TABLA II

TABLA SINTETICA DE LAS FORMACIONES GALLEGAS DE LA ASOCIACION CISTO-GENISTETUM HYSTRICIS COMPARADAS CON LA ASOCIACION LAVANDULO-GENISTETUM HYSTRICIS (RIVAS-MARTINEZ, 1968: tabla 7 y RIVAS-MARTINEZ, 1979: tabla 22).

	Cisto-Genistetum hystricis			Lavandulo-Genistetum hystricis
	ulicetosum europaei	ericetosum arboreae	ericetosum aragonensis	
Características de asociación y unidades superiores				
Cistus ladanifer	V^{1-3}	V^{1-5}	V^{1-4}	III^{+-3}
Lavandula stoechas subsp. sampaiana	V^{+-1}	V^{+-3}	V^{r-1}	.
Helichrysum stoechas subsp. stoechas	II^{+}	III^{+}	III^{r-+}	I^{1}
Thymus mastichina	III^{+}	III^{+}	.	IV^{+-2}
Cistus salvifolius	III^{+-3}	I^{r-+}	III^{r-2}	I^{2}
Genista hystrix	.	I^{1-2}	III^{1-2}	V^{+-4}
Cytinus hypocistis	I^{r}	I^{2}	II^{r-+}	.
Lavandula stoechas subsp. pedunculata	.	.	.	V^{+-4}
Cistus laurifolius	.	.	.	I^{+-1}
Lotus corniculatus subsp. carpetanus	.	.	.	I
Diferenciales de la subasociación ulicetosum europaei				
Cistus psilosepalus	V^{+-1}	.	.	.
Ulex europaeus subsp. europaeus	V^{+-1}	.	.	.
Diferenciales de la subasociación ericetosum arboreae				
Quercus rotundifolia	I^{+}	V^{r-2}	III^{+}	II^{+-1}
Erica arborea	I^{+}	V^{r-1}	II^{+-1}	I^{+}
Diferenciales de la subasociación ericetosum aragonensis				
Chamaespartium tridentatum	.	.	IV^{r-2}	III^{+-3}
Erica australis subsp. aragonensis	.	.	IV^{+-2}	.
Especies de la Quercetea ilicis				
Daphne gnidium	II^{+}	IV^{+}	III^{r-+}	IV^{+}
Phillyrea angustifolia	I^{+}	II^{+-1}	II^{+}	.
Arbutus unedo	II^{r-+}	I^{+}	I^{r}	.
Quercus suber	III^{r-+}	.	.	.
Osyris alba	I^{+}	I^{r-1}	I^{1}	.
Lonicera etrusca	.	I^{r-+}	.	.
Pistacia terebinthus	.	I^{r-+}	.	.
Rubia peregrina	.	I^{+}	.	.

RIVAS-MARTINEZ (1979) incluye la asociación de las rocas ultrabásicas transmontanas *(Cisto-Genistetum hystricis)* en la alianza *Cistion laurifolii* como vicariante de su *Lavandulo-Genistetum hystricis*. Aunque la aulaga de Lange ha sido considerada característica de la *Cistion laurifolii* la verdad es que únicamente aparece en la *Lavandulo-Genistetum hystricis* y falta en el resto de las comunidades conocidas que integran esta alianza. Por otro lado, el areal de la aulaga sólo coincide con los flancos occidentales de la misma (cf. VICIOSO, 1953) donde se integra en comunidades no referibles a dicha alianza y clase: as. *Genisto hystricis-Cytisetum multiflori* y *Genisto hystricis-Echinospartetum lusitanici* de la *Cytisetea scopario-striati;* encinares aparte.

Como consecuencia de la ausencia de características de la alianza carpetana y la presencia en nuestros jarales de *Lavandula stoechas* subsp. *sampaiana* más sus afinidades ecológicas y corológicas nos llevan a optar por su inclusión en el *Cisto-Genistetum hystricis* de la *Ulici argentei-Cistion ladaniferi,* tal como fué inicialmente subordinada (P. SILVA, 1970).

Distinguimos 3 subasociaciones nuevas de la *Cisto-Genistetum hysticis,* las tres orensano-sanabrienses por el momento:

— subas. *ericetosum arboreae* Izco et Ortiz nova

Es la más termófila de las trés y ocupa posición intermedia en cuanto a la continentalidad, representa el óptimo de evolución y desarrollo manifestado por una mayor riqueza en especies del bosque.

Erica arborea que es la especie diferencial de la subasociación junto con *Quercus rotundifolia* no marca sin embargo unos límites muy netos, sobre todo con la subasociación *ericetosum aragonensis,* debido a que en la subasociación *ericetosum arboreae* influyen factores dinámicos y no solamente territoriales. *Erica scoparia* contribuye a diferenciar mejor el sintaxon.

— subas. *ulicetosum europaei* Izco et Ortiz nova

Manifiesta una influencia oceánica mayor que las otras. Sus diferenciales son *Ulex europaeus* subsp. *europaeus* y *Cistus psilosepalus.* El alcornoque, madroño y *«xesta branca» (Cytisus multiflorus)* apoyan sus diferencias. Tiene cierta relación con la

Lavandulo sampaianae-Cytisetum multiflori de la que se separa por la presencia de *Cistus ladanifer* y *Ulex europaeus* subsp. *europaeus*, además de otras especies.

— subas. *ericetosum aragonensis* Izco et Ortiz nova

Define las áreas mas continentales y ocupa, por lo general, zonas de apreciable altitud. En ella es donde con mayor frecuencia se halla *Genista hystrix*. Donde mejor está representada esta subasociación es en contacto con el dominio de *Quercus pyrenaica* donde su parentesco con *Pterosparto tridentatae-Ericetum aragonensis*, al que precede en altitud, es claro; por ejemplo entre los 800 y 900 m s.n.m., en la cuenca del río Casaio.

Los aspectos nomenclaturales de esta comunidad merecen alguna consideración sobre todo por lo que se refiere a la identificación de la subas. típica y la citación de la autoría. El primitivo nombre utilizado por PINTO DA SILVA (1965), «*Cistetum ladaniferi* serpentinícola», debe rechazarse en aplicación del Art. 34 de C. I. N. F. por lo que hay que considerar que es en la publicación posterior (P. SILVA, 1970) donde se propone válidamente el sintaxon. Sin embargo, el reconocimiento de la idea prioritaria y la posibilidad de seguir el proceso de la definición de la asociación y de la génesis de la propuesta son causa más que suficiente para el empleo de la particula *ex* en la forma apuntada por la Recomendación *46D* del Código mencionado. Así, pensamos que la citación correcta es la siguiente:

Cisto (ladaniferi) — Genistetum hystricis P. Silva ex P. Silva 1970

De forma subsiguiente el caracter inválido de la primera publicación obvia el problema sobre la identificación de la variante típica ya que en aquella sólo se hace mención a inventarios serpentinícolas, siendo posteriormente desplazados de su consideración típica en la publicación de 1970.

De todas formas, consideramos que las variantes propuestas por P. SILVA (1970) tienen rango de subasociación y así las proponemos con nuevo nombre, lo que es posible al quedar fuera de la jurisdición del C. I. N. F. los rangos inferiores.

En consecuencia la ordenación sintaxonómica que proponemos para estos estevales gallegos y de Trás-os-Montes es:

Al. *Ulici argentei-Cistion ladaniferi* (Br.-Bl. 1940) Br.-Bl., P. Silva et Rozeira 1964 em. Rivas-Martínez 1979.

As. *Cisto-Genistetum hystricis* P. Silva ex P. Silva 1970.

subas. *genistetosum hystricis* em. nom. Izco & Ortiz

Basónimo: *Cisto-Genistetum hystricis* P. Silva 1970 var. *typicum*. Agron. Lusit. 30: 315-319. Tabla XII (invent. 9-10). Lectosíntipo invent. 10.

subas. *alyssetosum lusitanici* P. Silva ex Izco et Ortiz nova

Basónimo: *Cisto-Genistetum hystricis* P. Silva 1970 var. *serpentinicum*. Agron. Lusit. 30: 315-319. Tabla XII (invent. 1-8). Lectosíntipo invent. 3.

subas. *ulicetosum europaei* Izco et Ortiz nova. Tabla I, invent. 1-12. Holosíntipo invent. 1.

subas. *ericetosum arboreae* Izco et Ortiz nova. Tabla I, invent. 13-28. Holosíntipo invent. 26.

subas. *ericetosum aragonensis* Izco et Ortiz nova. Tabla I, invent. 29-37. Holosíntipo invent. 29.

PASTIZAL TEROFITICO DEL MOSAICO

El pastizal terofítico silicícola que ocupa los claros del jaral pertenece al orden *Tuberarietalia guttatae*, concretamente a la alianza *Thero-Airion*.

A pesar de la situación de los territorios estudiados en las fronteras atlánticas debemos reseñar, sin embargo, la flora marcadamente mediterránea que compone estos pastizales: *Tuberaria guttata, Aira caryophyllea* subsp. *caryophyllea, Ornithopus compressus, Trifolium campestre, Anthoxanthum aristatum* y *Ornithopus pinnatus* etc. que se comportan como diferenciales frente a otras comunidades de la alianza.

Por su composición general no es asimilable a las españolas que RIVAS-MARTINEZ (1978) engloba en la alianza, ni a las bretonas que citan WATTEZ, GEHU & FOUCAULT (1978), las de la Mancha oriental (GEHU & FOUCAULT, 1978), las de Borgoña (ROYER, 1978), etc.

Particularmente difiere de las asociaciones de regiones próximas que citan DALDA (1972): *Filagini-Vulpietum;* DIAZ & NAVARRO (1978): *Asterolino-Rumicetum* y *Petrorhagio-Trifolie-*

TABLA III. As. Galio - Logfietum minimae Izco et Ortiz nova

Nº inventario	1	2	3	4	5	6	7	8	9	10	11	12	13	14	15	16	17	18	19	20	21	22	23
Area en m^2	4	1	0'5	1	4	2	2	4	4	1	0'5	1	2	0'5	2	2	2	4	1	2	1	1	2
Cobertura cormófitos en %	90	40	30	30	15	20	80	50	20	70	60	50	60	60	40	40	70	70	20	30	40	20	30
Cobertura liquénico-muscinal en %	30	15	70	60	10	70	70	70	5		70	40	15		20	50	10	20	80	60	10	60	90
Altura vegetación en cm	40	10	10	5	20	15	20	15	20	30	15	15	30	10	25	20	25	25	15	20	15	20	15
Altitud sobre el nivel del mar en m	300	590	600	500	450	530	440	620	895	630	450	600	545	500	530	700	395	420	495	380	450	480	500
pH	5'5	6'3	5'4	5'6	5	4'8	5'3	5'1	4'7		5'9	6'2	5'4		5'3	6'5	6'6	6'7	6'4	6'8	6'6	6'6	5'8
Nº especies	15	18	14	11	12	13	13	13	11	15	14	14	20	11	10	13	13	12	11	10	12	11	10

																						Presencia	Grado de presencia	
Características y diferenciales de asociación y alianza (Galio-Logfietum minimae y Thero-Airion)																							sedetosum arenarii	logfietosum minimae
Tuberaria guttata	3.2	2.1	2.1	1.1	2.1	r	2.2	1.1	1.1	3.3	2.2	2.2	+	+.2	+	.	1.1	1.1	+	1.1	+	+	1.1	22	V	V
Logfia minima	+	+	+	.	1.1	1.1	1.1	1.1	+	1.1	.	+	+	3.2	(r)	+	+	+	.	1.1	+	+	+	20	V	V
Galium parisiense	+	.	.	2.2	+	1.1	+	.	1.1	2.2	+	.	+	1.1	2.1	+	.	2.1	+	+	+	1.1	1.1	18	IV	V
Aira caryophyllea subsp. caryophyllea	.	+.2	+	1.1	.	1.1	+	+	.	1.1	1.1	+	1.1	.	1.1	+	1.1	+	.	.	+	.	.	15	IV	IV
Ornithopus compressus	.	.	.	.	+	.	.	1.1	.	2.2	.	.	+	+	2.2	+	.	+	+	.	+	.	+	11	II	IV
Cerastium glomeratum	.	.	.	.	.	.	.	.	.	+	.	.	+	.	+	+	+	r	1.1	.	.	+	.	8	.	III
Trifolium campestre	.	.	.	.	.	.	.	.	.	.	+.2	2.1	.	.	.	1.2	2.2	.	+	+	2.2	.	+	8	.	III
Anthoxanthum aristatum subsp. aristatum	2.2	.	.	.	+	.	.	.	.	1.1	.	1.1	.	.	.	r	+	.	.	.	.	.	.	6	II	II
Moenchia erecta subsp. erecta	.	+.2	.	+	.	.	.	.	.	.	.	1.1	.	+	.	.	.	+	.	.	+	.	.	6	II	II
Ornithopus pinnatus	1.2	+	.	.	.	+	.	.	.	1.3	+	.	.	.	.	.	.	.	.	.	.	.	.	5	II	I
Ornithopus perpusillus	.	1.2	+	.	.	.	+	.	.	.	.	+	.	.	.	.	.	.	.	.	.	.	.	4	II	I
Hispidella hispanica	.	.	.	.	+.2	.	.	.	1.1	.	.	.	.	.	.	.	.	.	.	+	.	.	.	3	II	I
Diferenciales de la subasociación sedetosum arenarii																										
Sedum arenarium	1.1	+	1.2	.	+	.	+	1.2	1.2	.	.	.	.	.	.	.	.	.	.	.	.	.	.	7	IV	.
Aira praecox	.	1.2	1.1	+	.	+	+.2	+	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	6	IV	.
Características de orden y clase (Tuberarietalia guttatae y Tubarietea guttatae)																										
Vulpia bromoides	+	1.1	.	.	r	+	.	+.2	.	.	+	.	+	.	2.1	.	+	.	+	+	.	r	+	13	III	III
Teesdalia nudicaulis	.	+	+	+	.	.	+	+	+	.	.	.	+	r	(r)	.	.	.	+	r	.	+	.	12	IV	III
Asterolinon linum-stellatum	.	.	+	1.1	.	.	+	.	+	1.1	+	.	.	+	.	2.1	.	+	1.1	.	.	.	+	11	III	III
Vulpia myuros	+	.	.	.	.	.	.	.	.	3.3	.	+	+	2.1	.	1.1	r	r	.	.	.	+	+	10	I	IV
Micropyrum tenellum	.	.	.	.	.	+	.	+	1.1	.	.	.	+	.	+	.	r	.	r	.	.	+	.	9	III	II
Tolpis barbata	+	.	.	r	+	.	1.1	.	.	2.1	.	+	.	+	.	.	.	.	.	.	+	.	.	8	III	II
Trifolium arvense	.	+	.	.	.	.	.	.	.	.	r	+	.	+	.	+	r	.	.	.	+	.	.	7	I	III
Crucianella angustifolia	.	.	.	.	.	+	.	r	.	.	.	.	r	.	.	+	r	.	.	.	.	.	.	5	II	II
Leontodon taraxacoides subsp. longirostris	2.1	.	.	.	.	.	r	.	.	.	+	.	.	.	.	.	.	.	.	.	.	.	+	4	II	I
Briza maxima	.	r	.	.	+	r	.	.	.	.	.	.	.	+	.	.	.	.	.	.	.	.	.	3	II	I
Lathyrus sphaericus	.	.	.	.	.	r	.	.	.	.	.	.	.	.	.	+	+	.	.	.	.	.	.	3	I	I
Compañeras																										
Hypochoeris glabra	.	+	r	.	+	+	+	+	+	.	r	+	+	.	.	.	+	r	.	.	1.1	.	.	13	IV	III
Arabidopsis thaliana	.	.	.	.	.	.	.	.	.	.	.	1.1	.	.	.	.	r	.	.	.	+	1.1	+	5	.	II
Lotus corniculatus	+	.	r	.	.	.	.	.	.	.	+	.	.	+	.	.	.	.	.	.	+	.	.	5	II	II
Senecio lividus	.	.	.	+	+	.	r	.	.	.	.	.	+	.	.	.	.	.	.	.	.	.	.	4	II	I
Arnoseris minima	+	+	.	.	.	.	.	.	.	.	.	+	.	.	.	.	.	.	.	.	.	.	.	3	II	I
Juncus capitatus	.	.	.	.	.	.	.	.	.	.	.	.	+	.	.	.	.	.	.	.	.	.	.	2	I	I
Cardamine hirsuta	.	.	.	r	.	.	.	.	.	.	.	+	.	.	.	.	.	.	.	.	.	.	.	2	I	I
Centaurium maritimum	+	r	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	2	II	.
Cerastium brachypetalum subsp. tauricum	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	+	.	+	.	2	.	I
Draba muralis	.	.	.	.	.	.	.	.	.	.	.	r	.	.	.	.	.	.	1.1	.	.	.	.	2	.	I
Ranunculus nigrescens	.	.	r	.	.	.	.	.	.	.	r	.	.	.	.	.	.	.	.	.	.	.	.	2	I	I
Rumex acetosella s.a.	.	+	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	2	II	.
Sagina apetala subsp. apetala	.	+	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	1.1	.	.	.	.	2	I	I
Vicia tenuissima	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	+	.	.	.	2	.	I

Además:

Agrostis castellana 1.1 (10); Agrostis truncatula r (5); Airopsis tenella + (8); Andryala integrifolia + (10); Anogramma leptophylla + (1); Bromus madritensis + (13); Centaurium erythraea subsp. erythraea + (18); Dactylis glomerata + (10); Dianthus langeanus + (13); Erophila verna subsp. verna + (12); Hypericum linarifolium r (10); Lavandula stoechas subsp. sampaiana r (3); Linaria saxatilis + (9); Pterocephalus diandrus + (10); Radiola linoides + (11); Rubia peregrina r (1); Sanguisorba minor subsp. magnolii + (14); Scleranthus annuus subsp. ruscinonensis r (13); Stachys arvensis r (13); Thymus mastichina + (16); Veronica arvensis + (19); Veronica verna r (3); Vicia disperma r (4).

tum arvensis; NAVARRO & VALLE (1984): *Anthoxantho-Holcetum setiglumis;* LLAMAS (1984): *Triseto ovatae-Agrostietum truncatulae.*

Enmarcados en este esquema sintaxonómico, los pastizales en mosaico con los estevales gallegos conforman la associación *Galio-Logfietum minimae* Izco et Ortiz nova, donde *Galium parisiense* es especie que nunca participa en la larga serie de asociaciones florísticamente emparentadas con la nuestra que hemos revisado.

Como ya hemos señalado ocupa las zonas aclaradas del jaral aunque en ciertas ocasiones se desliga de él.

Reconocemos dos subasociaciones:

— subas. *logfietosum minimae* (típica)

Tabla III invent. 10-23, Holosíntipo invent. 18.

Es la versión más común de la asociación, ocupa terrenos más compactos que la siguiente. Sus diferenciales son *Cerastium glomeratum, Ornithopus compressus* y *Trifolium campestre.*

— subas. *sedetosum arenarii* Izco et Ortiz nova

Tabla III invent. 1-9, Holosíntipo invent. 7.

Ocupa los enclaves más arenosos y sueltos. Sus especies diferenciales son *Sedum arenarium* y *Aira praecox.* Es afín a la asociación *Filago minima-Sedum arenarium* descrita por CASASECA (1959), de la que se separa fundamentalmente por la presencia en nuestra subasociación de *Galium parisiense* además de otros taxones como *Moenchia erecta, Hispidella hispanica, Ornithopus pinnatus, Vulpia bromoides, Teesdalia nudicaulis, Asterolinon linum-stellatum,* etc.

DINAMISMO

Los pastizales de la *Galio-Logfietum minimae* representan la primera etapa de la serie sobre los suelos desnudos. Les sigue una etapa de matorral inicial o cantuesar de *Lavandula stoechas* subsp. *sampaiana* a la que frecuentemente acompañan *Erica umbellata* y *Erica cinerea,* principalmente. Este matorral es posteriormente invadido por *Cistus ladanifer* que conforma el esteval, en una secuencia serial que remata en la *Genisto--Quercetum rotundifoliae.*

REFERENCIA DE INVENTARIOS *

Tabla I

— 1: 17/5/81. Orense; cerca de Larouco, hacia Petín. Color pardo amarillento, 10 YR 5/4 en contacto con «xesteiras» de *Cytisus multiflorus.*

— 2: 15/8/82. Orense; valle de Verín, Monte Mazairos, encima de Vilaza. Sustrato granítico.

— 3: 28/6/81. Orense; Castrellón, cerca de Larouco. Color pardo amarillento claro, 10 YR 6/4. En contacto con «xesteira» de *Cytisus multiflorus.*

— 4: 29/6/81. Orense; entre Larouco y Freixido. Color pardo amariilento claro, 10 YR 6/4. Jaral jóven incendiado recientemente, ocupado por repoblación de *Pinus pinaster.*

— 5: 29/6/81. Orense; junto a Freixido de Abaixo. Color pardo pálido, 10 YR 6/3. Sustrato cuarcítico. Jaral en recuperación después de incendio.

— 6: 29/6/81. Orense; a 500 mts de Freixido de Arriba, hacia Portela. Color pardo pálido, 10 YR 6/3. Asentado en viñedo abandonado. En contacto con «xesteira» de *Cytisus multiflorus.*

— 7: 29/6/81. Orense; a 300 mts de Freixido de Abaixo, hacia Larouco .Color gris parduzco claro, 10 YR 6/2. Sobre repoblación de *Pinus pinaster* quemado.

— 8: 30/6/81. Orense; Chandoiro. Color pardo amarillento claro, 10 YR 6/4. En un souto de castaños abandonado.

— 9: 30/6/81. Orense; Castrellón, cerca de Larouco. Color pardo muy pálido, 10 YR 7/4.

— 10: 1/7/81. Orense; entre Portela y Portomourisco. Color pardo muy pálido, 10 YR 7/4. En viñedo abandonado.

— 11: 1/7/81. Orense; entre Santa Cruz y As Hermidas. Color pardo, 10 YR 5/3. Sustrato granítico. Jaral muy jóven y abierto sobre quemado.

— 12: 1/7/81. Orense; cerca de Portomourisco hacia Santa Cruz. Color pardo muy pálido, 10 YR 7/4. En contacto con «xesteira» de *Cytisus multiflorus.*

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* El sustrato de los inventarios es de naturaleza pizarrosa con filones cuarcíticos salvo que se indique otra cosa. Para determinar la coloración del suelo se siguió la carta de colores de suelos de Munsell aplicada sobre suelo seco.

— 13: 19/5/81. Orense; a 5 km de Larouco hacia Puebla de Trives. Color pardo amarillento claro, 10 YR 6/4.
— 14: 19/5/81. Orense; a 7 km de Larouco havia Puebla de Trives. Color pardo, 10 YR 5/3. Jaral cerrado sobre cantuesar, que va sucumbiendo.
— 15: 20/5/81. Orense; entre Santa Cruz y As Hermidas. Color entre pardo y pardo oscuro, 10 YR 4/3. Sustrato granítico.
— 16: 27/6/81. Orense; Barxa. Color pardo grisáceo oscuro, 10 YR 4/2. En contacto con la vegetación ribereña del Xares.
— 17: 10/7/81. Orense; km 12,5 de la carretera entre Sobradelo y Casaio, cerca de O Trigal. Color amarillo rojizo, 7.5 YR 6/6.
— 18: 12/7/81. Orense; a 500 mts de Sobradelo, hacia Casaio. Color amarillo rojizo, 7.5 YR 6/6.
— 19: 12/7/81. Orense; km 19 de la carretera Sobradelo-Casaio. Color pardo amarillento 10 YR 5/4. Desarrollado sobre brezal bajo de *Erica umbellata* y *Erica cinerea*.
— 19: 12/7/81. Orense; km 19 de la carretera Sobradelo-Casaio. próximo a Viladequinta. Color pardo amarillento, 10 YR 5/4. En viñedo abandonado.
— 21: 13/7/81. Orense; margen izquierda del río Casaio, a 100 mts del embalse de Sobradelo. Color amarillo parduzco, I0 YR 6/6.
— 22: 13/7/81. Orense; a 1,5 km de Sobradelo hacia Casoio. Color amarillo parduzco, 10 YR 6/6.
— 23: 13/7/81. Orense; entre Sobradelo y Robledo. Color pardo amarillento, 10 YR 5/4. Sobre matoral bajo de *Erica cinerea, Erica umbellata, Calluna vulgaris* y *Lavandula stoechas* subsp. *sampaiana*.
— 24: 13/7/81. Orense; 1 km antes de Robledo hacia Casoio. Color pardo amarillento oscuro, 10 YR 4/6. Jaral jóven sobre matorral bajo similar al inventario anterior, lindante con un arroyo, donde existe una facies de *Pteridium aquilinum*.
— 25: 13/7/81. Orense; a 100 mts del anterior. Color pardo, 10 YR 5/3.
— 26: 14/7/81. Orense; Casoio, al lado del cementerio. Color pardo amarillento claro, 10 YR 6/4. Entremezclado con encinas y algún «cerquiño».
— 27: 14/7/81. Orense; debajo de Casoio, hacia el río. Color pardo oliva claro, 2.5 YR 5/4. Jaral muy denso.
— 28: 14/7/81. Orense; debajo de Casoio, cercano a la ribera derecha del río. Color pardo muy claro, 10 YR 7/4.

— 29: 18/5/81. Lugo; Montefurado. Color amarillo rojizo. 7.5 YR 6/6. Jaral quemado anteriormente.
— 30: 15/8/82. Orense; a 3km de Verín, hacia A Gudiña. Sobre esquistos con cuarcitas.
— 31: 26/6/81. Orense; cerca de Carballal, hacia O Seixo. Color pardo grisáceo, 10 YR 5/2. Jaral jóven.
— 32: 26/6/81. Orense; al lado del embalse de Santa Eulalia. Color pardo, 10 YR 5/3.
— 33: 20/5/81. Orense; a 13 km de Puebla de Trives, hacia Freixido. Color pardo grisáceo, 10 YR 5/2.
— 34: 26/6/81. Orense; a 1 km de Carballal, hacia O Seixo. Color pardo, 10 YR 5/3.
— 35: 28/6/81. Orense; en el lugar de Tranbalasaguas, donde se unen el Xares y el Bibei. En un viñedo abandonado.
— 36: 10/7/81. Orense; km 8 de la carretera Sobradelo-Casaio. Color gris oscuro, 10 YR 4/1.
— 37: 10/7/81. Orense; km 6 de la carretera Sobradelo-Casaio. Color pardo amarillento oscuro, 10 YR 4/6. En contacto con bosque de *Quercus pyrenaica.*

Tabla III

— 1: 17/5/81. Lugo; Nocedo, al borde del río Sil. Color pardo amarillento claro, 10 YR 6/4. En claro de jaral sobre viñedo abandonado.
— 2: 19/5/81. Orense; cerca de la cabecera del embalse do Bao. Color amarillo, 10 YR 7/6. Sustrato granítico.
— 3: 20/5/81. Mosaico con invt. 15 de la tabla I.
— 4: 26/6/81. Mosaico con el invt. 34 de la tabla I.
— 5: 27/6/81. Mosaico con el invt. 16 de la tabla I.
— 6: 27/6/81. Orense, a 1km de Barxa hacia O Seixo. Color amarillo rojizo, 7.5 YR 7/6. Mosaico con jaral con *Erica umbellata.*
— 7: 28/6/81. Mosaico con el invt. 35 de la tabla I.
— 8: 1/7/81. Mosaico con el invt. 11 de la tabla I.
— 9: 10/7/81. Mosaico con el invt. 36 de la tabla I.
— 10: 15/8/82. Orense, Valle de Verín, Monte Mazairos, encima de Vilaza, sobre granito. Pastizal no ligado a esteval, algo ruderalizado.
— 11: 20/5/81. Mosaico con el invt. 33 de la tabla I.

— 12: 26/6/81. Orense, cerca del embalse de Santa Eulalia. Color pardo amarillento claro, 10 YR 6/4. Claros de jaral en contacto con una escombrera.
— 13: 28/6/81. Mosaico con el invt. 3 de la tabla I.
— 14: 15/8/82. Mosaico con el invt. 30 de la tabla I.
— 15: 30/6/81. Mosaico con el invt. 9 de la tabla I.
— 16: 10/7/81. Mosaico con el invt. 17 de la tabla I.
— 17: 12/7/81. Mosaico con el invt. 18 de la tabla I.
— 18: 12/7/81. Mosaico con el invt. 19 de la tabla I.
— 19: 12/7/81. Mosaico con el invt. 20 de la tabla I.
— 20: 13/7/81. Mosaico con el invt. 21 de la tabla I.
— 21: 13/7/81. Mosaico con el invt. 22 de la tabla I.
— 22: 13/7/81. Mosaico con el invt. 23 de la tabla I.
— 23: 14/7/81. Mosaico con el invt. 28 de la tabla I.

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STUDIES ON THE MUTAGENIC EFFECT OF COLCHICINE ON *LYCOPERSICUM ESCULENTUM* MILLER (SOLANACEAE) IN NIGERIA

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ABSTRACT

Mutagenic effect of colchicine on *L. esculentum* var. *vulgare* was carried out at the University of Lagos. In the tetraploid cells obtained from seed treated with 0.4 per cent colchicine, majority of the chromosomes were associated as bivalent. Lumping of chromosomes was regular feature at mitotic metaphase. Chromosomal aberrations such as translocation and anaphase bridges were observed at meiotic stages.

Soaking of seeds in 0.4 per cent colchicine for two days had no significant effect on seedling emergence but longer treatment had progressively greater detrimental effect. 0.4 per cent colchicine induced mutation in tomato with increase in number of flowers per inflorescence which could be utilized through selection. Other features exhibited by mutant plants included long and swollen cotyledons, curly leaves, distorted stems and extremely reduced internodes.

INTRODUCTION

According to FRANZKE & ROSS (1952), the treatment of diploid variants of *Sorghum* with colchicine didnot lead to changes in their chromosome number. ROSS, FRANZKE & SCHUH (1954) showed that agronomically important characteristics in *Sorghum* may be changed as a result of treatment with colchicine. They also observed that the progeny of the changed plants bred true in the majority of cases.

In their work on flax, soybeans, corn and wheat, DIRK *et al.* (1956) reported the development of chimeral sectors on plants

treated with colchicine. According to them, one F_1 of the treated plants produced some branches which gave rise to blue flowers and brown seeds while other branches gave rise to white flowers and yellow seeds. One branch had a mixture of yellow and brown seeds. They also observed that the brown seeded branches significantly out-yielded the yellow — seeded branches.

As a result of the above reports, we decided to investigate the effect of colchicine on the local tomato plants with the hope of producing more economically viable variants of this widely cultivated vegetable crop in Nigeria.

MATERIALS AND METHODS

Five month old seeds of *Lycopersicum esculentum* var. *vulgare* were selected for use. A hundred seeds were placed in petridishes measuring 1 ¾ cm high and 7 cm in diameter. 3 ml of freshly prepared 0.4 % aqueous solution of colchicine was used to presoak the seeds for 2, 4, 6 and 8 days at 23° C. The seeds were then washed with distilled water on every third day and presoaked in fresh colchicine solution. This method was aimed at ensuring that oxygen was available for metabolic activity needed for seed germination. In the control experiment, seeds were soaked in distilled water for 2 days at the same temperature. Thus C-2, C-4, C-6 and C-8 indicate the number of days seeds were presoaked in 0.4 % colchicine.

For mitotic study, root tips were pretreated in saturated aqueous solution of paradichlorobenzene for 1 ½ hours at room temperature. The root tips were fixed in 1:3 acetic alcohol for 24 hours. They were then hydrolysed in 1N-hydrochloric acid at 60° C for 15 minutes. The hydrochloric acid was replaced with tap water and five drops of 1 % solution of Ferric Chloride added to prestain the specimen. The root tips were then squashed in 2 % acetocarmine. For meiotic study, suitable young flower buds were fixed in acetic alcohol for 24 hours. Anthers were squashed in 2 % acetocarmine.

Plant height was measured from the ground surface to the shoot. The number of flowers and fruits per plant was estimated by visual rating.

RESULTS

Effect of colchicine on seedling emergence

There was no significant difference in seedling emergence between seeds soaked in distilled water (63.00 %) and those in 0.4 % colchicine (63.25 %) for 2 days. However, there was a progressive delay in seedling emergence in seeds soaked in 0.4 % colchicine for 4, 6 and 8 days (Fig. 1).

Effect of colchicine on chromosomes of somatic tissue

The mitotic index of root tip is 42.07 per cent when seeds were presoaked in aqueous solution of 0.4 % colchicine for 8 days as against 17.56 per cent in control. Analysis of mitotic stages in colchiploid tissue showed 23.77 per cent at prophase, 16.52 per cent of normal metaphase, 59.13 per cent of abnormal metaphase and 0.58 per cent in prophase-telophase stages. The control experiment gave 56.68 per cent prophase, 39.49 normal and 1.27 abnormal metaphase with 3.82 prophase-telophase stages. The most common abnormality at metaphase was clumping of chromosomes. Sometimes, the clumping was so complete that the entire chromosome set appeared as a stained mass (Pl. I, fig. 1). The percentage of polyploid cells was estimated as 1.45. No nuclear spindle was observed among the colchiploid cells.

Effect of colchicine on association of chromosome at prometaphase in pollen mother cells

The percentage of chain of four chromosomes per cell increased with increase in time of treatment. Ring tetravalents were observed only in C-6 and C-8 while univalent chromosomes were observed in the control, C-4 and C-8 (Table 1) Pl. I, figs. 2 & 3 show some chromosome associations.

Effect of colchicine on the frequency of anaphase aberration in pollen mother cells

When seeds were treated with colchicine, the percentage of aberration in pollen mother cells increased with the duration of treatment. In the control, C-2 and C-4, the frequency of aberration per tissue increased to 10.4 and 25.7 at C-6 and C-8 respectively.

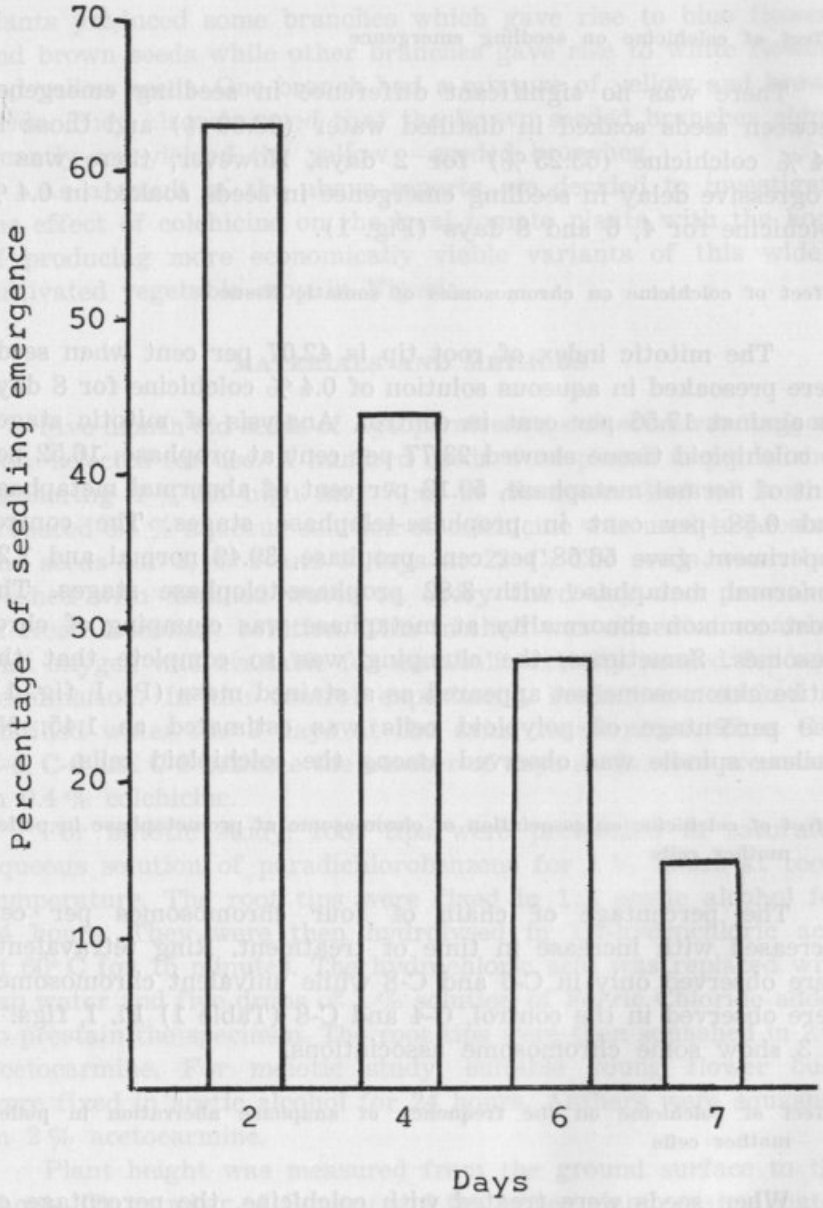

Fig. 1. — Histogram showing the percentage of seedling emergence of seeds soaked in 0.4 % colchicine for different days.

Among the most common aberrations observed were bridges (Pl. I, fig. 4), fragmentation and late movement of chromosomes. Detailed analysis of bridges showed the percentage of 0.21, 2.25, 2.00, 9.60 and 19.37 in control, C-2, C-4, C-6 and C-8 respectively.

TABLE 1

Chromosome association at prometaphase in P. M. C. (%). The number of cells scored is in parenthesis

Treatment	Ring IV	Chain IV	12_{II}	$11_{II} + 2_{I}$	Total
Control	—	7.03 (4)	91.22 (52)	1.75 (1)	100 (57)
C-2	—	8.00 (2)	92.00 (23)	—	100 (25)
C-4	—	13.9 (13)	82.79 (77)	3.31 (3)	100 (93)
C-6	3.12 (1)	62.52 (20)	34.36 (11)	—	100 (32)
C-8	2.50 (1)	42.50 (17)	47.50 (19)	7.50 (3)	100 (40)

On fragmentation of chromosomes, C-6 had 0.80 per cent while 6.33 per cent was observed for C-8. The percentages of laggards were 1.12 in C-2 and 1.50 in C-4 of the colchiploid tissue (Table 2).

Effect of colchicine on the number of chromosomes in pollen mother cell, sizes and fertility of pollen grains

Doubling of chromosome number was observed in C-4. Pl. I, fig. 5 shows 24 pairs of chromosomes at prometaphase. C-4 ranked first with a pollen fertility of 95%. The mean diameters of pollen grains for the treatments were found to be 34.4, 34.90, 36.75, 38.22 and 34.90 μm in control, C-2, C-4, C-6 and C-8 respectively. Pl. II, figs. 1-3 show variation in the size and shape of pollen grains obtained in C-4.

TABLE 2

Frequency of anaphase aberration in P. M. C. The figure in parenthesis is the number of cells with aberration

Treatment	No. of cells observed	Aberration (%)			Total
		Bridges	Fragments	Laggards	
Control	481	0.21 (1)	—	—	0.21 (1)
C-2	89	2.25 (2)	—	1.12 (1)	3.37 (3)
C-4	200	2.00 (4)	—	1.50 (3)	3.50 (7)
C-6	125	9.60 (12)	0.80 (10)	—	10.40 (22)
C-8	284	19.37 (55)	6.34 (18)	—	25.71 (73)

M_1 MUTANT

As a result of colchicine treatment of seeds, various morphological changes were observed. In C-4, growth of six seedlings was retarded after two cotyledonary stage. The cotyledons were long and swollen. The mean length measurement was 5.5 cm as against 2.4 cm in control plant after 30 days. At this age, the seedlings did not produce any foliage leaf, the hypocotyl became elongated and the root system disintegrated. Consequently, four out of such six mutants withered. One of the remaining two existed for three months before it shrivelled and died. The remaining one, however, underwent rapid development after the thirty-fifth day, producing the first inflorescence with 25 flower buds instead of 5-7 flowers in a normal plant.

However, of the other seedlings that developed normaly, one mutant plant produced cluster of six simple leaves around a node above the cotyledon, while another mutant plant for the same treatment produced curly leaves with a distorted stem. In C-8, one plant was characterized by extreme reduction of internodes so that all the leaves emerged just above the cotyledon.

The height of M_1 was 51 cm while the mean heights of plants for the different treatments varied from 60.25 cm in the control

to 86.9 cm in C-4. Variation was also noted in the fruiting period and yield. The M_1 mutant and C-6 produced more fruits per plant than the plants raised from the other treatments. Table 3 shows the details of the agronomic characters observed in the plants.

TABLE 3

Agronomic characters of plants for the different treatments and (mutant) M_1. 5 plants were considered for each treatment except in M_1 mutant where only one plant was available. Data on yield were recorded by assigning arbitrary numerical grades, the largest number was rated 5, average 4, least 3 while (—) signifies no fruit formation

Treatment	Average no. of leaves counted before the first inflorescence	Average no. flowers per inflorescence	Mean height of plant (cm)	No. of days to frutification	Uniform ripening (%)	Yield per plant (grade)
H_2O (control)	11.6	5.1	60.25	—	—	—
c-2	10.6	5.5	73.33	55	50	3
c-4	10.4	5.5	86.9	55	66.6	4
c-6	8.6	6.1	77.2	61	76	4
c-8	9.5	6.2	76	53	50	3
M_1 mutant	6	25	51	55	75	5

DISCUSSION

The analysis of the root-tip cells showed clumping of chromosomes in the colchiploid cells. This abnormality at the meristem might have been responsible for the death of the seedlings of treated seeds.

Most of the chromosomal aberrations observed in the PMCs of the colchiploid plant were multivalent chromosomes at prometaphase and bridges at anaphase I. The bridges suggested the presence of inversion which could be due to the formation of dicentric and acentric chromosomes. Similar observations made by PLOTNIKOVA (1932) on *Triticum-secale* hybrid was reported by DARLINGTON (1937). However in some tetraploid cells derived from seeds treated with colchicine, majority of the chromosomes were associated as bivalents. This is due to regular pairing of homologous chromosomes through polyploidy. LINDSTROM & HUM-

PHREY (1933) obtained similar result from decapitated young tomato plants.

Mutants obtained in our experiment were rosette characterized by extreme reduction of internodes, propeller characterized by large persistent cotyledons, large mean value for number of flowers per plant, better performance in fruit yield and dwarf plant character. BUTLER (1954) obtained similar results from tomato seedlings exposed to X-radiation, except that his mutants produced one to three flowers which didnot fruit. Since a better performance in fruit production is the most important expectation in such experiment, we encourage the use of colchicine as a mutagen for the breeding of tomato.

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PLATES

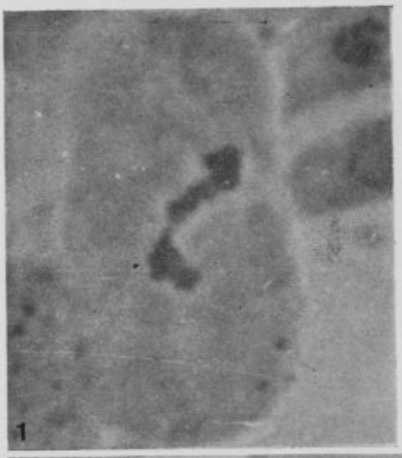
Fig. 1. — Abnormal mitotic metaphase showing lumping of chromosomes. × 2000.

Fig. 2. — Normal meiotic prometaphase showing 12 bivalents. × 3000.

Fig. 3. — Abnormal meiotic premetaphase showing tetravalent. × 3000.

Fig. 4. — Abnormal anaphase I showing bridges. × 3000.

Fig. 5. — Tetraploid cell showing 24 bivalents. × 3000.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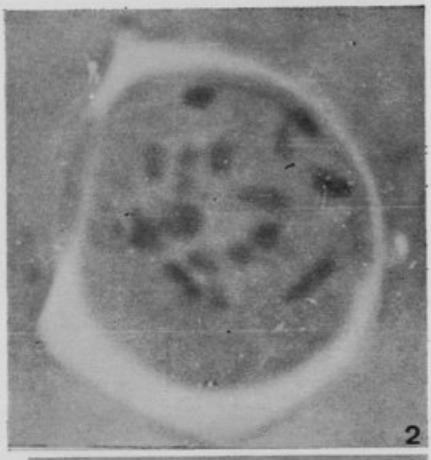
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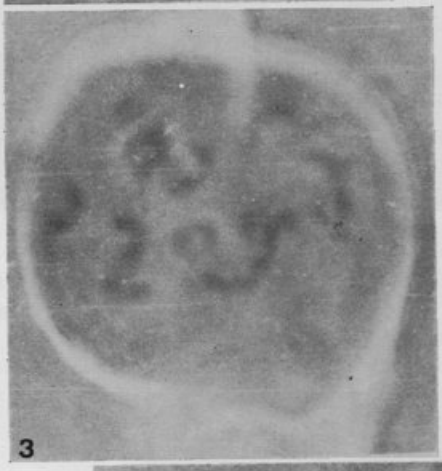
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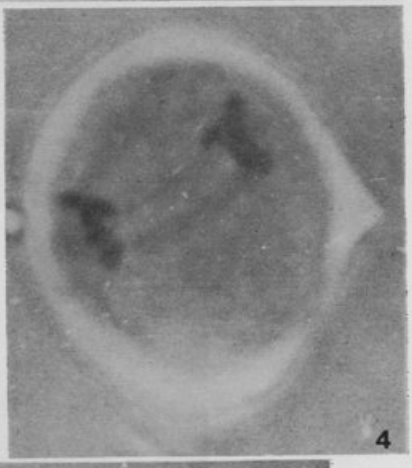
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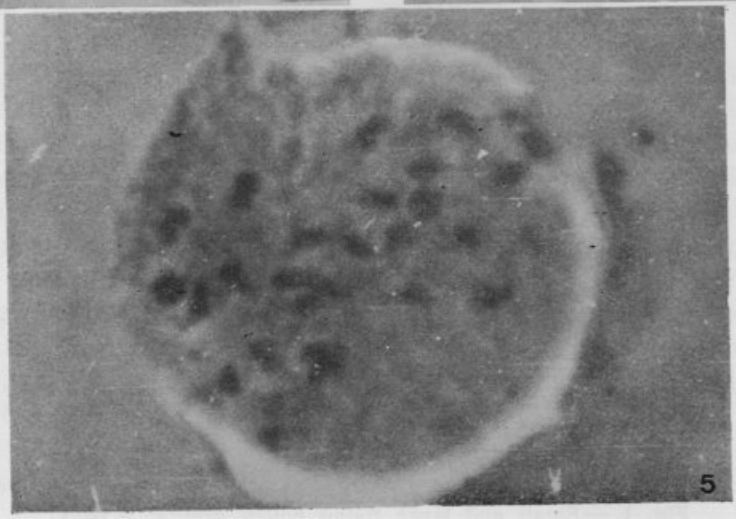
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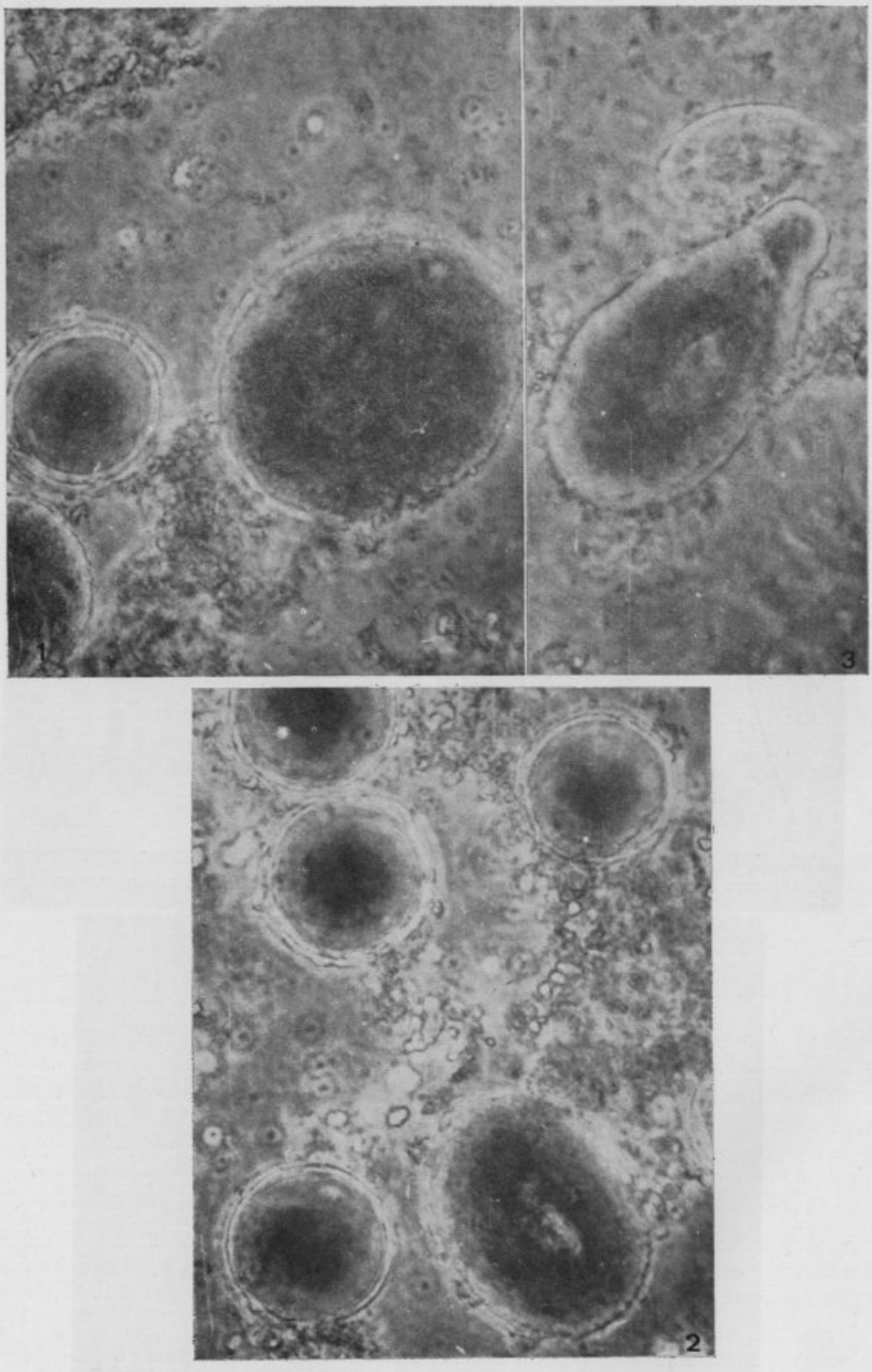

Fig. 1. — Small and large round pollen grains. × 1400.
Fig. 2. — Large oval and small round pollen grains. × 1400.
Fig. 3. — Large oblong pollen grain. × 1400.

Bol. Soc. Brot., Sér. 2, 58: 149-172 (1985).

CYTO-MORPHOLOGICAL STUDIES OF THE GENUS *CROTALARIA* L. (LEGUMINOSAE) FROM NIGERIA *

by

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ABSTRACT

Chromosome counts of 15 taxa (11 species) of the genus *Crotalaria* have been made from the Nigerian material. Of these chromosome numbers for *C. acervata* (n = 8), *C. bogensil* (n = 8), *C. cleomifolia* (n = 8), *C. confusa* (n = 8 + 1B) and *C. polygaloides* (n = 8) are new records. The position of the base number and the incidence of polyploidy in the so far cytologically known species are discussed. The distribution maps of the taxa studied are provided. *Crotalaria polygaloides* is recorded from Nigeria for the first time.

INTRODUCTION

A large genus of 550 species (WILLIS & AIRY-SHAW, 1973) in the tropics and subtropics with more than 400 species in Africa (BOULTER *et al.*, 1970). In Nigeria the genus is represented by 35 species (HUTCHINSON & DALZIEL, 1958). BENTHAM (1865) and TAUBERT (1893) placed this genus in the tribe *Genisteae* but HUTCHINSON (1964) has placed this genus in its own tribe *Crotalarieae* which is also supported by POLHILL (1968). The members of this genus range in habit from tiny annuals to small sized trees with simple or three foliolate entire leaves, flowers yellow to pink; standard usually broad and shortly clawed, pod turgid with septa.

* Dedicated to Prof. J. A. FRAHM-LELIVELD.

A perusal of the literature reveals that compared to its size and economic importance in agriculture and medicine, the genus *Crotalaria* has not attracted the desired attention from cytologists. The main contributions on the cytology and cytogenetics of this genus are by ATCHISON (1950), BOULTER *et al.* (1970), *Chennaveeriah & Patil* (1973), DATTA (1966), DATTA & BISWAS (1962), DATTA & GANGULY (1967), DATTA & GHOSHAL (1969), EICHHORN (1937), FRAHM-LELIVELD (1957), GUPTA & GUPTA (1978), KEMPANNA & CHANDRASAKHARIA (1960), MAGOON *et al.* (1963), RAINA & VERMA (1979), SENN (1938), SRIVASTAVA (1958), TURNER & FEARING (1959) and VERMA & RAINA (1982, 1983). But the cytological information on the Nigerian species is lacking and the present paper attempts to fill this gap to some extent. Eleven species have been presently investigated and of these chromosome counts for 5 species are new records.

MATERIAL AND METHODS

Young flower buds from wild populations were collected and fixed in 1:3 acetic alcohol for 24 hours, then transferred to 70 % ethyle alcohol and stored in the referigerator until needed. Details on techniques used for micro-sporogenesis, pollen fertility and the preparation of distribution maps have been discussed elswhere (GILL & HUSAINI, 1981, 1984). The voucher specimens are deposited in the herbarium of University of Benin, Benin City, Nigeria.

OBSERVATIONS

The exact locality along with cytological data of the taxa studied are summarized in Table I. The arrangement of species is alphabetical.

C. acervata Bak. f.

A woody herb of 0.5 to 1 m tall commonly found in acidic soils of grass land. It flowers from October to November.

A haploid count of 8 was determined at metaphase I (Pl. I, fig. 1). Meiosis was normal with 92 % filled pollen and pollen size is 32 μm. This is a new count for this species.

TABLE 1

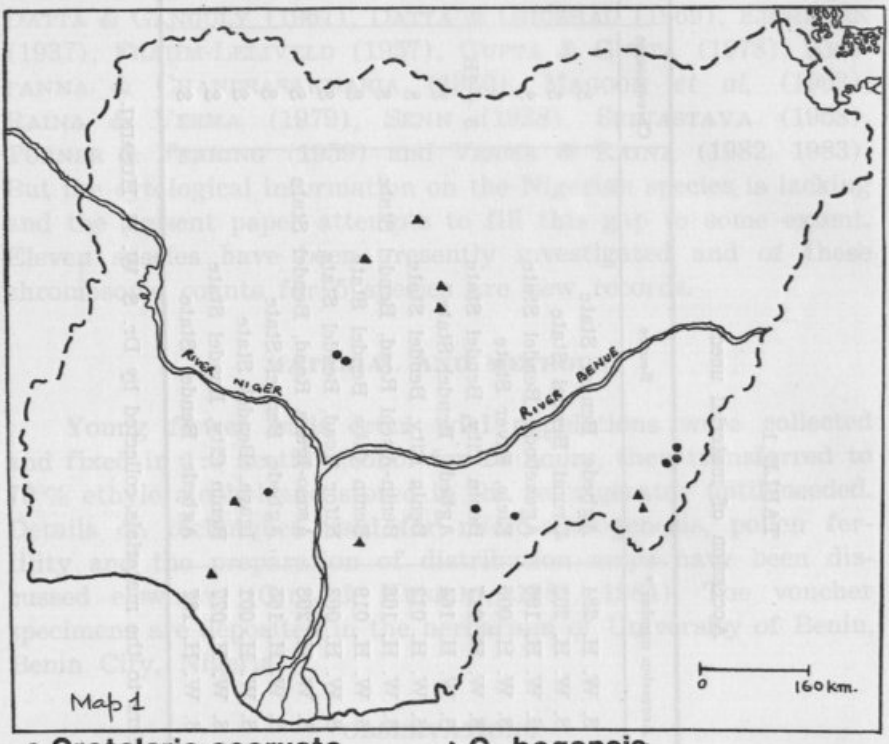
Accession of material used

Taxon	Accession number *	Source	Chromosome	X	Ploidy level
Crotalaria acervata Bak.	S. W. H. 284	Agbede, Bendel State	8	8	Diploid
C. gogensis Bak.	S. W. H. 203	Uromi, Bendel State	8	8	Diploid
C. calycina Schrank	S. W. H. 196	Agenebode, Bendel State	8	8	Diploid
C. cleomifolia Welw. ex Bak.	S. W. H. 005	Elele, River State	8	8	Diploid
C. confusa Hepper	S. W. H. 017	Benin City, Bendel State	8 + 1B	8	Diploid
C. cylindrocarpa DC.	S. W. H. 164	Agbede, Bendel State	8	8	Diploid
C. glauca Willd.	S. W. H. 012	Benin City, Bendel State	8	8	Diploid
	S. W. H. 106	Benin-Auchi Road, Bendel State	8	8	Diploid
	S. W. H. 019	Benin City, Bendel State	8	8	Diploid
C. gorrensis Guilld Perr.	S. W. H. 003	Nifor Road, Bendel State	8	8	Diploid
C. lachnophora Holchestax A. Rich.	S. W. H. 208	Asoso-Igara Road, Bendel State	8	8	Diploid
C. polygaloides Welw. ex Bak.	S. W. H. 165	Agbede, Bendel State	8	8	Diploid
C. retusa L.	S. W. H. 001	Igara, Bendel State	8	8	Diploid
	S. W. H. 077	Benin City, Bendel State	8	8	Diploid
	S. W. H. 137	Agbede, Bendel State	8	8	Diploid

* The designation S. W. H. refers to the materials collected by Dr. S W. H. HUSAINI.

Distribution and ecology: (Map. 1).

In Nigeria it occurs in ferruginous tropical soils with annual precipitation of 1270 mm. Outside Nigeria it has been recorded from Cameroun.



• Crotalaria acervata ▲ C. bogensis

C. bongensis Bak. f.

Slightly woody erect herb of 0.6 m tall; flowers yellow and strongly purple veined. The flowering period is from February to April.

The present haploid count of 8 (Pl. I, fig. 2) is a new record for this species and is in line with base number of 8. Meiosis and pollen formation were normal with 85 % filled pollen. The grain size is 25.6 μm.

Distribution and ecology: (Map. 1).

In Nigeria it is found on ferrelsols, ferruginous tropical soils and occasionally on lithosols. It can tolerate an annual prepicitation ranging from 1270 mm-1524 mm. In Africa it has been recorded from Angola, Sudan, Tanzania, Uganda, Zaire and Zambia.

C. calycina Schrank

An erect herb of 0.5 m tall with branches densely brown silky, flowers yellow and few and enclosed by villous calyx. It occurs in acidic soils of savanna area. The flowering period is from January to March.

At metaphase I eight bivalents were counted (Pl. I, fig. 3) which agrees with BOULTER *et al.* (1970) and FRAHM-LELIVELD (1960).

Distribution and ecology: (Map 2).

It is restricted in distribution to northern parts of Nigeria in lithosols and southwards it extends upto Agenebode where the soil is ferruginous tropical soil. Westwards it extends to Senegal and eastwards upto Sudan. The minimum annual precipitation required for this species is 762 mm.

C. cleomifolia Welw. ex Bak.

A 1-1.5 m tall shrub; occasionally found along roadside in acidic soils (pH 5.1). It flowers from January to March.

Eight bevalents were observed at metaphase I (Pl. I, fig. 4). Meiosis and pollen formation were normal with average pollen grain size of 25.6 μm. This is a new report for the species.

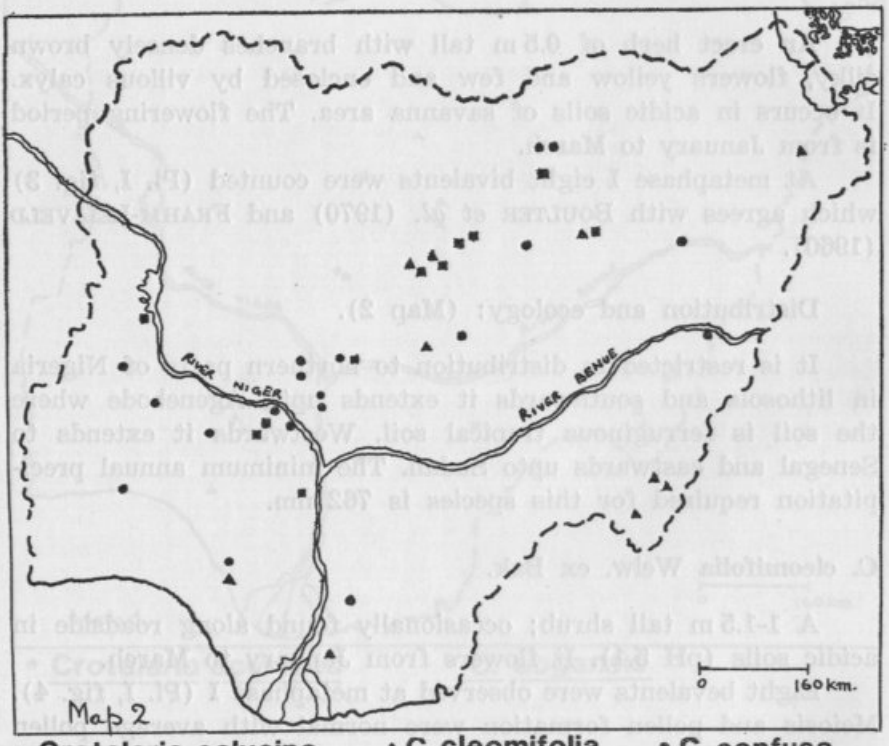
Distribution and ecology: (Map. 2).

It is restricted in distribution to ferralsols, ferruginous tropical soils and lithosols of Nigeria with annual precipitation ranging from 508-1524 mm. Outside Nigeria it has been recorded from Angola, Cameroun, Kenya, Mozambique, Uganda, Zambia, Zaire and Zimbabwe.

C. confusa Hepper

A procumbent profuse herb of upto 1 m tall with orange yellow flowers. The flowering period is from October to November.

The present haploid count of 8 + 1B (Pl. I, fig. 5) is a new record for the species. The percentage of filled pollen is 95 and the grain size is 32.0 μm.



Distribution and ecology: (Map. 2).

It is more common in ferralsols and ferruginous tropical soils of Nigeria though it has been recorded in vertisols, semiarid, brown and reddish brown soils. Outside Nigeria it has been recorded from Togo and Cameroun.

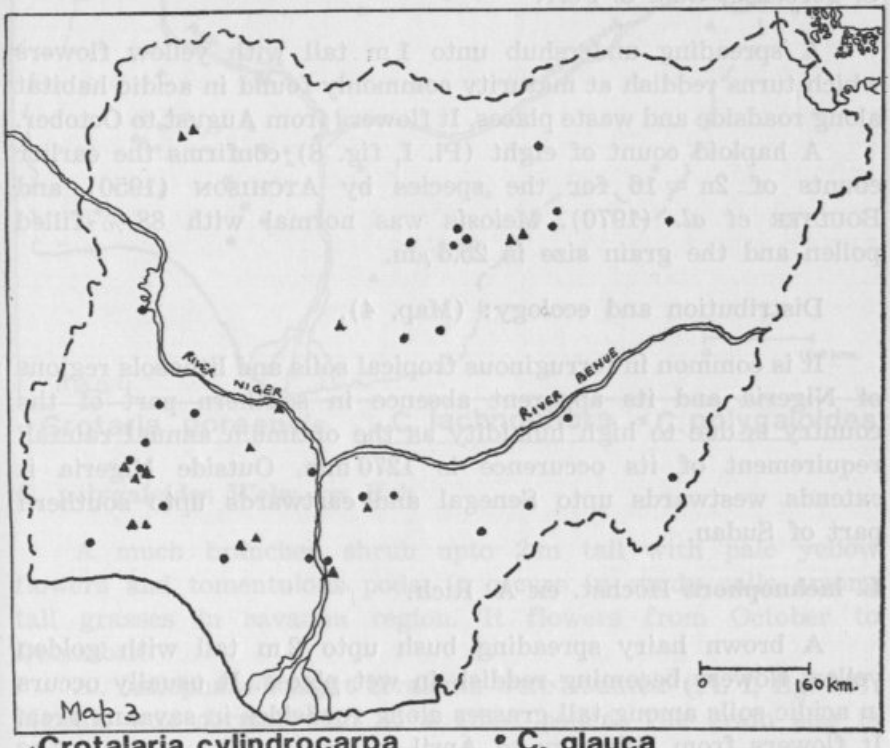
C. cylindrocarpa DC.

A much branched semi shrub upto 2 m tall, occurs in acidic soils along roadside among tall grasses in seasonally flooded areas with reddish tinged yellow flowers. It flowers from October to December.

Two populations were examined cytologically and both proved to have a haploid number of eight (Pl. I, fig. 6) which confirms the earlier report of BOULTER *et al.* (1970) and FRAHM-LELIVELD (1960). Meiosis was normal with 88% filled pollen and pollen size of 38.0 μm.

Distribution and ecology: (Map. 3).

It is restricted to ferralsols and ferruginous tropical soils of Nigeria with annual precipitation ranging from 762 mm--1524 mm. Outside Nigeria it extends westwards upto Senegal and eastwards upto Sudan.



C. glauca Willd.

An erect perennial glabrous sub-shrub upto 1 m tall with yellow flowers in lax axillary or terminal racemes. It flowers throughout the year.

Three populations of this species were studied and all had a consistent haploid number of eight (Pl. I, fig. 7). Meiosis and pollen formation were normal with 90-95 % filled pollen and grain size of 32 μm.

Distribution and ecology: (Map. 3).

In Nigeria it occurs on ferralsols ferruginous tropical soils and lithosols regions. The apparent absence form Niger and Sokoto states may be due to the lack of collection rather than its occurence in these two states. It extends westwards upto Senegal and eastwards upto Sudan.

C. goreensis Guill & Perr.

A spreading undershub unto 1 m tall with yellow flowers which turns reddish at maturity commonly found in acidic habitat along roadside and waste places. It flowers from August to October.

A haploid count of eight (Pl. I, fig. 8) confirms the earlier counts of $2n = 16$ for the species by ATCHISON (1950) and BOULTER *et al.* (1970). Meiosis was normal with 88 % filled pollen and the grain size is 25.6 μm.

Distribution and ecology: (Map. 4).

It is common in ferruginous tropical soils and lithosols regions of Nigeria and its apparent absence in southern part of the country is due to high humidity as the optimum annual rainfall requirement of its occurence is 1270 mm. Outside Nigeria it extends westwards upto Senegal and eastwards upto southern part of Sudan.

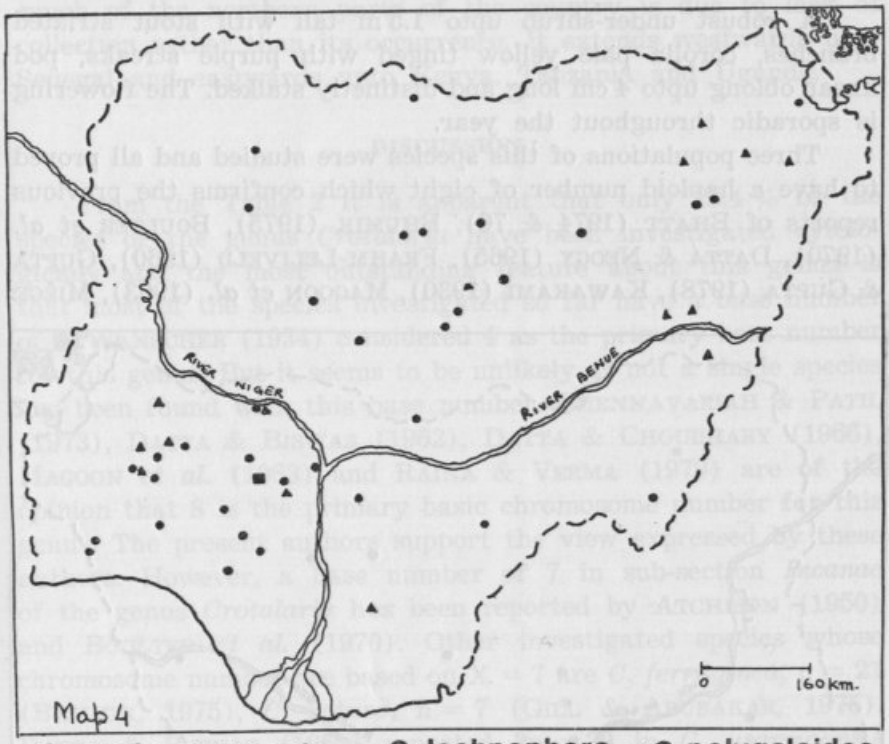
C. lachnophora Hochst. ex A. Rich.

A brown hairy spreading bush upto 2 m tall with golden yellow flowers becoming reddish in wet places. It usually occurs in acidic soils among tall grasses along roadsides in savanna area. It flowers from February to April.

At metaphase I eight bevalents were counted (Pl. I, fig. 9) which confirms the earlier report of BOULTER *et al.* (1970). The filled pollen is 80 % and average grain size is 32 μm.

Distribution and ecology: (Map. 4).

It prefers ferruginous tropical soils and the average annual rainfall for its optimum growth varies from 508 mm-1270 mm.



C. polygaloides Welw. ex Bak.

A much branched shrub upto 2 m tall with pale yellow flowers and tomentulous pods. It occurs in sandy soils among tall grasses in savanna region. It flowers from October to December.

At metaphase I eight bivalents were counted (Pl. I, fig. 10). Meiosis was normal with 86 % filled pollen. The grain size is 25.6 μm. It is new record for this species.

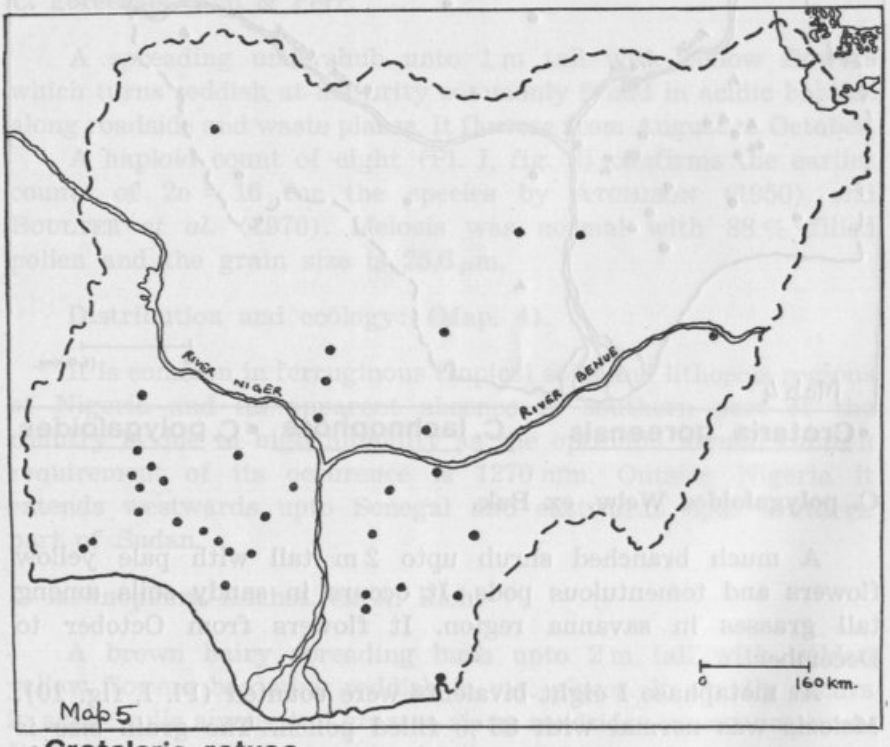
Distribution and ecology: (Map. 4).

The present report of its occurrence from Agbede, Bendel State is the first record of its occurrence in Nigeria though it has been reported from Angola, Central African Republic, Congo and Zaire.

C. retusa L.

A robust under-shrub upto 1.5 m tall with stout striated branches, corolla pale yellow tinged with purple streaks, pod linear oblong upto 4 cm long and distinctly stalked. The flowering is sporadic throughout the year.

Three populations of this species were studied and all proved to have a haploid number of eight which confirms the previous reports of BHATT (1974 & 76), BHUMIK (1975), BOULTER *et al.* (1970), DATTA & NEOGY (1965), FRAHM-LELIVELD (1960), GUPTA & GUPTA (1978), KAWAKAMI (1930), MAGOON *et al.* (1963), MIÈGE



•**Crotalaria retusa**

(1960), SHARMA (1970) and SUBRAMANYAM (1972). However, it differs from the reports of n = 7 by GILL & ABUBAKAR (1975) from Tanzania.

Distribution and ecology: (Map. 5).

In Nigeria it is distributed in ferralsols and ferruginous tropical soil regions of the country. Its apparent absence from much of the northern parts of the country is due to lack of collection rather than its occurrence. It extends westwards upto Senegal and eastwards upto Kenya, Tanzania and Uganda.

DISCUSSION

From the Table 2 it is apparent that only 25.4 % of the species of the genus *Crotalaria* have been investigated cytologically and the most outstanding feature about this genus is that most of the species investigated so far have a base number of 8. WANSCHER (1934) considered 4 as the primary base number for this genus. But it seems to be unlikely as not a single species has been found with this base number. CHENNAVARIAH & PATIL (1973), DATTA & BISWAS (1962), DATTA & CHOUDHARY (1966), MAGOON *et al.* (1963) and RAINA & VERMA (1979) are of the opinion that 8 is the primary basic chromosome number for this genus. The present authors support the view expressed by these authors. However, a base number of 7 in sub-section *Incanae* of the genus *Crotalaria* has been reported by ATCHISON (1950) and BOULTER *et al.* (1970). Other investigated species whose chromosome number are based on X = 7 are *C. ferruginea,* n = 21 (BHUMIK, 1975), *C. retusa,* n = 7 (GILL & ABUBAKAR, 1975). DATTA & BISWAS (1962) reported 2n = 20 in *C. usarmoensis* which seems to be erroneus as it does not fit into any basic number reported for this genus.

The incidence of polyploidy in this genus is very low (1.27 %) and highest polyploidy level is hexaploid reported in *C. ferruginea* with n = 21 (BHUMIK, 1975). Earlier, the B-chromosomes were reported in *C. brownei* (2n = 16 + 1B) and in *C. medicaginea* (2n = 16 + 1B) by GUPTA & GUPTA (1978). During the present investigations B-chromosomes were recorded in populations of *C. confusa* (n = 8 + 0-1B) which is a new report for the occurrence of B-chromosomes in this species.

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TABLE 2

Known chromosome counts in *Crotalaria* *

Species	n	2n	Author(s)
C. acervata	8		Present report
C. aculeata		16	Boulter *et al.*, 1970
C. aegyptica		16	Amin, 1973
		16	Boulter *et al.*, 1970
		16	Frahm-Leliveld, 1957
C. agati-folia		16	Boulter *et al.*, 1970
		16	Frahm-Leliveld, 1957
C. alata		16	Kawakami, 1930
		16	Berger *et al.*, 1958
C. alabida		16	Bir & Sidhu, 1966
	8	16	Bir & Kumari, 1967
C. amazoms		16	Shibata, 1962
C. anagyroides		16	Fernandez, 1977
		16	Favarger, 1965
	8	16	Gupta & Gupta, 1978
		16	Huynh, 1965
		16	Datta & Ganguly, 1967
		16	Kawakami, 1930
		16	Kao, 1950
	8		Sarkar *et al.*, 1973
		16	Shibata, 1926
C. arenaria		16	Hagerup, 1932
C. argyrea		16	Senn, 1938
C. astragalia		16	Magoon *et al.*, 1963
C. atrorubens		16	Miege, 1960
C. barkae		16	Chennaveeraih & Patil, 1973
	8		El-Sadek & Ashour, 1972
		16	Miege, 1960
C. barnabassii		16	Boulter *et al.*, 1970
		16	Nordenstam, 1969
C. balbi		16	Boulter *et al.*, 1970
C. bifaria		16	Rao, 1950
C. biflora		16	Sanjappa, 1978
C. bogensis	8		Present report
C. brevidens		16	Auquier & Renard, 1975
		16	Boulter *et al.*, 1970
		16	Gupta & Gupta, 1978

* Vide: Chromosome numbers of flowering plants by FEDEROV, 1969, Index to plant chromosome numbers by MOORE, 1968-1974, GOLDBLATT, 1975--1978 and present reports.

TABLE 2 *(Contd.)*

Species	n	2n	Author(s)
C. brevifolia		16	Coleman & Smith, 1969
		16	Gupta & Gupta, 1978
		16	Raghvan & Venketasubban, 1943
C. brownei	8	16	Gupta & Gupta, 1978
		16 + 1B	
		16	Kempanna, 1960
		16	Strivastava, 1958
C. bupleurifolia		16	Windler, 1974
C. burtii		16	Boulter *et al.*, 1970
		16	Gupta & Gupta, 1978
C. burhia		16	Baquer *et al.*, 1965
		16	Datta & Choudhary, 1966
		16	Malik, 1960
		16	Magoon *et al.*, 1963
		16	Ramanthan, 1955
C. calycina		16	Boulter *et al.*, 1978
		16	Frahm-Leliveld, 1960
	8		Present report
C. cleomifolia	8		Present report
C. capensis	8		Datta & Ghoshal ,1969
C. cephalotes		16	Boulter *et al.*, 1970
C. comosa		16	Miege, 1962
C. comanestiana		16	Boulter *et al.*, 1970
	8	16	Gupta & Gupta, 1978
C. confusa	8 + 1B		Present report
C. cuspidata		16	Boulter *et al.*, 1978
C. cylindrocarpa		16	Boulter *et al.*, 1978
		16	Frahm-Leliveld, 1960
	8		Present report
C. derserticola		16	Boulter *et al.*, 1978
C. dewildemaniana		16	Boulter *et al.*, 1970
		16	Gupta & Gupta, 1978
C. distantiflora		16	Boulter *et al.*, 1970
C. dollaniana		16	Atchison, 1950
C. ebenoides		16	Boulter *et al.*, 1970
		16	Frahm-Leliveld, 1960
C. erecta		16	Turner & Fearing, 1959
C. falcata		16	Miege, 1960
C. ferruginea	21		Bhumik, 1975
		16	Chennavariah & Patil, 1972
		16	Chennavariah & Patil, 1973
		16	Datta & Biswas, 1963

TABLE 2 *(Contd.)*

Species	n	2n	Author(s)
		16	Datta & Ghoshal, 1969
C. filipes	8		Chennavariah & Patil, 1972
		16	Subramanyam & Kamble, 1967
C. fulva		16	Eichhorn, 1937
C. fysonii		16	Sanjappa, 1978
C. glauca		16	Boulter *et al.*, 1970
		16	Frahm-Leliveld, 1960
	8		Present report
C. glaucoides		16	Meige, 1960
C. goetzei		16	Boulter *et al.*, 1970
C. goreensis		16	Atchison, 1950
		16	Boulter *et al.*, 1970
	16	32	Bouharmont, 1961
		16	Frahm-Leliveld, 1960
		16	Kempanna, 1960
		16	Miege, 1960
	8		Present report
C. grahmiana		16	Bagchi, 1966
		16	Chennavariah & Patill, 1973
	8		Chennavariah & Patil, 1972
		16	Gupta & Gupta, 1978
C. grantiana		16	Atchison, 1950
		16	Chennavariah & Patil, 1972
		16	Shibata, 1962
C. greenwayi		16	Boulter *et al.*, 1970
		16	Gupta & Gupta, 1978
C. hirta		16	Boulter *et al.*, 1970
		16	Rao, 1950
C. hirsuta		16	Bir & Kumari, 1978
	8	16	Bir & Kumari, 1977
C. humifusa		16	Bhumik, 1975
C. hyssopifolia		16	Boulter *et al.*, 1970
C. incana		14	Atchison, 1950
		14	Boulter *et al.*, 1970
	7		Chennavariah & Patil, 1972
	7		Chennavariah & Patil, 1973
	8	14	Gupta & Gupta, 1978
	7		Hsu, 1968
		14	Krapovickas & Krapovickas, 1957
		14	Patil & Chennavariah, 1975
		14	Rao, 1943, 1950
C. intermedia		16	Atchison, 1950

TABLE 2 *(Contd.)*

Species	n	2n	Author(s)
		16	Gupta & Gupta, 1978
		16	Kempanna, 1960
		16	Shibata, 1962
		16	Sybenga, 1960
C. invatulensis		16	Miege, 1950
C. juncea		16	Bir & Kumari, 1977
		16	Bhatt, 1976
		16	Bhatt, 1974
		16	Banerji & Samai, 1936
	8	16	Bhumik, 1975
		16	Batta & Biswas, 1962
		16	Datta & Ganguly, 1967
		16	Epecjiabeu, 1933, 1934
		16	Gupta & Gupta, 1978
		16	Magoon, 1963
		16	Ramanujam *et al.*, 1933
		16	Shibata, 1962
C. kipandensis		16	Boulter *et al.*, 1970
C. kirkii		16	Boulter *et al.*, 1970
	8		Gill, 1978
		16	Gupta & Gupta, 1978
C. laburnoides		16	Boulter *et al.*, 1970
	8		Gill & Abubakar, 1975
C. laburnifolia	8		Ayyangar & Sampathkumar, 1975
		16	Boulter *et al.*, 19700
		16	Gupta & Gupta, 1978
		16	Ramanujam *et al.*, 1933
		16	Raghavan & Venkatasubban, 1943
		16	Turner & Fearing, 1959
C. lanceolata	8	16	Gupta & Gupta, 1978
		16	Raghavan & Kenketasubban, 1943
	8		Tandon & Bhatt, 1970
C. lachnophora		16	Boulter *et al.*, 1970
		8	Present report
C. lachnocarpa		16	Boulter *et al.*, 1970
		16	Frahm-Leliveld, 1960
C. lachnocarpoides		16	Boulter *et al.*, 1970
C. lanata		16	Kempanna, 1960
C. laxiflora		16	Boulter *et al.*, 1970
C. leprieurii		16	Boulter *et al.*, 1970
C. leschenaultii		16	Chennavariah & Patil, 1972
	8		Chennavariah & Patil, 1973

TABLE 2 *(Contd.)*

Species	n	2n	Author(s)
		16	Gupta & Gupta, 1978
C. linifolia	8	16	Bir & Kumari, 1977
		16	Bir & Kumari, 1978
		16	Nadkarni, 1973
C. massaiensis		32	Boulter *et al.*, 1970
C. maxillaris		16	Atchison, 1950
C. mauensis		14	Boulter *et al.*, 1970
C. maypurensis		16	Fritsch, 1972
C. medicaginea		16	Bir & Sidhu, 1966
	8	16	Bir & Kumari, 1977
		16 + 3B	Gupta & Gupta, 1978
		16	Magoon *et al.*, 1970
		16	Rao, 1943, 1950
		16	Raghavan & Arora, 1958
		16	Sareen & Trehan, 1976
C. mesopontica		16	Turner & Fearing, 1959
C. mucronata	8	16	Gupta & Gupta, 1978
	8		Mitra & Datta, 1967
		14	Patil & Chennavariah, 1975
		16	Shibata, 1962
		16	Subramanyam & Kemble, 1966
	8		Tandon & Bhatt, 1970
C. mysorensis		16	Bir & Sidhu, 1966
	8	16	Bir & Kpmari, 1977
		16	Datta & Ghoshal, 1969
	8	16	Gupta & Gupta, 1978
		16	Rao, 1943
		16	Shibata, 1962
C. nana	8		Chennavarih & Patil, 1972
C. natalitia		16	Boulter *et al.*, 1970
C. naragutensis		16	Boulter *et al.*, 1970
		16	Frahm-Leliveld, 1960
C. navaritensis	16		Windler, 1974
C. nitens		32	Chennavariah & Patil, 1973
	8, 16	32	Chennavariah & Patil, 1972
C. obovata		16	Hagerup, 1932
C. ochrolenca		16	Boulter *et al.*, 1970
		16	Frahm-Leliveld, 1960
C. orixensis	8	16	Bir & Kumari, 1977
	8		Chennavariah & Patil, 1972
		16	Chennavariah & Patil, 1973
		16	Rao, 1943

TABLE 2 *(Contd.)*

Species	n	2n	Author(s)
	8		Tandon & Bhatt, 1970
C. ononoides		16	Boulter *et al.*, 1970
C. orthoclada		16	Boulter *et al.*, 1970
C. pallida		16	Auquier & Renard, 1975
		16	Boulter *et al.*, 1970
		16	Gupta & Gupta, 1978
C. paulina		32	Chennavariah & Patil, 1972
		32	Shibata, 1962
C. pilosa		32	Atchison, 1950
		32	Shibata, 1962
C. petitiana		16	Boulter *et al.*, 1970
		16	Gupta & Gupta, 1978
C. perrottitii		16	Frahm-Leliveld, 1960
		16	Miege, 1962
C. podocarpa		16	Miege, 1962
C. polygaloides	8		Present report
C. polyphylla		16	Windler, 1974
C. polysperma		14, 16	Boulter *et al.*, 1970
		16	Frahm-Leliveld, 1957
C. prostrata	8	16	Bir & Kumari, 1977
	8		Bhumik, 1975
		16	Ghosh & Choudhury, 1966
C. prolongata		16	Boulter *et al.*, 1970
C. pumila		32	Atchison, 1950
		32	Farnandex, 1977
C. pusilla	8	16	Bir & Kumari, 1975
	8	16	Bir & Kumari, 1977
C. purshii		16	Windler, 1974
C. pycnostachya		16	Boulter *et al.*, 1970
C. quercetorum		16	Windler, 1974
C. quinquetolia		S16	Boulter *et al.*, 1970
		116	Gupta & Gupta, 1978
		16	Magoon, 1963
		16	Rao, 1943
		16	Subramanyam, 1972
C. quartiniana		14	Boulter *et al.*, 1970
C. recta		16	Boulter *et al.*, 1970
C. retusa	8		Bhumik, 1975
		16	Bhatt, 1976
		16	Bhatt, 1974
		16	Boulter *et al.*, 1970
		16	Datta & Neogy, 1975

TABLE 2 *(Contd.)*

Species	n	2n	Author(s)
		16	Elias, 1967
		16	Frahm-Leliveldi, 1960
	7		Gill & Abubakar, 1975
		16 + 1B	Gupta & Gupta, 1978
		16	Harvey, 1966
		16	Kawakami, 1930
		16	Magoon, 1963
		16	Miege, 1960
		16	Subramanyam, 1972
		16	Subramanyam & Kemble, 1967
	8	16	Sharma, 1970
	8		Tandon & Bhatt, 1970
	8		Present report
C. rotundifolia		16	Windler, 1974
C. rotundicarinata		16	Datta & Neogy, 1965
	8		Ghoshal, 1962
C. rogersii		16	Boulter *et al.*, 1970
C. rosenii		16	Boulter *et al.*, 1970
C. sagittalis		32	Huynh, 1965
		32	Turner & Fearing, 1960
	16		Windler, 1974
C. saharae		16	Reese, 1957
C. saltiana		16	Atchison, 1950
		16	Bir & Sidhu, 1966
	8	16	Bhumik, 1975
		16	Chuang *et al.*, 1963
		16	Datta & Biswas, 1963
	8	16	Gupta & Gupta, 1978
	8		Sharma, 1970
		16	Srivastava, 1958
C. senagalensis		16	Boulter *et al.*, 1970
		16	Frahm-Leliveld, 1960
		16	Miege, 1960
C. sericea		16	Bir & Sidhu, 1966
		16	Bir & Kumari, 1977
	8		Bhumik, 1975
		16	Datta & Ganguly, 1967
	8	16	Gupta & Gupta, 1978
		16	Magoon *et al.*, 1963
		16	Miege, 1960
		16	Rao, 1943
		16	Roy & Sinha, 1959

TABLE 2 *(Contd.)*

Species	n	2n	Author(s)
	8		Sinha & Gupta, 1973
	8		Sinha & Prasad, 1973
	8		Sarkar *et al.*, 1975
	8		Sharma, 1970
		16	Subramanyan & Kemble, 1966
	8		Tandon & Bhatt, 1970
C. sessiliflora	8		Bir & Kumari, 1973
	8	16	Bir & Kumari, 1977
C. shevaroyensis		16	Chennavariah & Patil, 1973
C. spartea	8		Chennavariah & Patil, 1972
		16	Boulter & Bhatt, 1970
		16	Frahm-Leliveld, 1960
C. spectabilis		16	Atchison, 1950
		16	Boulter *et al.*, 1970
C. sphaerocarpa		16	Boulter *et al.*, 1970
		16	Miege, 1960
C. spinosa		16	Boulter *et al.*, 1970
		16	Eichhorn, 1937
C. striata	8		Ayyangar & Sampathkumar, 1975
	8		Bhumik, 1975
		16	Frahm-Leliveld, 1957
	8	16	Gupta & Gupta, 1978
		16	Magoon, 1963
	8		Mehra, 1976
		16	Rao, 1950
		16	Seni, 1938
		16	Shibata, 1962
		16	Sanjappa, 1978
		16	Turner & Irwin, 1961
C. stipularia		32	Chennavariah & Patil, 1973
		32	Farnandex, 1977
		32	Turner & Irwin, 1977
	16		Windler, 1974
C. triquertra	8		Chennavariah & Patil, 1973
C. trifoliastrum		16	Rao, 1950
C. uncea	8		Sharma, 1970
C. unifoliata		16	Bandel, 1974
	14, 16	20	Datta & Biswas, 1962
C. usaramoensis		16	Frahm-Leliveld, 1957, 1960
		16	Kawakami, 1930
		16	Magoon, 1963
		16	Rao, 1950

TABLE 2 *(Contd.)*

Species	n	2n	Author(s)
		16	Pritchard & Gould, 1964
		16	Shibata, 1962
C. usorensis		16	Raghavan & Venkatasubban, 1943
C. vallicola		16	Boulter *et al.*, 1970
C. vatkena		16	Boulter *et al.*, 1970
C. valetonii		16	Kawakami, 1930
C. verrucosa	8		Ayyangar & Sampathkumar, 1975
		16	Atchison, 1950
	8	16	Bhumik, 1975
		16	Datta & Biswas, 1962, 1963
		16	Gupta & Gupta, 1978
		16	Magoon *et al.*, 1963
		16	Raghavan & Kenketasubban, 1943
		16	Subramanyam, 1972
		16	Sanjappa, 1970
	8		Sharma, 1970
	8		Tandon & Bhatt, 1970
C. virgulata		16	Turner & Fearing, 1959
C. vogelii		16	Frahm-Leliveld, 1960
C. wightiana		16	Chennavariah & Patil, 1973
	8		Chennavariah & Patil, 1972

EXPLANATION TO FIGURES
× 1500

Fig. 1.	— *Crotalaria acervata*	n = M.I
Fig. 2.	— *C. bogensis*	n = M.I
Fig. 3.	— *C. calycina*	n = M.I
Fig. 4.	— *C. cleomifolia*	n = M.I
Fig. 5.	— *C. confusa*	n = 8 + 1B M.I
Fig. 6.	— *C. cylindrocarpa*	n = 8 Diak.
Fig. 7.	— *C. glauca*	n = 8 M.I
Fig. 8	— *C. goreensis*	n = 8 M.I
Fig. 8.	— *C. lachnophora*	n = 8 M.I
Fig. 10.	— *C. polygaloides*	n = 8 M.I
Fig. 11.	— *C. retusa*	n = 8 M.I


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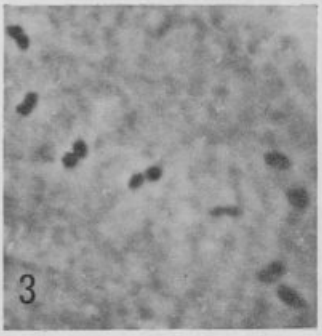
2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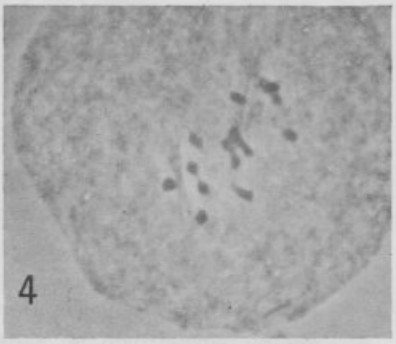
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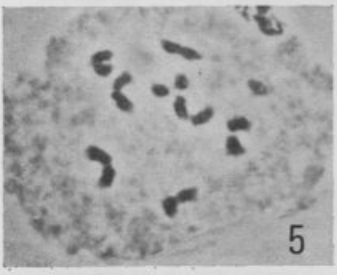
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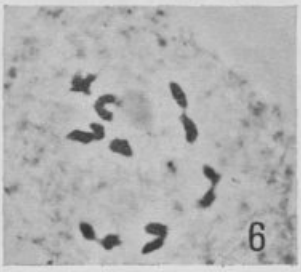
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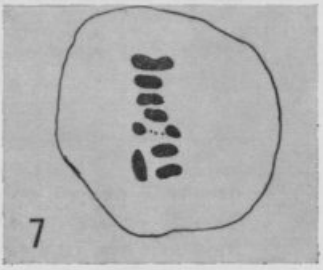
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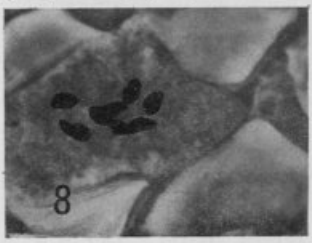
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9


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CURRENT STATE OF THE ULVACEAN GROUP IN THE IBERIAN PENINSULA

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RESUMEN

Esta contribución sobre el conocimiento y situación actual de las Ulváceas en la Peninsula Ibérica está basada en las citas bibliográficas existentes y en estudios de campo y herbario propios. Todo esto nos ha permitido confeccionar su «checklist» y los mapas de distribución de las especies no ubiquistas.

Por último los autores apuntan algunas sugerencias sobre la metodología a seguir en posteriores trabajos sobre este grupo.

ABSTRACT

An assessment of the current state of knowledge on Iberian Ulvacean algae is made, based upon literature recordings and light microscope studies. This allows the authors to compile a historical record and to perform both a preliminary checklist and the distribution maps of non-ubiquitous taxa. Several criteria concerning the future work on the group are discussed.

INTRODUCTION

DESPITE the great number of investigations on the Ulvacean algae, up to date their true phylogenetical relationships are unclear, both inside the group and with other Chlorophyta (HOOPS *et al.*, 1980; KORNMANN, 1973; ROUND, 1971). So we will consider them merely as a working group without any phylogenetical significance until their relationships are elucidated. But in fact there has been a lot of research in this group due to several reasons; 1st: its species are very common in the littoral fringe appearing in all ecological sites (shores, estuaries,

shallow or deep waters and even freshwater habitats), 2nd: they are cosmopolitan in distribution though this feature is restricted to the earlier described species. Research in Ulvacean algae has been raised up in the last thirty years, and as a result this has produced a lot of new taxa (e. g. CHAPMAN, 1956; DANGEARD, 1958, 1962) based upon both anatomic-morphologic and reproductive characters (GAYRAL, 1965, 1967; KORNMANN & SAHLING, 1962, 1978; TATEWAKI, 1969). The enormous plasticity of Ulvacean algae, however, might be the main factor responsible for the big diversity of forms found in Nature, these forms not being true species (MATHIESON *et al.*, 1981). In other words, the biological importance of this group lies on its genetical potentialities.

Ulvacean algae in the Iberian Peninsula are mentioned in all floristic works, but despite their abundance in the littoral they are not well known at all (see however, GALLARDO, 1984; GALLARDO & PÉREZ-CIRERA, 1982*b*, 1985; PÉREZ-CIRERA & GALLARDO, 1981). In order to gain knowledge of this group the first thing to do is critically study all the taxa taking into account, from different biological viewpoints, the floristic literature already published, personal observations, herbaria material and bibliography of the group, or confronting all the evidences available (PRINGSHEIM, 1967).

MATERIAL AND METHODS

A historical record has been made, making use of all studies on Spanish algae (ÁLVAREZ COBELAS, 1981; GALLARDO & ÁLVAREZ, 1985). We have visited the following herbaria: Madrid's Pharmacy Faculty (MAF), Barcelona's Pharmacy Faculty (BCF), Real Jardín Botánico de Madrid (MAD), British Museum (Natural History) (BM)). Several private algae collections have also been studied; i. e. those of Prof. Dr. PÉREZ-CIRERA and F. MIRANDA. Some institutions have sent us sheets of requested taxa; these being Botaniska Museet of Lund (LD), Rijksherbarium, Leiden (L), Muséum National d'Histoire Naturelle, Cryptogamie, Paris (P) and Jardin Botanique de Bordeaux (BORD).

Iberian Peninsula coasts have been surveyed for six years. The localities searched have been Vizcaya, Asturias, Galicia, Lisboa, Southern Portugal, Cádiz, Málaga, Almería, Murcia, Alicante, Valencia, Castellón, Barcelona and Gerona. Freshwater ecosystems have been surveyed too: Madrid, Toledo, Murcia.

Distribution maps have been elaborated with all these data, omitting *Ulva rigida* C. Ag., *U. lactuca* L., *Enteromorpha intestinalis* (L.) Link and *E. compressa* (L.) Grev. due to their cosmopolitism (but see below). Common synonyms (like *Phycoseris, Solenia, Conferva, Ilea, Fistularia,* and those of *Ulva,* e. g. *U. clathrata*) have not been taken into account.

Microscopical examination of all specimens has enabled us to elaborate the preliminary Ulvacean checklist for the Iberian Peninsula. Taxonomical criteria used were those of BLIDING (1963, 1969), DANGEARD (1962), KOEMAN & VAN DEN HOEK (1980, 1982*a*, 1982*b*), KORNMANN & SAHLING (1978) and VINOGRADOVA (1974).

DISCUSSION

Studies on Ulvacean algae at the Iberian Peninsula are mostly floristic, only a few realing with productivity and succession (NIELL, 1980; NIELL & PAZÓ, 1978). Physiological, genetical and ultrastructural works are lacking. Our results indicate that the geographical area considered is very rich in species of this group, though in PAUL C. SILVA's opinion (pers. comm.) it might be an overestimation. This richness, as based both on the diversity of distinct ecosystems in the Iberian Peninsula and the existence of two floristic areas concerning algae that VAN DEN HOEK (1975) termed as Lusitanica Province and Mediterranean Province, also have a great inner floristic diversity. Despite the biogeographical importance of Iberian algal flora, there has been just a few foreign authors that have studied it (e. g. ARDRÉ, 1970, 1971; DONZE, 1968; FOYN, 1955; SAUVAGEAU, 1879). Anyway all the distribution maps made by us making use of the historical records (Figs. 1-8), reflected students' distribution rather than that of the algae. Most Ulvales of the Iberian Peninsula are of widespread occurrence, and a thorough study will surely reveal it.

Ulvacean cosmopolitism is the consequence of three important characteristics, namely, their capabilities of development both in a broad range of ecosystems and environmental variability within a given ecosystem (GALLARDO & PÉREZ-CIRERA, 1982*a*; KAPRAUN, 1970; ROUND, 1981), their tolerance of organic pollution (COTTON, 1910; EDWARDS, 1975), and the ability of their zooids to colonize ship-frames (CLOKIE & BONEY, 1980; EVANS & CHRISTIE, 1970).

As a result of floristic studies undertaken by phycologists from many countries without any connection, the great plasticity of the group (BURROWS, 1959; GAYRAL, 1967) and the lack of true differential anatomical and morphological characters, hundreds of taxa have been described so far (GALLARDO, 1984).

From any approach the group show many problems, and an example of this is the study of *Ulva mutabilis* Føyn by FOYN's coworkers, who hahve considered it from several viewpoints: genetics, reproduction, development and so on (e. g. FOYN, 1961; LOVLIE, 1964; FJELD & LOVLIE, 1976 and works cited therein). The field studies on this taxa, however, are lacking.

Other instance of our latter statement is the case of *Ulva lactuca* L., a species currently considered as cosmopolitan and very often cited in the literature (DE TONI, 1889). PAPENFUSS (1960) discovered Linnean's type of *U. lactuca,* but he recognized that due to the poor conditions, it was very dificult to make a good description of the exsiccata. On the other hand FOYN (1955) believed that this species could not be found south of the English Channel, a quotation also supported by BLIDING (1969). Nevertheless, despite these facts and BLIDING's widely recognized criteria (VAN DEN HOEK, pers. comm.) this alga is still considered as cosmopolitan and has been cited many times in the Iberian Peninsula.

Most of the characters commonly used in Ulvacean taxonomy (morphological, anatomical and reproductive) are not constant, neither ontogenically nor geographically as GAYRAL (1962) suspected.

So we believe that algologists efforts will be successful in this group the more the number of characters used: organoleptic (colour, texture), morphological, genetical, biochemical, ecological, geographical and historical. All of these typologies do not have to be important for a given taxon, but they have to be kept in mind «a priori» (FEYERABEND, 1975: «all is worthwhile»).

The latter idea focuses on methodology. This should be as distinct as possible, including all sorts of biological techniques (statistics, numerical analysis) as well.

The great number of variables to be studied when considering the Ulvales points to multivariate approaches. But in our view multivariate considerations deserve to be kept in mind as a way of thinking prior to any use as a statistical tool; in other words,

we are not advocating statistical multivariate approaches for every work with Ulvales, but believe that there are many sources of variation in Ulvacean algae that might be considered before tacking any study on such organisms. Furthermore the giving up of the individual as a taxonomical unit compells us to study populations living in distant areas, and it can consequently enhance collaboration among Ulvacean researchers.

In the end we would like to stress the scientific importance of old taxonomical studies (SILVA, 1983). Perhaps, a number of newly described taxa has already been considered in such a literature.

HISTORICAL RECORD

ULVALES

Monostromataceae

Gomontia Bornet *et* Flahault 1888.
polyrhiza (Lagerh.) Born. *et* Flah.
codiolifera Chodat

Monostroma Thuret 1845.
bullosum (Roth) Thur.
fuscum (Post. et Rupr.) Wittr. (1)
grevillei (Thur.) Wittr. (1, 2)
latissimum (Kütz.) Wittr. (3)
obscurum (Kütz.) J. Ag. (4)
orbiculatum Thur. (3)
oxyspermum (Kütz.) Doty (3)
var. *oxyspermum*
var. *laceratum* (Thur.) Hamel
quaternarium (Kütz.) Desmaz.
wittrockii Born. *in* Born. *et* Thur. (3)

Blidingia Kylin 1947.
chadefaudii (J. Feldm.) Bliding
marginata (J. Ag.) P. Dang.
minima (Näg. *ex* Kütz.) Kylin
var. *minima*
var. *ramifera* Bliding

Capsosiphonaceae

Capsosiphon Gobi 1879.
fulvescens (C. Ag.) Setch. *et* Gardn.

Ulvaceae

Enteromorpha Link *in* Nees 1820.
aragoënsis Bliding
clathrata (Roth) Grev.
complanata Kütz. (5)
compressa (L.) Grev.
var. *compressa*
var. *caespitosa* Le Jol.
var. *capillacea* Kütz.
var. *nana* J. Ag.
crinita J. Ag.
flexuosa (Wulf. ex Roth) J. Ag.
subsp. *flexuosa*
subsp. *paradoxa* (Dillw.) Bliding
subsp. *pilifera* (Kütz.) Bliding
hendayensis P. Dang. *et* H. Parriaud (1)
intestinalis (L.) Link
var. *intestinalis*
var. *capillaris* Kütz.
var. *cornucopiae* Kütz.
var. *crispa* Grev.
var. *mesenteriformis* Kütz.
var. *tubulosa* Kütz.
juergensii Kütz.
jugoslavica Bliding (1)
lingulata J. Ag.
linza (L.) J. Ag. (7)
var. *linza*
var. *crispata* J. Ag.
var. *lanceolata* J. Ag.
marginata J. Ag. (8)
microccoca Kütz. (1)
minima Näg. ex Kütz. (9)
multiramosa Bliding
prolifera (O. F. Müll.) J. Ag.

var. *prolifera*
var. *gullmariensis* Bliding
ralfsii Harv. (1)
ramulosa (J. E. Smith) Hook.
f. *robusta* Hauck
var. *spinosa* Kütz.
salina Kütz. (10)
stipitata P. Dang. (1)
torta (Mert. *in* Jürg.) Reinb.
tubulosa Kütz. (6)
welwitschii J. Ag.

Percursaria Bory 1823.
percursa (C. Ag.) Rosenv.

Ulva Linnaeus 1753.
bertolonii C. Ag.
bifrons F. Ardré (11)
cribrosa J. Ag. (12)
curvata (Kütz.) De Toni
fasciata Delile
fimbriata Welwitsch (13)
gigantea (Kütz.) Bliding (11)
lactuca L. (14)
var. *lactuca*
var. *cribrosa* J. Ag.
var. *lacinulata* (Kütz.) Hauck
var. *lapathifolia* (Aresch.) Hauck
var. *latissima* (L.) D.C.
var. *myriotrema* (Crouan) De Toni
var. *perforata* Rodríguez i Femenias
var. *pulvinata* Schmidt
var. *rigida* Le Jol.
latissima L. (15)
linearis P. Dang. (11)
muscoides Clemente (16)
myriotrema Crouan
olivascens P. Dang.
rhacodes (Holmes) Papenfuss
rigida C. Ag.

var. *rigida*
var. *cribrosa* J.Ag.
var. *fimbriata* J. Ag.
var. *lacinulata* Hauck
var. *myriotrema* J. Ag.
rotundata Bliding
thuretii Føyn (12)

Ulvaria Ruprecht 1850.
fusca (Post. et Rupr.) Rupr. (1)
obscura (Kütz.) Gayral
oxysperma (Kütz.) Bliding (3)
var. *oxysperma*
var. *orbiculata* (Thur.) Bliding

NOTES

(1) Requires confirmation.

(2) We have seen sheets nº 972.046 928 y 972.046 934, of the Leiden Rijksherbarium (collected by DONZE in Arosa, Spain) and they belong to *Ulva*.

(3) Syncnym of *Gayralia oxysperma*.

(4) Synonym of *Ulvaria obscura*.

(5) Synonym of *Enteromorpha compressa*.

(6) Synonym of *Enteromorpha flexuosa*.

(7) Most Iberian records deserve both taxonomic and nomenclatural re-investigation but many of them are likely to be *Enteromorpha bertolonii* Montagne. See discussion in Dangeard (1960).

(8) Synonym of *Blidingia marginata*.

(9) Synonym of *Blidingia minima*.

(10) Synonym of *Enteromorpha prolifera*. The only portuguese record of *E. salina* has been seen by ARDRÉ (1970) in the COI Herb., and she considers it as *E. torta*.

(11) Requires taxonomic re-investigation.

(12) Possibly *Ulva rigida*.

(13) Requires re-investigation but in our opinion it might be a true species.

(14) We believe that *Ulva lactuca* does not exist in the Iberian Peninsula, and therefore all the records with that name should be assigned to other species of *Ulva*.

(15) For BLIDING (1968), synonym of *Ulva gigantea*.

(16) Synonym of *Enteromorpha ramulosa*.

CHECKLIST

ULVALES

Monostromataceae

Gomontia Bornet *et* Fhahault 1888.
polyrhiza (Lagerh.) Born. *et* Flah.

Monostroma Thuret 1854.
bulbosum (Roth) Thur.

Blidingia Kylin 1947.
chadefaudii (J. Feldm.) Bliding
marquinata (J. Ag.) P. Dang.
minima (Näg. ex Kütz.) Kylin

Capsosiphonaceae

Capsosiphon Gobi 1879.
fulvescens (C. Ag.) Setch. *et* Gardn.

Percursariaceae

Percursaria Bory 1823.
percursa (C. Ag.) Rosenv.

Ulvaceae

Enteromorpha Link *in* Nees 1820.
clathrata (Roth) Grev.
compressa (L.) Grev.
flexuosa (Wulf. *ex* Roth) J. Ag.
intestinalis (L.) Link
linza (L.) J. Ag.
multiramosa Bliding
prolifera (O. F. Müll.) J. Ag.
ramulosa (J. E. Smith) Hook.
torta (Mert. *in* Jürg.) Reinb.

Gayralia Ruprecht 1851.
oxysperma (Kütz.) Vinogr.

Ulva Linnaeus 1753.
curvata (Kütz.) De Toni
fasciata Delile
olivascens P. Dang.

rhacodes (Holmes) Papenfuss
rigida C. Ag.
rotundata Bliding

Ulvaria Ruprecht 1850.
obscura (Kütz.) Gayral

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DISTRIBUTION MAPS

Figs. 1-8. — Distribution maps of the Ulvacean' genera in the Iberian Peninsula, based upon the historical record and some records of our own.

Fig. 1, genera *Capsosiphon, Gomontia* and *Percursaria*. Fig. 2, genus *Blidingia*. Figs. 3-5, some species belonging to the genus *Enteromorpha*. Figs. 6, 7, some species belonging to the genus *Ulva*. Fig. 8, genus *Monostroma (sensu amplo)*.

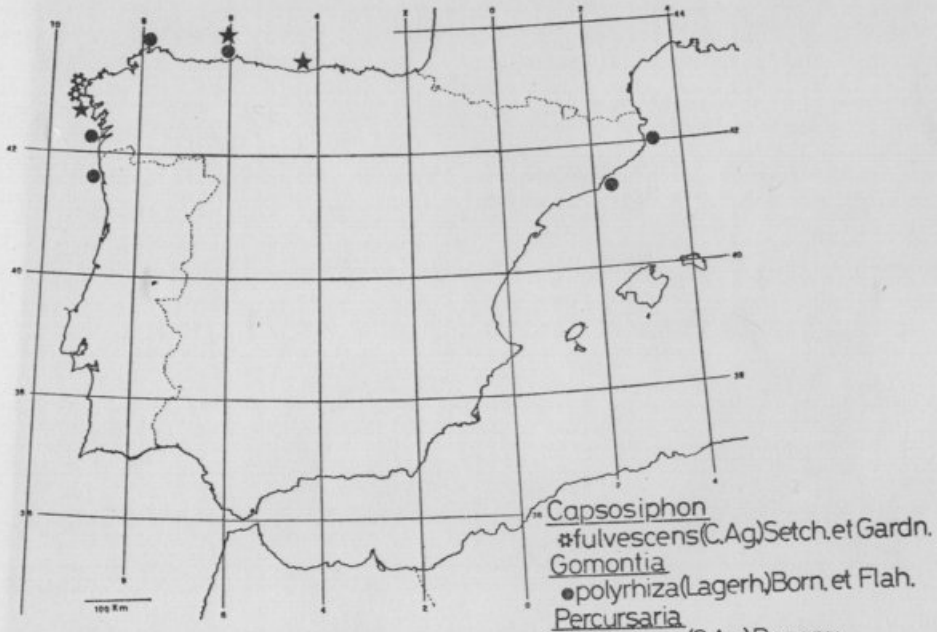
Capsosiphon
fulvescens (C.Ag.) Setch. et Gardn.
Gomontia
polyrhiza (Lagerh.) Born. et Flah.
Percursaria
percursa (C.Ag.) Rosenv.

Fig. 1

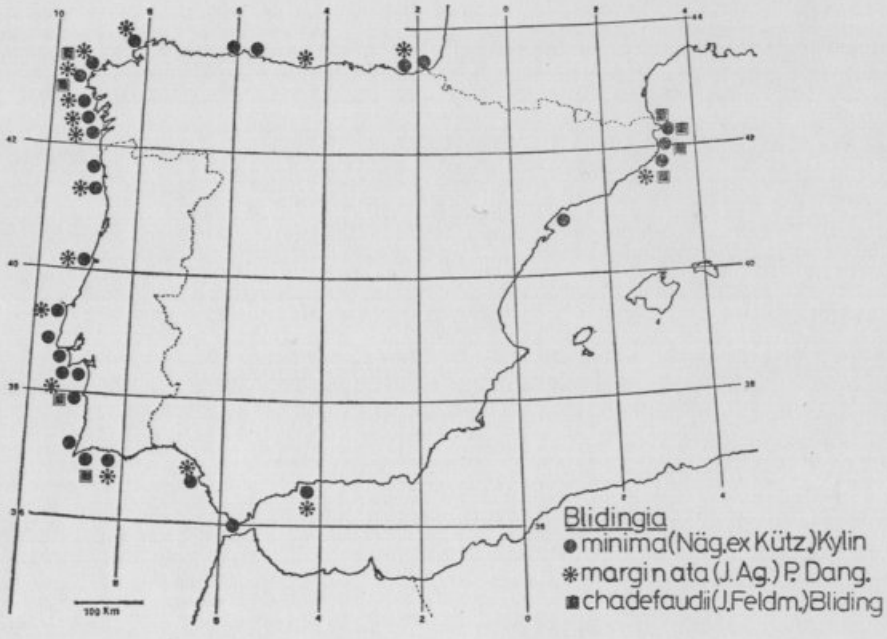
Blidingia
minima (Näg. ex Kütz.) Kylin
marginata (J.Ag.) P. Dang.
chadefaudii (J.Feldm.) Bliding

Fig. 2

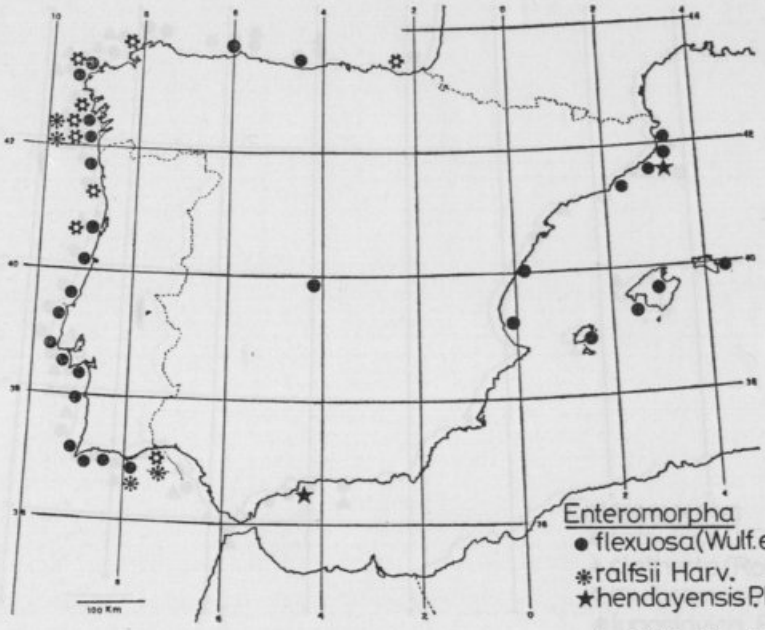
Enteromorpha
● flexuosa (Wulf. ex Roth) J. Ag.
* ralfsii Harv.
★ hendayensis P. Dang. et Parriaud
✲ torta (Mert. in Jürg.) Reinb.

Fig. 3

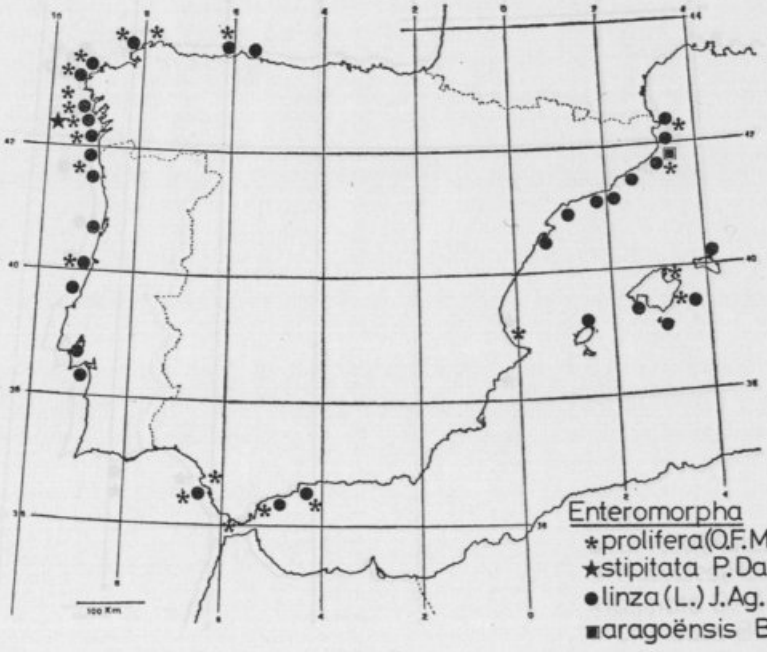
Enteromorpha
* prolifera (O.F. Müller) J. Ag.
★ stipitata P. Dang.
● linza (L.) J. Ag.
■ aragoënsis Bliding

Fig. 4

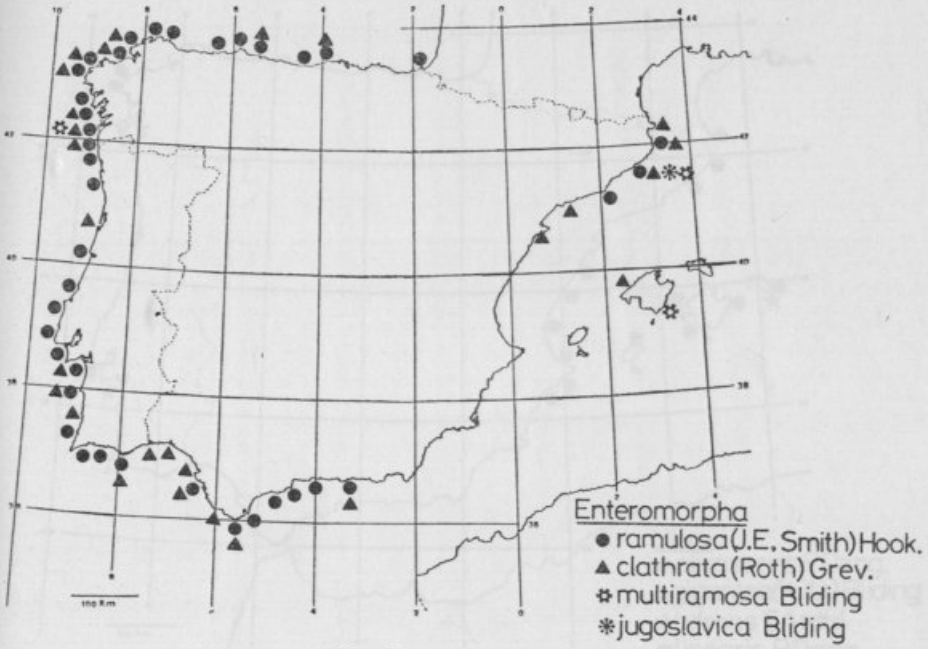
Enteromorpha
● ramulosa (J.E. Smith) Hook.
▲ clathrata (Roth) Grev.
✡ multiramosa Bliding
✳ jugoslavica Bliding

Fig. 5


Ulva
● curvata (Kütz.) De Toni
✳ rhacodes (Holmes) Papenf.
★ fasciata Delile
✡ rotundata Bliding

Fig. 6

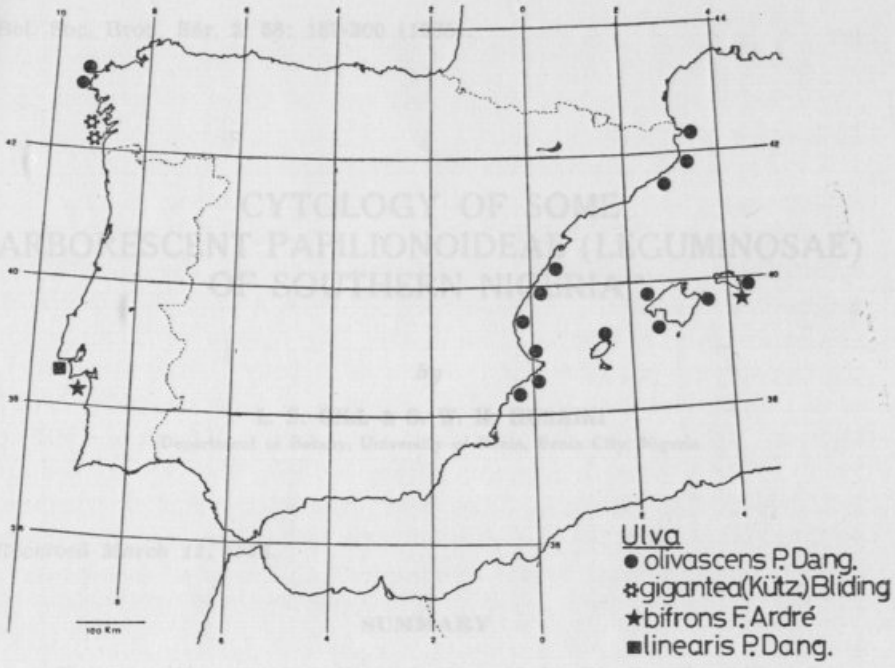
Ulva
olivascens P. Dang.
gigantea (Kütz.) Bliding
bifrons F. Ardré
linearis P. Dang.

Fig. 7

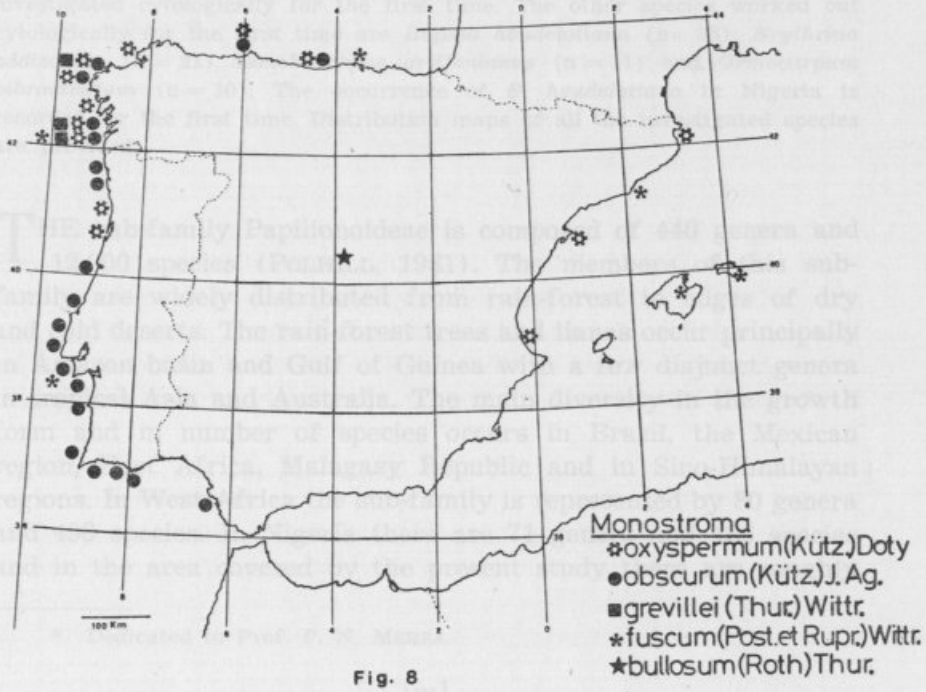
Monostroma
oxyspermum (Kütz.) Doty
obscurum (Kütz.) J. Ag.
grevillei (Thur.) Wittr.
fuscum (Post. et Rupr.) Wittr.
bullosum (Roth) Thur.

Fig. 8

Bol. Soc. Brot., Sér. 2, 58: 187-200 (1985).

CYTOLOGY OF SOME ARBORESCENT PAPILIONOIDEAE (LEGUMINOSAE) OF SOUTHERN NIGERIA *

by

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SUMMARY

Sixteen arborescent species of the sub-family Papilionoideae from Nigeria have been investigated cytologically. Three genera i. e. *Aganope* (*A. impressa* and *A. leucobotrya* both with n = 10), *Ostryocarpus* (*O. riparius* with n = 16) and *Platysepalum* (*P. violaceum* with n = 14) have been investigated cytologically for the first time. The other species worked out cytologically for the first time are *Baphia heudelotiana* (n= 33), *Erythrina addisoniae* (n = 21), *Lonchocarpus griffonianus* (n = 11) and *Ormocarpum bibracteatum* (n = 10). The occurrence of *B. heudelotiana* in Nigeria is recorded for the first time. Distribution maps of all the investigated species are provided.

THE sub-family Papilionoideae is composed of 440 genera and 12,000 species (POLHILL, 1981). The members of this sub-family are widely distributed from rain-forest to edges of dry and cold deserts. The rain-forest trees and lianas occur principally in Amazon basin and Gulf of Guinea with a few disjunct genera in tropical Asia and Australia. The main diversity in the growth form and in number of species occurs in Brazil, the Mexican region, East Africa, Malagasy Republic and in Sino-Himalayan regions. In West Africa the sub-family is represented by 80 genera and 496 species. In Nigeria there are 71 genera and 496 species and in the area covered by the present study there are roughly

* Dedicated to Prof. P. N. MEHRA.

193 species contained in 60 genera and of these 15 genera and 41 species are trees.

Cytological information is important in elucidating the evolutionary and the cytogenetic relationship among plants. But the arborescent flora has not attracted the desired attention from cytologists. Though the arborescent flora of the Himalayan region has been fairly investigated by MEHRA and his associates at the Punjab University Chandigarh. The results of these investigations were published in a series of papers (GILL, 1979, GILL *et al.*, 1982, KHOSLA, 1975, 1978; KHOSLA & SAREEN, 1978, 1981; MEHRA, 1972, 1976; MEHRA & BAWA, 1969; MEHRA & HANS, 1971, 1972; MEHRA & SAREEN, 1973*a*, 1973*b*). The central Indian arborescent Leguminosae have been studied by BIR & KUMARI, 1977). BAWA (1973) has carried out the chromosomal survey of arborescent taxa from Neotropics. Cytological information on the Nigerian tree species is scarce, though MANGENOT & MANGENOT (1957, 1958, 1962) and MIÈGE (1960, 1962) have reported chromosome numbers of West African plants including some taxa from Nigeria. The present paper is a continuation of authors previous papers (GILL & HUSAINI, 1981, 1982, 1984) and deals with the cytology of 16 important timber species of the sub-family Papilionoidea. Chromosome counts for nine species and three genera were made for the first time.

MATERIAL AND METHODS

Materials for cytological investigations were collected from wild population in southern Nigeria. Young flower buds were fixed in acetic alcohol (1:3) and transferred to 70 percent alcohol after 24 hours. Detailed techniques for meiotic preparations and the preparation of distribution maps have been discussed earlier (GILL & HUSAINI, 1981, 1982, 1984). Vouchers are kept in the Herbarium, Department of Botany, University of Benin, Nigeria.

RESULTS AND DISCUSSION

The accession of the material used along with locality chromosome number, base number, ploidy level and flowering period are listed in Table 1. The numerals in the Table 1, indicate months of the year for flowering. The arrangement of taxa studied is

TABLE 1

Chromosome numbers of some tree species in Papilionoideae (Leguminosae) from Nigeria

Taxon	Accession number *	Locality	Flowering period	Haploid number	Base number	Ploidy level
TRIBE: AESCHYNAMONEAE						
Ormocarpum bibracteatum Bak. [1]	SWH. 195	Fugar, Bendel State	2-4	10	10	Diploid
TRIBE: PHASEOLEAE						
Butea monosperma (Lamk.) Taub.	SWH. 174	Benin City, Bendel State	3-8	11	11	Diploid
Erythrina addisoniae Hutch. & Dalz. [1]	SWH. 103	Benin City, Bendel State	12-3	21	21	Diploid
TRIBE: SOPHOREAE						
Airyantha confusum (Hutch. & Dalz.) Pellegr.	SWH. 103	Benin City, Bendel State	12-3	11	11	Diploid
Baphia capparidifolia subsp. *polygalacea* Bak. [1]	SWH. 225	Benin-Ore Road, Bendel State	3-5	11	11	Diploid
B. heudelotiana Baill.	SWH. 244	Okrika, River State	5-6	33	11	Hexaploid
B. nitida Lodd.	SWH. 138	Irrua, Bendel State	3-7	11	11	Diploid
B. pubescens Hook. f.	SWH. 187	Ekpoma, Bendel State	1-3	11	11	Diploid
Pericopsis laxiflora (Bth. ex Bak.) Harms	SWH. 227	Auchi-Agenebode Road, Bendel State	1-6	9	9	Diploid
TRIBE: TEPHROSIEAE						
Aganope impressa Dunn. [1]	SWH. 261	Benin-Ore Road, Bendel State	7-9	10	10	Diploid
A. leucobotrya Dunn.	SWH. 269	Benin-Ore Road, Bendel State	7-9	10	10	Diploid
Lonchocarpus cyanescens (Schum. & Thonn.) Bth.	SWH. 274	Auchi-Agenebode Road, Bendel State	6-9	11	11	Diploid
L. griffonianus (Baill.) Dunn. [1]	SWH. 155	Benin-Ore Road, Bendel State	6-9	11	11	Diploid
L. sericeus (Poir.) H. B. & K.	SWH. 220	Benin-Ore Road, Bendel State	4-7	11	11	Diploid
Ostryocarpus riparius Hook. f. [1]	SWH. 247	Benin-Ore Road, Bendel State	7-9	16	8	Tetraploid
Platysepalum violaceum Welw. ex Bak. [1]	SWH. 157	Benin-Ore Road, Bendel State	5-7	14	7	Tetraploid

* The designation SWH. refers to the collections made by Dr. S. W. H. HUSAINI.

[1] Taxa studied for the first time.

alphabetical under each tribe. Meiosis and pollen formation were found to be normal in all the taxa presently studied.

Ormocarpum P. Beauv.

A genus of 30 species distributed in tropical and subtropical regions of Africa, India and Malayasia and represented in Nigeria by 5 shrubby or small sized tree species. DARLINGTON & WYLIE (1955) suggested 12 as the base number for the genus.

O. bibracteatum (Hochst. ex A. Rich.) Bak. (n = 10, Pl. I, fig. 1).

A small sized savanna tree of restricted distribution (Map. 1) in ferruginous tropical soils of Nigeria with an annual precipitation ranging from 508 mm - 1270 mm. The only other cytological report in this genus is of 2n = 24 for *O. trichocarpum* (ATCHISON, 1951). The present count haploid is indicative of a new number of x = 10 for this genus.

Butea Koen. ex Roxb.

Composed of 30 species distributed in Indo-Malayasian region and is represented in Nigeria by one introduced species.

B. monosperma (Lamk.) Taub. (n = 11, Pl. I, fig. 2).

The present haploid count of 11 agrees with the report of 2n = 22 by SANJAPPA & BHATT (1976) but differs from the report of 2n = 32 (DATTA & SAHA, 1973) and n = 9 (BIR & KUMARI, 1977, BIR & SIDHU, 1967, KEDARNATH, 1950, MEHRA, 1976, MEHRA & SAREEN, 1973*b*, MITRA & DATTA, 1967, NANDA, 1962, RAGHAVAN & ARORA, 1958 and TIXIER, 1965).

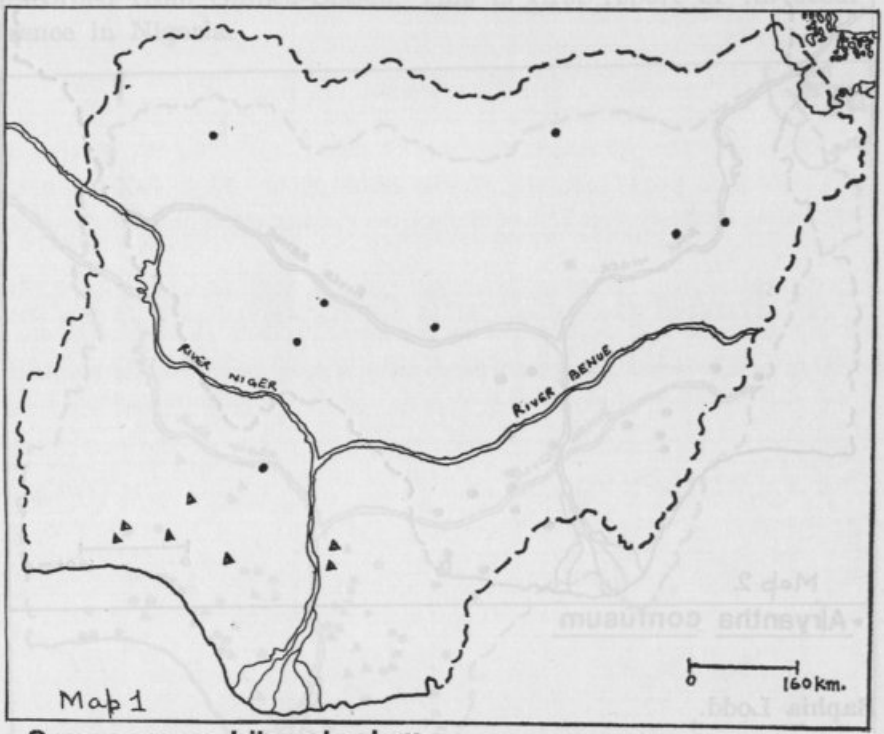
Erythrina L.

A genus of 100 species distributed in tropical and subtropical regions and in Nigeria there are five indigenous tree species.

E. addisoniae Hutch. & Dalz. (n = 21, Pl. I, fig. 3).

A tall forest tree upto 20 m high and 2 m in girth with wide spreading crown. Restricted in distribution to western

states of Nigeria with ferralsols and ferruginous tropical soils (Map. 1). Outside Nigeria its range extends westwards upto Sierra-Leone.

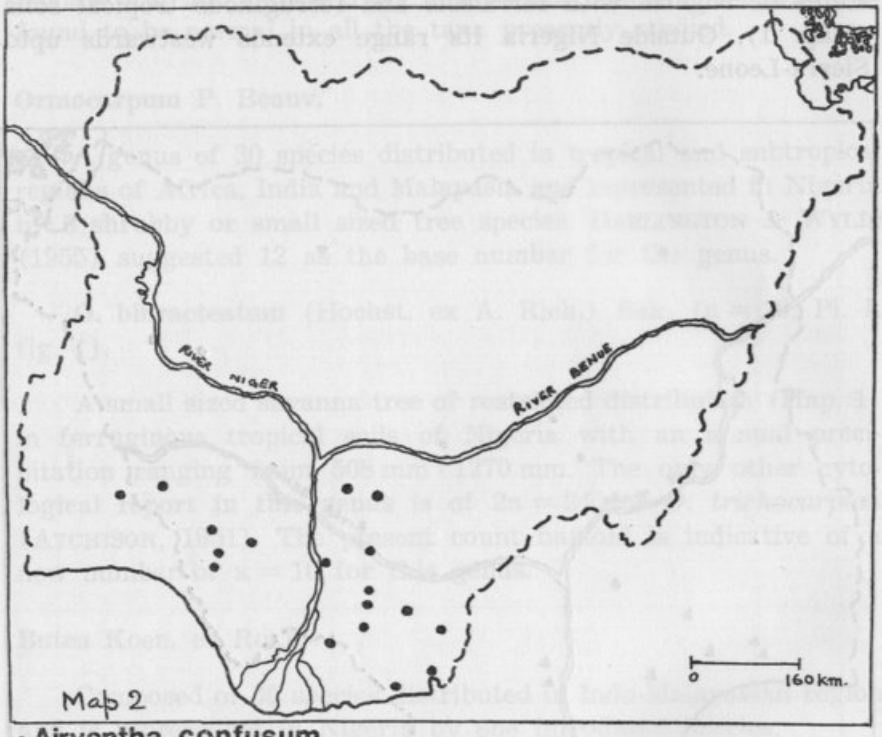


Airyantha Brummitt

A tropical genus of 2 species (POLHILL, 1981) represented in Nigeria by a single species.

A. confusum (Hutch. & Dalz.) Pellegr. (n = 11, Pl. I, fig. 4).

A small sized tree upto 8 m high and restricted in distribution to ferralsols and ferruginous tropical soils of Southern Nigeria (Map. 2) with an average annual precipitation ranging from 1270 mm - 1348 mm. Its range extends westwards upto Ivory Coast, eastwards to Cameroun and southwards upto Zaire.



Baphia Lodd.

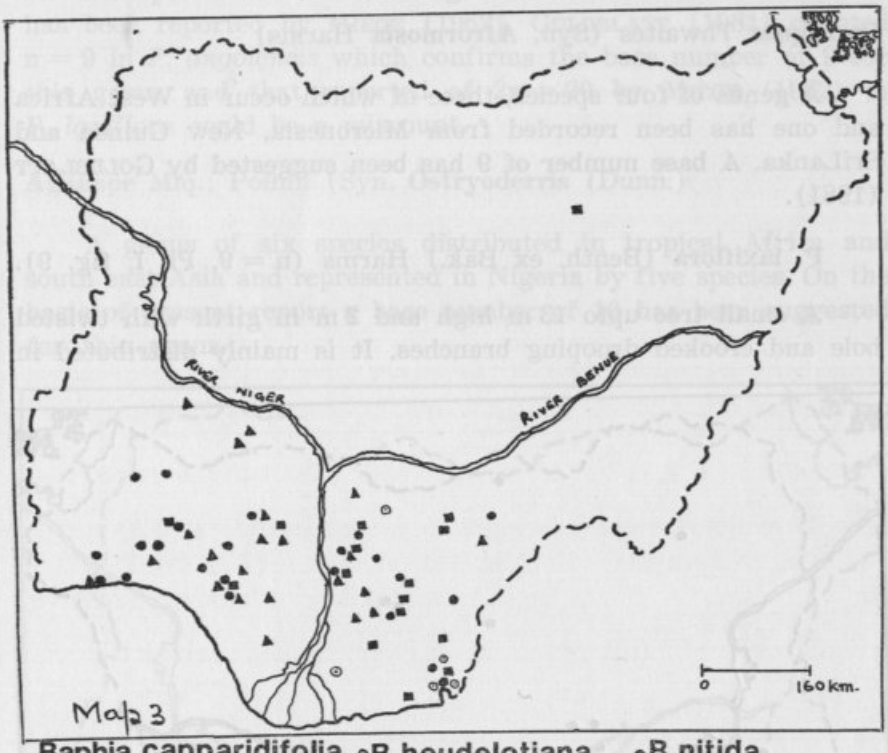
A genus of 65 species distributed in tropical Africa, Indonesia and Malagasy and represented in Nigeria by 7 tree species. Base number of 11 has been suggested by GOLDBLATT (1981).

B. capparidifolia Bak. subsp. **polygalacea** Bak. (n = 11, Pl. I, fig. 5).

A small tree restricted to southern region of the country; mostly in ferralsols and ferruginous tropical soils though a collection exists in F. R. I. Ibadan (*Jone* FHI 6406) from Ebom, Borno State (Map. 3). The tree might have been cultivated there as it is occasionally grown in backyard in southern Nigeria. Its range extends westwards upto Sierra-Leone and southwards upto Zaire.

B. heudelotiana Baill. (n = 33, Pl. I, fig. 6).

A small tree of very much restricted distribution (Map. 3) in ferralsols of southern Nigeria. Outside Nigeria it has been recorded from Guinea-Bissau. This is first report of its occurrence in Nigeria.



B. nitida Lodd. (n = 11, Pl. I, fig. 7).

A tree upto 10 m high with slender branches. It is the most widespread (Map. 3) species of this genus in forest zone with ferralsols and ferruginous tropical soils. It extends upto Sierra-Leone in the West and in the East its range extends upto Cameroun.

B. pubescens Hook. f. (n = 11, Pl. I, fig. 8).

A tree upto 10 m high and 1 m in girth with low branches. It is of widespread occurrence in southern part of the country

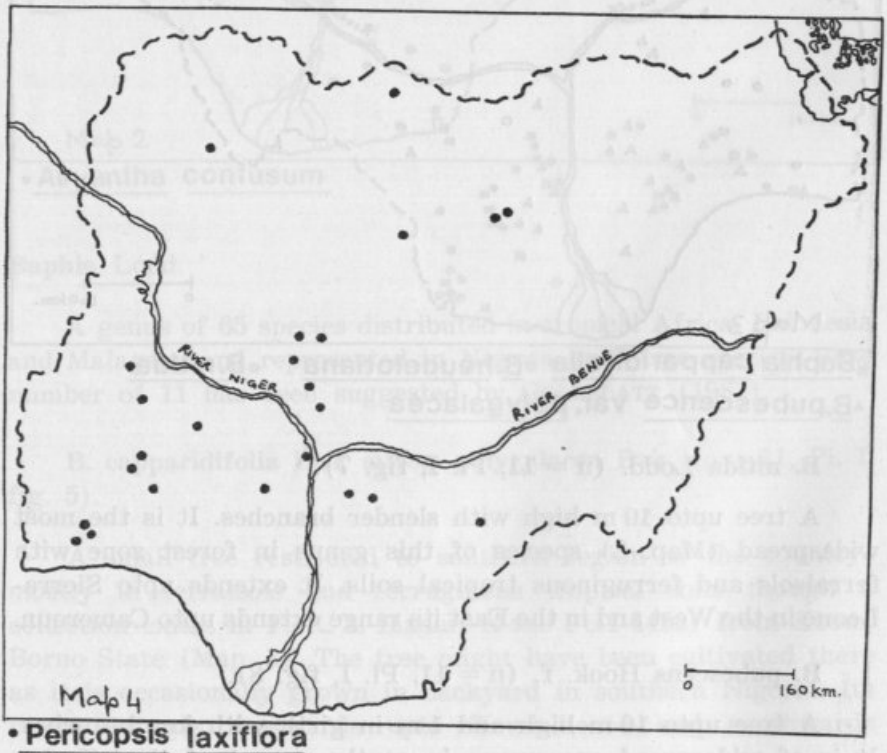
(Map. 3) with ferralsols and ferruginous tropical soils. It extends upto derived savanna of Kwara State. Its range extends from Cameroun to Liberia and southwards upto Zaire. Previously MANGENOT & MANGENOT (1958, 1962) have reported a tetraploid race of 2n = 44 from Ivory Coast.

Pericopsis Thwaites (Syn. **Afrormosia** Harms)

A genus of four species, three of which occur in West Africa and one has been recorded from Micronesia, New Guinea and SriLanka. A base number of 9 has been suggested by GOLDBLATT (1981).

P. laxiflora (Benth. ex Bak.) Harms (n = 9, Pl. I, fig. 9).

A small tree upto 13 m high and 2 m in girth with twisted bole and crooked drooping branches. It is mainly distributed in

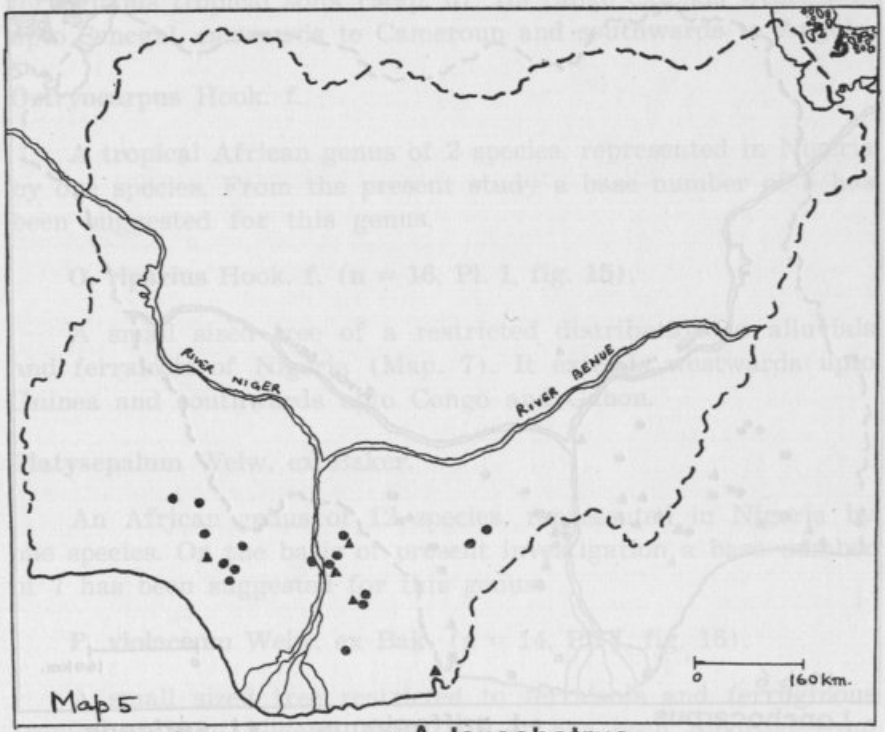


savanna region with ferruginous tropical soils and lithosols. It is typically absent from southern parts of the country (Map. 4). Its range extends westwards upto Senegal and eastwards upto Sudan.

MANGENOT & MANGENOT (1962) have also reported 2n = 18 for this species but a conflicting chromosome number (2n = 20) has been reported by MIÈGE (1962). GOLDBLATT (1981) counted n = 9 in *P. angolensis* which confirms the base number of 9 for this genus and that reported of 2n = 20 by MIÈGE (1962) in *P. laxiflora* could be a miscount.

Aganope Miq.; Polhill (Syn. **Ostryoderris** (Dunn.)

A genus of six species distributed in tropical Africa and south east Asia and represented in Nigeria by five species. On the basis of present report a base number of 10 has been suggested for this genus.



• Aganope impressa ▲ A. leucobotrya

A. impressa Dunn. (n = 10, Pl. I, fig. 10).

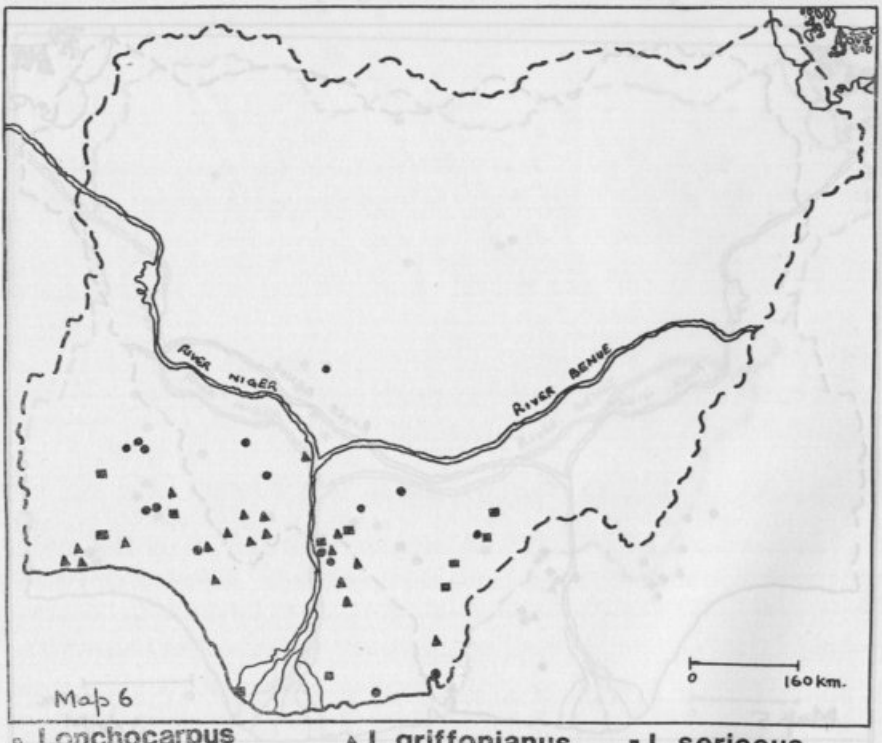
A small tree upto 35 m high restricted in distribution to south western region of the country with ferralsols and ferruginous tropical soils (Map. 5). It extends eastwards upto Congo.

A. leucobotrya Dunn. (n = 10, Pl. I, fig. 11).

A small tree restricted in distribution (Map. 5) to ferralsols and ferruginous tropical soils of Nigeria. Outside Nigeria it extends upto Sierra-Leone.

Lonchocarpus Kunth.

Composed of 100 species distributed in tropical Africa, Australia and West Indies and represented in Nigeria by 4 tree species. GOLDBLATT (1981) has suggested a base number of 11 for this genus.



L. cyanescens (Schum. & Thonn.) Benth. (n = 11, Pl. I, fig. 12).

A small tree found in ferralsols and ferruginous tropical soil zones of Nigeria (Map. 6). It extends westwards upto Liberia and eastwards upto Cameroun. ATCHISON (1949) has reported a diploid number of 22 for this species.

L. griffonianus (Baill.) Dunn. (n = 11, Pl. I, fig. 13).

A tree upto 10 m high restricted in distribution to ferralsols to ferruginous tropical soils of south eastern Nigeria (Map. 6). Outside Nigeria it has been reported from Angola and Ivory Coast.

L. sericeus (Poir.) H. B. & K. (n = 11, Pl. I, fig. 14).

A medium sized tree upto 13 m tall and restricted in distribution to southern region of the country with ferralsols and ferruginous tropical soils (Map. 6). Its range extends westwards upto Senegal, eastwards to Cameroun and southwards to Angola.

Ostryocarpus Hook. f.

A tropical African genus of 2 species, represented in Nigeria by one species. From the present study a base number of 8 has been suggested for this genus.

O. riparius Hook. f. (n = 16, Pl. I, fig. 15).

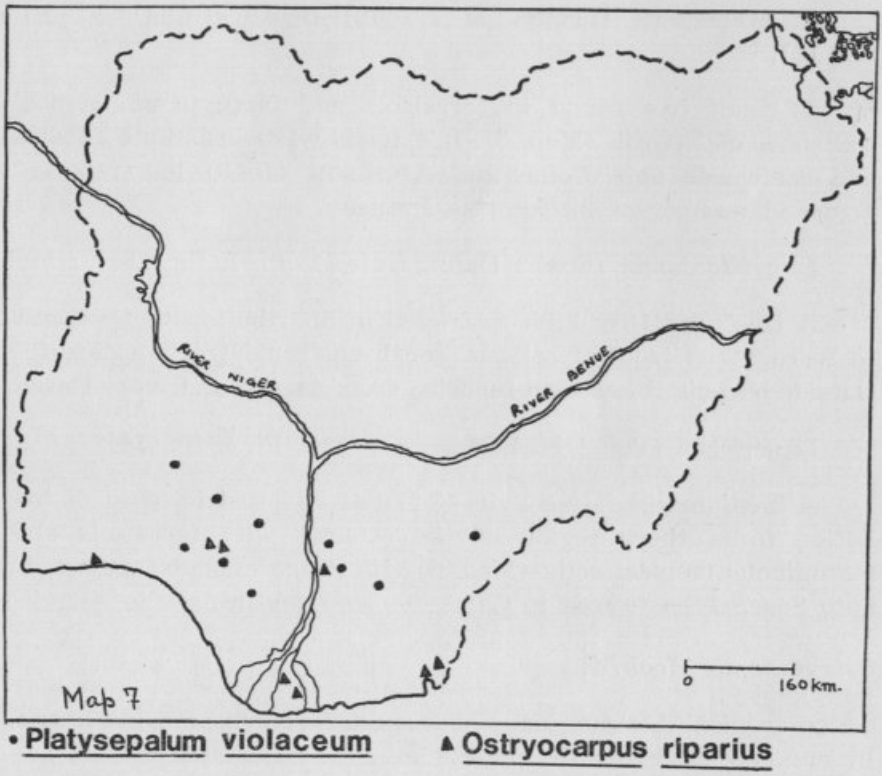
A small sized tree of a restricted distribution to alluvials and ferralsols of Nigeria (Map. 7). It extends westwards upto Guinea and southwards upto Congo and Gabon.

Platysepalum Welw. ex Baker.

An African genus of 12 species, represented in Nigeria by one species. On the basis of present investigation a base number of 7 has been suggested for this genus.

P. violaceum Welw. ex Bak. (n = 14, Pl. I, fig. 16).

A small sized tree restricted to ferralsols and ferruginous tropical soils of Nigeria (Map. 7). It has been reported from Angola, Cameroun and Gabon.



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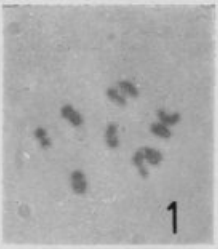
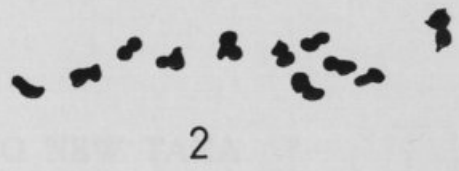
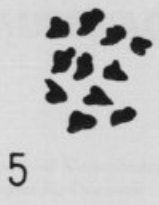
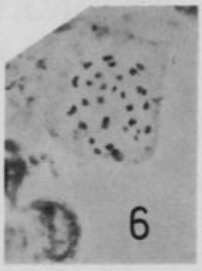
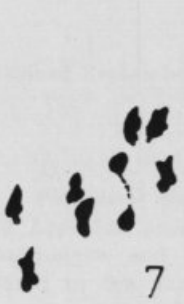
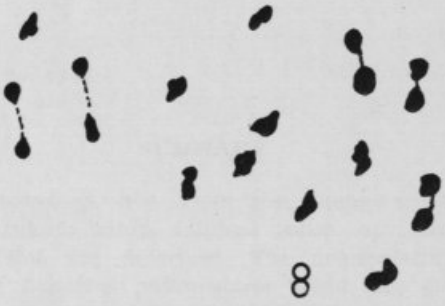


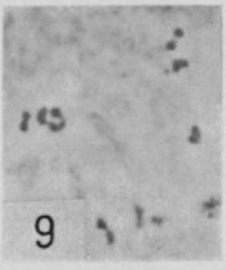


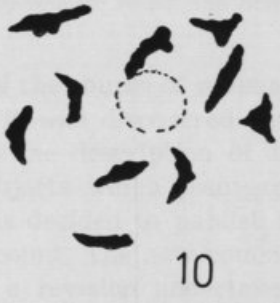


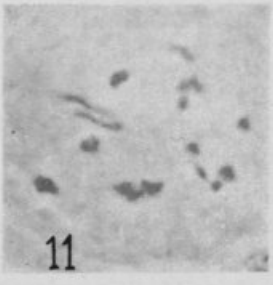


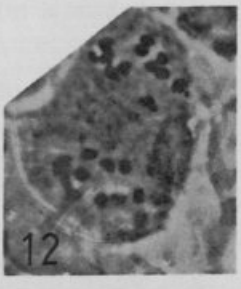


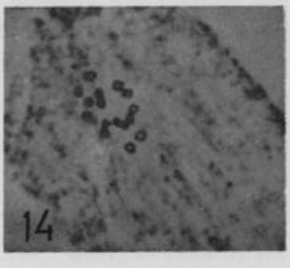


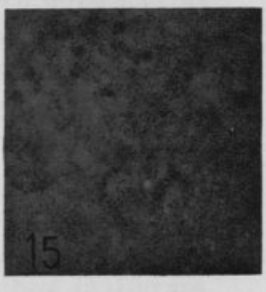




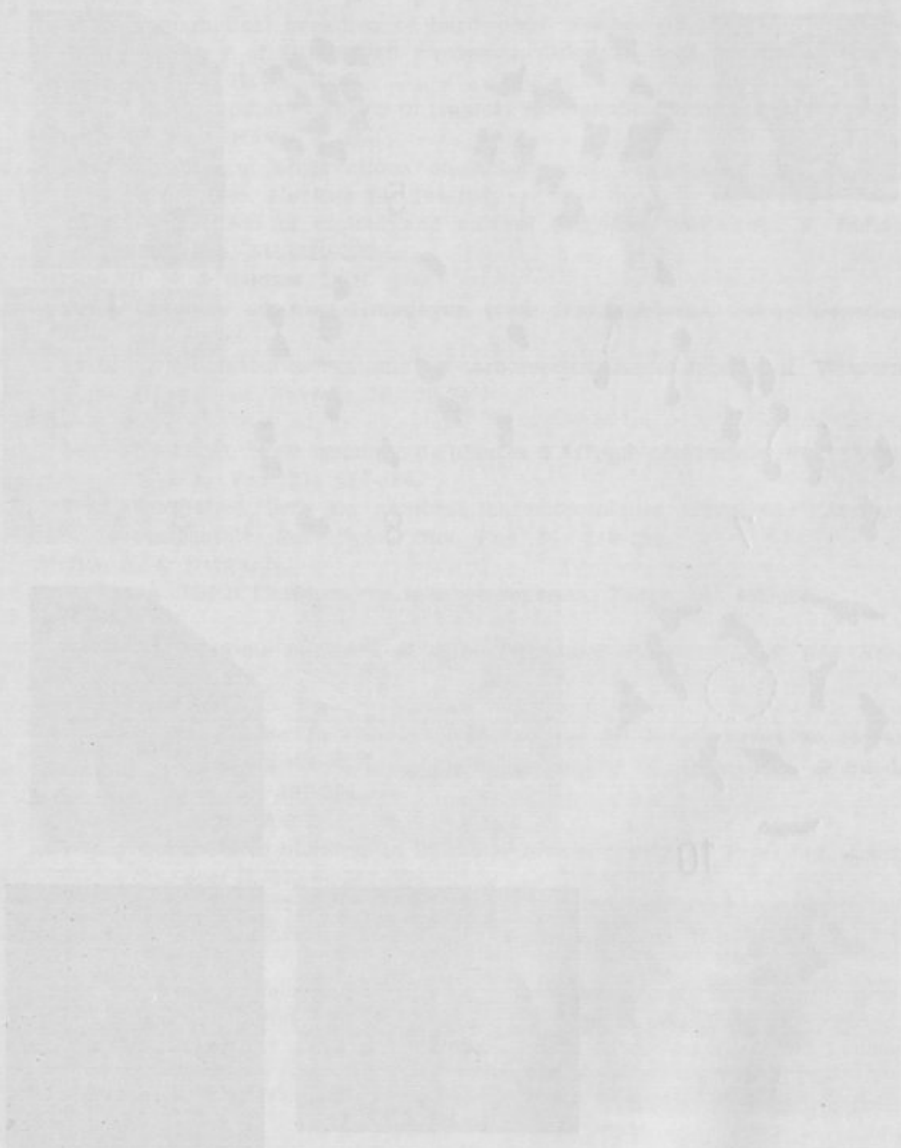








Figs. 1-15. — Explanation in the text.



Bol. Soc. Brot., Sér. 2, 58: 201-214 (1985).

TWO NEW TAXA AND A NEW COMBINATION IN THE *URTICACEAE* FOR THE FLORA ZAMBESIACA

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SUMMARY

Pouzolzia bracteosa sp. nov. from the Luangwa Valley in Zambia, and *Laportea peduncularis* subsp. *latidens* subsp. nov. from the coast of Mozambique and Natal are described. The nomenclatural complications related to the name *Laportea peduncularis* Wedd. are discussed, and the name is considered legitimate. Due to the reinstatement of the genus *Didymodoxa* Wedd. the new combination *Didymodoxa caffra* is made.

IN the course of revising the *Urticaceae* for the Flora Zambesiaca it was discovered that two taxa were previously undescribed. As the description of both of these taxa involves discussion of subjects which transgress the area of the Flora Zambesiaca, it was decided to publish these new taxa separately from the flora account. The new combination in *Didymodoxa* is the consequence of a revision undertaken jointly with Miss M. WILMOT-DEAR at the Royal Botanic Gardens, Kew. However, the revision will presumably not be published before the flora account, and the opportunity is therefore taken to validate the combination here.

POUZOLZIA

The African species of *Pouzolzia* were revised by FRIIS & JELLIS (1984). However, for that revision we did not borrow the material of the National Herbarium of Zimbabwe in Harare (SRGH). For writing up the account of the *Urticaceae* for the

Flora Zambesiaca this material was obtained on loan to Copenhagen, and it was discovered that two specimens of *Pouzolzia* from the Luangwa Valley in Zambia do not match any species accounted for in the revision. In fact the two specimens differ considerably from all African species of *Pouzolzia* in the large bracts of the inflorescence, much larger in proportion to the entire inflorescence than in *P. conulifera* Friis & Jellis, which was distinguished by the comparatively large bracts forming a cone-like structure enclosing the flowers. In other characters, e. g. the habit and duration, the specimens from Luangwa are more like the other new taxon recently established, *P. fadenii* Friis & Jellis from the coastal forests and bushlands of Kenya.

The new species does admittedly differ considerably in general appearance from other African species of the genus *Pouzolzia,* chiefly because of the prominent bracts. However, I have referred it to that genus because both male and female flowers do exactly agree with those known from other species of the genus. These newly discovered tropical African species are unfortunately not very well represented in herbaria (as is indeed the case with most species of African *Pouzolzia,* see Friis & Jellis 1984: 587). A re-evaluation of the generic delimitation in the *Boehmerieae* of the Old World is very much needed, but cannot be undertaken in connection with this flora account, and should perhaps wait until more material of the rare and critical species has accumulated.

Pouzolzia bracteosa Friis, sp. nov.

A P. guineensi Benth. et P. denudata De Wildem. & Th. Dur. differt foliis maturis serratis, a P. cordata Peter, non Benn. foliis oppositis vel alternis cum marginibus serratis et floribus masculis tetrameris sine crista dorsali, a P. mixta Solms, P. shirensi Rendle et P. parasitica (Forssk.) Schweinf. habitatione annua, a speciebus africanis omnibus (P. conulifera Friis & Jellis et P. fadenii Friis & Jellis inclusis) bene distincta bracteis numerosis amplis pseudopetiolatis.

Type: Zambia, Mpika Distr., Luangwa Valley, at Point Bar, 21.3.1972, *N. O. J. Abel* 490 (SRGH, holotype).

Erect annual herb up to 45 cm tall. Young branches and petioles with an indumentum of scattered stiff hairs. Leaves opposite (seems to be the case with at least the lowermost two pairs) or alternate, sessile (on shortened side shoots, forming transitions to bracts) or petiolate, stipules linear-lanceolate, with long, narrow apex, ciliate, up to 3.5 mm long, petiole up to 3.5 cm long, lamina lanceolate to ovate, up to c. 6 × 3 cm, base cuneate to subtruncate, margin entire (in juvenile or bract-like leaves) or with 3-(?) 5 not very sharp teeth, apex acute or acuminate, with long apical tooth, a pair of long, lateral nerves from the base of lamina, reaching almost to the tip, sometimes also an additional pair of lateral nerves emanating from the midnerve about half way up the lamina, above with scattered stiff hairs and punctiform cystoliths, below with scattered stiff hairs on the nerves. Inflorescences bisexual, on shortened axillary branches, with numerous subsessile, elliptic-ovate bracts, up to c. 10 × 7 mm, attenuated into an up to 3 mm long petiole-like part, with entire margin and acute to rounded apex, and with scattered stiff hairs on both sides. Male flowers on up to 1 mm long, bracteolate pedicels, ca. 1 mm in diam. in bud, with 4 tepals, provided with hooked hairs, 4 stamens inflexed in bud, later reflexed, rudimentary ovary not observed. Female flowers sessile, with a fused perianth with 5 (-? 6) not very well marked ridges and scatered stiff hairs, stigma not observed. Achene dark brown, glossy, enclosed in the persisting perianth. Illustration, see Pl. I.

Collections other than the type: Zambia, Mpika Distr., Luangwa Valley, 9.5.1972, on alluvium, *N. O. J. Abel* 640 (SRGH).

Distribution and ecology: Only known from the Luangwa valley in Zambia, presumably in riverine vegetation. See locality on map, Fig. 1.

LAPORTEA

The genus *Laportea* (including *Fleurya*) was revised on a world wide scale by CHEW (1965, 1969). These works have formed a very useful basis for further regional studies of the genus, as appears from FRIIS (1981; 1982), and the forthcoming Flora Zambesiaca account of the genus. They have also been useful

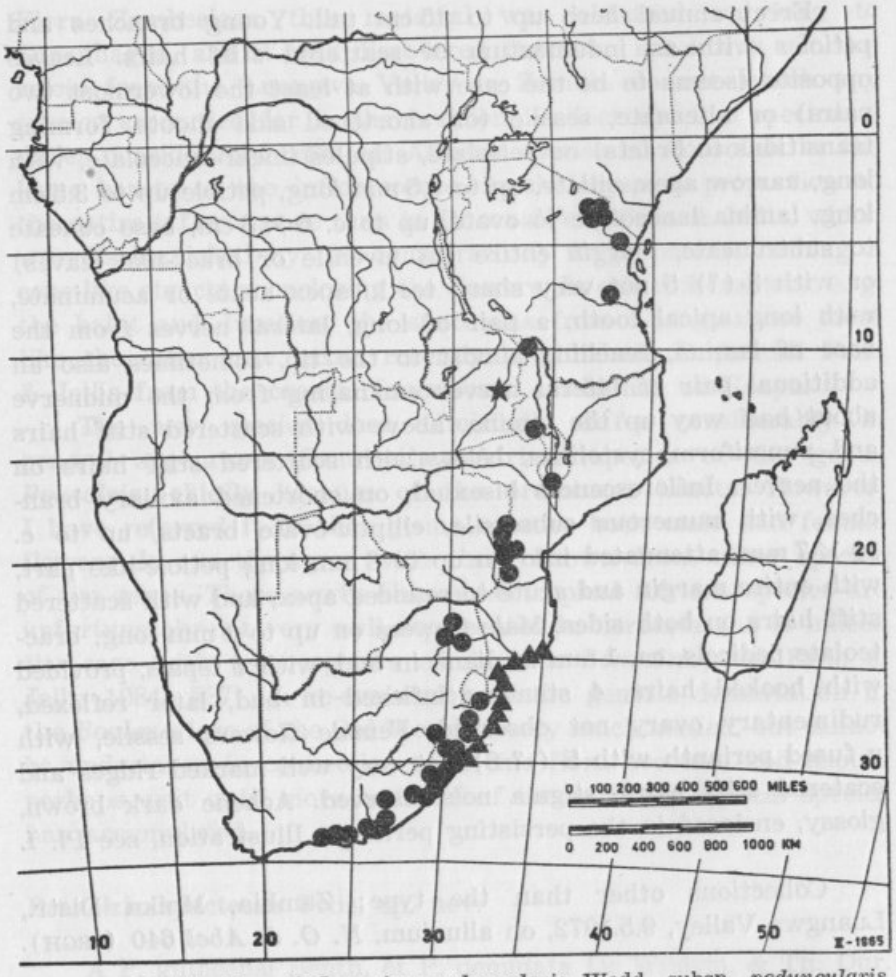

Fig. 1. — Distribution of *Laportea peduncularis* Wedd. subsp. *peduncularis* (dots), *L. peduncularis* subsp. *latidens* Friis (triangles), and *Pouzolzia bracteosa* Friis (star). Based on the material mentioned in the text.

for the initial studies of the genus for the Flora of Southern Africa. However, the species related to *L. peduncularis* (Wedd.) Chew have presented some problems. It was found that the material referred to *L. peduncularis* in the flora area and in South Africa was heterogenous, and could be separated into two taxa. One of these is distributed from the Cape Province of the South African Republic to NE Tanzania, occurring chiefly in inland localities with forest or scrub in South Africa, and in

upland forest from Natal and northwards to NE Tanzania. The other taxon is distributed from the vicinity of Durban, along the coast northwards to Sul do Save in Mozambique. One of the two specimens (not the type) cited by CHEW (1969) under his new species *L. caffra* Chew, and three of the specimens cited by CHEW under *L. mooreana* (Hiern) Chew do in fact belong to the coastal taxon. The other specimen cited by CHEW under *L. caffra* Chew (the type) represents a depauperate specimen of the inland taxon. I have studied several parts of the type material, and found that in all characters, including the male flowers, where CHEW's most important diagnostic character (the poorly developed corniculate tepals) is found, it agrees with *L. peduncularis*.

The coastal and the inland taxa differ in leaf shape, in number of teeth on the margin of lamina, and to a certain degree in indumentum, but there is a slight overlap in all characters. In spite of this, it is possible to refer all specimens seen to one of the two taxa on morphological grounds alone. It is therefore difficult to decide on a rank for these taxa, but in view of the difficulties of producing a key which would work well in all cases on morphological criteria alone, I have decided to use subspecific rank. Moreover, the two taxa possess very strong similarities in inflorescence and flower structure, e. g. in the repeatedly dichotomous branching of the male inflorescence, and in the dorsiventral wings of the female pedicel, characters which are not found in the two otherwise very closely related species, *L. mooreana* (Hiern) Chew, and *L. grossa* (Wedd.) Chew.

The name *Laportea peduncularis* Wedd. has a complicated nomenclatural history, and the use of the name rests on a decision which is not entirely uncontroversial, and has ramifications in other genera of *Urticaceae*. I have therefore given a full synonymy, and discussed the nomenclature in a separate note.

Laportea peduncularis (Wedd.) Chew (1965: 21)

For synonymy, see under the subspecies.

Key to the subspecies of *L. peduncularis:*

1. Erect, prostrate or scrambing herbs, usually with an indumentum of stiff hairs and stinging hairs mounted on small protuberances; lamina ovate, base rounded, truncate, rarely cordate, not cuneate, margin with (7-) 12-25 fine teeth on each side . . . . . 1. subsp. *peduncularis*

—. More or less erect herb, usually glabrous and without mounted stinging hairs; lamina rhomboid to ovate, base cuneate, not truncate or cordate, margin with 5-8 (-12) broad, triangular teeth on each side . . . . . 2. subsp. *latidens*

1. subsp. **peduncularis**

Fleurya peduncularis Wedd. (Weddell 1869: 75). — Type: South African Republic, at Yellowood River, Kachu, *Drège* s. n. (V. b. 7), [G, lectotype, selected by CHEW (1969), K, isotype].

Fleurya capensis var. *mitis* Wedd. (Weddell 1856: 118). — *Fleuria peduncularis* var. *mitis* (Wedd.) Wedd. (Weddell 1869: 76). — *Fleurya mitis* (Wedd.) N. E. Br. (Brown 1925: 546). — Type: South African Republic, Galgebosch, forest, *Drège* s. n. (IV, Cc, 9), (K, isosyntype); at Yellowood River, Kachu, *Drège* s. n. (V. b. 7), (K, isosyntype, not identical with the collection which is the type of F. peduncularis); Donkamma, forest, *Drège* s. n. (IV. Cb. 12), (K, isosyntype); Strandfontein and Matjesfontein, *Drège* s. n. (IV. Cc 8), (K, isosyntype); Vanstadesrivier, at the river, *Drège* s. n. (IV. Cc. 12), (K, isosyntype).

Laportea caffra Chew (1969: 155). — Type: South African Republic, Cape Province, Cape Province, Outeniekwaberg Distr., near George, forest margin, *Schlechter* 2331 (Z, holotype, A, BR, RPC, S, SAM, UPS, isotypes).

Fleurya capensis sensu Weddell (1856: 117 & Tab. I, Fig. A, 7-8), non Weddell (1854).

For a description of this taxon, see CHEW (1969: 152), allowing for the added range of variation by the inclusion of *L. caffra* Chew (1969: 155).

Distribution: South African Republic (Cape Province, from Knysna and George towards the NE, Natal, Transvaal), Zimbabwe, Mozambique, Malawi, Tanzania. See map, Fig. 1. In forest, mostly montane forest north of 30° S.

2. subsp. **latidens** Friis, subsp. nov.

L. mooreana auct., non (Hiern) Chew: CHEW (1969: 159), quoad specim. *Barbosa & Lemos* 8035 & 8401.

L. caffra auct., non Chew (1969), sensu stricto: CHEW (1969: 155), quoad specim. *Hafstroem* («Hapstroem») s. n. Aug. 1938.

A subespecie pedunculari distincta absentia indumenti in caulibus et petiolis paene tota, forma foliorum rhomboidea vel ovata (basi foliorum cuneata vel truncata) et margine eorum cum dentibus late triangularibus non nisi 5-8(-12).

Type: Mozambique, Inhaca Island, near sea level, 8.4.1964, *A. O. D. Mogg* 30.920 (K, holotype, LMU, isotype).

Erect or ascending annual herb up to 45 cm tall. Stems and petioles almost entirely glabrous. Leaves alternate, petiolate, stipules linear-lanceolate, up to 3 mm long, ciliate, petiole up to 4.0 cm long, lamina rhomboid to ovate, up to 7.0 × 4.8 cm, with cuneate to truncate base, coarsely serrate margin with 5-8 (-12) broadly triangular teeth, apex acuminate, with long apical tooth, lateral nerves in 3-4 (-5) pairs, lamina above with very few and scattered stiff hairs and dot-like cystoliths, below subglabrous, with elongated cystoliths. Inflorescences unisexual, pedunculate clusters, on up to 4.5 cm long peduncles. Male inflorescences usually dichotomous or sometimes overtopping, each cluster with 10-20 flowers. Male flower on c. 1 mm long pedicels, c. 1 mm in diam., with 5 corniculate tepals, 5 stamens and abortive ovary. Female flowers subsessile in bracteate dichasia, on c. 0.5 mm long, dorsally and ventrally winged pedicels. Female perianth with 4 tepals, the two lateral ones up to 0.75 mm long, enclosing the ovary, the dorsal one mostly shorter, the ventral one often minute. Ovary up to 1 mm long, laterally compressed, ovoid. Style filiform. Achene c. 1.5 mm long, ovoid, laterally compressed, on each side with a ridge of the same general outline as the achene, enclosing a warted depression. Ilustration, see Pl. II.

Collections other than the type:

MOZAMBIQUE: Lourenço Marques (Maputo), 18.3.1969, *Balsinhas* 1443 (LISC); S. Martinho de Bilene, 1.9.1965, *Balsinhas* s. n. (COI); Chirindzeni, 13.10.1957, *Barbosa & Lemos* 8035 (K, LISC); Vila João Belo, 13.11.1957, *Barbosa & Lemos* 8105 (K, LISC, COI); Chissano, 13.2.1959, *Barbosa & Lemos* 8401 (COI, K, LISC, PRE, SRGH); Inhaca Island, 30.9.1959, *Mogg* 32.147 (LMU, SRGH); Chongoene, 4.8.1947, *Pedro & Pedrógão* 1632 (PRE); Vila João Belo, 11.12.1940, *Torre* 2315 (LISC) & *Torre* 2316 (LISC); Bilene,

10.1.1943, *Torre* 4772 (LISC); Lumane, 7.2.1948, *Torre* 7287 (LISC); Cabo de Maputo, 20.6.1981, *de Koenig, Hemstra & Muvanga* 8860 (K).

SOUTH AFRICAN REPUBLIC (Natal): St. Lucia Estuary, 13.6. 1978, *Pooley* (K); Durban, 17.7.1893, *Schlechter* 2775 (K, mixed collection) & 19.6.1893, *Schlechter* 2791 (BM); Zinkwasi, 18.1.1966, *Moll* 2916 (K, PRE); Mpangazi Lake, 10.1.1964, *Strey* 5108 (K, PRE); Sordwana Bay, 26.3.1965, *Vahrmeijer* 606 (K, PRE); Umhlanga Rocks, 12.1959, *Watmough* 410 (K, PRE); Umkomaas, 23.11.1934, *Dyer* 3120 (K, PRE); Lake Sibayi, 4.12.1969, *Moll* 4915 (K); near Durban, August 1938, *A. Hafstroem* s. n. (S).

Distribution: South African Republic (Natal), Mozambique. See map, Fig. 1. In dune forest or coastal scrub, apparently never very far from the sea.

Note on the nomenclature of Laportea peduncularis:

WEDDELL (1854: 183) published the name *Fleurya capensis* with a reference to *Urtica capensis* Thunb. It is not quite certain whether THUNBERG (1794: 31) intended to take up the name *Urtica capensis* Linn. f. (LINNÉ 1781: 417) or to publish a new name; the two descriptions are alike, but not identical. However, in the Flora Capensis (THUNBERG 1813: 565) he makes a direct reference to the Linnaean name, which can be taken as an indication, although not the proof, of his earlier intention. If it is accepted that THUNBERG in 1794 did not intend to publish a new name (which then is an illigitimate later homonym of the Linnaean name), all references to «Urtica capensis Thunb.» are in fact references to *Urtica capensis* Linn. f., and WEDDELL's *Fleurya capensis* is in that case based on the type of the Linnaean name.

WEDDELL (1869: 30) specifically excluded *Urtica capensis* Linn. f. from *Urticaceae* on the grounds that it represented a taxon in the *Euphorbiaceae,* and indeed the type specimen of *Urtica capensis* Linn. f. in the Linneaen Herbarium (LINN) is a species of *Acalypha,* now called *Acalypha capensis* (Linn. f.) Prain. WEDDELL (1869) did not account separately for «Urtica capensis Thunb.». If the above interpretation of «Urtica capensis Thunb.) is accepted, then *Fleurya capensis* becomes a synonym of *Acalypha capensis* with the authority *F. capensis* (Linn. f.) Wedd.

The name *Fleurya capensis* Wedd. is cited in the protologue of *Fleurya peduncularis* Wedd. (1869), which would appear to make the name an illegitimate substitue name. However, if the above interpretation is accepted, the basionym of *Fleurya capensis* (i. e. *Urtica capensis* Linn. f.) is in the same work specifically excluded, and the name *F. peduncularis* is therefore legitimate according to Art. 63. 1-2 of the Code (note especially the examples).

This has ramifications in the genus *Didymodoxa* Wedd. which is presently being revised by the author in colaboration with Miss M. WILMOT-DEAR. BROWN (1913: 80) lectotypified *Urtica capensis* Thunb. with a specimen in the THUNBERG herbarium marked «Urtica capensis beta», and, assuming the name was an illigitimate later homonym of *Urtica capensis* Linn. f., he proposed the nomen novum *Australina thunbergii* N. E. Br. for THUNBERG's plant. Now our revisional work has shown that *Australina thunbergii,* as circumscribed by N. E. BROWN, is not distinct from a taxon for which there is an earlier valid and legitimate name proposed by WEDDELL [*Didymodoxa integrifolia* (Wedd.) Wedd.].

In conclusion of the above I will propose that nomenclatural stability is best served with the acceptance of the idea that THUNBERG's *Urtica capensis* is based on *Urtica capensis* Linn. f. If this solution is chosen, we can maintain both the name *Laportea peduncularis* and *Didymodoxa integrifolia,* while *Fleurya capensis* and *Australina thunbergii* become synonyms of *Alcalypha capensis.* If the alternative option is chosen, then N. E. BROWN's lectotypification of «Urtica capensis Thunb.» must stand, *Fleurya capensis* Wedd. becomes a synonym of *Didymodoxa integrifolia,* and a new name would be required for the species of *Laportea* dealt with here, while *L. peduncularis* would become an illigitimate synonym of *Didymodoxa integrifolia.* The latter choice will hardly lead to a desirable situation, and will not serve the nomenclatural stability which is the goal of the Code, as stated in the Preamble.

DIDYMODOXA

As a consequence of the revision of the genera *Australina* Gaud. and *Didymodoxa* Wedd. which I am presently undertaking with Miss M. WILMOT-DEAR, I have to make the following new combination, required for the account of the *Urticaceae* for the Flora Zambesiaca:

Didymodoxa caffra (Thunb.) Friis & Wilmot-Dear, comb. nov.

Urtica caffra Thunb. (THUNBERG 1794: 31). — *Australia caffra* (Thunb.) Fourc. (FOURCADE 1941: 80). — Type: South African Republic, without further locality, THUNBERG s. n., specimen marked «Urtica caffra beta (UPS-THUNB, lectotype, selected by BROWN 1913: 80).

Australina acuminata Wedd. (WEDDELL 1854: 212). — *Didymodoxa acuminata* (Wedd.) Wedd. (WEDDELL 1856: 549). — *Didymodoxa cuneata* Wedd. (WEDDELL 1869: 235/62), nom. illeg. supperfl., based on *A. acuminata*. — Type: South African Republic, Natal, Yellowood River, *Drège* s. n., specimen marked «Parietaria cuneata E. M. a» (P, lectotype, selected here, K, isotype).

Drouguetia umbricola Engl. (ENGLER 1895: 164). — Type: Tanzania, Kilimandscharo, Marangu, Volkens 1700 (B, holotype, destroyed, BM, G, K, isotypes).

Pouzolzia erythraeae Schweinf. (SCHWEINFURTH 1896: 146). — Type: Ethiopia, Lava Valley, *Schweinfurth* 1658 (B, holotype, destroyed).

Pouzolzia piscicelliana Buscalioni & Muschler (1913: 465). — Type: Zambia/Zaire, Buana Mukuba — Sekontui, 1200 m, Hélène d'Aosta 512 (B, holotype, destroyed).

ACKNOWLEDGEMENTS

I should like to thank my wife, VICTORIA C. FRIIS, for her two drawings, Mrs. ANNE FOX MAULE, Botanical Museum, Copenhagen, for help with the Latin diagnoses, and Dr. R. M. BRUMMITT, The Herbarium, Royal Botanic Gardens, Kew for a valuable discussion of the nomenclatorial problems in relation to *Laportea peduncularis*. I should also like to acknowledge the help of the curators of the herbaria from which I have borrowed material.

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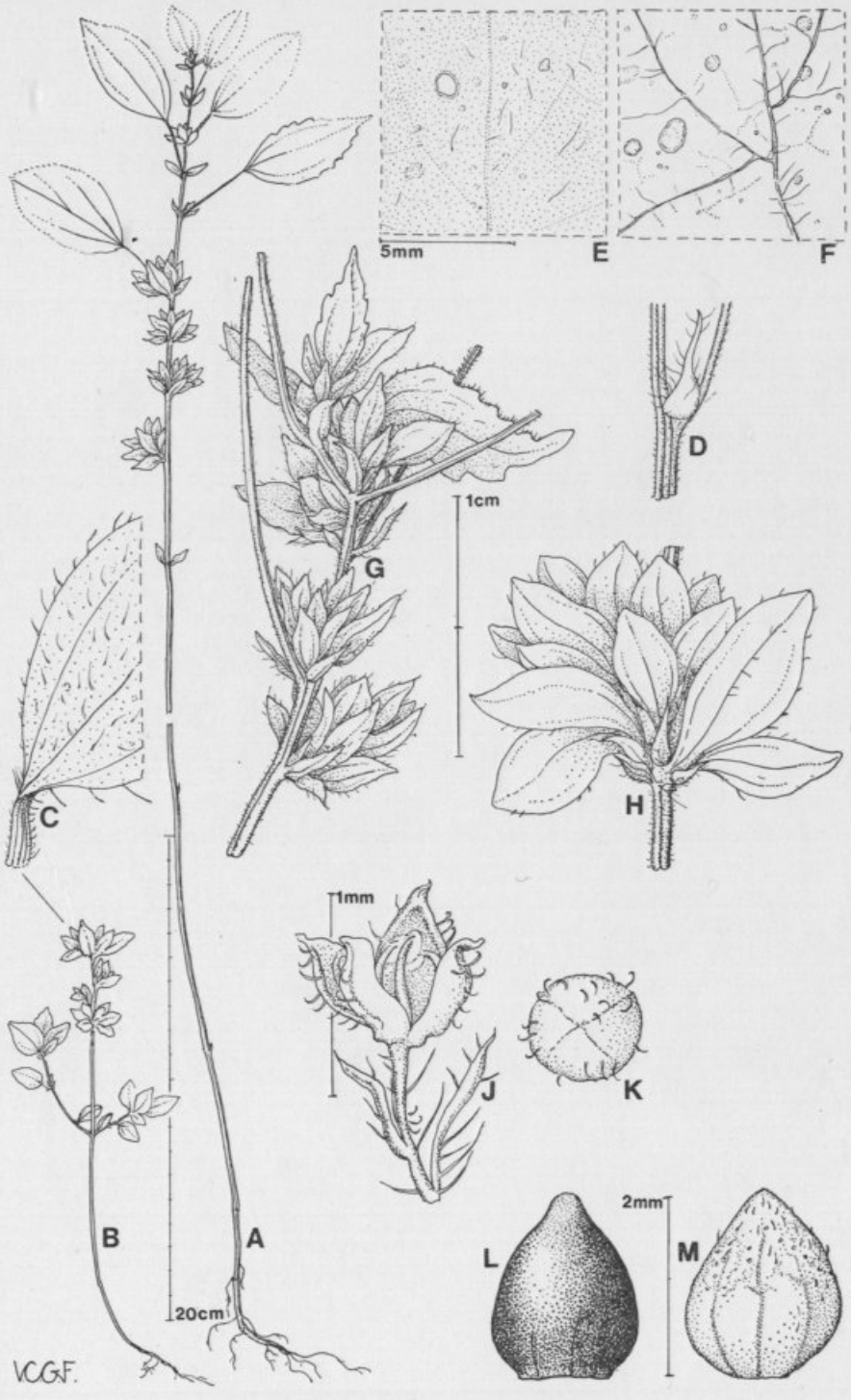
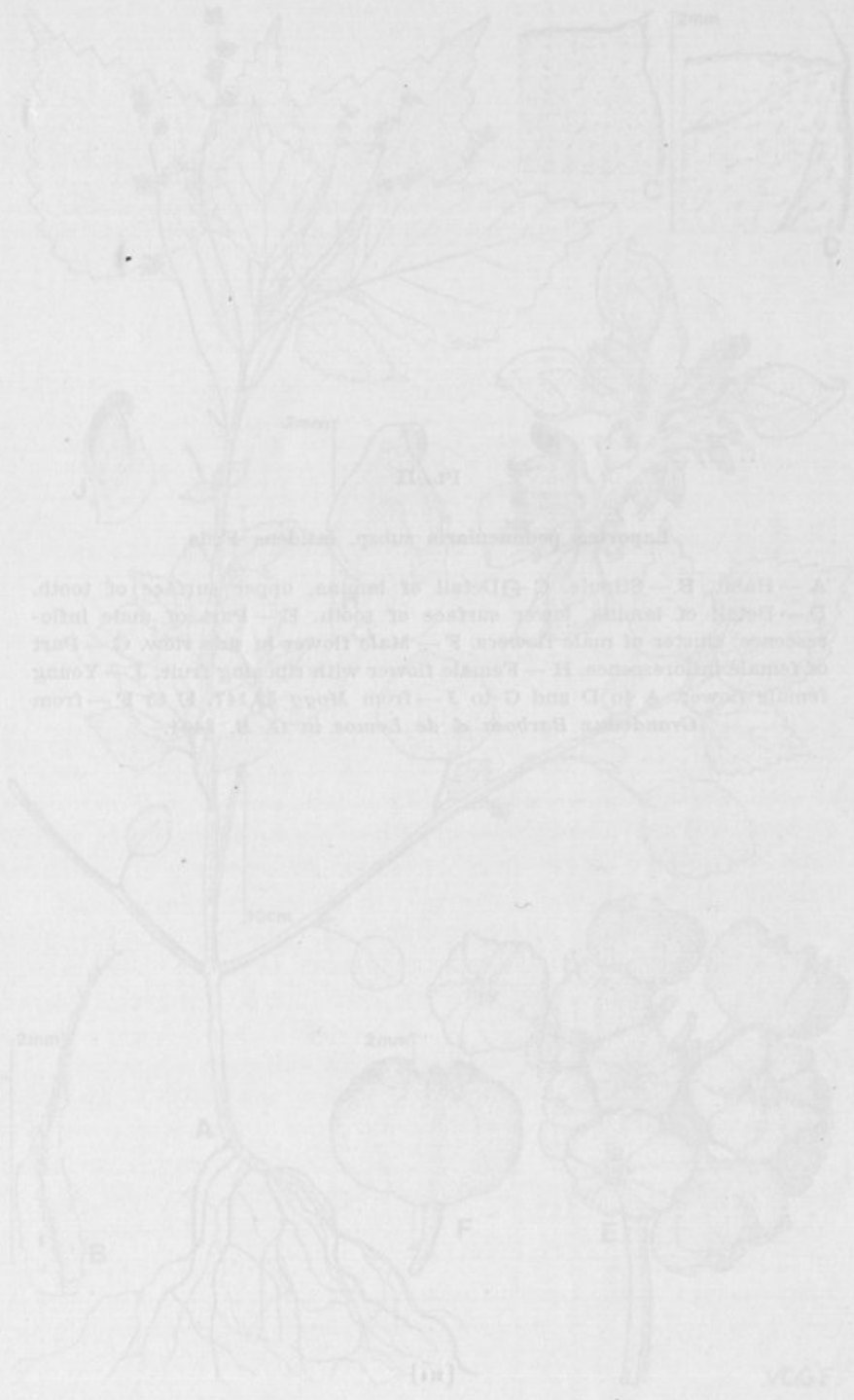
Pl. I

Pouzolzia bracteosa Friis

A — Habit of larger specimen. B — Habit of small specimen. C — Detail of petiole-like part of bract from B. D — Stipule. E — Upper surface of lamina. F — Lower surface of lamina. G — Detail of top of plant. H — Detail of inflorescence with large bracts. J — Open male flower. K — Bud of male flower, from above. L — Mature achene, without perianth. M — Mature achene with perianth. A and D to M — from *Abel* 490. B to C — from *Abel* 640.



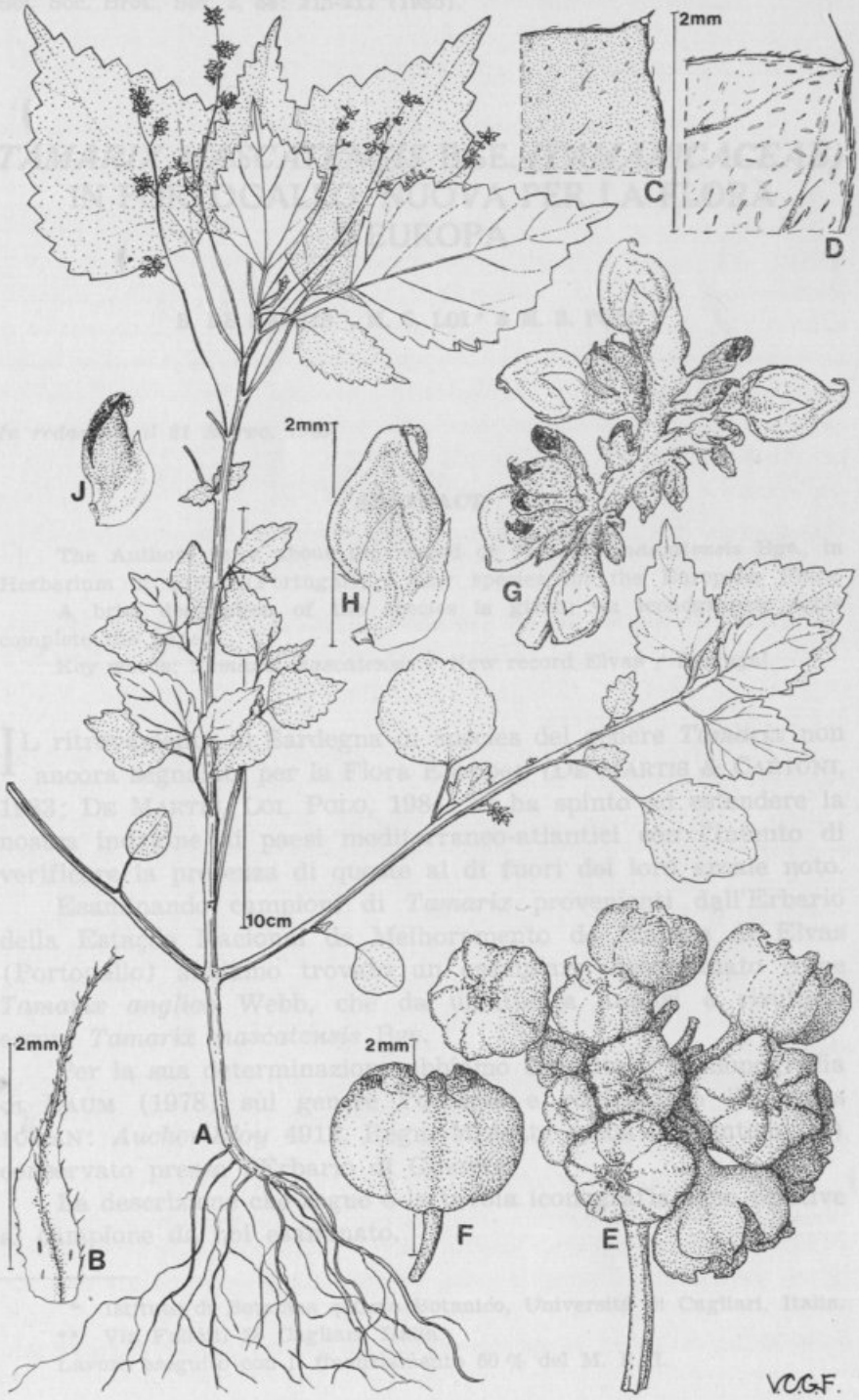
Pouzolzia bracteosa Friis



PL. II

Laportea peduncularis subsp. **latidens** Friis

A — Habit. B — Stipule. C — Detail of lamina, upper surface of tooth. D — Detail of lamina, lower surface of tooth. E — Part of male inflorescence, cluster of male flowers. F — Male flower in side view. G — Part of female inflorescence. H — Female flower with ripening fruit. J — Young female flower. A to D and G to J — from *Mogg* 32,147. E to F — from *Grandvaux Barbosa & de Lemos in G. B.* 8401.



Laportea peduncularis subsp. **latidens** Friis

Bol. Soc. Brot., Sér. 2, 58: 215-217 (1985).

TAMARIX MASCATENSIS BGE. *(TAMARICACEAE)* IN PORTOGALLO, NUOVA PER LA FLORA D'EUROPA

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In redazione il 21 Marzo, 1985.

ABSTRACT

The Authors refer about the record of *Tamarix mascatensis* Bge., in Herbarium of Elvas (Portugal), a new species for the European Flora.

A brief description of the species is given; an iconographic table complete the paper.

Key words: *Tamarix mascatensis* / New record Elvas / Portugal.

IL ritrovamento in Sardegna di species del genere *Tamarix* non ancora segnalate per la Flora Europea (DE MARTIS & CARTONI, 1983; DE MARTIS, LOI, POLO, 1984) ci ha spinto ad estendere la nostra indagine ai paesi mediterraneo-atlantici con l'intento di verificare la presenza di queste al di fuori del loro areale noto.

Esaminando campioni di *Tamarix* provenienti dall'Erbario della Estação Nacional de Melhoramento de Plantas di Elvas (Portogallo) abbiamo trovato un esemplare, determinato come *Tamarix anglica* Webb, che da un'attenta analisi è risultato essere *Tamarix mascatensis* Bge.

Per la sua determinazione abbiamo consultato la monografia di BAUM (1978) sul genere *Tamarix* e confrontato l'isotypus (OMAN: *Aucher-Eloy* 4912, Regn. Mascate secus Torrentem -G-) conservato presso l'Erbario di Ginevra.

La descrizione che segue e la tavola iconografia sono relative al campione da noi esaminato.

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Tamarix mascatensis Bge., Tentamen, 60 (1852).

Specimen: Alto Alentejo — Elvas, Herdade da Alagada na lezíria do rio Guadiana, s. d., leg. *Beliz i Runi,* det. Abreu sub *Tamarix anglica* Webb (ELVE).

Infiorescenze estivali, composte. Racemi brevemente peduncolati, densamente fioriti con rachide minutamente papilloso. Brattee più lunghe dei pedicelli e subegualianti il calice, lineari, acuminate, con i margini leggermente denticolati. Fiori sessili o brevement peduncolati. Calice pentamero inciso fino alla base. Sepali lunghi 1-1.25 mm da lisci a finemente denticolati; gli esterni ovato-acuti, sottilmente carenati, gli interni ovato-trullati. Corolla pentamera. Petali largamente trullato-ovati di 2.5×1.5 mm. Androceo aplostemone di 5 stami antsepali, inserzione dei filamenti peridiscale, disco da paralofico a parasinlofico. Antere cuoriformi leggeremente apicolate (Fig. 1).

Tamarix mascatensis è presente, secondo BAUM (l. c.), in Iran, Oman, Arabia Saudita, Yemen del Sud, Isola di Sokotra, Somalia et Etiopia. ZOHARY (1973) la segnala anche per le zone salate del territorio Sudaniano.

Le notizie bibliografiche sulle specie del genere *Tamarix* presenti in Portogallo sono poche e spesso contrastanti: COUTINHO (1939) riporta come presenti *Tamarix africana* Poir., *Tamarix anglica* Webb e *Tamarix gallica* L. (queste due ultime, peraltro, sinonime), mentre FRANCO (1971) e BAUM (1968) indicano la presenza di *Tamarix africana* Poir. e *Tamarix canariensis* Willd.

Lo stesso BAUM (1978), però, nella sua più recente monografia su questo Genere, confermando la presenza della sola *Tamarix africana* Poir., tenderebbe ad escludere quella di qualsiasi altra specie.

La segnalazione di *Tamarix mascatensis* in Portogallo potrebbe aprire, soprattutto se ulteriormente confermata, interessanti interrogativi sia di carattere ecologico che fitogeografico.

Poichè a nostro giudizio è necessario avere una visione più completa della diffusione della specie di questo interessante e difficile genere nell'area mediterraneo-atlantica, è nostra intenzione continuare l'indagine sia su campioni «exsiccata» che su esemplari da noi direttamente racolti, per arrivare ad una definizione di tutte le specie vegetanti sul territorio portoghese.

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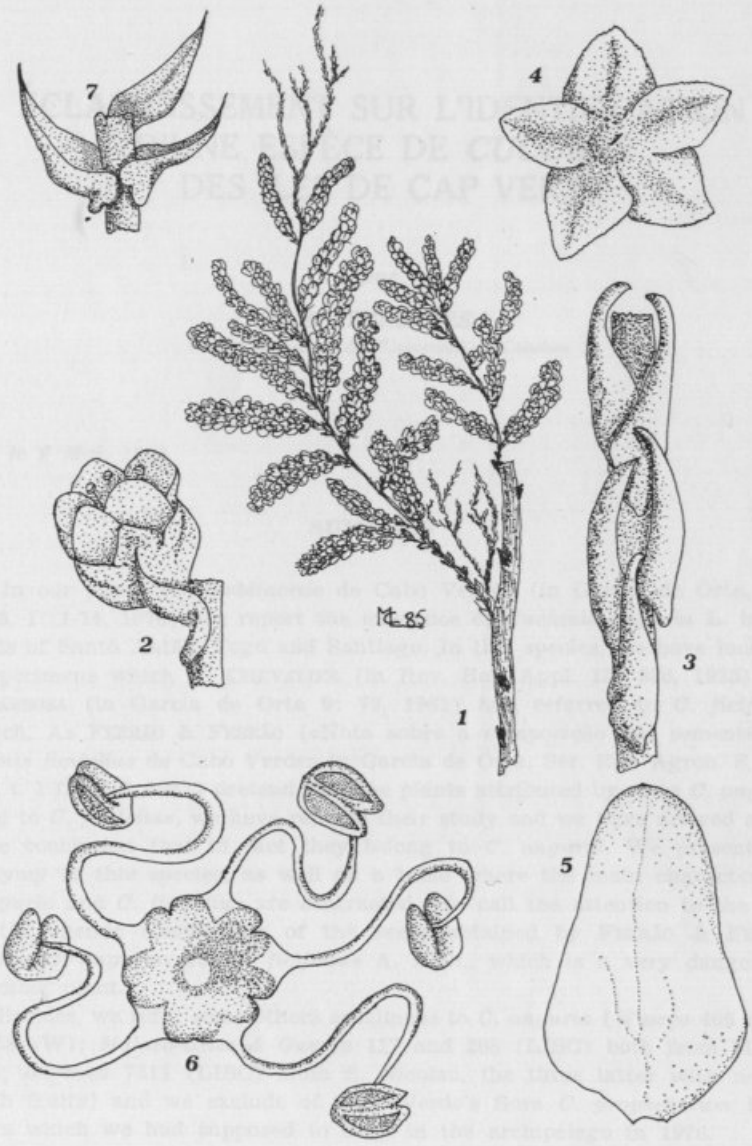

Fig. 1. — *Tamarix mascatensis* Bge. 1, ramo fiorito (× 1); 2, fiore (× 12,5); 3, foglie (× 10); 4, calice (× 10); 5, petalo (× 20); 6, disco (× 20); 7, brattea fiorale (× 10).

Bol. Soc. Brot., Sér. 2, 58: 219-234 (1985).

ÉCLAIRCISSEMENT SUR L'IDENTIFICATION D'UNE ESPÈCE DE *CUCUMIS* DES ÎLES DE CAP VERT

par

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SUMMARY

In our paper «*Cucurbitaceae* de Cabo Verde» (in Garcia de Orta, Sér. Bot. **3**, 1: 1-14, 1976), we report the existence of *Cucumis anguria* L. in the islands of Santo Antão, Fogo and Santiago. In this species, we have included the specimens which A. CHEVALIER (in Rev. Bot. Appl. **15**: 936, 1935) and G. BARBOSA (in Garcia de Orta **9**: 72, 1961) had referred to *C. ficifolius* A. Rich. As FERRÃO & FERRÃO («Nota sobre a composição das sementes de *Cucumis ficifolius* de Cabo Verde» in Garcia de Orta, Sér. Est. Agron. **8**, 1-2: 11-16, t. 1 fig. 1-2, 1981) pretend that the plants attributed by us to *C. anguria* belong to *C. ficifolius*, we have remade their study and we have arrived again to the conclusion that in fact they belong to *C. anguria*. We present the synonymy of this species, as well as a table where the main characters of *C. anguria* and *C. ficifolius* are contrasted. We call the attention to the fact that the chemic composition of the seeds obtained by FERRÃO & FERRÃO concerns *C. anguria*, not *C. ficifolius* A. Rich., which is a very dangerous, not edible plant.

Besides, we refer some others specimens to *C. anguria* [*Wawra* 406 (W); *Gilli* 58 (W); *Malato-Beliz & Guerra* 117 and 268 (LISC) both from Maio's island; *Barbosa* 7311 (LISC) from S. Nicolau, the three latter with nearly smooth fruits] and we exclude of Cape Verde's flora *C. prophetarum* L., a species which we had supposed to exist in the archipelago in 1976.

Finally, we admit that the three very bad specimens *Chevalier* 44448 and 44471 (P) from Maio and 44859 (P) from Fogo, with reduced leaves, referred by *Chevalier* (loc. cit.) to *C. figarei* Naud., may be poor forms of *C. anguria*, conditioned by the extreme aridity.

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DANS un article intitulé «Nota sobre a composição das sementes de *Cucumis ficifolius* de Cabo Verde» [1] (in Garcia de Orta, Sér. Est. Agron. 8, 1-2: 11-16, t. 1 fig. 1-2, 1981), MENDES FERRÃO & A. M. B. C. FERRÃO réfèrent au *C. ficifolius* A. Rich. les plantes que, dans notre travail «*Cucurbitaceae* de Cabo Verde» (in Garcia de Orta, Sér. Bot. 3, 1: 2-7, 1976), nous avions rapportées au *C. anguria* L. [2].

Bien qu'ils ont été amenés à cette conclusion, les auteurs n'ont pas fait la comparaison entre les plantes qu'ils ont étudiées dans l'île de Santiago soit avec des échantillans authentiques de *C. anguria,* pourvus ou non d'épines sur les fruits, soit de *C. ficifolius* A. Rich. [3] de la vraie aire de ce taxon (Éthiopie, Onganda, Kenya et Tanzanie). De plus, ils ne réfèrent pas soit dans le texte, soit dans la liste bibliographique les auteurs étrangers qui se sont occupés du problème de l'identification de *C. anguria* L.: A. MEEUSE (in Blumea, Suppl. 4: 196-205, 1958 et in Bothalia 8, 1: 77-79, 1962; C. JEFFREY in Fl. Trop. East. Afr., Cucurbitaceae: 104-105, 1967).

Comme les plantes de Cap Vert étudiées par FERRÃO & FERRÃO ont les fruits couverts d'épines longues et que le type linnéen de *C. anguria* les possède lisses ou courtement épineux et qu'ils ont vérifié que la pulpe des fruits des plantes de l'île de Santiago est plus ou moins amère (cf. FERRÃO & FERRÃO, op. cit.: 12), «au contraire de ce que nous avions affirmé» [4], ces

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[1] «Note sur la composition des graines de *Cucumis ficifolius* de Cap Vert». Comme cet article, ainsi que le nôtre, est écrit en portugais, nous traduisons en français les parties qu'on a besoin d'être transcrites.

[2] Bien que FERRÃO & FERRÃO ne présentent pas une description de la plante qu'ils ont étudiée, elle est identifiée comme l'espèce de l'archipel que nous avions référée au *C. anguria,* par le suivant: 1) leurs références à notre travail; 2) leurs références à la plante que GRANDVAUX BARBOSA a attribuée au *C. ficifolius;* 3) leurs références au fait que les chèvres mangent les fruits, ce qui démontre qu'ils sont comestibles; 4) les photos des fruits publiées par FERRÃO & FERRÃO, et qui les montrent couverts d'épines longues.

[3] Nous doutons même qu'ils aient confronté leur matériel avec les échantillons cités par nous (op. cit.: 3), puisque les auteurs ne font aucune référence à une confrontation.

[4] Entre guillemets les affirmations de FERRÃO & FERRÃO.

FERRÃO & FERRÃO ont vérifié que la pulpe des fruits est «légèrement à très amère» mais que, malgré cela, «les chèvres les consomment en grande quantité et avec avidité». D'autre part, ils ajoutent (cf. FERRÃO & FERRÃO,

auteurs ont trouvé «plus correct (loc. cit.) employer la désignation *Cucumis ficifolius* A. Rich.», au lieu de celle de *C. anguria* L. que nous avions utilisée.

Comme il ne s'agit pas d'un simple changement de nom, puisque *C. anguria* L. correspond à une espèce et *C. ficifolius* A. Rich. à une autre, complètement différente de la première soit par ses caractères morphologiques et chimiques, soit par son aire de distribution géographique, nous reprenons ici, en le résumant mais en ajoutant quelques notes indispensables, ce que nous avions écrit à propos du *C. anguria* dans notre antérieur travail.

HOOKER F. (in Fl. Trop. Afr. 2: 547, 1871) a décrit son *C. longipes* avec des fruits oblongs, longs de 5 cm, glabres et lisses ou parsemés de quelques épines courtes, sur des pédoncules longs de 7.5-12.5 cm. De plus, le limbe des feuilles de la nouvelle espèce était long de 5-10 cm et profondément 5-7-lobé, aux lobes obovés, et les pétioles étaient assez longs. Il la citait seulement de l'Angola: Golungo Alto, Cazengo et plages et alentours de Luanda, les récoltes y ayant été toutes faites par WELWITSCH, dont cependant aucun numéro n'était référé. Dans les clés des espèces de *Cucumis,* HOOKER F. (op. cit.: 542) place le *C. longipes* dans son groupe B («Fruit smooth, glabrous or pubescent), qui s'oposait au groupe A («Fruit echinate, spinous or tubercled),

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loc. cit.) que nous avions admis «qu'il n'y a pas de fruits amers à Cap Vert en nous basant pour affirmer cela dans le fait que les singes (sanjos) mangent les fruits, ce qui n'arriverait pas, s'ils étaient amers». Cette affirmation de FERRÃO & FERRÃO n'est pas tout-à-fait exacte, puisque nous avons dit le suivant (cf. R. FERNANDES, op. cit.: 7): '...le nom créole donné à la plante dans l'île de Santiago est pepino (concombre) de sanjo, ou pepino-de-santcho. Comme *sanjo* signifie (macaco) singe, les désignations ci-dessus mentionnées *semblent* montrer que les singes mangent les fruits de cette espèce, ce qui n'arriverait pas s'ils étaint amers. Cependant, nous ne possédons pas de données nous permettant d'affirmer avec certitude que seulement la forme à fruits doux de *C. anguria* existe à Cap Vert'. Comme on le voit, nous n'avions même pas affirmé catégoriquement soit que les singes mangeassent les fruits, soit que seule la forme à fruits non amers existe dans l'archipel. Comme les chèvres, selon FERRÃO & FERRÃO, mangent les fruits, apparemment avec satisfaction, ou bien elles cherchent seulement les plantes à fruits comestibles (la distinction faite par les animaux entre les plantes bonnes à manger et les mauvaises est assez fréquente) ou l'amertume n'est pas très forte. Ce qui est vrai est que l'ingestion de ces fruits ne semble pas affecter les chèvres dans leur santé.

où le *C. figarei*, que HOOKER F. supposait identique au *C. ficifolius* A. Rich., était placé. Le *C. anguria* n'était pas cité par cet auteur pour l'Afrique.

Malgré l'absence de citation des numéros de WELWITSCH, on peut savoir auxquels HOOKER F. se référait, d'après les lieux de récolte. Ainsi, les échantillans attribués au *C. longipes* sont: *Welwitsch* 824, de Cazengo; *Welwitsch* 846, de Golungo Alto, et *Welwitsch* 848, de Luanda [5].

De ces trois spécimens, les numéros 824 et 846 [6] ont les fruits lisses (sans épines), tandis que celui de Luanda (n° 848) les possède courtement épineux.

Un autre échantillon aussi de Luanda, *Welwitsch* 847, appartenant sans aucun doute au même taxon par l'ensemble de ses caractères à l'exception des épines longues couvrant les fruits, a été introduit dans *C. figarei* Naud. par HOOKER F. (op. cit.: 544). Cependant, cet auteur fait sur lui la remarque: «Welwitsch's specimens have more scattered spines than Kirk's, or the Abyssinian, or than Natal ones grown in Paris Garden. WELWITSCH describes the plant as an annual, and the fruit as tasting of cucumber» [7].

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[5] La localisation plus détaillée de ces récoltes est indiquée par HIERN (Cat. Afr. Pl. Welw. 1, 2: 395-396, 1898), lequel a traduit dans l'anglais les données, en latin, des étiquettes originales de WELWITSCH se trouvant sur les échantillons de LISU.

Dans le Conspectus Florae Angolensis (4: 258, 1970), nous (avec le Prof. A. FERNANDES) avons désigné le spécimen *Welwitsch* 846 (LISU) comme l'holotype de l'espèce, quand il ne peut être que le lectotype. A. MEEUSE (op. cit.: 77, 1962) a désigné comme le type de cette entité (sous var. *longipes* de *C. anguria*) le spécimen *Welwitsch* 848 (K) par le fait qu'il est le seul de l'herbier de HOOKER F. nommé comme *C. longipes*. Cependant, cette récolte (in BM et LISU) possède des fruits courtement épineux, ce qui ne s'accorde pas totalement avec la place que HOOKER F. donnait à son espèce dans ses clés. D'autre part, l'échantillon 846 de LISU possède aussi la détermination «*Cucumis longipes* Hook. f.» dans une écriture qui nous semble pouvoir être attribuée à HOOKER F., ce qui justifie encore notre désignation de ce numéro comme le lectotype de *C. longipes*.

[6] La description des fruits dans l'étiquette du n° 846 (LISU) de la main de WELWITSCH est: «Bacca oblongo-elliptica, matura pallide flavescens 1 ½-1 ¾ poll. longa absque aculeis sed laevis!».

[7] Le vrai *C. figarei* Naud. est une espèce pérenne à fruits couverts non d'épines mais de pustules courtes. L'échantillon *Kirk* du Mozambique ne lui appartient pas (cf. JEFFREY, op. cit.: 102, 1967). Au Natal, non plus, le *C. figarei* n'existe. HOOKER F. a, donc, fait confusion.

Comme on le voit, le n° 847 était non seulement une plante annuelle, mais ses fruits avaient le même goût de concombre que WELWITSCH avait remarqué dans ceux des spécimens de *C. longipes*. Ce n° 847 a été ensuite placé par COGNIAUX (in A. & C. DC., Mon. Phaner. 3: 493, 1881) et par COGNIAUX & HARMS (in Das Pflanzenreich IV. 275, 2: 139, 1924) dans *C. ficifolius* var. *echinophorus* (Naud.), et par HIERN (op. cit.: 396, 1898) dans *C. chrysocomus* var. *echinophorus* (Naud.), à cause de ses fruits longuement épineux [8].

L'identité entre la plante africaine, à fruits épineux sur de longs pédoncules et à feuilles 3-5-palmatilobées, de lobes arrondis (à laquelle appartient aussi l'échantillon *Welwitsch* 847), et l'espèce américaine *C. anguria* L., à fruits non ou courtement épineux aussi sur des pédoncules longs, a été faite par A. MEEUSE (in Blumea, Suppl. 4: 196-205, 1958). Pour établir cette identité, l'auteur s'est basé sur la grande ressemblance entre les deux taxa en ce qui concerne leur biologie (les deux sont des plantes annuelles), leurs caractères morphologiques et sur le fait qu'ils hybrident, en produisant des descendants fertiles. Selon A. MEEUSE, les seules différences seraient les suivantes: A) existence d'épines plus ou moins longues sur les fruits de la plante africaine (que A. MEEUSE attribuait au *C. longipes*) et absence de ses formations (les fruits sont alors lisses) ou la présence de protubérances très courtes sur les fruits du type (américain) de *C. anguria;* B) fruits du taxon africain amers, tandis que ceux du *C. anguria* ne le sont pas. Analysons ces deux différences:

A) Comme on a vu plus haut, des trois spécimens (syntypes) de WELWITSCH sur lesquels HOOKER F. a fondé *C. longipes,* deux sont dépourvus d'épines et le troisième les possède très courtes. L'échantillon que R. & A. FERNANDES (loc. cit.) ont choisi comme lectotype de ce taxon (*Welwitsch* 846) possède des fruits lisses, en accord avec la place (groupe B) des clés où HOOKER F. avait introduit son espèce [9]. Comme, d'autre part, d'autres plantes

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[8] Le *C. chysocomus* Schum. est le *Raphidiocystis chrysocoma* (Schum.) C. Jeffrey (cf. C. JEFFREY in Kew Bull. 15: 360, 1962). Le vrai var. *echinophorus* a été publié comme une variété de *C. figarei* Naud., en étant un synonyme de *C. prophetarum* L. subsp. *dissectus* (Naud.) C. Jeffrey (cf. C. JEFFREY, op. cit.: 351, 1962).

[9] COGNIAUX & HARMS (op. cit.: 117-118) ont aussi placé le *C. longipes* dans leur groupe des espèces à fruits lisses: «Fructus laevis, glaber vel pubescens», en les décrivant dans le texte aussi comme lisses (op. cit.: 135),

africaines ne diffèrent de celles-là que par la présence d'épines longues sur les fruits, elles ne peuvent pas être séparées spécifiquement des prémières. C'est-à-dire, en Afrique on trouve soit des plantes à longues épines sur les fruits, soit d'autres qui en sont dépourvues (au moins en Angola), en devant toutes être placées dans *C. anguria* L. [10]. Le *C. longipes* Hook. f. est donc un synonyme de *C. anguria*.

B) Selon A. MEEUSE, l'amertume des fruits serait sous contrôle d'un seul facteur dominant, ce qu'expliquérait la prédominance d'individus à fruits amers chez la plante africaine sauvage. Et encore, la présence aux Amériques du cultivar à fruits non amers et à épines réduites serait le résultat de la sélection opérée sur des plantes introduites *accidentellement* par les esclaves noirs dans le Nouveau Monde, où la forme comestible s'aurait maintenue à cause de son isolement.

Notre critique sur ce point de vue de A. MEEUSE a déjà été faite en 1976 (cf. R. FERNANDES, op. cit.: 4-7), en nous limitant ici à réaffirmer ce que nous avions alors dit en ce qui concerne la présence de plantes à fruits mangeables dans le continent africain et dans l'Amérique. En effet, à propos des fruits de son échantillon n° 848, WELWITSCH a écrit sur l'étiquette «Bacca... odori et sapori Cucumis sativi» et sur celle du n° 847 «Fructus... sapori Cucumis sativi». De plus, l'exemplaire angolais *Gossweiler* 13552 porte sur l'étiquette la note: «annuel, fruits longs de 5 cm, *comestibles,* se développant en 3 mois, *modérément cultivé;* l'échantillon *Gossweiler* 12040, à fruits obovoïdes très courtement épineux, sur des pédoncules très longs (jusqu'à 16.5 cm) — tous des caractères des plantes cultivées comme *C. anguria* — porte sur l'étiquette: «Luanda, gardens escape». Dans l'étiquette du spécimen *Cardoso* s. n., on trouve même l'indication des façons dont les fruits sont utilisés par les indigènes — crus ou bouillis. D'autres échantillons

«Fructus... laevis». Et, au contraire, ils situent le *C. anguria* L. dans le groupe à «Fructus echinatus, spinosus vel tuberculatus» (op. cit.: 118-119), en décrivant le fruit de cette espèce (op. cit.: 149) comme «...aculeatus aculeis sparsis rigidisque»!

[10] La catégorie de variété ou de forme pourra être attribuée à la plante aux fruits longuement épineux. Étant donné que le lectotype de *C. longipes* possède des fruits lisses, cette épithète ne peut pas être employée pour la dite variété ou forme. Nous préférons, cependant, envisager le *C. anguria* dans un sens ample, n'y distinguant pas de variétés basées sur la longueur des épines.

angolais encore (*Gossweiler* s. n., 114 et 13428; *Mendes* 2741 et 3270) ont été aussi, comme ceux-là, récoltés près des cultures des noirs ou dans des terrains abandonnés après les cultures, dans des terrains cultivés, portant sur les respectives étiquettes l'information que leurs fruits sont comestibles. Seulement, sur celle du spécimen *Teixeira* 1442, une possible référence à la probable amertume des fruits est trouvée, renseignement qui a été donné au collecteur par les indigènes, lesquels pourraient avoir confondu la plante avec le *C. africanus* L. f., dont les fruits pour la plupart ne peuvent pas être mangés.

On peut, donc, admettre que c'est à partir de ces formes cultivées en Angola, à fruits non amers et pour la plupart dépourvus d'épines ou avec des épines courtes, que l'introduction de l'espèce africaine dans le Nouveau Monde a été faite. Nous croyons encore que la dispersion de ces formes, au moins sur la côte occidentale d'Afrique, a été effectuée aussi par l'intermédiaire des esclaves provenant de l'Angola. On sait que les indigènes capturés en Angola pour l'esclavage étaient obligés à charger leurs aliments de préside en préside. Les fruits de ce *Cucumis* devraient alors faire partie de leur ration, soit fournis par les gardiens, soit récoltés par les esclaves eux mêmes dans les champs des villages qu'ils traversaient dans la marche vers Luanda. Ces fruits, à ces époques (et même parfois encore récemment, comme nous l'avons mentionné plus haut), devraient compléter le régime habituel des noirs en aliments frais, l'espèce étant cultivée avait l'introduction d'autres espèces comestibles par les européens. En effet, le *C. anguria (= C. longipes)* possède les caractéristiques culturales appréciées par les noirs: il se cultive facilement, fructifie rapidement et sa production en fruits est abondante.

Étant donné que, vers 1538, le trafic organisé d'esclaves pour le Brésil existait déjà (cf. A. CARREIRA in Bol. Cult. Guiné Port. 23: 5-88, 301-345, 1968), nous croyons que la première introduction de ce *Cucumis* en Amérique a eu lieu dans le dit pays, et non aux «West Indies» comme l'admettait A. MEEUSE (op. cit.: 200, 202 et 204, 1958), par le suivant:

1) Les fruits de *C. anguria (= C. longipes)* peuvent être conservés pendant quelques semaines et leurs graines maintiennent leur pouvoir germinatif pendant des années (cf. A. MEEUSE, op. cit.: 202, 1958).

2) Il y a eu, dans le passé, un commerce intensif d'esclaves entre l'Angola et le Brésil.
3) La plus ancienne référence de la plante pour l'Amérique est celle de MARKGRAF (Hist. Bras.: 44, 1648), précisément pour le Brésil [11].
4) Le mot qui désigne le *C. anguria* au Brésil et le seul d'origine africaine qui le nomme en Amérique est «Machicho», «Machiche» (cf. COGNIAUX in Mart., Fl. Bras. **6**, 4: 16, t. 2, 1878), correspondant au mot quimbundo (dialecte banto parlé dans l'Angola aux distr. de Luanda et Malanje, à peu-près) «machiche» (cf. WELWITSCH in An. Cons. Ultram.: 556, 1859 sous *C. africanus;* FICALHO, Pl. Úteis Afr. Port. ed. 2: 186, 1947; Hiern, Cat. Afr. Pl. Welw. **1**, 2: 396, 1898).

En ce qui concerne la présence de la forme comestible en d'autres régions africaines, C. JEFFREY (op. cit.: 105, 1967) réfère un spécimen (*N. W. Thomas* 1338) de Sierra Leone comme appartenant au cultivar (*C. anguria* typique), en affirmant encore que «specimens from the Cap Verde Is. have been seen» et que des formes à grands fruits «appear to be cultivated in East Africa».

Pour faire l'identification des plantes des îles de Cap Vert, nous les avions confrontées en 1976 avec celles de l'Angola, dont quelques unes avaient été préalablement déterminées par A. MEEUSE et par C. JEFFREY comme *C. anguria*. En présence de l'article de FERRÃO & FERRÃO, nous avons entrepris leur révision et nous sommes arrivée à la même conclusion qu'auparavant (cf. R. FERNANDES, op. cit.: 3), c'est-à-dire, qu'elles appartiennent toutes au

[11] Il est intéressant de vérifier que MARKGRAF décrivait les fruits de son «Cucumis silvestris Brasiliae» presque de la même façon que WELWITSCH dans ses descriptions (sur les étiquettes) des spécimens de *C. longipes* qu'il a récoltés en Angola. MARKGRAF: «...fructus ovi gallinae magnitudine, ellipticae figurae, tuberculis per ambitu acutis...», en concluant que le fruit est comestible — «...edulis est».

Welwitsch nº 824: «fruct. imat. viridis ellipticis, ovi gall. min...».
» 847: «Fructus ovi columbini, plerumque majores, herbaceo-echinati... saporis Cucumis sativi».

On peut encore conclure que la forme à fruits épineux a été aussi introduite au Brésil et que les fruits de celle-ci étaient mangeables.

C. anguria L., sens. lat. (Pl. I-II) et non au *C. ficifolius* (Pl. III-IV), comme l'ont prétendu FERRÃO & FERRÃO. Ces échantillons sont les suivants: *Chevalier* 45627 [12] (COI; P), de l'île de Santo Antão; *Herb. Miss. E. Agron.* 26 (LISU) de l'île de Fogo; *Barbosa* 5709 (COI; LISC) [13], 5758 et 5906 (LISC) et *Semedo & P. Silva* 16 (LISJC), tous de l'île de Santiago.

Outre ces spécimens, doivent être inclus aussi dans *C. anguria* les échantillons des îles de Cap Vert *Wawra* 406 (W, sans lieu de récolte), que nous n'avions pas vu en 1976 et que alors nous avions supposé appartenir au *C. prophetarum* (cf. R. FERNANDES, op. cit.: 8, 1976), et *A. Gilli* 58 pro parte (W) [14], de Santiago. Au *C. anguria* appartiennent également les plantes de Cap Vert étudiées par FERRÃO & FERRÃO, dont l'identification, d'après les photoes coloriées des fruits, ne donne aucun doute, et quelques autres échantillons que nous référons dans les pages 232-233.

Pour bien établir l'identité de *C. anguria* L. et ses différences relativement au *C. ficifolius,* nous présentons ci-dessous la synonymie du premier taxon (des travaux sur la flore africaine y sont particulièrement cités), suivie du Tableau I, où sont mis en confrontation les principaux caractères différentiels des deux espèces. Par la consultation de ce Tableau, on pourra facilement vérifier que les plantes en question de l'archipel de Cap Vert appartiennent au *C. anguria* L. et non au *C. ficifolius* A. Rich. (faire aussi la confrontation entre les Pl. I-II et les Pl. III-IV).

Cucumis anguria L., Sp. Pl.: 1011 (1753). — Cogn. in A. & C. DC., Mon. Phaner. **3**: 505 (1881). — Cogn. & Harms in Engl., Pflanzenr. IV. 275, 2: 148 (1924). — R. & A. Fernandes in Mem. Junta Invest. Ultramar, Sér. 2, **34**: 91 (1962); in Consp.

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[12] Nous n'avons pas référé explicitement ce numéro en 1976, mais nous avons cité dans la synonymie du *C. anguria,* alors présentée, le *C. ficifolius* sensu A. Chev. (in Rev. Bot. Appl. **15**: 936, 1935). Comme le seul échantillon y rapporté au *C. ficifolius* par A. CHEVALIER est le n° 45627, la référence à celui-ci est implicite.

[13] Par erreur, nous avons cité ce numéro comme existant dans COI en 1976 quand aucun spécimen n'y se trouvait à cette date. Une même erreur a été commise relativement à *Barbosa* 5758.

[14] *Gilli* 58 (W) est composé par des fragments de *Cucumis anguria* L. et de *Momordica charantia* L. Il avait été déterminé par le collecteur comme *C. ficifolius* var. *echinophorus* Naud.

TABLEAU I

Cucumis anguria L.	*Cucumis ficifolius* A. Rich.
Plante annuelle.	Plante pérenne.
Tiges prostrées ou grimpantes, longues jusqu'à 3 m.	Tiges généralement prostrées, jusqu'à 1 m longues.
Indument des tiges à poils étalés, ± longs.	Indument des tiges à poils aculeïformes, rigides, et aussi à poils plus courts et plus fins que les premiers.
Limbe des feuilles largement cordé à la base, de (4)6-12 × (3.5)5.5-12.5 cm.	Limbe des feuilles faiblement cordé à la base, long de 2-7 cm et large jusqu'à 8.4 cm.
Pétiole long de 2-12 cm.	Pétiole long de 1-3.5 cm.
Fleurs ♂ 2-10 en fascicules subsessiles.	Fleurs ♂ solitaires.
Pédicelles des fleurs ♂ longs de 0.6-3 cm.	Pédicelles des fleurs ♂ longs de 0.3-1.2 cm.
Pédicelles des fleurs ♀ longs de 1.8-10.5 cm.	Pédicelles des fleurs ♀ longs de 0.6-1.2 cm.
Fruit largement ellipsoïde à subglobose, ± densement couvert d'épines ou lisse.	Fruit ellipsoïde, à pustules écartées.
Épines des fruits cylindriques, charnues, 3-11(20?) mm longues.	Pustules largement coniques, courtes.
Pied du fruit long de 2.5-21 cm, en grossissant vers le sommet.	Pied du fruit long de 0.7-2.5 cm, ne grossissant pas vers le sommet.

Fl. Angol. 4: 257 (1970). — C. Jeffrey in Fl. Trop. E. Afr., Cucurbitaceae: 104 (1967); in Fl. Zambesiaca 4: 464, t. 112 fig. F (1978). — Launert & Roessler in Prodr. Fl. SW. Afr., Cucurbitaceae: 13 (1968). — R. Fernandes in Garcia de Orta, Sér. Bot. 3, 1: 3 (1976).

Cucumis africanus sensu Welw. in Ann. Cons. Ultram.: 556, n° 129 (1859). — Ficalho, Pl. Úteis Afr. Portug.: 189-190 (1884); op. cit. ed. 2: 186 (1947). — Hiern, Cat. Afr. Pl. Welw. 1, 2: 396 (1898). — Martineau,

Rhodes. Wild Fl.: 83, t. 4 (1953). — Keraudren in Fl. Madag., **Cucurbitaceae**: 142, t. 34 fig. 7 (1962). Non L. f. (1781).

Cucumis longipes Hook. f. in Fl. Trop. Afr. 2: 547 (1871). — Cogn., op. cit.: 491 (1881). — Hiern, op. cit.: 395 (1898). — Cogn. & Harms, op. cit.: 135 (1924).

Cucumis figarei sensu Hook. f. in Fl. Trop. Afr. 2: 543 (1871), quoad specim. *Welwitsch*. — Eyles in Trans. Roy. Soc. S. Afr. 5, 4: 498 (1916). Non Naudin (1859).

Cucumis ficifolius var. *echinophorus* sensu Cogn., op. cit.: 494 (1881). — Cogn. & Harms, op. cit.: 139 (1924), quoad saltem specim. *Wawra* 406 et *Welwitsch* 847. Non Naudin (1859).

Cucumis chrysocomus var. *echinophorus* sensu Hiern, op. cit.: 396 (1898), quoad *Welwitsch* 847, non Naudin (1859).

Cucumis ficifolius sensu A. Chev. in Rev. Bot. Appl. 15: 936 (1935). — Wild, Fl. Vict. Falls: 145 (1953). — Keay in Fl. W. Trop. Afr., ed. 2, 1, 1: 213 (1954), quoad specim. *Wawra* (err. Waura) 406. — Barbosa in Garcia de Orta 9: 72 (1961). — Ferrão & Ferrão in Garcia de Orta, Sér. Est. Agron. 8, 1-2: 11-16, t. 1 fig. 1-2 (1981). Non A. Rich. (1847).

Cucumis anguria var. *anguria* — A. Meeuse in Blumea, Suppl. 4: 200 (1958); in Bothalia 8: 77 (1962).

Cucumis anguria L. var. *longipes* A. Meeuse, loc. cit. (1958). — in Bothalia, loc. cit. (1962). — Watt & Breyer-Brandwijk, Medic. Pois. Pl. S. & E. Afr. ed. 2: 350 (1962).

En 1976 (cf. R. FERNANDES, op. cit.: 7) nous avons émis trois hypothèses concernant la présence de *C. anguria* aux îles de Cap Vert:

1) La plante y serait spontanée, en prolongeant vers l'ouest l'aire de l'espèce dans le continent africain. Cette hypothèse nous a semblé peu plausible puisque l'espèce ne se trouve pas soit au Sénégal (cf. BERHAUT, Fl. Sénégal, 1954), soit en Guinée-Bissau (cf. R. & A. FERNANDES in Garcia de Orta 7, 4: 741-753, 1959). Comme le *C. anguria* existe ou a existé dans Sierra Leone, il pourrait être venu directement de là. Mais il pouvait avoir été introduit, même dans ce pays, puisque dans ses ports il y avait des dépôts d'esclaves venus d'autres régions d'Afrique, lesquels pourraient avoir apporté des fruits ou des graines avec eux.
2) L'espèce y aurait été introduite aux siècles XVI-XVII indirectement à partir de Sierra Leone. De ce pays, les esclaves (qui porteraient des fruits ou des graines) étaient transportés à Bissau, dans l'ancienne Guinée portugaise,

d'où ils partaient pour le Nordest du Brésil. Mais, de Bissau et de Cacheu (aussi dans la Guinée), une autre route de bateaux conduisait à l'archipel de Cap Vert, où la «Companhia de Grão-Pará e Maranhão» avait des commis dans quelques îles (cf. CARREIRA, op. cit.: 56-57).

3) L'introduction aurait été faite par les esclaves venus directement de l'Angola. Bien que la colonisation des îles de Cap Vert ait été faite particulièrement par des indigènes de la Guinée (portugaise), l'archipel était lieu de transit pour les bateaux négriers d'esclaves destinés à l'Europe, les Antilles et l'Amérique du Nord, capturés parfois en Angola (cf. CARREIRA, op. cit.: 323-324), quelqu'uns pouvant être retenus dans les îles.

Des trois hypothèses, la troisième nous semble la plus probable, l'introduction de *C. anguria* aux îles de Cap Vert ayant, donc, été opérée, comme au Brésil, par des graines provenant de l'Angola, où des formes soit à fruits lisses, soit à fruits épineux, parmi lesquelles certaines à fruits comestibles, sont trouvées.

Cet éclaircissement sur ce *Cucumis* de Cap Vert s'imposait non seulement au point de vue taxonomique, mais aussi au point de vue de l'utilisation de la plante dans l'alimentation humaine et du bétail. En effet, en se basant sur l'article de FERRÃO & FERRÃO, les agronomes des pays où croît le vrai *C. ficifolius* A. Rich. (Éthiopie, Ouganda, Kenya, Tanzanie) pourraient persuader leurs paysans à employer les fruits de cette espèce dans leur alimentation et dans celle de leurs animaux domestiques, particulièrement des chèvres, ce qui pourrait aboutir à la mort. Effectivement, le *C. ficifolius* est une plante très dangereuse, METTAM (cité par WATT & BREYER-BRANDWIJK, op. cit.: 352, 1962) la considérant «*one of the most deadly* yet found in East Africa». Ce même auteur remarque que, au Kenya, «the grazing stock *avoid the plant* but it may be hidden in other vegetation», et, dans ces conditions, il peut être mangé par le bétail. W. D. RAYMOND (aussi cité par WATT & BREYER-BRANDWIJK, loc. cit.) réfère que, en Tanzanie, a été observé l'empoisonnement de personnes par les fruits de *C. ficifolius*. Au contraire, le *C. anguria* (= *C. longipes*) est employé comme aliment dans la Tanzanie et ses fruits

soit crus, soit cuisinés sont mangés par les Bemba, en Zambie (cf. WATT & BREYER-BRANDWIJK, op. cit.: 350).

En conclusion:

1) Les plantes des îles de Cap Vert que FERRÃO & FERRÃO ont attribuées au *C. ficifolius* A. Rich. appartiennent au *C. anguria* L.
2) Le *C. ficifolius* A. Rich est une espèce de l'Afrique orientale qui ne se trouve pas dans l'archipel de Cap Vert.
3) *C. ficifolius* A. Rich. est une plante vénéneuse, dont l'ingestion peut conduire à la mort soit de personnes, soit d'animaux.
4) Les fruits de *C. anguria* L., même parfois ceux couverts d'épines, peuvent être mangés sans danger.

Cucumis sp. — R. Fernandes, op. cit.: 8 (1976).

En 1976, nous avons émis l'hypothèse que les échantillons de Cap Vert *Wawra* 406 (W), que nous n'avions pas alors pu observé, et *Barbosa* 7311 (LISC), de l'île de S. Nicolau, pourraient appartenir au *C. prophetarum* L. L'étude du premier échantillon et la révision des échantillons de *Barbosa* 7311 nous ont permis d'arriver maintenant à une autre conclusion. En effet, *Wawra* 406, comme nous l'affirmons à la p. 227, est un exemplaire de *C. anguria* L., dont il possède les caractères très bien définis (forme, dimensions et découpure du limbe foliaire; longueur du pétiole relativement à celle du limbe; longueur du pédoncule fructifère; fruits couverts d'épines; etc.). Cependant, par les épines courtes de ceux-ci, il fait la transition entre les plantes africaines à longues épines sur les fruits (var. *longipes* auct.) et la forme typique, en se rapprochant par ce caractère intermédiaire de l'échantillon *Barbosa* 5758, de l'île de Santiago, aussi aux épines peu allongées.

En ce qui concerne le n° 7311, récolté par BARBOSA, dont l'échantillon étudié auparavant possédait alors un fruit (dépourvu de pédoncule et sans épines, pustules ou poils) qui n'existe plus, par sa racine robuste, nous semblait être pérenne. D'après ces caractères et encore par le fait que ses feuilles sont plus petites que chez la plupart des spécimens de *C. anguria* et que l'indument des parties agées était plus ou moins apprimé, nous avons admis qu'il pourrait être aussi inclus dans *C. prophetarum*. À présent

et après sa comparaison avec des échantillons (déterminés par C. JEFFREY) de l'autentique *C. prophetarum,* nous concluons qu'il ne peut pas appartenir à cette espèce. En effet, à première vue, son aspect en est très distinct, la couleur générale de ses tiges et feuilles étant verte (feuilles d'un vert foncé), tandis que le *C. prophetarum* a une coloration verte-cendrée, très pâle. Son indument est aussi différent, formé par des poils plus longs, hyalins, peu rigides, étalés sur les parties jeunes, alors que les poils de *C. prophetarum* sont plus courts, plus rigides, blanchâtres, et beaucoup plus denses. Par l'indument des parties jeunes, par sa coloration, par les forme, découpure et consistance du limbe foliaire (peu épais et peu rigide par séchage), par la longueur du pétiole qui subégale ou excède celle du limbe, par les fleurs mâles fasciculées, par la fleur femelle (une seule fleur vue) sur un long pédoncule et par les dimensions des graines, le spécimen *Barbosa* 7311 nous semble appartenir plutôt au *C. anguria.* Il s'agirait d'une forme rabougrie, dont les petites dimensions des feuilles et la racine pérennante (?) [15] seraient déterminées par l'extrême aridité du milieu. Par ses fruits lisses, ce spécimen correspond au cultivar (type de *C. anguria*), dont l'existence aux îles a été référée par C. JEFFREY (op. cit.: 105, 1967).

Deux échantillons semblables à *Barbosa* 7311, aussi non étudiés par nous en 1976, ont été récoltés à l'île de Maio: *Malato-Beliz & Guerra* 268 (Alto Caro, au-dessus de Esgrovera, 12-XI-1964, LISC, distinctement annuel et à fruits couverts de courtes protubérances, mais non d'épines) et *Malato-Beliz & Guerra* 117 (Funchago, 8-XI-1964, LISC, Pl. II, sans la racine, à tiges plus longues et feuilles un peu plus grandes que celles du n° 268 — limbe long de 4 cm, pétiole long de 4.5 cm —; fruit lisse sur un pédoncule un peu grossi au sommet, long de 5.3 cm). Par l'ensemble de leurs caractères, ceux deux exemplaires ne peuvent pas être inclus soit dans le *C. figarei* Naud. (Pl. V), soit dans le *C. ficifolius* A. Rich. (Pl. III-IV), car ces deux espèces sont des plantes pérennes, à fleurs mâles solitaires, tandis que celles des plantes de l'île de Maio sont fasciculées; leurs feuilles sont moins

[15] La base grossie et la racine robuste de l'un des échantillons de ce numéro semblent celles d'une plante pérenne. Cependant, nous n'avons pas trouvé les restes de tiges des années précédentes, qu'on devrait rencontrer s'il s'agissait d'une plante pérenne.

profondément divisées et à lobe médian moins rétréci à la base que chez les dites plantes de Cap Vert; le respectif indument est différent; et le pédoncule fructifère est beaucoup plus fort chez le *C. figarei* et plus court chez le *C. ficifolius* que ceux des deux spécimens *Malato-Beliz & Guerra*. Ils ne peuvent non plus appartenir au *C. prophetarum* car celui-ci est pérenne, à indument très différent, à feuilles plus épaisses et rigides et à fruits jeunes bandés longitudinalement de vert claire et de vert foncé, ce qui n'arrive pas chez les plantes de Maio. Au contraire, malgré la petitesse des feuilles et les fruits dépourvus d'épines, par leurs restants caractères, ils sont en accord avec les échantillons de Cap Vert et d'autres régions d'Afrique à feuilles plus grandes et fruits épineux ou lisses que nous même ou A. MEEUSE ou C. JEFFREY avons placés dans *C. anguria*. Par l'absence d'épines sur les fruits, les spécimens *Malato-Beliz & Guerra* 117 et 268 sont comparables à ceux de l'Angola *Welwitsch* 824 [16] et 846.

Le *C. anguria* existe donc aussi à S. Nicolau et Maio, où il est représenté par sa forme typique. La réduction des dimensions des plantes y récoltées doivent être déterminées par la sécheresse du sol et de l'air.

Des quatre échantillons attribués au *C. figarei* par A. CHEVALIER (sous *C. pustulatus*, cf. A. CHEVALIER, loc. cit.), un, qui nous n'avons pas pu étudier, a été récolté par KRAUSE à S. Vicente, un autre par lui même (*Chevalier* 44859, P) à l'île de Fogo et les deux restants (*Chevalier* 44448 et 44471, P) à Maio. Ces trois derniers, que nous n'avions pas vus en 1976, ont été à présent examinés par nous. Ils s'agit de très mauvais exemplaires, très mal préparés, particulièrement les deux derniers, qui n'ont ni fleurs ni fruits, le n° 44471 étant dépourvu encore de la partie basilaire. Comme, cependant, tous possèdent les pédicelles des fleurs mâles groupés par 2-3 dans quelques aisselles et un indument dans les parties les plus jeunes formé par des poils assez longs, fins et translucides, et des feuilles, bien que petites, vertes, non très rigides ni épaisses, profondément divisées, à lobes arrondis, le médian assez étranglé à la base, ils ne peuvent pas être mis

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[16] Le spécimen *Welwitsch* 824, par les dimensions plus petites des feuilles et par leur division plus profonde en lobes un peu moins larges que d'habitude, est très semblable soit à *Barbosa* 7311, soit à *Malato-Beliz & Guerra* 117 et 268.

dans *C. figarei* [17]. Ils sont très semblables à ceux des îles S. Nicolau et Maio, récoltés, respectivement, par BARBOSA et M.-BELIZ & GUERRA, bien que encore plus rabougris. Des trois, seulement *Chevalier* 44859 possède des fruits, comparables aussi à ceux des échantillons de Maio (*M.-Beliz & Guerra* 268 et 117) et dont les graines sont plus petites que celles du *C. figarei* (5×2.5 mm contre 6.5×3 mm), ce qui ajoute à notre conviction que la détermination que leur a donnée A. CHEVALIER ne leur convient pas. De plus, il nous semble qu'ils ne peuvent pas être inclus dans *C. prophetarum,* dont ils sont exclus au premier abord par leur indument très différent de celui de cette espèce. Comme ça, il est bien possible qu'ils appartiennent aussi au *C. anguria.* Cependant, pour éclaircir définitivement le problème de l'identification des petites plantes de l'île de Maio semblables à celles de A. CHEVALIER ci dessus référées, il faut récolter des échantillons en de plus bonnes conditions et étudier la variation du taxon *in loco.*

Nous remercions vivement notre collègue J. E. MARTINS ORMONDE qui a réuni le matériel d'herbier et la bibliographie, ce qui nous a facilité l'élaboration de ce travail.

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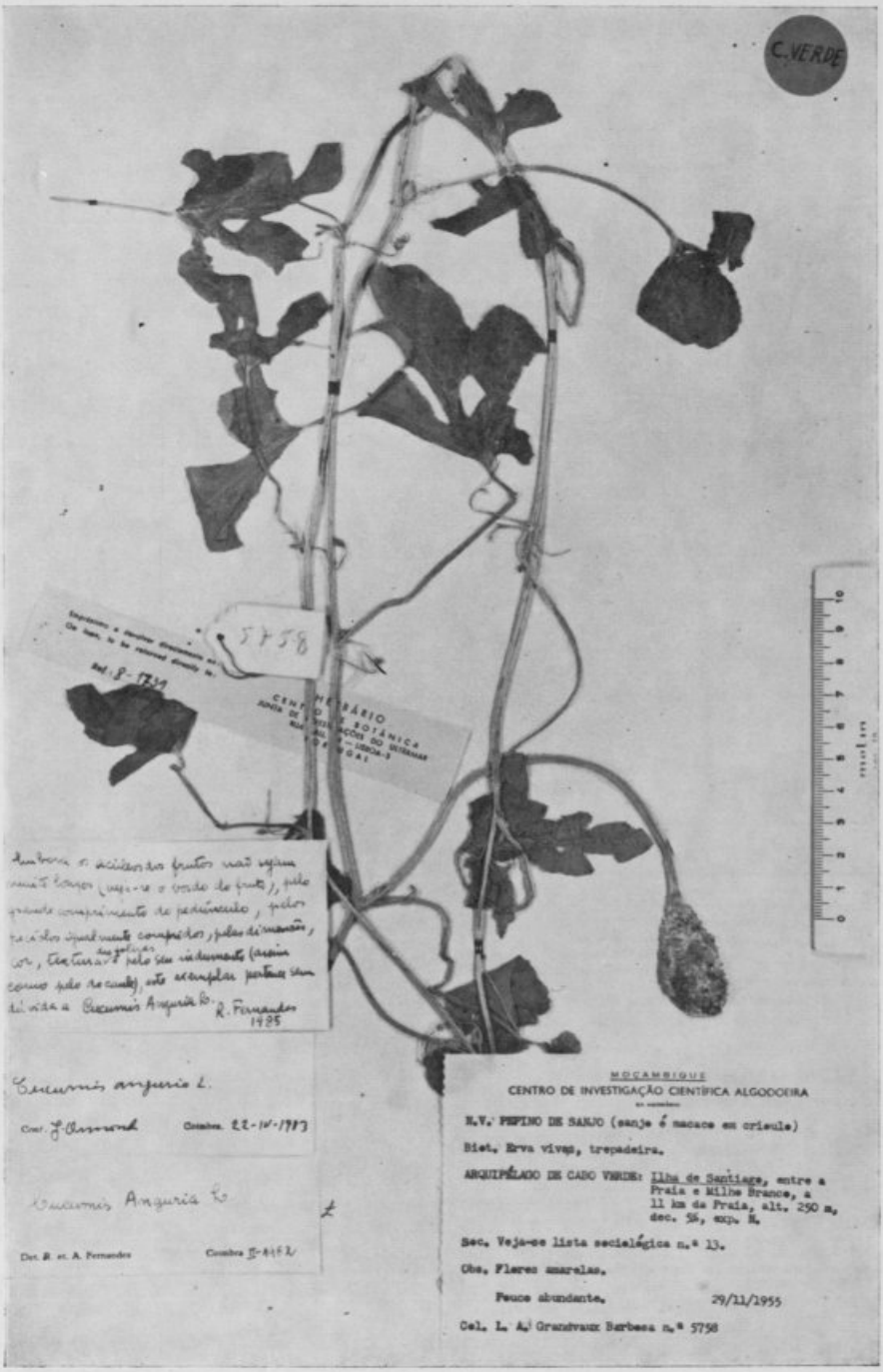
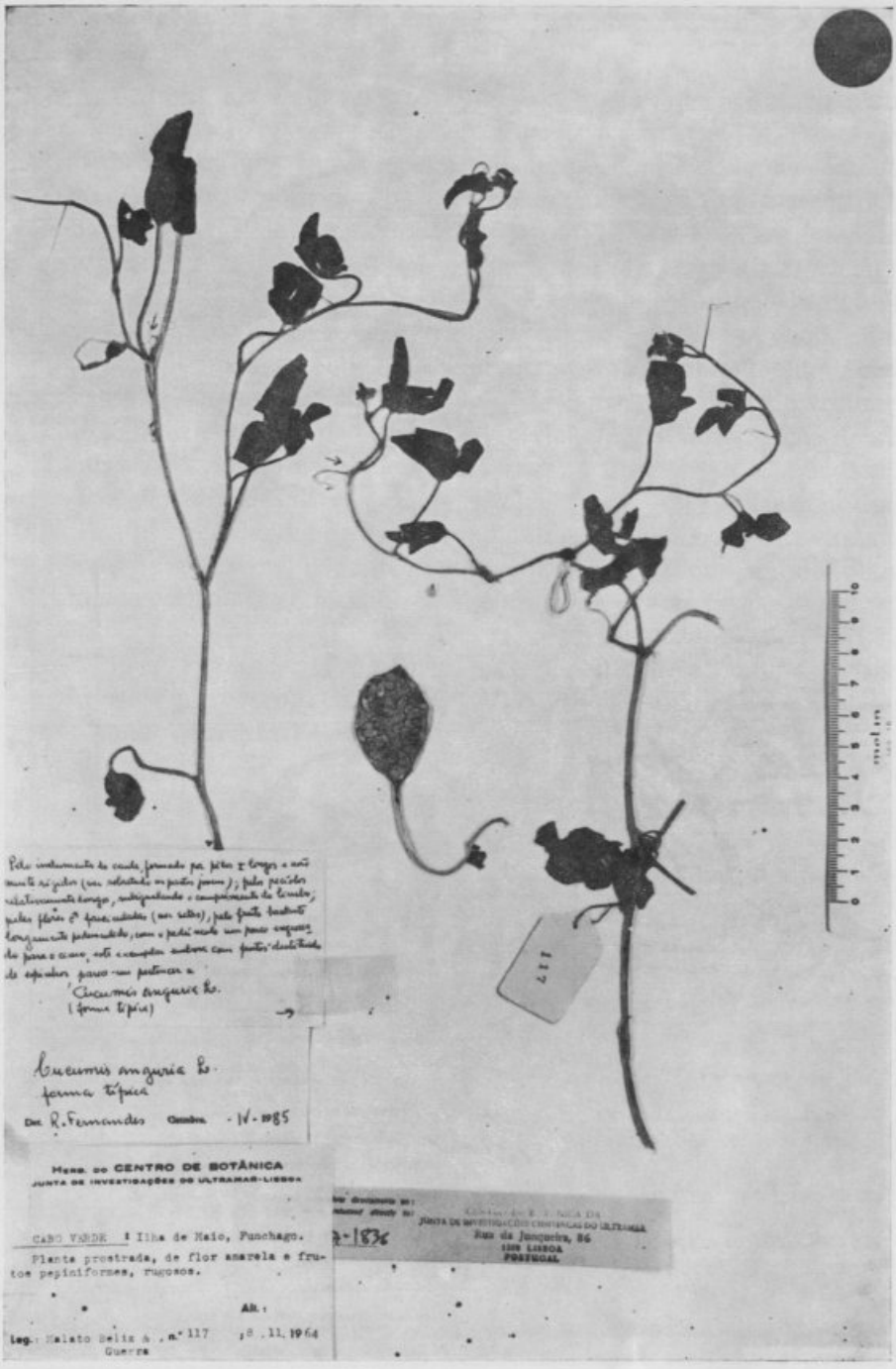
[17] Il est bien possible que A. CHEVALIER ait été porté à les identifier comme ça à cause de l'échantillon de KRAUSE, lequel avait été déterminé par ASCHERSON (et cité par KRAUSE, in Engl., Bot. Jahrb. **14**: 413, 1882) comme *C. figarei* (err. *figonii*).



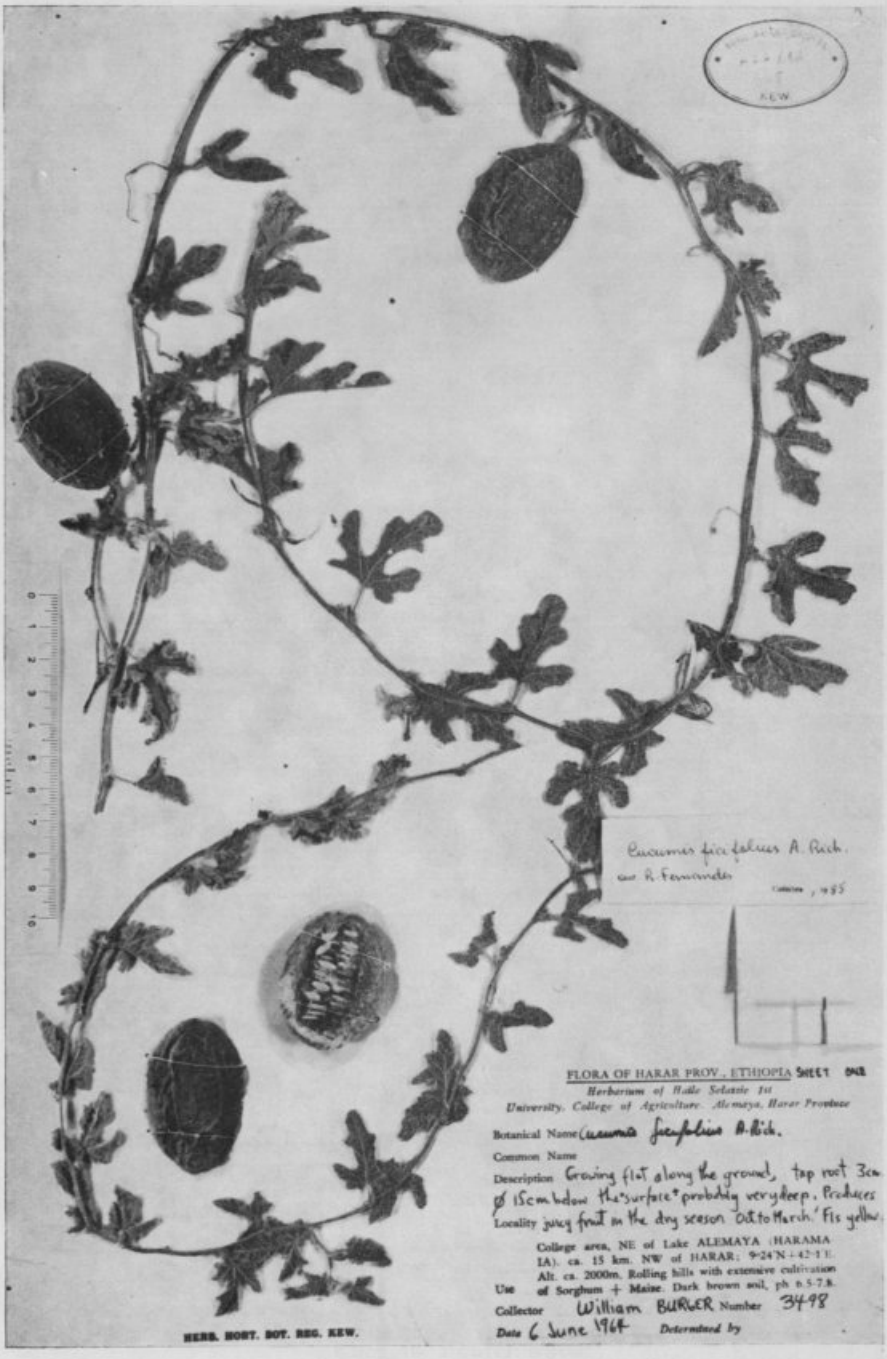
Cucumis anguria L.

Spécimen *Barbosa* 5758 (LISC), de l'île de Santiago, avec un fruit couvert d'épines courtes. Remarquer la grande longueur du pédoncule fructifère et celle des pétioles. Comparer avec *C. ficifolius* A. Rich. (Pl. III et IV) et *C. figarei* Naud. (Pl. V).



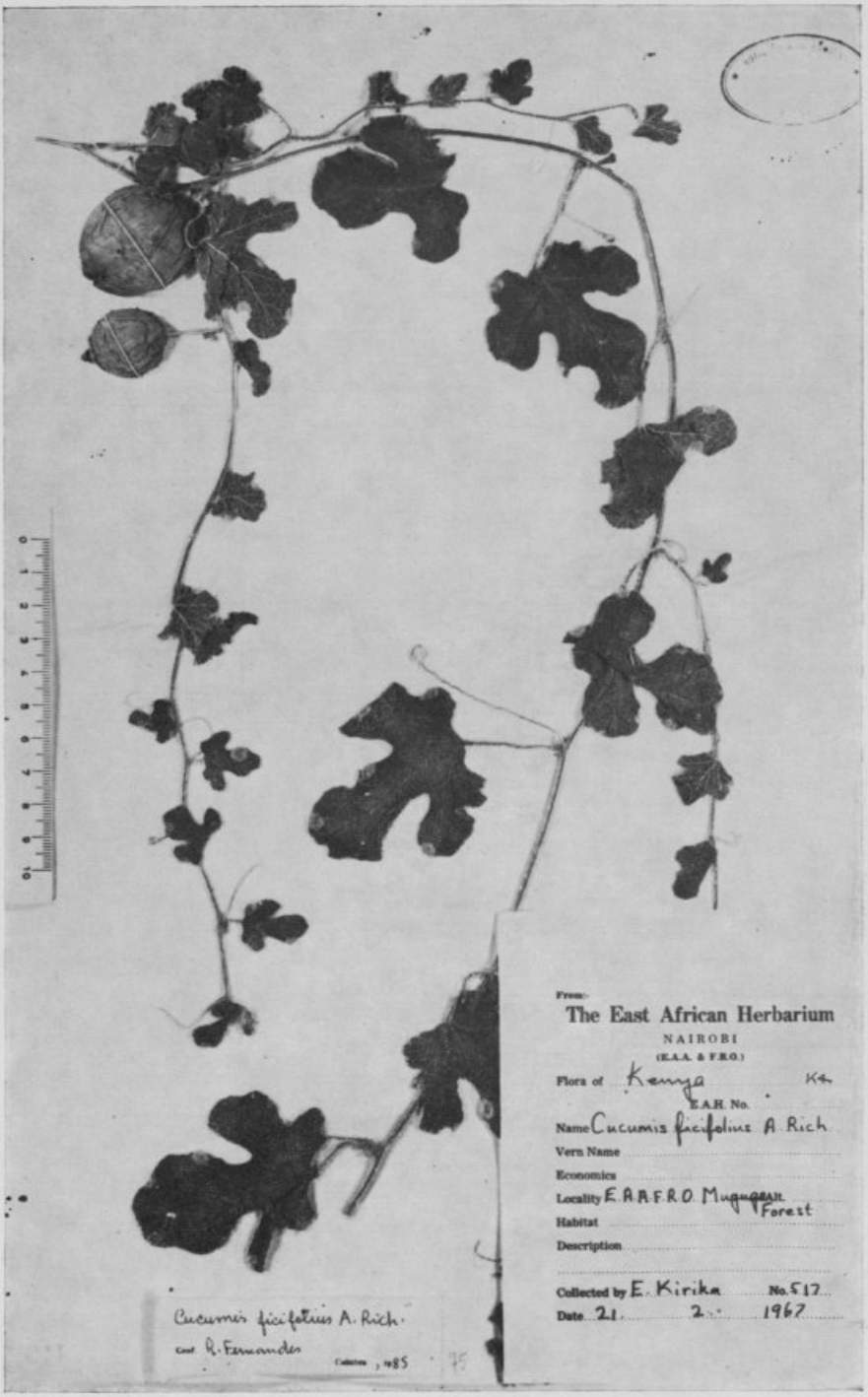
Cucumis anguria L.

Spécimen *Malato-Beliz & Guerra* 117 (LISC), de l'île Maio, avec un fruit presque lisse. Remarquer la longueur du pédoncule fructifère et celle des pétioles. Les flèches indiquent les aisselles où se trouvent des groupes de fleurs ♂. Comparer avec la Pl. I et avec les Pl. III et IV *(C. ficifolius)* et V *(C. figarei)*.



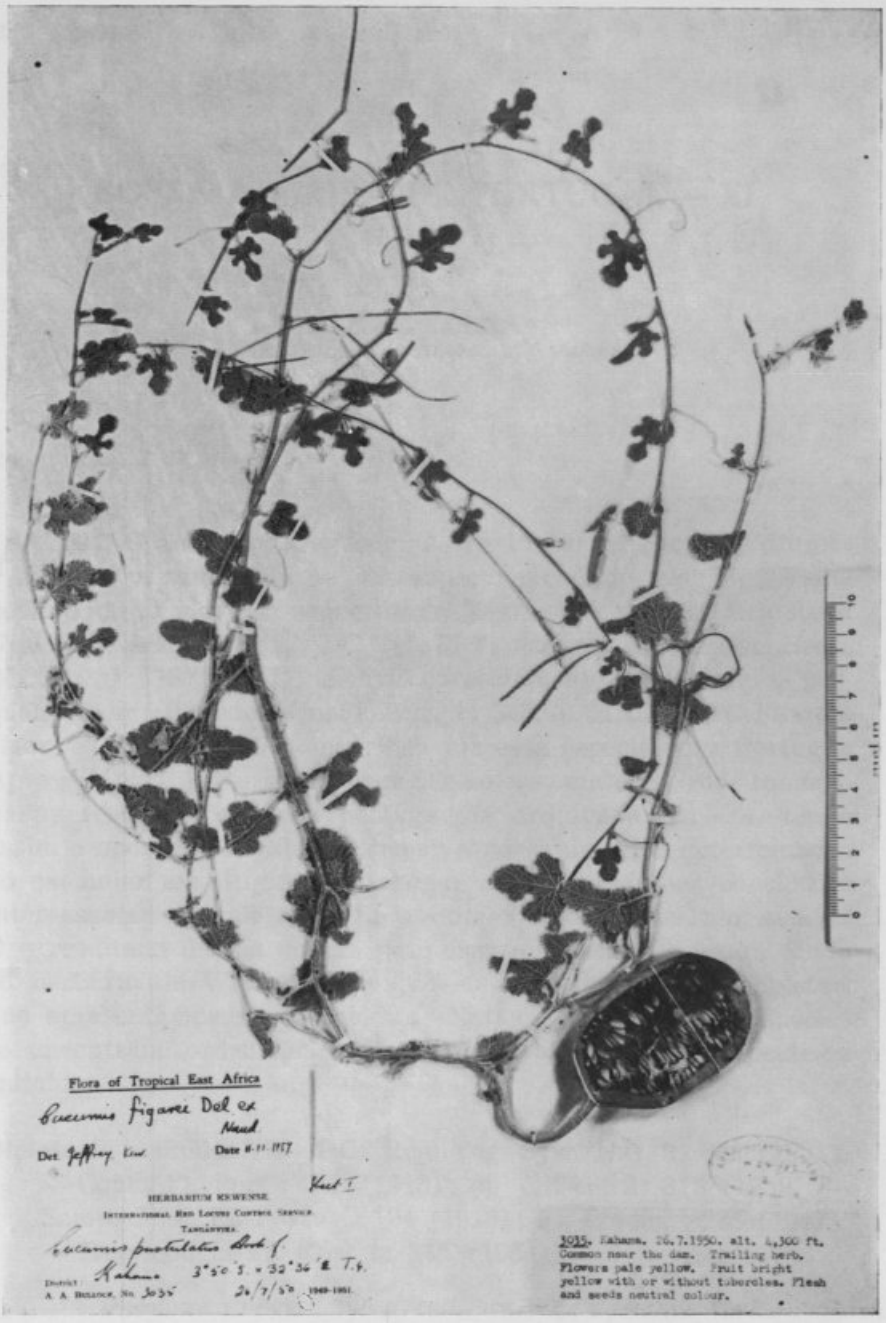
Cucumis ficifolius A. Rich.

Spécimen *Burger* 3498 (K), de l'Éthiopie. Remarquer la forme des feuilles, la longueur des pétioles et celle des pédoncules fructifères, la forme des fruits et l'absence complète d'épines sur ceux-ci.



Cucumis ficifolius A. Rich.

Spécimen *Kirika* 517 (K), du Kenya. Les mêmes remarques que pour la Pl. III.



Cucumis figarei Naud.

Spécimen *Bullock* 3035 (K), de Tanzanie. Remarquer la forme et le réticule des feuilles, la longueur des pétioles, celle du pédoncule fructifère, etc.

Bol. Soc. Brot., Sér. 2, 58: 235-248 (1985).

NOTAS SOBRE A FLORA DE PORTUGAL — XI

por

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ALGUNS anos atrás, o Eng. A. R. PINTO DA SILVA pediu-nos para verificarmos se um espécime colhido em Vila Velha de Rodão, na margem esquerda do Tejo e que nós referíramos a *Diplotaxis erucoides* (L.) DC. (cf. R. FERNANDES in Bol. Soc. Brot., Sér. 2, 31: 197, 1957), estava correctamente identificado, porquanto nem HEYWOOD (in Fl. Eur. 1: 335, 1964), nem A. FRANCO (Nov. Fl. Port. 1, 1971) mencionavam essa espécie para Portugal. Aproveitámos, então, para rever não só esse material, mas também o das restantes espécies portuguesas arquivado em COI, tendo assim a oportunidade de confirmar a nossa anterior determinação do exemplar em litígio e de chegar ainda a algumas conclusões interessantes no que respeita a outros taxa do mesmo género. É o resultado dessas nossas pesquisas, que se estenderam ainda ao herbário de WILLKOMM e que só agora pudemos completar, que apresentamos nestas nossas «Notas», nas quais as espécies se encontram ordenadas por ordem alfabética dos respectivos epítetos.

Diplotaxis catholica (L.) DC., Reg. Veg. Syst. Nat. 2: 632 (1821). — Cout., Fl. Port.: 262 (1913); op. cit. ed. 2: 315 (1939). — Samp., Man. Fl. Portug.: 194 (1910); Fl. Portug.: 235 (1947). — Heywood in Fl. Eur. 1: 335 (1964).

Diplotaxis catholica subsp. *catholica* — A. Franco, Nov. Fl. Port. 1: 229 (1971).

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No seu trabalho «Contribuição para o conhecimento citotaxonómico das *Spermatophyta* de Portugal. IX. Cruciferae» (in Bol. Soc. Brot., Sér. 2, **47**: 326, 1973), M. QUEIRÓS apresenta o desenho (fig. 15b) de uma placa equatorial com 2n = 18 cromossomas, obtida a partir de uma planta cultivada no Jardim Botânico de Coimbra (sementeira n.º 2277, do Projecto CB1) de sementes provenientes da ilha de Faro, planta que a autora atribui a *Diplotaxis virgata* (Cav.) DC. Essas sementes tinham sido colhidas em 23-IV-1968, durante a III Reunião de Botânica Peninsular, em plantas que se destinavam a herbário, as quais figuram em COI com o n.º 10521. Acontece, porém, que o espécime testemunha resultante dessa sementeira n.º 2277 (Est. I), arquivado igualmente em COI, não pertence a *D. virgata* [1], mas a *D. catholica,* conforme tivemos ocasião de verificar. E, como era de esperar, o exemplar 10521 (Est. II) inclui-se também em *D. catholica,* espécie a que aliás fora correctamente referido por I. NOGUEIRA no «Catálogo das plantas herborizadas, durante a III Reunião de Botânica Peninsular», publicado em 1970-1971 nas Memórias da Sociedade Broteriana (**21**: 168), isto é, dois anos antes de M. QUEIRÓS ter dado à estampa o seu trabalho. Acresce ainda que em COI existem mais três exemplares de *D. catholica* da ilha de Faro, enquanto nele se não encontra nenhum de *D. virgata* dessa localidade [2].

A placa equatorial 15b desenhada por M. QUEIRÓS não corresponde, pois, a *D. virgata,* mas a *D. catholica.* Neste caso, o engano poderá não ter consequências graves, pois que, segundo REESE, que M. QUEIRÓS também cita, *D. virgata* tem o mesmo número cromossómico (n = 9) que *D. catholica.* Atendendo, porém, a que aquele investigador (in Flora **144**: 615, fig. 7e, 1957) apresenta o desenho de uma metafase II, obtida numa célula mãe dos grãos de pólen (cf. op. cit.: Tabelle 2, n.º 48), na qual os cromossomas se apresentam muito encurtados, quase esféricos, não se podem

[1] No livro de registo das sementeiras para estudos cariológicos, a n.º 2277 figura como *D. virgata.* Esta determinação foi confirmada por M. QUEIRÓS no exemplar testemunha em herbário, na etiqueta manuscrita de sua mão (cf. Est. I).

[2] *D. virgata* existe, todavia, no Algarve, em Albufeira, onde foi colhida, em 1968, durante a III Reunião de Botânica Peninsular, por ROZEIRA *& al.* (cf. Memórias Soc. Brot. **21**: 168, 1970-1971). A espécie não é, porém, mencionada para essa zona da província algarvia por A. FRANCO (loc. cit.).

estabelecer comparações com os cromossomas somáticos desenhados por M. QUEIRÓS. É ainda curioso assinalar a grande semelhança entre a placa equatorial 15a, correspondente a uma planta de *D. catholica,* colhida na Estação Velha (Coimbra), e a 15b, semelhança que deveria alertar M. QUEIRÓS para a identidade entre os exemplares dos quais as duas tinham sido obtidas.

No mesmo trabalho (op. cit.: 327), M. QUEIRÓS refere a *D. vicentina* (Cout.) Rothm. uma planta de Arrifana (Condeixa, Beira Litoral), cujo número de sementeira para efeitos de estudos cariológicos é o 3280 (Est. III). A menção desta espécie para a Beira Litoral e para uma localidade desta província um tanto afastada do mar, pareceu-nos insólita, dado que *D. vicentina* tem sido encontrada só no sul do país, particularmente no Cabo de S. Vicente (Algarve). O epíteto *vicentina*[3], aplicado não só a esta espécie, mas também a outros taxa endémicos do Cabo de S. Vicente, como *Scilla vicentina* Hoffgg. & Link, *Teucrium vicentinum* Rouy, *Centaurea vicentina* (Welw.) Mariz, e ainda a consulta das Floras portuguesas deviam ter chamado a atenção de M. QUEIRÓS para um possível engano da sua parte na identificação da planta de Condeixa, tanto mais que *D. vicentina* é uma espécie muito bem caracterizada, quanto mais não seja pelas suas sementes esféricas[4]. Resolvemos, por isso, esclarecer o caso. A consulta do livro de sementeiras mostrou-nos que a n.º 3280 figura aí como *D. catholica,* tendo as sementes sido colhidas em 27-III-1968 pelos colectores do Instituto Botânico de Coimbra, que, aliás, conhecem muito bem essa espécie, frequente nos arredores de Coimbra, a qual é incluída todos os anos no *Index Seminum* do Instituto. O exame do espécime testemunha arquivado em COI, obtido a partir da sementeira n.º 3280, permitiu-nos confirmar a determinação dos colectores, porquanto ele pertence indubitavel-

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[3] O adjectivo *vicentinus (a, um)* ou *vincentinus (a, um)* deriva do nome próprio *Vincentius* (em português Vicente, mas em francês Vincent), nome de um mártir e santo, o qual nasceu em Huesca e morreu torturado em Valência, em 304. Quando da invasão árabe da Península, a fim de que os seus restos não fossem profanados, conta a tradição que se trasladaram para o Promontorium Sacrum, onde se recolheram numa capela. Por tal motivo, o cabo do extremo sul ocidental de Portugal passou a designar-se por Cabo de S. Vicente.

[4] Todas as restantes espécies portuguesas do género possuem sementes ovóides ou ovóide-oblongas.

mente a *D. catholica* [5] e não a *D. vicentina,* como M. QUEIRÓS o determinou na etiqueta (Est. III) e citou no seu trabalho.

Como na fig. 15c do dito artigo (pág. 326), M. QUEIRÓS representa uma metafase com 2n = 20 cromossomas, obtida no vértice vegetativo de uma planta que refere ao n.º de sementeira 3280, e atendendo a que esse mesmo número cromossómico fora anteriormente encontrado por A. FERNANDES & M. QUEIRÓS (in Mem. Soc. Brot. **21**: 349, fig. 6, 1970-1971) numa planta pertencente a *D. vicentina* [6], herborizada em Monte Clérigo, arriba da costa que se situa um pouco a norte do Cabo de S. Vicente, mas ainda no Algarve, para explicar o número 2n = 20 encontrado e referido à planta de Condeixa pertencente a *D. catholica,* nós apresentamos três hipóteses:

a) Em *D. catholica,* além de 2n = 18, número encontrado até à data, não só por M. QUEIRÓS mas também por outros investigadores [7], poderá existir também o número 2n = 20.

b) A sementeira 3280 da planta de Condeixa *(D. catholica)* terá sido contaminada por sementes de *D. vicentina,* cujo vaso em que se cultivava devia encontrar-se próximo do que continha aquela. Sendo assim, as raízes fixadas para efeitos de estudos cariológicos pertenciam a uma planta de *D. vicentina,* possivelmente ainda pouco desenvolvida, enquanto que a planta que se deixou crescer para figurar no herbário como testemunho era a *D. catholica.*

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[5] M. QUEIRÓS fez o estudo, sob o ponto de vista cariológico, de uma outra colheita de *D. catholica* dos arredores de Condeixa (Belide; sementeira 3334), o que lhe devia ter chamado a atenção para a sua errada identificação da colheita de Arrifana, também perto de Condeixa.

[6] O nosso estudo da colheita 10325 (COI), efectuada em Monte Clérigo durante a III Reunião de Botânica Peninsular, da qual foram retiradas as sementes destinadas a essa investigação, confirmou esta determinação. Cf. também o «Catálogo das Plantas Herborizadas» durante a III Reunião (op. cit.: 168, 1970-1971), onde o n.º 10325 é correctamente citado como *D. vicentina.*

[7] MANTON (in Ann. of Bot. **46**: 523 et 546, 1932) determinou este número em plantas obtidas de sementes que lhe foram enviadas de Portugal, de local não mencionado; BJÖRKQVIST *& al.* (in Bot. Not. **122**: 273, 1969) encontrou igualmente 2n = 18 em plantas do norte de África (Tânger). Estes dois autores foram citados por M. QUEIRÓS a propósito da sua determinação do número 2n = 18 que encontrou nas plantas portuguesas de *D. catholica* por ela estudadas e correctamente identificadas, uma do norte do país (Amares) e duas do centro [Coimbra e Belide (Condeixa)].

c) Teria havido uma lamentável troca de material, a qual se poderia ter operado em qualquer das fases para obtenção das preparações.

Inclinamo-nos mais para a segunda possibilidade e achamos estranho que M. QUEIRÓS não tivesse encarado o caso da contaminação da cultura, preferindo, pelo facto de ter contado 20 cromossomas, atribuir a planta de Condeixa a *D. vicentina*.

Diplotaxis catholica subsp. **siifolia** (Kunze) Maire in Jahandiez & Maire, Cat. Pl. Maroc **2**: 282 (1932). — Quézel in Maire, Fl. Afr. Nord **12**: 281, fig. 101 (1965).

Diplotaxis siifolia Kunze, Chloris Austro-Hisp.: 42 (1846). — Cout., Supl. Fl. Port. (in Bol. Soc. Brot., Sér. 2, **10**): 56 (1935); Fl. Port. ed. 2: 315 (1939). — Samp., Fl. Portug.: 236 (1947).

Diplotaxis catholica subsp. *siifolia* (Kunze) Rivas-Martinez, Publ. Inst. Biol. Apl. (Barcelona) **42**: 117 (1967). — A. Franco, Nov. Fl. Port. **1**: 229 (1971).

A combinação de *D. siifolia* Kunze como subespécie de *D. catholica* (L.) DC. foi primeiramente feita por MAIRE.

O tipo de *D. siifolia* é o exemplar *Willkomm* 443. Os dados da etiqueta deste número, existente em COI — «in arenosis regionis calidae Baeticae occidentalis: ad sepes prope oppidum Puerto de Sta. Maria copiose, 7 Febr. 1845» — são diferentes dos indicados por KUNZE — «In vineis locisque arenosis circa oppidum Sanlúcar de Barrameda, Jan. et in isthmo et ad totum sinum Gaditanum frequens. Jan.-Mart. c. fl. et fr.». É possível que estes últimos dados sejam os que WILLKOMM enviou a KUNZE juntamente com o duplicado (se é que não foi o próprio original, que agora se encontra em COI, o exemplar que KUNZE estudou).

Diplotaxis erucoides (L.) DC., Reg. Veg. Syst. Nat. **2**: 631 (1821). — Mariz in Bol. Soc. Brot. **3**: 104-105 (1885). — Cout., Fl. Port.: 262 (1913); op. cit. ed. 2: 314 (1939). — Samp., Man. Fl. Portug.: 193 (1910); Fl. Portug.: 235 (1947). — R. Fernandes in Bol. Soc. Brot., Sér. 2, **31**: 197 (1957). — Heywood in Fl. Eur. **1**: 335 (1964).

Diplotaxis platystylos Willk. in Bot. Zeit. **5**: 233 (1847).

Diplotaxis virgata var. *platystylos* (Willk.) Nyman, Consp.: 49 (1878). — Willk. in Willk. & Lange, Prodr. Fl. Hisp. **3**: 866 (1880) pro parte.

Diplotaxis valentina Pau, Not. Bot. **1**: 9 (1887). — Willk., Suppl. Prodr. Fl. Hisp.: 309 (1893).

Diplotaxis erucoides var. *valentina* (Pau) O. E. Schulz in Planzenreich IV-105, **1**: 165 (1919).

Diplotaxis erucoides var. *leiocarpa* Maire & Weiller forma *valentina* (Pau) Maire & Weiller in Maire, Fl. Afr. Nord **12**: 272 (1965) [8].

Diplotaxis catholica subsp. *siifolia* sensu A. Franco in Nov. Fl. Port.: 229 (1971) pro parte.

Em COI existem dois exemplares, colhidos em Maio de 1849 por WELWITSCH na Península de Tróia (Setúbal), os quais se encontram determinados na etiqueta original como *D. erucoides*, provavelmente pelo próprio colector.

Como esses espécimes tivessem sido redeterminados em 1969 por A. FRANCO & I. NOGUEIRA como *D. siifolia*, fomos levada a fazer o seu estudo, o que nos permitiu verificar que eles pertencem, de facto, a *D. erucoides*. Com efeito, bastam os caracteres do indumento para os distinguir de todas as outras espécies do género que existem em Portugal. Assim, em *D. erucoides* o indumento do caule é constituído por pêlos muito delgados, relativamente curtos, perfeitamente aplicados e retrorsos, enquanto algumas das outras espécies apresentam caules glabros e as restantes espécies possuem sedas mais ou menos rígidas, patentes ou um pouco reflexas, mais espessas junto à sua inserção (que, por vezes, é bastante larga) ou pêlos longos e não aplicados; as folhas de *D. erucoides* possuem pêlos nas duas páginas, idênticos aos do caule, estreitamente aplicados, mas aqui antrorsos, ao passo que as folhas das outras espécies ou são glabras ou apresentam sedas como as dos respectivos caules e também patentes, ou só na margem ou nesta e ainda nas nervuras; os botões florais de *D. erucoides* são pilosos (pêlos longos, delgados, mais ou menos crespos, mais ou menos densos), enquanto nas outras espécies ou são glabros ou possuem sedas dispersas ou só no ápice.

[8] A var. *leiocarpa* é nome ilegítimo, pois que, correspondendo ao tipo da espécie como os seus autores o afirmam, deveria designar-se por var. *erucoides*.

Em 1957 (loc. cit.), referimos a *D. erucoides* o exemplar *A. Fernandes, J. Matos & A. Santos* 5963 (COI), colhido em Vila Velha de Rodão. Face às dúvidas que nos foram levantadas acerca da existência desta espécie no nosso país, fizemos igualmente a sua revisão, tendo chegado à mesma conclusão que nessa data. É possível que a presença da espécie nesse local tivesse resultado do arrastamento de sementes de plantas espanholas pelas águas do Tejo. No entanto, só outras herborizações em Vila Velha de Rodão permitirão verificar se *D. erucoides* aí se mantém, constituindo um elemento da nossa flora, ou se se tratou apenas de um efemerófito, como parece ter sido o caso das plantas de Tróia.

D. platystylos Willk. tem sido considerada pelos autores como uma variedade de *D. virgata* (Cav.) DC., subordinação admitida, aliás, pelo próprio WILLKOMM. O estudo do seu holótipo (em 1847, WILLKOMM refere-lhe apenas um exemplar) — «in regione calida in sepibus ad viam regiam ab urbe Valencia in Catalonian ducentem prope monasterium San Miguel de los Reyes, 16 Majo-1844», *Willkomm* s. n. (COI) — permitiu-nos verificar que ele se identifica com *D. erucoides,* espécie da qual o próprio WILLKOMM aproximava a sua, visto afirmar «cui nostra affinis». Esta afinidade ou melhor identidade é evidenciada não só pelos caracteres que o autor atribui à *D. platystylos* — «caule basi... lignoso, ramis... pilis brevibus retrorsis scabro. Folia glabriuscula... petalis parvis albescentibus seu flavescenti-roseis. Siliqua pollicaris rostro 1 ½″ (= ± 3,5 mm) [9] longo ⅓″ lato monospermo» —, mas também pelo epíteto específico que lhe dá. O tipo é um exemplar fraco e já desprovido das folhas basilares, o que pode justificar as diferenças de forma que WILLKOMM aponta entre as folhas da sua espécie e as de *D. erucoides* [cf. a descrição desta espécie em Flora Europaea (1: 335, 1964) no que respeita às variações da forma das folhas, do comprimento do rostro da silíqua e do comprimento das pétalas, e compará-la com a descrição de *D. platystylos*)].

Em 1880 (loc. cit.), WILLKOMM transfere *D. platystylos* como variedade para *D. virgata,* atribuindo-lhe, além do tipo, vários outros espécimes, os quais, como aquele, estão todos arquivados no seu herbário (COI). Da observação destes, verificámos

[9] Embora WILLKOMM indique esta medida, encontrámos no tipo alguns rostros um pouco mais longos, um deles atingindo quase 5 mm.

que apenas um é idêntico à planta de S. Miguel de los Reys. Trata-se do exemplar *Willkomm* 501, também de Valência — «In pinguibus prope pagum *Salér* ad lacum *Albufera* regni Valentini, Aug. 1850». Os restantes pertencem a uma forma de *D. virgata,* a qual tem vindo a ser designada erradamente pelos autores como var. *platystylos* (Willk.).

O. E. SCHULZ (in Pflanzenr. IV-105, *Cruciferae-Brassiceae:* 171, 1919) refere *D. virgata* var. *platystylos* para Portugal, baseado num exemplar de LINK — «bei Porto am Ufer des Duero» —, que não vimos, não sabendo, portanto, se se trata da verdadeira *D. platystylos (= D. erucoides),* se da variedade da *D. virgata.* Assim como nos não podemos igualmente pronunciar sobre a identidade dos restantes espécimes que O. E. SCHULZ inclui na var. *platystylos,* vários do Sul de Espanha e um de Marrocos, nenhum dos quais se encontra no herbário de WILLKOMM, não sendo os que este último atribuíu à mesma.

D. valentina que, em Flora Europaea (loc. cit.), é incluída em *D. erucoides,* pela descrição que dá o seu autor e por caracteres que lhe são atribuídos por O. E. SCHULZ (loc. cit.) e por WEILLER & MAIRE (loc. cit.), parece corresponder muito bem a *D. platystylos,* cujo tipo, como o do taxon de PAU, foi igualmente colhido em Valência, o que vem em apoio da identidade entre ambas.

MARIZ (loc. cit.) introduz na sinonímia de *D. erucoides* a *Eruca latifolia Scalbricensis,* de GRISLEY (Virid. Lusit.: 34, 1789). Não sabemos, porém, quem estabeleceu essa identidade, se o próprio MARIZ, se algum outro naturalista posterior a 1789, porquanto VANDELLI, a quem se deve a identificação dos nomes de GRISLEY, não identifica a planta. Por outro lado, não conseguimos esclarecer qual o topónimo donde derivou o adjectivo *scalbricensis* [10].

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[10] O distinto bibliotecário do Instituto Botânico de Coimbra, Dr. TOMAZ M. PEREIRA, que a nosso pedido se encarregou de averiguar a derivação do adjectivo e a quem penhoradamente agradecemos os esforços dispendidos nesse sentido, informou-nos que no Instituto de Estudos Clássicos da Faculdade de Letras da Universidade de Coimbra, nada se conhecia sobre tal palavra e que possivelmente, ela era uma corruptela de *scalabicensis,* de *Scalabis* (Santarém). Sendo assim, a *D. erucoides* teria sido encontrada também no Ribatejo, em Santarém. No entanto, parece-nos que o adjectivo formado a partir de Scalabis é scalabitanus e não scalabicensis.