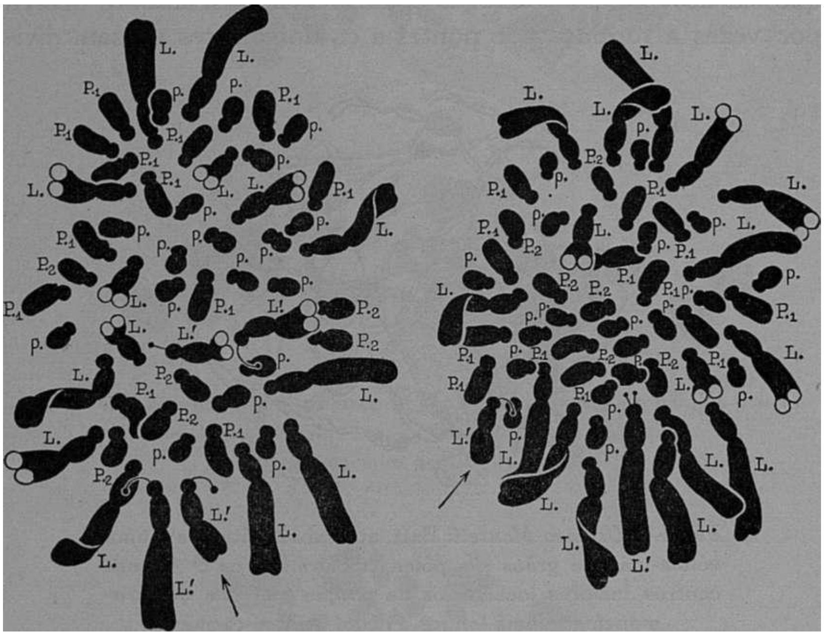

Fig. **2.** — *Urginea* ***Mouretii*** Batt. et Trab. **Metafases** em células dos meristemas radiculares do **indivíduo I/13**: 54 cromossomas. Note-se a presença de um cromossoma **satelitífero** mais curto. Navachine-violete de genciana. ×3.200.

A suspeita de que *U. Mouretii* Batt. et **Trab.** fosse um **poliplóide,** foi confirmada pela observação de algumas raras figuras em que notámos a presença de polivalentes. Assim, a fig. 5 α apresenta 1 IV+25 II e a fig. *5 b* mostra 1 III +22 II + +7 **I,** podendo ver-se que em dois dos **univalentes** já se deu a divisão do centrómero.

Note-se que os polivalentes observados são na sua quase totalidade **tetravalentes;** apenas em uma **metafase** (fig. 5 *b*) notámos a presença de um trivalente. Quanto aos elementos menores da guarnição, torna-se por vezes difícil averiguar se as imagens observadas correspondem a tetravalentes ou se são apenas devidas a emparelhamento secundário.

A observação dos estádios subsequentes da meiose mostrou que ela decorre com relativa regularidade, pois, embora ocorra por vezes a formação de pontes e os univalentes possam dividir-se na primeira ou na segunda divisão, a formação de micronúcleos é bastante rara e as tétradas apresentam um aspecto normal. As contagens do pólen produzido por vários indivíduos mostraram a ocorrência de grãos mal conformados em percentagens que vão de 15 a 20 %.

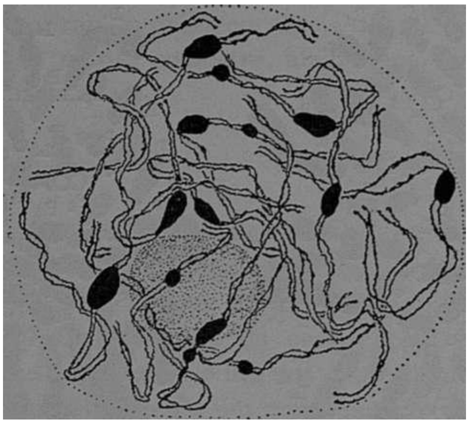

Fig. 3. — *Urginea Mouretii* Batt. et Trab. Zigóteno em uma célula-mãe de grãos de pólen, mostrando os 9 cromocentros maiores localizados na porção mediana dos cromonemata mais longos. Álcool acético-carmim acético. ×1.600.

A comparação da guarnição de *U. Mouretii* Batt. et Trab. com as guarnições conhecidas em diversas espécies de *Urginea* (HEITZ, 1926; GEITLER, 1929 a, *b;* RAGHAVAN, 1935; RAGHAVAN et VENKATASUBBAN, 1940; MARTINOU, 1949; GIUFFRIDA, 1950; MAUGINI, 1956; BATTAGLIA, 1957a, *b,* c) mostrou diferenças acentuadas, principalmente no que respeita ao número de cromossomas que, em quase todas as espécies estudadas de *Urginea*, é de base 5 ($2n=20, 30, 40, 60$).

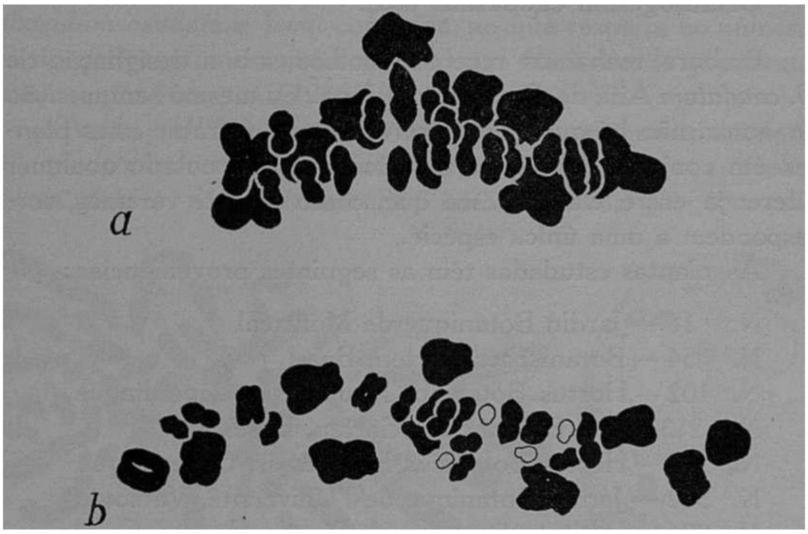

Fig. 4. — *Urginea Mouretii* Batt. et Trab. Metafases I em células-mães dos grãos de pólen. *a*, 27 II. *b*, 25 II +4 I. Álcool acético-carmim acético. ×1.600.

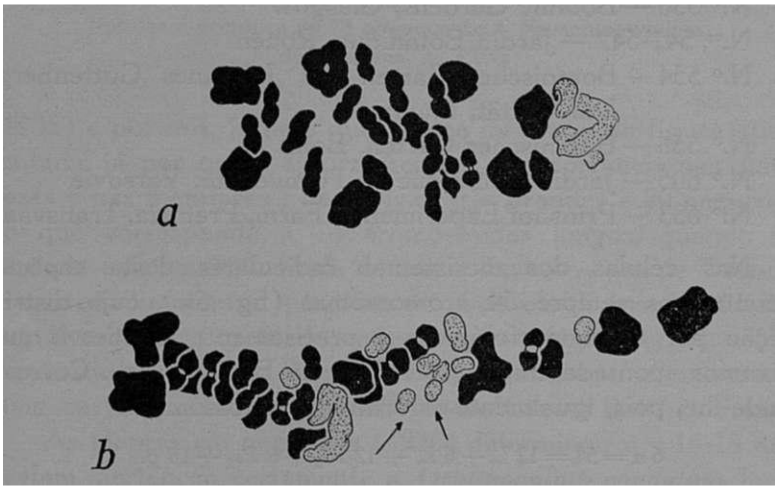

Fig. 5. — *Urginea Mouretii* Batt. et Trab. Metafases I em células-mães dos grãos de pólen. *a*, 1 IV +25 II. *b*, 1 III +22 II +7 I. Note-se que 2 dos univalentes (os indicados pelas setas) já sofreram divisão do centrómero. Àlcool acético-carmim acético. X 1.600.

Ornithogalum caudatum Jacq.

Embora tenhamos recebido bolbos sob a designação de *O. caudatum* Ait., de *O. caudatum* Jacq., ou mesmo sem menção de autor, não há qualquer inconveniente em tratar estas plantas em conjunto, pois além de não havermos notado qualquer diferença entre elas, acresce que, como adiante veremos, correspondem a uma única espécie.

As plantas estudadas têm as seguintes proveniências :

N.° 18 — Jardin Botanique de Montréal
N.° 54 — Botanischer Garten, Basel
N.° 102 — Hortus Botanicus Hauniensis, Copenhague
N.os 213-216 — Botanischer Garten, Basel
N.° 277 — Hortus Botanicus Hauniensis, Copenhague
N.° 362 — Jardin Botanique de l'Université, Varsovie
N.° 386 — Instituto Botanico di Siena
N.° 418 — Jardin Botanique de l'Université de Friburg
N.° 425 — Betanischer Garten der Universität, Erlangen
N.° 501 — Jardin Botanique de Montréal
N.° 536 — Botanic Gardens, Glasgow
N.os 541-542 — Jardin Botanique, Rouen
N.° 554 — Botanischer Garten der Johannes Guttenberg Universität, Mainz
N.° 556 — Botanischer Garten, Bonn
N.° 605 — Jardin Botanique de l'Université, Varsovie
N.° 633 — Prinshof Experimental Farm, Pretoria, Transvaal

Nas células dos meristemas radiculares desta espécie encontrámos sempre 54 cromossomas (fig. 6α), cuja distribuição por tipos morfológicos é precisamente idêntica à que deixamos apontada em *Urginea Mouretii* Batt. et Trab. Corresponde-lhe, pois, igualmente a fórmula cromossómica :

$$6\,n = 54 = 12\ L. + 6\ L.' + 12\ P._1 + 6\ P._2 + 18\ p.$$

Também aqui os núcleos em intercinese (fig. *6 b)* apresentam cromocentros com as mesmas características dos encontrados em *Urginea Mouretii* Batt. et Trab., tendo-se verificado igualmente que correspondem a porções medianas heterocromáticas de cromossomas longos.

A guarnição cromossómica por nós encontrada em *Ornithogalum caudatum* Jacq. concorda, no que respeita ao número e tipos dos cromossomas, com a que foi indicada para esta espécie por NAKAJIMA (1936).

THERMAN (1951) apresenta também 54 cromossomas para *O. caudatum* Jacq., mas a sua distribuição por tipos morfológicos parece não corresponder à estabelecida por NAKAJIMA (1936) e por nós, já pelo que parece inferir-se da figura apresentada, já por que a autora menciona a ocorrência nas diacineses e nas metafases I de 7 bivalentes grandes e 20 pequenos (o que corresponde a 14 cromossomas longos, quando na verdade existem 18). Pode dar-se, todavia, o caso de THERMAN ter estudado plantas que, em consequência de irregularidades que tivessem ocorrido durante a meiose que precedeu a formação dos elementos reprodutores, possuíssem cromossomas mais curtos (*vide* a fig. 2 de *Urginea Mouretii* Batt. et Trab.).

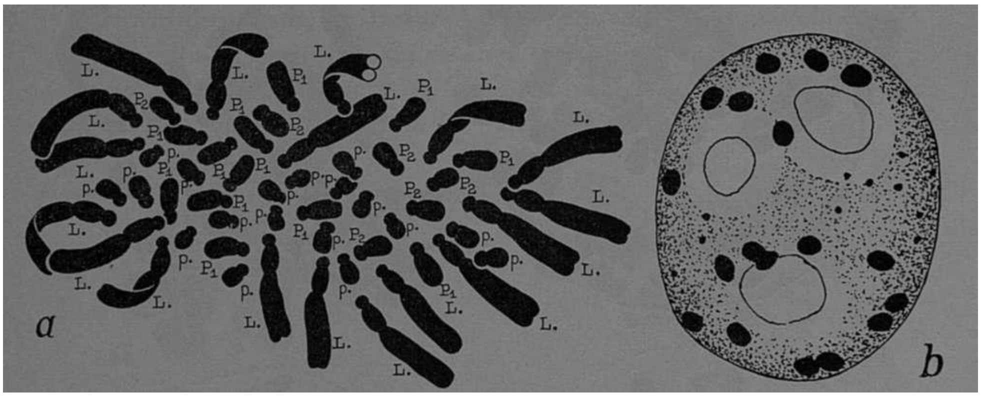

Fig. 6. — *Ornithogalum caudatum* Jacq. *a,* Metafase em uma célula do meristema radicular: 54 cromossomas. *b,* Núcleo em intercinese. Note-se a presença de 18 cromocentros. Navachine-violete de genciana. X 3.200.

As plantas em que HEITZ (1926) determinou $\eta = 16\text{-}18$ não deviam pertencer certamente a *Ornithogalum caudatum* Jacq.

Quanto ao problema da existência de emparelhamento somático em *O. caudatum* Jacq., apresentado por THERMAN (1951), parece-nos discutível. E de observação corrente que, quando numa guarnição existem cromossomas longos e outros muito curtos, estes se dispõem em geral na porção central da placa, enquanto que aqueles se dispõem usualmente à periferia, formando uma espécie de cercadura. Esta disposição pôde

Fig. 7.— *Ornithogalum caudatum* Jacq. Diacineses em células-mães dos grãos de pólen. *a*, 27 II. *b*, 1 IV+25 II. c, 25 II+4 I. *d*, 26 II+2 I. Note-se que em c e *d* alguns dos univalentes já sofreram divisão do centrómero. Alcool acético-carmin acético. X 1.600.

observar-se em todas as figuras que examinámos em *O. caudatum* Jacq. e nas outras plantas estudadas no presente trabalho, como pode verificar-se nas figuras que apresentamos. Deste modo, parece natural que de entre os 36 cromossomas pequenos, que se encontram principalmente no centro da placa, possam observar-se alguns bastante próximos, dando a impressão de emparelhamento somático, e que o mesmo possa acontecer com os cromossomas longos, dispostos perifèricamente, tanto mais que pelo menos 12 destes são do mesmo tipo morfológico. Um exame cuidadoso mostra todavia que, na maioria dos casos, os cromossomas pequenos, presumivelmente emparelhados, não são do mesmo tipo. Estes factos levam-nos mais uma vez a discordar da existência de emparelhamento somático em *Ornithogalum* (cf. NEVES, 1953a, *b).*

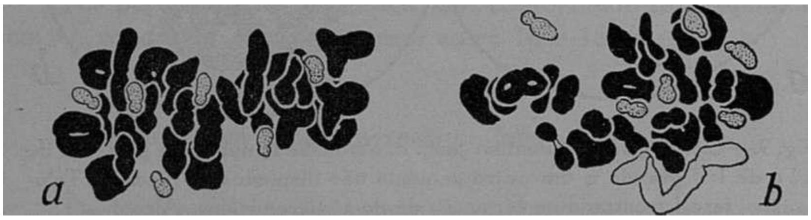

Fig. 8. — *Ornithogalum caudatum* Jacq. Metafases I. *a,* 24 II + 6 I. *b,* 1 IV + 22 II + 6 I. Alcool acético-carmim acético. ×1.600.

O estudo da meiose mostrou que se formam quase sempre 27 bivalentes (fig. 7*a*) mas, tal como já assinalámos para *Urginea Mouretii* Batt. et Trab., podem ocorrer outras combinações. Assim, puderam ver-se, entre outras, 1 IV + 25 II (fig. 7*b*), 25 II + 4 I (fig. 7c), 26 II + 2 I (fig. 7*d*), 24 II + 6 I (fig. 8α), 1 IV + 22 II + 6 I (fig. 86).

A divisão I decorre usualmente com regularidade, mas casos há em que alguns elementos retardatários originam a formação de micronúcleos (fig. 9*b*). Embora geralmente todos os elementos cromossómicos se disponham no plano equatorial durante a metafase I, tal não acontece por vezes (fig. 9*a*), sendo muito provàvelmente incluídos no grupo polar que lhes fica mais próximo os elementos que se não dispõem no plano equatorial. Foi possìvelmente o que aconteceu durante a primeira divisão na célula-mãe que originou as que estão representadas na fig. 10. Esta figura mostra o fim de uma anafase II, notando-se que uma das células (*a*) apresenta apenas 8 cromossomas L. em cada grupo polar, enquanto que a célula-

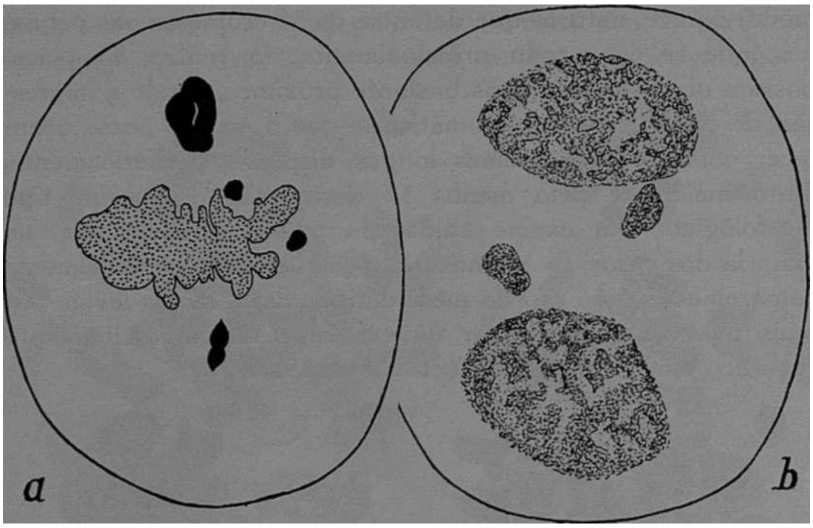

Fig. 9.— *Ornithogalum caudatum* Jacq. *a,* Metafase I; note-se a presença de 2 I e de 1 II grande e um outro pequeno não dispostos na placa. *b,* Telofase I mostrando a formação de dois micronúcleos. Álcool acético-carmim acético. χ 1.600.

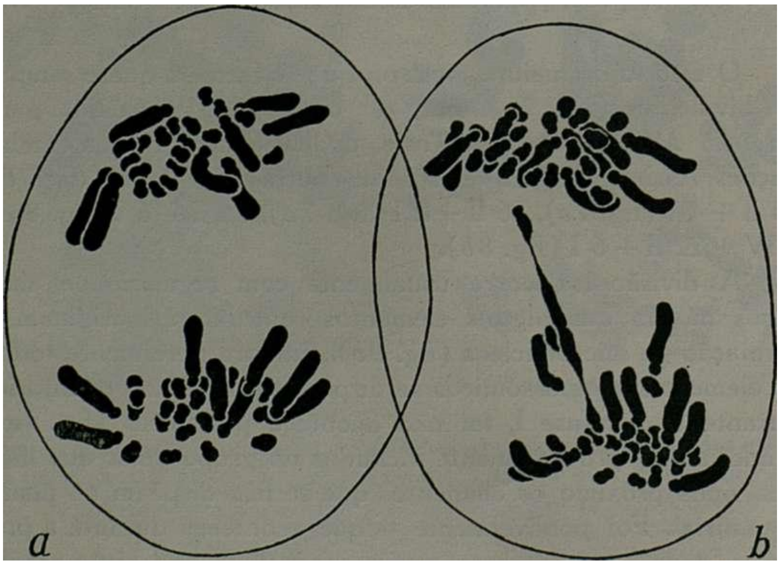

Fig. 10. — *Ornithogalum caudatum* Jacq. Anafase II em célula-mãe dos grãos de pólen. Note-se que os grupos polares da célula-filha *a* apresentam ambos apenas 26 cromossomas (8 grandes + 18 pequenos), enquanto que os da outra *(b)* ficarão com 28 (10 grandes + 18 pequenos). Alcool acético-carmim acético. ×1.600.

-irmã *(b)* virá a possuir 10 cromossomas L. em cada grupo polar, logo que se rompa a ponte. E possível que a falta ou excesso de um cromossoma não afecte a viabilidade dos grãos de pólen formados, uma vez que se trata de um poliplóide, tornando-se assim provável a existência de plantas com um número de cromossomas diferente de 54. O exame que fizemos de bastantes indivíduos não nos revelou nenhum com tais números, mas tal facto não invalida a probabilidade, visto que as plantas estudadas resultaram de multiplicação vegetativa de alguns bolbos inicialmente recebidos. Torna-se, pois, necessário examinar outras produzidas por semente.

As percentagens de pólen mal conformado determinadas em *O. caudatum* Jacq. oscilaram entre 14 e 18 °/o.

Ornithogalum longibracteatum Jacq.

Desta espécie estudámos plantas das seguintes proveniências :

N.° 21 — Hortus Botanicus Gotoburgensis
N.° 47 — Université Technique de Delft
N.° 53 — Jardin Botanique de la Ville, Bordeaux
N.° 95 — Hortus Botanicus, Amsterdam
N.° 220 — Jardin Botanique de Nancy
N.° 222 — Hortus Botanicus Gotoburgensis
N.° 354 — Jardin Botanique de l'Université de Gand
N.° 365 — Hortus Botanicus, Amsterdam
N.° 419 — Jardin Botanique de l'Université, Friburg
N.° 422 — Jardin Botanique de la Ville, Rennes
N.° 429 — Arboretum Landbouwhogeschool, Wageningen
N.° 505 — Jardin Botanique de Montréal
N.° 537 — Botanic Gardens, Glasgow

O estudo da mitose nas células dos vértices vegetativos da raiz de todas estas plantas mostrou que, em todas elas, existem 54 cromossomas (fig. 11*a*) morfològicamente semelhantes aos já anteriormente descritos para *O. caudatum* Jacq. e *Urginea Mouretii* Batt. et Trab. e que, portanto, possuem uma guarnição cromossómica que podemos traduzir igualmente pela fórmula:

$$6n = 54 = 12\ L. + 6\ L.' + 12\ P._1 + 6\ P._2 + 18\ p.$$

Heitz (1926) indica para esta espécie η = 26-28, número com que estão de acordo as nossas observações. O autor não apresenta, porém, qualquer figura com que possamos comparar os tipos cromossómicos.

Também em *O. longibracteatum* Jacq. os núcleos em intercinese apresentam cromocentros grandes (fig. 11 *b)* de dimensões correspondentes às dos cromossomas p., mas que verificámos corresponderem igualmente a porções heterocromáticas medianas dos cromossomas L. e L.'.

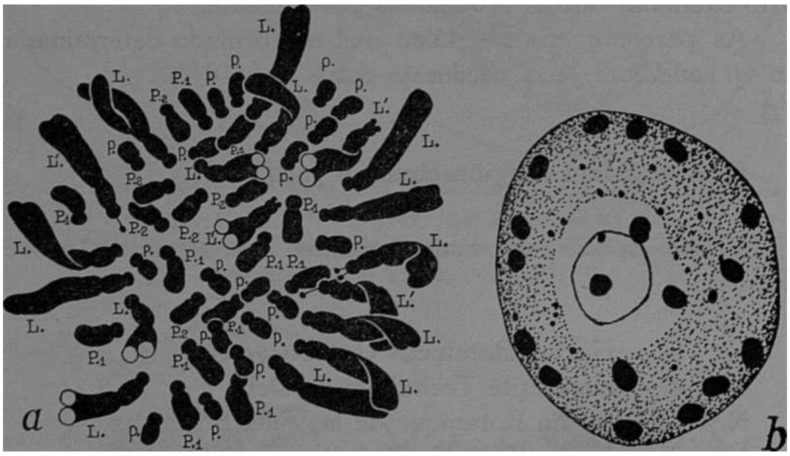

Fig. 11. — *Ornithogalum longibracteatum* Jacq. *a,* Metafase numa célula do vértice vegetativo da raiz: 54 cromosomas. *b,* Núcleo em intercinese. Navachine-violete de genciana. X 2.200.

O estudo da meiose mostrou nas diacineses e metafases I a formação frequente de 27 II (fig. 12), mas pudemos observar várias figuras com univalentes e outras com polivalentes, de entre as quais destacamos as seguintes combinações: 3 IV + 21 II (fig. 13 *a*), 1 VI + 1 IV + 22 II (fig. 13 *b*). Esta última figura é particularmente importante, pois a presença de um hexavalente veio confirmar a opinião de que estas plantas são hexaplóides.

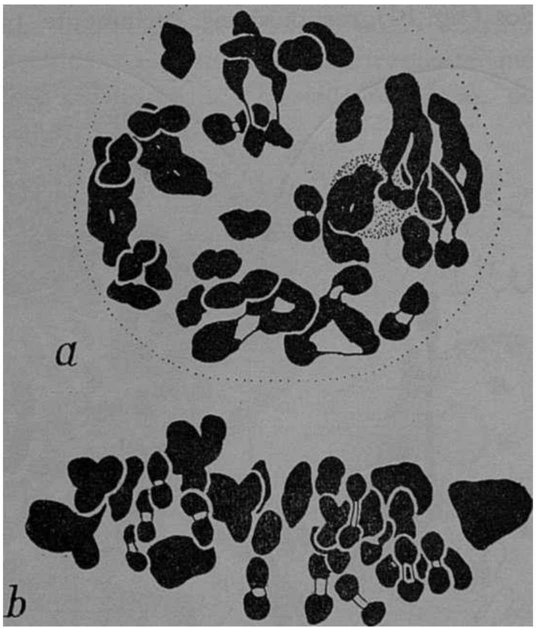

Fig. 12.— *Ornithogalum longibracteatum* Jacq. *a*, Diacinese: 27 II. *b*, Metafase I: 27 II. Álcool acético-carmim acético. ×1.600.

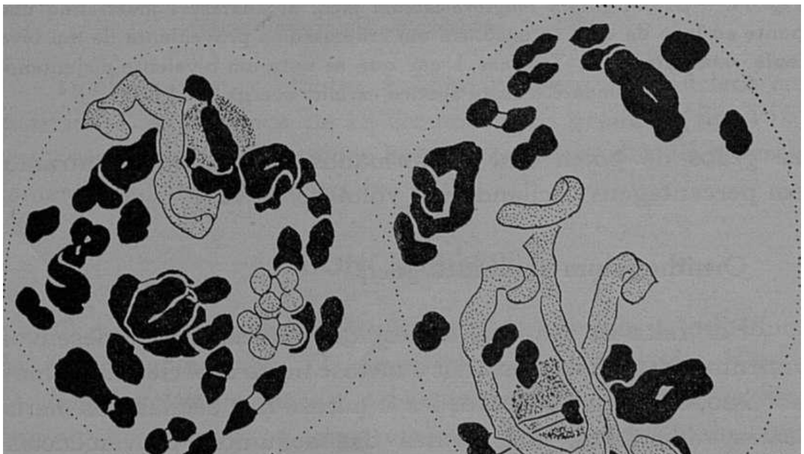

Fig. 13.— *Ornithogalum longibracteatum* Jacq. Diacineses: *a*, 3 IV + 21 II. *b*, 1 VI + 1 IV + 22 II. Álcool acético-carmim acético ×1.600.

Em algumas células notámos presença de pontes e de retardatários (fig. 14), responsáveis, certamente, pela formação de grãos de pólen mal conformados que aqui encontrámos em percentagens oscilando em volta de 15 %.

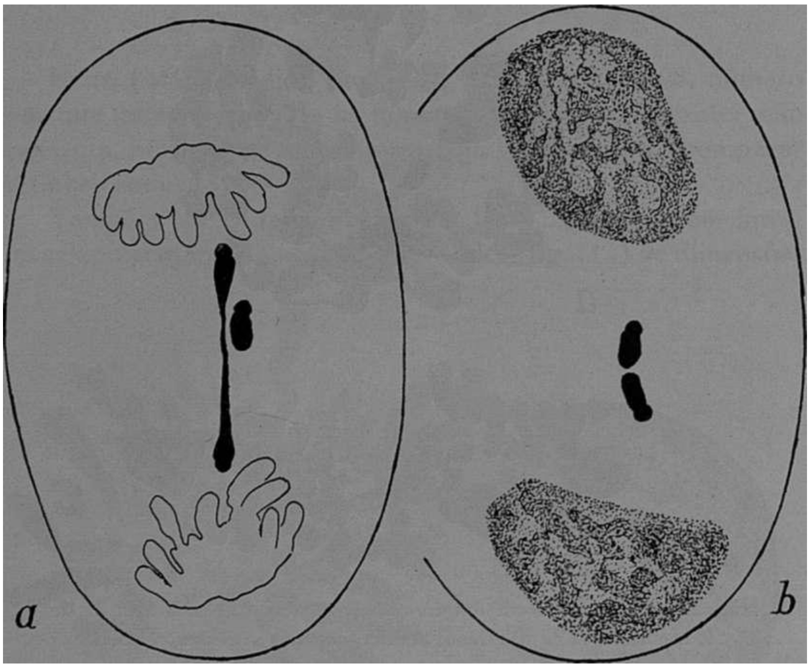

Fig. 14. — *Ornithogalum longibracteatum* Jacq. a, Anafase I mostrando uma ponte ao lado da qual se encontra um cromossoma proveniente de um bivalente retardatário. *b*, Telofase I em que se nota um bivalente disjuntando tardiamente. Àlcool acético-carmim acético. X 1.600.

Ornithogalum scilloides Jacq.

Por falta de material em estado conveniente de desenvolvimento não pudemos estudar a meiose nesta espécie. Limitámos, por isso, as nossas observações à mitose nas células dos meristemas radiculares, em plantas das seguintes proveniências :

N.° 46 — Jardin Botanique de la Ville, Nancy
N.° 352 — Hortus Botanicus Lugduno Batavus
N.° 538 — Botanic Garden, Glasgow

As **metafases** somáticas apresentam 54 cromossomas (fig. 15α), **cuja morfologia** determinou a sua distribuição pelos tipos estabelecidos nas espécies anteriormente **mencionadas** neste trabalho, pelo que a *O. scilloides* Jacq. corresponde também a fórmula cromossómica :

$$2n = 54 = 12\ L. + 6\ L.' + 12\ P._1 + 6\ P._2 + 18\ p.$$

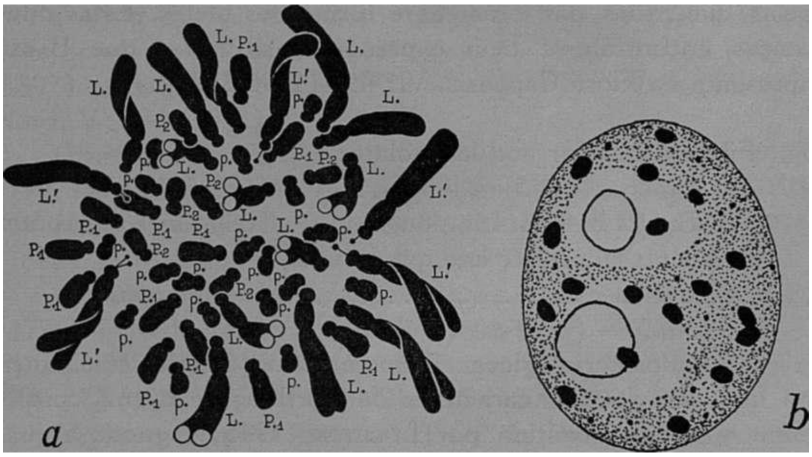

Fig. **15.**— *Ornithogalumscilloides* Jacq. *a,* Metafase em uma célula do vértice **vegetativo** da raiz : 54 **cromossomas.** *b,* Núcleo em intercinese. **Navachine-violete** de genciana. X 3.200.

Também nestas plantas é bem evidente, nos núcleos em **intercinese**, a presença de 18 cromocentros grandes **(fig. 15*b*)** que correspondem a porções heterocromáticas dos 18 cromossomas longos da guarnição.

CONCLUSÕES

O estudo **cariológico** que fizemos de numerosos indivíduos de *O. caudatum* **Jacq.**, *O. caudatum* **Ait.**, *O. scilloides* Jacq. e *O. longibracteatum* **Jacq.**, provenientes de diversos jardins botânicos estrangeiros, mostrou que todos apresentam uma guarnição somática constituída por 54 cromossomas que, distribuídos por tipos morfológicos, permitiram estabelecer para aquelas plantas a fórmula **cromossómica:**

$$6n = 54 = 12\ L. + 6\ L.' + 12\ P._1 + 6\ P._2 + 18\ p.$$

A repartição dos cromossomas pelos tipos morfológicos, assim como o seu comportamento durante a meiose, mostraram que se trata de plantas hexaplóides de base 9 e que apresentam uma pronunciada tendência para a diploidia funcional.

No que respeita à morfologia externa, estas 3 espécies são bastante semelhantes, diferindo, principalmente e segundo pode ver-se nas descrições que delas dão os diferentes autores, pelas dimensões das brácteas e forma dos filetes. Estas diferenças encontram-se bem expressas nas chaves que BAKER apresenta na Flora Capensis, VI: 496 (1896-1897):

Filaments linear and lanceolate :
  Bracts 1/2-3/5 in. long . . . . (67) *scilloides*
  Bracts 3/4-1,1/4 in. long . . . . . . (68) *longebracteatum*
Filaments lanceolate and quadrate at
  the base . . . . (69) *caudatum*

Os dados cariológicos, aliados à extraordinária semelhança no que respeita aos caracteres da morfologia externa, confirmam a opinião emitida por LEIGHTON (1945) segundo a qual estas espécies devem ser reunidas em uma única, que, por motivo de prioridade, deve denominar-se *Ornithogalum caudatum* Jacq.

O exame da guarnição somática de *Urginea Mouretti* Batt. et Trab., assim como o comportamento dos cromossomas durante as divisões de redução, revelou uma semelhança tão extraordinária com o que se observou nas espécies mencionadas de *Ornithogalum* L., que se torna impossível distingui-la cariològicamente dos referidos *Ornithogala.* Aliás, o mesmo se observa no que respeita aos caracteres da morfologia externa. Confirma-se, assim, a opinião expressa por JAHANDIEZ e MAIRE (1931) de que *Urginea Mouretii* Batt. et Trab. é idêntica a *Ornithogalum caudatum* Jacq. Durante a preparação deste trabalho recebeu-se no Instituto Botânico o volume V da Flore de l'Afrique du Nord, onde, a páginas 184, se pode verificar que MAIRE (1958) inclui *Urginea Mouretii* Batt. et Trab. na sinonímia de *Ornithogalum caudatum* Ait.

Do exposto resulta que todas as plantas estudadas devem ser remetidas a uma única espécie:

Ornithogalum caudatum Jacq., Coll. II: 315 (1788); Ic. II: 19, *t. 423* (1786-1793).—Leighton in Journ. South Afr. Bot. XXI: 166 (1945).

Ornithogalum caudatum Ait., Hort. Kew. I: 442 (1789); Idem, ed. 2, II: 261 (1811).—Willd., Sp. Pl. II: 125 (1799).—Bot. Mag.: *t. 805* (1805).—Kunth, Enum. Pl. IV: 357 (1843).—Baker in Saund. Ref. Bot.: *t. 262* (1871); in Journ. Linn. Soc. Lond. Bot. XIII: 276 (1873); in Fl. Cap. VI: 515 (1896-1897).—Bailey, Man. Cult. Pl.: 232 (1949).—Maire, Fl. Afr. Nord, V: 184 (1958).

Ornithogalum scilloides Jacq., Hort. Schoenbr. I: 46, *t. 88* (1797).—Willd., Sp. Pl. II: 119 (1799).—Kunth, Enum. Pl. IV: 358 (1843).—Baker in Journ. Linn. Soc. Lond. Bot. XIII: 276 (1873); in Fl. Cap. VI: 514 (1896-1897).

Ornithogalum longibracteatum Jacq., Hort. Vindob. III: *t. 29* (1776).—Redouté, Liliac: *t. 120* (1802-1816).—Kunth, Enum. Pl. IV: 357 (1843).—Baker in Journ. Linn. Soc. Lond. Bot. XIII: 277 (1873); in Fl. Cap. VI: 515 (1806-1897).

Urginea Mouretii Batt. et Trab. in Bull. Soc. Bot. Fr. LXVIII: 437 (1921).

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NEW AND LITTLE KNOWN SPECIES FROM THE FLORA ZAMBESIACA AREA

IX

HIBISCI NOVI

by

A. W. EXELL

I have, for convenience, included in this paper descriptions of four new species from South Africa which have not yet been recorded from the Flora Zambesiaca area but which are closely related to species in that area.

I am very much indebted to the Director and Staff of the National Herbarium, Pretoria not only for lending me copious material but for all kinds of help. Dr. A. D. J. MEEUSE, in particular, has supplied me with invaluable information about the South African species

1. Sect. **FURCARIA** DC.

1. **Hibiscus meeusei** Exell, sp. nov.

Hibiscus sp. cf. *H. diversifolius*.— Verdoorn & Collett in Farming in S. Afr. 34: 2, fig. 2 (1947).

Herba annua vel biennis erecta plerumque ad 1 m nonnunquam ad 1.5 m alta, caulis basin versus ramosus ± lignosus pallide viridis vel brunneo-purpureus, juventute dense breviter stellato-tomentosus et sparse piloso-setosus, pilis patentibus rigidis e basi bulbosa pungentibus demum basi inflata excepta deciduis. Folia petiolata, petiolo ad 12 cm longo indumento ut in caule, stipulata, stipulis subulato-setosis c. 10 mm longis; lamina atroviridis plerumque margine purpurascens in foliis inferioribus ambitu ovato-orbicularia, ad 12 x 12 cm, basi truncata vel paullo cordata leviter 5-lobata vel 5-angulata, media ovata ± profunde 3-5 palmatisecta vel fere palmatipartita, lobis rhomboideis obovatis vel oblanceolatis, in foliis superioribus vix lobata lanceolata 3-6 cm longa margine serrata basi cuneata, supra primo minute pubescens pilis stellatis vel simplicibus, subtus plerumque minute stellato-pubescens. *Flores* lutei oculo atro-rubro solitarii axillares breviter pedunculati ad ramorum apices racemi formantes. *Involucri bracteae* 8-12, lineares c. 10 mm longae basi connatae apice nonnunquam appendiculatae sed vix manifeste furcatae. *Calyx* c. 15 mm longus, lobis ovato-lanceolatis vel triangularibus acutis margine tomentellis ceteroque indumento ut in caule costa media elliptica vix prominenti instructa, in fructo accrescens induratusque ad 20 mm longus. *Petala* obovata, 2-4 cm longa. *Tubus stamineus* c. 6 mm long, filamentorum partibus liberis 0.5 mm longis. *Styli rami* c. 1 mm longi, stigmatibus papillosis inter anthera occultis. *Capsula* ovoideo-conica, rostrata, 14-15 × 11-12 mm, appresse setosa, valvis lignosis. *Semina* numerosa, angulato-subreniformia, griseo-brunnea, 3-4 × 3 mm, squamis minutis pectinatis instructa.

TRANSVAAL. Bronkhorstspruit Distr.: Donkerhoek (Donkerpoort), between Pretoria and Bronkhorstspruit, fl. & fr. 19.III.1959, *A. D. J. Meeuse* 10646 (BM, holotype; COI; K; LISC; PRE; SRGH).

« Erect annual, usually branched from the base but often one stem 'domineering' and up to 1.5 mm tall; stems and leaf-edges often reddish (as is the calyx in basal part), plant covered with spiny hairs, corolla yellow with a brown-red 'eye'. This plant is a typical 'ruderal' species; grows in (old) lands, along roadsides, fallow land and locally often very frequent; widespread in the Transvaal ».

This species differs from *H. cannabinus* L. as shown below:

	H. meeusei	*H. cannabinus*
Habit.	Branched from the base; usually not more than 1 m tall.	Usually unbranched and more than 1.2 m tall.
Stems.	Pubescent and setose.	Usually with rather sparse prickles or setae but otherwise nearly glabrous or with a longitudinal line of pubescence.
Leaves.	Darker dullish green with relatively shorter broader lobes and a greater tendency to become entire towards the apices of the stems.	Lighter green with relatively longer narrower more distincty serrate lobes.
Flowers.	Bright yellow with reddish-brown centre.	Somewhat greyish sulphur-yellow with purple centre.
Calyx-lobes.	Ovate-lanceolate or triangular. Median gland less conspicuous.	Lanceolate, long-acuminate to sub-caudate at the apex. Median gland larger and more conspicuous.

H. meeusei was for some time erroneously identified with *H. mastersianus* Hiern, a species belonging to «Furcaria typica» with clearly forked epicalyx bracts, and specimens are often to be found in herbaria under that name. I am indebted to Dr. A. D. J. MEEUSE for detailed information about the species and for the excellent and copious material from which the holotype has been chosen. The species is a common weed of cultivated ground in Southern Rhodesia and the Transvaal where nearly all the characters separating it from *H. cannabinus* occur in combination and the two species appear to be quite distinct. In Nyasaland and Mozambique it seems to be rare and is perhaps only a sporadic introduction. In Mozambique, I have seen only one specimen which appears to be genuine *H. meeusei.* Two or three others tend towards *H. cannabinus* especially in the increased pubescence of the stems and the longer calyx-lobes. There may have been some hybridization.

The following is a representative selection of specimens:

NORTHERN RHODESIA. **Northern Prov.:** Bangweulu, Kamindas, fl. & fr. 9.X.1911, *R. E. Fries* 954 (UPS). **Western Prov.:** Ndola, fl. & fr. 20.III.1954, *Fanshawe* F 979 (ϰ). **Central Prov.:**

Musha Hills, near Kanona, c. 1705 m, fr. 8.IV.1932, *G. W. St. Clair-Thompson* 1288 (K). Southern Prov.: near Mumbwa, fr. 1911, *Mrs. Macaulay* 720 (K); Choma, 1070 m, fl. & fr. III.1909, *F. A. Rogers* 8010 (K); Mazabuka, 1095 m, fl. IV.1933, *C. G. Trapnell* 1312 (K).

SOUTHERN RHODESIA. Northern Div.: N. Sinoia, Richmond B. Farm, Umboe Valley, 1130-1190 m, fl. & fr. 28.III.1950, *P. A. Colvile* 108 (BM; SRGH); Mazoe, 1280 m, fl. & fr. IV.1907, *F. Eyles* 538 (BM; SRGH). Western Div.: Besner Kobila Farm, 1430 m, fl. II.1953, *O. B. Miller* 1602 (SRGH); Bembesi Forest Reserve, fl. XI.1951, *F. L. Orpen* 31/51 (PRE; SRGH); Victoria Falls, fl. & fr. V.1915, *F. A. Rogers* 13157 (BM). Central Div.: Hartley, Poole Farm, fl. & fr. 15.IV.1950, *R. M. Hornby* 3170 (PRE; SRGH).

NYASALAND. Central Prov.: Dowa Distr., near Lake Nyasa Hotel, 425 m, fl. & fr. 31.VII.1951, *N. C. Chase* 3911 (BM; SRGH).

MOZAMBIQUE. Manica e Sofala: Barué, fr. 18.IX.1942, *F. A. Mendonça* 332 (LISC).

CAPRIVI STRIP. Bagani Pontoon, fl. 19.I.1956, *B. de Winter* 4341 (PRE).

OKAVANGO NATIVE TERRITORY. Okavango River, Diyona Camp, 3.2 km E. of Nyangana Mission Station, fl. & fr. 18.II.1956, *B. de Winter & W. Marais* 4757 (BM; M; PRE); Sambusu Camp, near Sambuzu Mission Station, fl. 3.III.1956, *B. de Winter & W. Marais* 4956 (PRE).

SOUTHWEST AFRICA. Tsumeb, fl. IV.1934, *K. Dinter* 7588 (BM; PRE); Grootfontein, between Numkaub and Bumbi, fl. 5.III.1958, *H. Merxmüller & W. Giess* 1827 (M).

TRANSVAAL. Zoutpansberg Distr.: 3.2 km W. of Hangklip, fr. 4.IV.1957, *A. D. J. Meeuse* 10234 (BM; PRE). Waterberg Distr.: 6.5 km N. of Pienaar River Station, 1065 m, fl. & fr. 18.III.1947, *L. E. Codd* 2749 (BM; PRE); Warmbaths, fr. 2.IV.1941, *D. G. Collett* in Nat. Herb. Pretoria 28247 (PRE); Warmbaths, fr. 7.IV.1928, *C. E. Moss* 16604 (BM). Pietersburg Distr.: Duivels Kloof, fl. IV.1932, *J. E. Elphinstone* s. n. (PRE). Pretoria Distr.: Hammanskraal, fl. 17.IV.1947, *D. G. Collett* in Nat. Herb. Pretoria 28233 (PRE); 31 km NE. of Pretoria, fr. 19.III.1947, *L. E. Codd* 2757 (PRE). Barberton Distr.: Magnesite

Mine, 365 m, fr. 20.IV.1956, *J. N. Thorncroft* 91 (PRE). Kruger National Park: Pretoriuskop, fl. & fr. III.1937, *A. A. Obermeyer* in Herb. Transv. Mus. 36101 (PRE).

SWAZILAND. Bremersdorp, fl. I.1935, *H. Hutchinson* 2 (PRE).

2. Sect. **BOMBYCELLA** DC.

2. **Hibiscus sabiensis** Exell, sp. nov.

Hibiscus micranthus var. *hispidus* Cufod. in Ann. Naturh. Mus. Wien, **56**: 48 (1948) pro parte excl. specim. *Dinter* 83. Syntypes from Transvaal, Sandrivier, fr. 5.III.1894, *Schlechter* 4591 (M) and from Southwest Africa, Hereroland, Okahandja, fl. & fr. 25.VII.1906, *Dinter* 83 (u). *Schlechter* 4591 is chosen as the lectotype.

Herba perennis ad 100 cm alta, caulibus teretibus patente-stellato-hispidis, pilis 1-1.5 mm longis. *Folia* stipulata, stipulis subulatis 5-7 mm longis, petiolata, petiolo ad 18 mm longo stellato-hispido; lamina ovata ad 5 X 3 cm supra subtusque sparsiuscule vel densiuscule stellato-hispidula apice obtusiuscula vel acutiuscula margine serrata basi rotundata, 5-7 nervis, nervis supra prominulis subtus prominentibus. *Flores* parvi albidi vel rosei solitarii axillares, pedunculo ad 7 mm longo hispido vix conspicue articulato. *Involucri bracteae* 5-6, filiformes 2 mm, longae. *Calycis lobi* ovato-triangulares, 3 X 1.5 mm, basi connati. *Petala* obovato-elliptica, 5 × 2.5 mm extra stellato-setulosa intus glabra. *Tubus stamineus* 2.5 mm longus, filamentorum partibus liberis brevissimis. *Styli rami* 1.5 mm longi. *Capsula* subglobosa, 6-8 mm in diam., minutissime pubescens. *Semina* gossypina.

SOUTHERN RHODESIA. Eastern Div.: Lower Sabi, east bank, under mopane on alluvium, 0.6-1 m tall, flowers white, pink-tinged, fl. & fr. 28.I.1948, *H. Wild* 2312 (SRGH, holotype).

TRANSVAAL. Zoutpansberg Distr.: Sandrivier, fr. 5.III.1894, *Schlechter* 4591 (BM; PRE).

This seems to be as distinct from *H. micranthus* L. f. as many of the other taxa in Sect. *Bombycella* which have been recognised as species. Not only is the indumentum different but the stipules are longer and the leaf-lamina is 5-7-nerved at the base (typically 3-5-nerved in *H. micranthus).*

Dinter 83, included by CUFODONTIS (loc. cit.) in *H. micranthus* var. *hispidus* is, in my opinion, probably *H. okavangensis* Exell, described below.

3. **Hibiscus okavangensis** Exell, sp. nov.

? *Hibiscus micranthus* var. *hispidus* Cufod. in Ann. Naturh. Mus. Wien, **56**: 48 (1948) pro parte quoad specim. *Dinter* 83.

Frutex 2.5 m altus, ramulis gracilibus teretibus appresse vel subpatente stellato-hispidis. *Folia* stipulata, stipulis setaceis 2-3 mm longis, petiolata, petiolo stellato-hispidulo ad 7 mm longo; lamina ovato-elliptica, 1-3.5 × 0.7-2 cm, supra subtusque sparsiuscule pilosa, pilis setaceis 2-3-ramosis vel stellatis, apice acuta, margine serrata, basi obtusa vel rotundata 5-nervis. *Flores* primo albidi mox rosei demum rubri, solitarii axillares, pedunculo 1-4 cm longo setuloso-piloso. *Involucri bracteae* 6, subulatae, 3-5 mm longae. *Calyx* 6-7 mm longus, lobis elongato-triangularibus 5 × 1.5 mm basi ad 2 mm connatis. *Petala* obovata, 9 × 5 mm, extra stellato-setosa intus glabra. *Tubus stamineus* 6-9 mm longa, filamentorum partibus liberis 0.5-1 mm longis in verticillos 3 dispositis. *Stylirami* 6 mm longi. *Capsula* subglososa, 10-12 mm in diam., minute pubescens. *Semina* albo-vel subfusco-sericea.

OKAVANGO NATIVE TERRITORY. Andara Mission Station, shrublet in forest, 2.4 m high, with pinkish-red flowers, fl. & fr. 14.I.1956, *de Winter* 4252 (BM, holotype; PRE).

Mbukushu names: mukena (the bush), kakehu (the flowers).

The change of flower-colour from white to red and the somewhat patent hispidulous indumentum recall *H. mutatus* N. E. Br. from the Matopos (Southern Rhodesia) and I consider *H. okavangensis* to be nearer to that species than to *H. micranthus* L. f. The differences are as follow: petals 9-10 mm long (10-20 mm in *H. mutatus);* leaves not lobed (usually 3-lobed in *H. mutatus).* The flowers are larger than in *H. micranthus* L. f. and the staminal column longer.

4. **Hibiscus mendoncae** Exell, sp. nov.

Suffrutex vel *herba* perennis ad 2-2.5 m altus, ramulis gracilibus teretibus appresse-stellato-setosis. *Folia* stipulata, stipulis subulatis 2-4 mm longis, petiolata, petiolo ad 8 mm longo ; lamina ambitu suborbicularis vel late ovata plerumque leviter 3-lobata, 1-3 × 0.8-2.5 cm, supra subtusque sparsiuscule vel densiuscule stellato-pubescens vel stellato-hispida, apice acuta vel rotundata, margine serrata, basi obtuse cuneata vel fere truncata 3-5-nervis, nervis supra subtusque prominulis. *Flores* albidi vel rosei vel juventute albidi et demum rosei vel purpurascentes solitarii axillares, pedunculo ad 3.5 cm longo stellato-pubescenti ad 7-10 mm sub apice articulato. *Involucri bracteae* plerumque 7, subulatae vel filiformes, 2-3 mm longae. *Calycis lobi* elliptico-triangulares, acuti, 5 × 2 mm, pubescentes, basi 1.5 mm connati. *Petala* reflexa, obovata, 15 × 10 mm, extra stellato-hispida, intus glabra. *Tubus stamineus* 6-8 mm longa, filamentorum partibus liberis 0.5 mm longis plerumque in verticillos 4 dispositis. *Stylirami* 2-3 mm longi. *Capsula* subglobosa, 10 mm in diam., minute pubescens. *Semina* gossypina.

Key to the Subspecies

Leaves densely stellate-setose ; mature stems with stellate hairs overlapping ; bracts of epicalyx 2-3 mm long . . . . subsp. *mendoncae*

Leaves sparsely stellate-setulose or stellate-pubescent, mature stems with stellate hairs scarcely contiguous ; bracts of epicalyx 2-4 mm long. . . . subsp. *transvaalensis*

Subp. **mendoncae**

Caulium pili ± imbricati. *Folia* dense stellato-hispida. *Involucri bracteae* 2-3 mm longae.

MOZAMBIQUE. Lourenço Marques : Maputo, Goba, prox. do rio Mesumati « erva ou subarbusto do sub-bosque da floresta de mucrusse», fl. & fr. 18.XII.1947, G. *Barbosa* 749 (LISC); Maputo, Fonte de Goba, « erva vivaz de 2 m », fl. & fr. 23.VIII.1944, *F. A. Mendonça* 1816 (LISC); Maputo, Goba, «erva ou subarbusto erecto de 2 m», fl. & fr. 22.XI.1944, *F. A. Mendonça,* 3019 (LISC, holotype); Maputo, Salamanga, « erva anual bienal ou vizaz subarbustiva dos lugares ruderais e terrenos cultivados abandonados ; flores brancas virando a purpura-vinoso depois da ântese », fl. & fr. 25.XI.1947, *Mendonça* 3523 (BM; LISC); Maputo, Goba, ravina do rio Umbelusi, «floresta de *Androstachys*»fl. & fr. I.1950, *J.* G. *Pedro* 3835 (LISJ); near km 68 on the Goba road, fl. 8.III.1945, *A. Esteves de Sousa* 130 (LISC; PRE); between Boane and Impamputo « subarbusto de 1.5 m do mato denso num morro rochoso, corolas brancas ou rosadas », fl. 30.VI.1944, *A. Rocha da Torre* 6652 (LISC).

NATAL. **Ingwavuma:** nearly 5 km NW. of Ingwavuma, 610 m, «slender upright shrub, 3 ft., white reflexed petals ageing pink, fl. 24.IV.1947, *L. E. Codd* 2832 (BM; PRE). **Zululand**: W. slopes of Lebombo Mts., near Ubombo, 400 m, «virgate shrub, 4 ft., flowers white turning purple on fading, petals reflexed, bushveld» fl. 16.X.1946, *J. P. H. Acocks* 13125 (PRE); Zululand, without precise locality, *Gerrard* 1638 (BM; K); top of Utschani Hill, « shrublet with pure white flowers», fl. 8.XI.1944, *J. Gerstner* 5134 (BM; PRE).

Subsp. **transvaalensis** Exell, subsp. nov.

Caulium pili vix contigui. *Folia* sparse stellato-hispidula vel stellato-pubescentia. *Involucri bracteae* 2-4 mm longae.

TRANSVAAL. **Zoutpansberg Distr.**: Wylies Poort, fl. 17.XII. 1928, *J. Hutchinson* 2045 (K); between Punch Bowl and Wylies Poort, fl. 6.X.1956, *A. D. J. Meeuse* 9714 (BM; PRE); Messina, fl. IX.1918, *Rogers* 21543 (K). **Waterberg Distr.**: Nylstroom, fl. 12.IV.1936, *Repton* 551 (PRE). **Pilgrims' Rest Distr.**: Mariepskop area, fl. & fr. 18.XI.1958, *D. J. B. Killick & R. G. Strey* 2470 (BM; PRE); Erasmus Pass, fl. 20.XI.1958, *Killick & Strey* 2526 (BM; PRE). **Lydenburg Distr.** ± 5 km. N. of Branddraai, fl. 17.X.1957, *A. D. J. Meeuse* 10281 (BM; PRE, holotype; M).

Barberton Distr. : Komati Poort, fl. 5.XII.1918, *Rogers* 22203 (K). Kruger National Park : Punda Maria, 460 m, fl. 15.X.1952, *Schyff* 982 (K; PRE).

The species occurs from the Transvaal to Natal and southern Mozambique. Subsp. *mendoncae* occurs in southern Mozambique and Natal ; subsp. *transvaalensis* is confined to the Transvaal where it is fairly widespread.

This species is close to *H. micranthus* L. f. and to several other related species in Sect. *Bombycella.* The differences between the nearest relatives are tabulated below :

H. micranthus	*H. mendoncae*	*H. praeteritus*	*H. mutatus*
Flowers white or pinkish.	*Flowers* white or pinkish turning to purplish.	*Flowers* usually red.	*Flowers* white turning to red.
Petals 5-8mm long.	*Petals* 15 mm long.	*Petals* 10-20 mm long.	*Petals* 10-20 mm long.
Indumentum of somewhat projecting hairs.	*Indumentum* appressed.	*Indumentum* appressed.	*Indumentum* of somewhat projecting hairs.
Leaves not lobed.	*Leaves* with a tendency to be 3-lobed.	*Leaves* not lobed.	*Leaves* with a tendency to be 3-lobed.
Bracts of epicalyx 2-3 mm long.	*Bracts of epicalyx* 2-3 mm long.	*Bracts of epicalyx* 5-10 mm long.	*Bracts of epicalyx* 4-7 mm long.
Staminal tube 2-2.5 mm long,	*Staminal tube* 6-8 mm long.	*Staminal tube* 7-12 mm long.	*Staminal tube* 6-8 mm long.
Style-branches 1-1.5 mm long.	*Style-branches* 2-3 mm long.	*Style-branches* 7-15 mm long.	*Style-branches* 5-7 mm long.

To put the case very briefly, *H. mendoncae* subsp. *transvaalensis* comprises plants, especially in the Zoutpansberg area, which have been referred to *H. praeteritus* R. A. Dyer with hesitation because their white or pinkish flower colour instead of the red of the latter species has caused doubt. *H. mendoncae* subsp. *mendoncae* comprises similar plants with a denser indumentum occupying a more easterly area. The two populations probably meet in the neighbourhood of Komati

Poort or Ressano Garcia but up to the present no noticeable overlap in characters has been found.

5. **Hibiscus gwandensis** Exell, sp. nov.

Herba perennis vel suffrutex, ramulis stellato-hispidis, pilis subpatentibus. *Folia* stipulata, stipulis subulatis 4 mm longis, petiolata, petiolo ad 11 mm longo; lamina ovata, 3 X 2.5 cm, supra stellato-setulosa, subtus hispidula, apice acuta margine irregulariter serrata, basi obtusa vel truncata 5-nervis. *Flores* primo albidi demum rubra, in cymas axillares 2-3-floras dispositi, pedunculo ad 10 mm longo, apicem versus inconspicue articulato. *Involucri bracteae* 7-9, anguste lineares vel subulato-filiformes, 2.5-4.5 mm longae. *Calyx* 6-8 mm longus, lobis 4-6 × 1.5-2 mm ovato-lanceolatis vel elongato-triangularibus ad basin paullo connatis. *Petala* obovata, 12-15 mm longa, extra sparse stellato-setosa intus glabra. *Tubus stamineus* 6 mm longus; filamentorum partibus liberis 0.5 mm longis. *Styli rami* 5 mm longi. *Capsula* subglobosa, 8 X 9 mm, pubescens. *Semina* (immatura) verisimiliter gossypina.

SOUTHERN RHODESIA. Southern Distr.: Gwanda, Marangudzi, on rim of ancient volcano, 700 m, fl. & fr. 10.V.1958, *R. Drummond* 5754 (BM, holotype; SRGH).

« Among syenite rocks. Erect, pure white fading red ».

Near *H. mendoncae* Exell and *H. okavangensis* Exell but differing from the former by the subpatent hairs of the branchlets, the longer bracts of the epicalyx and the longer style-branches and from the latter by the much larger flowers and the longer bracts of the epicalyx.

6. **Hibiscus barbosae** Exell sp. nov.

Herba perennis ad 1.5 m alta, basi lignosa, caulibus annuis pilis stellatis scabriusculis densis munitis. *Folia* stipulata, stipulis acicularibus 2 mm longis, petiolata, petiolo 3-4.5 cm longo, dense stellato-setoso; lamina ambitu ovata vel anguste oblonga ± profunde trilobata, 1.5-6 X 0.6-4 cm, apice obtusa vel rotundata margine irregulariter crenato-serrata basi plerumque truncata 5-7-nervis supra subtusque dense stellato-scabrido-pubescens nervis utrinsecus prominulis. *Flores* rubri, pedunculo ad 4 cm longo stellato-tomentoso, apicem versus articulato, in racemos terminales et in axillis foliorum superiorum dispositi. *Involucri bracteae* 5-7 lineares, 4-5 mm longae, dense pilosae. *Calycis lobi* lanceolati acuti, 8-10×2.5-3.5 mm, dense pilosi. *Petala* ad 20×15-18mm, extus sparse stellato-setosa. *Tubus stamineus* 5-6 mm longus, filamentorum partibus liberis 2-4 mm longis. *Ovarium* late ovoideum acutum, 5-costatum, 2x1.5 mm, minute pubescens, styli ramis gracilibus 4-4.5 mm longis. *Capsula* subglobosa, 8-10X8-10 mm, pubescens. *Semina* gossypina.

MOZAMBIQUE. Lourenço Marques : between Goba and the frontier, fl. & fr. 13.XII.1947, *Barbosa in Mendonça* 718 (LISC); Namaacha, ± 600 m, fl. & fr. 27.III.1957, *G. Barbosa ä F. Lemos* 7545 (LMJ, holotype); Maputo-Goba, fl. 8.I.1947, *Pedro & Pedrógão* 404 (LMJ; PRE), 482 (LMJ); Libombos, near Goba, 31.III.1945, *Esteves de Sousa* 121 (LISC; PRE).

TRANSVAAL. Nelspruit **Distr.** : Nelspruit, fl. XII.1917, *Breyer* 17961 (PRE); Nelspruit, fl. XII.1930, *Liebenberg* 2705 (PRE); Schagen, 760 m, *Liebenberg* 3378 (PRE). Barberton **Distr** : Steynsdorp, fl. I.1932, *Dieperink* 66 (PRE); Barberton, fr. XII.1916, *Pott* 5624 (SRGH); Joe's Luck, fl. XI.1907, *Thorncroft* 4989 (PRE). **Piet Retief Distr.** : Pongola, fl. 19.XII.1955, *Prosser* 1993 (PRE).

This species was identified by Burtt Davy (Man. Fl. Pl. & Ferns Transv. **2**: 281 (1932)) as *Hibiscus aponeurus* Sprague & Hutch., a species extending from Kenya to the Niassa Province of Mozambique and separated geographically from *H. barbosae* by a considerable gap. *H. barbosae* can be distinguished by the much longer free parts of the filaments (2-4 mm long and only 0.5 mm long in *H. aponeurus).* It is probably nearer in affinity to *H. rhodanthus* Gürke but is found at much lower altitudes and can be distinguished by the leaves, which have a tendency to be 3-lobed and are 5-7-nerved at the base (3-nerved in *H. rhodanthus*).

7. **Hibiscus richardsiae** Exell, sp. nov.

Herba perennis, 0.6 m alta, caulibus gracilibus erectis subpatente-stellato-pubescentibus. *Folia* stipulata, stipulis subulatis bruneis 3-5 mm longis, petiolata, petiolo ad 15 mm longo stellato-pubescenti; lamina vix lobata, ovata, 1-2.5 × 0.8-1.5 cm, supra + dense pubescens subtus setulosa pilis supra subtusque 2-3-ramosis, apice acuta margine serrata basi obtusa vel rotundata. *Flores* rubri solitarii, axillares, pedunculo ad 3-4 cm longo stellato-pubescenti, apicem versus articulate. *Involucri bracteae* 8-9, lineares, 3-5 mm longae, ciliatae. *Calycis lobi* lanceolati, acuti, ad 10 X. 3 mm, extra pilosi, intus fere glabri, basi breviter connati. *Petala* obovata, 1.5-2 X 1-1.3 cm, extra stellato-pilosa intus glabra. *Tubus stamineus* 9-10 mm longus, filamentorum partibus liberis 1-1.5 mm longis. *Styli rami* graciles, 6.5 mm longi. *Capsula* subglobosa, 9-10 mm in diam., minute pubescens. *Semina* (immatura) gossypina.

NORTHERN RHODESIA. Northern Prov. : Mporokoso Distr., escarpment road, Sumba, Lake Tanganyika, fl. & fr. 5.IV.1957, *Mrs. H. M. Richards* 9033 (BM; K, holotype).

« 2 ft. herbaceous plant growing among rocks in sandstone, flowers bright red, seeds white».

This species is very close to *H. aponeurus* Sprague & Hutch. and, except for the less densely hairy leaves (fairly densely pubescent rather than tomentose) it is difficult to give the usual diagnostic differences. Nevertheless the Rhodesian plant can be separated at once in the herbarium since it looks strikingly different in having a silver-grey appearance in contrast with the tawny indumentum characteristic of *H. aponeurus* and the stems, peduncles and petioles are more slender. The leaves of *H. richardsiae* usually have about 12-16 teeth on each side of the lamina while *H. aponeurus* has 18-20 on a similar-sized leaf-margin. In general appearance *H. richardsiae* is much more like *H. praeteritus* R. A. Dyer from which it differs by its more patent indumentum and more densely pubescent leaves.

The present tendency, which I am following, is to recognize a multiplicity of species in Sect. *Bombycella*. It is unlikely that all of them will survive further collecting and the filling in of gaps but I think the present system is better than the alternative one of having a large number of subspecific units grouped under *H. micranthus* L. f.

8. **Hibiscus coddii** Exell, sp. nov.

Suffrutex 1 m altus, caulibus teretibus, tomentosis, griseo-viridibus. *Folia* stipulata, stipulis subulatis vel acicularibus 3.5-5 mm longis, petiolata, petiolo ad 4 cm longo; lamina chartacea suborbicularis vel late ovata, 1.4 × 1.4 cm, supra subtusque dense tomentosa, apice obtusa vel rotundata, margine irregulariter serrata basi rotundata truncata vel paullo cordata, 5-7-nervis, nervis sub indumento fere occultis. *Flores* coccinei vel flavido-rubri, solitarii in axillis foliorum superiorum dispositi, pedunculo ad 15 mm longo tomentoso vix conspicue articulato. *Involucri bracteae* 5-6, elongato-triangulares vel lineares, 2-2.5 × 0.8-1 mm. *Calycis lobi* ovato-triangulares vel elongato-triangulares, 5-7 *X* 2 mm, stellato-tomentosi, basi ad 2 mm connati. *Petala* obovato-elliptica, 9 X 5.5 mm extra stellato-hispida, intus glabra. *Tubus stamineus* 6 mm longus, filamentorum partibus liberis 0.5-0.8 mm longis. *Ovarium* subglobosum 1.5 mm in diam., styli ramis 1.5-2 mm longis. *Capsula* subglobosa, 7-8 mm in diam., minute pubescens. *Semina* albido-vel brunneo-gossypina.

TRANSVAAL. Kruger National Park : 52 km NE. of Punda Maria, overlooking the Papiri River, 300 m, fl. & fr. 17.V.1949, *L. E. Codd & B. de Winter* 5536 (BM; PRE, holotype).

This is one of the small-flowered species near *H. micranthus* L. f. from which it can, however, be at once distinguished by its much longer staminal column. It is nearest to *H. okavangensis* Exell from which it can be separated by the much denser indumentum entirely covering and hiding the surface of the leaf-lamina.

9. **Hibiscus rupicola** Exell, sp. nov.

Suffrutex vel *herba* perennis, 1.5 m altus, caulibus teretibus dense stellato-tomentosis. *Folia* stipulata, stipulis subulatis

2-3 mm longis, petiolata, petiolo ad 10 mm longo stellato-tomentoso ; lamina chartacea late ovata vel suborbiculare, ad 5×4.5 cm, supra subtusque stellato-tomentosa, apice rotundata, margine crenato-dentata, basi rotundata vel truncata 5-7-nervis, nervis supra prominulis subtus prominentibus. *Flores* rubri, solitarii, axillares, pedunculo ad 15 mm longo, stellato-tomentoso 5 mm sub apice articulato. *Involucri brateae* lineares vel lineari-oblongae, 5-6 × 1.5-2 mm, tomentosae. *Calycis lobi* elongato-triangulares vel lanceolato-triangulares, ad 12X4.5 mm, apice acuti basi breviter connati. *Petala* obovata, 10-20x5-10 mm, extra stellato-pilosa intus glabra. *Tubus stamineus* 2 mm longa, filamentorum partibus liberis 3-3.5 mm longis. *Styli rami* 5-6 mm longi. *Capsula* subglobosa, 8-10 mm in diam., minute pubescens. *Semina* gossypina.

MOZAMBIQUE. Tete : Serra de Zóbuè, fl. & fr. 3.X.1942, *F. A. Mendonça* 579 (LISC, holotype).

« Erva ou subarbusto de 1.5 m da Petrideserta ; corola vermelha ».

This species is near to *H. aponeurus* Sprague & Hutch. but the bracts of the epicalyx are much broader and the staminal column much shorter, the latter indeed exceptionally so for Sect. *Bombycella* in comparison with the length of the style-branches.

10. **Hibiscus waterbergensis** Exell, sp. nov.

Hibiscus elliottiae sensu Burtt Davy in Man. Fl. Pl. & Ferns Transv. **2**: 282 (1932).

Frutex vel suffrutex erectus 1-2 m altus, ramulis dense minute stellato-tomentellis demum glabrescentibus. *Folia* cinerea vel flavescentia, stipulata, stipulis subulatis 2.5-4 mm longis, petiolata, petiolo 2-10 mm longo stellato-tomentello ; lamina chartacea ovata late ovata vel ovato-triangulare, 1.5-3.5X1-3 cm, supra subtusque dense minute stellato-tomentella, apice rotundata vel truncata 5-nervia, costa media supra prominula subtus prominente nervis venisque supra inconspicuis subtus prominulis. *Flores* rubri solitarii, axillares, pedunculo ad 3.5 cm longo, minute tomentello, 7-8 mm sub apice articulato. *Involucri bracteae* 7-8, triangulares vel elongato-triangulares, 2-2.5 mm longae. *Calyx* 7-8 mm longus, lobis ellipticis vel lanceolato-ellipticis, 6-7 × 2.5-3 mm, basi ad 1-2 mm connatis stellato-tomentellis. *Petala* oblongo-elliptica, ad 20 × 5-6 mm, extra stellato-pilosa, intus glabra. *Tubus stamineus* 5 mm longus, filamentorum partibus, liberis 2-3.5 mm longis. *Ovarium* ellipsoideum, 4 × 3 mm, styli ramis 1.5-4 mm longis. *Capsula* subglobosa, 12 mm in diam., minute pubescens. *Semina* matura dense gossypina.

TRANSVAAL. Waterberg Distr.: De Hoop, Trigonometrical Beacon, fl. & fr. XII.1919, *J. Burtt Davy* 18335 (BM); 4 km S. of Elmeston, fl. & fr. 8.IV.1948, *L. E. Codd* 4012 (BM; PRE, holotype); 17.5 km NW. from Hermannsdoorns on road to Elmeston, fr. 27.I.1955, *A. D. J. Meeuse* 9656 (PRE); 80 km from Du Toit, on Waterberg Sandstone, fl. & fr. 14.II.1929, *I. B. Pole Evans* 44 (K); Spruitskloof, fl. & fr. I.1958, *Theron* 2137 (BM; PRE).

Three South African species of Sect. *Bombycella*, *H. sulfuranthus* Ulbr., *H. castroi* Bak. f. & Exell, and the species described above, are distinguishable from the rest by having the young stems and leaves covered by a fine dense greyish or yellowish tomentellum. They can be separated as follows :

H. sulfuranthus	*H. castroi*	*H. waterbergensis*
Leaves narrowly oblong.	*Leaves* ovate to elliptic.	*Leaves* ovate to elliptic.
Flowers yellow.	*Flowers* white or somewhat yellowish.	*Flowers* red.
Bracts of epicalyx 1.5-2 mm long.	*Bracts of epicalyx* 2-6 mm long.	*Bracts of epicalyx* 2-2.5 mm long.
Petals 4-5 mm long.	*Petals* 6-7 mm long.	*Petals* 20 mm long.
Staminal tube 1 mm long.	*Staminal tube* 2-2.5 mm long.	*Staminal tube* 5 mm long.

It will be seen that *H. waterbergensis* has distinctly larger flowers than either of the others and the presence of an epicalyx distinguishes it at once from *H. elliottiae* Harv.

11. **Hibiscus barnardii** Exell, sp. nov.

Herba perennis, 1-2.5 m alta, caulibus teretibus stellato-tomentosis vel dense stellato-setosis. *Folia* stipulata, stipulis filiformibus 3-5.5 mm longis, petiolata, petiolo ad 18 mm longo stellato-setuloso ; lamina suborbicularis, 1-2.5 cm in diam., stellato-tomentosa, apice rotundata, margine serrata, basi cordata 5-nervis, nervis fere inconspicuis. *Flores* rubri solitarii axillares, pedunculo 10-20 mm longo medio articulato stellato-setuloso. *Involucri bracteae* 6-7, lineares, 5 X 0.6 mm. *Calycis lobi* elongato-triangulares, 8×1.5-2 mm basi ad 1.5 mm connati stellato-setulosi. *Petala* obovato-elliptica, 10-12×5-6 mm, extra stellato-setulosa intus glabra. *Tubus stamineus* 8 mm longus, filamentorum partibus liberis 0.5 mm longis. *Ovarium* subglobosum, 1.5 mm in diam., styli ramis 3-3.5 mm longis. *Capsula* mihi ignota.

TRANSVAAL. Lydenburg Distr.: Sekukuni, 1220 m, fl. 8.XI.1934, *W. G. Barnard* 156 (PRE); same locality, 760 m, fl. 15.XI.1934, *W. G. Barnard* 208 (PRE, holotype).

This differs from *H. aponeurus* Sprague & Hutch., with which it has been at times confused, by the suborbicular-cordate leaf-lamina (ovate and obtuse to rounded at the base in *H. aponeurus)* and the shorter style-branches.

3. Sect. **KETMIA** DC.

12. **Hibiscus jacksonianus** Exell, sp. nov.

Herba annua erecta, ad 50 cm alta, basi ramosa ramis arcuato-adscendentibus crispo-pubescentibus et sparsiuscule stellato-setosis, setis 1-5-ramosis. *Folia* stipulata, stipulis caducissimis filiformibus, c. 2 mm longis, petiolata, petiolo gracili, ad 2 cm longo, pubescenti ; lamina ambitu ovata vel suborbicularis, ad 3.5 *X* 3 cm, plerumque 3-secta vel 3-lobata, margine crenata vel serrata, basi cordata. *Flores* lutei oculo purpureo, 1.5-2.5 cm in diam., in cymas terminales parvas 2-5-floras dispositi, pedunculo 4 mm longo. *Involucri bracteae* 7-8, anguste lineares vel filiformes, 3-4 mm longae. *Calyx* 10-12 mm longus, lobis triangularibus basi 2-3 mm latis, ad 3-5 mm connatis dense pubescentibus. *Petala* anguste obovata, 2.5 cm longa. *Tubus stamineus* c. 6 mm longus, filamentorum partibus liberis 0.5 mm longis. *Styli rami* 1.5 mm longi (immaturi). *Capsula* subglobosa, 6-7 mm in diam., valvis aristatis. *Semina* angulato-subreniformia, 2.5 X 2 mm, minute lepidota.

NYASALAND. Southern Prov. : Namwera Escarpment, Jalasi, 1120 m, fl. 15.III.1955, *A. W. Exell, F. A. Mendonça & H. Wild* 912 (BM; SRGH, holotype).

« In *Brachystegia-Julbernardia-Cussonia* woodland and old cultivation ».

This species is probably nearest to *H. schinzii* Gürke but differs as follows :

H. jacksonianus	*H. schinzii*
Habit. Erect with slender arcuate-ascending branches.	*Habit.* Prostrate, stem stouter.
Indumentum. 1-5-branched bristles in addition to the pubescence.	*Indumentum.* Long simple bristles in addition to the pubescence.
Flowers. About 2.5 cm in diam.	*Flowers.* About 4 cm in diam.
Peduncle. Up to 0.4 cm long in our material but greater lengths are to be expected.	*Peduncle.* Up to 7 cm long.

This species is named after Mr. GEORGE JACKSON who was with us when it was found.

UN *PLANTAGO*
NOUVEAU DE MADÈRE

par

ANDRÉ **LAWALRÉE**

Jardin Botanique de l'État, Bruxelles

MONSIEUR J. MALATO-BELIZ, qui m'honore de son amitié, m'a communiqué quatre échantillons de *Plantago* recueillis à Madère et appartenant à une espèce de la section *Arnoglossum* DECNE. qu'il ne parvenait à identifier à aucune des espèces déjà décrites. Ce *Plantago* montre des affinités étroites avec *P. leiopetala* LOWE, mais, par un ensemble de caractères, s'écarte de la description que PILGER (Plantaginaceae, p. 327, in ENGL. et DIELS, Das Pflanzenreich, IV. 269, 102 Heft, 1937) donne de cette espèce, et des spécimens de BORNMÜLLER (Porto Santo, Pico do Facho, Mai 1900, *Bornmüller* 1166, BR) reconnus par PILGER comme appartenant bien au *P. leiopetala* et dont des exemplaires se trouvent dans l'Herbier du Jardin Botanique de l'Etat à Bruxelles. Certains des caractères différentiels ont valeur spécifique dans ce groupe de *Plantago* : ainsi, le nombre des nervures des feuilles. D'autre part, les deux plantes sont très différentes d'aspect. Ainsi, j'estime nécessaire de décrire comme espèce nouvelle les *Plantago* découverts par Monsieur MALATO-BELIZ.

Plantago Malato-Belizii LAWALRÉE sp. nov. e sect. *Arnoglossum* DECNE., ab affini *P. leiopetala* LOWE praesertim statura majore, foliis majoribus etiam adultis villosis et 11-15-nervatis, sepalo duplici antico villoso differens.

Herba perennis ; radix elongata, crassa, radicellas graciles emittens ; caulis indivisus, usque 6 cm longus et 11 mm crassus, rugosus, basibus petiolorum et lana longa albida apice obtectus, interdum partes inferiores pedunculorum ceterum delapsorum ferens. *Folia* pauca apice caulis rosulata, longe petiolata et triquetro-vaginata, elliptica, basin versus sensim attenuata, remote obtuse vix denticulata, apice acuta, cum petiolis 25-28 cm longa et 6,5-9 cm lata, adulta ciliata et in utraque pagina sed valde copiosius in nervis villis albidis longis pilosa, membranacea, sicca griseo-viridia, nervis longitudinalibus 11-15 supra parum anguste impressis, subtus anguste prominulis. *Spicae* ellipsoideae, breves, 1,5-2,7 cm longae et 1,5-1,9 cm latae, densissimae ; pedunculi erecti, usque ad 45 cm longi et basi 3 mm crassi, sulcati, ima basi excepta dense villosi, villis albidis longis antrorsis ad patulis ; bracteae rotundato-ovatae, apice longe angustatae, 5-7 mm longae et 3-3,5 mm latae, laete brunnescentes, basi villis albidis paucis ciliatae, carina angusta in dorso villis paucis ornata percursae. *Flores* sepalis anticis coalitis sepalum late obovatum formantibus, breviter apice bilobatum, 4 mm longum et 2,8-3 mm latum, dorso basi et apice villosum, carinis versus lobos divergentibus, ad basin loborum desinentibus ; sepala postica libera, elliptica, inaequilateralia, apice breviter angustata, in fere tota carina villosa, carina angusta prominula ; corollae tubus 4,5-5 mm longus, lobi lanceolati ad ovati, 2,5-3 mm longi, stria brunnea medio notati, praeter striam laete brunnescentes et hyalini. *Fructus* desunt.

MADEIRA: Descida do Pico Ruivo para o Caldeirão do Inferno, alt. 1700 m, 4. Junho 1954, *J. Malato-Beliz* n.º 795 (holotypus ELVE).

Plantago Malato-Belizii a été recueilli sous les arbres de la laurisilve, sur une pente très forte exposée au Nord, qui appartient au rebord d'un très large et très profond cratère volcanique d'un type répandu dans l'île de Madère. Les strates arbustive et herbacée étaient très pauvres en cet endroit. Aucun autre *Plantago* n'a été observé à proximité.

La découverte à Madère d'un *Plantago* nouveau de la section *Arnoglossum* n'a rien d'extraordinaire au point de vue phytogéographique.

Bien des groupes végétaux méditerranéens ont différencié des endémiques en Macaronésie. *Plantago Malato-Belizii* présente ainsi des vicariances d'un type classique. On ne peut mieux les définir qu'en rappelant brièvement l'aire des divers *Plantago* de la section *Arnoglossum*:

1 — *P. lanceolata* L.: Europe entière sauf l'extrême nord, bassin Méditerranéen, Açores, Turkestan, Sibérie, Himalaya occidental, Cachemire ;

2 — *P. leiopetala* LOWE : archipel de Madère : uniquement connu de l'île de Porto Santo, au Pico do Facho, alt. 500 m, rochers ;

3 — *P. Malato-Belizii* LAWALRÉE : archipel de Madère : uniquement connu de l'île de Madère, Caldeirão do Inferno, alt. 1700 m, laurisilve ;

4 — *P. altissima* L. : depuis l'Italie septentrionale jusqu'au domaine Danubien hongaro-tchécoslovaque, alluvions ;

5 — *P. lacustris* MAIRE : Maroc, Atlas moyen, lieux humides, alt. 1200-1600 m ;

6 — *P. argentea* CHAIX : nord-est de l'Espagne (Catalogne), Cévennes, bord sud des Alpes, Apennins, Istrie, Hongrie, Siebenbürgen et Transsilvanie, Balkans septentrionaux (peut-être le nord de l'Asie mineure), sols calcaires secs, pierreux, subalpin et montagnard ;

7 — *P. lagopus* L. : tout le bassin Méditerranéen, mais se raréfiant dans l'extrême est: Macaronésie, toute l'Afrique du Nord du Maroc à l'Egypte, Portugal, Espagne méridionale, centrale et orientale, France méditerranéenne, Italie, Istrie méridionale, Dalmatie, Bulgarie méridionale, Grèce et îles Grecques, Macédonie, Thrace, Asie mineure, Taurie, Transcaucasie (mer Caspienne), Palestine, Syrie, Arabie pétrée, localités isolées en Mésopotamie et Perse méridionale.

SUMÁRIO

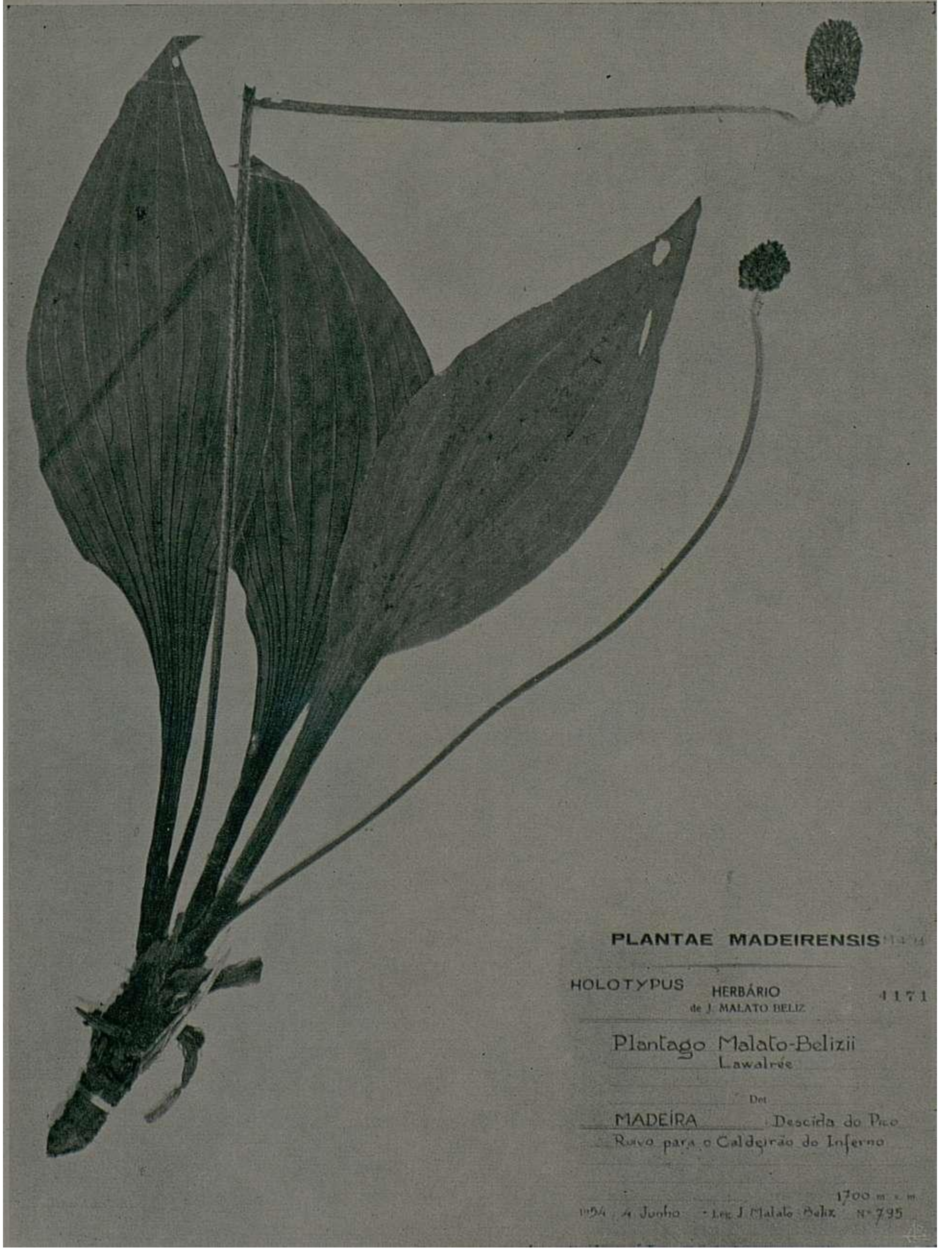
Com base no material de *Plantago* herborizado por J. MALATO-BELIZ na Ilha da Madeira, em 1954, descreve-se uma nova espécie deste género (*Plantago Malato-Belizii*) a qual se situa na secção *Arnoglossum* DECNE.

A nova espécie tem certas afinidades com o *P. leiopetala* LOWE conhecido da Ilha de Porto Santo, mas distingue-se deste por caracteres bem evidentes.

Foi colhida no interior da Ilha, a cerca de 1700 m de altitude, sob as árvores da laurisilva, em encosta de forte inclinação exposta a N, próximo do Caldeirão do Inferno.

Para melhor definir a posição do novo *Plantago*, relembra-se a distribuição geográfica de cada uma das espécies da secção *Arnoglossum* DECNE.

Pl. I



PLANTAE MADEIRENSIS

HOLOTYPUS HERBÁRIO de J. MALATO BELIZ 4171

Plantago Malato-Belizii
Lawalrée

Det.

MADEIRA Descida do Pico Ruivo para o Caldeirão do Inferno

1700 m s. m.

1954 4 Junho Leg. J. Malato Beliz N.º 795

Type du Plantago Malato-Belizii LAWALRÉE

PLANCHE II

Plantago Malato-Belizii LAWALRÉE (herb. *Malato-Beliz* 795, holotypus) :

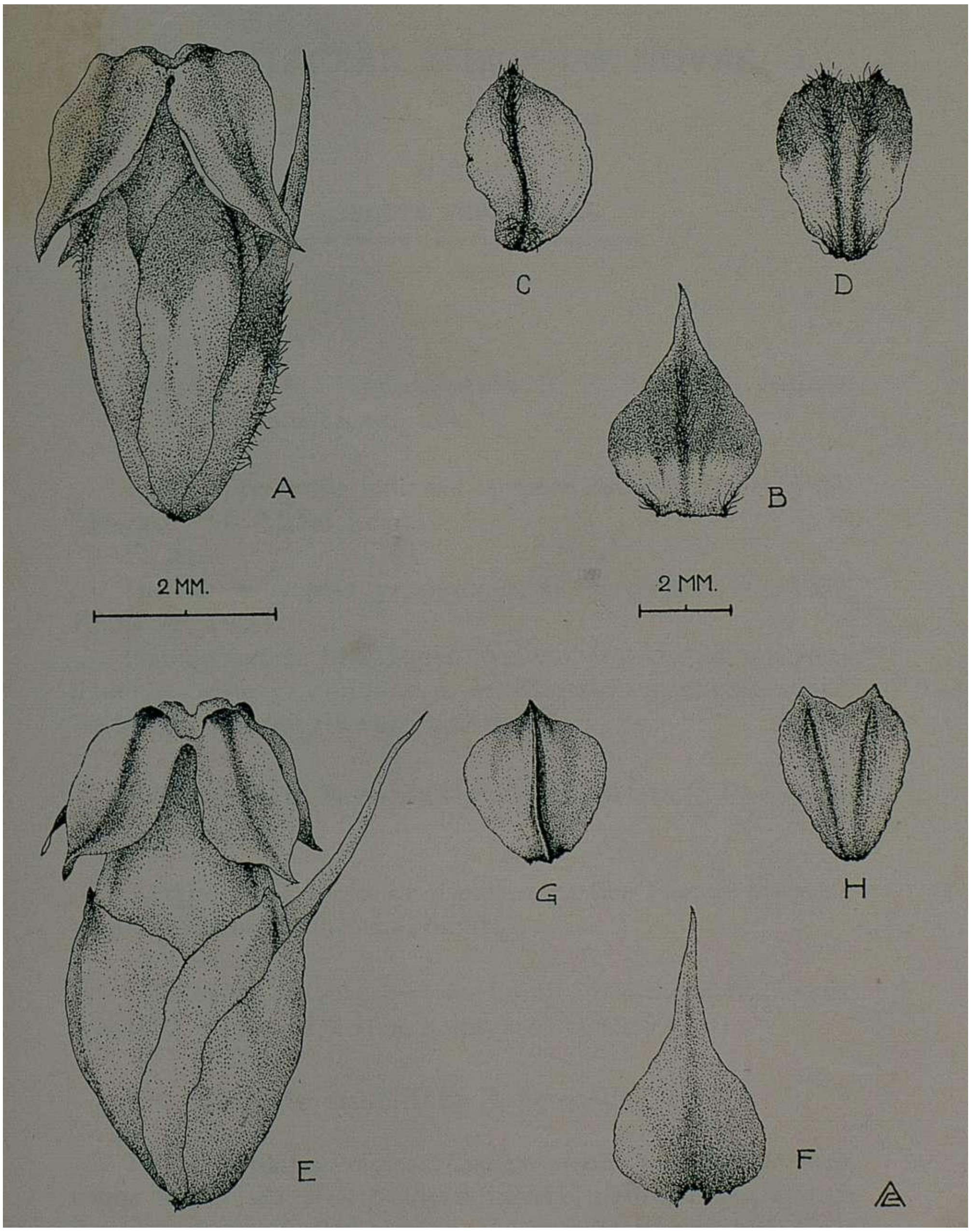
A — Fleur et bractée.
B — Bractée vue par la face dorsale.
C — Sépale postérieur vu par la face externe.
D — Sépale antérieur double vu par la face externe.

Plantago leiopetala LOWE (herb. *Bornmüller* Pl. exsicc. Mader. 1166, BR) :

E — Fleur et bractée.
F — Bractée vue par la face dorsale.
G — Sépale postérieur vu par la face externe.
H — Sépale antérieur double vu par la face externe.

Del. A. Cleuter

PL. II



CUCURBITACEAE AFRICANAE NOVAE — I

AUCTORE

ROSETTE FERNANDES
Instituti Botanici Universitatis Conimbrigensis

Trochomeria brachypetala R. E. Fries var. **foliata** R. Fernandes, var. nov.

A typo praesentia foliorum tempore anthesis differt. *Folia* linearia, 4,5-6 X 0,2-1,3 cm.

Fl. Nov.

Habitat in Angola, pr. *Malanje,* in xerophytis silvis, 1932, *Young* 926 (BM).

Habitat etiam in Angola, regione *Moxico,* ad margines fluminis *Luena* pr. *Vila Luso,* in arenosis xerophytae silvae, 7-XI-1932, *Young* 1379 (BM, holotypus).

Trochomeria Bussei Gilg var. **tripartita** R. Fernandes, var. nov.

A typo foliis profunde tripalmatipartitis (neque integris), segmentis circ. 2 X 0,25 cm, differt.

Fl. Oct.

Habitat in Angola, regione Lunda, loco dicto *Xa-Sengue,* 3-X-1932, *Young* 1032 (BM, holotypus) et 1058 (BM).

Trochomeria multiflora R. Fernandes, sp. nov.

Herba perennis, dioica. *Caules* erecti vel adscendentes, usque 25 cm alti, striato-sulcati, inferne glabrescentes, apicem versus canescente-pilosi, verisimiliter a radice crassa orti. *Folia* in speciminibus masculis visis sub anthesi non evoluta; in specimine femineo lineari-lanceolata, obtusa, breviter petiolata, 2,5 X 0,4 cm, breviter denseque pilosa. *Flores musculi* virides, in racemos 5-11-floros, solitarios vel fasciculatos in axilla bracteae circ. 4 mm longae, dispositi; pedunculi communes usque circ. 2,3 mm longi, puberuli; pedicelli 3,5-5 mm longi pr. basin bracteolati, bracteolis subulatis 1,5 mm longis. *Calycis tubus* cylindrico-campanulatus, circ. 5,5-6 mm longus et 3,5 mm diam., extus sparse subadpresseque pilosus. *Sepala* minutissima. *Petala* patula, triangularia, acutiuscula, 5 × 2,3 mm, carnosula, extus sparse pilosa, intus papillosa. *Staminum filamenta* 3, circ. 1,5 mm longa, paulo supra (circ. 1,5 mm) basin calycis tubi inserta; capitulum antheriferum circ. 2,4 mm longum. *Pistillodium* sphaericum, circ. 0,6 mm diam. *Flores feminei* solitarii vel bini; pedicelli 6-8 mm longi; corolla maris. *Ovarium* fusiforme, sparse pilosum.

Fl. Sept.

Ic. nostr. Tab. I.

Hab. in Angola, regione Benguella, pr. Missionem Catholicam Huambensem, IX-1942, Pater *Ch. Tisserant* A. 169 (COI, holotypus).

« Fleurs vertes avant les feuilles. Savane boisée près de la Mission de Huambo ».

Affinis *T. polymorphae* Welw. a qua racemis multifloris neque paucifloris, pedicellis longioribus (usque 5 mm neque usque 2 mm), calycis tubo minore, pistillodio sphaerico vix 0,6 mm diam. neque cylindrico circ. 2 mm longo, etc. differt.

Momordica angolensis R. Fernandes, sp. nov.

Herba scandens, usque 2 m alta, odore foetido. *Caules* graciles, sulcati, sparse tenueque villosi vel glabrescentes. *Folia* intense viridia, 4-12 × 4-12 cm, supra glabra, subtus puncticulato-scabra, ad nervos et marginem breviter villosa, ambitu ovata, usque infra medium 3-lobata, lobis late ovatis, acutis, lateralibus ascendentibus et dentatis vel dentato-lobatis, mediano subintegro vel ondulato-dentato; petioli 1,5-6 cm longi, sulcati, glabri vel sparse villosi. *Cirrhi* simplices, glabri. *Flores masculi* solitarii; pedunculi graciles, 3-11 cm longi, glabri vel sparse villosi, apice bracteati; bractea sessilis, late ovata, 10-15 × 12--16 mm, extus sparse pilosa, florem juvenilem amplectens;

pedicelli circ. 2-5 mm longi, dense villosi, post maturitatem florum paulatim (usque 30 mm) elongantes. *Calycis tubus* 9 mm longus. *Sepala* anguste lanceolata, acuta, dense villosa, 8 X ×2,5 mm. *Petala* albida, extus villosa, obovato-lanceolata, 27×13 mm. *Flores feminei* solitarii; pedunculi fructifer 2,5-10 cm longi, infra medium bracteati. *Fructus* immaturus fusiformis, 3 X 1 cm, maturus (sec. coll.) ruber, circ. 5,5×4 cm.

Fl. et fr. Jan.

Ic. nostr. Tab. II.

Habitat in Angola, regione Cuanza Merid., loco *Capir*, pr. flumen *Carloaongo-Cuvo*, alt. 850 m, 25-I-1933, *Gossweiler* 9973 (COI, holotypus; LISJC).

« Trepadeira anual de 2 m de altura, trepando pelos arbustos próximos; fétida; fruto do tamanho de ovo de pata, vermelho brilhante na maturação completa. Frequente na vegetação secundária dos cafezais naturais. Clímax de Laurisilva ».

Habitat etiam in Angola, regione Huilla, s. d., *Antunes* s. n. (COI); s. d., Herb. Miss. Huill. 184 et 275 (LISC).

Ad *M. angustisepalam* Harms forma foliorum accedit, sed floribus solitariis, bracteis minoribus, sepalis acutis nec acuminatis, etc. valde distincta.

Affinis etiam *M. involucratae* E. Mey. a qua lobis foliorum acutis nec obtusis, floribus majoribus, sepalis lanceolatis acutis 8X2,5 mm neque sepalis ovato-suborbicularibus 7×5-6 mm, etc. differt.

Coccinia Keayana R. Fernandes, sp. nov.

Coccinia grandis P. Sousa in An. Junta Invest. Ultr. VII, 2: 13 (1952) non *C. grandis* (L.) J. O. Voigt.

Coccinia sp. A. Keay in Hutch. & Dalz., Fl. W. Trop. Afr. ed. 2, I: 216 (1954).

Herba annua, scandens, usque 3 m alta. *Caules* graciles, glabri, angulato-sulcati. *Foliorum petiolus* tenuis, supra breviter villosus, basi incrassatus et incurvus, 2,5-5,5 cm longus; lamina 7-12,5×6-11 cm, membranacea, supra obscure viridis, subtus pallidior, utrinque minute punctata, 3-palmatipartita, lobis lateralibus oblongis, ascendentibus, mediano paulo longiore, lanceolato, omnibus acutis vel acutissimis, margine denticulatis vel leviter sinuato-denticulatis ; sinus basilaris circ. 1,5 cm profundus. *Cirrhi* tenues, simplices. *Flores masculi* racemosi ; racemi laxi, solitarii vel comitati pedunculo unifloro cumaxillare; pedunculi communes graciles, 1-2,3 cm longi, 3-8-flori; pedicelli usque 1,5 cm longi; bracteolae breves, caducae vel persistentes. *Calycis tubus* glaber, 6 mm longus et 11 mm latus ; dentes lineares, 3-4 mm longi. *Corolla* lutescens, 2,5 X 1,2 cm, cylindrico-campanulata, 5-lobata, lobis obtusiusculis, circ. 7 mm longis. *Antherae* 5 mm longae, in capitulo globoso connatae ; filamenta coalita. *Flores feminei* solitarii ; pedunculi 1,5-2 cm; fructus immaturus obovoideus.

Fl. Jul.

Ic. nostr. Tab. III.

Habitat in Guinea, loco dicto *Carine*, VIII-1933, *Espírito Santo* 603 (COI, holotypus) et 631 (L1SJC).

« Trepadeira anual, da floresta hidrófila. Flores brancas ».

Etiam in Guinea inter *Cacine* et *Guileje*, 1-VIII-1945, *Espírito Santo* 2151 (COI; LISC).

Habitat etiam in Liberia, 29-VII-1926, *Linder* 121 (K).

« Firestone Plantation n.° 3, Du River ; climbing vine with salmon colour flowers».

Habitat etiam in vulgo dicto *Serra Leoa*, loco *Jigaya*, alt. circ. 350 m, 28-IX-1914, *Thomas* 2844 (K) ; *Bumban*,30-VIII-1928, *Deighton* 1221 (K) ; *Moyamba*,25-VIII-1931, *Deighton* 2217 (K).

«Cucurbitaceous climber in high bush. Cream-coloured flowers. NDOGBO-GOJAI (Mende) =bush egusi. The plant is pounded and warmed and tied on the body for side pains ». (*Deighton* 2217).

Affinis C. *Barteri* (Hook. f.) Keay a qua caulibus, petiolis, cirrhis et pedunculis gracilioribus, foliis tenuioribus cum lobis angustioribus et saepe acutioribus, racemis laxis nec densis, floribus masculis distincte pedicellatis nec subsessilibus, alabastris apiculatis nec obtusis, calycibus glabris neque puberulis, dentibus calycis 3-4 mm longis neque vix 1-2 mm longis, floribus femineis solitariis neque racemosis, differt.

Kedrostis gracilis R. Fernandes, sp. nov.

Planta perennis, dioica. *Radix* crassa, cortice suberoso irregulariter fissurato-squamato, vestita. *Pars caulis* basilaris brevis, incrassato-lignosa, ramos plures ferens. *Rami* graciles, usque 25 cm longi, simplices vel saepe plus minusve ramulosi, angulato-sulcati, juniores breviter denseque villosi. *Folia* minima vix usque 1 × 1 cm, late ovato-subtrilobata, obtusa, margine crenulato-crispa, utrinque viride-cinerea et dense breviterque villoso-hirta, sinu basilare angusto; petiolus usque 6 mm longus, breviter hispidus. *Cirrhi* simplices, capillares, flagelliformes, faciliter fracti. *Flores masculi* in racemos breves, densos, axillares, dispositi ; pedunculus communis usque 3-4 mm longus, leviter hirtellus ; pedicelli brevissimi, post abscessionem florum elongati. *Calycis tubus* campanulatus, 2,5 mm longus et 2,4 mm diam., breviter hirtellus. *Sepala* triangularia, 0,5 mm longa. *Petala* ovata, obtusa, trinervia, circ. 1,75 X 1,7 mm. *Antherae* 3, ovato-ellipticae, loculis paulo incurvis, connectivo lato, utrinque ciliolato, apice appendiculato ; filamenta brevíssima pr. medium calycis tubi affixa. *Pistillodium* cupulliforme. *Flores feminei* et *fructi* ignoti.

Fl. Dec.

Ic. nostr. Tab. IV.

Habitat in Angola, *Moçâmedes* distr., ad margines viae *Caracul* pr. locum dictum *Dois Irmãos*, 21-XII-1955, *Torre* 8265 (LISC, holotypus).

« Erva vivaz, suculenta, dos lugares pedregosos, desérticos. Ao km 55 da estrada Moçâmedes-Caracul (Dois Irmãos) ».

Affinis *K. cinereae* Cogn. a qua ramis, petiolis et pedunculis masculis brevioribus, foliis minoribus, margine crispis neque vix crenulatis, petalis minoribus etc. differt.

Affinis etiam *K. Engleri* Gilg (ex descript.) a qua floribus racemosis neque solitariis praecipue differt.

Cayaponia multiglandulosa R. Fernandes, sp. nov.

Bryonopsis laciniosa sensu Norman in Journ. of Bot. LXVII, Suppl. Polypet.: 195 (1929) non *B. laciniosa* (L.) Naud.

Herba monoica, alte scandens. *Caules* ramosi, profunde sulcati, juniores pilosi, seniores glabri. *Folia* 7-15x6-14 cm, viridia, subtus pallidiora, vix puberula vel glabra, basi in petiolum decurrentia, 3-5-palmatipartita, lobis ovatis, mediano paulo majore, omnibus irregulariter dentato-lobatis, dentibus obtusiusculis, mucronatis; nervi laterales paulo supra basin 2-3-furcati; veni et venuli subtus conspicue reticulati, vix prominuli; glandulae usque 9, sessiles, brunneae, ovatae vel orbiculares, fere punctiformes, sinum basis foliorum marginantes; petiolus striatus, sparse villosus, 3-10,5 cm longus. *Cirrhi* 2-3-furcati. *Flores masculi* solitarii, pedicello 5 mm longo. *Calycis tubus* turbinato-campanulatus, 5-6 mm longus, apice 5 mm latus. *Petala* oblonga, apice rotundata, 6-5×2-3 mm. *Staminum filamenta* 3, circ. 4 mm longa, in fundo calycis tubi inserta; antherae ca. 3 mm. *Pistillodium* sessile, cupulliforme, subtrilobatum. *Flores feminei* solitarii vel in racemos 2-3 (-4)-floros dispositi; pedicelli puberuli, 3-4 mm longi. *Calycis tubus* campanulatus, basi constrictus, 3 mm longus, apice 3 mm latus; lobi erecti, circ. 1,5 mm longi. *Petala* oblongo-lanceolata, 5-6×2mm, albescentia, extus brevissime papilloso-tomentosa, intus longiuscule villosa. *Ovarium* elliptico-ovoideum, glabrum, minute areolato-punctatum, loculis 1-ovulatis; stylus ca. 5 mm longus; stigmata 3, reflexa.

Fl. et fr. Sept.

Ic. nostr. Tab. V.

Habitat in Angola, regione Cuanza Septentr. loco dicto *Granja de S. Luis* pr. *Cazengo,* III-1909, *Gossweiler* 4590 (BM; COI, holotypus; BM).

«Anual, trepando pelas árvores, nas orlas da floresta higrófila».

Affinis *C. africanae* (Hook. f.) Exell a qua foliis majoribus (usque 15×14 neque usque 9,5×9,5 cm), profundius divisis

(3-5-palmatipartitis neque fere indivisis vel 3-palmatilobatis) in petiolum decurrentibus; glandulis basis foliorum numerosioribus (usque 9 neque usque 3); filamentis longioribus; etc. differt.

Nunc est nobis gratias agere Clariss. Vir. Dr. G. TAYLOR, Herbarii Kewensis Directori, pro speciminibus Cocciniae quae nobiscum benevole communicare voluit.

Etiam Rev. M. PÓVOA DOS REIS, pro auxilio in revisione textus latini gratias habemus.

TABULAE

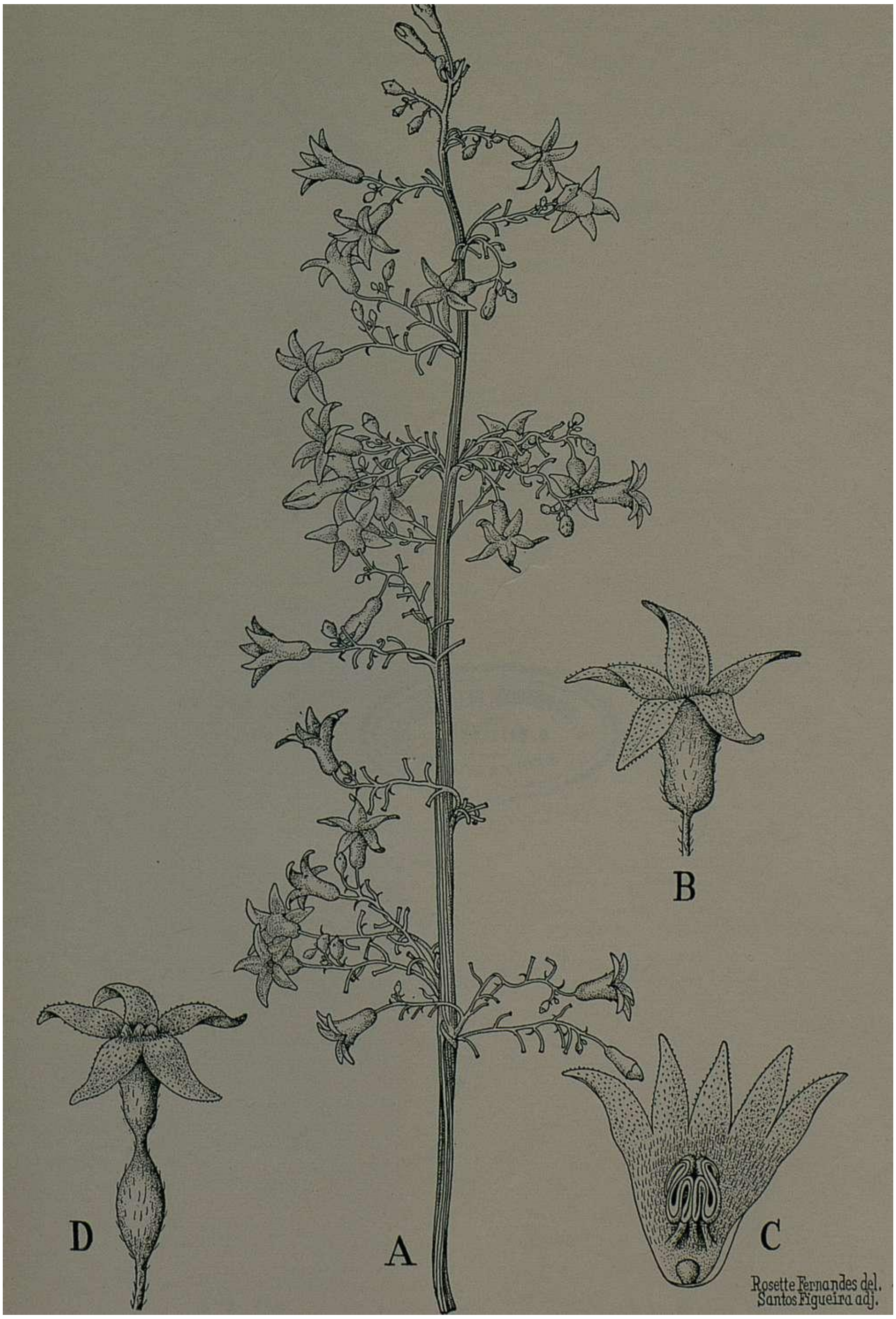
TABULA I

Trochomeria multiflora R. Fernandes

A — **Caulis** partes mediana et **superior.** × 1.
B — Flos **masculus.** × 3.
C — Idem explanatus capitulum **antheriferum** et pistillodium **ostendens** × 3.
D — Flos femineus. × 3.

(**Specimen** *Tisserant* A 169)

TAB. I



Trochomeria multiflora R. Fernandes

TABULA II

Momordica angolensis R. Fernandes

A — Pars **caulis.** X **0,5.**
B — Bractea **lateraliter visa.** ×1.
C — Bractea cum alabastro superne visa. ×1.
D — Flos masculus. × 1.
E — Stamen. X 2.

(Specimen *Gossweiler* 9973)

TAB. II

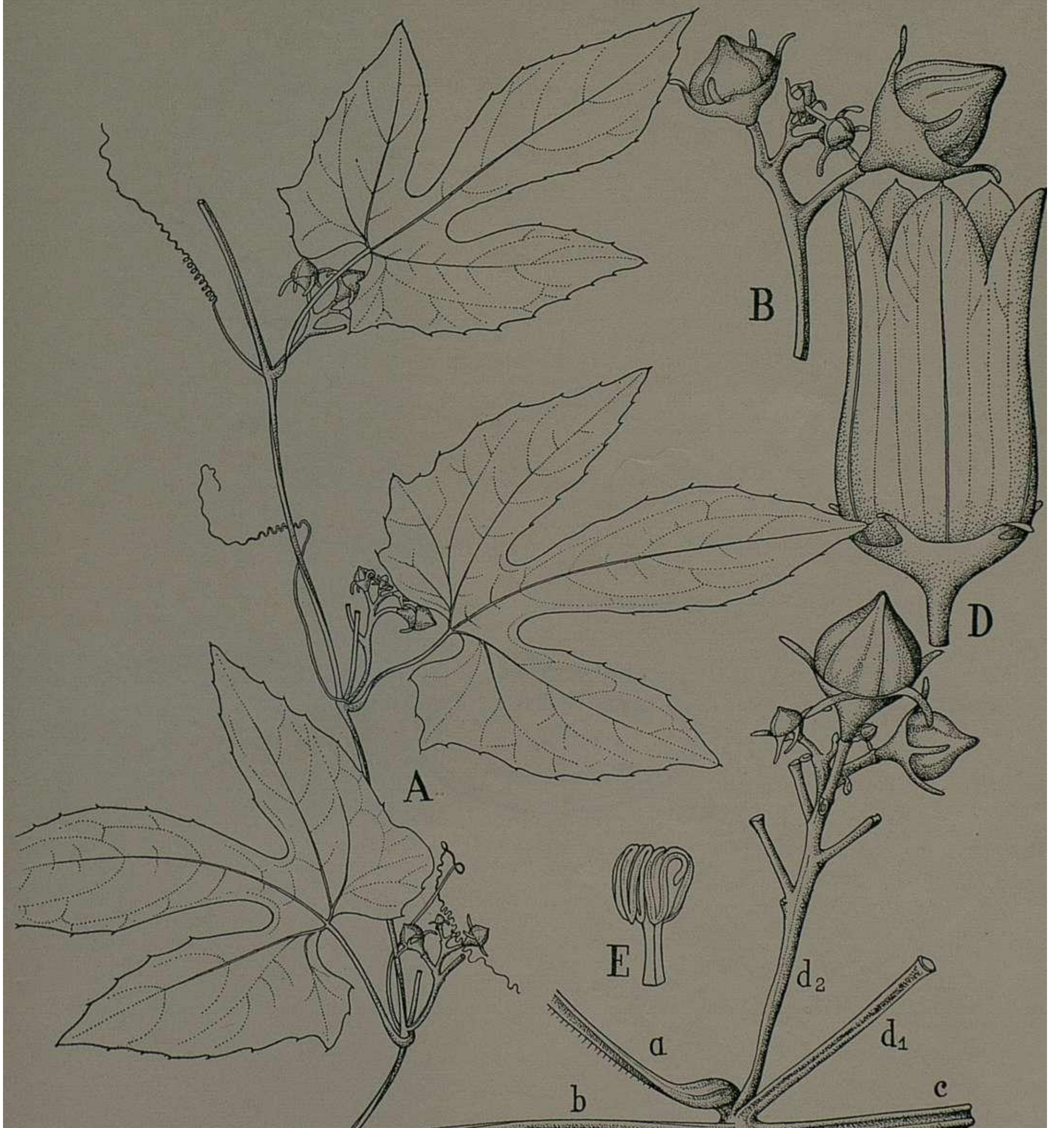
Momordica angolensis R. Fernandes

TABULA III

Coccinia Keayana R. Fernandes

A — Pars caulis plantae masculae. X 0,5.
B — Inflorescentia mascula. X 2.
C — Pars caulis (c) cum racemo (d_2), pedunculo unifloro (d), parte basilare petioli (a) et parte cirrhi (b). × 2.
D — Flos masculus. × 2.
E — Capitulum antheriferum. X 2.

(A, B — Specimen *Espírito Santo* 603 ; C, D, E — Specimen *Deighton* 2217).



Rosette Fernandes del.
Santos Figueira adj.

Coccinia Keayana R. Fernandes

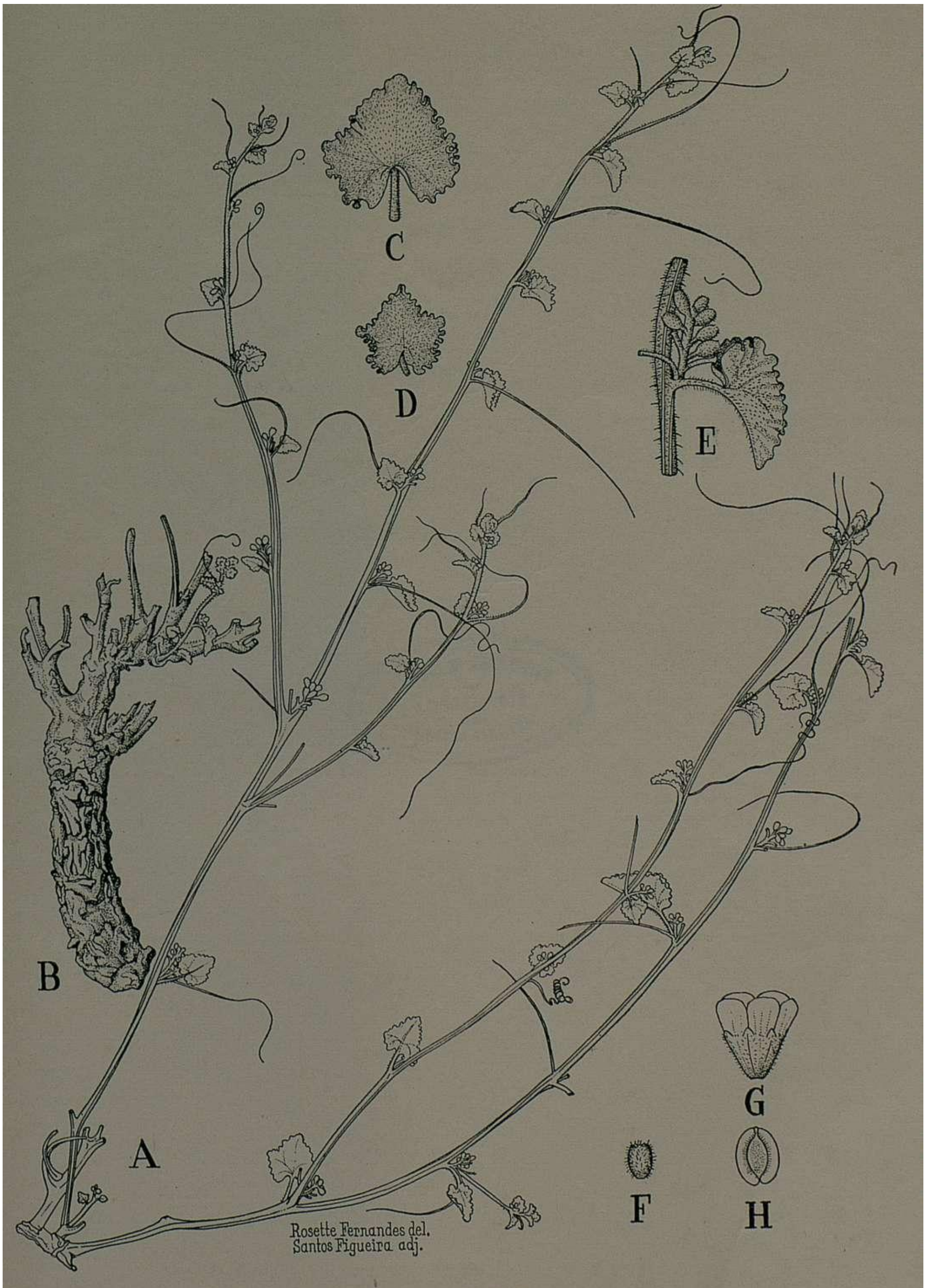
TABULA IV

Kedrostis gracilis R. Fernandes

A — **Habitus.** × **1.**
B — Radix cum **partibus** inferioribus caulium. × **1.**
C, D — **Folia.** ×3.
E — Pars **caulis** cum folio et **inflorescentia mascula.** ×3.
F — **Alabastrum.** X 3.
G — **Flos** masculus. ×3.
H — **Anthera.** × 6.

(Specimen *Torre* 8265)

TAB. IV



Rosette Fernandes del.
Santos Figueira adj.

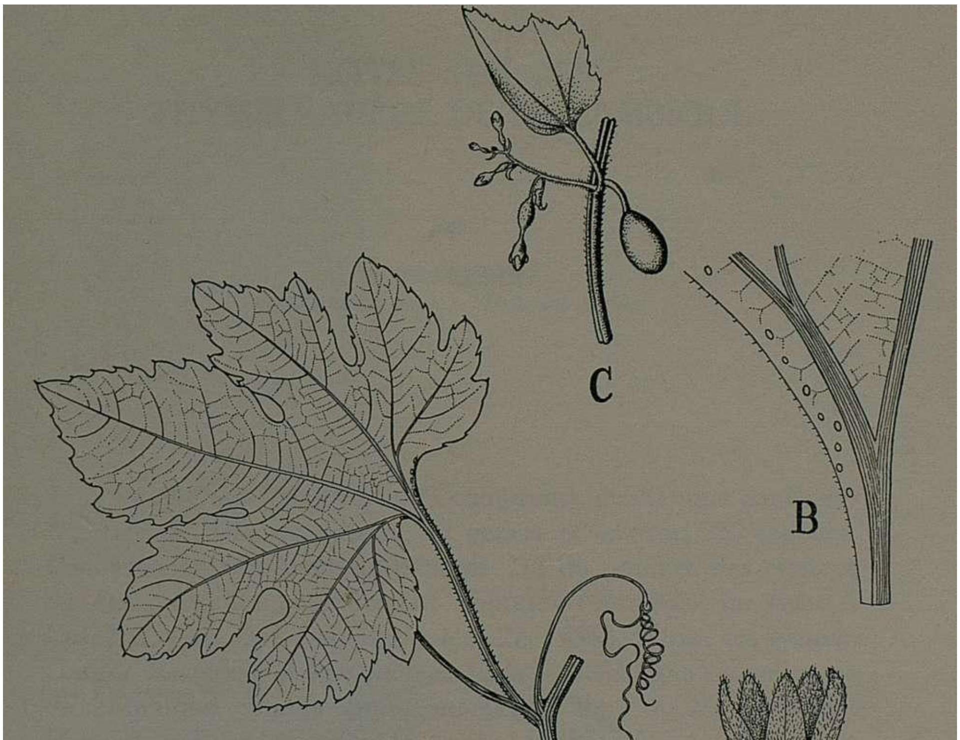
Kedrostis gracilis R. Fernandes

TABULA V

Cayaponia multiglandulosa R. Fernandes

A — Pars caulis cum foliis superne et inferne visis. × ×0,5.
B — Pars basilaris laminae folii inferne visa glandulas ostendens ×2.
C — Ramulus cum inflorescentia feminea. ×1.
D — Flos femineus. ×3.

(Specimen *Gossweiler* 4590)



Cayaponia multiglandulosa R. Fernandes

NOTES SUR LES THYMÉLÉACÉES DE MOZAMBIQUE

par

B. PETERSON

Muséum de Botanique de l'Université de Lund

LA famille des Thyméléacées comprend, en Afrique continentale, au sud du Sahara, 12 genres et environ 230 espèces. Ces espèces représentent plus de 1/3 du nombre des espèces de cette famille actuellement connues (PETERSON in ANGELY, Cat. Est. Gên. Bot. Fanerogâmicos 22, 1956). Parmi ces genres, *Gnidia*, *Passerïna* et *Synaptolepis* figurent déjà dans les ouvrages de botanique comme appartenant à la flore du Mozambique. Comme indiqué ci-après, le genre *Struthiola* est maintenant connu comme existant aussi dans cette région.

Les Thyméléacées ne constituent pas un élément très important de la flore du Mozambique. On ne les rencontre pas non plus sur de grandes étendues. Les espèces de *Passerina* et *Struthiola* n'ont été relevées que dans un seul endroit chacune dans le Chimanimani. On les trouve dans la zone subalpestre, à environ 1700 m d'altitude, et il ne faut pas s'attendre à découvrir d'autres spécimens de ces espèces ailleurs que dans le massif montagneux à la frontière de la Rhodésie du Sud.

Au cours de mon travail de revision sur les genres africains des Thyméléacées, j'ai constaté que les matériaux réunis au Mozambique étaient très précieux pour déterminer l'amplitude de variation de différentes espèces. Afin d'obtenir si possible des matériaux encore plus représentatifs, je voudrais, par cette brève énumération d'éléments de Thyméléacées au Mozambique, tenter d'attirer l'attention des botanistes sur cette famille. C'est surtout dans le massif de montagnes à la frontière de la Rhodésie du Sud qu'existent bon nombre des espèces intéressantes.

Ni dans les herbiers, ni dans les ouvrages spécialisés, je n'ai pu trouver mention du genre *Peddiea* comme étant représenté au Mozambique. Cela doit pourtant être le cas, puisque des espèces de ce genre ont été relevées dans le sud du Nyassaland et, par exemple, sur le Mont Silinda près de la frontière entre la Rhodésie du Sud et le Mozambique. Il en est à peu près de même pour le genre *Dais*.

Les exemplaires dont il est question ici font partie de collections sans dénominations, mises obligeamment à ma disposition par le professeur A. FERNANDES à Coimbra, M. F. A. MENDONÇA à Lisbonne et M. Eng.° J. GOMES PEDRO à Quelimane. Cette énumération comprend en outre des exemplaires isolés en provenance de quelques autres herbiers. Les abréviations utilisées ci-après sont en conformité avec LANJOUW et STAFLEU, Index Herbariorum 1, ed. 4, 1959.

GNIDIA L.

Ce genre est, tant par le nombre des espéces que par l'expansion, le plus important de la famille des Thyméléacées en Afrique. L'auteur entend le genre dans toute son extension, c'est à dire y compris *Lasiosiphon* Fres., *Arthrosolen* C. A. Mey. et *Englerodaphne* Gilg.

Plusieurs espèces intermédiaires sont si variables qu'il est absolument impossible d'établir des caractères distinctifs entre les genres.

Gnidia buchananii Gilg, Bot. Jahrb. 19: 261. 1894; Pearson in Thiselton-Dyer, Fl. Trop. Afr. 6 (1): 219. 1910; Peterson, Bot. Not. 111: 624. 1958.

NIASSA: Missão Católica de Unango, floresta aberta e lugares de derruba, flores amareladas, XII-1932, *Gomes e Sousa* 1023 (COI); Missão Católica de Unango, frequente nos lugares de derruba, vulgar, flores branco-creme, XII-1932, *Gomes e Sousa* 1039 (COI), Massangulo, clareiras, flores amareladas, XII-1932, *Gomes e Sousa* 1093 (COI, K).

Cette espèce est très proche de *G. montana* H. H. W. Pearson. Les espèces suivantes appartiennent au même groupe que

G. buchananii: *G. involucrata* Steud., *G. usafuae* Gilg, *G. schweinfurthii* Gilg et *G. nutans* H. H. W. Pearson. Dans les matériaux que j'ai eu l'occasion de consulter se trouvaient plusieurs formes intermédiaires. Deux ou trois de ces espèces ne représentent visiblement que des formes extrêmes d'une espèce à grandes variations. Ces variations apparaissent tout d'abord dans les différentes parties de la fleur ainsi que dans la grandeur des feuilles. Le pédoncule droit ou courbé, comportant ou non des feuilles, sont des caractéristiques utilisées parfois pour distinguer les espèces de ce groupe. Des matériaux assez restreints ont cependant démontré que ces caractéristiques n'ont pas une bien grande signification. En comparant des spécimens jeunes et plus vieux, on peut observer des variations importantes chez ces genres, phénomènes qui se retrouvent chez plusieurs Thyméléacées africaines. Un certain dimorphisme saisonnier se remarque également. Les exemplaires de *G. buchananii* cités ici, en provenance du Mozambique, concordent cependant très bien avec la collection originale du genre (*Buchanan* 29, de Blantyre, Nyassaland). J'ai renoncé à faire des réductions dans le groupe d'espèces ci-dessus tant que des matériaux plus abondants n'auront pas été étudiés.

G. buchananii apparaît principalement dans les savanes de l'Ouganda, du Tanganyika, du Congo Belge, de l'Angola, du Nyassaland, de la Rhodésie du Nord et du Sud ainsi que du Mozambique.

Gnidia capitata L. f., Suppl. Pl. 224. 1781; Peterson, Bot. Not. 111: 627. 1958. *Lasiosiphon linifolius* (Lam.) Decne in Jacquem., Voy. Bot. 4: 148. 1844; Wright in Thiselton-Dyer, Fl. Cap. 5 (2): 73. 1915. *L. similis* Wright, 1. c. (anglice) et Kew Bull. 177. 1916. *G. transvaalensis* [*transvaaliensis*] Gilg in De Wild. Pl. Nov. Herb. Then. 1: 206. t. 46. f. 10-16. 1904. *L. capitatus* (L. f.) Burtt Davy, Man. Flow. Pl. Ferns Transvaal 1: 45, 207. 1926; Dyer, Flow. Pl. S. Afr. 24: t. 937. 1944.

MOÇAMBIQUE: Mogovolas, flores amareladas, X-1930, *Gomes e Sousa* 101 (COI).

GAZA: 7 km S. Moamba, *Acacia*-savannah, occasional among *Themeda triandra* and *Cymbopogon plurinodis*, 100-150 m s. m., 16-I-1957, *Dahlgren & Peterson* 1673-1676 (LD).

LOURENÇO MARQUES: Goba Fronteira, encosta a W. do monumento, terr. pedregoso castanho-avermelhado, flores amarelas, aqui e ali nos matos, nanofanerófita, 8-I-1947, *Barbosa* 11 (COI); Namaacha, 9-I-1947, *Pedro e Pedrógão* 505 (LMJ); 15km NE. Goba, *Acacia*-savannah, ca. 150m s. m., rare, 18-I-1957, *Dahlgren & Peterson* 1677, 1678 (LD); 5 km NE. Goba, rather common in *Themeda*-grassland, ca. 200 m s. m., 18-I-1957, *Dahlgren & Peterson* 1679 (LD).

G. capitata est également une espèce très variable. La variation intéresse particulièrement les pétales qui sont en général très petits et qui, en certains cas, font entièrement défaut. Tous les exemplaires cités ici, provenant du Mozambique, présentent cependant des pétales bien formés, blancs, membraneux, atteignant jusqu'à 3 mm de long. Sous ce rapport, les spécimens du Mozambique correspondent à certains exemplaires du Swaziland et du district de Baberton au Transvaal.

Au cours d'une expédition botanique en Afrique du Sud en 1956-57, j'ai eu l'occasion, pendant un court arrêt à Mozambique, d'étudier des spécimens de *G. capitata.* Ils présentaient tous une grande similitude et très peu de variation. Tous les exemplaires avaient des pétales très fournis et un pédoncule très court.

Au Jardin Botanique de Lund, j'ai actuellemennt en culture des exemplaires de *G. capitata* venant de graines ramassées sur place au sud de Moamba. Au début de cette année, une plante de 20 cm de haut a donné deux inflorescences de 11 et 13 fleurs respectivement. Cette espèce est manifestement autoféconde, la plante en question ayant produit des graines. Quelques autres exemplaires de *Gnidia,* dans les mêmes circonstances, n'ont pas fleuri.

Je n'ai pu trouver mentionné dans les ouvrages spécialisés que l'on ait eu connaissance auparavant de *G. capitata* en provenance du Mozambique.

La distribution de cette espèce est jusqu'à présent: Rhodésie du Sud, Mozambique, Transvaal, Swaziland, État libre d'Orange, Basutoland, Natal et l'est de la Province du Cap.

Gnidia chrysantha (Solms-Laub. ex Schweinf.) Gilg, Bot. Jahrb. 19: 258. 1894; Peterson, Bot. Not. 111: 628. 1958.

Arthrosolen chrysanthus Solms-Laub. ex Schweinf., Beitr. Fl. Aethiop. 165. 1867; Pearson in Thiselton-Dyer, Fl. Trop. Afr. 6 (1): 234. 1910. *A. glaucescens* Oliver, Journ. Linn. Soc. 15: 96. 1871. *A. flavus* Rendle, Trans. Linn. Soc. ser. 2. Bot. 4: 40. 1894. G. *stenosiphon* Gilg, Bot. Jahrb. 19: 258. 1894. G. *ignea* Gilg, 1. c. 19: 258. 1894. G. *katangensis* Gilg & Dew., Bot. Jahrb. 19: 276. 1894. *A. chrysanthus* var. *igneus* (Gilg) Pearson in Thiselton-Dyer, Fl. Trop. Afr. 6 (1): 235. 1910.

NIASSA: porto da Povoação do Matunde, Mecaloja, num prado seco na época seca, erva vivaz, multicaule, flores alaranjadas, 7-IX-1934, *Torre* 557 (COI); próximo de Vila Cabral, subarbusto dos lugares pantanosos, II-1934, *Torre* 28 (COI); Massangulo, lugares húmidos, terrenos humíferos, flores alaranjado-avermelhadas, XII-1932, *Gomes e Sousa* 1063 (COI); Massangulo, terrenos argilosos, frequente na floresta aberta, XII-1932, *Gomes e Sousa* 1091 (COI); Massangulo, floresta clara, terrenos humíferos, flores vermelho-alaranjadas, I-1933, *Gomes e Sousa* 1132 (COI); Massangulo, lugares húmidos, terrenos humíferos, flores amarelas, I-1933, *Gomes e Sousa* 1133, 1174, 1188, 1189 (COI); Mandimba, do règulado Luambala para o posto de Catur, planta rizomatosa, flores amarelo-alaranjadas ou avermelhadas, baixa alagadiça, 25-X-1948, *Andrada* 1449 (COI).

CABO DELGADO: Balama, entre Balama e Maúa, frequente nos terrenos pantanosos, erva vivaz ramificada desde a base, corola com um tubo amarelo e limbo cor de salmão, 22-IX-1935, *Torre* 741 (COI).

ZAMBÉZIA: Molumbo-Milanje road (Nyasaland border), rather woody plants growing in a swampy area, many stems from a woody root, 19-VI-1949, *Faulkner* 438 (COI).

L'espèce à fleurs rouges, différenciée de G. *chrysantha*, ne saurait être retenue, pas même comme variété, la couleur rouge n'étant qu'un signe de caducité. Les matériaux du Mozambique présentent des exemplaires aussi bien à fleurs jaunes qu'à fleurs rouges et même des exemplaires offrant dans une même inflorescence à la fois des fleurs jaunes et des fleurs rouges. Cette espèce, de même que G. *buchananii*, apparaît dans les régions du nord de la province où elle semble par endroits être assez commune.

Distribution : Guinée française, nord du Nigéria, Soudan anglo-égyptien, Ethiopie, Ouganda, Kenya, Tanganyika, Congo Belge, Nyassaland, Rhodésie du Nord et du Sud et Mozambique.

Gnidia microcephala Meisn. in De Candolle, Prodr. 14: 589. 1857; Pearson in Thiselton-Dyer, Fl. Trop. Afr. 6 (1): 225. 1910; Peterson, Bot. Not. 111: 625. 1958. *Arthrosolen pimeleoides* Meisn. in De Candolle, Prodr. 14: 560. 1857. *A. microcephalus* (Meisn.) Phillips, Journ. S. Afr. Bot. 10: 63. 1944 (non S. Moore 1919).

ZAMBÉZIA: Mocuba, somewhat spreading plants growing from a woody root in damp ground, flowers dull orange and yellow, common along damp boundaries and in bush, ca. 650 m, I-III-1943, *Faulkner* 284 (LD, LMJ); Mocuba, Namagoa Estate, common in damp ground in open forest or along tracks, flowers dull yellow, X-I-1945-46, *Faulkner* 82 (G-DEL, K, S).

LOURENÇO MARQUES : Catembe, terras arenosas, X1I-1930, *Gomes e Sousa* 612 (COI); entre Boane e Namaacha, na subida para a povoação, terreno argiloso, ca. 500 m s. m., 27-VIII-1948, *Myre et Carvalho* 119 (COI, LMJ).

Parmi les exemplaires cités ici, *Faulkner* 82 représente une forme à feuilles plus larges et *Gomes e Sousa* 612 une forme à petites feuilles. Tous deux, néanmoins, de même que les autres exemplaires mentionnés, rentrent bien dans l'amplitude de variation de l'espèce.

G. microcephala a été observée jusqu'ici dans les régions suivantes: Ouganda, Kenya, Nyassaland, Rhodésie du Sud, Mozambique, Bechuanaland, Transvaal, Swaziland, État libre d'Orange et Natal.

Gnidia mollis C. H. Wright, Kew Bull. 23. 1906 ; Pearson in Thiselton-Dyer, Fl. Trop. Afr. 6 (1): 220. 1910; Staner, Bull. Jard. Bot. Bruxelles 13: 354. 1935. G. *wittei* Staner, Contrib. Fl. Kat. Suppl. 4. 73. 1932.

NIASSA : Vila Cabral, erva subarbustiva, flores ligeiramente carminadas, vulgar na água corrente, solo pantanoso, 23-V-1934, *Torre* 122 (COI).

Cette intéressante espèce (Planches I et II) a déjà été relevée dans la région des hauts plateaux autour de Vila Cabral. Elle se caractérise surtout par ses inflorescences arrondies d'environ 2 cm, formées de 15 à 20 petites fleurs. Chacune de celles-ci est entourée d'un petit involucre se composant de trois petites bractéoles et d'une plus grande. Une inflorescence de même conformation à peu près apparaît dans le genre *Gnidia* chez l'espèce *G. bakeri* Gilg, qui existe à Madagascar à l'état endémique.

Distribution connue de G. *mollis*, outre le Mozambique : Nyassaland, Rhodésie du Nord, Congo Belge (Katanga) et Tanganyika.

Gnidia nutans H. H. W. Pearson, Kew Bull. 337. 1910 et in Thiselton-Dyer, Fl. Trop. Afr. 6 (1): 221. 1910 (anglice).

NIASSA: arredores de Maniamba, planta subarbustiva, vivaz, multicaule, frequente na floresta aberta, terrenos argilosos, flores amarelo-esverdeadas, pl. medicinal (da raiz fazem os indígenas um cozimento usado contra a prisão de ventre), nom. vern. «Nializi» (ajana), XII-1934, *Torre* 555 (COI); Maniamba, lugares de derruba na floresta aberta, planta vivaz, multicaule, flores alaranjadas, frequente, 24-VIII-1934, *Torre* 556 (COI); Massangulo, clareiras da floresta xerófila, flores amarelas, V-1933, *Gomes e Sousa* 1477 (COI).

Comme indiqué précédemment, G. *nutans* entre dans le même groupe de variation que G. *buchananii* et plusieurs autres espèces. Les exemplaires cités ici concordent cependant très bien avec par exemple *Whyte* 330 de Nyassaland, dont PEARSON cite la collection en faisant la description de l'espèce. G. *nutans* n'a été rencontrée qu'au Mozambique et au Nyassaland.

PASSERINA L.

Passerina sp.

MANICA E SOFALA: Chimanimani Mtn., Mevumozi River, ab. 1700 m s. m., on sandy river banks, suffrut. heath-like plant, 1.5 m high, 7-VII-1949, *Pedro e Pedrógão* 7310 (LD); eod. loc., ab. 1600 m s. m., 2 m high, 8-VII-1949, *Pedro e Pedrógão* 7360 (LD).

Les spécimens ci-dessus entrent dans une collection de plantes que M. GOMES PEDRO m'a obligeamment fait parvenir. Le n.° 7310 est totalement dénué de fleurs et sur le n.° 7360 je n'ai pu découvrir que deux ou trois fleurs desséchées et abimées. Ces exemplaires appartiennent indubitablement au genre *Passerina.* Une monographie sur ce genre a été publiée par THODAY dans Kew Bulletin 1924: 146-168. Il en ressort que *P. montana* Thod. est l'espèce qui s'étend le plus au nord. C'est ainsi qu'on l'a observée dans le massif Inyanga en Rhodésie du Sud. Il ne serait donc pas impossible de retrouver cette espèce dans la région de Chimanimani. Les exemplaires de *Pedro et Pedrógão* n'appartiennent cependant pas à cette espèce, étant donné que l'inflorescence, à en juger par la position des bractées et des fleurs, est en forme d'épi. Chez *P. montana* elle est strictement terminale. Les bractées et les feuilles sont, en outre, de formes différentes.

Ce n'est qu'après avoir étudié des spécimens en fleur qu'il sera possible de déterminer avec certitude s'il s'agit d'une des espèces déjà connues de *Passerina* ou d'une toute nouvelle espèce. Il se peut que les exemplaires en question représentent une forme extrême de *P. filiformis* L. Cette espèce, assez répandue, apparaît notamment dans le Drakensberg, au Natal.

Quoi qu'il en soit, la découverte de *Passerina* à Chimanimani est importante au point de vue de la géographie botanique. Le grand espace où le genre *Passerina* faisait défaut (nord du Transvaal-Inyanga) se trouve en effet quelque peu réduit.

STRUTHIOLA L.

Struthiola sp.

MANICA E SOFALA : Chimanimani Mts, tiny yellowish flower, 9-VI-1948, *Munch* 75 (NBG, SAL).

J'avais projeté primitivement de faire, au cours de mon voyage en Afrique du Sud, un séjour de quelques semaines dans le Chimanimani. Ce massif de montagnes offre en effet quelques espèces de *Struthiola* extrêmement intéressantes. Le manque de temps a malheureusement empêché la réalisation de cette partie de mon programme. Du côté sud-rhodésien du Chimanimani, croît une espèce de *Struthiola* récemment décrite, *S. rhodesiana* B. Peterson, Kew Bull. 1958: 319-320. Cette espèce existe également dans la région de l'Inyanga et il est très vraisemblable qu'elle se trouve également au Mozambique. Dans un exposé relatif aux découvertes faites en Rhodésie du Sud, intéressantes au point de vue de la géographie botanique, WILD indique dans Proc. Rhod. Scient. Ass. 43: 55. 1951, qu'une espèce voisine de *S. congesta* C. H. Wright aurait été récoltée dans les monts Chimanimani du côté sud-rodhésien. M. MUNCH, qui a constitué cette collection, m'a dit cependant que l'endroit de la découverte se trouve dans une partie difficilement accessible du massif, assez loin à l'intérieur du Mozambique. WILD se réfère à une définition de COMPTON. *S. congtsta* ne peut cependant être retenue comme espèce à part, étant donné qu'elle est en tous points identique à *S. pondoensis* Gilg ex C. H. Wright, qui apparaît dans un territoire assez limité dans le sud du Natal. En ce qui concerne les caractères végétatifs, *Munch* 75 pourrait peut-être se rattacher à *S. pondoensis.* Ses fleurs sont cependant de même taille que celles de *S. rhodesiana.* Puisqu'on ne dispose que d'une seule récolte, il me semble préférable d'attendre, pour fixer la dénomination, d'avoir acquis plus de certitude à l'aide de matériaux plus abondants.

SYNAPTOLEPIS Oliv.

Le genre *Synaptolepis,* qui compte 6 à 7 espèces, a sa distribution la plus importante en Afrique orientale (Kenya-

-Mozambique). On en connaît une espèce dans une région assez restreinte de la Guinée française et une en Angola. La partie nord de Madagascar offre une espèce très proche de *S. kirkii* Oliv. que l'on trouve sur le continent africain.

Synaptolepis alternifolia Oliv. in Hooker's Icones Plant. 12: 81. t. 1194. 1872; Pearson in Thiselton-Dyer, Fl. Trop. Afr. 6(1): 246. 1910.

NIASSA: Amaramba, próx. de Mandimba, subarbusto de 5 dm, da floresta decídua, flores esverdeadas, 8-X-1942, *Mendonça* 651 (LISC).

CABO DELGADO: próx. de Montepuez, liana alta das margens dos cursos de água, flor amarela-gema de ovo, nom. vern. «Rampela», 17-X-1942, *Mendonça* 924 (LISC); entre Montepuez e Namuno, arbusto sarmentoso do mato secundário, flores amarelo-esverdeadas, 3-IX-1948, *Barbosa* 1993 (LISC).

MOÇAMBIQUE: Angoche, António Enes, Missão de Malatana, frequente nos lugares secos, subarbusto de 1 a 1.3 m alt., multicaule, flores brancas e frutos alaranjados, 11-XI-1936, *Torre* 1041 (LISC); Nampula, próximo do rio Napipini, solo arenoso, arbusto de 0.5 a 1 m, no domínio da floresta aberta do tipo *Brachystegia-Isoberlinia* (os indígenas utilizam esta planta para atordoarem o peixe e também contra as dores de barriga), nom. vern. «Namutalina», V-1948, *Andrada* 1464 (LISC).

ZAMBÉZIA: Mocuba, Namagoa Estate, climbing plants with scented creamy green flowers, 29-IX-1948, *Faulkner* 293 (COI, S); Moebede road, forest, a bushy plant up to 2-3 ft. in height, common in some areas of forest, flowers creamy-green, 15-XI-1948, 22-XI-1948 (fruit), *Faulkner* 345 (COI, S).

MANICA E SOFALA: Báruè, entre o rio Púnguè e Vila Gouveia, arbusto com ramos sarmentosos, flores esverdeadas, 16-IX-1942, *Mendonça* 256 (LISC); Beira, próx. de Dondo, arbusto trepador da floresta decídua, flores esverdeadas, 18-IX-1943, *Torre* 5915 (LISC); Chimoio, Gondola, arbusto da floresta de Pindanganga (Gondola), flor branca, nom. vern. «Chipembue», 17-X-1945, *Simão* 597 (LISC); Chimoio, próx. da Serração Braunstein, nom. vern. «Rucangazi», 21-I-1948, *Andrada* 1004 (LISC); Chimoio, Gondola, a 5 km da serração Braunstein, suffrutice de 1 a 2 m, das clareiras da floresta decídua, frutos amarelo-alaranjados, 2-II-1948, *Garcia* 6 (LISC); Manica, Mavita, Mabongo, arbusto do mato decíduo, nom. vern. «Duhupa», 7-II-1948, *Barbosa* 952 (LISC); Chimoio, serra de Chibata, liana da floresta mista, 11-II-1948, *Garcia* 151 (LISC); Chimoio, Garuzo, subarbusto do mato decíduo, flores amarelo-avermelhadas, 3-III-1948, *Barbosa* 1076 (LISC); Chimoio, sopé dos morros de Belas, arbusto sarmentoso de 3 a 4 m da floresta mista residual, flores branco-creme, 1-IV-1948, *Garcia* 821 (LISC); Manica, Mavita, estrada para Macequece, arbusto de 1 a 2 m, flores álbidas, 8-IV-1948, *Barbosa* 1377 (LISC).

Les spécimens de *Synaptolepis* d'Afrique orientale examinés par mes soins ont prouvé que la variation chez les espèces de ce genre est au moins aussi grande que chez les autres genres de Thyméléacées africaines. Après examen de matériaux abondants, je crois possible de réduire de deux ou trois le nombre des espèces de *Synaptolepis*Les caractères qualitatifs, surtout quant au tube de la corolle et aux feuilles, qui sont utilisés pour délimiter certaines espèces de *Synaptolepis,* sont de peu de valeur. La forme de la feuille ne peut pas non plus servir de caractère distinctif. Cela ressort déjà dans une certaine mesure des matériaux mentionnés ici mais encore bien davantage de matériaux abondants, en provenance du Tanganyika et du Nyassaland, que je suis en train d'examiner actuellement. La variation dans les écailles pétaloïdes de la fleur est très grande, ce qui rend la classification extraordinairement difficile en certains cas. Par contre, les inflorescences et les fruits semblent être d'assez bons caractères sur lesquels baser une classification des espèces. Une récolte abondante de spécimens portant des fruits est grandement souhaitable, car ceux dont nous disposons pour le moment ne permettent pas de tirer de conclusions étant donné que, pour la plupart, ils portent des fruits non arrivés à maturité. Parmi les spécimens mentionnés ci-dessus, *Andrada* 1004, *Mendonça* 924 et *Faulkner* 345 (particulièrement l'exemplaire appartenant au Musée National de Stockholm), notamment, sont des formes intermédiaires entre *S. alternifolia* et *S. longiflora.*

S. alternifolia a été relevée dans les régions suivantes : Tanganyika, Nyassaland, Rhodésie du Sud et Mozambique.

Synaptolepis longiflora Gilg, Bot. Jahrb. 19: 276. 1894; Pearson in Thiselton-Dyer, FI. Trop. Afr. 6 (1): 246. 1910.

CABO DELGADO: próx. de Montepuez, arbusto cespitoso de 5 dm do mato decíduo, nom. vern. «Cucujula», 17-X-1942, *Mendonça* 935 (LISC); entre Meza e Montepuez, suffrútice de 0.5 m das bermas dos caminhos (o cozimento das raízes serve de purga aos indígenas), nom. vern. «Mucucureia», 26-VIII-1948, *Barbosa* 1906 (LISC, LMJ); entre Montepuez e Balama, suffrútice de 0.5 m da floresta decídua, flores álbidas, 29-VIII-1948, *Barbosa* 1919 (LISC, LMJ); Mucojo, entre Macómia e Mipande, suffrútice do mato decíduo, flores brancas, 30-IX-1948, *Barbosa et Lemos* 2300 (LISC, LMJ).

MOÇAMBIQUE: Nampula, no mato xerófilo, erva vivaz com rebentação da raiz, de 5 a 10 dm alt., flores esverdeadas, 6-V-1937, *Torre* 1397 (COI, LISC).

ZAMBÉZIA: Macuro, 1884-1885, *Carvalho* s. n. (COI, isotype); entre Milange e Mocuba, arbusto de 5 a 15 dm da floresta decídua, flores brancas, 14-X-1942, *Torre* 4617 (LISC); entre Mocuba e Muobede, subarbusto de 5 dm do mato secundário, junto das estradas, 8-VI-1943, *Torre* 5413 (LISC).

MANICA E SOFALA: Chimoio, Gondola, floresta de Nhamissanguere, subarbusto de cerca de 1 m, ramoso desde a base, flores branco-amareladas, fruto alaranjado, 21-I-1948, *Mendonça* 3659 (LISC).

Les récoltes de *S. longiflora* énumérées ci-dessus représentent des matériaux offrant une grande similitude, et elles concordent bien avec la collection originale. Comme mentionné précédemment, il existe cependant des formes intermédiaires entre *S. alternifolia* et *S. longiflora* et cette dernière espèce n'est certainement qu'une forme extrême de *S. alternifolia.*

Distribution : Tanganyika, Nyassaland et Mozambique.

Synaptolepis oliveriana Gilg, Bot. Jahrb. 19: 276. 1894 et in Engler und Prantl, Nat. Pflanzenfam. 3 (6a): 231. f. 81

F-J. 1894. sub nom. *S. kirkii* Oliv.; Wright in Thiselton-Dyer, Fl. Cap. 5 (2): 80. 1915; Engler in Engler und Drude, Veg. Erde 9. 3 (2): 639. f. 280 F-J, 640. 1921.

CABO DELGADO: Quissanga, próx. da Missão de Mahate, trepadeira do mato xerófilo, flores esverdeadas, nom. vern. «Nacondge», 27-X-1942, *Mendonça* 1091 (LISC).

MOÇAMBIQUE: Nampula, nos lugares secos e pedregosos, erva anual até 7 dm, com rebentação da raiz, flores esverdeadas, 11-V-1937, *Torre* 1408 (COI, LISC); Nacala, entre Fernão Veloso e Quissangulo, arbusto de 2 m do mato decíduo, flores brancas, 15-X-1948, *Barbosa* 2425 (LISC).

SUL DO SAVE: Manhiça, arbusto, fruto encarnado, comestível, flores amarelas (os indígenas pisam as folhas e a raiz e esfregam no sítio atacado pelo reumatismo), nom. vern. «Chu-upa-upa», 18-XI-1936, *Guerra* 418 (COI); Inhambane, Vilanculos, próx. de Mucoque, arbusto do mato decíduo, fruto comestível, nom. vern. «Chiuvanvane», 30-VIII-1944, *Mendonça* 1915 (LISC).

Selon Fl. Cap. 5 (2): 80. 1915, les deux espèces très voisines *S. kirkii* Oliv. et *S. oliveriana* sont signalées au Mozambique. Aucune des récoltes que j'ai eu l'occasion d'étudier ne peuvent cependant se classer dans la première de ces deux espèces tandis que cinq collections, par contre, appartiennent à *S. oliveriana*. Aucune de celles-ci, cependant, ne provient de Delagoa Bay où la collection originale de l'espèce (*Monteiro* 45) a été récoltée.

Dans Esboço do Reconhecimento Ecológico-Agrícola de Moçambique 2: 101. 1955, PEDRO donne *S. bussei* Engl. comme existant au Mozambique. Cette espèce n'est indiquée que comme un *nomen nudum* par ENGLER dans Veg. Erde 1 (1): 390. 1910. Les spécimens du Tanganyika que j'ai vus étiquetés sous cette dénomination étaient tous à ranger dans *S. kirkii*. N'ayant pas eu la possibilité d'étudier les spécimens mentionnés par M. PEDRO, je ne puis dire s'il en est de même pour eux.

Jusqu'ici *S. oliveriana* n'a été relevé qu'au Mozambique.

RESUMO

A família das *Thymelaeaceae* encontra-se representada em Moçambique pelos géneros *Gnidia* s. lat., *Passerina, Struthiola* e *Synaptolepis.*

Supõe-se que *Gnidia buchananii* e *G. nutans* são formas extremas de uma espécie variável que inclui também os taxa da África tropical oriental *G. involucrata, G. schweinfurthii* e G. *usafuae.* A medida que se tem disposto de mais material, tem-se verificado que a amplitude de variação se tem vindo sobrepondo dentro destas espécies.

Gnidia capitata é uma espécie um tanto variável no Norte e no Leste da Província do Cabo. No entanto, o material de Moçambique, estudado até esta data, parece ser bastante uniforme.

Provàvelmente, uma nova espécie de *Struthiola* e outra de *Passerina* foram colhidas nos Montes de Chimanimani. Em ambos os casos, porém, o material é muito incompleto para que se possa descrever e denominar.

Há uma grande variabilidade no género *Synaptolepis,* a qual é particularmente pronunciada em *S. alternifolia* e *S. longiflora.* Estas duas espécies são unidas por uma série de formas intermediárias.

SUMMARY

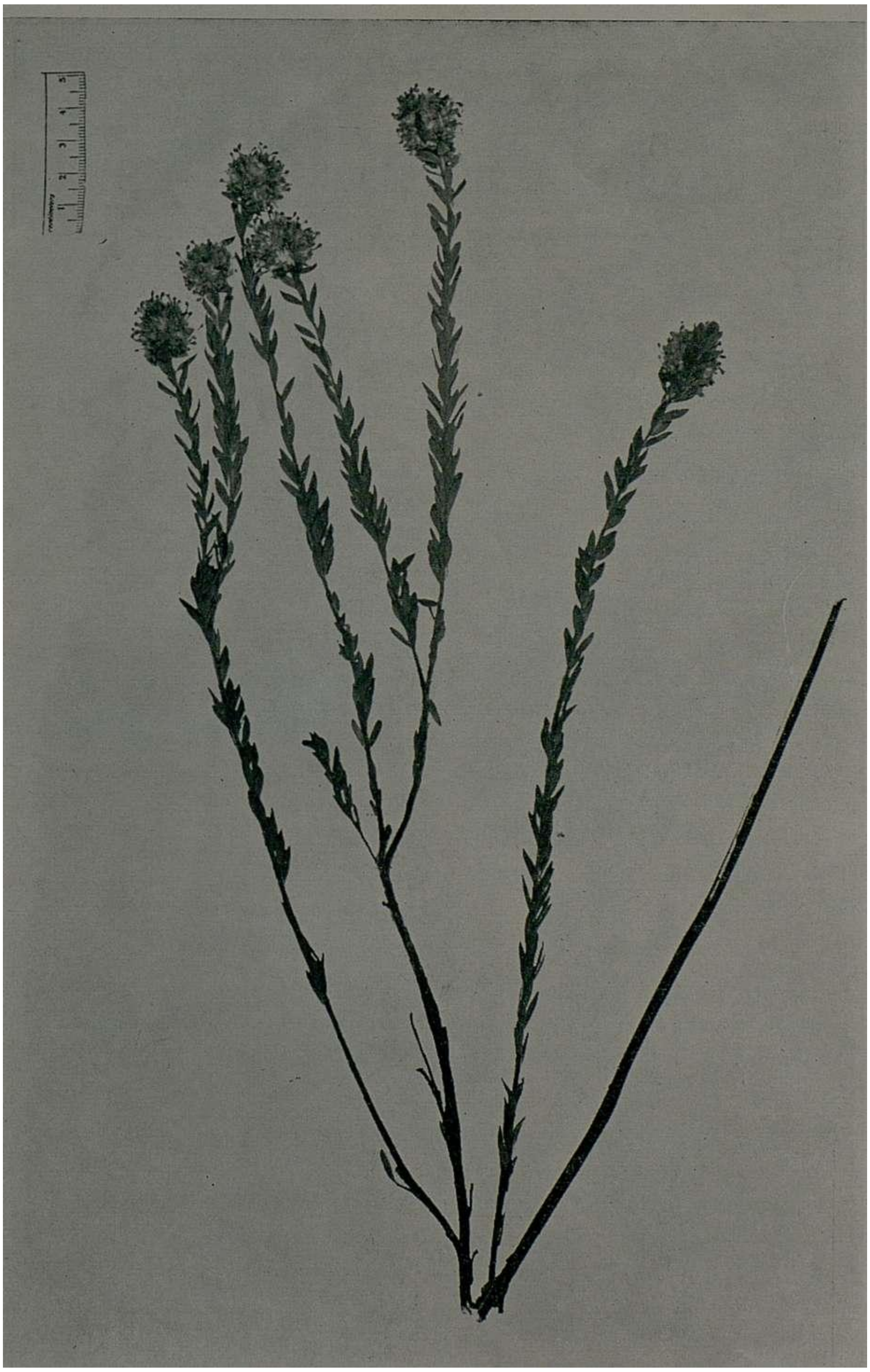
The family *Thymelaeaceae* is represented in Mozambique by the genera *Gnidia* s. lat., *Passerina, Struthiola* and *Synaptolepis.*

Gnidia buchananii and G. *nutans* are supposed to be extremes of a very variable species also including the tropical East African species G. *involucrata, G. schweinfurthii* and G. *usafuae.* As more and more material has been available the range of variation gradually has been overlapping within these species.

In the northern and eastern Cape Province *Gnidia capitata* is a rather variable species. The material hitherto studied from Mozambique, however, seems to be rather uniform.

Probably new species of *Struthiola* and *Passerina* are collected in Chimanimani. In both cases the material is too incomplete to be named.

Within the genus *Synaptolepis* there is a great variability which is particularly pronounced in *S. alternifolia* and *S. longiflora.* These two species are united with series of intermediate forms.



Gnîdia mollis C. H. Wright.

Une espèce distincte et très intéressante, des hauts plateaux autour de Vila Cabral. (*Torre* 122).

Gnidia mollis C. H. Wright.

Détail de la partie supérieure de deux rameaux, avec des inflorescences, de la plante montrée sur la Pl. I.

BEITRAG ZUR KENNTNIS DES PHYTOPLANKTONS PORTUGIESISCHER GEWÄSSER

von

ARNOLD NAUWERCK, Z. Zt. Falkau

ALLGEMEINES

Aus der Umgebung von Coimbra standen mir 10 Planktonproben zur Verfügung, die seine Hochwürden Padre M. PÓVOA DOS REIS mir zu besorgen die Freundlichkeit hatte. Es handelt sich um 9 mit J-JK-Essigsäure fixierte Wasserproben und einen, mit Formalin fixierten Netzfang. Alle Proben wurden entnommen in der Zeit zwischen dem 19. Februar und dem 10. April 1958. Sie verteilen sich auf die drei Lokale wie folgt:

1. Poço do Almegue, Coimbra:	19.2.58.,	2	Proben	(J-JK-Essigs.)
	»	1	Probe	(Formalin)
	23.2.58.,	2	Proben	(J-JK-Essigs.)
	10.4.58.,	»	»	(»)
2. Olho da Ribeira dos Moinhos, Tentúgal:	23.2.58.,	»	»	(»)
3. Poço da ponte de S. João de Loure, Vouga :	9.4.58.,	»	»	(»)

Die ursprüngliche Absicht mit diesen Planktonproben war, in einer präliminären und informatorischen Untersuchung einen ersten Einblick in die qualitative und quantitative Verteilung des Phytoplanktons in portugiesischen Gewässern zu bekommen. Leider konnte das Programm nicht in der geplanten Form durchgeführt werden. Deshalb sollen die bisherigen Resultate kurz mitgeteilt werden. Ich hoffe, in naher Zukunft eine mehr ausführliche entsprechende Untersuchung durchführen zu können.

Bei den « Poços » und « Olhos » handelt es sich um tiefe Wasserlöcher im Laufe von Flüssen (hier Mondego und Vouga), wo auch zu Trockenzeiten immer noch Wasser vorhanden ist.

Da jedoch im Frühjahr die Flüsse entsprechend wasserreich sind, führt die Strömung reichliche Mengen von kleinen organischen und anorganischen Partikeln (Detritus) mit sich, was die Entwicklung von echten Planktonarten sehr erschwert. Aus dem gleichen Grunde war auch eine quantitative Bearbeitung nur summarisch möglich.

Die qualitative Zusammensetzung des Planktons ist aus der Tabelle ersichtlich. Die für fliessende Gewässer charakteristische Vielzahl von benthischen und litoralen, kleinen Kieselalgen wird darin allerdings nicht aufgeführt, sondern nur die gewöhnlich planktisch erscheinenden Arten. Auch Fragmente von festsitzenden höheren Algen, wie *Ulothrix, Spirogyra, Oedogonium* etc., die übrigens zum gegebenen Zeitpunkt selten waren, werden nicht berücksichtigt.

Da schliesslich quantitative Unterschiede zwischen Oberfläche und tieferen Schichten nicht festzustellen waren, werden die beiden jeweiligen Proben gemeinsam behandelt.

SPEZIELLES

a) *Die Lokale*

Lokal 1 wurde im Laufe des Frühjahrs drei Male besucht. Die vorhandenen Proben genügen, um eine Sukzession sowohl in quantitativer, wie auch in qualitativer Hinsicht klar erkennen zu lassen. Die erste Probe, vom 19. Februar, bietet ein Bild, das auch mittel- und nordeuropäische Gewässer von eutrophem (= nahrungsreichen) Charakter im Frühjahr aufweisen, und für welches der Begriff « Frühjahrsexplosion » geprägt worden ist. Typisch dafür ist die auf kurzen Zeitraum beschränkte Massenentwicklung von *Stephanodiscus Hantzschii* var. *pusillus* GRUN., sowie verschiedener Cryptomonadinen. In Süddeutschland konnte ich derartige « Frühjahrsexplosionen » im März, in Schweden kurz nach der Eisschmelze in April und Mai beobachten. Im milderen Klima Südeuropas ist die Erscheinung natürlich früher zu erwarten. Dass sie allerdings überhaupt auftritt, spricht gegen Überlegungen mancher Forscher, nach welchen das Phänomen mit der « Aufstauung der Entwicklung » im See durch die Eisdecke und mit dem jähen Ansteigen von Lichteinstrahlung und Temperatur beim Eisgang im Zusammenhang stehen soll. Auch die absoluten Zahlen, 4,8. 10^7 *Stephanodiscus*- und 4,0. 10^5 *Cryptomonas*zellen pro Liter, entsprechen durchaus den anderorts gefundenen Grössenordnungen. Interessant ist indessen, dass die im Norden dominierenden *Rhodomonas*arten nur in bescheidenen Mengen auftreten. Einigermassen zahlreich ist nur die kleine *Chroomonas acuta* UTERMÖHL. *Peridinium Volzii* LEMM., das die gleichzeitig entnommene Netzprobe beherrscht, hat hingegen am planktischen Gesamtvolumen nur geringen Anteil.

Die Tatsache, dass bei der Probenahme vom 9. Februar nur unbedeutende Detritusmengen vorhanden waren, mag die Massenentwicklung von nannoplanktischen Algen teilweise erklären. Jedenfalls nehmen diese Formen in der Folgezeit rapide ab, in gleichem Masse, wie der Detritus zunimmt. Zugleich aber treten neue Arten auf, vor allem verschiedene farblose, d. h. holophytisch sich ernährende Dinophyceen, was auf einen natürlichen Zusammenbruch der *Stephanodiscus*population schliessen lässt. Denn in der Folge von zerfallenden Organismen kann man immer andere, heterotrophe Organismen beobachten, die sich von deren halb abgebauten Substanz ernähren. Gleichzeitig ist der Wechsel von einem mehr oder weniger Massen-Mono-Plankton zu quantitativ armem Polyplankton charakteristisch, der sich in der Probe vom 10. April deutlich abzeichnet.

Als typisches Zwischenstadium kann die Probe vom 23. März gewertet werden, wo zunächst grössere Kieselalgen, hier *Synedra acus* KÜTZ. zusammen mit den Cryptomonaden die dominierende Rolle übernommen haben.

Die am 10. April eingetretene Entfaltung von Bodendiatomeen, besonders *Cymbella helvetica* KÜTZ., *Gomphonema acuminatum* var. *coronata* (EHRNB.) W. SMITH, sowie *Ceratoneis arcus* KÜTZ., deutet zusammen mit dem Detritus auf eine zunehmende Durchströmung des Wassers hin, während die heterotrophen *Gymnodinium*-, *Amphidinium*- und *Glenodinium*arten nebst dem Süsswasserpilz *Cerasterias raphidioides* REINSCH auf einen gleichzeitigen, natürlichen Zerfall der vorhergegangenen *Stephanodiscus*population schliessen lassen. Man darf also annehmen, dass das Planktonbild hier von den beiden Faktoren massgeblich beeinflusst wird.

Bei Lokal 2 handelt es sich um ein, zum Zeitpunkt der Probenahme sehr detritusreiches und sehr planktonarmes Wasser. Die quantitativ dominierende Art ist *Synedra ulna* (NITZSCH) EHRNB., von den relativ zahlreichen, kleinen Diatomeen fällt *Cocconeis placentula* (EHRNB.) HUST. am meisten auf. Die ebenfalls sekundär planktische *Cerasterias raphidioides* REINSCH ist nicht selten. Durch das Vorkommen der Arten *Pediastrum integrum* NAEG. und *Scenedesmus Bernardi* G. M. SMITH ist das Lokal in charakteristischer Weise von den beiden anderen unterschieden. Ob der Unterschied grundsätzlich ist, lässt sich freilich aufgrund des geringen Materials nicht sagen.

Lokal 3 schliesslich zeichnet sich aus durch ein verhältnismässig armes Phytoplankton, und zwar obwohl wenig Detritus und wenig Bodendiatomeen vorhanden sind. Einigermassen häufig ist lediglich *Gomphonema acuminatum* var. *coronata* (EHRNB.) W. SMITH. Unterschieden von den anderen beiden Lokalen ist Lokal 3 hauptsächlich durch das Vorkommen von *Dinobryon sertularia* EHRNB.

Inwieweit der Unterschied zwischen den Lokalen von physikalischen und inwieweit er von chemischen Faktoren abhängt, lässt sich natürlich auf Basis einiger Planktonproben nicht entscheiden. Man kann sich fragen ob eine «Frühjahrsexplosion» kleiner Kieselalgen in Lokal 2 und 3 überhaupt fehlt. Das wäre möglich; in diesem Falle wären wohl physikalische Faktoren, d. h. in erster Linie die Strömung dafür verantwortlich zu machen. Wahrscheinlicher ist jedoch, dass eine entsprechende Massenentwicklung überall stattfindet oder stattfinden kann. In Lokal 2 väre dann diese noch nicht eingetreten und in Lokal 3 bereits vorbei gewesen.

b) *Die Algen.*

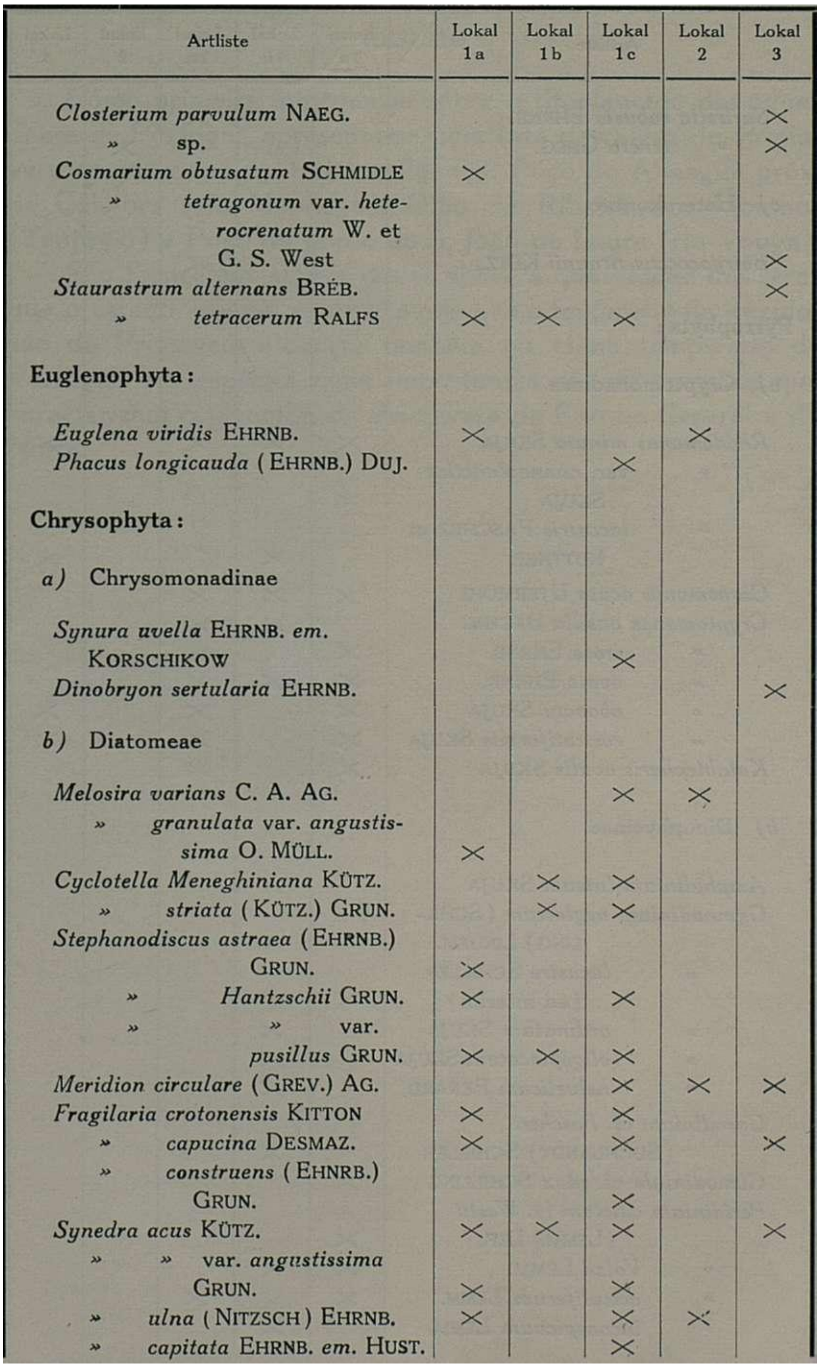
Neben den für Fliessgewässer bezeichnenden Kieselalgen sind besonders die zahlreichen *Scenedesmus*arten charakteristisch für das ganze Gebiet. Auch *Staurastrum tetracerum* RALFS, *Coelastrum microporum* NAEG. und *Pandorina morum* (MÜLLER) BORY sind allgemein und gewöhnlich. Auffällig ist der Mangel an grösseren Volvocalen und Desmidiaceen, doch pflegen diese im allgemeinen erst im Spätsommer in grösseren Mengen aufzutreten. Das gleiche gilt für die Cyanophyceen. Bis zu einem gewissen Grade könnte man auch das völlige Fehlen von *Asterionella formosa* HASALL und *Tabellaria fenestrata* (LYNGB.) KÜTZ. jahreszeitlich erklären. Dass aber die sonst ausserordentlich verbreitete *Asterionella* fehlt ist immerhin bemerkenswert.

Die Mehrzahl der Arten sind mehr oder weniger typische Frühjahrsplankter. Interessant ist, dass *Peridinium aciculiferum* LEMM. mehrfach gefunden wurde. Diese Art hat ihre Hauptverbreitung in ausgesprochen kalten Gewässern und ist als typische Winterform oft in grossen Mengen unter dem Eis anzutreffen.

Die Anwesenheit von zahlreichen, von SKUJA aus nordeuropäischen Gewässern beschriebenen Pyrrophyten sei schliesslich noch hervorgehoben. Die Familien *Rhodomonas, Katablepharis* und *Gymnodinium* sind offenbar zumindest während der kälteren Jahreszeit auch in Portugal reichlich vertreten.

Poço do Almagre [illegible]

Artliste	Lokal 1 a	Lokal 1 b	Lokal 1 c	Lokal 2	Lokal 3
Cyanophyta:					
Chroococcus tenax HIERON.				×	
Oscillatoria limosa AG.					×
Pseudanabaena catenata LAUTERB.			×		
Chlorophyta:					
Chlorogonium maximum SKUJA			×		
Gonium sociale (DUJ.) WARMING	×				×
Pandorina morum (MÜLLER) BORY	×	×	×		
Eudorina elegans EHRNB.			×		
Pediastrum simplex MEYEN	×				
» *duplex* MEYEN	×		×		
» *Boryanum* (TURP.) MENEGH.				×	
» *integrum* NAEG.				×	
Oocystis pusilla HANSG.		×			
Tetraëdron minimum (A. BR.) HANSG.		×	×		
» *regulare* KÜTZ.					×
Scenedesmus acuminatus (LAGERH.) CHOD.	×	×	×		
» *acutus* (MEYEN) CHOD		×			
» *falcatus* CHOD.			×		
» *bijuga* (TURP.) LAGERH.	×		×		
» *bijuga* var. *alternans* (REINSCH) HANSG.			×		
» *bicellularis* CHOD.	×	×	×		
» *denticulatus* LAGERH.	×	×	×		
» *incrassulatus* BOHLIN					×
» *quadricauda* TURP. *em.* CHOD.			×		
» *Bernardii* G. M. SMITH				×	
» *armatus* (CHOD.) G. M. SMITH	×	×	×		
Crucigenia tetrapedia (KIRCHN.) W. et G. S. WEST			×		
Coelastrum microporum NAEG.	×	×	×		
Ankistrodesmus setigerus (SCHROED.) G. S. WEST			×		
Stichococcus bacillaris NAEG.	×				
Closterium acutum var. *variabile* (LEMM.) KRIEGER	×	×	×		



Artliste	Lokal 1 a	Lokal 1 b	Lokal 1 c	Lokal 2	Lokal 3
Closterium parvulum NAEG.					×
» sp.					×
Cosmarium obtusatum SCHMIDLE	×				
» *tetragonum* var. *heterocrenatum* W. et G. S. West					×
Staurastrum alternans BRÉB.					×
» *tetracerum* RALFS	×	×	×		
Euglenophyta:					
Euglena viridis EHRNB.	×			×	
Phacus longicauda (EHRNB.) DUJ.			×		
Chrysophyta:					
a) Chrysomonadinae					
Synura uvella EHRNB. *em.* KORSCHIKOW			×		
Dinobryon sertularia EHRNB.					×
b) Diatomeae					
Melosira varians C. A. AG.			×	×	
» *granulata* var. *angustissima* O. MÜLL.	×				
Cyclotella Meneghiniana KÜTZ.		×	×		
» *striata* (KÜTZ.) GRUN.		×	×		
Stephanodiscus astraea (EHRNB.) GRUN.	×				
» *Hantzschii* GRUN.	×		×		
» » var. *pusillus* GRUN.	×	×	×		
Meridion circulare (GREV.) AG.			×	×	×
Fragilaria crotonensis KITTON	×		×		
» *capucina* DESMAZ.	×		×		×
» *construens* (EHNRB.) GRUN.			×		
Synedra acus KÜTZ.	×	×	×		×
» » var. *angustissima* GRUN.	×		×		
» *ulna* (NITZSCH) EHRNB.	×		×	×	
» *capitata* EHRNB. *em.* HUST.			×		

Artliste	Lokal 1a	Lokal 1b	Lokal 1c	Lokal 2	Lokal 3
Surirella robusta EHRNB.			×		
» *tenera* GREG.				×	
c) Heterokontae					
Botryococcus Braunii KÜTZ.			×		
Pyrrophyta:					
a) Cryptomonadinae					
Rhodomonas minuta SKUJA	×	×	×		×
» var. *nannoplanctica* SKUJA	×				
» *lacustris* PASCHER et RUTTNER		×			×
Chroomonas acuta UTERMÖHL	×	×	×		
Cryptomonas pusilla BACHM.		×	×		
» *erosa* EHRNB.	×		×		
» *ovata* EHRNB.	×	×	×		
» *obovata* SKUJA	×		×		×
» *rostratiformis* SKUJA	×		×		×
Katablepharis ovalis SKUJA	×		×		
b) Dinophycinae					
Amphidinium luteum SKUJA		×			
Gymnodinium neglectum (SCHILLING) LINDEM.		×			
» *lacustre* SCHILLER (ad interim)	×				
» *ordinatum* SKUJA		×			
» *oligoplacatum* SKUJA		×			
» *helveticum* PENARD		×			
Gyrodinium cf. *Pascheri* (SUCHLANDT) SCHILLER		×			
Glenodinium cf. *edax* SCHILLING	×		×		
Peridinium cinctum fa. *Westii* (LEMM.) LEF.	×				
» *Volzii* LEMM.	×	×			
» *aciculiferum* LEMM.	×	×	×		
» *inconspicuum* LEMM.		×			

RESUMO

Como primeira informação sobre o fitoplancton das águas doces de Portugal, apresenta-se uma lista das algas de Primavera encontradas em três localidades : Poço do Almegue próx. de Coimbra (rio Mondego), Olho da Ribeira dos Moinhos (Tentugal) e Poço da ponte de S. João de Loure (rio Vouga).

São fornecidos alguns dados sobre a quantidade dos seres que o estudo revelou e verificou-se que o fenómeno da «explosão da Primavera» ocorre também no clima temperado de Portugal. As espécies mais importantes são as mesmas que caracterizam o plancton de Primavera da Europa Central e do Norte.

NOVAS ESPÉCIES PARA A FLORA DE PORTUGAL

por

J. **MALATO-BELIZ**
Estação de Melhoramento de Plantas, Elvas

AS herborizações recentemente iniciadas pelo Laboratório de Fitossistemática e Ecologia Vegetal da E. M. P. no Baixo Alentejo, como trabalho preliminar de reconhecimento de pastagens naturais, em obediência a plano há anos estabelecido, a sequência dos inventários florístico e fitossociológico que visam a preparação de um estudo monográfico da Serra de S. Mamede e, por último, a determinação de material colhido no Algarve pelo colega J. A. SOARES CHAVES, tornaram possível o conhecimento de mais quatro espécies a juntar à flora portuguesa.

De entre elas, três são, sem qualquer dúvida, indígenas, muito embora duas tenham permanecido ignoradas até agora. Da outra (*Bupleurum rigidum*), houve referências em antigos escritos, chegando, todavia, modernamente a pôr-se em dúvida a sua existência por não haver notícia do seu aparecimento, nem exemplares antigos em herbários portugueses que lhe confirmassem a presença.

A última planta de que agora se dá notícia, embora de origem americana, encontra-se perfeitamente aclimatada e em evidente expansão.

É com o maior prazer que damos público testemunho do mais vivo reconhecimento ao Senhor Dr. M. RAYMOND (Montréal) por haver tido a amabilidade de confirmar a determinação dos espécimes de *Carex*, e aos Senhores Directores dos Institutos Botânicos do Porto, Coimbra e Lisboa e da Estação Agronómica Nacional, bem como aos Senhores Conservadores dos respectivos herbários, pela valiosa ajuda prestada na preparação da presente nota.

Catapodium tuberculosum Moris, *Att. 3.ª Riun. Sc. Ital.:* 481 (1841); FIORI, *Nuova Fl. Anal. Ital.* **1:** 143 (1923-1925); JAHANDIEZ et MAIRE, *Cat. Pl. Maroc* **1:** 79 (1931); CUÉNOD, *Fl. Tun.:* 140 (1954); MAIRE, *Fl. Afr. Nord* **3:** 213 (1955).

Castellia tuberculata Tin., *Pl. rar. Sic.* **2:** 18 (1846); WILLKOMM, *Suppl. Prodr. Fl. Hisp.:* 29 (1893).

Desmazeria tuberculosa (Moris) Bonnet, in B. et B., *Cat. Tun.:* 482 (1896).

Festuca tuberculosa (Moris) Dur., in Coss. et DUR., *Expl. Sc. Alg.:* 42 (1849); CABALLERO, *Fl. Anal. Esp.:* 89 (1940).

Nardurus tuberculosus (Moris) Hayek, in *Fedde Repert. Beih.* 30 (3): 295 (1932); DIAPULIS, *Syn. Fl. Graec:* 190 (1939).

ICON. — FIORI, *Icon. Fl. Ital.:* 42 (1933); MAIRE, *l. c:* 214.

Planta verde, anual. Colmos solitários ou, mais frequentemente, fasciculados, de 0,15 a 1,00 m, erectos ou, por vezes, geniculado-ascendentes, muitas vezes arroxeados, ligeiramente estriados, glabros e lisos, brilhantes, mais ou menos longamente nus no cimo, rígidos. Bainhas arredondadas no dorso, um tanto dilatadas, estriadas, glabras e lisas ou escabras, com asperezas retrorsas, auriculadas no cimo, com as aurículas sobrepostas, arredondadas, acastanhadas e um tanto ciliadas; lígula curta (ca. 1-2 mm), troncada e denticulada, mais ou menos lacerada; limbo podendo atingir 28 X 0,7 cm, plano, estriado e um pouco escabro nas duas faces, com a nervura média proeminente, longamente atenuado em ponta, mais ou menos aguda. Panícula subunilateral, rígida, composta, com ramos espiciformes mais ou menos patentes ou levantados, simples e espiciforme na extremidade, por vezes inteiramente simples e espiciforme; espigas laterais mais ou menos pedunculadas, algumas vezes ramosas; eixo trigonal-anguloso, estriado e um tanto escabro; ramos semi-cilíndricos, escabros, por vezes mais ou menos flexuosos; pedúnculos das espiguetas de ordinário muito curtos, tão compridos como largos, achatados, às vezes um tanto mais compridos. Espiguetas dísticas, oblongas, encostadas ao eixo, ligeiramente atenuadas na extremidade, comprimidas lateralmente, 3-6 floras ou, com maior frequência, com 6-12 flores, bastante apertadas, caducas na maturação, ráquis escabro. Glumas um pouco desiguais, não carenadas, glabras e lisas, coriáceas com margens escariosas, mais ou menos agudas ou a superior obtusiúscula e, por vezes, submucronada, trinérveas, a inferior com 3-3,5 mm, a superior com 4-4,5 mm de comprimento. Glumela inferior oblonga, obtusa, mútica, papirácea, arredondada no dorso, fortemente escabra com asperezas tuberculosas hialinas, 5-nérveas, com nervuras salientes, escariosas na ponta arredondada e, por vezes, um tanto emarginada. Glumela superior igualando a inferior, oblongo-lanceolada, ligeiramente bidentada ou inteira na extremidade, mais ou menos obtusa, com duas carenas escabras muito aproximadas das margens. Dois lodículos hialinos, glabros, oval-lanceolados, menores do que o ovário, com 0,75 mm, por vezes desigualmente bi-trilobados. Anteras 3, ovoide-oblongas, acentuadamente chanfradas nas duas extremidades, com 0,5-0,6 mm, permanecendo longo tempo inclusas após a disseminação do pólen. Ovário obovoide, frouxamente peludo na extremidade, com dois estiletes apicais longamente nus; estigmas plumosos de pêlos simples. Cariopse castanha avermelhada, ovado-oblonga, muito aderente às glumelas, glabra, fortemente comprimida dorsalmente, com 3,2-3,5 × 1,3 mm, arredondada no ápice, obtusamente rostrada na base; face ventral côncava, com uma mancha hilar linear sub-basal, chegando a $^2/_3$ da semente ; face dorsal ligeiramente convexa ; embrião com 0,65 mm. Floração: Abril-Maio (MAIRE, 1955).

Espécime: Baixo Alentejo : Barrancos : Herdade das Russianas : clareiras pedregosas da parte alta (18.V.1959, *Malato-Beliz et al.* ELVE 9819).

Exsiccata :

ITÁLIA : Sicile : Lampedouse : lieux maritimes herbeux (IV.1879, *Todaro* Herb. G. Rouy 1979 PO).

MARROCOS — Reg. Rabat: Mâmora orientale, le long de la tranchée centrale, juste avant la vallée de l'oued Tarherest; dans les touffes de lentisque et de phillyrea (17.IV.1958, *Ch. Sauvage* RAB).

Distribuição geográfica: Portugal, Espanha meridional, Sardenha, Sicília, Linosa, Grécia, Cirenaica, Marrocos, Argélia, Tunísia e Canárias.

Ecologia e fitossociologia Tanto quanto nos é dado saber, esta planta vive nos locais mais ou menos áridos, em estepes, pastagens e matos clareados (JAHANDIEZ et MAIRE, 1931) e, por vezes, nos tufos de *Phillyrea* e *Pistacia.*

Nos arredores de Barrancos, encontrámo-la vivendo nas elevações com afloramentos xistosos, nos locais soalheiros, expostos a W, em companhia de:

Cleome violacea L.
Helianthemum guttatum (L.) Miller
Malva hispanica L.
Echium plantagineum L.
Andryala integrifolia L.
Asparagus aphyllus L.
Brachypodium distachyum (L.) R. et Sch.
Ruta chalepensis L.
Delphinium peregrinum L.
Silene inaperta L.
Antirrhinum Orontium L.
Filago germanica L.
Vicia gr. *disperma* DC.
Jasione montana L.

A cobertura arbórea e arbustiva da região é constituída, principalmente, pelas espécies: *Quercus rotundifolia, Olea Oleaster, Phillyrea angustifolia, Pistacia Lentiscus, Astragalus lusitanicus, Phlomis purpurea, Asparagus albus* e *Cistus ladaniferus.*

Do ponto de vista sociológico, embora se disponha de bem poucos elementos, e se ignore a posição da espécie no resto da sua área, na região onde agora se encontrou, parece fazer parte de um agrupamento subordinado à *Quercus rotundifolia.*

Carex Pairaei F. W. Schultz, *Flora:* 303 (1868); COSTE, *Fl. Fr.* **3**: 498 (1937); FOURNIER, *Les Quatre Fl. Fr.:* 102 (1946); CLAPHAM, TUTIN and WARBURG, *Fl. Brit. Isles:* 1403 (1952); KERN en REICHGELT, *Carex* L. in *Fl. Neerl.* 1 (3): 113 (1954); HEUKELS-VAN OOSTSTROOM, *Fl. Nederl.:* 733 (1956); GLEASON, *Ill. Fl. Nort. U. S. Adj. Canada* **1**: 308 (1958).

Carex divulsa Stokes var. *Pairaei* (F. W. Schultz) Kobus, *Ned. Kruidk. Arch.* 2ᵉ *ser.* 4 (4): 492 (1886).

Carex echinata sensu Kükenth. in Engl., *Pflanzenr.* 4 (20): 160 (1909), non Murr. 1770.

Carex loliacea sensu Schk., *Riedgr.* : 22 (1801).

Carex muricata L. var. *loliacea* sensu Schk., *Riedgr.* **2**: 12 (1806), non *C. loliacea* L. 1753.

Carex muricata L. ssp. *Pairaei* (F. Schultz) Asch. et Gr., *Syn.* 2 (2): 40 (1902).

Carex muricata L. var. *Pairaei* (F. Schultz) Fiori, *N. Fl. An. It.* **1**: 185 (1923-1925).

ICON. — BONNIER, *Fl. Compl. Fr. Suis. Belg.* 11, *planche* 634: 2920b (1911-1934); COSTE, *l. c.;* KERN en REICHGELT, *l. c.:* 110 et 114; MAIRE, *Fl. Afr. Nord* **4**: 108 (1957); GLEASON, *l. c.*

Planta vivaz de 30-60 cm, em tufo curto, denso, com a base rodeada de fibras; caules alongados e delgados, folhas estreitas; lígula curta, oval, obtusa, com o bordo anterior chanfrado em curva arredondada; espiga oblonga, densa ou um pouco frouxa na base, verde arruivada; brácteas setáceas; utrículos, por fim, patentes em estrela, castanho-anegrados, largamente ovais, curtos (3 1/2 mm), estreitando bruscamente em bico curto; aquénios tão compridos como largos (COSTE, 1937).

Espécimes: Alto Alentejo: Serra de S. Mamede: Souto do Cego: restos de floresta de *Quercus pyrenaica* (Inv.° 573) (24.IV.1957, *Malato-Beliz et al.* ELVE 9818); Idem, idem: Alvarrões: restos de floresta de *Quercus pyrenaica* (Inv.° 583) (24.Abril.1957, *Malato-Beliz et al.* ELVE 9821); Idem, idem: Entre M.ᵗᵉ Paleiros e Alvarrões: Quinta Nova: na berma da estrada (24.Abril.1957, *Malato-Beliz et al.* ELVE 9822).

Exsiccata :

CHECOSLOVÁQUIA: Silésia (27.VI.1951).

ESPANHA: Guardia (*P. Merino s. j.* Herb. S. Fiel).

FINLÂNDIA: Regio Aböensis, par. Lojo, ins. Jalassaari, Ekeberga, in margine silvae (1.VII.1942, *Harald Lindberg).*

FRANÇA: In silvis prope Brumath, Alsatia *(M. Paira);* Clairières des bois de Geudertheim, sur le diluvium quartzeux de la plaine près Brumath (Alsace) 25.V-VIII.1870, *M. Paira*) ; Coteaux granitiques de Laveyron et au chemin de Champis, près Saint--Vallier, le long de la Galeuse (Drôme, France) (20.V-14.VI.1871, *Chabert);* Chemin de champs près de St. Vallion le long de la Galaure (Drôme, France) (14.VI.1871, *Chabert).*

ITÁLIA: Bei Bolone in Val Vestino in Südtirol auf Kalkboden ; ca 900 m. ü. d. M. (V-VI.1900, *Porta).*

RÚSSIA: Prov. et distr. Pskow: In decliviis pr. pagum Borissowiczi (13.VI.1900, *W. Andrejew)*; Prov. Rjazan, distr. Zarajsk: In ripis calcareis flum. Osetr. pr. Iljassowo (12.VI.1900, *A. Petunnikow*).

Distribuição geográfica Europa, Ásia ocidental, Norte de África, Madeira e América do Norte.

Ecologia e fitossociologia : A espécie, ao longo da sua área, encontra-se quase exclusivamente em domínios florestais, muito embora viva nas pequenas clareiras ou junto às veredas das matas. Parece, assim, preferir condições de certa luminosidade, a dentro de frescura ambiental.

No que respeita aos solos, verifica-se que a *C. Pairaei* vive não só em solos calcáreos (cf., p. ex., OBERDORFER, 1949), mas também nos siliciosos e ácidos.

Na Serra de S. Mamede, onde agora foi assinalada, vive, principalmente, nas matas clareadas de *Quercus pyrenaica,* em solos frescos, soltos, graníticos, pardo-amarelados, acentuadamente ácidos (pH 4.5-5.0), acima de 400 metros de altitude, em locais por vezes de acentuado pendor.

Quanto à posição fitossociológica desta espécie, cremos que ela fará parte de um dos agrupamentos vegetais que representam em Portugal as florestas de carvalhos de folha caduca, o qual, ainda por definir, se filiará na aliança denominada por BRAUN-BLANQUET, PINTO DA SILVA e ROZEIRA (1956) *Quercion occidentale.*

São suas companheiras habituais, nos locais estudados, as seguintes espécies :

Quercus pyrenaica Willd.
Ulex minor Roth
Genista falcata Brot.
Pteridium aquilinum (L.) Kuhn
Asphodelus albus Mill.
Physospermum aquilegifolium (All.) Koch
Arenaria montana L.
Rumex Acetosa L.
Ruscus aculeatus L.
Geranium lucidum L.
Arum italicum Miller var. *pictum* P. Cout.
Rhagadiolus stellatus (L.) Gaertn.
Crataegus monogyna Jacq.
Tamus communis L.
Polygonatum odoratum (Mill.) Druce
Teucrium Scorodonia L.

Bupleurum rigidum L., *Sp. PL:* 238 (1753); WILLKOMM et LANGE, *Prodr. Fl. Hisp.* 3: 74 (1880); BONNIER, *Fl. Compl. Fr. Suis. Belg.* 4: 113 (1911-1934); FIORI, *Nuova Fl. Anal. Ital.* 2: 36 (1925-1929); COSTE, *Fl. France* 2: 202 (1937); CABALLERO, *Fl. Anal. Esp.:* 335 (1940); FOURNIER, *Les quatre Fl. France:* 670 (1946).

ICON.— BONNIER, *l.* c, *planche* 233: 1210; FIORI, *Icon. Fl. Italicae:* 274 (1933); COSTE, *l. c.;* FOURNIER, *l. c.:* 669.

Planta vivaz de 30-80 cm, erecta, de caule ramoso, flexuoso, com ramos delgados, patentes ; folhas inferiores aproximadas na base do caule, coriáceas, atenuadas em pecíolo, persistentes longo tempo, ovais ou oval-oblongas, com as nervuras muito salientes, das quais duas marginais ; folhas superiores pequenas e lineares; umbelas pequenas, de 2-5 raios filiformes, subiguais; invólucro de 3-4 brácteas filiformes ; involucelo com 5-6 brácteas lineares muito mais curtas que as umbélulas; fruto ovóide-oblongo, de costas finas e pouco salientes. Floração : Julho--Setembro.

Citada para o nosso País por LANGE (in WILLKOMM et LANGE, 1880), e, posteriormente, por outros autores (cf., por ex., BONNIER, 1911-1934 e COSTE, 1937), esta espécie foi incluída por COUTINHO (1939), sob reserva, na *Flora de Portugal.*

Muito embora até 1957 não haja notícia de ter sido herborizada entre nós — ao menos nas últimas décadas —, nem tão pouco exista qualquer espécime português em herbários nacionais, foi naquele ano colhida por nós na Serra de S. Mamede, e, no ano corrente, foi também assinalada no Ribatejo pelo Departamento de Fitossistemática e Geobotânica da Estação Agronómica Nacional.

Em face destes achados, confirma-se a citação de LANGE *(l.c.)* e deixam de justificar-se a reserva posta por COUTINHO *(l.c.)* e a omissão feita por SAMPAIO (1947).

Espécimes: Alto Alentejo: Serra de S. Mamede: próx. do Picoto: encosta exposta a NE ; mata de *Quercus pyrenaica* clareada (Inv.° 601) (29.IV e 12.IX.1957, *Malato-Beliz et al.* ELVE 9820); Ribatejo: Alcanede, pr. Tremês: nos matos de calcário *(Rosmarinetalia)*; uma planta única! (30.IV.1959, *P. Silva et B. Rainha*, LISE).

Exsiccata :

ESPANHA — Castilla: Obarenes: montes (11.IX.1906, *Fr. Sennen et Elias)*; Catalogne: Figueras (21.VIII.1909, *F. Sennen)*; Catalogne: Massif du Tibidabo: Barranco de S. Genés (14.IX.1912, *Sennen*); Monte del Rio Zover (Ciudad Real) (6.VII.1934, *Gz.-Albo*).

FRANÇA — Sommières (Gard) (21.VIII.1890, *Lombard--Dumas*); Vendémian (Hérault): Garrigues près du Tir (22.VIII.1905, *Puech).*

ARGÉLIA — Terny, vers le Nador: Broussailles; 1400 m (19.VII.1941, *A. Faure*).

Distribuição geográfica Portugal, Espanha, França meridional, NW de Itália, Marrocos e Argélia.

Ecologia e fitossociologia : Através da região mediterrânica ocidental, o *Bupleurum rigidum* vive nos bosques e matos abertos e nos locais estéreis, em altitudes que, em geral, não ultrapassam 850 metros, com maior frequência em solos calcários, mas também nos siliciosos.

Em França, BRAUN-BLANQUET (1936), situa-o quer na *Quercetum ilicis galloprovincialis* quer num estado inicial da degradação deste agrupamento *(Quercetum cocciferae)*. Na Catalunha, BOLOS (1950) refere igualmente a sua presença no domínio climácico da *Quercion ilicis*.

Em Portugal, próximo de Tremês, o *B. rigidum* foi encontrado nos matos de solo calcário pertencentes a *Rosmarinetalia*. Na Serra de S. Mamede, foi herborizado numa mata clareada de *Quercus pyrenaica*, em solo pardo de granito, acentuadamente ácido (pH 4.5), exposto a NE, com grande inclinação, a cerca de 650 metros de altitude.

Embora possa surpreender, se se atender às referências sociológicas anteriores, a presença no local de certas espécies, tais como : *Quercus pyrenaica, Ulex minor, Cistus hirsutus, Arenaria montana, Silene nutans, Polygonatum odoratum* e *Pteridium aquilinum*, sugere que o agrupamento no qual está presente o *B. rigidum* se filia na *Quercion occidentale*.

A explicação deste facto talvez se possa encontrar na circunstância da zona estudada se situar no limite sul das florestas de folha caduca, confinante com vasta superfície dominada pela *Quercus Ilex* ssp. *rotundifolia*.

Bidens aurea (Ait.) Sherff, *Bot. Gaz.* **59**: 313 (1915), ex synon. Ait. nec alior.; *ibid.* 81: 42 (1926).

Bidens aurea var. *Wrightii* (Gray) Sherff, *Bot. Gaz.* 85: 16 (1928).

Bidens arguta H. B. K., *Nov. Gen. et Sp.* **4**: 181 (231) (1820).

Bidens arguta var. *luxurians* (Willd.) DC, *Prodr.* 5: 596 (1836).

Bidens decolorata H. B. K., *op. cit.*: 182 (233).

Bidens heterophylla Ortega, *Hort. Matr.*: 99, pl. 12 (1798).

Bidens heterophylla var. *typica* Fiori, in Fiori et Paoletti, *Fl. Anal. Ital.* 3: 303 (1904).

Bidens heterophylla var. *Wrightii* Gray, *Proc. Amer. Acad.* **19**: 15 (1883); *Syn. Fl. N. Am.* **1**, pt. 2: 298 (1884).

Bidens longifolia DC., *op. cit.*: 597.

Bidens luxurians Willd., *Enum. Hort. Berol.*: 847 (1809) (nec alior.).

Bidens mexicana Willd., *Herb.* No. 15034-1 (nec alior.).

Bidens tetragona (La Llave et Lex.) DC, loc. cit..

Bidens Warszewicziana Regel, *cum* vars. *simplicifolia*, *pinnata* et *bipinnata*, *Flora* **32**: 183-184 (1849).

Coreopsis aurea Ait., *Hort. Kew.* **3**: 252 (1789), non aliorum.

Coreopsis lucida Cav., *Descrip.*: 224 (1802).

Coreopsis nitida Hort., R. M. ex *Elenchus Pl. Hort. Bot.* J. J. Destremx ann. 1805: 10 (1806).

Coreopsis tetragona La Llave et Lex., *Nov. Veg. Descrip.* **1**: 31 (1824), ex descrip. et loco.

Coreopsis trichosperma var. *aurea?* Nutt., *Gen.* **2**: 180 (1818), tantum quoad synon. Ait.

Diodonta aurea (Ait.) Nutt., *Trans. Amer. Phil. Soc. ser. 2*, **7**: 360 (1841), ex synon. Ait.

Diodonta aurea (Ait.) Nutt. ex Walp., *Repert.* **2**: 614 (1843), ex synon. Ait.

ICON. — SHERFF, *The gen. Bidens* **1**: pl. LXXX (1937).

« Herba erecta, perennis vel interdum annua; caule tetragono, simplici ramosove, viridi vel subpurpurascenti, plerumque 0.5-1 m alto. Folia submembranacea, plerumque petiolata petiolis plus minusve alatis et 0.2-4 cm longis, glabra vel interdum tomentula vel supra debiliter pubescentia, petiolo adjecto 0.8-2.2 dm longa, maxime variabilia; nunc indivisa, linearia vel lanceolata vel etiam elliptico-oblonga, serrata dentibus brevibus longisve vel interdum subintegra, saepe acuminata; nunc 3-5 partita, foliolis lanceolatis linearisbusve (raro etiam capillaribus), acriter tenuiterque serratis vel integris, imis interdum connatis ad apicem petioli ; nunc rarissime bipinnata, segmentis linearibus et integris. Capitula radiata, pansa ad anthesin 2-5 cm lata et 0.6-1 cm alta. Involucri bracteae exteriores 8-17, lineares, apice acuto induratae, hispido-ciliatae, faciebus saepe glabrae, 3-6 mm longae, bracteis interioribus subaequales. Flores ligulati plerumque 5 vel 6, flavi, ligula obovati, apice subintegri vel irregulariter dentati, 1-3 cm longi. Achaenia cuneato-linearia, subtetragona, nigra vel subnigra, plus minusve erecto-setosa setis ad basim saepe papilliformibus, corpore 4-7 mm longa, apice biaristata ; aristis flavidis, tenuibus, supra retrorsum hamosis, 1.5-2.7 mm longis». (SHERFF, 1937).

Espécime: Algarve: Luz de Tavira: propriedade de D. Carlos Picoto : junto a um tanque (3.XI.1958, *J. A. Chaves* ELVE 9817)·

Exsiccata :

FRANÇA — Bordeaux : subspontané (XI-1877, *Motelay* Pl. Gal. et Belg. 585).

MÉXICO — Pedregal: bords des champs (12.IX, *M. Bourgeau* Herb. de la Comis. Scient. du Mexico 1865-1866); San Nicolas: bords des champs (27.IX, *M. Bourgeau* 1865-1866).

Distribuição geográfica Desde o extremo sul do Arizona, em vários locais do México, atingindo as regiões do Vulcão do Fogo e do Vulcão de Pacaya, na Guatemala. Subespontânea em França, Itália e Portugal.

Ecologia: No SW da América do Norte, sua área natural, a *Bidens aurea* vive, geralmente, nos campos cultivados e bordos destes, nos planaltos e prados, em solos fundos, ricos e húmidos, atingindo cerca de 2.700 metros de altitude (México). Nos países onde é subespontânea (França e Itália), parece manter preferência pelos solos húmidos e fundos, muito embora em baixas altitudes. Estas características de *habitat* mantêm-se ainda em Portugal, pois no Algarve encontra-se nos terrenos cultivados e suas margens, húmidos e mais ou menos profundos, constituindo já, em certos locais, séria ameaça das culturas, como planta invasora.

SUMÁRIO

No presente trabalho, o autor dá conhecimento, pela primeira vez, da existência em Portugal de quatro espécies: *Catapodium tuberculosum* Moris, *Carex Pairaei* F. W. Schultz, *Bupleurum rigidum* L. e *Bidens aurea* (Ait.) Sherff, das quais as três primeiras indígenas e a última originária da América e hoje subespontânea.

Para cada uma delas, foram anotadas a sinonímia, descrição e distribuição geográfica, terminando por algumas considerações sobre as suas ecologia e posição fitossociológica.

RÉSUMÉ

ESPÈCES NOUVELLES POUR LA FLORE DU PORTUGAL

Dans le présent travail, l'auteur signale, pour la première fois au Portugal, la présence de : *Catapodium tuberculosum* Moris, *Carex Pairaei* F. W. Schultz, *Blupleurum rigidum* L. et *Bidens aurea* (Ait.) Sherff.

Bien qu'inconnues jusqu'ici, les trois premières espèces sont indigènes dans le pays ; la dernière a été introduite d'Amérique et elle se trouve, aujourd'hui, subspontanée.

Pour chaque espèce, on a référé la synonymie, la description, la distribution géographique et des caractères ecologiques et phytosociologiques.

SUMMARY

NEW SPECIES TO THE PORTUGUESE FLORA

In this paper, some new species to the flora of the country are presented. They are : *Catapodium tuberculosum* Moris, *Carex Pairaei* F. W. Schultz, *Bupleurum rigidum* L. and *Bidens aurea* (Ait.) Sherff.

Indubitably, the first three are native in the country, and the last was introduced from America and now she is subspontaneous.

For each species, synonims, description, geographical distribution and some notes on ecology and phytosociology are refered.

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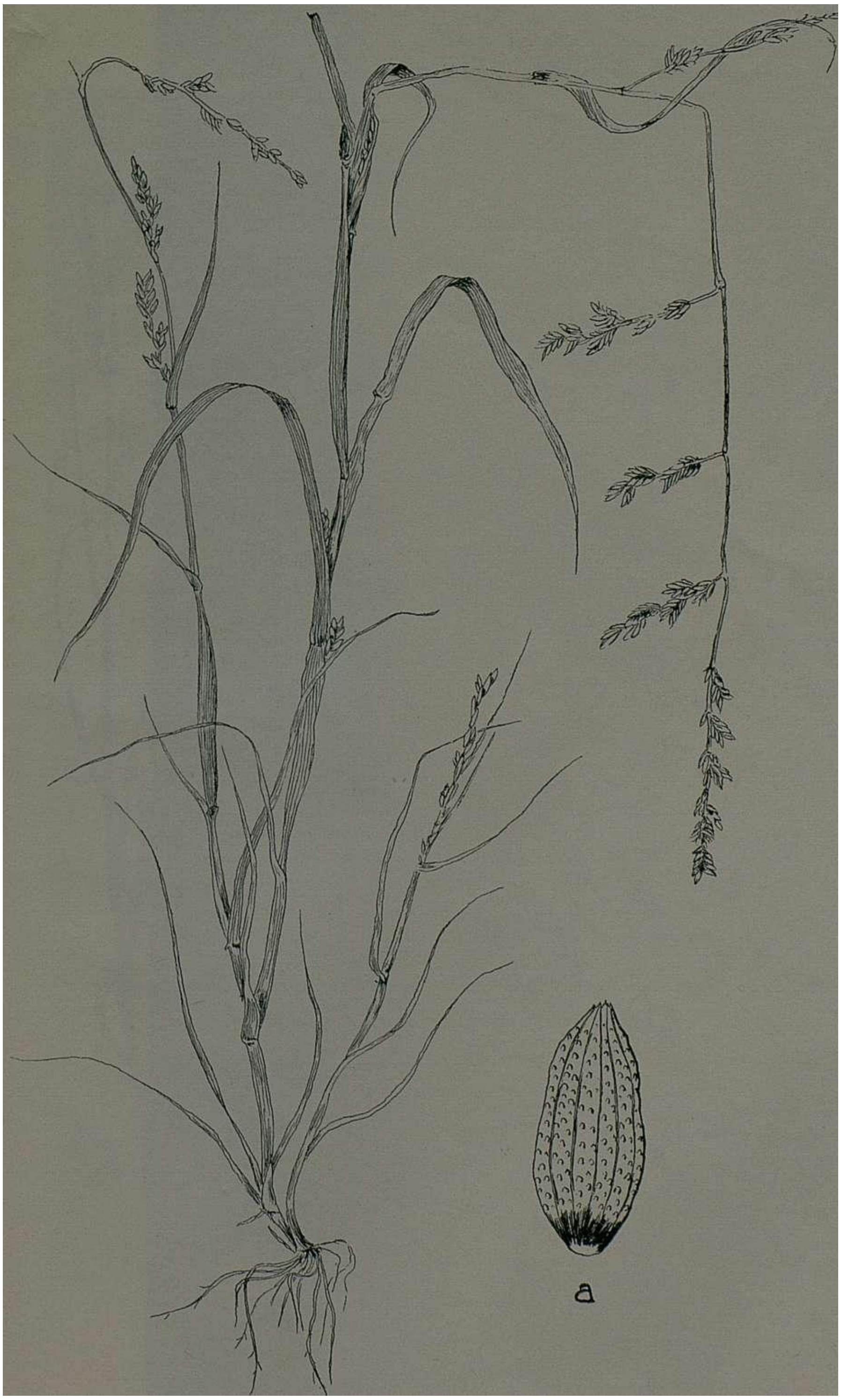
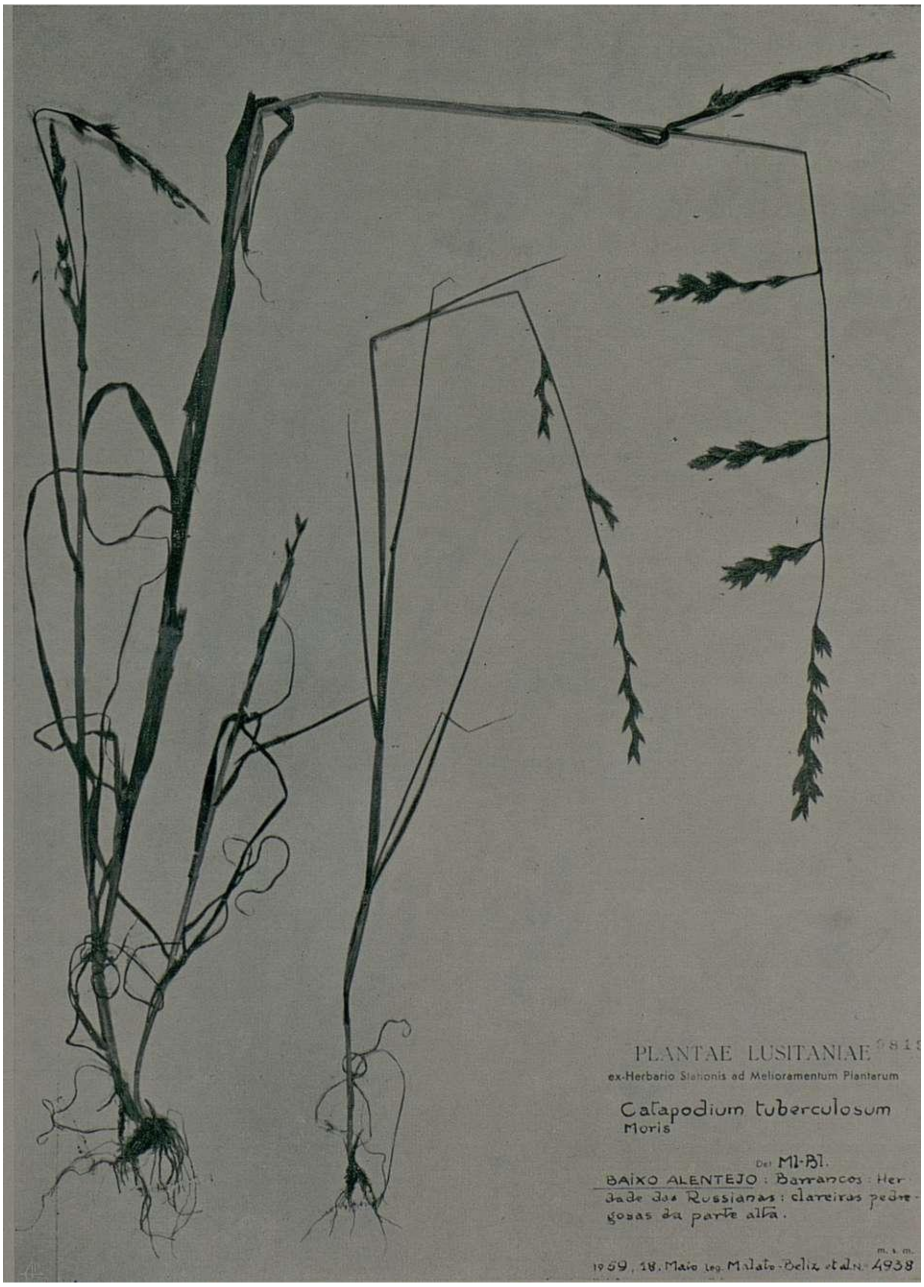


Catapodium tuberculosum Moris ; ***a,*** glumela inferior.



PLANTAE LUSITANIAE 981
ex-Herbario Stationis ad Melioramentum Plantarum

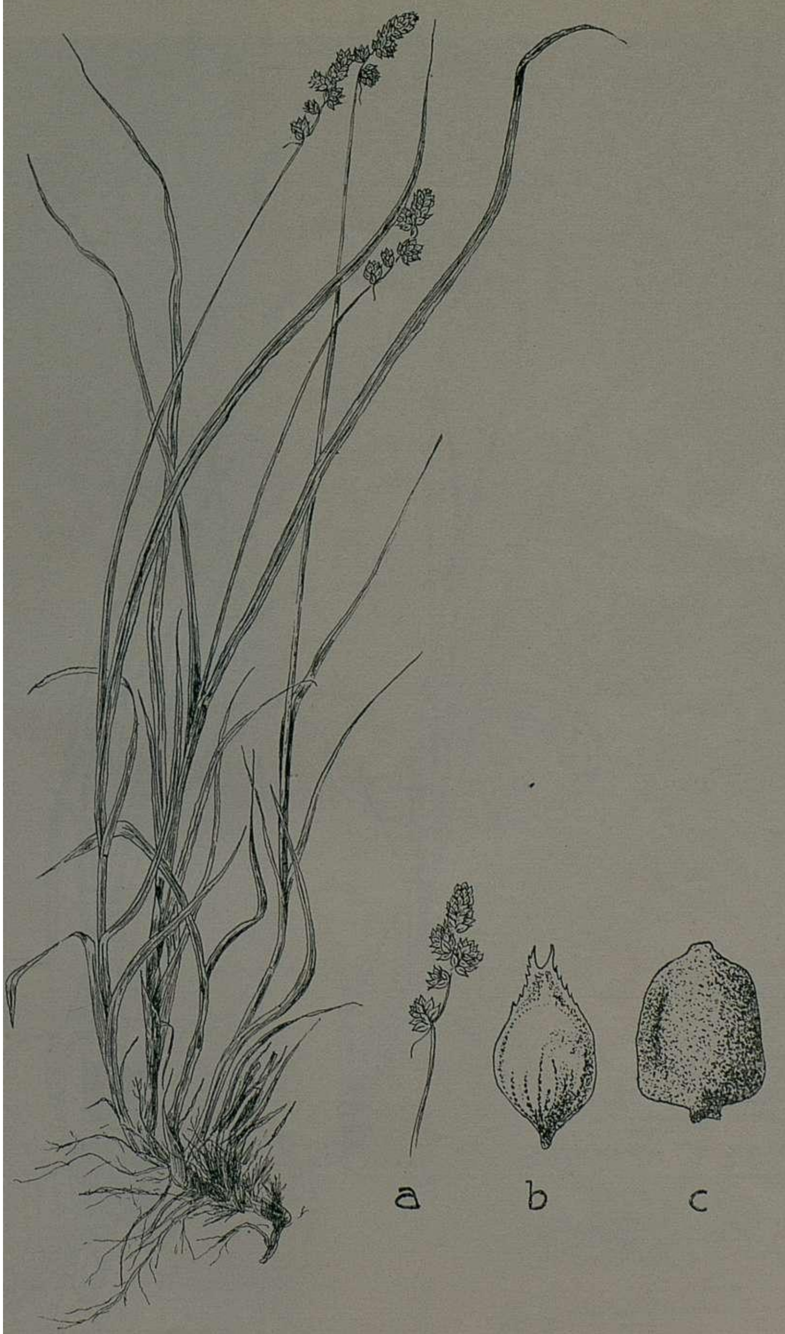
Catapodium tuberculosum
Moris

Det. MI-BI.

BAIXO ALENTEJO: Barrancos: Herdade das Russianas: claireiras pedregosas da parte alta.

m. s. m.
1959, 18. Maio leg. Malato-Beliz et al. N.º 4938

Catapodium tuberculosum Moris

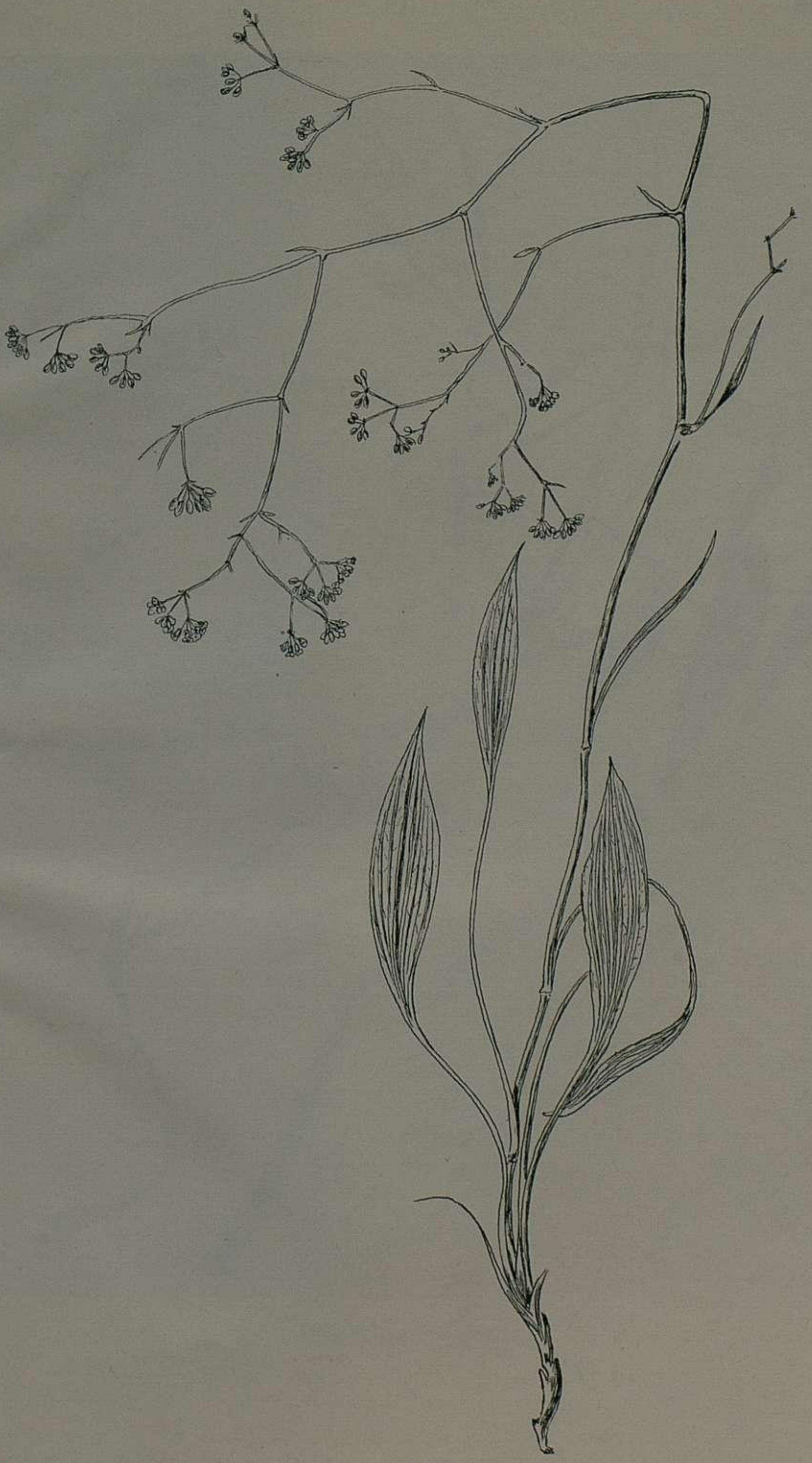


Carex Pairaei F. W. Schultz; *a,* inflorescência; *b,* utrículo; *c,* aquénio.

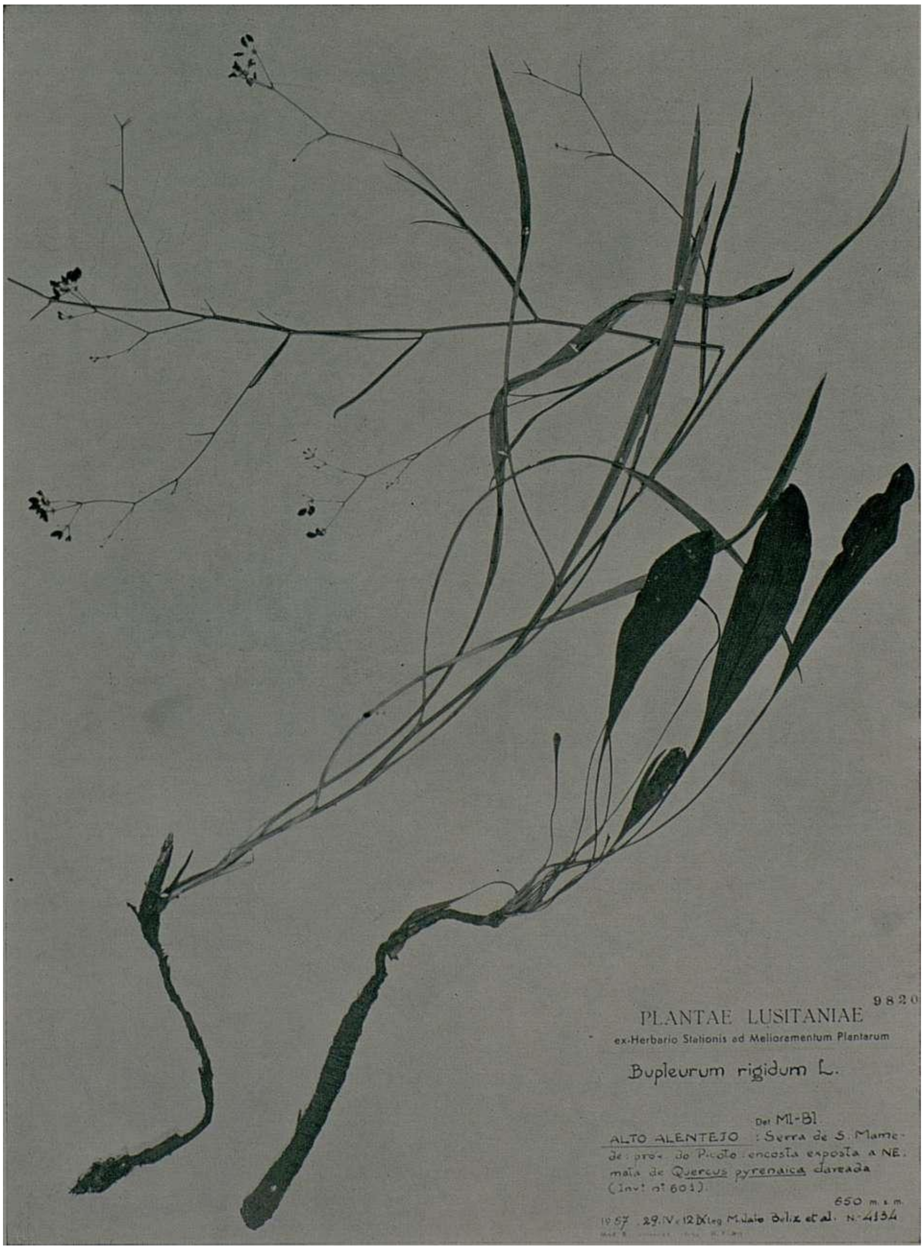
EST. IV

Carex Pairaei F. W. Schultz

Est. V



Bupleurum rigidum L.



Bupleurum rigidum L.

EST. VII

Bidens aurea (Ait.) Sherff; *a,* folhas; *b,* aquénio; *c,* corola marginal.

PLANTAE LUSITANIAE 9817
ex-Herbario Stationis ad Melioramentum Plantarum

Bidens aurea (Ait.) Sherff

Det Ml-Bl.
ALGARVE : Luz de Tavira:
na propriedade de D. Carlos Picoto
junto a um Tanque.

m. s. m.
1958 . 3 Nov.º leg. J. A. Chaves N.º –

Bidens aurea (Ait.) Sherff

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