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BOLETIM
DA
SOCIEDADE BROTERIANA

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REDACTORES

PROF. DR. A. FERNANDES

Director do Instituto Botânico

DR. J. BARROS NEVES

Professor catedrático de Botânica

COIMBRA
1967

Composição e impressão das Oficinas
da Tip. Alcobacense, Lt. — Alcobaga

A memória
dos seus eminentes membros

Prof. Dr. Américo Pires de Lima

1886-1966

Prof. Dr. Manuel Joaquim Ferreira

1890-1963

Prof. Dr. Flávio Ferreira Pinto Resende

1907-1967

dedica a

SOCIEDADE BROTERIANA



A. B. 1915
A. B. 1915

PROF. DR. AMÉRICO PIRES DE LIMA

23.I.1886 — 14.VIII.1966

AMÉRICO PIRES DE LIMA nasceu a 23 de Fevereiro de 1886 em Areias, concelho de Santo Tirso. Depois de frequentar algum tempo Farmácia, transitou para a Escola Médica do Porto, onde terminou o curso em 17 de Julho de 1911. Às suas qualidades pedagógicas revelaram-se desde muito cedo, porquanto foi encarregado, como aluno assistente, das aulas práticas de Bacteriologia no Laboratório Nobre, durante o ano lectivo 1910-1911.

Após a formatura, concorreu a médico do exército, tendo, por promoções sucessivas, atingido o posto de tenente-coronel.

Em 12 de Abril de 1912, foi nomeado assistente de Clínica Médica da Faculdade de Medicina do Porto, lugar de que pediu a exoneração em 18 de Outubro do mesmo ano.

Por Decreto de 13 de Setembro de 1913, foi provido no lugar de 2.º assistente do 3.º grupo (Zoologia) da 3.ª secção (Ciências Histórico-Naturais) da Faculdade de Ciências do Porto. Transitou pouco depois para o grupo de Botânica, no qual foi nomeado 1.º assistente em 18 de Outubro de 1919 e professor catedrático por Decreto de 13 de Julho de 1921.

Em 1916, quando a 1.ª Grande Guerra atingiu grande intensidade, foi mobilizado como oficial médico, tendo sido integrado na Expedição a Moçambique, onde desempenhou o cargo de chefe da Secção de Higiene e Bacteriologia. Durante o período em que permaneceu em Moçambique, aproveitou o tempo disponível para colher plantas, coleccionar animais e fazer observações antropológicas. Deste modo, reuniu algumas colecções de plantas, herborizadas particularmente em Porto Amélia, Mocimboa da Praia, Palma e Cabo Delgado, regiões que não tinham sido ainda percorridas por nenhum botânico português. Essas plantas, estudadas por PIRES DE LIMA após o seu regresso à Metrópole, deram ensejo à

publicação de dois trabalhos sob o título de «Subsídios para o conhecimento da Flora de Moçambique». Os espécimes encontram-se arquivados no herbário do Instituto de Botânica do Porto e têm sido citados na *Flora Zambesiaca*.

Enquanto exercia as funções de 2.º assistente da Faculdade de Ciências, passou, em 16 de Janeiro de 1919, a prestar também a sua colaboração à Escola de Farmácia. Tendo entrado nessa data como encarregado de curso, foi nomeado professor ordinário contratado em 30 de Dezembro de 1920 e professor ordinário efectivo por Decreto de 21 de Dezembro de 1925.

Como professor da Faculdade de Ciências, teve a seu cargo, desde 9 de Abril de 1935 até à sua jubilação, a direcção do Instituto de Botânica «Dr. Gonçalo Sampaio», na qual desempenhou um papel do maior relevo. Efectivamente, PIRES DE LIMA não se conformava com o facto de o Instituto que dirigia não possuir uma instalação independente com um Jardim Botânico anexo, pois que, com toda a razão, considerava este o complemento necessário de um Instituto Botânico, sem o qual a pesquisa se não poderia efectuar em muitos ramos. Os seus porfiados esforços foram por fim coroados de êxito, tendo o Prof. PIRES DE LIMA conseguido do Governo a compra de um palacete na rua do Campo Alegre, com um extenso jardim que poderia servir para o efeito pretendido. Obteve ainda verbas que lhe permitiram adaptar o edifício, construir estufas e contratar um técnico alemão para delinear o novo Jardim Botânico.

Como professor da Faculdade de Farmácia, exerceu o cargo de Director do Laboratório de Criptogamia, onde teve também acção notável.

Foi Director da Faculdade de Farmácia da Universidade do Porto, de 1929 a 1932, e da Faculdade de Ciências da mesma Universidade desde 3 de Outubro de 1935 a 28 de Abril de 1945. Desempenhou ainda as funções de Presidente do Conselho Regional do Porto da Ordem dos Médicos (1939) e de Presidente da Comissão Científica da Associação Médica Lusitana (1929).

PIRES DE LIMA era membro do *Comité International de la Lumière*, sócio da *Académie Internationale d'Histoire des*

Sciences, da Sociedade Farmacêutica Lusitana e da Sociedade Broteriana.

Escrevendo **com** facilidade em um estilo simples, claro e elegante, a obra de PIRES DE LIMA é **extraordinariamente** vasta, pertencendo os seus trabalhos aos vários domínios em que exerceu a sua actividade. Na sua bibliografia encontram-se, pois, artigos sobre temas de Medicina, entre os quais se destacam os referentes à higiene do leite, problemas médico-sociais, profilaxia, questões pedagógicas, assistência à infância, trabalhos de investigação sobre a aplicação de radiações, etc.; de Antropologia (estudos da mandíbula dos indígenas de Moçambique, etc.); de biologia geral (evolução do transformismo, o **transformismo** e as mutações bruscas de DE VRIES, etc.); de Farmácia (biografias de farmacêuticos, plantas medicinais, etc.); de Botânica (taxonomia de plantas vasculares de Moçambique, influência de certas substâncias e de radiações sobre a germinação e desenvolvimento de várias plantas, história da Botânica em Portugal, biografias de botânicos e exploradores portugueses, ensino da Botânica, etc.); elaboração de livros para o Ensino **Secundário**; política **ultramarina**; etc.

Polemista vigoroso e divulgador de raras qualidades, a PIRES DE LIMA se devem numerosos artigos publicados em diversos jornais e conferências proferidas principalmente nas sedes das principais agremiações científicas e culturais do Porto.

AMÉRICO PIRES DE LIMA tinha pelo seu Mestre, GONÇALO SAMPAIO, a maior admiração. Assim, compreende-se que, por sua proposta, ao Instituto de Botânica do Porto tenha sido dado o nome deste nosso distinto botânico e que em frente do edifício tivesse mandado colocar o seu busto, modelado pelo eminente professor e artista, colega de GONÇALO SAMPAIO, que foi ABEL SALAZAR. Compreende-se, ainda, que tenha publicado a obra póstuma de SAMPAIO «Iconografia Selecta da Flora Portuguesa» (incompleta) e editado a 2.^a edição da Flora Portuguesa, depois de a parte do manuscrito inédita ter sido revista pelo discípulo de SAMPAIO e actual professor de Botânica da Universidade do Porto, Dr. ARNALDO **ROZEIRA**.



Clavel Ferry

PROF. DR. MANUEL JOAQUIM FERREIRA

18.III.1890 — 22.II.1963

MANUEL JOAQUIM FERREIRA nasceu em S. Martinho do Campo, concelho de Póvoa de Lanhoso, em 18 de Março de 1890. Frequentou os Liceus de Braga e Guimarães, tendo concluído o 7.º ano do Curso Complementar de Letras. Presumindo ter vocação para a vida religiosa, inscreveu-se no Seminário Conciliar de Braga, onde completou o curso Teológico. Desistiu, porém, de seguir a carreira eclesiástica, matriculando-se no 7.º ano de Ciências do Liceu.

Em seguida, inscreveu-se na Faculdade de Medicina da Universidade do Porto, terminando a licenciatura em Medicina e Cirurgia em 1923. Em 1928, obteve o grau de Doutor em Medicina, acto para o qual apresentou a dissertação intitulada «A Pelagra».

Em 1921 foi contratado 1.º assistente do 2.º grupo (Botânica) da 3.ª secção (Ciências Histórico-Naturais) da Faculdade de Ciências do Porto, cargo que desempenhou até 1931, ano em que foi nomeado professor auxiliar do mesmo grupo.

Em 1938, foi contratado professor catedrático de Botânica, passando a efectivo em 1942, com a propriedade da cadeira de Botânica sistemática. Em 1956, deixou a propriedade dessa disciplina para tomar a de Biologia.

Foi também professor da cadeira de Criptogamia e fermentações da Faculdade de Farmácia e desempenhou as funções de Secretário da Faculdade de Ciências de 1951 a 1953.

Dirigiu ainda com proficiência o Instituto de Botânica «Dr. Gonçalo Sampaio» da Faculdade de Ciências e o Labo-

VIII

ratório de Criptogamia e fermentações da Faculdade de Farmácia desde 1956 até à sua jubilação em 1960.

Médico muito distinto, a ele se devem numerosas notas clínicas, publicadas principalmente nos *Arquivos de Clínica Médica* e no *Porto Médico*.

Como investigador no domínio da Botânica, ocupou-se em especial do estudo dos fenómenos de antibiose entre Fungos, particularmente da acção da Lusomicina, antibiótico produzido por certas leveduras, sobre os agentes da tinha. A MANUEL FERREIRA se deve também a oração de sapiência «Perspectivas da Biologia geral — Das enzimas aos antibióticos», com a qual se iniciaram os trabalhos da Universidade do Porto no ano lectivo de 1947-1948.

Com o louvável intuito de despertar o gosto pela investigação científica no domínio das matérias da cadeira de que fora primeiramente proprietário, a Ex.^{ma} Família do extinto instituiu, em 1964, um Prémio denominado Doutor Manuel Ferreira, para ser todos os anos atribuído «ao aluno distinto que tenha demonstrado aptidão para a investigação científica, comprovada por trabalho especial de Sistemática pura ou aplicada». Este prémio tem sido conferido todos os anos.



PROF. DR. FLÁVIO FERREIRA PINTO RESENDE

28.II.1907 - 1.I.1967

FLÁVIO FERREIRA PINTO RESENDE nasceu em Cinfães em 28 de Fevereiro de 1907. Depois de ter concluído em 1924 o curso liceal como aluno externo, matriculou-se no mesmo ano em Ciências Histórico-Naturais na Faculdade de Ciências da Universidade do Porto, onde foi discípulo de GONÇALO SAMPAIO, AMÉRICO PIRES DE LIMA, MANUEL FERREIRA, MACHADO GUIMARÃES e outros distintos professores.

Concluída a licenciatura em 19 de Outubro de 1928, fez exame de admissão à Escola Normal Superior de Coimbra, que frequentou durante os anos lectivos de 1928-1929 e 1929-1930. Em Março de 1931, apresentou-se ao exame de Estado para o Magistério Secundário (6.º grupo), tendo sido aprovado.

Enquanto frequentava a Escola Normal Superior, exerceu provisoriamente o magistério no Liceu José Falcão, de Coimbra, no ano lectivo 1928-29. Em 15 de Junho de 1931, depois de ter concluído o exame de Estado, foi nomeado professor agregado e em seguida (22 do mesmo mês) efectivo do Magistério Secundário, tendo sido colocado no Liceu Afonso de Albuquerque, na Guarda.

Como professor do ensino liceal numa cidade como a Guarda, FLÁVIO RESENDE sentia-se condenado a uma vida em que as suas reais capacidades se perderiam. Ao mesmo tempo, verificava que, para ministrar um ensino que satisfizesse a sua consciência de professor probo, necessitava adquirir aqueles conhecimentos concretos que os estudos que efectuara, quase inteiramente teóricos, lhe não tinham dado. Para realizar esse objectivo, solicitou do Instituto

de Alta Cultura equiparação a bolseiro no País, a fim de estagiar no Instituto Botânico da Universidade de Coimbra durante o ano de 1932-33. Acolhido muito cordialmente nesta Instituição pelo respectivo Director, Prof. Dr. Luís WITTNICH CARRISSO, este entregou a direcção do seu estágio ao Prof. Dr. AURÉLIO QUINTANILHA e a ABÍLIO FERNANDES. Durante o ano que frequentou o Instituto Botânico, foi iniciado nas técnicas de pesquisa, particularmente no domínio da cariologia, e adquiriu os hábitos de trabalho de laboratório e o gosto pela investigação científica. Entretanto, surgiu no Instituto Botânico de Coimbra a oferta de uma bolsa de estudo da instituição alemã «Alexander von Humboldt-Stiftung». QUINTANILHA perguntou a RESENDE se estaria interessado na referida bolsa e, como a resposta fosse afirmativa, FLÁVIO RESENDE partiu para a Alemanha, onde permaneceu, graças à bolsa alemã e ao subsídio ou a uma bolsa integral do I. A. C, durante os anos lectivos de 1933-34 a 1936-37.

Depois de ter trabalhado o semestre de Inverno no «Pflanzen Physiologische Institut» de Berlin-Dahlem, transferiu-se para Hamburgo, e aí, no «Institut für Allgemeine Botanik», iniciou, em Maio de 1934, as suas pesquisas cariológicas nas *Aloinae*, sob a direcção do Prof. E. HEFTZ. Aí elaborou a sua dissertação «Über die Ubiquität der SAT-Chromosomen bei den Blütenpflanzen» e prestou provas de doutoramento. Mediante parecer do Conselho Permanente de Acção Educativa do Ministério da Educação Nacional, foi-lhe concedida a equiparação do grau de Doutor pela Universidade de Hamburgo ao mesmo grau pelas Universidades portuguesas.

Regressou a Portugal em Janeiro de 1938, tendo ficado a trabalhar, como equiparado a bolseiro, na Estação Agronómica Nacional, cujo Director, Prof. A. CÂMARA, O recebeu com o mais vivo interesse, pondo à sua disposição um lugar no laboratório de Citogenética.

Em Agosto do mesmo ano, voltou para Hamburgo, onde permaneceu até o fim do ano lectivo de 1939-40, data em que foi trabalhar para o «Kaiser Wilhelm-Institut für Biologie» de Berlin-Dahlem. Manteve-se nesta Instituição

até Outubro de 1941, regressando depois a Portugal para ingressar no Instituto de Botânica «Dr. Gonçalo Sampaio», no qual o seu antigo Mestre, Prof. AMÉRICO PIRES DE LIMA, o recebeu COM a maior simpatia e lhe procurou obter todos os recursos necessários para poder prosseguir as suas pesquisas em citogenética.

Em Junho de 1942, fez concurso de provas públicas para o preenchimento de uma vaga de professor extraordinário de Botânica da Universidade do Porto, tendo sido aprovado por unanimidade. Nomeado para o respectivo lugar, foi encarregado da regência teórica de Botânica **geral** e de Morfologia e fisiologia dos vegetais, bem como dos trabalhos práticos da última disciplina.

Em Novembro de 1943, prestou provas públicas em concurso para preenchimento de uma vaga de professor catedrático de Botânica da Universidade de Lisboa. Pelo facto de o concurso ter sido aberto em data anterior à nomeação de RESENDE como professor extraordinário e de ter concorrido, portanto, apenas na qualidade de Doutor, as provas consistiram em um conjunto das dos concursos para professor extraordinário e catedrático. Graças aos conhecimentos que demonstrou durante a prestação das provas e ao seu *Curriculum vitae*, que mereceu uma análise cuidada por parte dos professores encarregados da sua apreciação, a FLÁVIO RESENDE foi atribuído o primeiro lugar na votação em mérito relativo a que se procedeu.

Depois de ter sido nomeado professor catedrático da Universidade de Lisboa, RESENDE teve a seu cargo a direcção do Museu, Laboratório e Jardim Botânico, lugar que desempenhou COM muito brilho. Efectivamente, durante a sua direcção conseguiu aumentar substancialmente as dotações; assalariar jardineiros; ampliar e apetrechar convenientemente os laboratórios destinados ao ensino e à **investigação**; instalar em edifício próprio uma secção de **micologia**; imprimir grande desenvolvimento à biblioteca com a aquisição de numerosos livros e revistas necessários ao ensino e à **investigação**; melhorar o Jardim; remodelar inteiramente as estufas, instalando em algumas delas câmaras especiais

para a realização de pesquisas no domínio do fotoperiodismo; aumentar as colecções do herbário; etc.

Dotado de extrema vivacidade de espírito e tendo grande entusiasmo pela investigação científica, foram numerosos os trabalhos que legou, os quais se repartem pelos seguintes domínios: cariologia, citogenética, fisiologia e sistemática. Entre os primeiros, merecem especial menção os referentes às relações entre os nucléolos e os cromossomas satelitíferos, à estrutura dos cromossomas, ao fenómeno que denominou «aglutinação cromática», à acção das radiações e de diversas substâncias sobre a mitose das células dos meristemas radiculares, etc. No segundo grupo, encontram-se os relativos à citogenética da tribo *Aloinae* que intensivamente estudou. Nos do terceiro, destacam-se os que tratam da fisiologia do desenvolvimento e da floração, particularmente na tribo *Aloinae* e nos géneros *Kalanchoë* e *Bryophyllum*. Nos do último grupo, são dignos de ser postos em destaque os relativos à sistemática das *Aloinae*.

RESENDE publicou ainda vários artigos de divulgação e proferiu diversas conferências, escutadas sempre com o maior interesse.

Em colaboração COM BRANQUINHO DE OLIVEIRA e J. A. SERRA, criou, em 1944, a revista *Portugaliae Acta Biologica*, COM duas séries, uma (A) destinada a inserir trabalhos de citologia, genética, citogenética, anatomia, fisiologia, etc. e outra (B) reservada a trabalhos de taxonomia. A esta revista, que rapidamente conquistou no mundo científico um lugar de merecido relevo, dedicava RESENDE O maior carinho. À data do seu falecimento, encontravam-se publicados 9 volumes da série A e 8 da série B.

Foi também ele que, em 1956, após uma viagem ao Brasil, COM o louvável intuito de intensificar as relações científicas entre Portugal e aquele país, lançou, em colaboração COM C. CHAVES (Rio de Janeiro), A. MACHADO (Lunda) e J. PINTO LOPES (então em Lourenço Marques), a *Revista de Biologia*, que contava ainda como redactores A. CHAVES-BATISTA (Recife), M. GUIMARÃES-FILHO (S. Paulo), H. C. MONTEIRO (Rio de Janeiro), A. QUINTANILHA (Lourenço Marques), A. SANTOS-COSTA (Campinas), J. A. SERRA (Lis-

boa), A. DA SILVA (Pelotas) e M. VENTURA (Fortaleza).
Desta revista encontram-se publicados 5 volumes.

RESENDE prestou ainda a sua colaboração, como conselheiro científico, à Fundação Calouste Gulbenkian. A ele se devem as directrizes que presidiram à instalação do Laboratório de Fisiologia do Desenvolvimento do Centro de Biologia do Instituto Gulbenkian de Ciência daquela Fundação, laboratório cuja direcção lhe seria confiada se a morte o não tivesse arrebatado tão cedo.

FLÁVIO RESENDE foi um professor entusiasta que exerceu profunda influência sobre os seus discípulos, vários dos quais enveredaram pelo caminho trilhado pelo Mestre, no qual muito se têm distinguido, honrando, assim, a memória do Português que tanto pugnou pela elevação do ensino e da investigação científica na nossa Pátria.

PRELIMINARY CONTRIBUTION
TOWARDS A REVISION OF THE GENUS
BRASSAVOLA R. BR. OF THE *ORCHIDACEAE*

by

H. G. JONES

I. HISTORY OF THE GENUS

THE genus *Brassavola* was established by ROBERT BROWN in 1813 on the basis of a species which had been designated *Epidendrum cucullatum* by LINNAEUS in the second edition of *Species Plantarum* (1763). In BROWN'S original diagnosis of the new genus, as published by ATTON, there is no indication as to the origin of the generic name; but it is believed to have honoured the early Italian scientist, Dr. ANTONIO MUSA BRASSAVOLA (1500-1555), a pupil of LEONICENUS, who subsequently became Professor of Logic, Physics and Medicine at the University of Ferrara. This worthy doctor is said to have performed tracheotomy; and he is, moreover, credited with the remarkable achievement of having diagnosed more than 200 different kinds of syphilis — which must be a record, even for Renaissance Italy. In former times, of course, the connection between the *Orchidaceae* and things sexual was by no means so recondite as it has become in our own more sophisticated age; the word orchid itself being derived from the Greek *orchis*, meaning «testicle». And in the latter connection, it may also be of passing interest to note that some orchid-growers have claimed to find a certain resemblance between the fringed lip of *Brassavola Digbyana* and the female erogenous zone.

The first attempt to divide the genus *Brassavola* into sections was made by the English botanist, R. A. ROLFE, in 1902. ROLFE proposed three sections of the genus, which he named *Cuneilabia*, *Sessililabia* and *Grandiflorae* but inas-

much as the international code of botanical nomenclature requires that «the subgenus or section including the type species of the correct name of the genus to which it is assigned repeats that name unaltered as its epithet», ROLFE'S § *Sessililabia* must be changed to § *Brassavola*. This nomenclatural adjustment is proposed formally below.

The two species which comprised ROLFE'S § *Grandiflorae* have always been a subject of controversy. They were originally assigned to *Brassavola* by LINDLEY, but were transferred to *Laelia* by BENTHAM in 1881; and in 1918, RUDOLF SCHLECHTER established an entirely new genus for these two taxa, which he named *Rhyncholaelia*. The treatment which these two species has received at the hands of modern taxonomists can hardly be considered more enlightened, for they have been moved back and forth between *Brassavola* and *Laelia* with bewildering regularity; but the only serious student who subsequently accepted SCHLECHTER'S genus was Dr. L. O. WILLIAMS in his enumeration of the Central American *Orchidaceae* published in 1956. We note, however, that only a few years earlier, in his treatment of the orchids of Mexico (1951), Dr. WILLIAMS had followed BENTHAM in assigning these two species to the genus *Laelia*.

It is our opinion that these two species fit better into the genus *Brassavola* than they do elsewhere: consequently, we have retained LINDLEY'S original classification; and since we do not consider them sufficiently distinct from the other species of *Brassavola* to warrant their segregation as a separate genus, we have reduced SCHLECHTER'S *Rhyncholaelia* to a synonym of *Brassavola*. As ROLFE pointed out at the beginning of this century, the two species in question bear only the most superficial resemblance to the genus *Laelia* Lindl.; and had BENTHAM first undertaken a critical study of the two taxa, it is doubtful whether he would ever have proposed their transfer to *Laelia*. The whole position in regard to these two species has been rather nicely summarized by Dr. ROBERT L. DRESSLER in an article published in *The Orchid Review* in 1959. Table I, below, contains a list of the main features by which *Laelia* and *Brassavola* may be distinguished from each other.

In his review of the remaining species of *Brassavola* which he published in 1919, SCHLECHTER proposed four sectional aggregations: he altered the spelling of ROLFE'S *Cuneilabia* to *Cuneilabium*; he changed the name *Sessilabia* to *Eubrassavola*; and finally, he proposed two entirely new sections which he named *Prinoglossum* and *Conchoglossum*.

TABLE I

<i>Laelia</i>	<i>Brassavola</i>
(1) Plants with distinctly thickened pseudobulbs or long stems.	(1) Plants with short, slender stems.
(2) Leaves bright green or dark green.	(2) Leaves pale green or greyish green.
(3) Flowers coloured.	(3) Flowers greenish white.
(4) Capsule without a long, sterile beak.	(4) Capsule with a long, sterile beak.
(5) Clinandrium entire.	(5) Clinandrium toothed.

In our opinion, the characters upon which these two sections were founded appear to be entirely superficial; and cannot, therefore, be considered of sufficient importance to warrant the treatment accorded to them by SCHLECHTER. In the following synopsis of the sections of *Brassavola*, we have, therefore, reduced the names of SCHLECHTER'S sections to synonymy under the appropriate sections of ROLFE'S system, which, of course, has chronological priority. In the same article, SCHLECHTER also described a number of «new species», which have been reduced by subsequent taxonomists to the synonymy of some of the older concepts.

No further sections were proposed for the genus *Brassavola* until the year 1955, when the Brazilian botanist, Dr. G. F. J. PABST described what he believed to be a new species, *B. fasciculata*. Dr. PABST considered this plant so distinct from the other species of *Brassavola* that its accommodation in that genus required the establishment of a

new section, which he described and named *Aggregatae*. Actually, *B. fasciculata* is distinguished from the earlier *B. ovaliformis* C. Schweinf. (1949) only by the fasciculate form of the inflorescence—the value of which, as a diagnostic feature, is, at the best, but dubious. We have seen this type of inflorescence occurring as an abnormal condition in *B. Digbyana* (§ *Grandiflorae*) and *B. nodosa* (§ *Cuneilabia*); and there is some reason to suspect that it may also occur as such in § *Brassavola*. However, as Dr. PABST states quite clearly that «...specimina omnia inflorescentian fasciculatam habent», we think it advisable to treat *B. fasciculata* as a variety of the older species, thus:

Brassavola ovaliformis* C. Schweinf. var. *fasciculata
(Pabst) H. G. Jones, comb. nov.

Brassavola fasciculata Pabst in Arq. Bot. Est. S. Paulo 3: 126 (1955).

As a result of the above reduction, § *Aggregatae* Pabst must now be considered a synonym of § *Brassavola*, as indicated herein below.

II. GEOGRAPHICAL DISTRIBUTION

Geographically, the distribution of the genus *Brassavola* appears to be spread over a fairly wide area of the American tropics, extending from Mexico in the north, down through the West Indian Islands, to the republics of Central America and South America. According to the records at present available to this writer, Argentina appears to represent the southernmost limit of extension for the genus; but strangely enough, no *Brassavolas* appear to have been recorded so far for Bolivia. It is not impossible, however, that some species may also occur in that country as well as Uruguay and Chile.

In his review of the genus, SCHLECHTER accepted as valid some 16 taxa, consisting of 15 species and only 1 variety. Taking into consideration subsequent additions to the genus as well as those taxa which were accepted by SCHLECHTER

but which we believe should be reduced to synonymy, our preliminary studies on the genus tend to suggest a net reclassification of 15 taxa, consisting of 12 species and 3 varieties, arrived at as follows:

Total taxa accepted by SCHLECHTER in 1919 . . .		16
Add: (a) Species reduced to synonymy by SCHLECHTER to be restored1
(b) Species transferred to <i>Rhyncholaelia</i> by SCHLECHTER to be returned to <i>Brassavola</i>2
(c) New species and varieties described since 19196
		9
		25
Less: (d) Species accepted by SCHLECHTER to be reduced to synonymy9
(e) Post-1919 species to be reduced1
		10
		15

Table II, below, contains an analysis of the geographical distribution of these 15 taxa. For the purpose of this analysis, we have divided the habitat of the genus into three main phytogeographical regions: (a) the West Indies; (b) Middle

TABLE II

Distribution	Genus	§ I	§ II	§ III
West Indies	13 %	2	0	0
West Indies and Middle America	—	0	0	0
West Indies and South America	—	0	0	0
Middle America	40 %	6	3	0
Middle America and South America	—	0	0	0
South America	34 %	5	0	5
Common to all 3 areas	13 %	2	0	1
Total	100 %	15	3	6

America (Mexico and Central America); and (c) South America.

The data given in the above tabulation should form the basis of an interesting study for the ecologist. It is

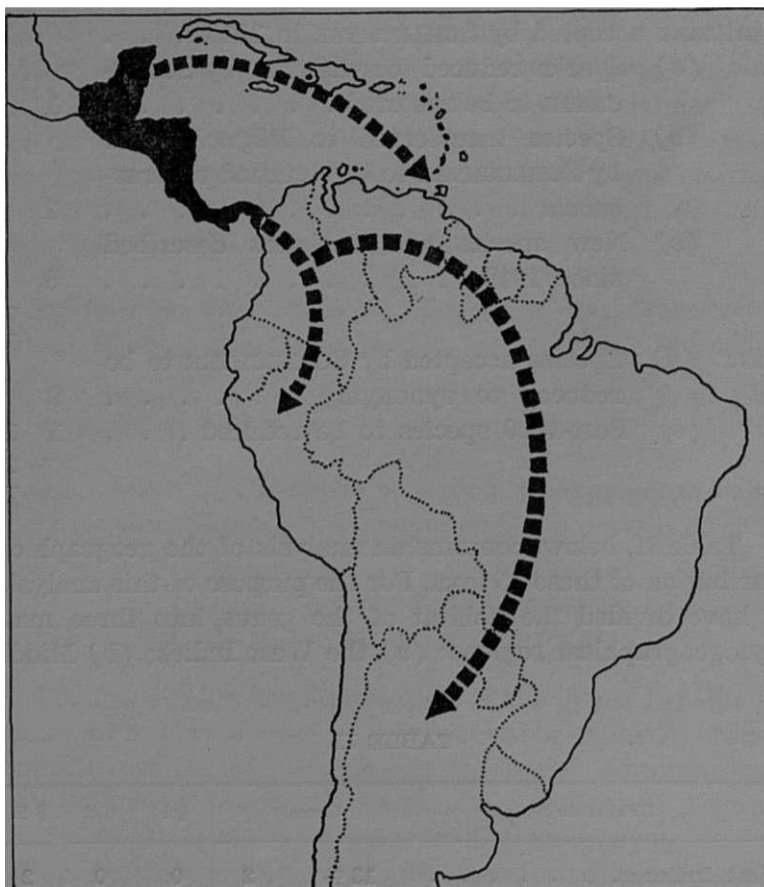


Fig. 1. — Geographical extension of the genus
Brassavola R. Br.

curious to note, for instance, that the group of *Brassavolas* which may possibly provide the connecting link with *Laelia* (§ *Grandifloræ*) are found only in Middle America; while the group of *Laelias* which they most closely resemble (§ *Cattleyodes* Schltr.) are confined to Brazil—the Middle American *Laelias* being of quite a different character.

The fact that Middle America is the only area in which all three biological types of *Brassavola* are found growing together seems to point to this region as the original centre of distribution for the genus as a whole. From this centre, the genus appears to have spread outwards in two main channels: one curving down through the West Indies to the island of Trinidad; and the other passing through Panama to Colombia, where there occurs what may possibly be a secondary centre of distribution. Here the main channel divides into two branches; one extending through Colombia to Peru, and the other curving downwards through Venezuela, Brazil and Paraguay to northern Argentina.

III. BRASSAVOLA AND THE LAELIA-EPIDENDRUM ALLIANCE

The genus *Brassavola* belongs to a group of nine¹ rather fascinating genera of the *Laeliinae* which, for the sake of convenience, we have called the *Laelia-Epidendrum* Alliance. In a recent article published in the *Annalen des Naturhistorischen Museums in Wien*, Vol. 69 (1966), we have endeavoured to indicate, in tabular form, the possible pattern of relationships which may exist between this interesting group of orchid genera. Supplementary to this tabulation, the following artificial key may also be of assistance in identifying the members of this group.

Key to the *Laelia-Epidendrum* Alliance

1. Plants with 8 pollina.
 2. Stigma on the front of the column.
 3. Flowers coloured, borne on tall stems.
 4. Lip free of the column. *Laelia*.
 4. Lip joined to base of column *Schomburgkia*.
 3. Flowers greenish white; stems short *Brassavola*.

¹Twelve if we include the three natural hybrid genera, *Laelio-cattleya* (*Laelia* X *Cattleya*), *Pseudolaelia* (*Schomburgkia* X *Encyclia*) and *Renata* (*Schomburgkia* X *Epidendrum*).

H. G. Jones

2. Stigma on the apex of the column.
 5. Leaves short and broad *Sophronitis*.
 5. Leaves long and narrow *Sophronitella*.
1. Plants with 4 pollina.
 6. Plants with long, slender stems *Epidendrum*.
 6. Plants with distinct pseudobulbs.
 7. Lip with horn-like processes *Caularthron*
 7. Lip without horns.
 8. Pseudobulbs short \pm ovoid *Encyclia*.
 8. Pseudobulbs longer \pm fusiform *Cattleya*.

IV. SYNOPSIS

Brassavola R. Br. in Ait. Hort. Kew. ed. 2, 5: 216 (1813).
Rhyncholaelia Schltr. in Beih. Bot. Centr. 36: 477
(1918).

We accept as valid for the genus *Brassavola* the three sections listed below. § *Grandifloræ* consists of three taxa only: two species and one variety, of which full details are provided; but for the sections *Brassavola* and *Cuneilabia* it is not possible at this time to give detailed listings, which must await the completion of studies now in progress. A more detailed account of some of the species and varieties which comprise these two sections will appear in our forthcoming treatment of the genus *Brassavola* in Mexico and Central America, which will be the first instalment of our projected revision of the genus as a whole.

Many of the *Brassavola* species bear exquisitely fragrant flowers— a characteristic which is especially noticeable at night. BARBOSA RODRIGUES named one species *B. fragrans* in 1877, while in its native Central America, *B. nodosa* is known by the beautiful name of «Dama de la Noche». Another species which is remarkable for its nocturnal fragrance is *B. Digbyana*: we have known a plant of this species bearing a single flower to fill an entire room with the haunting fragrance of its subtle perfume.

Key to the Sections of *Brassavola*

- 1. Leaves broad and flat §I. *Grandiflorae*.
- 1. Leaves narrow, terete or semi-terete.
 - 2. Lip sessile §II. *Brassavola*.
 - 2. Lip cuneiform §III. *Cuneilabia*.

§I. *Grandiflorae* Rolfe in Orch. Rev. 10: 69 (1902).

Species typica sectionis: *B. glauca* Lindl.

The three taxa which comprise this section of the genus are confined geographically to the Middle American region.

1. *Brassavola glauca* Lindl. Bot. Reg. 25: 47 (1839).

Bletia glauca Rchb. f. in Walp. Ann. 6: 422 (1861).

Laelia glauca Bth. in Jour. Linn. Soc. 18: 314 (1881)¹.

Rhyncholaelia glauca Schltr. in Beih. Bot. Centr. 36: 477 (1918).

2. *Brassavola Digbyana* Lindl. Bot. Reg. 32: 53 (1846).

Bletia Digbyana Rchb. f. in Walp. Ann. 6: 422 (1861).

Laelia Digbyana Bth. in Jour. Linn. Soc. 18: 314 (1881).

Rhyncholaelia Digbyana Schltr. in Beih. Bot. Centr. 36: 477 (1918).

3. *Brassavola Digbyana* Lindl. var. *fimbripetala* (Ames)

H. G. Jones in Orch. Rev. 70: 234 (1962).

Laelia Digbyana Bth. var. *fimbripetala* Ames in Amer. Orch. Soc. Bull. 1: 59 (1932).

Rhyncholaelia Digbyana Schltr. fma. *fimbripetala* A. D. Hawkes in Orch. Rev. 72: 262 (1964).

¹ In his two monographs on the orchids of Mexico and Central America, Dr. L. O. WILLIAMS gives the original place of publication for BENTHAM'S names, *Laelia glauca* and *L. Digbyana* as «ex JAKSON, Index Kew, 2: 21, 1895»; but these names were first published in *The Journal of the Linnaean Society*, Vol. 18 (1881).

Mr. HAWKES' original publication of the name *R. Digbyana* fma. *fimbripetala* cannot be considered valid as it appeared in an article which he published in the mimeographed *Orchid Weekly*—thereby failing to comply with the international code of botanical nomenclature. Unfortunately, the author has chosen this issue to criticize the correctness of our own validly published combination, simply because it appeared in a footnote and not in the main text of the article in which it was published—a procedure which he describes as «singularly awkward and frowned upon by botanists»! Fortunately, there is no provision in the international code whereby a validly published name ceases to be so simply because it was published in a footnote. Unfortunately, Mr. HAWKES' superfluous name must now be considered a validly published synonym, since he chose to reprint his article in *The Orchid Review*.

The three taxa which comprise the above section of the genus *Brassavola* may be distinguished from those of the two ensuing sections by their relatively broad, flat leaves, and large, showy flowers.

§II. *Brassavola*

§ *Sessililabia* Rolfe in Orch. Rev. **10**: 67 (1902).

§ *Eubrassavola* Schltr. in Orchis **13**: 45 (1919).

§ *Prinoglossum* Schltr. in Orchis **13**: 45 (1919).

§ *Conchoglossum* Schltr. in Orchis **13**: 45 (1919).

§ *Aggregatae* Pabst in Arq. Bot. Est. S. Paulo **3**: 126 (1955).

Species typica sectionis: *B. cucullata* (L.) R. Br. in Ait. Hort. Kew. ed. 2, 5: 216 (1813); *Epidendrum cucullatum* L. Sp. Pl. ed. 2: 1350 (1763); *Cymbidium cucullatum* Sw. in Nov. Act. Ups. 6: 33 (1799); *Bletia cucullata* Rchb. f. in Walp. Ann. 6: 433 (1861).

This is the typical section of the genus, the *species typica* of this section being also the generic type of *Brassavola*. Although superficially dissimilar, this species is, in certain respects, so closely related to *B. Digbyana* (§ *Grandiflorae*) that it seems doubtful whether these two concepts should be placed in different sections of *Brassavola*, far less

in separate genera as SCHLECHTER proposed. We first drew attention to this fact in an article published in *The Orchid Review* in 1962; but unfortunately, our remark was completely misunderstood by Mr. A. D. HAWKES, who used this misunderstanding as the basis of a rather unfortunate piece of criticism which he published first in *The Orchid Weekly* (1963) and then reprinted in *The Orchid Review* (1964a). By applying our words incorrectly to *B. Digbyana* and *B. glauca*, instead of *B. Digbyana* and *B. cucullata* as we wrote them, Mr. HAWKES made it appear as though we had suggested the possibility of *B. Digbyana* and *B. glauca* being placed in separate sections of *Brassavola*, or different genera, which, of course, was quite absurd.

Unfortunately, the original Linnaean name upon which BROWN based *Brassavola cucullata* is not represented by an actual specimen in the Linnaean herbarium. The original *Epidendrum cucullatum* of LINNAEUS was based upon a plant illustrated by PLUMIER in 1758, which must, therefore, be considered the lectotype of *B. cucullata*. The actual plant from which BROWN derived his conception of the genus had been introduced from the West Indies by Rear Admiral WILLIAM BLIGH in 1793, and had flowered for the first time in England in the collection of Mr. EDWARD WOODFORD in September, 1801. It was from this plant that SIMS obtained the illustration which he published in *The Botanical Magazine*, t. 543, and to which BROWN refers in his original diagnosis.

As in the species of § *Grandiflorae*, the flowers of *B. cucullata* are usually borne singly: «B. caule uniflora... Single flower'd Brassavola» BROWN called it. In recent years, however, descriptions have been published which state that the inflorescence of this species sometimes bears two or more flowers¹. We have never observed this phenomenon

¹ This mistake—if it is a mistake—may have arisen from the original PLUMIER plate upon which the species was based, and which shows a 2-flowered inflorescence, consisting of 1 fully-expanded flower and 1 bud. It should be borne in mind, however, that the same illustration also shows the stem of the plant bearing 2 leaves—which is certainly incorrect.

ourselves; but if it does occur, we believe that it should be regarded as an abnormal condition of the type which we mentioned earlier as occurring in some of the other species. *B. cucullata* is also remarkable for the very prolonged beak to the ovary — yet another feature which it shares in common with *B. Digbyana* of § *Grandiflorae*.

The species of this section may be distinguished from those of § *Grandiflorae* by their smaller flowers and narrow ± terete leaves. From the species of § *Cuneilabia*, they may be distinguished by the form of the labellum, which is sessile, broadening outwards from the base.

§III. *Cuneilabia* Rolfe in Orch. Rev. 10: 65 (1902).

Species typica sectionis: *B. nodosa* (L.) Lindl. Gen. & Sp. Orch. PL: 114 (1831); *Epidendrum nodosum* L. Sp. Pl.: 953 (1753); *Cymbidium nodosum* Sw. in Nov. Act. Ups. 6: 33 (1799); *Bletia nodosa* Rchb. f. in Walp. Ann. 6: 433 (1861).

As in the case of *B. cucullata*, the original Linnaean name upon which *B. nodosa* was based is not substantiated by any specimen in the Linnaean herbarium. The Linnaean protologue covers several elements, of which the plate and description cited under the designation «*Epidendron curassavicum orchidi affinis, folio crasso sulcato. Herm. parad. 187. t. 187*» (201) appears to provide the best lectotype for *B. nodosa*. This taxon appears to be the most geographically widespread of all the *Brassavola* species.

LINDLEY'S conception of *B. nodosa* also contained two distinct elements at first; but fortunately, he made it quite clear that the specific characters were drawn from the plant illustrated by JACQUIN in 1763, which corresponds with the lectotype mentioned above — as it does with the WRIGHT collection from Nicaragua, which subsequently found its way into LINDLEY'S herbarium, and which he came to associate with this name. The foreign element which LINDLEY at first included in his conception of *B. nodosa* was the plant cited by LINNAEUS as «*Viscum delphinii flore minus, petalis angustioribus, radice fibrosa. Sloan. jam. 120. hist. 1.*

p. 251. t. 125. f. 3»¹. The latter was subsequently described by GRISEBACH as *B. Sloanei* in 1864, but probably represents the same thing as LINDLEY'S *B. subulifolia* (1831).

Some years ago, we received from the late Dr. H. P. S. GILLETTE of Trinidad, under the name *B. nodosa*, a curious little plant which subsequently turned out to be a new species. We are pleased to take advantage of this opportunity to describe the plant below and name it in honour of its collector. It is somewhat related to *B. nodosa*, but may easily be distinguished by the dwarf habit, the relatively tall flower-scape, the erect dorsal sepal, and the rather peculiar, «eurlled-up» form of the labellum, which does not expand fully as in the other species of the genus.

Brassavola Gillettei H. G. Jones, sp. nov.

Affinis *B. nodosae* a habitu et labello bene differt. Epiphytica, erecta, usque ad 28 cm. alta : radicibus filiformibus, flexuosis, glabris; rhizomate brevi, decumbente; caulibus unifoliatis, circa 4 cm. longis; folio erecto, anguste elliptico, acuto, circa 7 cm. longo, circa 9 mm lato; scapo gracili erecto, unifloro vel bifloro, circa 17 cm. longo; ovario cum pedicello gracili, glabro, circa 3 cm. longo. Flores expansi circa 8 cm. diametro: sepalis linearibus, acutis, circa 4.6 cm. longis, circa 3 mm. latis; petalis anguste linearibus, acutis, circa 4.5 cm. longis, circa 1 mm. latis; labello circa 3.5 cm. longo, parte basilari angustato, parte anteriore late ovali, medio circa 3 cm. lato; columna generis, circa 5 mm. longa.

Type: Trinidad, without exact location (Herb. Jones. B. 38).

Table III, below, contains a list of the main differences by which *B. Gillettei* may be distinguished from *B. nodosa*.

The species of § *Cuneilabia* may be distinguished from those of § *Grandiflorae* by their smaller flowers and narrow

¹ LINNAEUS also cited «β. Viscum radice bulbosa minus, delphinii flore rubro specioso. *Sloan.jam.* 119. *hist.* 1. p. 250. t. 121. f. 2»; but the latter is quite a different plant, which is now known as *Broughtonia sanguinea*.

± terete leaves; and from § *Brassavola* by the cuneiform shape of the labellum, the base of which is attenuated to a narrow claw-like tube.

TABLE III

<i>B. nodosa</i>	<i>B. Gillettei</i>
(1) Flower-scape shorter than the leaf.	(1) Flower-scape twice as long as the leaf.
(2) Dorsal sepal curving forward towards the opening of the lip.	(2) Dorsal sepal erect.
(3) Lip fully open.	(3) Margin of the lip curving inwards.

ACKNOWLEDGEMENTS

We are grateful to the following persons and institutions for very kindly providing photocopies of extracts from a number of publications which were not available in any of the libraries here in Barbados: to Dr. W. T. STEARN and the librarian, both of the Department of Botany in London's British Museum (Natural History), and to the librarian of the Botanischer Garten und Museum, Berlin-Dahlem. Our thanks are also due to Dr. G. F. J. PABST of the Herbarium Bradeanum in Rio de Janeiro for providing reprints of his papers, and to Sir GEORGE TAYLOR, Director of the Royal Botanic Gardens, Kew, for permission to reproduce Plate I, which is copyright.

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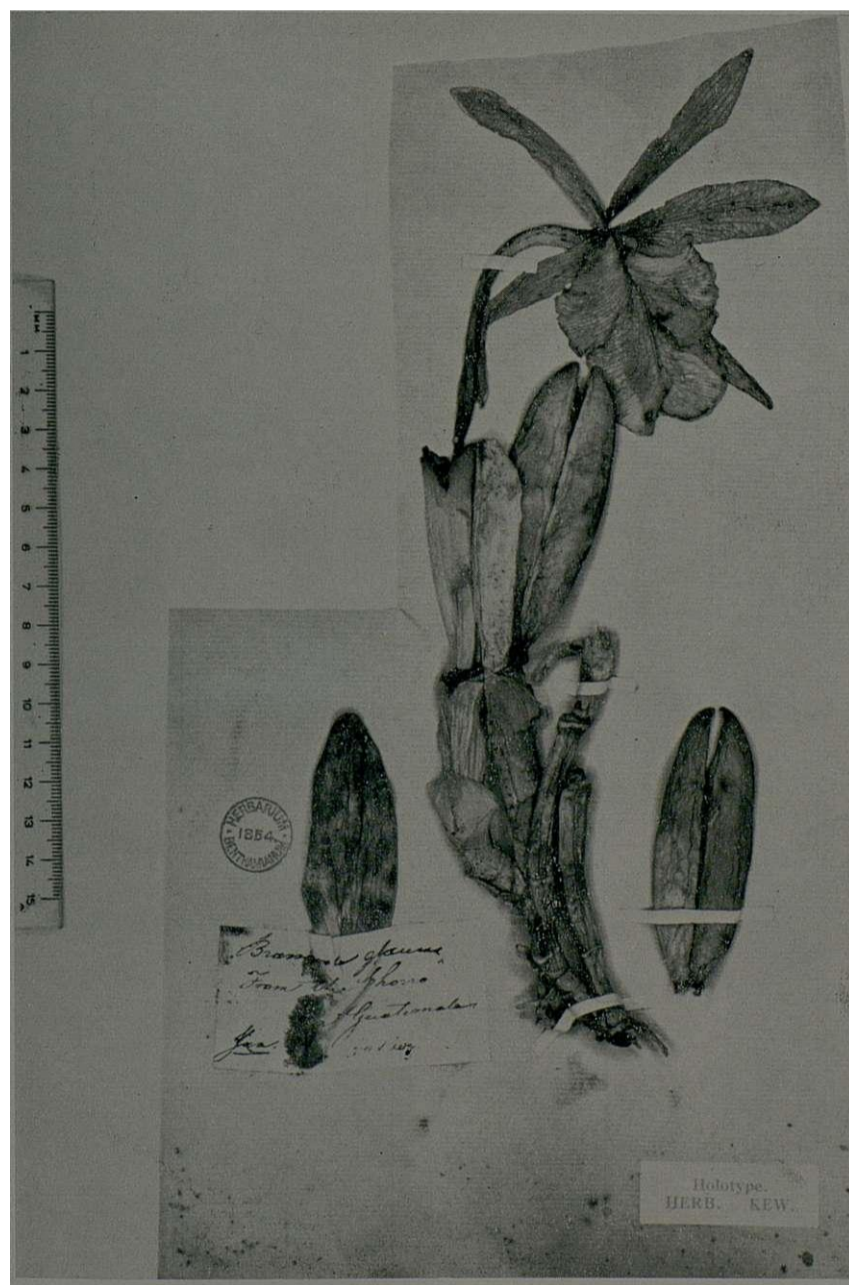
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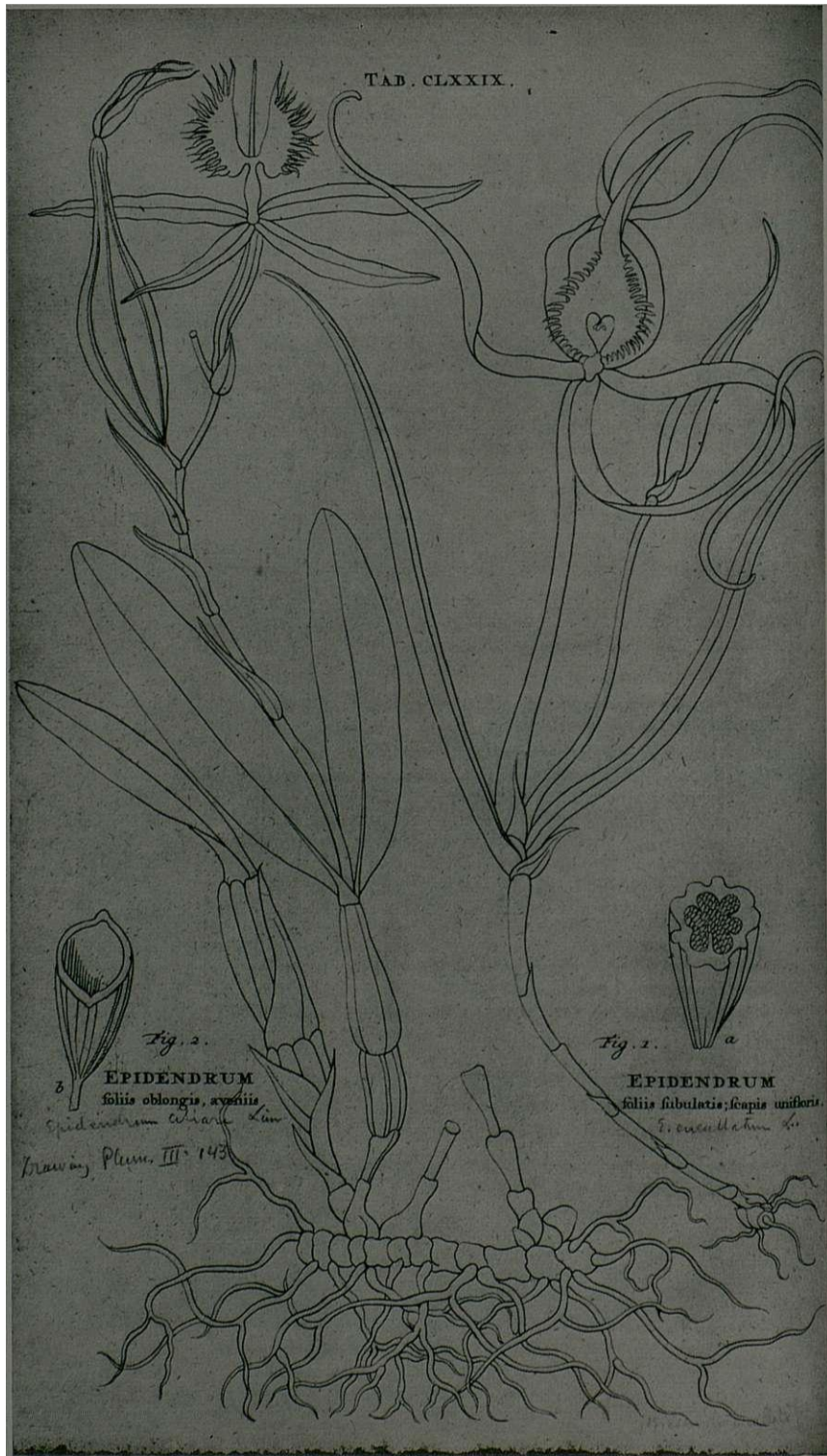
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Brassavola glauca Lindl.
(TYPE: Kew Herbarium). Species typica § *Grandi florum*.



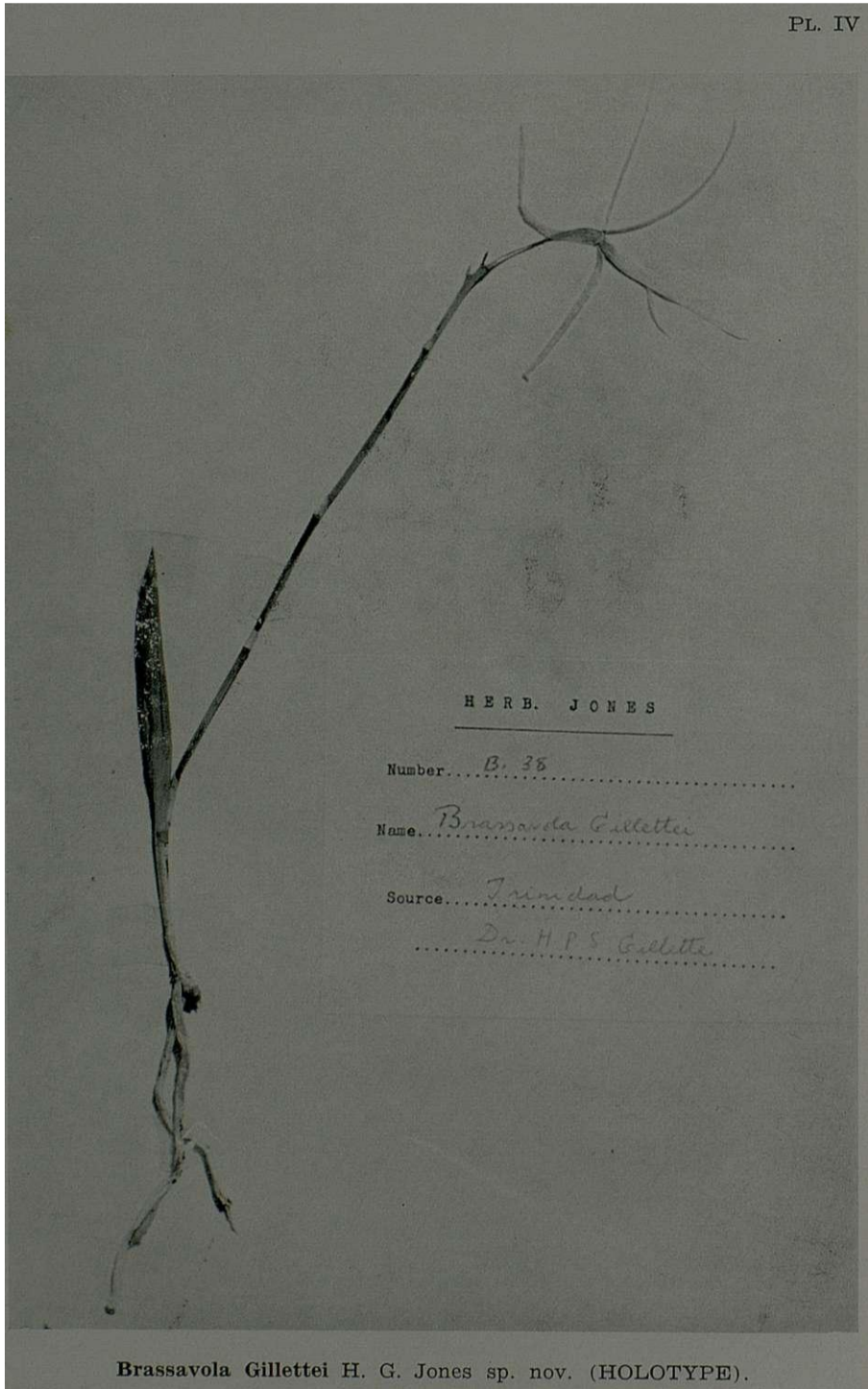
Brassavola cucullata (L.) R. Br.
(LECTOTYPE: Plumier, 1758). Species typica § *Brassavola*.

2.187.

Orchidi affinis.
EPIDENDRON *Coraffavicum*
folio crasso Sulcato.



Brassavola nodosa (L.) Lindl.
(LECTOTYPE: Hermann, 1698). Species typica § *Cuneilabia*.



HERB. JONES

Number *B. 35*

Name *Brassavola Gillettei*

Source *Trinidad*
Dr. H. P. S. Gillettei

Brassavola Gillettei H. G. Jones sp. nov. (HOLOTYPE).

BREVES NOTAS SOBRE LICOPODIÁCEAS

por

J. DE CARVALHO E VASCONCELLOS

&

J. DO AMARAL FRANCO

NA revisão de pteridófitos do Continente e Ilhas Adjacentes a que recentemente procedemos, tivemos oportunidade de, nas Licopodiáceas, estabelecer um novo género e uma nova combinação subespecífica, e bem assim confirmar a existência do *Lycopodium clavatum* L. em Portugal.

- 1) **Huperzia selago** (L.) Schrank & Mart. subsp. **suberecta** (Lowe) Franco et Vasc., nov. comb.

Lycopodium suberectum Lowe, Prim. Fl. Mad. 9 (1830).

L. selago ssp. *suberectum* (Lowe) Romariz in Rev. Fac. Ciênc. Lisboa, sér. 2, C, 3: 71, t. 1 f. 3 (1953).

Huperzia selago subsp. *dentata* (Herter) Valentine in Feddes Repert. 69: 44 (1964).

Lycopodium dentatum Herter in Bot. Jahrb. 43, Beibl. Nr. 98: 41 (1909).

O estudo comparativo de espécimes madeirenses e açorianos mostrou a identidade entre *L. suberectum* Lowe e *L. dentatum* Herter, pelo que ambos estes nomes correspondem a um mesmo taxon. Consequentemente, é de adoptar em *Huperzia selago* a nova combinação subespecífica acima proposta, porquanto, nesta categoria, a designação válida mais antiga é *L. selago* ssp. *suberectum* (Lowe) Romariz (1953).

2) **Palhinhaea** Franco et Vasc., nov. gen.

ROTHMALER [in Feddes Repert. **54** (1944) et Flora Europaea 1: 3 (**1964**)] **considera**, como um dos géneros em que foi desdobrado o *Lycopodium* L., o género *Lepidotis* P. Beauv. Acontece, porém, que, segundo HOLUB [in *Preslia* 38 (1): 78 (1966)], este nome genérico é ilegítimo porque PALISSOT DE BEAUVOIS nele também incluiu a espécie *Lycopodium clavatum* L., que, por sua vez, é o tipo do género *Lycopodium* L. **s. str.** Consequentemente, à face das vigentes Regras de Nomenclatura, o nome *Lepidotis* P. Beauv. torna-se supérfluo para *Lycopodium* L. e não pode ser usado.

HOLUB (1. c.) **estabeleceu** o novo género *Lycopodiella*, apenas baseado na espécie *Lepidotis inundata* (L.) C. Borner, que designou *LycopodieUa inundata* (L.) Holub. As restantes 3 espécies, também incluídas por ROTHMALER em *Lepidotis*, ficaram sem nome genérico disponível. Sucede que a espécie *Lepidotis cernua* (L.) P. Beauv., ou seja *Lycopodium cernuum* L., difere de *LycopodieUa inundata* por importantes caracteres distintivos quer vegetativos quer reprodutivos, o **que verificámos** pelo exame minucioso de material do antigo *Lycopodium cernuum* L. Desta feita, uma vez desdobrado o género *Lycopodium* L. em vários géneros, há razão bem fundamentada para se considerar um outro novo género baseado na mencionada espécie.

Assim e em homenagem à memória do Professor Doutor RUY TELLES PALHINHA, natural dos Açores e estudioso da flora do Arquipélago, **dedicamos-lhe** o novo género:

Palhinhaea Franco et Vase, nov. gen.

Suffrutex rhizomatosus caulibus erectis ramis sparsis repete breviterque ramosissimis teretibus strobiliferis cernuis subsecundis; folia **subverticillata, conferta**, uncinato-subulata, dimorpha; strobili oblongi, terminales in ramulis lateralibus cernuis brevibus, sporophyllis imbricatis deltoideo-rhomboidalibus et longe acuminatis, per **omnem** ambitum **irregulariter** denticulatis; sporangia subglobosa **prope ad** basin hiantes, sporis reticulatis.

Hoc genus cl. Prof. Doct. RUY TELLES PALHINHA, florum azoricae insigne cultore, grato animo dicamus.

Species typica:

P. cernua (L.) Franco et Vasc., nov. comb. (*Lycopodium cernuum* L., Sp. Pl. 1103. 1753) — Suffrutex ad 80 cm altus, ramosissimus; folia caulinea 3-6 mm longa demum subpatula sed ramulina minora, valde incurva; strobili 5-10 mm longi lutescentes, sporophyllis tenuiter et irregulariter denticulatis.

3) *Lycopodium clavatum* L. Sp. Pl. 1101 (1753).

A existência desta espécie em Portugal foi primeiro referida por J. HENRIQUES, *Esb. Fl. Bacia Mond.*: 13 (1913), obra posterior à 1.^a edição da *Flora de Portugal* de PEREIRA COUTINHO, que não a menciona. Este último autor cita-a porém nas suas *Notas da Flora de Portugal*, VI: 3 (1926) e na 2.^a edição da *Flora*, com a indicação de não ter observado espécime português. Em herborizações mais recentes, esta espécie não voltou a ser encontrada, não existindo qualquer espécime tanto em LISU como em LISI.

O espécime em que tal citação se fundamentou está arquivado em COI e foi colhido por M. FERREIRA em Julho de 1907 na Serra da Estrela, Candieiras, em altitude entre 1700 e 1858m (vide Henriques, *op. cit.* 5). Trata-se dum espécime estéril com as folhas típicas do *L. clavatum* L. (lineares, subaplicadas, terminadas em pêlo hialino de 2 a 3 mm de comprimento) se bem que na quase totalidade inteiras, como de resto sucede em alguns dos exemplares estrangeiros observados em COI e LISI.

STUDIES IN THE
ARUNDINELLEAE (*GRAMINEAE*), VI.

DEVELOPMENT OF GENERIC CONCEPTS

by

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ABSTRACT

The Loudetioid and Tristachyoid (PHIPPS, 1966) groups of the *Arundinelleae* are regions of great phenetic diversity (PHIPPS, 1964) in which there is very great parallelism and in which no species-groups exist that are simultaneously very homogeneous and widely separated from other such *Arundinellean* groups.

Three main phases in the development of generic concepts in the Loudetioid-Tristachyoid region may be noted. In the early phase *Tristachya* (*sens. lat.*) was recognised in essentially modern form but *Loudetia* species were almost always incorrectly described under *Trichopteryx*. Consequently the really serious problem had not emerged. During the consolidation phase of HUBBARD *Loudetia* was enormously enlarged, mainly by transfer from *Trichopteryx*. However, this move resulted in a very difficult *Loudetia-Tristachya* demarcation.

Attempts at resolving this demarcation (the modern period) include those of CONERT, who produced a third genus, *Loudetiopsis*, from elements of both and those of JACQUES-FÉLIX, who split *Loudetiopsis* and of PHIPPS who followed JACQUES-FÉLIX but in addition fragmented the remainder of *Tristachya* and *Danthoniopsis*.

Arundinella has remained essentially unchanged through all periods, except for the splitting off of *Jansenella*. It has been least confused with other *Arundinellean* genera and most confused with non-*Arundinellean* ones.

It is suggested that theoretically acceptable solutions await a multicharacter Adansonian numerical analysis.

INTRODUCTION

There has been considerable fluidity in both the generic limits and in the number of genera accepted as belonging to the tribe *Arundinelleae*. The reasons for this, as stated in PHIPPS (1964, pp. 92-94) are undoubtedly, on the one hand, the strong parallelism existing in the group and, on the other, the difficulty of finding unique character sets by which to define certain genera. The present paper is offered as an aid to clarifying the taxonomic history of the tribe, thereby helping to pinpoint the problematical regions. It will be seen that the major turning-point in understanding appears with HUBBARD'S (1934, 1935, 1936a and b and 1937) and KENG'S (1936) works, those of the first author dealing mainly with the great complex of African taxa (nearly all the non-*Arundinella*), and that of KENG being the first major study of *Arundinella*, which is largely non-African. The taxonomic names used in this paper, including the terms Tristachyoid, Loudetioid and Danthoniopsoid groups, follow PHIPPS (1966) unless otherwise stated.

THE EARLY PERIOD

By the middle 1930's six genera of *Arundinelleae*, *Arundinella* (1823), *Tristachya* (1829), *Trichopteryx* (1836), *Loudetia* (1854), *Gilgichloa* (1914), and *Danthoniopsis* (1916) had been described but the generic distinctions among three of them: *Loudetia*, *Tristachya* and *Trichopteryx* (especially between *Trichopteryx* and *Loudetia*) had been not at all clear to most earlier authors (e. g. STAPF, K. SCHUMANN, PILGER, CHIO VENDA, DE WILDEMAN, VANDERYST, etc.). The following treatment considers the taxonomic history of each pre- 1934 generic name in turn.

a) **Arundinella** (Table I). In this genus of approximately 47 species (PHIPPS, 1966) there are 106 specific epithets dating to before KENG'S monograph (1936) of Asiatic *Arundinella*. Of these 106 names 93 are today considered as belonging to *Arundinella* species. The ten names incorrectly

TABLE I
 Synonymy of names described in *Arundinella* prior to 1936, omitting the 93 names remaining
 in *Arundinella* (presently accepted names in italics). Basionyms with asterisks

Author	Date	Tristachyoid affinities (1966)	Loudetioid affinities (1966)	Trichopteryx (1966)	Other affinities (1966)
TRINIUS	1831		<i>A. flammida</i> * (<i>Loudetia flammida</i>)		
THWAITES	1864				<i>A. avenacea</i> * (<i>Jansenella griffithiana</i>)
HOOKEE fil.	1864			<i>A. elegantula</i> * (<i>Trichopteryx elegantula</i>)	
BENTHAM	1878				<i>A. schultzi</i> * (<i>Axonopus semialatus</i>)
HACKEL	1884		<i>A. stipoides</i> * (<i>Loudetia stipoides</i>)		
HOOKEE fil.	1896				<i>A. hookeriana</i> * (<i>Calamagrostis pilosula</i>)
VANDERYST	1920			<i>A. funaensis</i> * (<i>Trichopteryx dregeana</i>)	
MEZ	1921		<i>A. hildebrandtii</i> * (<i>Loudetia stipoides</i>)		
VANDERYST	1922			<i>A. kunu</i> * (<i>Trichopteryx dregeana</i>)	
CHIOVENDA	1922			<i>A. marungensis</i> (<i>Trichopteryx marungensis</i>)	

assigned to *Arundinella* include two non-Arundinelleans (*Axonopus semialatus* and *Calamagrostis pilosula*—described respectively as *Ar. schultzei* and *Ar. hookeriana*), three *Trichopteryx* species (described as *Arr. elegantula*, *funaensis*, *kunu* and *marungensis*), two *Loudetias* (described as *Arr. flammida*, *hildebrandtii* and *stipoides*) and *Jansenella griffithiana* (described as *Ar. avenacea*). In addition, 3 *Arundinella* names were of unknown application.

Arundinella was described by RADDI in 1823 [type: *Arundinella brasiliensis* Raddi = *A. hispida* (Humb. and Bonpl.) Kuntze; based on *Andropogon hispidus* Humb. and Bonpl.]. After 1823, 10 *Arundinella* species were first described in other genera, always, as it happened, in non-Arundinellean genera, the last such case being in 1918. There are also examples of names which were described under genera that are synonyms for *Arundinella* (q. v., p. 43).

A remarkable fact emerging from Tables I and VI (summarised in Table VII) is that although there has been some confusion between *Arundinella* and certain non-Arundinellean genera there has been very little confusion with other *Arundinelleae*.

So stable a nomenclatural history is strong circumstantial evidence for the naturalness of the genus. The main lines of earlier authors are followed by HUBBARD and KENG.

b) *Tristachya* (Table II). *Tristachya* was described by NEES in 1829 and is accordingly chronologically the second valid generic name in the tribe. From that date until 1934 there was a total of 53 specific epithets described. Of these, 4 are now regarded as being Danthoniopsoid, 2 belong to *Dilophotriche*, 1 to *Trichopteryx*, 8 to the Loudetiod group and the remaining 38 are Tristachyoid.

It is abundantly clear that from 1829 right up to the present day a fairly general concept of *Tristachya* (or Tristachyoid genera as a single group) has held, *i. e.* mainly those taxa with medium to large spikelets in lax or dense triads.

TABLE 11

Synonymy of names described in *Tristachya* prior to 1934
 . (presently accepted names, if differing, in italics).
 Basionyms with asterisks.

Author	Date	Tristachyoid affinities (1966)	Loudetioid affinities (1966)	Other affinities (1966)
NEES	1829	<i>T. chrysothrix</i> * (<i>Diandrostachya chrysothrix</i>)		
NEES	1829	<i>T. leiostachya</i> *		
NEES	1829	<i>T. leucothrix</i> * (<i>Apochaete hispida</i>)		
KUNTH	1833	<i>T. mexicana</i> * (<i>T. avenacea</i>)		
NEES	1841			<i>T. barbata</i> * (<i>Xerodanthia barbata</i>)
NEES	1841		<i>T. simplex</i> * (<i>Loudetia simplex</i>)	
HOCHSTETTER	1846	<i>T. monocephala</i> * (<i>Apochaete hispida</i>)		
RICHARD	1851		<i>T. arundinacea</i> * (<i>Loudetia arundinacea</i>)	
RICHARD	1851		<i>T. elegans</i> (<i>Loudetia simplex</i>)	
STEUDEL	1855			<i>T. microstachya</i> * (<i>Dilophotriche tristachyoides</i>)
SCHWEINFURTH and ASCHERSON	1867	<i>T. superba</i>		
FRANCHE	1882			<i>T. somalensis</i> * (<i>Xerodanthia barbata</i>)
BOISSIER	1884			<i>T. stocksii</i> * (<i>Xerodanthia stocksii</i>)

TABLE II

(Continued)

Author	Date	Tristachyoid affinities (1966)	Loudetioid affinities (1966)	Other affinities (1966)
CHIOVENDA	1891			<i>T. brichettiana</i> * (<i>Xerodanthia barbata</i>)
STAFF	1895	<i>T. decora</i> * (<i>Zonotriche decora</i>)		
K. SCHUMANN	1895			<i>T. dregeana</i> (<i>Trichopteryx dregeana</i>)
K. SCHUMANN	1895	<i>T. inamoena</i> * (<i>Piptostachya inamoena</i>)		
HACKEL	1895	<i>T. rehmannii</i> * (<i>Dolichochoete rehmannii</i>)		
FRANCHET	1895	<i>T. thollonii</i> * (<i>Apochaete thollonii</i>)		
STAFF	1897	<i>T. biseriata</i> * (<i>Dolichochoete biseriata</i>)		
STAFF	1897	<i>T. glabra</i> * (<i>Dolichochoete rehmannii</i>)		
STAFF	1897			<i>T. tuberculata</i> * (<i>Dilophotriche</i> sp.)
K. SCHUMANN	1897	<i>T. nodiglumis</i> * (<i>Dolichochoete nodiglumis</i>)		
RENDLE	1899	<i>T. huillensis</i> * (<i>Muantijamvella huillensis</i>)		
RENDLE	1899	<i>T. welwitschii</i> * (<i>Dolichochoete nodiglumis</i>)		
SCRIBNER and MERRILL	1901	<i>T. avenacea</i>		

TABLE II

(Continued)

Author	Date	Tristachyoid affinities (1966)	Loudetioid affinities (1966)	Other affinities (1966)
SCRIBNER and MERRILL	1901	T. laxa *		
HACKEL	1902		T. parviflora * (<i>Loudetiopsis ambiens</i>)	
PILGER	1907	T. superbiens * (<i>Dolichochaete nodiglumis</i>)		
STAPP	1912	T. chevallieri * (<i>Diandrostachya chevallieri</i>)		
BUSCALIONI and MUSCHLER	1913	T. helenae * (<i>Dolichochaete rehmannii</i>)		
BUSCALIONI and MUSCHLER	1913	T. pilgeriana * (<i>Zonotriche decora</i>)		
HITCHCOCK	1913	T. angustifolia *		
CHIOVENDA	1914	T. elymoides * (<i>Apochaete thollonii</i>)		
CHIOVENDA	1914	T. granulosa * (<i>Apochaete hispida</i>)		
PILGER	1914		T. thorbeckii * (<i>Loudetia annua</i>)	
CHIOVENDA	1919	T. aurea * (<i>Piptostachya inamoena</i>)		
DE WILDEMAN	1919	T. bequaertii (<i>Dolichochaete bequaertii</i>)		
DE WILDEMAN	1919	T. hockii * (<i>Dolichochaete hockii</i>)		

TABLE II

(Continued J)

Author	Date	Tristachyoid affinities (1966)	Loudetioid affinities (1966)	Other affinities (1966)
DE WILDEMAN	1919	<i>T. homblei</i> * (<i>Apochaete thollonii</i>)		
DE WILDEMAN	1919	<i>T. ringoetii</i> * (<i>Piptostachya inamoena</i>)		
DE WILDEMAN	1919	<i>T. vanderystii</i> * (<i>Dolichochoaete nodiglumis</i>)		
VANDERYST	1920	<i>T. mukuluensis</i> * (<i>Apochaete hispida</i>)		
VANDERYST	1920		<i>T. anthoxanthoides</i> * (<i>Loudetia vanderystii</i>)	
VANDERYST	1922	<i>T. butuluensis</i> * (<i>Dolichochoaete nodiglumis</i>)		
STENT	1923	<i>T. pedicellata</i> *		
STENT	1924	<i>T. pallida</i> * (<i>Dolichochoaete biseriata</i>)		
CAMUS	1926	<i>T. humbertii</i> * (<i>Isalus humbertii</i>)		
PETER	1930	<i>T. atricha</i> * (<i>Dolichochoaete nodiglumis</i>)		
PETER	1930	<i>T. spicata</i> * (<i>Apochaete thollonii</i>)		
STENT and RATTRAY	1933	<i>T. eylesii</i> * (<i>Dolichochoaete nodiglumis</i>)		
CAMUS	1934		<i>T. coarctata</i> * (<i>Loudetia coarctata</i>)	

c) *Trichopteryx* (Table III). *Trichopteryx* is now accepted as possessing eight species, of which five were known to C. E. HUBBARD in 1934. Of the 62 names given in *Trichopteryx* between the time of its initial description (NEES in LINDLEY, 1836) and 1934, 10 are now regarded as *Trichopteryx*, 7 are in the *Tristachyoid* group, 5 are *Danthoniospsoid* and the remaining 40 *Loudetioid*. It is important to note the inability of most workers prior to HUBBARD of distinguishing between *Trichopteryx* and *Loudetia* in their modern senses, a period spanning 80 years.

d) *Loudetia*, sens. Phipps, to 1934 (Table IV). The history of *Loudetia* is entirely different from that of *Arundinella*. Although 27 species of *Loudetia*, sens. Phipps, are recognised by HUBBARD in his work for the Flora of Tropical Africa (HUBBARD, 1934, 1935, 1936a and b, 1937) only 4 *Loudetia* names existed before HUBBARD'S work and of these only 2 are retained in *Loudetia* to this day. These are *Loudetia elegans* Hochst. ex A. Br. nom. illegit. [= *L. simplex* (Nees) C. E. Hubbard] and *L. arundinacea* (Hochst. ex A. Rich.) Steud. In a way, this is very surprising, for although in the modern era (*i. e.* since 1934) there have been problems in delineating *Loudetia* from *Loudetiopsis* and even from *Tristachya* (*sens. str.*), a central core of the genus is nowadays regarded as a very natural entity. In bringing up the numbers of *Loudetia* to 27 by 1937 C. E. HUBBARD made 17 new combinations, 15 of them based on *Trichopteryx* and 2 on *Tristachya*. HUBBARD also described 6 new species while other workers were responsible for the remaining three.

Loudetia was first validly described by STEUDEL (1854) but remained essentially unrecognised until 1934. In the intervening period one *Danthoniopsis* (sens. Hubbard) — *D. barbata* — and one *Tristachya* (*T. superba*) had been incorrectly described under *Loudetia*.

In addition to the new combinations from *Trichopteryx* basionyms mentioned above a further 23 *Trichopteryx* names were described during the early period that would be combined under *Loudetia* to-day were they not synonyms. Only 4 *Tristachya* names are in this situation.

TABLE III

Synonymy of names described in *Trichopteryx* prior to 1934 (presently accepted names, if differing, in italics)

Author	Date	Tristachyoid affinities (1966)	Loudetioid affinities (1966)	Trichopteryx (1966)	Other affinities (1966)
NEES	1836			<i>T. dregeana</i> *	
BENTHAM	1881		<i>T. flammea</i>		
BENTHAM	1881		<i>T. flammida</i> <i>(Loudetia flammida)</i>		
BENTHAM	1881		<i>T. simplex</i> <i>(Loudetia simplex)</i>		
ELLIOT	1891		<i>T. stipoides</i> <i>(Loudetia stipoides)</i>		
ENGLER	1892		<i>T. arundinacea</i> <i>(Loudetia arundinacea)</i>		
ENGLER	1892				<i>T. somalensis</i> <i>(Xerodanthia</i> <i>barbata)</i>
DURAND and SCHINZ	1892				<i>T. barbata</i> <i>(Xerodanthia</i> <i>barbata)</i>
HACKEL	1892		<i>T. elegans</i> <i>(Loudetia simplex)</i>		
STAFF	1895			<i>T. elegantula</i>	
K. SCHUMANN	1895		<i>T. grisea</i> * <i>(Loudetia arundinacea)</i>		

K. SCHUMANN	1895		T. grisea * (<i>Loudetia arundinacea</i>)
K. SCHUMANN	1895		T. spirathera * (<i>Loudetia kagerensis</i>)
K. SCHUMANN	1895		T. kagerensis * (<i>Loudetia kagerensis</i>)
FRANCHET	1895		T. incompta * (<i>Loudetia simplex</i>)
STAPP	1897		T. acuminata * (<i>Loudetia acuminata</i>)
STAPP	1897		T. ambiens (<i>Loudetiopsis ambiens</i>)
STAPP	1897		T. annua * (<i>Loudetia annua</i>)
STAPP	1897		T. camerunensis. * (<i>Loudetia camerunensis</i>)
STAPP	1897		T. flavida * (<i>Loudetia flavida</i>)
STAPP	1897	T. gigantea * (<i>Tristachya superba</i>)	
STAPP	1897		T. hordeiformis * (<i>Loudetia hordeiformis</i>)
STAPP	1897		T. nigriflora * (various <i>Loudetias</i>)
STAPP	1897		T. ramosa * (<i>Loudetia ramosa</i>)

TABLE III

(Continued) 00

Author	Date	Tristachyoid affinities (1966)	Loudetioid affinities (1966)	Trichopteryx (1966)	Other affinities (1966)
K. SCHUMANN	1897		T. glabrata * (<i>Loudetiopsis glabrata</i>)		
CHIOVENDA	1897		T. pennata * (<i>Loudetia pennata</i>)		
RENDLE	1899				T. viridis * (<i>Danthoniopsis viridis</i>)
RENDLE	1899		T. densispica * (<i>Loudetia densispica</i>)		
HACKEL	1901		T. glabra (<i>Loudetia flavida</i>)		
HACKEL	1902			T. brevifolia * (<i>Trichopteryx dregeana</i>)	
PILGER	1902		T. reflexa * (<i>Loudetia kagerensis</i>)		
PILGER	1904	T. kerstingii * (<i>Diandrostachya kerstingii</i>)			
PILGER	1904		T. togoensis * (<i>Loudetia togoensis</i>)		
STAPP	1905		T. crinita * (<i>Loudetia togoensis</i>)		

		r. togoensis.		
STAPP	1905		<i>T. crinita</i> * (<i>Loudetia togoensis</i>)	
STAPP	1905		<i>T. ternata</i> * (<i>Loudetiopsis ternata</i>)	
STAPP	1911		<i>T. cerata</i> * (<i>Loudetia cerata</i>)	
PILGER	1914			<i>T. dinteri</i> * (<i>Jacquesfelixia dinteri</i>)
CHIOVENDA	1914			<i>T. fruticulosa</i> *
CHIOVENDA	1917		<i>T. figarii</i> * (<i>Loudetia togoensis</i>)	
CHIOVENDA	1919	<i>T. superba</i> (<i>Tristachya superba</i>)		
CHIOVENDA	1919			<i>T. catangensis</i> * (<i>Danthoniopsis catangensis</i>)
CHIOVENDA	1919			<i>T. marungensis</i> *
DE WILDEMAN	1920	<i>T. bequaertii</i> * (<i>Tristachya hubbardiana</i>)		
DE WILDEMAN	1920		<i>T. convoluta</i> * (<i>Loudetia arundinacea</i>)	
DE WILDEMAN	1920		<i>T. demeusei</i> * (<i>Loudetia demeusei</i>)	

TABLE III

(Continued) 0

Author	Date	Tristachyoid affinities (1966)	Loudetioid affinities (1966)	Trichopteryx (1966)	Other affinities (1966)
DE WILDEMAN	1920		T. dobbelaerei * (<i>Loudetia arundinacea</i>)		
DE WILDEMAN	1920		T. elisabethvilleana * (<i>Loudetia simplex</i>)		
DE WILDEMAN	1920	T. hockii * (<i>Tristachya superba</i>)			
DE WILDEMAN	1920	T. homblei * (<i>Tristachya superba</i>)			
DE WILDEMAN	1920		T. kapiensis * (<i>Loudetia kagerensis</i>)		
DE WILDEMAN	1920			T. katangensis * (<i>Trichopteryx fruticulosa</i>)	
DE WILDEMAN	1920	T. lualabaensis * (<i>Tristachya lualabaensis</i>)			
DE WILDEMAN	1920			T. mukuluensis * (<i>Trichopteryx dregeana</i>)	
DE WILDEMAN	1920		T. vanderystii * (<i>Loudetia vanderystii</i>) (<i>Loudetia arundinacea</i>)		

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			(<i>Loudetia arundinacea</i>)		
VANDERYST	1920		T. ganaensis * (<i>Loudetia vanderystii</i>)		
VANDERYST	1920			T. sandaensis * (<i>Trichopteryx fruticulosa</i>)	
VANDERYST	1920				T. wasaensis * (<i>Danthoniopsis wasaensis</i>)
VANDERYST	1922		T. lembaensis * (<i>Loudetia demeusei</i>)		
HENRARD	1922			T. stolziana * (<i>Trichopteryx elegantula</i> ssp. <i>stolziana</i>)	
CHIOVENDA	1928		T. migiurtina * (<i>Loudetia migiurtina</i>)		
PETER	1930		T. gracilis * (<i>Loudetia simplex</i>)		
PETER	1930		T. phragmitoides * (<i>Loudetia phragmitoides</i>)		
STENT and RATTRAY	1933		T. lanata * (<i>Loudetia lanata</i>)		

TABLE IV

Synonymy of names described in *Loudetia* prior to 1934
(presently accepted names, if differing, in italics)

Author	Date	Tristachyoid affinities (1966)	Loudetioid affinities (1966)	Trichopteryx (1966)	Other affinities (1966)
A. BRAUN	1841		<i>L. elegans</i> * (<i>Loudetia simplex</i>)		
A. BRAUN (nomen)	1841				<i>L. barbata</i> (<i>Xerodanthia barbata</i>)
DE NOTARIS	1852	<i>L. superba</i> * (<i>Tristachya superba</i>)			
STEUDEL	1854		<i>L. arundinacea</i>		
STEUDEL	1854				<i>L. barbata</i> (<i>Xerodanthia barbata</i>)

Thus in the 1854-1934 period new *Loudetia* species were generally described under *Trichopteryx*.

e) **Danthoniopsis** (Table V). *Danthoniopsis* described by STAPF in 1916 (type: *D. gossweileri*, later proving to be *Trichopteryx viridis* Rendle), was not properly re-recognised again until HUBBARD'S work of 1934.

TABLE v

Synonymy of names described in *Danthoniopsis* prior to 1934
(presently accepted names, if differing, in italics).
Basionyms with asterisks

Author	Date	Tristachyoid affinities (1966)	Danthoniopsoid affinities (1966)	Other affinities (1966)
STAPF	1916		<i>D. gossweileri</i> * (<i>Danthoniopsis viridis</i>)	

f) **Gilglochloa**. *Gilglochloa*, described by PILGER in 1914, is a very distinctive genus and its one species has no synonym in any other genus.

Non-Arundinellean Synonyms of Arundinelleae (Table VI)

Descriptions of Arundinellean taxa in genera no longer considered Arundinellean not surprisingly antedate the descriptions of individual genera. In *Arundinella* there are 6 such examples: *Andropogon hispidus* (1806) = *Ischdemum hispidum* (1816) = *Arundinella hispida* (Kuntze 1867) = *A. brasiliensis* Raddi (1823); *Poa hirta* (1784) = *A. hirta*; *Panicum bengalensis* (1820) = *A. bengalensis*; *Holcus ciliatus* and *H. nervosus* (1820) = *A. ciliatus* and *A. nervosus*. In *Tristachya* there are 2: *Avena hispida* (1781) = *T. hispida* = *Anthis-tiria hispida* (1818). In *Danthoniopsis* only 1 example [*Sorghum barbatum* (1841) = *D. barbata*] is known. In *Jansenella* also, only 1 example [*Danthonia griffithiana* (1856) = *J. griffithiana*] occurs.

After the establishment of the appropriate Arundinellean genus the practice continued to occur;—10 further *Arundinella* species appearing in 10 different genera, while no *Tristachyas* and 1 *Loudetia* were so treated. The type species of all Arundinellean genera, however, except *Arundinella*, are first described under an Arundinellean genus.

Arundinella is thus the most difficult genus to distinguish from extratribal genera, a fact reflected also in its early classification into different tribes from other *Arundinelleae*, as discussed by CONERT (1957, pp. 226-227).

Generic Synonyms of the Early Period

A number of synonyms (6) for *Arundinella* exist, as listed and discussed by BOR (1955), but none for other genera except for *Monopogon* (= *Tristachya*). Some (2) of these are later homonyms. These generic names, because of the few species described under each, can have little bearing on generic concepts.

TABLE VI

Synonyms in genera no longer considered Arundinellean genera

Name of Synonym	1937 Arundinellean classification
<i>Avena hispida</i> L. f. (1781)	<i>Tristachya hispida</i>
<i>Poa hirta</i> Thunb. (1784)	<i>Arundinella anomala</i> *
<i>Andropogon hispidus</i> Humb. et Bonpl. (1806)	<i>Arundinella hispida</i>
<i>Ischaemum hispidum</i> Humb. et Bonpl. (1816)	<i>Arundinella hispida</i>
<i>Anthistiria hispida</i> Thunb. (1818)	<i>Tristachya hispida</i>
<i>Panicum strictum</i> Roxb. (1820)	<i>Arundinella bengalensis</i>
<i>Holcus ciliatus</i> Roxb. (1820)	<i>Arundinella ciliata</i>
<i>Holcus nervosus</i> Roxb. (1820)	<i>Arundinella nervosa</i> Nees ex Hook et Arn.
<i>Trichochloa berteroniana</i> Schult. (1824)	<i>Arundinella berteroniana</i>
<i>Piptatherum confine</i> Schult. (1824)	<i>Arundinella confinis</i>
<i>Panicum bengalense</i> Spreng. (1825)	<i>Arundinella bengalensis</i>
<i>Danthonia hispida</i> Spreng. (1825)	<i>Tristachya hispida</i>
<i>Ischaemum peruvianum</i> Kunth (1833)	<i>Arundinella berteroniana</i>
<i>Panicum tristachyoides</i> Trin. (1836)	<i>Tristachya tristachyoides</i>
<i>Sorghum barbulatum</i> Steud. (1841)	<i>Danthoniopsis barbata</i>
<i>Berghausia barbulata</i> Endl. (1841)	<i>Arundinella setosa</i>
<i>Miquelia setosa</i> Nees (1846)	<i>Arundinella setosa</i>
<i>Panicum leptochloa</i> Nees ex Steud. (1854)	<i>Arundinella leptochloa</i>
<i>Danthonia neuroelytrum</i> Steud. (1854)	<i>Arundinella setosa</i>
<i>Danthonia luzonensis</i> Steud. (1854)	<i>Arundinella setosa</i>
<i>Panicum mandschuricum</i> Maxim. (1854)	<i>Arundinella anomala</i> *
<i>Anemagrostis tenella</i> Steud. <i>in syn.</i> (1854)	<i>Arundinella pumila</i>
<i>Danthonia griffithiana</i> C. Muell. (1856)	<i>Jansenella griffithiana</i> **
<i>Panicum williamsii</i> Hance (1866)	<i>Arundinella anomala</i> *
<i>Stipa madagascariensis</i> Baker (1883)	<i>Loudetia madagascariensis</i>
<i>Panicum blephariphyllum</i> Trimen (1885)	<i>Arundinella blephariphylla</i>
<i>Danthonia lasiantha</i> Baker (1890)	<i>Trichopteryx dregeana</i>
<i>Panicum decempedale</i> Kuntze (1891)	<i>Arundinella decempedalis</i>
<i>Panicum zeylanicum</i> Arn. ex Hook. f., nomen (1896)	<i>Arundinella leptochloa</i>
<i>Millium cimicinoides</i> Roxb. ex Hook. f. (1896)	<i>Arundinella setosa</i>
<i>Garnotia japonica</i> Hack. (1902)	<i>Arundinella anomala</i> *
<i>Trisetum latifolium</i> Ridl. (1916)	<i>Arundinella latifolia</i> Ohwi ex Jansen
<i>Garnotia barbulata</i> Merrill (1918)	<i>Arundinella setosa</i>

* Now known as *A. hirta*.** After 1955 only; in 1937 known as *Arundinella avenacea*.

Summary of the early period of generic taxonomy until
HUBBARD (Table VII)

1. The more consistent delimitations in the tribe. *Arundinella*, *Gilgichloa* and the Tristachyoid group have had a fairly stable history though some of the early synonyms of *Arundinella* species are widely scattered among non-Arundinellean generic names.

2. The more inconsistent parts of the tribe. *Trichopteryx* had been a depository for most *Loudetia*, *Danthoniopsoids* and *Trichopteryx* until the great expansion of *Loudetia* at its expense.

3. A distinction between problems concerning *Arundinella* and those concerning other genera. Whereas 2 *Arundinella* names are not believed now to belong to species of *Arundinelleae* and 10 *Arundinella* species were first described outside Arundinellean genera, for all the other members of the tribe only 2 names originate outside the tribe while no names described in these remaining Arundinellean genera have been shown to be attributable to non-Arundinellean taxa.

In truth, at the tribal level, the «typical» Arundinelleae are non-Arundinelloid.

THE CONSOLIDATING WORK OF HUBBARD AND KENG

The seven classifications compared in the next two sections are drawn from studies devoted to the *Arundinelleae per se* (e. g. CONERT and PHIPPS) and also those intended primarily as contributions to regional floras (the remainder). In this section we consider the treatments of the mid-1930's, of C. E. HUBBARD and Y. L. KENG, which together span almost all taxa known in the tribe at that time (see Table VII).

i) HUBBARD (1934, 1935, 1936a and b, 1937). This is the basis for modern work on the tribe and had been developed as described below. HUBBARD'S contribution involved.

a) the recognition of *Loudetia* as a large genus. He increased its two species to 27, most of them drawn from *Trichopteryx*.

TABLE VII
Summary of 1937 Situation

	Present disposition of epithets described in genus named						Number of species accepted for genus in left column first described elsewhere	
	No. of species accepted	No. of epithets	No. of epithets which actually belong	No. of epithets not belonging	No. of epithets not even in Arundinelleae	Name of uncertain application	First described under another Arundinellean name *	First described under a non Arundinellean name
Arundinella (incl. Jansenella)	36	106	93	10	2	3	0	10
Loudetia (sens. PHIPPS)	27	29	28	2	0	0	17	1
Trichopteryx	7	62	10	52	0	0	1	0
Tristachya (sens. Tristachyoid group, PHIPPS 1966)	22	53	38	15	0	0	4	1
Danthoniopsis (sens. HUBBARD)	9	10	10	0	0	0	6	0
Gilgichloa	1	2	2	0	0	0	0	0

Except generic synonyms.

b) the essential maintenance of *Tristachya*, there being merely a few transfers to *Loudetia* and *Danthoniopsis*.

c) the restriction of *Trichopteryx* to a closely-knit group of five species.

d) the development of *Danthoniopsis* by the inclusion of 2 *Tristachya* and 3 *Trichopteryx* species and the description of four more (two with other authors).

e) a difficult boundary between *Tristachya* and *Loudetia*.

It will be noted that HUBBARD'S improvement was made without introducing a single new generic name.

ii) KENG (1936). KENG'S monograph of Asiatic *Arundinella* is important in that it treats the majority of species in that genus, only a few being known outside Asia. But for the retention of *A. avenacea*, KENG'S work confirms a modern circumscription of *Arundinella*. KENG'S work, nevertheless, does not have too much significance from our point-of-view, due to the centre of Arundinellean diversity being African, rather than Asiatic.

MODERN CLASSIFICATIONS

i) CONERT (1957). A world-wide «monograph» though omitting 36 % of the then known species (see PHIPPS, 1966, p. 236). This classification contains 8 genera and somewhat resembles that of HUBBARD, differing as follows: firstly, parts of HUBBARD'S *Tristachya* and *Loudetia* are removed to make the genus *Loudetiopsis*; secondly, part of HUBBARD'S *Loudetia* is placed in *Tristachya*; thirdly, the Asiatic *Jansenella*, described by BOR in 1955, is added and fourthly, the species of PHIPPS'S *Isalus* already described under *Tristachya* (but not treated by HUBBARD, being Malagasian) was placed with *Danthoniopsis*. CONERT'S classification is thus a definite modification of that of HUBBARD, though not a great one. It introduced anatomical studies of the awn and leaf-blade.

ii) JACQUES-FÉLIX (1960, 62). This classification is for West Africa only. Its distinctive feature is to break down CONERT'S *Loudetiopsis* into *Loudetiopsis*, *Diandrostachya* and *Dilophotriche*. From the 5 of HUBBARD'S genera that occur in West Africa there thus arise 8.

iii) PHIPPS (1966, genera). A whole world treatment using narrow generic delimitations. JACQUES-FÉLIX is followed in dividing *Loudetiopsis* (sens. Conert) into three genera, while the remainder of HUBBARD'S sections of *Tristachya* are upgraded to genera. *Danthoniopsis*, sens. HUBBARD, is split into 5 genera while 4 further genera are created. Total 22 genera.

iv) PHIPPS (1966, *op. cit.*, major groups). The above 22 genera arranged into 6 major groups. This classification closely resembles that of HUBBARD, with a very close match between HUBBARD'S genera and PHIPPS'S groups.

v) CLAYTON (in press). West Africa only. Follows CONERT, rather than JACQUES-FÉLIX or PHIPPS.

The five above classifications are shown in Table VIII and Fig. 1 where they are compared with HUBBARD'S treatment.

Similarities between the modern classifications

- 1) The genus *Arundinella* consistently delimited.
- 2) The genus *Trichopteryx* is consistently delimited.
- 3) The Loudetioid group (PHIPPS, 1966).

In all treatments *Loudetia* sens. *str.* appears intact. Since this delimitation contains 38 out of 48 species strong agreement is represented among the classifications. Taxonomic discussion centres on the disposition of the 9 species comprising *Loudetiopsis* sens. Phipps (see below).

- 4) The Tristachyoid group (PHIPPS, 1966):

Again there is major agreement that there are close affinities between most elements in this group. Debate centres on the position of *Diandrostachya* (considered *Loudetiopsis*, *q. v.*, by CONERT and CLAYTON), *Isalus* (considered *Danthoniopsis* by CONERT) and the Old World *Tristachya* sens. *str.* (considered *Loudetia* by HUBBARD).

- 5) The Dilophotrichoid group (PHIPPS, 1966).

This clearly identifiable entity is treated as part of *Tristachya* by HUBBARD, placed in *Loudetiopsis* by CONERT and treated as a genus by JACQUES-FÉLIX and PHIPPS.

- 6) The Danthoniopsoid group (PHIPPS, 1966).

This group is also under considerable agreement, the main area of divergence concerning the disposition of *Isalus*.

TABLE VIII

Comparison of main recent classifications of *Arundinelleae*
(The two columns of initial letters under each classification are to facilitate the discrimination of groups)

HUBBARD, genera (1934-37)	CONERT, genera (1957)	JACQUES-FÉLIX, genera (1960)	PHIPPS, major groups (1966)	PHIPPS, genera (1966)	CLAYTON, genera (in press)
A	A	A	A	Arundinella	A
—	J	—	A	Jansenella	—
L	L	L	L	Loudetia	L
—	—	—	L	Rattraya	—
L	Loud.	Loud.	L	Loudetiopsis	Loud.
				Tristachya	
T	T	—	T	(Tristachya) *	—
L	T	T	T	(Paratristachya) *	T
T	T	—	T	Dolichochaete	—
T	—	—	T	Muantijamvella	—
T	T	T	T	Apochaete	T
T	T	—	T	Piptostachya	—
T	Loud.	Diandr.	T	Diandrostachya	Loud.
T	T	—	T	Zonotriche	—
—	D	—	T	Isalus	—
—	—	—	T	Veseyochloa	—
D	D	—	D	Petrina	—
—	—	—	D	Gazachloa	—
D	D	—	D	Xerodanthia	—
D	D	D	D	Danthoniopsis	D
D	D	—	D	Jacquesfelixia	—
G	G	—	D	Gilgiochloa	—
T	Loud.	Dil.	Dil.	Dilophotriche	Loud.
Tch.	Tch.	Tch.	Tch.	Trichopteryx	Tch.

A = Arundinella; D = Danthoniopsis; Diandr. = Diandrostachya; Dil. = Dilophotriche; G = Gilgiochloa; J = Jansenella; L = Loudetia; Loud. = Loudetiopsis; T = Tristachya; Tch. = Trichopteryx; — = taxon not treated by this author.

* These are sections of HUBBARD'S *Tristachya* and *Loudetia* respectively and are not distinguished by CONERT, PHIPPS, JACQUES-FÉLIX.

Residual Arguments

1) Width of generic limits. This problem is discussed below and cannot be further resolved on subjective grounds.

2) The treatment of *Loudetiopsis* sens. Conert.

The question of the naturalness of *Loudetiopsis* sens. CONERT is undoubtedly the centre of taxonomic argument in the generic delimitation of the tribe if cladistics are to be a criterion. It is worth extracting from Table VIII a further Table (Table IX) illustrating the situation.

TABLE IX

Varying treatments of *Loudetiopsis* sens. CONERT

HUBBARD, 1935-37	CONERT, 1957	JACQUES-FÉLIX, 1960 and PHIPPS, 1966	CLAYTON, in press
Loudetia sect. Pseudotristachya	Loudetiopsis sect. Loudetiopsis	Loudetiopsis	Loudetiopsis
Tristachya sect. Diandrostachya	»	Diandrostachya	Loudetiopsis
Tristachya sect. Dilophotriche	Loudetiopsis sect. Dilophotriche	Dilophotriche	Loudetiopsis

Of the three species-groups represented here it will be noted that *Dilophotricha* is the most consistently recognised. The trend has been towards treating it as a distinct genus, a trend culminated in the present author's (1966) treatment where PHIPPS is unable to assign this taxon to any other major group.

As for *Loudetiopsis*, sens. str., and *Diandrostachya*, two basic treatments exist—that of CONERT and CLAYTON who find difficulty in distinguishing these taxa from each other at all, and that of HUBBARD, JACQUES-FÉLIX and PHIPPS who separate them.

It may fairly be said that the last word remains to be uttered on *Loudetiopsis* sens. lat. (i. e. sens. Conert).

3) The relationship of the Arundinelloid group with other *Arundinelleae*. The taxonomic history suggests as a

possibility, and further investigations into the question are in progress, that *Arundinella* and other Arundinelleae are only distantly related.

DISCUSSION

The strong similarity of the classifications described should be noted. In the main there is a trend from broadly-defined genera (e. g. HUBBARD) to narrowly-defined genera (JACQUES-FÉLIX and PHIPPS), with those of CONERT and CLAYTON standing in a midway position. One of the major problems of Arundinellean classification is thus one of ranking, *i. e.* should supra-specific groups be treated as sub-sections, sections, sub-genera or genera? In order to answer this problem, three criteria relevant to the problem of ranking, as follows, may be considered:

- i) uniformity, *i. e.* consistency of treatment.
- ii) discontinuities, *i. e.* size of difference between taxa.
- iii) homogeneity, *i. e.* so far as possible not too great variability within a taxon.

[A fourth, monophyly, is popular with systematists, but it is generally quite out of place, since, as SOKAL and SNEATH clearly point out (1963 pp. 55-56; see also DAVIS and HEYWOOD, 1964 p. 63) it is illogical and meaningless to attempt phylogenies until after the construction of taxonomic groups and even then phylogenetic considerations must be used with great care or circular argumentation will be involved. Furthermore, since phylogenies are inevitably continuous, serious problems are involved in selecting points at which to delimit taxa, and in deciding on ranking criteria.]

It will be seen that each of the three accepted criteria is in interaction with the other two and cannot be considered separately. Clearly then, with the present (classical) methodology, only the subjective opinions of individual taxonomists are at odds. The classifications are non-testable. In order to make the opinion behind each classification appear more cogent, as a way out of the dilemma, the study of a still greater number of characters has been regularly used for the

satisfaction of the three criteria of rank stated. However, the study in isolated taxonomic regions of more characters does not really meet the demands of **uniformity** of treatment. Consequently, an answer that is intellectually satisfying cannot be expected to be reached without utilising the rigorous approach given in an empirical numerical taxonomy.

CONCLUSIONS

Three distinct phases can be identified in the development of Arundinellean taxonomy. They might be called: the early **phase**; the consolidation **phase**; and the modern phase. The early phase commences with the establishment of the genus *Arundinella* by RADDI in 1823 and continues until about 1934. During this period the six «main»¹ genera of the tribe: *Arundinella*, *Tristachya*, *Trichopteryx*, *Loudetia*, *Gilgichloa* and *Danthoniopsis* were described. In considering the proposals of these generic names, only one, *Danthoniopsis*, could be considered a split (in fact from *Trichopteryx*). During this early period only 2 names were proposed that are not now considered as belonging to Arundinellean taxa, while the use of non-Arundinellean generic names in describing new Arundinellean taxa only occurred 12 times, both these statements being pieces of evidence strongly circumstantially supporting the naturalness of the tribe, considering that it contains 421 epithets.

During the early period *Arundinella*, *Tristachya*, *Gilgichloa* and *Danthoniopsis* were fairly consistently delimited, once their type species had been described. *Arundinella* was only confused with non-Arundinellean genera, and *Tristachya* mainly with the larger *Loudetias*, where error (by modern criteria) occurred. *Trichopteryx* and *Loudetia*, however, were not adequately separated.

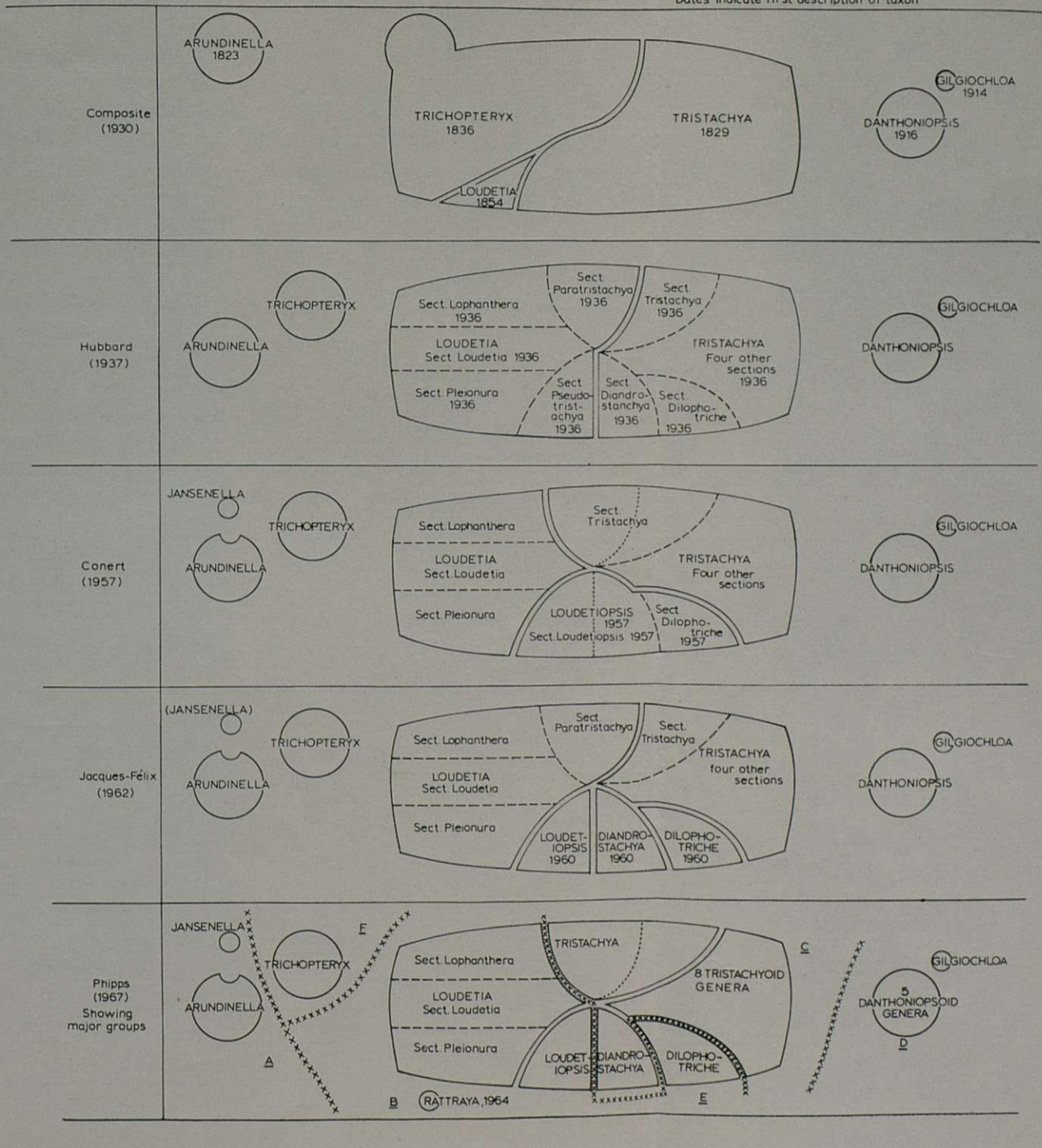
The consolidation phase coincides with HUBBARD'S work

¹ The term «main» genera is used in view of the fact that all Arundinellean taxa known today either have been, or could be, using broad generic concepts, fitted into one of these six genera. No study has ever attempted to reduce this number of genera.

Fig1 Main Outlines of Changing Delimitations of Arundinellean Genera in this Century

LEGEND

-) = brackets indicate taxon not considered by this author
- xxxxxxx = boundary between major groups
- = boundary between genera
- = boundary between sections
- = boundary obsolete
- Dates indicate first description of taxon



of 1934-37 and KENG'S of 1936. Though HUBBARD'S papers concern a revision for tropical Africa, the geographical distribution of Arundinellean genera is such that only one genus accepted today, whose species were known at the time (*Jansenella*) stood unconsidered among them.

HUBBARD accepted the delimitation of *Arundinella*, *Gilgichloa*, and *Danthoniopsis*, radically reduced *Trichopteryx* to a very natural genus of 7 species (transferring most taxa of *Trichopteryx* to *Loudetia*), and set a boundary between the exceedingly diverse *Tristachya* and the diverse *Loudetia*. HUBBARD'S treatment was very perceptive, especially in isolating a natural *Trichopteryx*, but conservative, creating no new generic taxa.

The modern phase has been especially concerned with the boundary between *Tristachya* and *Loudetia* but has also seen the split of the remarkable *Jansenella* (BOR, 1955) from *Arundinella*. No student of the *Arundinelleae*, however, since HUBBARD, has easily followed HUBBARD'S *Loudetia-Tristachya* boundary. CONERT (1957), accepted by CLAYTON (in press), has attempted to resolve the situation by a transfer of part of *Loudetia* to *Tristachya*, adding the creation of the further genus *Loudetiopsis* (type *ex Loudetia*) from parts of *Loudetia* and *Tristachya*. This solution, however, did not satisfy JACQUES-FÉLIX (1960, 1962) nor PHIPPS, who view *Loudetiopsis* (*sens.* Conert) as an unnatural entity and who considered the remnant (but still very large) *Tristachya* far too diverse to be treated as a single genus. PHIPPS, developing JACQUES-FÉLIX'S split of *Loudetiopsis* into three genera, has also fragmented *Tristachya*, created further *Tristachyoid* genera based on more recently described species and has split the diverse *Danthoniopsis* in parallel fashion.

The most recent published treatment, consequently, differs most strongly from its alternatives in splitting the extremely diverse *Loudetia-Tristachya* complex (*sens.* mid 1930's) into 15 genera, taking into account recent discoveries.

Finally, the relationship of *Arundinella* to other *Arundinelleae* should be more fully investigated.

ACKNOWLEDGEMENTS

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¹ This paper is erroneously referred to in PHIPPS (1966) as «CLAYTON (1965, in press)». Publication is not now expected before 1967.

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ADDITIONS TO THE GRASS FLORA
OF SIERRA LEONE

by

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THE writer has previously commented that the richness of the grass flora of the Sierra Leone mountains has only become apparent in recent years and that it is only revealed by collections made at different seasons, with the vegetation in various states of maturity or disturbance by burning (GLEDHILL, 1966). The present paper is concerned with two new grass species and one new grass record which have been discovered recently; the last is considered to be a new subspecies.

Urelytrum Hack. Fl. Trop. Afr. 9, 43; 1889

This genus is the most diverse of the African *Vossiastrae*, although *Vossia* Wall. & Griff. is of wider distribution. There are some 20 common and mostly widespread species and HUBBARD (verbal communication) proposes to erect a number of other new species. The genus is distinguished from *Vossia* Wall. & Griff., *Thyrsia* Stapf, and *Jardinea* Steud. by having the lower glumes coriaceous and smooth, that of the pedicelled spikelet alone long awned, and the spikelets two-flowered. The structural features of the inflorescence and spikelets of *Loxodera* Launert, *Lepargochloa* Launert, *Lasiurus* Boiss. and *Elionurus* Hack. provide a link, through the solitary racemed *Urelytrum* species, between the *Vossiastrae* and the *Rottboelliastrae*.

A single gathering was made on the Loma mountains of a *Urelytrum* which can not be accommodated in any species so far described, and which was not familiar to Dr. HUBBARD as one of the species which he proposes to erect. The gathering was made on a one-day ascent and descent of the mountain which the writer was able to make when in the area for the purpose of escorting Prof. J. G. ADAM (I. F. A. N.) to Freetown. The apparent novelty of the material was reported to Prof. P. JAEGER (Strasbourg) who, as he remained on the mountain, was able to make a second gathering from the same locality, one month later.

Urelytrum strigosum D. Gledhill, spec. nov.

Gramen perenniale caespitosum ad 1 m. altum formans fibrosos densos fasciculos. Culmi erecti, simplices, nodis 4; vaginis foliorum inferioribus persistentibus, fibrosis, vaginis superioribus parum inflatis, internodis saepe emergentibus sub apice vaginae, nodis caulis parum amplificatis; foliis basalibus ad 40 cm longis ad 5 mm latis, linearibus acutissimis, scabridis, 7-nerviis; foliis superioribus 6-3 cm longis setaceis. Racemi solitarii, 6-8 cm longi, compressi, atropurpurei, suboblique disarticulantes nodis; articulis 8-10 mm longis, manifeste nervatis, minute adpresso-ciliatis supra, collo ad apicem obliquo irregulariter lobulato-laciniato membranaceo, collo infra obtuso, strigose barbato cum umbone parvo; pedicellis 5 mm longis, aliquantum latis et planis, levibus, ciliis in marginibus supra et in apice. Spiculae geminatae, sessiles 8 mm longae, ovato-lanceolatae; gluma inferiore acuta vel breviter aristata, 5-nervi, parum asymmetrica; gluma superiore membranacea cymbiformi, alata et minute ciliata in carina, 3-nervi; callo 1 mm longo, late obcuneato. Flosculus inferior ♂; lemmate membranaceo, 7 mm longo, lineari obovato, obtuso, 3-nervi, minute ciliato ad apicem; palea 6 mm longa, lanceolato-obtusa, 2-nervi, emarginata et minute ciliata ad apicem. Flosculus superior hermaphroditus; lemmate membranaceo, 8 mm longo, late lanceolato (explanato), 2-nervi, rotundato et minute ciliato ad apicem; palea simili lemmati sed 3-nervi et bifida ad apicem.

Spicula pedicellata 22 mm longa includens aristam 15 mm longam; gluma inferiore elliptico-acuta, 5-7 nervi, minute antrorse ciliata ad apicem, arista scabridulosa; gluma superiore submembranacea, cymbiformi, 3-nervi, ciliata ad apicem in carina. Flosculus inferior ♂ cum ovario rudimentali; lemmate membranaceo, lanceolato-elliptico, marginibus supra alatis, 3-nervi, apice minute laciniato; palea simili sed 2-nervi, fissa ad apicem, et margine non alata. Flosculus superior ♂ cum ovario rudimentali; lemmate tenuiter membranaceo, 6 mm longo, 3-nervi, marginibus inf lexis secus nervos laterales, acuto et minute ciliato ad apicem; palea explanata 2-nervi, laciniato-obtusa. Antherae 3 in flosculo utroque. Stigmata plumosa, basibus styli remotis. Lodicules spatulato-obcuneati.

Icon. nostr.: Tab. I.

Type: *D. Gledhill* DG 369 (SL). Isotypes in K. GC. WAG. FHI. IF AN. PCU. M. From Loma Mountains, Sierra Leone, on an accumulation of organic earth amongst boulders in savanna slopes at about 4,800 feet, below camp 2. Flowering 2 and 3. Also pertaining: *Jaeger* 9.484 from same locality.

Schizachyrium Nees.

The Guinea, Sierra Leone, Ivory Coast area is a centre of proliferation of this genus; of some 60 species in the tropics of both hemispheres, about 25 species occur in West Africa and 13 of these are present in the Western Guinea area. The proliferation of taxa is partly due to the endemics which are confined to the mountains of this area and partly to the pantropic species complex *S. brevifolium* (Sw.) Nees ex Büse. Five subdivisions of the complex have been recognised but none is clearly defined and intermediates can be seen in a single population, linking two taxa [e. g. *Maitland* 1291 (K) links *var. maclaudii* J.-Félix and *var. flaccidum* Stapf]. The complex is in need of experimental study.

In addition to the five subdivisions [*var. brevifolium*, *var. maclaudii*, J.-Félix, *var. flaccidum* Stapf, *var. simulum* J.-Félix and *subsp. paradoxa* (Büse) Henr.] *S. djalonicum*

J.-Félix should also be included in the complex. This is a montane endemic of Guinea and Sierra Leone and is distinguishable by its smaller proportions and the characters of the pedicelled spikelet and its pedicel. *S. djalonicum* is intermediate between *S. brevifolium* and the following new species.

Schizachyrium minutum D. Gledhill, sp. nov.

Gramen pygmaeum annuum ad 3 cm altum, culmis erectis vel minime decumbentibus. Culmi nodis 7-8 infra inflorescentiam; vaginis internodiis longioribus, equitantibus, nervis 8 prominentibus; foliis linearo-lanceolatis, acutis, ad 9 mm longis, nervis 7 prominentibus supra et infra; vagina suprema spathacea, lamina deminuta aciculari basin inflorescentiae amplectenti. Racemi spathacei, deminuti spicula 1 sessili et pedicellis 2 (raro spiculis 2 sessilibus et pedicellis 3). Spathae lanceolato-acutae, ad 5 mm longae, pedunculo emergenti media parte ad maturitatem. Pedunculus filiformis, supra dilatatus et cupulatus, vix dentatus. Spicula sessilis anguste lanceolato-ovata, 1.8 mm longa arista exclusa; gluma inferiore anguste lanceolato-ovata, obscure 3-nervi, levi sed minute sub-ciliata in nervis lateralibus; nervis lateralibus productis in mucrones, nervo medio evanescenti quoque minute producto; gluma superiore simili sed glabra et nervo medio solum producto in mucronem apicalem; lemmate fertili 1 mm longo, bifido paene ad basin, arista exorienti e basi, lobis tenuiter membranaceis, nervatis; columna aristae glabra, torta, 3 mm longa; limbo aristae 4-4.5 mm longo, minute antrorse scabrido; palea 1 mm longa, tenuiter membranacea, evanide 2-nervi, obtusa et abrupte acuto-mucronata. Pedicellus 1.6 mm longus, filiformis, parum curvatus, breviter strigulosus, minute expansus ad apicem obliquus; spicula pedicellata deminuta subcurvata arista, parum amplificata infra, antrorse scabridulosa. Granum 1.2 mm longum, constrictum sub medio.

Icon. nostr.: Tab. II.

Type: *D. Gledhill* DG 467 (SL). Isotype in K.

Loma Mountains, Sierra Leone, on summit of Bintumane,

6,400 feet, growing with *Panicum pusillum* around flush over bare dolerite.

Also pertaining; SL 2557 (SL. K. GC. WAG. FHL. IF AN. PCU. M) also from Loma Mountains, at 4,500 feet, on wet peaty soils between grass tussocks.

Oxyrhachis Pilger.

This monospecific genus was previously known only from Madagascar and the Tanzania-Congo area of central Africa. It is usually allied with the *Rottboelliastrae*, but differs from the other members in having no trace of the pedicel and very oblique disarticulation of the rachis of the inflorescence. Two collections made by Mr. JAEGER, on the Loma Mountains (one from marshy ground in the margin of gallery forest supporting also *Drosera pilosa*, *Mesanthemum prescottianum*, *Osmunda regalis* and *Xyris* sp., the other from organic soil supporting *Afrotrilepis pilosa*, *Lepargochloa glabra* and *Andropogon mannii*) differ from typical *O. gracillima* (Baker) Hubbard by having spikelets more or less equal in length to their rachis joints, the palea of the fertile floret irregularly margined and widely bifid, and the lodicules symmetrically obtuse. I propose to afford these West African collections the distinction of subspecies.

Oxyrhachis gracillima subsp. **occidentalis** D. Gledhill subsp. nov. Differt a subsp. *gracillima* spiculis plusminusve longitudine aequalibus ad articulos rachis, palea flosculi fertilis irregulariter marginata et late bifida, lodiculis symmetrice obtusis.

Icon. nostr.: Tab. III.

Type: *P. Jaeger* 9.485 (SL).

Loma Mountains, Sierra Leone, March 1966.

Also pertaining; *P. Jaeger* 9.409, Loma Mountains, February 1966 (SL. K. P).

The discovery of this grass in Sierra Leone is of great biogeographic interest as an example of a very widely

disjunct distribution of a Madagascarean element in the West African flora. The Sierra Leone mountains are the highest in West Africa but rise to only 6,080 and 6,400 feet. This is evidently high enough, and their vegetation is sufficiently isolated, physically, to act as a refuge for a large number of plant species which have formerly had a wider and more continuous distribution. There is little satisfactory evidence for the timing of major climatic fluctuations in West Africa but there is no doubt that these have occurred. In the van of the moving climatic zones the vegetation has receded and in the wake floristic elements from other zones have advanced. The present isolation of the West African flora from those of the Mediterranean, Asian and southern and eastern African areas was once bridged by successive climatic, and vegetational, oscillations of the equatorial belt. In the course of such oscillations, floristic elements entered West Africa from the other areas. Those which persist today do so because they have evolved as derivative taxa, or because they have a wide ecological tolerance, or because they have found suitable and secure habitats in such refugia as the montane areas.

It is not surprising, therefore, that the vegetation of the West African mountains includes a large number of species which occur on all, or many, of the mountains. It is surprising to find a species which is apparently present only in the most western mountains although it originates in the eastern half of the continent.

REFERENCE

GLEDHILL, D.

- 1966 *Lepargochloa glabra*; a new species from West Africa. *Bol. Soc. Brot. sér. 2*, XL: 63-71.

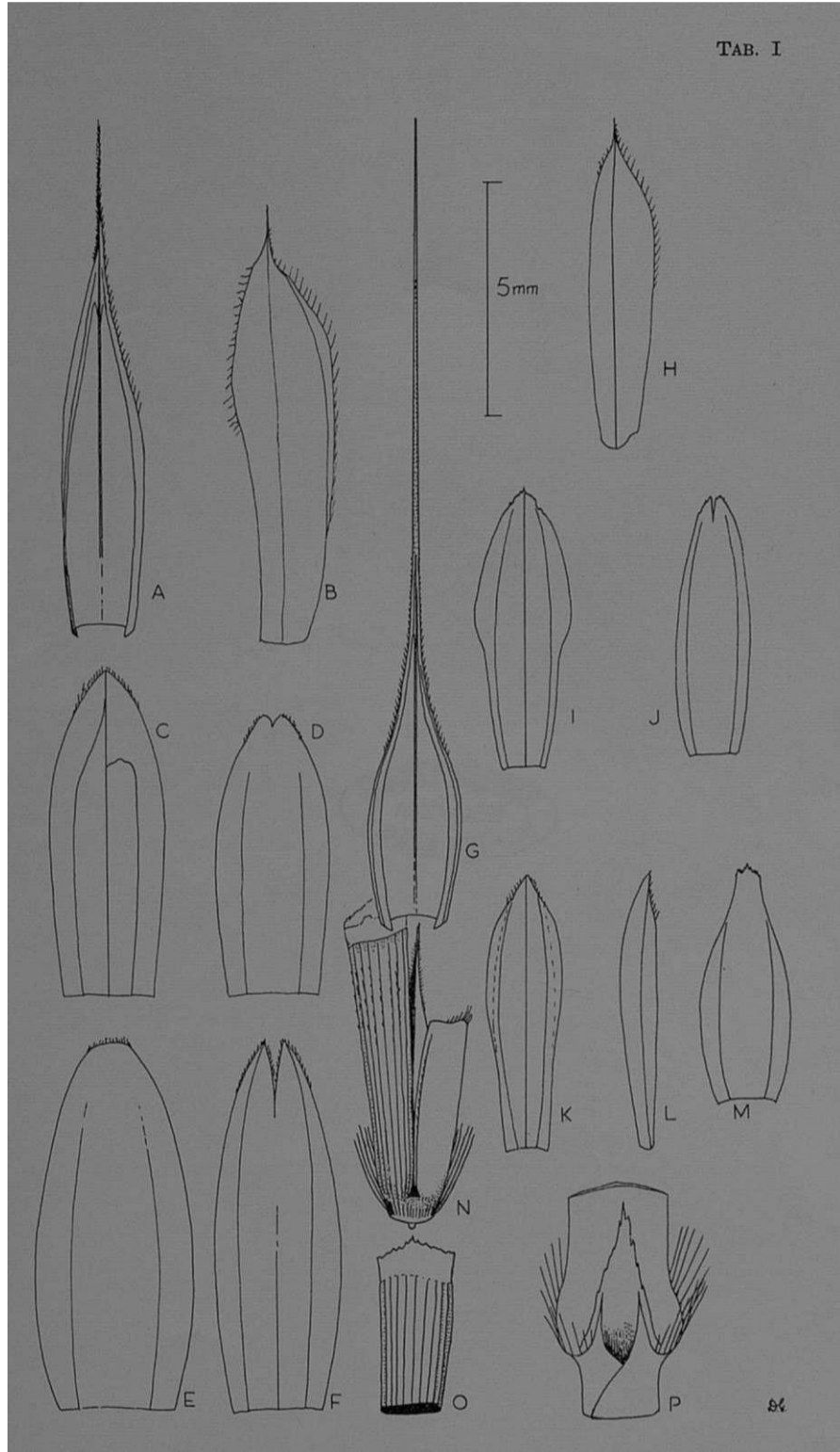
TABULAE

TABULA I

Urelytrum strigosum D. Gledhill, sp. nov.

- A — Lower glume of sessile **spikelet**.
- B — Upper glume of sessile spikelet.
- C — Lower lemma.
- D — Lower palea.
- E — Upper lemma.
- P — Upper palea.
- G — Lower glume of **pedicelled** spikelet.
- H — Upper glume of pedicelled spikelet.
- I — Lower lemma.
- J — Lower palea.
- K — Upper lemma.
- L** — Upper lemma (profile).
- M — Upper palea.
- N — Junction of sheath and lamina, showing ligule.
- O — A joint of the rachis with its sessile spikelet and pedicel (the pedicelled spikelet and basal hairs have been **removed**).
- P — Apex of rachis joint showing membranous collar.

TAB. I

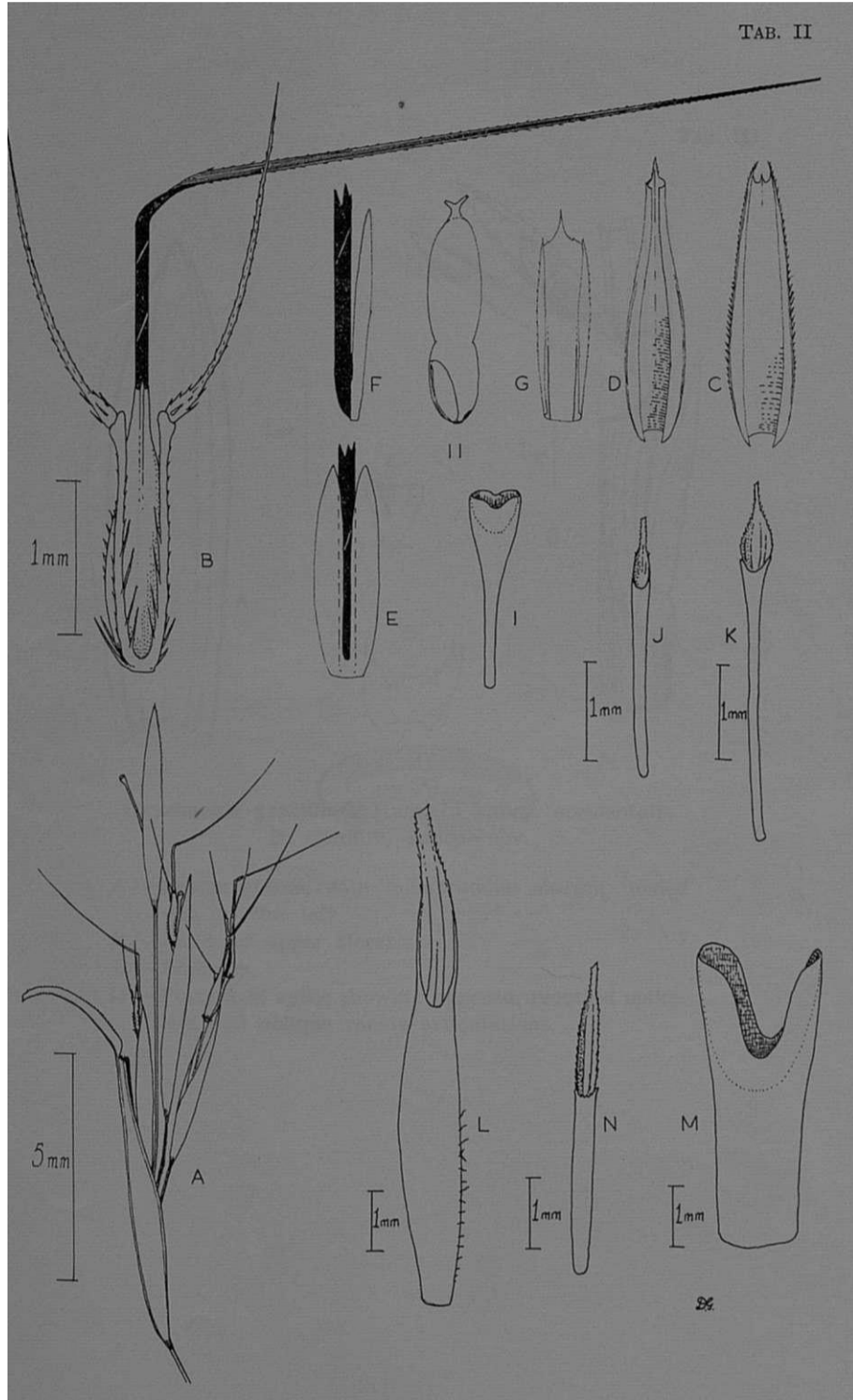


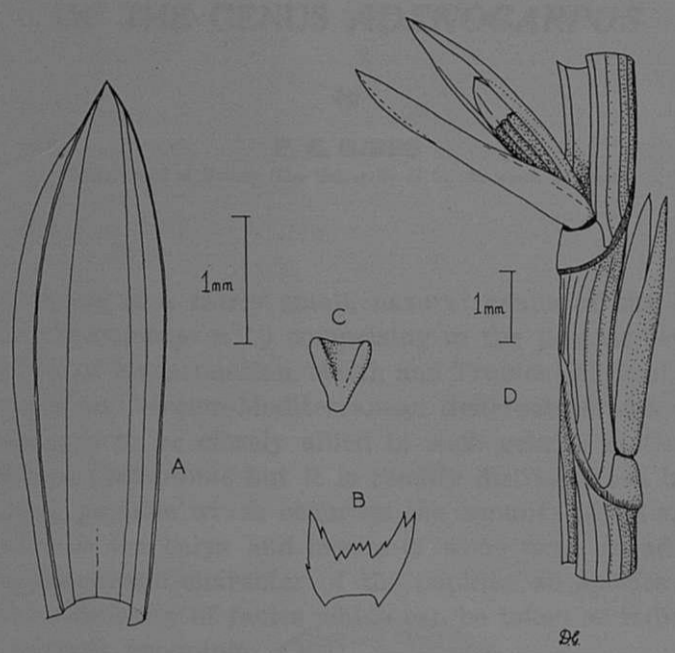
TABULA II

Schizachyrium **minutum** D. Gledhill, sp. nov.

- A — Inflorescence.
- B — Sessile spikelet with its pair of obsolete pedicelled spikelets.
- C—Lower glume of sessile spikelet.
- D — Upper glume of sessile spikelet.
- E — Fertile lemma with base of column of awn.
- F — Fertile lemma in profile.
- G — Fertile palea.
- H — Caryopsis.
- I — Apex of peduncle.
- J — Pedicel and reduced spikelet of *S. brevifolium*, J. K. Morton s. n. Biakpa Tur. Ghana. (SL).
- K—Pedicel and reduced spikelet of *S. brevifolium*. Morton & Gledhill, SL 73, Kambia, Sierra Leone (SL. K. GC. WAG. FHI).
- L — Pedicel and reduced spikelet of *S. brevifolium* var. *maclaudii* Jaeger 665. Loma Mts. Sierra Leone (SL. K).
- M — Apex of peduncle, Jaeger 665.
- N — Pedicel and reduced spikelet *S. djalonicum* aeger 7.714. Loma Mts. Sierra Leone (SL. K).

TAB. II





Oxyrhachis gracillima Hubbard subsp. *occidentalis*
 D. Gledhill, subsp. nov.

- A—Lower glume, with membranous margin turned out on the left.
- B—Palea of upper floret.
- C—Lodicule.
- D—Portion of spike showing opposed, recessed spikelets and oblique rachis articulations.

**A REVISION
OF THE GENUS *ADENOCARPUS***

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Adenocarpus is a fairly small, natural genus of the Leguminosae (*Genisteae*. L.) comprising in the present revision 14 species of Macaronesian, North and Tropical African, S. W. European and circum-Mediterranean distribution. *Adenocarpus* appears to be closely allied to such genera as *Genista*, *Cytisus* or *Calicotome* but it is readily distinguished by the glandular papillae which occur on the legumes of all species and also on the calyx and bracts of some taxa. In addition to the diagnostic character of the papillae all species show at basic similarity of facies which can be taken as indicative of a natural grouping.

The genus *Adenocarpus* has not been completely revised since the account by DE CANDOLLE (*Prodromus* 1825), but MAIRE (1921, 1922) has provided a key with distributional notes for most of the North African species, and VICIOSO (1955) has revised the four Spanish taxa. There is also an unpublished manuscript at Kew prepared by J. GAY in 1836 which contains an outline treatment of three European and one Canary Island species.

ACKNOWLEDGEMENTS

I am greatly indebted to the Directors of the following herbaria for having made available on loan their *Adenocarpus* material: Instituto Botânico «Dr. Júlio Henriques», Coimbra (COI); Herbarium Universitatis Florentinae, Istituto Botanico, Firenze (FI); Conservatoire et Jardin botanique, Genève (G); and the Botanical Museum and Herbarium,

Lund (LD). Also to the Directors of the Royal Botanic Gardens at Edinburgh (E) and Kew (κ) for the use of herbarium and library facilities. It is also a pleasure to record my thanks to Dr. R. K. BRUMMITT (Kew) for kindly checking a number of references and for a helpful discussion on the nomenclature of *Adenocarpus complicatus*.

GENERAL ASPECTS OF THE GENUS *ADENOCARPUS*

Adenocarpus was placed in the tribe *Genisteae* subtribe *Spartieae* by BENTHAM & HOOKER (*Genera Plantarum* 1862) but HUTCHINSON (1964) has recently split this grouping into a number of distinct tribes. According to HUTCHINSON *Adenocarpus* should be grouped in the tribe *Laburneae* together with the genera *Laburnum*, *Podocytisus*, *Hesperolaburnum* and *Calicotome*.

MORPHOLOGY

Habit: Most *Adenocarpus* species are shrubs which do not usually exceed 1 m in height, but specimens of *A. hispanicus* and *A. decorticans* are taller plants and commonly reach 3 m or more. *A. manni* is apparently very variable in habit, ranging from low growing or semiprostrate individuals to small trees of up to 4 m.

Leaves: All species have petiolate, digitately trifoliolate leaves. Within the genus leaflets vary between 3 X 2-35 X 15 mm and are commonly ovate or obovate in shape, but four species, *A. artemisiifolius*, *A. decorticans*, *A. umbellatus* and *A. viscosus* have very narrowly elliptic or narrowly oblanceolate leaflets. In these species the leaflets are also markedly involute and thus appear sub-linear.

At least the lower surface of the leaves is pubescent to some extent in all taxa, usually with appressed sericeous or villous hairs; four species, *A. boudyi*, *A. cincinnatus*, *A. faurei* and *A. umbellatus* are distinctive in possessing minute, circinnate hairs on the leaf laminae. These hairs, which must be examined with a magnification of X 10 or more, are hygroscopic (at least on herbarium material) so that they uncoil in a humid atmosphere and recoil on drying.

Dense fascicles of leaves tend to be almost a diagnostic character of the genus and dissection has shown that such leaves are arranged in whorls around the suppressed axes of lateral branches. This fasciculation is most striking in the species *A. decorticans*, *A. foliolosus* and *A. viscosus* but it occurs to some extent in all taxa.

Prominent pulvinii are not developed within the genus, but two small stipules which are frequently adnate and sheathing at the base of the petiole are usually present.

Inflorescence: Most species have a racemose inflorescence which tends to be lax and rather elongate on the main branches, but with the flowers congested subterminally on the lateral or secondary branches. However, specimens occur in all species which have the flowers congested subterminally on all branches. The North African species, *A. boudyi*, *A. faurei* and *A. umbellatus* have developed a capitate inflorescence, and in addition, *A. telonensis* usually approaches this condition.

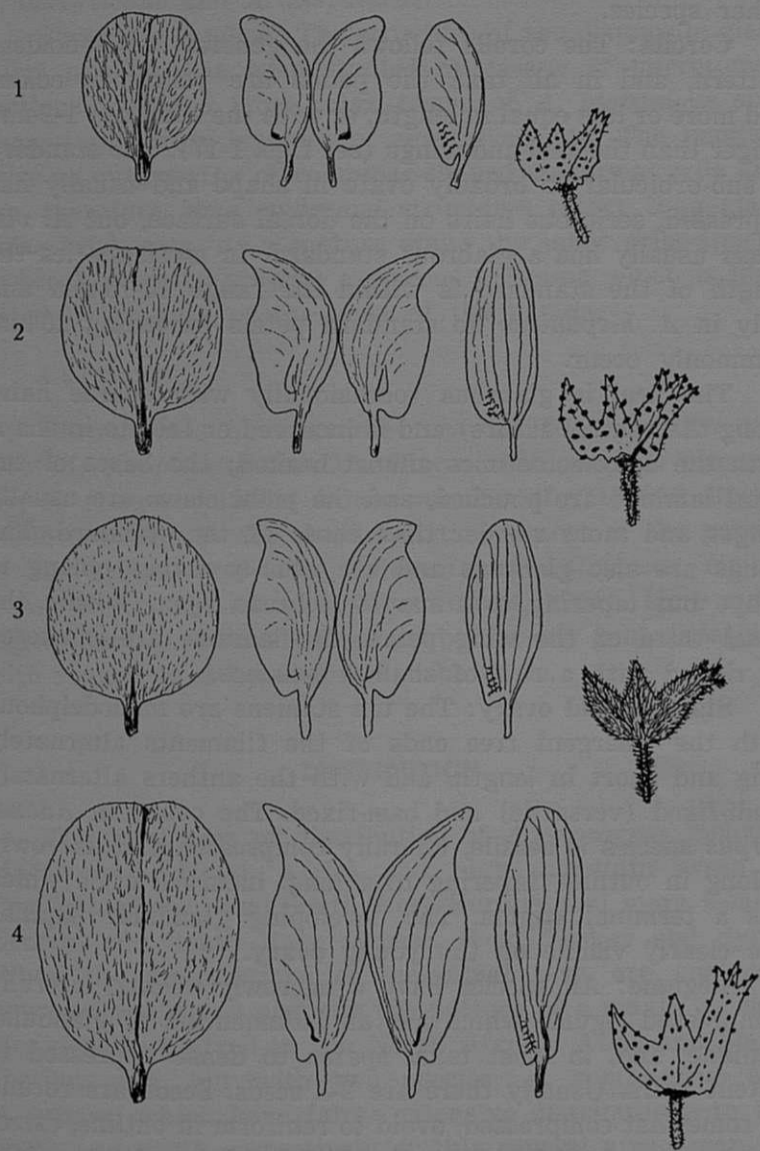
In some cases it is difficult to draw a sharp distinction between capitate and congested, subterminal, racemose inflorescences since the terminal head of flowers is simply an extreme development of the latter condition such that the flowers arise almost from a single point at the branch apex. Nevertheless, the three North African species noted above can be readily distinguished as being capitate in contrast to the other species with racemose inflorescences, and only *A. telonensis* occupies a somewhat intermediate condition.

Calyx: The calyx is tubular with distinct upper and lower lips; the upper lip is divided into two prominent teeth and the lower lip has three shorter teeth (see figs. 1-17). In most species the lower calyx lip is somewhat longer than the upper but *A. manni* is distinctive in having a very elongate lower lip which is usually subequal to the standard petal. With the exception of some specimens of *A. complicatus* the calyx is always pubescent, usually densely so. The species *A. complicatus* (part), *A. viscosus* and *A. hispanicus* also have glandular papillae on the calyx, and

Figs. 1-4. —*A. complicatus*

Illustrations of the corolla (source material for floral dissections is indicated on parentheses).

1. (France: Hte. Vienne, Chateaupousac, 9.ix.1910, *Simon* LU)
2. (Turkey: **Balikesir**, Mt. Ida (**Kaz** Dagh), 22.vi.1883, *Sintenis* LU)
3. (Spain: Sierra de Guadarrama, Chozas, 22.vi/19.vii.1854, *Bourgeau* G)
4. (Portugal: Caldas de Monchique, v.1888, *Moller* COI)



1 cm

occasional papillae are found on the calyces of several other species.

Corolla: The corolla follows the general Papilionoideae pattern, and in all taxa the petals are yellow in colour and more or less equal in length, or with the standard 1-2 mm longer than the keel and wings (see figs. 1-17). The standard is sub-orbicular to broadly ovate in shape and usually has appressed, sericeous hairs on the dorsal surface, but *A. viscosus* usually has a glabrous standard. In most species the length of the standard is within the range 10-15 mm and only in *A. hispanicus* do standard petals exceeding 20 mm commonly occur.

The keel is glabrous (occasionally with sparse hairs along the ventral suture) and is incurved or falcate in shape with the apex sometimes almost beaked; the bases of the petal laminae are pouched, and the petal claws are usually longer and more slender than those of the standard. The wings are also glabrous and are usually rather oblong in shape but tapering to a narrow, obtuse apex. Within the basal third of the wing petals the laminae are puckered or ridged with a row of shallow pouches.

Stamens and ovary: The ten stamens are monodelphous with the emergent free ends of the filaments alternately long and short in length, and with the anthers alternately medi-fixed (versatile) and basi-fixed. The ovary in *Adenocarpus* species is sessile, laterally compressed and narrowly oblong in outline, tapering to a long, incurved style which has a terminal stigma. The developing glandular papillae are clearly visible on the young ovary.

Legume: All species have a narrowly oblong, laterally compressed legume which has an indumentum of glandular papillae, and, in most taxa, sparse to dense appressed to patent hairs. Usually there are 2-8 seeds. Seeds are rotund or somewhat compressed, ovoid to reniform in outline, estrophiolate¹ and with a smooth black or brown testa. Seed

¹ The aril-like appendages which are prominent on the seeds of some groups of the *Papilionoideae* have been traditionally termed strophioles. According to CORNER (1951) such structures are rim-arils rather than true strophioles.

length is c. 2-3 mm in most species, but up to 4 mm in *A. decorticans* and *A. hispanicus*.

Glandular papillae: The structure of the diagnostic glandular papillae has been studied by means of microtomed sections prepared from calyx tissue of *A. hispanicus* specimens and from legumes of several species. The papillae arise as outgrowths of columnar-shaped epidermal cells and are, therefore, true epidermal structures rather than glandular trichomes. At a mature stage the inner cells appear to break down to produce a viscous secretion which is liberated by rupture of the apex of the papilla.

CYTOLOGY

Chromosome numbers are recorded for only two species: *A. complicatus* $2n: 52$ (GTLOT, 1965) and *A. viscosus* $2n: 48$ (LARSEN, 1960). A base number of $x:12$ and diploid number of $2n: 48$ are characteristic of most of the genera of the tribes *Genisteae*, *Cytiseae* and *Laburneae* (tribal classification according to HUTCHINSON, 1964). More cytological data is obviously required before any generalisations with regard to *Adenocarpus* can be made.

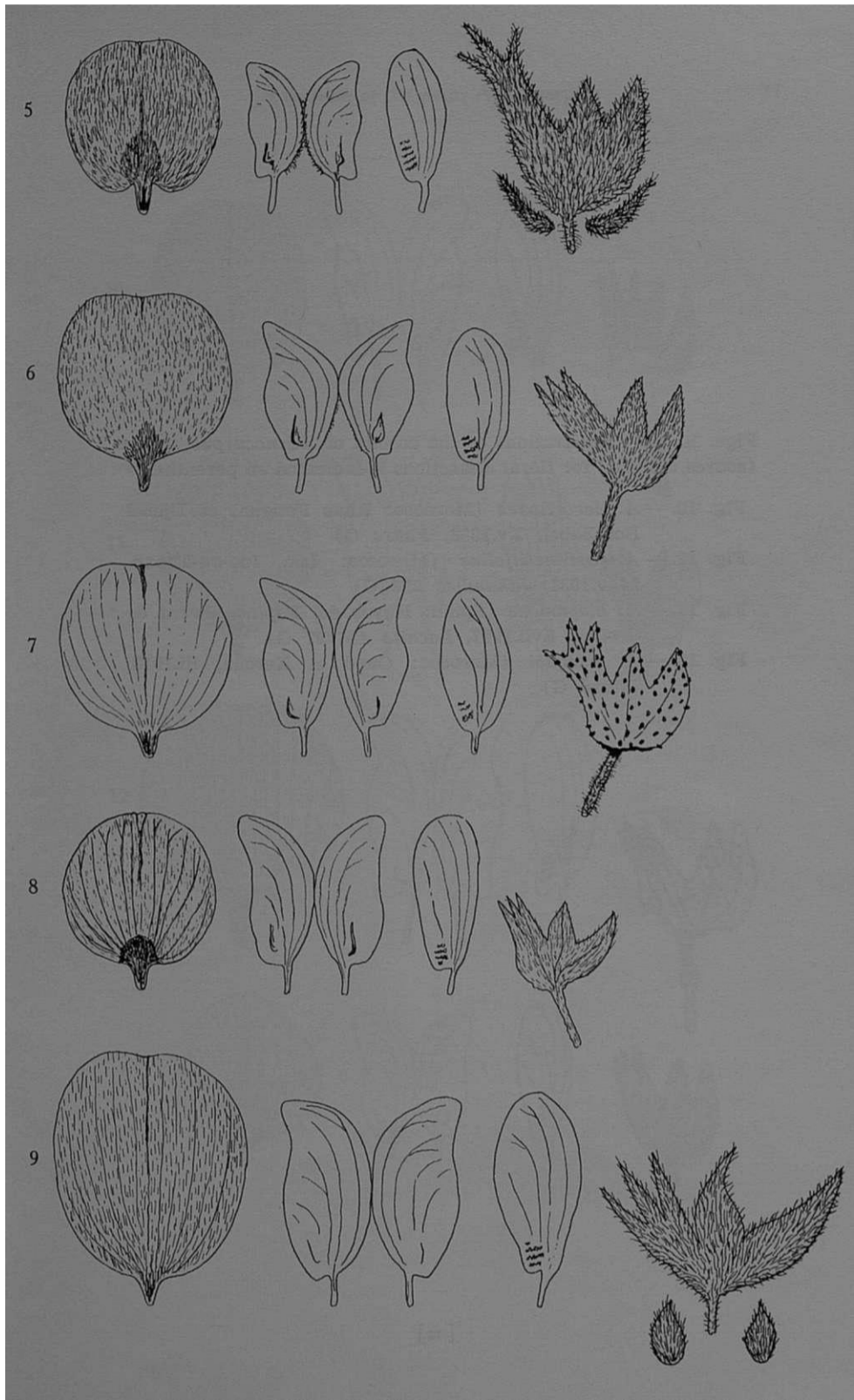
DISTRIBUTION

The total area of distribution of *Adenocarpus* includes Macaronesia, North Africa and high mountain areas of Tropical Africa; also South-West Europe, and more locally, Central and South Italy, Greece, West Turkey and Syria. When the distributions of individual taxa are analysed, however, the genus presents the pattern of a maximum species density centred in the North African Atlas and South Iberian area, but with two species, *A. complicatus* and *A. manni* which have fairly extensive distributions to the north and south respectively of this central area (map 1).

Thus, of the four species which are distributed in Europe, *A. complicatus*, *A. telonensis*, *A. decorticans* and *A. hispanicus*, only the former is distributed, if very locally, around the Mediterranean and also extends into Atlantic

Figs. 5-9. — Illustrations of the corolla of *Adenocarpus* species (source material for floral dissections is indicated in parentheses).

- Fig. 5. — *A. manni* (Tanzania: Station **Kyimbila**, **23.viii.1910**, *Stolz* G)
- Fig. 6. — *A. foliolosus* (Gran **Canaria**: San Mateo, **26.v.1900**, *Bornmüller* 434 G)
- Fig. 7. — *A. viscosus* (Tenerife: La Fortalese, **11.v.1933**, *Asplund* 837 G)
- Fig. 8. — *A. anagyriifolius* (Morocco: Moyen Atlas, Ksiba, **17.V.1927**, *Jahandiez* 236 G)
- Fig. 9. — *A. telonensis* (Spain: Ronda, **12.vi/26.vii.1889**, *Reverchon* G)



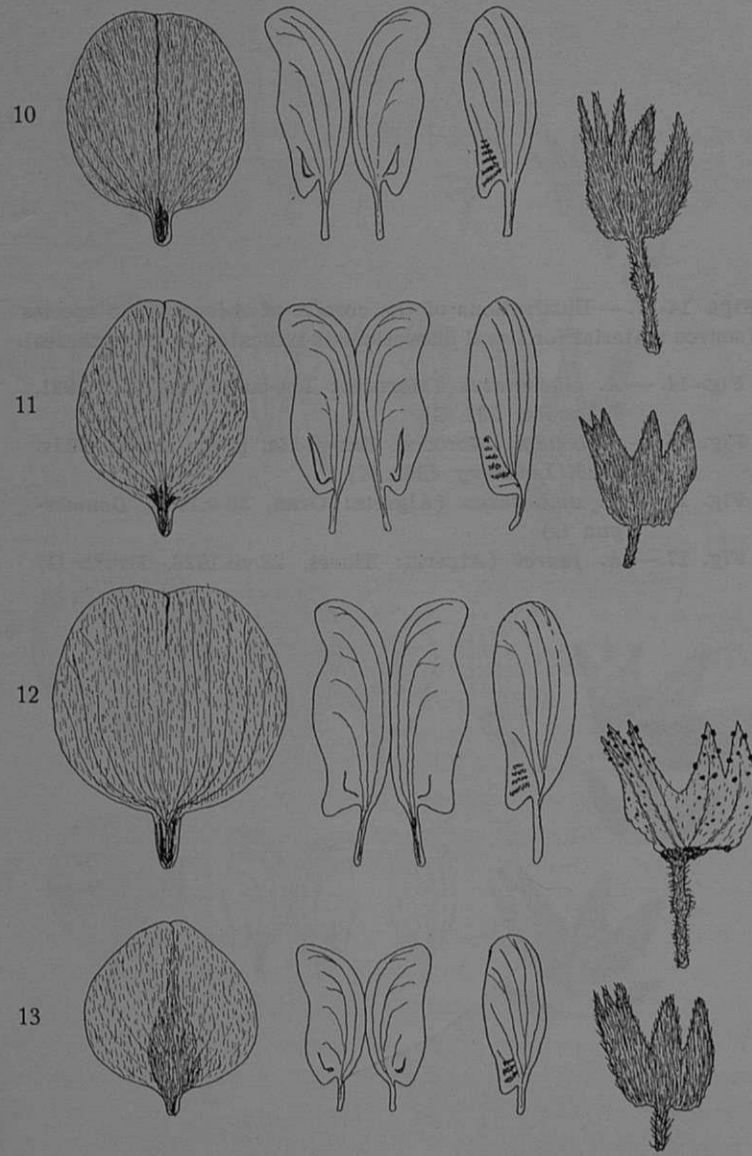
Figs. 10-13. — Illustrations of the corolla of *Adenocarpus* species
(source material for floral dissections is indicated in parentheses).

Fig. 10. — *A. decorticans* (Morocco: Rhas Foughal et Djebel
Bou-Zabel, 3.V.1933, *Faure* G)

Fig. 11. — *A. artimesiifolius* (Morocco: Isk, Ida-ou-Tanan,
24.iv.1931, *Jahandiez* 223 G)

Fig. 12. — *A. hispanicus* (Spain: Hoyos del Espino, Sierra de
Gredos, 4.vii.192Y, *Lacaita* 457/27 G).

Fig. 13. — *A. bacquei* (Morocco: Oued el Keroua, iii.1913,
Pitar d G)



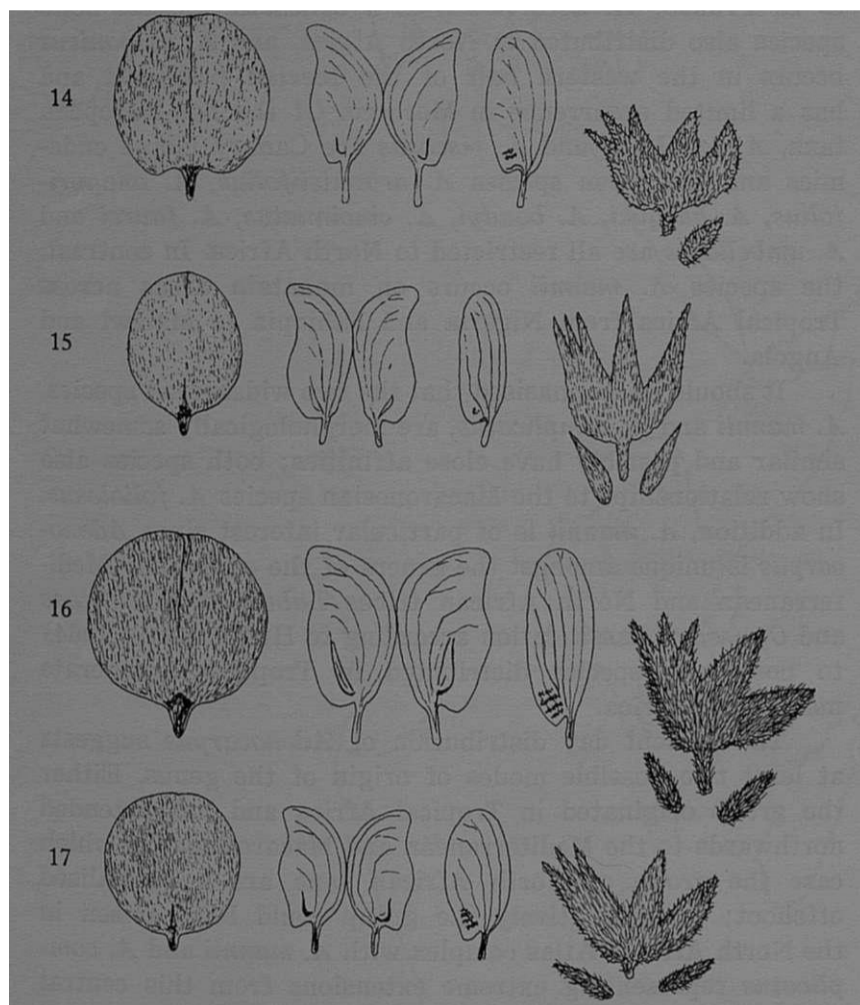
Figs. 14-17. — Illustrations of the corolla of *Adenocarpus* species
(source material for floral dissections is indicated in **parentheses**).

Fig. 14. — *A. cincinnatus* (Morocco: **Ida-ou-Tanan**, 24.iv.1931,
Jahandiez 231 G)

Fig. 15. — *A. boudyi* (Morocco: **Ras-el-Ma**, prope Azrou, 29.iv.
1926, *Lindberg* 4392 K)

Fig. 16. — *A. umbellatus* (Algeria: Oran, **30.v.1906**, *Doumer-*
gue G)

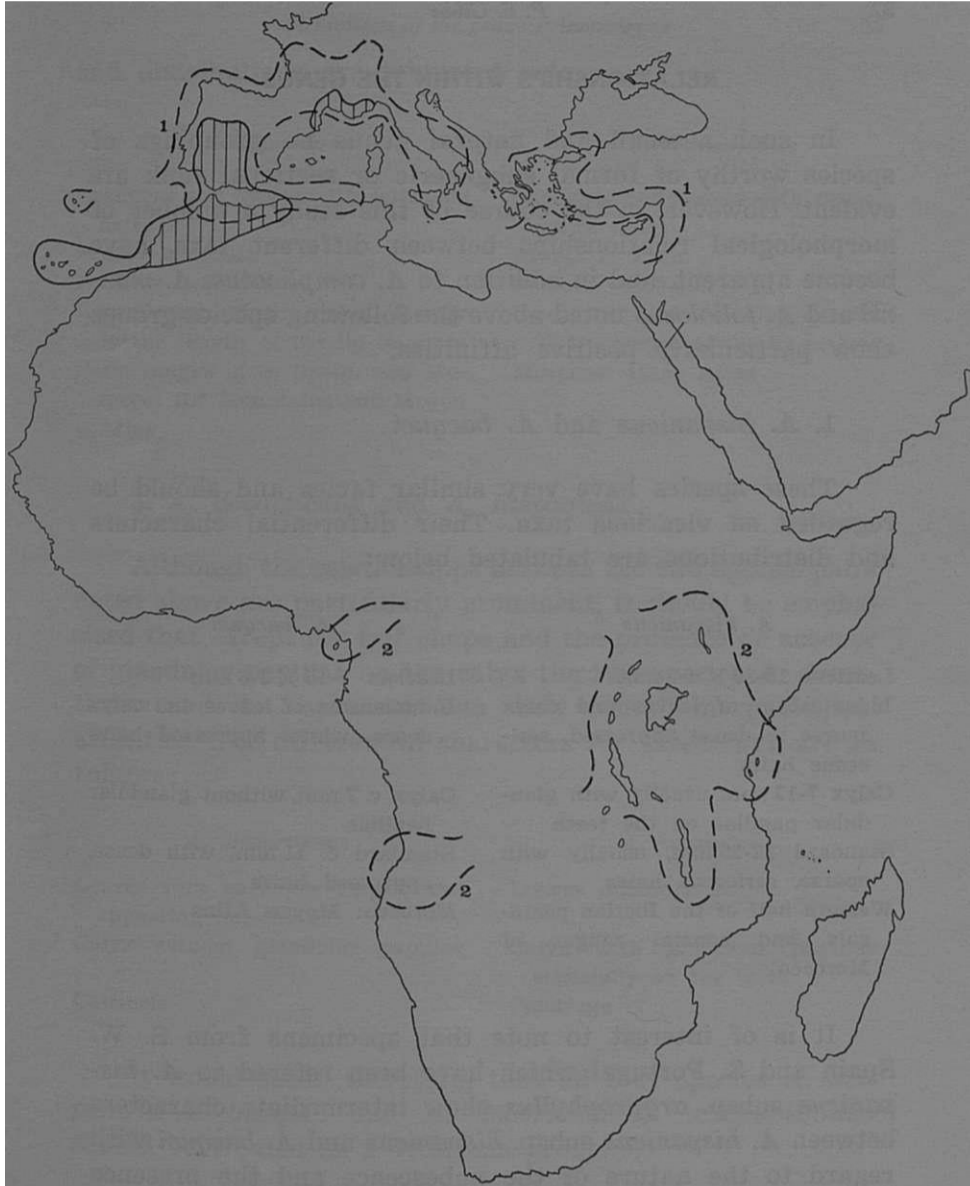
Fig. 17. — *A. faurei* (Algeria: **Tiaret**, 23.vii.1926, *Faure* G)



regions of Portugal, Spain and France. *A. telonensis* is centred in the southern half of the Iberian peninsula and northern Morocco but also has a limited occurrence in S. E. France; *A. decorticans* a southern Iberian betic species also distributed in North Africa, and *A. hispanicus* occurs in the western half of the Iberian peninsula and has a limited occurrence in Morocco. Of the non-European taxa, *A. foliolosus* and *A. viscosus* are Canary Island endemics and the seven species *A. artemisiifolius*, *A. anagyri-folius*, *A. bacquei*, *A. bouyeri*, *A. cincinnatus*, *A. fauriei* and *A. umbellatus* are all restricted to North Africa. In contrast, the species *A. mannii* occurs on mountain areas across Tropical Africa from Nigeria and Ethiopia to Malawi and Angola.

It should be emphasised that the two widespread species, *A. mannii* and *A. complicatus*, are morphologically somewhat similar and possibly have close affinities; both species also show relationships to the Macaronesian species *A. foliolosus*. In addition, *A. mannii* is of particular interest since *Adenocarpus* is unique amongst the genera of the essentially Mediterranean and North African tribes *Laburneae*, *Genisteae* and *Cytiseae* (classification according to HUTCHINSON, 1964) to possess a species distributed in Tropical (temperate mountain) Africa.

The present day distribution of *Adenocarpus* suggests at least two possible modes of origin of the genus. Either the group originated in Tropical Africa and has extended northwards to the Mediterranean and Macaronesia, in which case the group of North African taxa are a specialised offshoot; or alternatively the group could have arisen in the North African Atlas complex with *A. mannii* and *A. complicatus* representing extreme extensions from this central area. Whatever the geographical centre of origin may have been, present day distributions together with morphological considerations suggest that the group has evolved from an ancestral taxon with *A. mannii*-*A. foliolosus*-*A. complicatus* facies.



Map. 1. — Distribution of the genus *Adenocarpus*.

1 — Generalised area of distribution of *A. complicatus*.

2 — Generalised area of distribution of *A. mannii*.
Total area occupied by the remaining 12 species of *Adenocarpus* indicated by hatching.

RELATIONSHIPS WITHIN THE GENUS

In such a small and natural genus no groupings of species worthy of formal subgeneric or sectional rank are evident. However, in the course of this study a number of morphological relationships between different taxa have become apparent, and in addition to *A. complicatus*, *A. manni* and *A. foliolosus* noted above the following species groups show particularly positive affinities.

1. *A. hispanicus* and *A. bacquei*

These species have very similar facies and should be regarded as vicarious taxa. Their differential characters and distributions are tabulated below:

<i>A. hispanicus</i>	<i>A. bacquei</i>
Leaflets 15-30 X 4-8 mm	Leaflets 7-15 X 3-6 mm
Indumentum of leaves and calyx sparse to dense appressed, sericeous hairs	Indumentum of leaves and calyx dense, white, appressed hairs
Calyx 7-12 mm, usually with glandular papillae on the teeth	Calyx c. 7 mm, without glandular papillae
Standard 12-25 mm, usually with sparse, sericeous hairs	Standard c. 11 mm, with dense, appressed hairs
Western half of the Iberian peninsula and coastal ranges of Morocco	Morocco: Moyen Atlas

It is of interest to note that specimens from S. W. Spain and S. Portugal which have been referred to *A. hispanicus* subsp. *argyrophyllus* show intermediate characters between *A. hispanicus* subsp. *hispanicus* and *A. bacquei* with regard to the nature of the pubescence and the presence of glandular papillae.

2. *A. decorticans* and *A. artemisiifolius*

These species also show very similar facies and must be considered as vicarious taxa. Their differential characters

and distributions are tabulated below:

<i>A. decorticans</i>	<i>A. artemisiifolius</i>
Branches and leaves with sericeous hairs	Branches and leaves with dense, white hairs
Bracts c. 5 mm	Bracts c. 2 mm
Pedicels 4-8 mm	Pedicels 1-2.5 mm
Lower teeth of the calyx usually $\frac{1}{2}$ the length of the lip or more	Lower teeth of the calyx usually $\frac{1}{3}$ the length of the lip or less
Betic ranges of S. Spain, and Morocco: Rif Mountains and Moyen Atlas	Morocco: Haut Atlas

3. *A. âeoorticans* and *A. hispanicus*

Although the relationships between the two species pairs noted above are particularly prominent, it should be emphasised that except for leaf shape and the presence or absence of glandular papillae on the calyx the two species *A. decorticans* and *A. hispanicus* also show overall morphological affinities. The differential characters for these taxa are as follows:

<i>A. decorticans</i>	<i>A. hispanicus</i>
Leaves very narrowly elliptic and appearing sub-linear	Leaves oblanceolate
Calyx without glandular papillae	Calyx with glandular papillae especially on the teeth
Calcicole	Calcifuge

It would seem, therefore, that all four species *A. hispanicus*-*A. bacquei* and *A. decorticans*-*A. artemisiifolius* should be treated as a vicarious group.

4. *A. viscosus* and *A. foliolosus*

The relationship between the two Canary Island endemics, *A. viscosus* and *A. foliolosus*, is also of interest. The differential characters for these taxa are tabulated below:

<i>A. viscosus</i>	<i>A. foliolosus</i>
Leaves narrowly elliptic and marginally involute	Leaves oblanceolate or obovate with the margins only slightly involute
Calyx with glandular papillae	Calyx usually without glandular papillae
Standard petal subglabrous	Standard petal with dense, appressed hairs

These two species appear to replace each other ecologically since *A. viscosus* is restricted to the upper exposed slopes of volcanic cones whilst *A. foliolosus* grows at the margins of woodlands on the lower slopes. Further, occasional specimens with intermediate facies with regard to calyx papillae and pubescence of the standard have been seen, which suggests that the two taxa are probably ecological vicariads.

This relationship between *A. viscosus* and *A. foliolosus* is of especial interest because of the difference in leaf shape (and presence of papillae) between them: obovate or oblanceolate leaflets are characteristic of most species of *Adenocarpus*, and it has been noted that narrowly elliptical or sub-linear leaflets are found only in the species *A. viscosus*, the vicariad pair *A. decorticans*-*A. artemisiifolius*, and *A. umbellatus*. If *A. viscosus* and *A. foliolosus* are in fact closely related, then the change in leaflet shape must be a fairly readily acquired evolutionary step, and this is supported by the *A. hispanicus*-*A. decorticans* relationship. It is likely, therefore, that similar affinities exist between the capitate inflorescence species *A. faurei* (with obovate or oblanceolate leaflets) and *A. umbellatus* (with narrowly elliptical leaflets). The morphology of the leaflets of most of the species of the genus suggests that it is most likely that the change has been in the direction from obovate to very narrowly elliptic.

TAXONOMIC TREATMENT

In the following systematic account of the species of *Adenocarpus* the taxa have been listed in accordance with their apparent affinities as judged by external morphology alone. With the limited data at present available no attempt has been made to outline a detailed phylogenetic scheme.

In the selected citation of specimens given for each species the political boundaries and limits of provinces, etc. are based on those given in the Times Atlas, Mid-Century Edition. For specimens cited from Tropical Africa (*A. mannii*) the floristic provinces as defined for the *Flora of Tropical East Africa* have been followed for Kenya, Tanzania and Uganda, and those defined for the *Flora Zambesiaca* have been followed for Malawi and Zambia.

Adenocarpus DC, in Lam. & DC, *Fl. Fr.* ed. 3, 5 (Suppl.): 549 (1815).

Non-spiny shrubs varying from semi-prostrate plants to small trees of up to 4 metres, with branching alternate. Leaves trifoliolate and petiolate, usually in fascicles, with two small stipules; leaflets obovate, oblanceolate or very narrowly elliptical. Flowers borne in terminal racemes or capitate. Calyx tubular, with prominent upper and lower lips, upper lip deeply bifid, lower lip with three distinct teeth. Standard sub-orbicular to broadly ovate, as long as or longer than the wings and keel, usually with appressed sericeous hairs on the outer surface. Legume narrowly oblong, with glandular papillae and usually appressed or patent hairs. Seeds 2-8, estrophiolate. Type species: *A. complicatus* (L.) Gay, according to HUTCHINSON, *Genera of Flowering Plants* 1: 356 (1964).

Key to the species of *Adenocarpus*

1. Flowers in heads (all flowers borne within 2 mm of the stem apex)
2. Bracts and bracteoles ovate to broadly lanceolate; standard (12-) 15-17 mm 10. *A. telonensis*
2. Bracts and bracteoles linear or narrowly elliptic; standard 9-13 mm
3. Upper surface of the leaves subglabrous or sparsely hairy 14. *A. faurei*

3. Upper surface of the leaves densely pubescent
4. Standard 9-11 mm; leaves oblanceolate or obovate, with the margins slightly involute 12. *A. bouadyi*
- 4. Standard 11-13 mm; leaves elliptical, markedly involute and ericoid 13. *A. umbellatus*
1. Flowers in lax racemes (sometimes congested subterminally, especially on lateral branches)
5. Both surfaces of the leaves (but especially the lower) with circinnate hairs ($\times 10$ - $\times 20$ magnification) 11. *A. cincinnatus*
5. Both surfaces of the leaves with straight or slightly curled hairs, or upper surface glabrous
6. Leaflets 15-35 \times 10-15 mm, broadly ovate or elliptic 9. *A. anagyriifolius*
6. Leaflets smaller than 15 X 10 mm, or if more than 15 mm long, then very narrowly elliptic or very narrowly oblanceolate
7. Petioles 4-15 mm
8. Leaflets 1-2 mm wide, very narrowly elliptic or very narrowly oblanceolate, markedly involute at the margins and appearing sublinear
9. Pedicels 1-2.5 mm; lower teeth of the calyx $\frac{1}{3}$ as long as the lip or less 6. *A. artemisiifolius*
9. Pedicels 4-10 mm; lower teeth of the calyx usually $\frac{1}{2}$ the length of the lip or more
10. Calyx with glandular papillae; standard C. 12 mm 4. *A. viscosus*
10. Calyx eglandular; standard C. 15 mm 5. *A. decorticans*
8. Leaflets 3-6 mm wide, broadly elliptic to oblanceolate, margins only slightly involute
11. Pedicels 1-7 mm; standard 10-12(-15) mm
12. Upper surface of the leaves subglabrous or sparsely hairy; calyx sometimes with glandular papillae 1. *A. complicatus*
12. Upper surface of the leaves with dense, white, appressed hairs; calyx never with glandular papillae 8. *A. bacqueti*
11. Pedicels (5-)7-15 mm; standard 12-25 mm 7. *A. hispanicus*
7. Petioles 1-4 mm
13. Lower lip of the calyx subequal to or longer than the standard 2. *A. mannii*
13. Lower lip of the calyx $\frac{1}{2}$ - $\frac{2}{3}$ the length of the standard
14. Stems densely covered with fasciculate leaves; pedicels 4-12 mm
15. Calyx with glandular papillae; standard subglabrous 4. *A. viscosus*

15. Calyx eglandular; standard with sericeous hairs . . .
 3. *A. foliolosus*
14. Stems usually sparsely leafy; pedicels 1-5 mm
16. Bracteoles 2-4 mm, ovate or lanceolate, persisting; calyx
 6-10 mm, never with glandular papillae, lower teeth
 the length of the lip 10. *A. telonensis*
16. Bracteoles 1-2 mm, narrowly elliptical or sublinear, often
 fugacious; calyx 5-8 mm, sometimes with glandular
 papillae, lower teeth c. $\frac{1}{3}$ the length of the lip . . .
 1. *A. complicatus*

1. *A. complicatus* (L.) J. Gay in Ann. Sci. Nat., sér. 2,
 6: 125 (viii.1836); Gay in Durieu Pl. Hispano-Lusit., sect. 1,
 Asturicae, no. 350 (vi.1836 ?).

Spartium complicatum L., Sp. Pl.: 709 (1753).

Erect shrub with young stems varying from subglabrous to densely pubescent and from sparsely to more or less densely leafy. Leaves trifoliolate, sometimes in fascicles, petioles 1-10 mm; leaflets 6-20 X 3-6 mm, oblanceolate or obovate, lower surface with sparse to dense hairs, upper glabrous or hairy. Flowers in lax or congested racemes. Bracts c. 5 mm, simple, lanceolate, persisting or fugacious; bracteoles 1-2 mm, usually fugacious; pedicels 1-6 mm. Calyx 5-9 mm, subglabrous or with sparse to dense, villous hairs, sometimes with glandular papillae; lips c. 2x the length of the tube, upper lip somewhat shorter than the lower, upper teeth as long as the lip, lower teeth c. $\frac{1}{3}$ the length of the lip. Standard 10-19 mm, broadly ovate, with short, appressed hairs. Legumes 30 X 5 mm, narrowly oblong, with glandular papillae and sparse hairs, 3-8 seeded, 2n: 52 (GILLOT, 1965).

Type specimen no. 891. 8 (Savage Catalogue 1945) in the Linnaean herbarium (LINN) *lectotypus*. See discussion below.

Distribution: Madeira, Portugal, W. Spain, W. & S. France, extending in the N. E. as far as Jura; much

more locally in C. and S. Italy, Sicily, Greece, W. Turkey, Syria and North Africa.

Two subspecies are recognised:

i. subsp. *complicatus*

Cytisus parvifolius Lam., Encycl. Méth. Bot. **2**: 248 (1786).

C. divaricatus L'Hérit., Stirpes nov. fasc. 7 (consp.) 184 (1791).

C. complicatus (L.) Raeuschel, Nom. Bot., ed. 3, 212 (1797).

Spartium aureum Cav. in Anal. Cien. Nat. **4**(10): 65 (1801).

Cytisus ponticus Willd. in L., Sp. PL, ed. 4, **3**(2): 1120 (1802).

Adenocarpus parvifolius (Lam.) DC. in Lam. & DC, Fl. Fr., ed. 3, **5**(Suppl.): 549 (1815).

A. intermedius DC, *op. cit.* 500 (1815).

Genista bivonae C. B. Presl, Del. Prag. 33 (1822).

Adenocarpus bivonae (C. B. Presl) C. B. Presl, Fl. Sic. **xix** (1826).

A. commutatus Guss., Fl. Sic. Prodr. 2: 875 (1828).

A. cebennensis Delile, Ind. Sem. Hort. Monsp., 1 (1838) *nomen nudum*.

A. villosus Boiss., Diagn. PL Or. Nov. 1(2): 14 (1843).

A. graecus Griseb., Spicil. Fl. Rumei. **1**: 10 (1843).

A. divaricatus (L'Hérit.) Boiss., Fl. Or. 2: 34 (1872).

A. vallisioletanus Sennen & Pau in Bull. Acad. Geogr. Bot. 18: 457 (1908).

A. complicatus subsp. *aureus* (Cav.) C. Vicioso in Anal. Inst. Bot. Cavanilles 6: 43 (1945).

Icon.: Reichenbach & Reichenbach fil., Icon. FL Germ. **22**: t. 4 (figs. 1-13); Vicioso, Genisteas Españolas **2**: lám. 62; fig. *nostra* 1-4 (corolla only).

Upper surface of the leaves glabrous; bracts and bracteoles without glandular papillae, usually fugacious; calyx sometimes with glandular papillae.

Distribution. As for the species above, but rare and limited to the coastal ranges in North Africa.

MADEIRA

Funchal, vi/xi. 1865, *Mandon* 57 (COI).

PORTUGAL

Minho: Melgaço, vi.1885, *A. R. Cunha* 424 (COI); Serra do Gerês, entre S. Bento da Porta-Alberta e Covide, 9.vii.1948, *Fernandes & Sousa* 2672 (COI); Esposende, 11.vii.1945, *Garcia* 639 (COI); Cabeceiras de Basto, v.1883, *Henriques* (COI); Braga, viii.1883, *Sequeira* (COI); Gerês, Cascata do Torgo, viii.1910, *Maris* (COI, LU); Melgaço, S. Gregório, vi.1894, *Moller* (COI); Viana do Castelo, prope Lanhelas, 29.vii.1938, *Rothmaler* (G). **Douro Litoral:** Porto, vi.1891, *Buchtien* (G, LU); arredores do Porto, v.1882, *Johnston* (COI); Cannas-Felgueiras, vii.1886, *Moller* (COI). **Trás-os-Montes e Alto Douro:** Izedá, prope Bragança, 9.vi.1932, *Carrisso & Mendonça* 2258 (COI); Bragança, Sabor, vi.1879, *M. Ferreira* (COI); Chaves, Outeiro do Seixal, 17.vii.1945, *Garcia* 850 (COI); Pedras Salgadas, vii.1881, *Henriques* (COI); Miranda do Douro, vi.1888, *Mariz* (COI); Montalegre, vi.1891, *Moller* (COI); Chaves, Serra do Brunheiro, vi.1892, *Moller* (COI). **Beira Alta:** Guarda, prope Quinta do Prado, 13.viii.1948, *A. Fernandes & R. Fernandes* (COI); 12 km. de Viseu, 22.vi.1955, *Fernandes, J. Matos & A. Matos* 5313 (COI, LU); Viseu-Carregal, 21.vi.1955, *Fernandes, J. Matos & A. Matos* (COI); Tondela, vii.1886, *M. Ferreira* (COI); Serra da Estrela, *Fonseca* (COI); S. Romão, 8.V.1944, *Garcia* 285 (COI); Santa Comba Dão-Tábua, 17.vi.1954, *J. Matos, A. Matos & Marques* 5056 (COI, LU); Mangualde, vii.1884, *Moller* (COI). **Beira Baixa:** Alpedrinha, vi.1882, *A. R. Cunha* (COI); Castelo Branco-Malpica, 19.vi.1956, *Fernandes, J. Matos & Santos* 5880 (COI, LU); Caramulo, v.1892, *Moller* (COI); Covilhã, 17.vi.1938, *Rothmaler* 13675 (G). **Beira Litoral:** estrada Celorico-Coim-

bra, pr. Venda de Galizes, 28.vi.1955, *Fernandes, J. Matos & A. Matos*, 5719 (COI, LU); Pedrógão Grande, Zêzere, Ponte de Cabril, 17.vi.1947, *Fontes & Rainha* 2015 (G); Vila Franca pr. Coimbra, vi.1882, *Moller* (COI, G, LU). **Estremadura:** Caneças, 1884, *Daveau* (G); Areias, x.1899, *Moller* (COI); Serra de Sintra, v.1840, *Welwitsch* (G). **Alto Alentejo:** Castelo de Vide, 26.vi.1951, *Beliz* 210 (COI); Évora, v.1882, *Daveau* (COI). **Algarve:** Monchique, 4.vi.1853, *Bourgeau* 1803 (COI, G, LU); Caldas de Monchique, v.1888, *Moller* (COI).

SPAIN

Burgos: Castillo de la Reina, v.1930, *Losa* (G). **Léon:** Brañueles, vi.1904, *Gandoger* (COI); Riaño, vi.1905, *Gandoger* (COI); Almanza, 6.vii.1927, *Lacaíta* 495/27 (G); Valcabado de Paraino, 8.vii.1851-2, *Lange* (COI). **Astúrias:** près Tineo, 21.vii.1864, *Bourgeau* (COI); Sama de Langreo, près Oviedo, 13.V.1864, *Bourgeau* 2634 (LU); Grado, 25.vi.1835, *Durieu* (G). **Lugo:** Villardiez, Fousagrada, 12.viii.1954, *Carreira* (G); **Coruña:** prope Santiago de Compostela, 1846, *Willkomm* (COI). **Pontevedra:** inter Porriño & Redondela, 9.vii.1928, *Lacaíta* 592/28 (G). **Valladolid:** Olmedo, 18.vi.1851-2, *Lange* (COI); **Toledo:** Talavera de la Reina 28.V.1945, *Rivas* (G). **Madrid:** Sierra de Guadarrama, Chozas, 22.vi/19.vii.1854, *Bourgeau* (COI, G, LU); Miraflores, vi.1841, *Reuter* (G); Retamares, 18.vi.1946, *Rivas Goday* (G). **Avila:** Labajos, 28.vii.1946, *Monasterio & Perez* (G). **Cáceres:** Vallée de Jerte, près Plasencia; Barco de Avila, 2.vii.1863, *Bourgeau* 249 (COI, G, LU); Aldeanueva del Camino, 19.vii.1946, *Rivas Goday* (G).

FRANCE

Maine et Loire: Blongerva, 30.vii.1866, *Genevier* (LU). **Côte d'Or:** Auxonne, 1897, *Heurot* (G); Flammerans, 28.ix., *Millardet* (G). **Jura:** Forêt de la Terre, vii.1840, *Meyran* (COI); Rochefort s. Nenou, près Dole, 4.vi.1855, *Michalet* (G). **Hte. Vienne:** Chateaupousac, 9.ix.1910, *Simon* (LU). **Vendée:** La Tardière, 28.vii.1912, *Charrier* (G); La Chaigneraie, 29.vi.1903, *Flahault* (LU); Verrie, 1.viii.1859,

Genevier (G); **Cantal**: près de Boisset, vii.1889, *Héribaud* (COI, LU); Canton de Maurs, 11.viii.1876, *Heribaud* (G). **Ardèche**: Vals-les-Bains, 19.vii., ? (LU); Thueyts, vers Pont de Labaume, 10.vii.1909, *Coste* (G). **Gard**: près Vigan, vii.1878, *Anthouard* (COI, G); Valleraugue, 13.viii., *Copineau* (LU). **Lozère**: Villeforte, vii.1892, *Gooley* (LU). **Aveyron**: La Rouquette, 6.vii.1895, *Simon* (LU); Carcenac-Peyrales, 26.vii.1898, *Soulier* (G). **Lot**: Canton de Lacapelle-Marival, 4.vii.1887, *Malvinaud* (LU). **Hérault**: Montpellier, 1807, ? (G). **Landes**: St. Sever-sur-Adoun, 28.vi.1853, *Amblard* (G); près Dax, 31.v/25.vii.1863, *Blanchet* (G). **Basses Pyrénées**: Château de Besanos, près Pau, vi.1854, *Franqueville* (?) (G); Bayonne, vii.1895, *Bordère* (G); environs de Pau, *Delartre* (G). **Htes. Pyrénées**: Capvern-les-Bains, 12.viii.1876, *Arnaud* (COI, LU); Argèles, 25.vi/16.viii.1885, *Bordère* (COI, LU); Bagnères-de-Bigorre, 11.vii.1847, *Desvaux* (G); L'Escalé-Dieu, *Irat* (COI, LU); entre Lourdes et Bigorre, 29.viii.1856, *Zetterstedt* (LU).

ITALY

Firenze: Radicofani, pr. Florence, 26.viii.1846, *Cosson* (G); Appenine de Toscana, *Reynier* (G). **Marche**: Montefortino, 1840, *Marzialetti* (FI). **Lazio**: Rome, 6.vii.1938, *Armitage* (FI); Paliano, 20.vii.1897, *Béguinot* (FI); Frascati-Bocca di Papa, 29.viii.1889, *Caruel* (FI); Monte Bosani (?), *Macchiati* (FI); Antemimare, ix.1901, *Nicotra* (FI); M. Ciimini, 19.viii.1836, *Parlatore* (FI); M. Albani, v/vi.1850, *Rolli* (FI). **Calabria**: S. Eufemia et Palmi, 22.V.1877, *Arcangeli* (FI); Pecoraro, 18.vi.1877, *Biondi* (FI); pr. Tiriolo, 16.vi.1899, *Fiori* (FI); La Sila, 17.vi.1899, *Fiori* (FI); St. Stephano in Aspromonte, 3.vii.1877, *Huter, Porta Rigo* 475 (FI); Monte San Copolo, sopra Arno, 27.V.1921, *Lacaita* (FI); Serra San Bruno, vi.1884, Reggio, Gerace, 6.vi.1898, *Rigo* (FI). **Sicily**: Mandanici, 4.vi.1882, *Borzi* (FI, LU); Monti Scuderi, vi., *Citarda* 1201 (COI); Messina, vi/vii.1905, *Ross* 522 (FI, G, LU); Aetna, vi.1908, *Ross* 623 (LU).

GREECE

Makedhonia: Mt. Athos, 1887, *AucherEloy* 1113 (G); Hagion Oros, inter Xiropotanon et Caryes, 14/26.viii.1862, *Orphanides* (COI, L U); Kavalla, 8.vi.1955, *Rechinger fil.* 15539 (L U); Peninsula Hagio Oros, Karyales, 14.vi.1891, *Sintenis & Bornmüller* 709 (G). **Evvoia:** Dirphys, 5.viii.1858, *Hel-dreich* 2126 (G); Euboea, vii.1875, *Orphanides* (L U); supra Steni, 1958, *Rechinger fil.* 1956 (G). **Khios:** near Kampia, 6.V.1939, *Platt* 259 (κ).

TURKEY

Bursa: Bozdagh, Tmolus occid., 29.vii.1854, *Balansa* (G); Tmolus austr., vi.1842, *Boissier* (G). **Balikesir:** M. Ida (Kaz Dagh), 22.vi.1883, *Sintenis* 735 (L U). **Izmir:** Loudja, près Smyrne, 21iv/26.vi.1854, *Balansa* (G). **Antalya:** above Ge-devet yayla, 25.viii.1947, *Davis* 14265 (K). **Hatay:** Beless hogazi, 30.vi.1944, *Karapligel* (κ).

SYRIA

Inter Bekfaya et Biskinta, 14.vi.1897, *Bornmüller* (G, L U); Beilan-Narkislik, 22.vi.1862, *Kotschy* (κ); Aïn Geddaïl, Libano-Berkfaya, 30.V.1879, *Peyron* 484 (G).

ALGERIA

Alger: Kabylie, Tala-Kitane, 15.vi.1931, *Maire* (FI); Aisser-Guizan, Agoulmin-Aberkan (fide Maire 1921); **Constantine:** Sommet du Babor (fide Maire 1921).

ii. subsp. **nainii** (Maire) P. Gibbs *comb. et stat. nov.*

Adenocarpus nainii Maire in Bull. Soc. Hist. Nat. Afr. Nord 13: 210 (1922).

A. bracteatus Pau & Font Quer, Iter Maroc. **exsic.** no. 281 (1927) in *sched.*

A. intermedius var. *bracteatus* (Pau & Font Quer) Maire in Jahandiez & Maire, Cat. Pl. Maroc. 2: 359 (1932).

A. intermedius var. *nainii* (Maire) Maire in Bull. Soc. Hist. Nat. Afr. Nord **29**: 413 (1938).

Leaves with dense, appressed hairs on both surfaces; bracts, bracteoles, pedicels and calyx with usually dense, glandular papillae; bracts and bracteoles persisting.

Type: «hab. in Quercetis Atlantis medii maroccani, in jugo Tanoualt prope Mrit. iv.1915, *Nain* (herb. Battandier according to Maire in Bull. Soc. Hist. Nat. Afr. Nord 13: 210 (1922). Specimen not seen.

Distribution: Morocco, Moyen Atlas to the Rif mountains.

MOROCCO

Zaïn: Oulmès, forêt de Tajaout, 1200 m, 1.v.1927, *Jahandiez* 112 (G); pr. Bu Meziat (Atlante riphæo), 1700 m, solo silic., 17/29.vi.1927, *Font Quer* (G); Hab. in declivibus arenaceis Yebel Afestel (Gomara), 1500m, 25.vi.1928, *Font Quer* (G); Azib de Ketama, maquis, 1600 m, 22.vi.1934, *Sennen & Mauricio* 9320 (G).

Taxonomy of A. complicatus

A. complicatus is a rather polymorphic species which shows variation in the following characters: pubescence of the branches, leaves and calyx varies from subglabrous to dense, patent hairs; presence or absence of glandular papillae on the calyx; length of the calyx and relative lengths of the upper and lower lips; size and degree of persistence of the bracts and bracteoles.

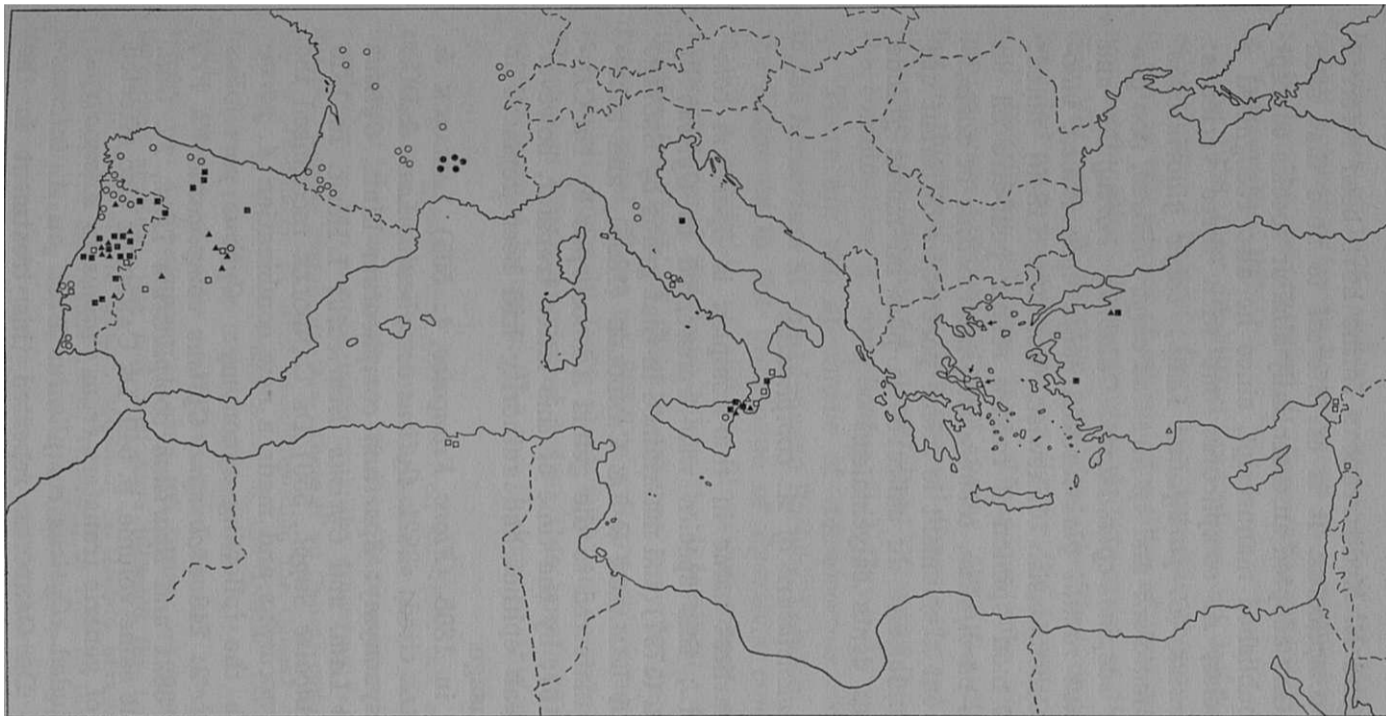
On the basis of variations in these characters a number of species have been recognised by various authors: *A. parvifolius* (Lam.) DC. and *A. bivonae* (C. Presl) C. Presl refer to specimens from S. W. France and Sicily (Etna) respectively which tend to combine subglabrous stems and leaves with a short, glandular calyx. *A. complicatus* subsp. *aureus* (Cav.) Vicioso and *A. villosus* Boiss. include specimens with dense, villous hairs and an eglandular calyx from the Iberian peninsula and W. Turkey respectively, whilst specimens from Portugal, France and Italy with a usually eglandular calyx and an indumentum of appressed hairs, and some-

times with persistent bracts and bracteoles, have been referred to *A. intermedius* DC. or *A. commutatus* Guss. In addition, specimens from the East Mediterranean which combine dense, villous hairs with a glandular calyx have been described as *A. graecus* Griseb., and the name *A. cebennensis* Del. apparently refers to specimens from S. E. France which show the subglabrous condition of *A. parvifolius* but which lack the glandular papillae on the calyx.

I have studied herbarium material from throughout the area of this complex and have come to the conclusion that, with the exception of subsp. *nainii* described above, none of the character combinations which have been referred to as distinct species show sufficient constancy or correlated geographical distribution to warrant formal taxonomic recognition even at the subspecies level. Map 2 attempts to show the distribution pattern in two of the more prominent character trends — presence or absence of glandular papillae on the calyx and the nature and extent of the pubescence on the stems, leaves and calyx. The map shows several features of the complex:

a) There is one partially distinctive character combination and distribution in that sparsely pubescent forms with a glandular calyx (cf. *A. parvifolius*) tend to have an Atlantic type distribution in Portugal, Spain and France. Such variants may be worthy of formal recognition as a *varietas*, but they do intergrade with more pubescent inland forms, so that the variation is of a clinal rather than discrete nature; further, such specimens differ from others in S. E. France by only a single character, the presence of glandular papillae on the calyx.

b) In general, there is an overall lack of distinct distribution for the various character combinations, and where fairly extensive herbarium material which contains numerous duplicate specimens and collections from adjacent localities has been studied, eg. from Portugal (COI) and Firenze (FI), then a more or less continuous range of morphology has been represented. I have, therefore, recognised the single species *A. complicatus* with only two subspecies, and all



Map 2. — Distribution of variation in pubescence and presence of glandular papillae on the calyx in *A. complicatus* s. l. (excluding subsp. *nainii*)
 Young stems and leaves: o with sparse, appressed hairs; □ with dense, appressed hairs; △ with dense, patent hairs (O calyx glandular; ● eglandular).

European and E. Mediterranean forms have been referred to subsp. *complicatus*. It is of interest to note that even in 1836 J. GAY adopted an essentially similar species concept in his unpublished manuscript, since he also recognised a single species, *A. complicatus* but with three varieties: « α *polyadenius* (*C. parvifolius* Lam.) *calyx glabriusculus. Gallia occidentalis.*» and « β *hirsutus calyx villosus, non glabriusculus, saepius eglanduloso. Calabria, Portugal.*» and « γ *amadeniensis ramuli glabriusculo, calyx eglanduloso, villosiusculo. Cebennensis.*» Likewise, BOISSIER (1840) noted: «...suivant mon opinion il faudra réunir peut-être en un seul les *A. parvifolius, cebennensis, intermedius* et *commutatus*, qui ont absolument le même port et ne diffèrent que par la glandulosité du calice et la plus ou moins grande longueur des dents calycinales.»

ii. *Nomenclature of A. complicatus*

The earliest name in this complex is *Spartium complicatum* L.; this species was transferred to *Cytisus* by RAEUSCHEL (1797) and maintained in that genus by BROTERO (1804) and LAMARCK & DE CANDOLLE (1805), and subsequently transferred to the genus *Adenocarpus* by DE CANDOLLE (1815); by the time of this latter transfer, however, the Linnaean epithet and authority had been replaced in common usage.

Thus, in 1805 (*Flore Française* 4: 505) LAMARCK & DE CANDOLLE cited: «3821. *Cytisus complicatus* Lam. & DC.» with the synonymy: *Spartium complicatum* Linn., *Cytisus parvifolius* Lam. and *Cytisus divaricatus* L'Hérit. In 1815 (*Flore Française Suppl.*, 550) DE CANDOLLE recognised the genus *Adenocarpus* and made a new combination *A. parvifolius* with the following synonymy: «*Cytisus parvifolius* Lam., *Dict.* 2: 248 *excl. syn.*, *Cytisus complicatus* Fl. Fr., ed. 3, no. 3821 and *Spartium complicatum* Lois., *Fl. Gall.* 441.» In the same volume, p. 549, DE CANDOLLE also effected a number of generic transfers from *Cytisus* to *Adenocarpus* which included «*Cytisus complicatus* Brot. ou *A. intermedius* DC.» DE CANDOLLE repeated this treatment in the

Prodromus of 1825, and as a consequence the original Linnaean epithet came to be replaced in a number of floristic texts by the two names *A. parvifolius* (Lam.) DC. and *A. intermedius* DC.

In 1836 GAY identified and drew up labels for the collections by DURIEU from the Asturias region of N. W. Spain, in the course of which a number of new species and new combinations were recognised. In August of 1836 (*Ann. Sci. Nat.*, sér. 2, 6) GAY published the first of what was intended as a series of papers listing the DURIEU exsiccata and describing all new taxa. Unaccountably, no further papers were published (see LACAÏTA, 1927 for discussion) but in this first paper GAY several times referred to «*Adenocarpus complicatus* (*A. parvifolius*) DC.» and thus effected the combination *A. complicatus* (L.) Gay¹.

There are two specimens of *Adenocarpus complicatus* in the herbarium at the Linnaean Society, London, and since the diagnosis in the protologue of *Spartium complicatum* is not a repetition of any pre-Linnaean source, and since LINNAEUS could not have taken the information from any illustration, both of these specimens may be regarded as type material. Sheet no. 891.8 is a SAUVAGE'S specimen, and is a small, sparsely leafy plant with an eglandular calyx which has short, appressed hairs; this specimen also has several mature legumes. The morphology of this plant cor-

¹ It is possible that GAY effectively published this combination at a slightly earlier date with the distribution of the DURIEU exsiccata: the printed label for specimen no. 350 cites: «*Adenocarpus complicatus a polyadenius* Gay monogr. ined.» with the synonymy: «*A. parvifolius* DC, *Cytisus complicatus* L.» (There is no *Cytisus complicatus* L., this is presumably an error or abbreviation for *Cytisus complicatus* (L.) DC. or Brot.). Certainly some of the DURIEU exsiccata was forwarded to the Royal Botanic Gardens, Kew before August 1836, for in a letter from GAY to HOOKER dated January 1836 there is a reference to a consignment of some 400 DURIEU specimens for the herbarium at Kew; this may well have included the Leguminosae since the label of the DURIEU specimen of *Genista obtusiramea* has the handwritten date «June 1836». However, in view of the difficulty of accurately dating the exsiccata it is convenient to accept publication as from the reference in *Ann. Sci. Nat.* of August 1836.

responds to specimens from S. E. France which have been referred to by the name *A. cebennensis* Del. (see also Map 2). Sheet no. 891.9 is a specimen which is much more representative of *A. complicatus* s. l., having leafy stems with rather dense, villous hairs, persistent bracts, and a calyx with sparse, villous hairs and glandular papillae. This specimen has no fruits. Plants with similar facies occur in Portugal and W. Spain.

I am indebted to Dr. STEARN (British Museum, Natural History) for pointing out that the SAUVAGE'S specimen, sheet no. 891.8 must be selected as the type of *Adenocarpus complicatus*. STEARN (1957) has noted that the SAUVAGES herbarium was in LINNAEUS'S possession before 1753 and so was available when the *Species Plantarum* was drafted. STEARN (*in litt.*) has pointed out that of two specimens in the Linnaean herbarium, only sheet no. 891.8 is labelled in LINNAEUS'S hand '6 complicatum' and that the use of the number is particularly cogent evidence that LINNAEUS referred to this specimen when drafting the entry for the *Species Plantarum*. Further, the diagnosis for *Spartium complicatum*: «*Spartium... caulibus... glabris, leguminibus soabris*» fits the specimen no. 891.8 rather than no. 891.9 since the latter has densely villous stems and is lacking legumes. Accordingly, the SAUVAGES specimen, sheet no. 891.8 in the Linnaean herbarium has been selected as the type for *Adenocarpus complicatus*.

2. *A. mannii* (Hook. fil.) Hook. fil. in J. Linn. Soc. **7**: 189 (1864)

Cytisus mannii Hook. fil. in J. Linn. Soc. **6**: 8 (1861).
Adenocarpus benguellensis Welw. ex Baker in Oliver, Fl. Trop. Afr. **2**: 47 (1871).

Icon.: Fig. *nostra* 5 (corolla only).

Low growing, semi-prostrate, or erect shrub, or small tree up to 4 m, stems and branches with dense, patent, villous hairs. Leaves trifoliolate, petioles 1-2 mm; leaflets 5-10 X 3-4 mm, elliptic or lanceolate, lower surface with

dense, villous hairs, upper subglabrous to sparsely hairy. Flowers borne in terminal racemes. Bracts c. 5-8 mm, simple, lanceolate, persisting; bracteoles 3-5 mm, narrowly lanceolate, borne just below the calyx or adnate to the calyx tube; pedicels 2-3 mm. Calyx 9-14 mm, with dense, subpatent to patent, villous hairs; lips longer than the tube, lower lip longer than the upper and subequalling or exceeding the standard, upper teeth as long as the lip, lower teeth c. $\frac{1}{3}$ - $\frac{1}{2}$ the length of the lip Standard 10-14 mm, ovate, sericeous, Legume c. 25 X 5 mm, narrowly oblong, with dense, villous hairs and glandular papillae, 3-8 seeded.

Type: Fernando Po, Clarence Peak, alt. 9000 ft, iv.1860, *Gustav Mann* 594 (\times , *holotypus*).

Distribution: Tropical Africa, in high montane areas at c. 500-4000 m, from Nigeria, Fernando Po, W. Cameroun, E. Cameroun, southern Sudan and Ethiopia, Rwanda Republic, Congo Republic, Uganda, Kenya, Tanzania, Malawi, N. E. Zambia and Angola (map 3).

FERNANDO PO

Pico de Santa Isabel, 2.iii.1947, *Guinea* 2678 (G).

NIGERIA

Northern Region: Mambila Distr., Mambila Plateau, Gembu 1620 m, 31.i.1958, *Hepper* 1843 (\times); Mambila Distr., Mambila Plateau, Maisamari to Bellel, 1680 m, 18.i.1958, *Hepper* 2804 (\times).

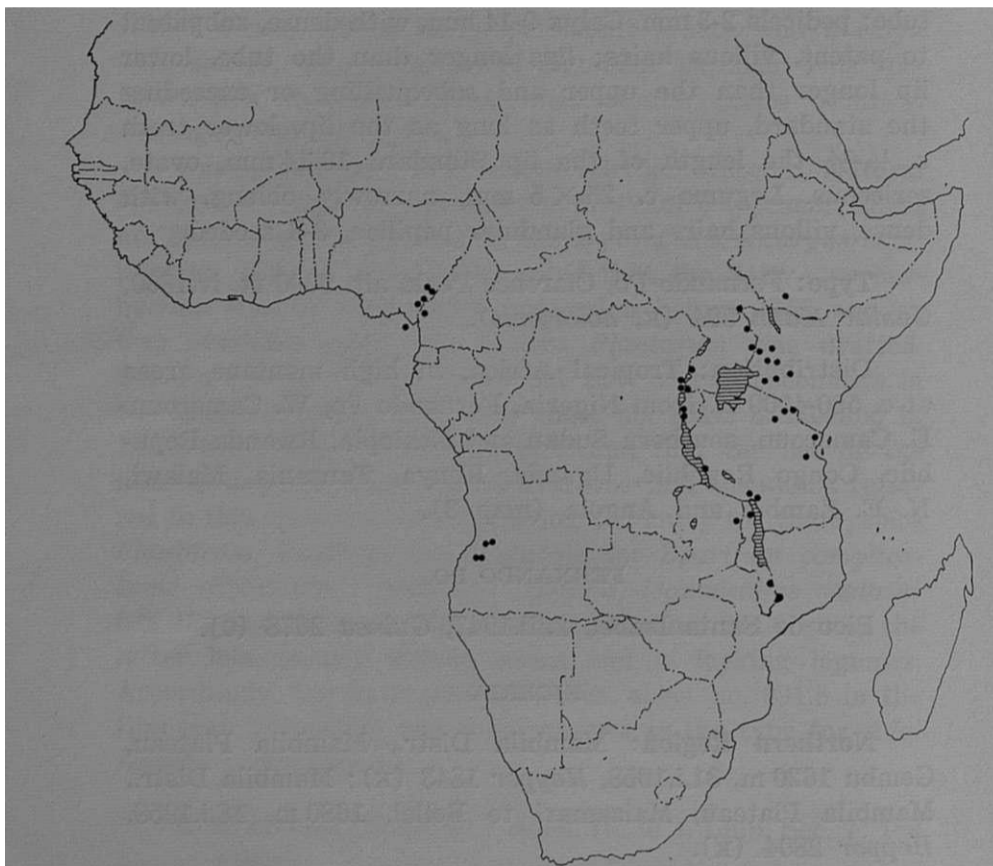
W. CAMEROUN

Cameroon Mtn. (S. side), Mann's Spring, Vefondi, 1.iv.1948, *Brenan* 9557 (\times); Cameroon Mtn., 8.ii.1927, *Dalziel* 8316 (\times); Bamenda, Bafut-Negemba Forest Reserve, 30.xii.1948, *Tamajong* FHI 22216 (\times).

E. CAMEROUN

Bambuto Range, Dschang Distr., 8.iii.1917, *Unwin* 210 (\times).

Equatoria: Imatong Mtns., Mt. Kineti, 3,466 m, 21.ix.
1940, *Tothill* 13515 (\times).



Map 3. —Distribution of *A. manni*

ETHIOPIA

Amaro Mtns., E. slopes of Mt. Delo (5 48' N: 37 54' E),
28.i.1953, *Gillet* 14992 (\times).

RWANDA REPUBLIC

Shangugu Territory, Route Astrida-Bukavu, km 66, riv.
Kuwasenkoko, 2385 m, 27.ix.1956, *Troupin* 2675 (COI, \times).

CONGO REPUBLIC

Kivu: Lacs Edouard et Kiva (Sabingo-Gahinda), *Mildbraed* 1683 (fide *Flore du Congo Belge*).

UGANDA

U 1: Mt. Moroto, 2,900 m, *E g geling* 2949 (K); **U 2:** Kigezi, Muhavura Mtns., 3048 m, 7.xii.1930, *B. D. Burt* 2816 (x); Toro Distr., Ruwenzori, Mobuku, Valley, x. 1908, *Kassner* 3120 (x); Kigezi, v.1933, *Mrs. Sanford* in *Tohill* 1205 (x); **U 3:** Bulambuli, Elgon, 3048 m, *Tohill* 2344 (K); Gabaralona, Mt. Elgon, 3,500 m, 15.xii.1938, *Thomas* 2696 (K).

KENYA

K 3: Trans Nzoia, N. E. Elgon, 3048 m, xii.1956, *Mrs. Tweedie* 1422 (x); Elgeyo, Cherangani Hills, 2743 m, xii.1933, *Mrs. Powles* 18 (x); Uasin Gishu, Kaptagat, 2438 m, 16.ix.1955, *Mrs. Irwin* 222 (x); Laikipia, Thompsons Falls district, 2134 m, 23.X.1931, *Pierce* 1464 (x); Ravine, Timboroa, turning to Londiani, 2896 m, viii.1952, *Mrs. Irwin* in Bally 8280 (x); Nakuru, Mau, Upper Plateau, 1898, *Whyte* (x); Naivasha, W. Aberdares, Njabini, 2743 m, 1923, *Gardner* 1133 (x); **K 4:** North Nyeri, Western Mt. Kenya, regio alpina inferior, 3200 m, 31.i.1922, *R. E. & C. T. E. Fries* 1313 (x); Meru, Mt. Kenya, Gorges Valley, 3780 m, 19.ii.1965, *AW* 84 (x); **K 6:** Masai, Narok Distr., Olokurto, 2591 m, 1.vi.1961, *Glover, Gwynne & Samuel* 1517 (K).

TANZANIA

T 2: Mbulu Distr., Loolmalassin Mtn., 17.ix.1932, *B. D. Burt* 4197 (G, K); Mt. Kilimanjaro, Bismark to Peters Huts, 2,900 m, 23.viii.1930, *B. D. Burt* 2340 (x); Arusha Distr., Mt. Meru, 29.ix.1932, *B. D. Burt* 4125 G, (x); **T 3:** Lushoto, X.1936, *Davies* 1269 (x); **T 4:** Mpanda Distr., Kungwe-Mahli peninsula, below summit of Kungwe Mtn., 7.ix.1959, *Harley* 9558 (x); **T 6:** Morogoro Distr., Lukwangule Plateau, 26.viii.1951, *Greenway & Eggeling* 8676 (x); **T 7:** Njombe Distr., Elton Plateau, 2,100 m, 7.i.1957, *Mrs. Richards* 7538 (x);

Mbeya Distr., Poroto Mtns., 2,250 m, 13.V.1957, *Mrs. Richards* 9664 (\times); Rungwe Distr., Station Kyimbila, 23.viii.1910, *Stolz* (G).

MALAWI

N: Nyika Plateau, N. Nyasa Distr., 11.viii.1946, *Brass* 17165 (\times); S: Lucheny Plateau, Mlanje Mtn., 28.vi.1946, *Brass* 16510 (\times).

ZAMBIA

E: Lundazi Distr., Nyika Plateau, Kangampende Mtn., 3.X.1952, *White* 2573 (\times).

ANGOLA

Benguela: Ganda, Serra de Vera, Calenga, *Gossweiler* 12400 (BM, LISC, LUA); Huila, entre Sá da Bandeira e Humpata, 1900 m, *Exell & Mendonça* 2005 (BM, COI) fide TORRE in *Conspectus Florae Angolensis*; Benguela, rocks of the Morro de Lopolo, 1897, *Welwitsch* (\times).

3. *A. foliolosus* (Aiton) DC. in Lam. & DC, Fl. Fr., ed. 3, **5(Suppl.)**: 549 (1815).

Cytisus foliolosus Aiton, Hort. Kew. **3**: 49 (1789).

Icon.: Webb, P. B. & Berthelot, S., Phyt. Canar. **2**: t. 50B; fig. *nostra* 6 (corolla only).

Erect densely leafy shrub. Leaves trifoliolate, usually in dense fascicles, petioles 1-3 mm; leaflets 3-6 X 1.5-2.5 mm, obovate or narrowly lanceolate, margins somewhat involute, lower surface with appressed or spreading hairs, upper glabrous. Flowers in terminal racemes. Bracts c. 3-5 mm, simple, lanceolate, fugacious; bracteoles 3-4 mm, narrowly elliptical, fugacious; pedicels 4-12 mm. Calyx 7-8 mm, usually with dense, villous hairs; lips longer than the tube, upper teeth as long as the lip, lower teeth c. $\frac{1}{3}$ the length of the lip. Standard c. 12 mm, broadly ovate, with dense, sericeous hairs. Legume 24-40 X 4-5 mm, narrowly oblong, with glan-

dular papillae, sometimes very sparsely so, and sparse hairs, 3-5 seeded.

Type: specimen originally cultivated at Kew (**BM**, *holotypus*).

Distribution: Canary Isles. Gran Canaria, Tenerife, Gomera, La Palma. At 250-1000 m, usually in woodland on the lower slopes, particularly in *Laurus canariensis* community.

ISLAS CANARIAS

Gran **Canaria**: San Mateo, 1500 m, 20/26.v.1900, *Bornmüller* 434 (**G, LU**); Santa Brigida, 22.iv.1855, *Bourgeau* (**COI, G**); Tenerife: Las Mercedes, 650 m, 4.V.1933, *Asplund* 1088 (**G**); Tenerife, in dumetis et ad *sylvam* margines, iv.1845, *Bourgeau* (**G**); Las Mercedes, 19.v/15.vii.1855, *Bourgeau* (**COI, G, LU**); **Gomera**: Roquillo, 500 m, 23.iv.1905, *Pitard* (**G**). Without precise locality: Iles Canaries, sur les bords des forêts, 1831, *Webb & Berthelot* (**G**).

Specimens of *A. foliolosus* from Gran Canaria, which tend to be more densely villous and to have leaves in markedly dense fascicles, have been described as var. *villosus* by *Webb & Berthelot* (1842). Plants from Hierro which apparently resemble *A. foliolosus* in general facies, but which have long petioles of c. 10 mm have been described as a distinct species, *A. ombriosus* by *Ceballos & Ortuño* (1947). No specimens have been seen, and the taxon is apparently virtually extinct. See also discussion under *A. viscosus*.

4. *A. viscosus* (Willd.) *Webb & Berthelot*, *Phyt. Canar.* 2: 32 (1842).

Genista viscosa Willd. in *L.*, *Sp. PL.*, ed. 4, **3(2)**: 937 (1802).

Adenocarpus frankenioides Choisy ex DC, *Prodr.* 2: 158 (1825) *nom. illegit.*

Adenocarpus anagyris Sprengel, *Syst. Veg.* **3**: 226 (1826).

Icon.: Webb & Berthelot, Phyt. Canar. 2: t. 50 (1842) as *A. frankenioides* Choisy; fig. *nostra* 7 (corolla only).

Erect, densely leafy and somewhat viscous shrub. Leaves trifoliolate and fasciculate, petioles 2-5 mm; leaflets 3-7(-12) X 1.5-2.5 mm, narrowly elliptic, markedly involute, both surfaces with spreading hairs, the lower densely so. Flowers in terminal racemes. Bracts 2-5 mm, simple, narrowly lanceolate; bracteoles 2-3 mm, linear; pedicels 4-10 mm. Calyx 7-8 mm, with villous hairs and glandular papillae; lips longer than the tube, upper teeth as long as the lip, lower teeth c. $\frac{1}{2}$ the length of the lip. Standard c. 12 mm, broadly ovate, subglabrous or with sparse hairs towards the apex. Legume 20-35 X 5 mm, with glandular papillae and sparse hairs. 2n: 48 (LARSEN, 1960).

Type: not traced.

Distribution: Canary Isles. Tenerife and Palma. Subalpine zone, exposed upper slopes of volcanic cones at c. 2000 m in association with *Spartocytisus nubigenus* (Retama-Codeso).

ISLAS CANARIAS

Tenerife: La Fortalese, 2000 m, 11.v.1933, *Asplund* 1233 (G); Pico de Teide, 28.vi.1900, *Bornmüller* 438 (G, LU); Peraltis vallis Orosavinsis, La Cumbre, 2000 m, v.1922, *Burchard* 36 (G); Pico de Teide, *Webb* (G); La Palma: «in reg. alpina», *Bourgeau* (G); Cumbre Alta, ii.1921, *Burchard* (G); In montibus insulae Palmae, 1844, *Webb* (G).

Intermediate specimens between *A. foliolosus* and *A. viscosus*.

Tenerife: Buenavista, 800 m, 15.v.1933, *Asplund* 837 (G); Guimar, 400 m, 3.vi.1901, *Bornmüller* 2178 (G); La Palma: El Paso, in pinetis, 900 m, 26.iv.1901, *Bornmüller* 2177 (G).

Specimens of *A. viscosus* from La Palma with long leaves (10 mm or more) which are rather less densely fas-

cycled than in the typical form have been described as var. *spartioides* by WEBB & BERTHELOT (1842).

There are some grounds for regarding *A. foliolosus* and *A. viscosus* as only subspecies of a single species. As noted above (Relationships within the Genus) the two taxa tend to replace each other altitudinally, and intermediate specimens which combine the differential characters of the two taxa are well known; they should probably be regarded as ecological vicariads. It is of interest to note that G A Y in his unpublished monograph treated the two taxa as infraspecific variants since he recognised within *A. foliolosus* « α *exadenius*» (*A. foliolosus*) and « β *polyadenius*» (*A. viscosus*). On the whole, however, the characters of the two taxa appear to be fairly constantly correlated and I have preferred to retain them as distinct species in the present revision ¹.

5. *A. decorticans* Boiss. in *Bibl. Univ. Genève* 2: 407 (1838).

A. boissieri Webb, *Iter Hisp.* 52 (1838).

A. speciosus Pomel, *Nouv. Mat. Fl. Atl.* 178 (1874).

Icon.: Boissier, E., *Voy. Bot. Esp.* 1: t. 41 (1839-40); Webb, P. B., *Otia Hisp. Pl. Rar.*, ed. 2, t. 4 (1853) sub. *A. boissieri*; Vicioso, C., *Genisteas Españolas* 2: lám. 58 (1955); *Bot. Mag.* 166, t. 48 (1949) text by J. R. SEALY; fig. *nostra* 10 (corolla only).

¹ After the above account had been written a study of these two species by LEMS (1958) was brought to my attention. On the basis of detailed field studies LEMS has produced good evidence to suggest that the occurrence of intermediate specimens between *A. foliolosus* and *A. viscosus* is almost certainly due to introgressive hybridisation between two species rather than to phenotypic effects. LEMS also notes that presumed hybrid specimens tend to occur only in «intermediate» habitats, such as areas relatively recently cleared by fire, or on North facing slopes where *Pinus canariensis* has successfully invaded the lower slopes and forms an 'ecological bridge' between the subalpine scrub and laurel forest.

Erect shrub up to 3 m, stems and branches usually with dense fascicles of leaves. Leaves trifoliolate, petioles 5-10 mm; leaflets 9-18 X 1-2.5 mm, very narrowly elliptic and with the margins markedly involute, appearing sub-linear, both surfaces with appressed, sericeous hairs. Flowers in congested, terminal racemes. Bracts c. 5 mm, simple, narrowly lanceolate; bracteoles sublinear, fugacious; pedicels 4-8 mm, simple, narrowly lanceolate; bracteoles sublinear 4-8 mm. Calyx 5-8 mm, with appressed, sericeous hairs; lower lip longer than the upper, upper teeth as long as the lip, lower teeth c. $\frac{1}{2}$ the length of the lip. Standard c. 15 mm, broadly ovate, with appressed sericeous hairs. Legume 20-60 X 8-10 mm, narrowly oblong, with dense glandular papillae, 3-5 seeded.

Type: Spain, Sierra Nevada vallibus 4000-6000', vii.1837, Boissier (K, *isotypus*).

Distribution: Betic ranges of southern Spain; Sierra Nevada, Sierra Tejeda, Sierra del Endrinal (Grazalema), Sierra de los Filabres. Rif mountains of Morocco and Algeria. (map 4). High montane areas with calcareous substrates.

SPAIN

Granada: Sierra Nevada, Lanjaron-Trevez, vii.1853, Boissier (G); Sierra Nevada, Barranco de San Juan, 10.vii.1851, Bourgeau (COI, G); Sierra Nevada, San Jerónimo, ix.1848, Funk (G); Sierra de Alfacar, 1.vii.1879, Huter, Porta & Rigo 7 (G); Sierra Nevada supra Bubion, 1.vi.1902, Pau (COI); Guejar de la Sierra, iv/v.1852, Del Campo (G); Sierra de Alfacar, 1.vii.1845, Willkomm (COI); Sierra Nevada, Trevenque, 7.viii.1844, Willkomm 209 (COI). Almeria: Barranco de Finana, 6.vii.1908, St. Lager (G); Sierra de los Filabres, 23.vii.1845, Willkomm (COI); Málaga: Sierra Tejeda, 9.vi.1935, Laza (COI).

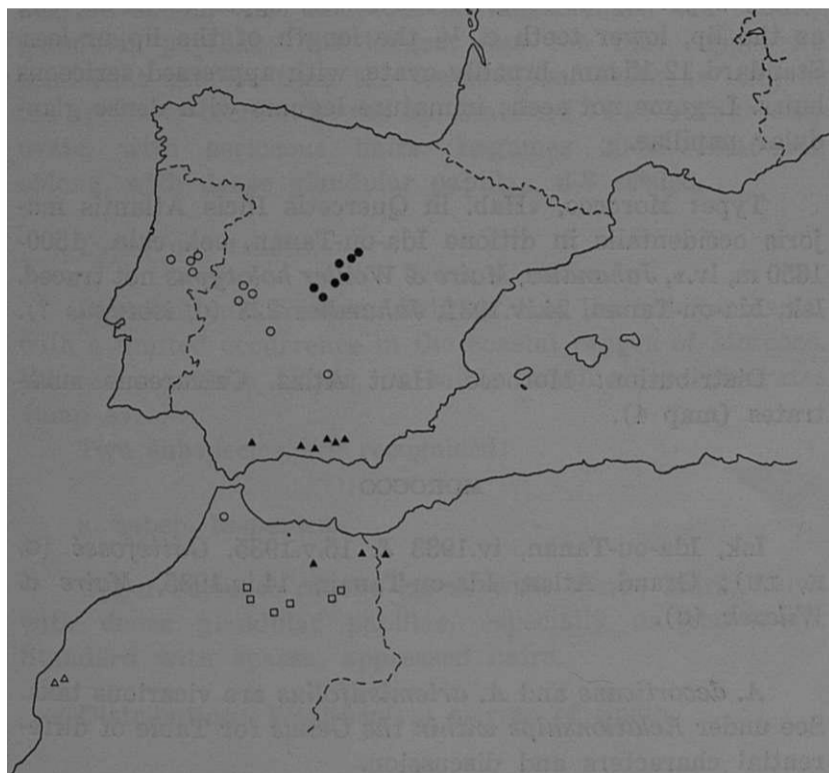
MOROCCO

Rhas Foughal et Djebel Bou-Zabel, 3.v.1933, Faure (G); Djebel Lerz, pr. Bu-Meziat (Atlante Riphæo), 12/29.vi.1927,

Font Quer (G); *Atlantis medii supra Taza*, 18.vi.1925, *Maire* (G); *Atlas Rifain, Beni Seddat a Isaguen*, 6.vii.1932, *Sennen & Mauricio* (G); *Beni Snassene*, 25.iv.1928, *Wilezek Briquet, Dutoit & Emberger* (G).

ALGERIA

Oran: Terny a Ain Ghoraba, 30.vi.1935, *Faure* (G, L U); *Ghar Rouban*, 20 km. S. E. of *Oudjan*, iv.1856, *Munby* (K).



Map 4 Distribution of *A. hispanicus*, *A. bacquei*, *A. decorticans* and *A. artemisiifolius*
 • subsp. *hispanicus*; O subsp. *argyrophyllus*; □ *A. bacquei*;
 ▲ *A. decorticans*; △ *A. artemisiifolius*

6. *A. artemisiifolius* *Jahand., Maire & Weil.* in *Bull. Soc. Hist. Nat. Afr. Nord* 22: 286 (1931).

Icon.: *Pig. nostra* 11 (corolla only).

Erect, densely leafy shrub, young branches with dense, white, appressed hairs. Leaves trifoliolate, usually fasciculate, petioles 4-10 mm; leaflets 5-12 X 2 mm, narrowly elliptical, margins markedly involute, appearing sublinear; both surfaces with short, white, appressed sericeous hairs. Flowers in congested terminal racemes. Bracts c. 2 mm, lanceolate, rapidly fugacious; bracteoles 1-2 mm, linear, fugacious; pedicels 1-2.5 mm. Calyx 6-7 mm with dense, white, appressed hairs; upper lip as long as the lower, upper teeth as long as the lip, lower teeth c. $\frac{1}{3}$ the length of the lip or less. Standard 12-15 mm, broadly ovate, with appressed sericeous hairs. Legume not seen; immature legume with dense glandular papillae.

Type: Morocco, «Hab. in Quercetis Ilicis Atlantis majoris occidentalis in ditone Ida-ou-Tanan, sol. calc., 1500-1650 m, iv.», *Jahandiez, Maire & Weiller holotypus* not traced. Isk, Ida-ou-Tanan, 24.iv.1931, *Jahandiez* 223 (G, *isotypus?*).

Distribution: Morocco, Haut Atlas. Calcareous substrates (map 4).

MOROCCO

Isk, Ida-ou-Tanan, iv.1933 & 15.v.1935, *Gattefossé* G, α , LU); Grand Atlas, Ida-ou-Tanan, 14.iv.1935, *Maire & Wilczek* (G).

A. decorticans and *A. artemisiifolia* are vicarious taxa. See under *Relationships within the Genus* for Table of differential characters and discussion.

7. *A. hispanicus* (Lam.) DC. in Lam. & DC, *Fl. Fr.*, ed. 3, **5(Suppl)**: 549 (1815).

Cytisus hispanicus Lam., *Encycl. Méth. Bot.* 2: 248 (1786).

C. anagyrius L'Hérit., *Stirpes nov.*, fasc. 7 (consp.): 184 (1791).

Icon.: Laguna, *Fl. Forest. Esp.*, t. 41 (1890); Vicioso, *Genisteas Españolas 2: lám. 57*; Fig. *nostra* 12 (corolla only).

Erect, leafy shrub up to 3-4 m. Leaves trifoliolate, usually in fascicles, petioles 7-15 mm; leaflets 15-30 × 4-8 mm, oblanceolate, both surfaces with dense, appressed, sericeous hairs or upper subglabrous, margins somewhat involute. Flowers borne in terminal racemes. Bracts simple, narrowly elliptical; bracteoles sublinear; pedicels 5-15 mm. Calyx 7-12 mm with sericeous or villous hairs and usually glandular papillae; lips longer than the tube, upper lip somewhat shorter than the lower, upper teeth as long as the lip, lower teeth c. $\frac{1}{3}$ the lip. Standard 12-25 mm, broadly ovate, with sericeous hairs. Legumes 20-50 × 8-10 mm, oblong, with dense glandular papillae, 3-8 seeded.

Type: not traced.

Distribution: Western half of the Iberian peninsula, with a limited occurrence in the coastal ranges of Morocco. Wooded mountain slopes, on sandy or siliceous substrates (map 4).

Two subspecies are recognised:

a. subsp. **hispanicus**

Upper surfaces of the leaves with sparse hairs. Calyx with dense glandular papillae, especially on the teeth. Standard with sparse, appressed hairs.

Distribution: West-central sierras of Spain.

SPAIN

Madrid: Sierra de Guadarrama, Cercedilla, vii.1912, *Beltran & Vicioso* (Sennen 1530) (G, LU); Puerto de Guadarrama, 6.vii.1854, *Bourgeau* (COI, G); Tableda, 6.V.1945, *Rivas Godoy* (G); prope El Escoriai, 18.vi.1877, *Torrependo* (G).
Avila: Sierra de Gredos, Puerto de Miravete, 6.v/9.vii.1863, *Bourgeau* (G, LU); Sierra de Gredos, Hoyos del Espino, 4.vii.1927, *Lacaita* 457.27 (G).

- b. subsp. **argyrophyllus** Rivas Goday in Anal. Inst. Bot. Cavanilles **12**(2): 307 (1954).

A. hispanicus var. *argyrophyllus* Rivas Goday in Font Quer, Herb. Norm., cent. II *nomennudum*, no. 144 (1946).

Both surfaces of the leaves with more or less dense, whitish, appressed hairs. Calyx with few or no glandular papillae, and dense, sericeous or villous hairs. Standard with dense, sericeous hairs.

Type: Spain, prov. Cáceres; Sierra de Canaveral, 13.v. 1945, *Rivas Goday* (Font Quer Herb. Normal, cent. II, no. 144) (α , *isotypus*).

Distribution: S. W. Spain, C. & S. Portugal; Morocco.

SPAIN

Ciudad Real: Sierra de Madrona, 29.V.1950, *Rivas Goday*, *Monasterio & Borja* (G).

PORTUGAL

Beira Alta: Serra da Estrela, Covão da Metade, 4.viii. 1951, *Fernandes, Sousa & J. Matos* 3798 (COI); Serra da Estrela, Candeeiras, vii.1884, *Fonseca* (COI); Beira **Baixa:** Serra da **Guardunha**, Alcongosta, 21.vi.1953, *A. Fernandes, R. Fernandes & Sousa* 4587 (COI); Beira Litoral: Coimbra, *Machado* 177 (COI).

MOROCCO

Djebel Tamgunt, c. Tala Mzalla (Mtigua), 12.V.1929, *Font Quer* 238 sub. *A. bacquei* (G).

G A Y employed the name *A. anagyrius* (L'Hérit.) in his unpublished manuscript revision, referring to *Cytisus hispanicus* Lam. as a synonym of *Cytisus anagyrius* L'Hérit.; the latter name was published in the *Stirpes nov.*, fasc. 7, and G A Y presumably took the date of publication of this work as 1784. However, 1784 is the date of publication of fasc. 6 of the *Stirpes* and according to BRITTEN & WOODWARD

(1905) the *Conspectus* fasc. 7 was not in fact published until December 1791. Consequently, *Cytisus hispanicus* Lam. has priority of publication.

8. *A. bacquei* Batt. & Pitard in Pitard, Contr. Etude Fl. Maroc. 10 (1918).

Icon.: Batt., Maire & Trabut, Atlas Fl. Algérie 5: t. 51 (1920); Fig. *nostra* 13 (corolla only).

Erect, leafy shrub, young branches with white, appressed hairs. Leaves trifoliolate, sometimes fasciculate, petioles 5-10 mm; leaflets 7-15 X 3-6 mm, elliptic or obanceolate, margins slightly involute, both surfaces with dense, white, appressed hairs. Flowers in terminal racemes. Bracts 3-5 mm, simple, elliptic, fugacious; bracteoles linear, fugacious; pedicels 5-7 mm. Calyx c. 7 mm, with dense, villous hairs; lips longer than the tube, upper lip shorter than the lower, upper teeth as long as the lip, lower teeth c. $\frac{1}{3}$ the length of the lip. Standard c. 11 mm, broadly ovate, with appressed sericeous hairs. Legume 17-50 X 4-8 mm, with dense glandular papillae.

Type: Maroc oriental, Oued el Keroua, iii.1913, Pitard (G, *isotypus*).

Distribution: Moyen Atlas and arid regions of E. Morocco (map 4).

MOROCCO

Monts de Figuig, Teniet zait, iv.1924, Foley (G); Dra, près Skoura, 14.ii.1936, Gattefossé (K); Above Itzer, S. of the Middle Atlas, 5000', 9.V.1963, Hodgkin (K); Hautes Moulaya, Col du Larais, 1850 m, 24.vi.1924, Jahandiez 703 (G); Montis Araia, prope Figuig, 22.iv.1927, Maire (G); prope Erfoud, 15.iv.1933, Maire (G); Colomb-Bechar to Boudenib, 28.iv.1927, Maire (G); Regio desertica orientalis, Teniet zait, 15.iv.1933, Maire & Wilczek 346 (LU).

A. hispanicus and *A. bacquei* are vicarious taxa. See under *Relationships within the Genus* for Table of differential characters and discussion.

9. *A. anagyriifolius* Coss. & Bal. in Bull. Soc. Bot. Fr. 20: 246 (1873).

A. anagyriifolius Coss. & Bal. in Balansa, Pl. Maroc. exsicc, 1867 *nomen nudum*.

Icon.: Cosson, Ill. Fl. Atl. 2(5): t. 119 (1892); Fig. *nostra* 8 (corolla only).

Erect shrub up to c. 2 m. Leaves trifoliolate, petioles 10-20 mm; leaflets 15-35 X 10-15 mm, broadly ovate or elliptic, apex with a short mucro, lower surface with sparse, appressed hairs, upper subglabrous. Flowers in lax racemes. Bracts lacking (rapidly fugacious?); bracteoles 1 mm or less, linear, fugacious; pedicels 2-4 mm. Calyx 5-7 mm with appressed to subpatent hairs; lips as long as the tube, upper lip somewhat shorter than the lower, upper teeth longer than the lip, lower teeth c. $\frac{1}{3}$ the length of the lip. Standard c. 12 mm, broadly ovate, with short appressed hairs. Legumes 30-45 X 4-6 mm, with dense glandular papillae.

Type: Morocco, in montibus ad meridiem urbis Maroc. in glareosis alvei Oued Ghaghaia ubi copiosis, Balansa in Pl. Maroc. exsicc, 1867. Specimen not seen.

Distribution: Morocco, Haut and Moyen Atlas (map 6).

MOROCCO

Atlantis majoris, convalle Urika, 10.v.1871, Ball (COI); Djebel Afgouens, S. W. de la ville de Maroc, 8.vi.1875, Cosson (G, κ); Taddert, 9.iv.1952, Eastern 24 (κ); Tizi n'Test, 7.iv.1952, Eastern 17 (κ); S. E. de la ville de Morne, 1872, Ibrahim (K); Grand Atlas, a Ijoukak, 28.iv.1931, Jahandiez 236 (G); Middle Atlas, Ksiba, 17.V.1927, Jahandiez 236 (G);

Grand Atlas, Ait Messane, pr. **Anferllou**, 5.vi.1926, *Lindberg* 3625 (LU); Haut Atlas, **Reraïa**, Asni, 19.vii.1922, *Litardière* (G); Atlas médii, Tizi-n-Ozeria, 21.vi.1936, *Maire* (G); Grand Atlas, Tagädir N'Bourd, 20.V.1921, *Murbeck* (LU); Grand



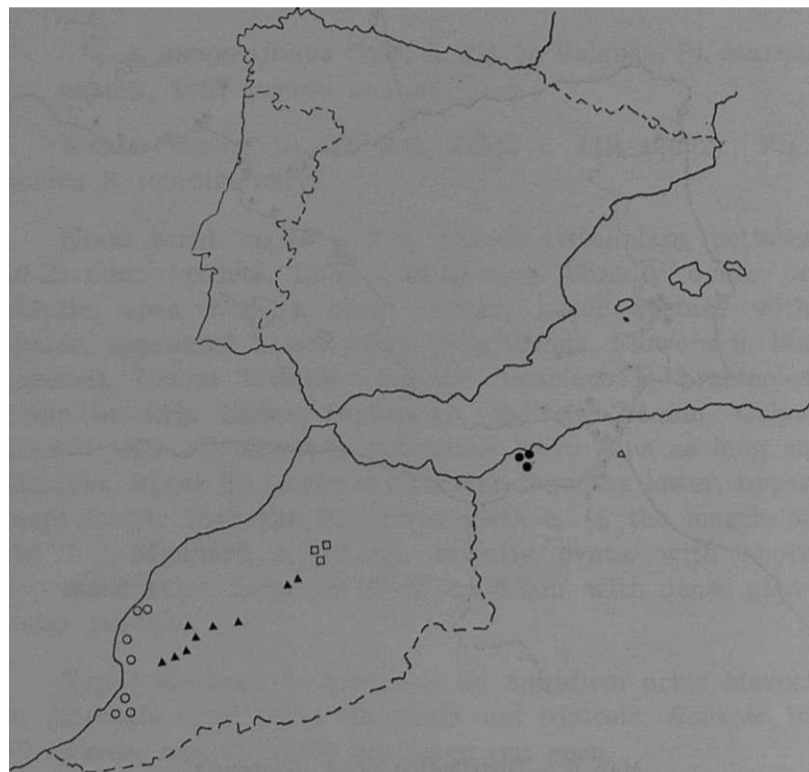
Map 5. — Distribution of *A. telonensis*

Atlas, Demnat, 20.v.1921, *Murbeck* (LU); Glaona, vallée de l'Acif Rdat a Tabahouget, 10.iv.1926, *Wilczek, Dutoit & Girardet* (G).

A. anagyriifolius is a very distinctive species because of its large, ovate, sparsely hairy leaves. Occasional specimens occur which have the glandular papillae on the legumes poorly developed or lacking, and these have been described as var. *leiocarpus* MAIRE (1929).

10. *A. telonensis* (Lois.) DC. in Lam. & DC, Fl. Fr.,
5(Suppl.): 550 (1815) *quoad syn. excl. spec.*

Icon.: Boissier, Voy. Bot. Esp. 1: t. 42 (1840); Vicioso,
 Genisteas Españolas 2: lám. 59 sub. *A. grandiflorus* Boiss.
 (1955); Fig. nostra 9 (corolla only).



Map 6. — Distribution of *A. anagyris*, *A. cincinnatus*,
A. boudyi, *A. umbellatus* and *A. faurei*
 A *A. anagyris*; ○ *A. cincinnatus*; □ *A. boudyi*;
 ● *A. umbellatus*; △ *A. faurei*

Erect shrub up to 1 m or so, with usually sparsely leafy branches. Leaves trifoliolate, usually in fascicles, petioles 1-3 mm; leaflets 3-8 × 1.5-4 mm, obovate, lower surfaces with sparse, spreading hairs, upper glabrous. Flowers borne in short terminal racemes or capitate. Bracts 3-6 mm, broadly ovate or lanceolate; bracteoles 2-4 mm, ovate or lan-

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ceolate; pedicels 1-3 mm. Calyx 6-10 mm, with sparse to dense spreading hairs; lips twice as long as the tube, lower lip as long as the upper, upper teeth as long as the lip, lower teeth c. $\frac{1}{2}$ the length of the lip. Standard 12-18 mm, broadly ovate, with short, sericeous hairs. Legume c. 15-30 X 5 mm, narrowly oblong with sericeous hairs and glandular papillae, 2-5 seeded.

Type: France, «habitat in sylvis et ericetis circa Telsonem.» Specimen not traced.

Distribution: S. E. France, S. & W. Iberian peninsula, coastal ranges of Morocco (map 5).

FRANCE

Alpes-Maritimes: environs de Nice, *Dumont* (G). **Var:** Forêt de Maures, près Pierrefeu, 23.V.1899, *Goste* (G); Hyères; 10.vi.1848, *Bourgeau* 103 (G); Toulon, 1827, *Delile* (G). **Lozère:** without precise locality or collector (G). **Hérault:** Montpellier, 1830, *Cadet* (G); environs de Ville-neuve, vi.1887, *Girod* (G). **Aude:** St. André de Roquelongue 14.vi.1909, *Pittard* (G). **Pyrenées Orientales:** Cap Béar, près Porte-Vendres, 15.V.1850, *Pechinat* (COI, G).

SPAIN

Ciudad Real: prope Almadén, 29.ix.1845, *Willkomm* (COI). **Jaén:** Despeñaperros, 13.vi.1952, *Roivanen* (COI). **Córdoba:** El Cortejo de Nuestra Señora del Agna Santo, 19.vii.1927, *Lacaita* 333.27 (G); La Albayda, pr. Córdoba, 18.iv.1851-2, *Lange* (COI); Sierra de Córdoba, Cordone, 28.vi.1935, *Sagredo* (Sennen 9798) (G). **Málaga:** supra S. Elmo, pr. Málaga, 9.V.1879, *Huter, Porta & Rigo* 8 (G, L U); Ronda 12.vi/26.vii.1889, *Reverchon* (G); Sierra de Cartama, 8.vi/20.vii.1888, *Reverchon* (G, Lu); route de Carratraca à Alora, 15.vii.1910, *St. Lager* (G); Málaga, 1827, *Saltzman* (G) inter Competa & Frigiliana, 11.vi.1845, *Willkomm* (COI) Sierra Bermeja, 1847, *Willkomm* (COI, G); Junquera, 1845 *Willkom* (COI). **Cádiz:** supra Algeciras, 1849, *Boissier & Reuter* (G); supra Cobre, 21.iv.1926, *Lindberg* (L U); Grazalema, 24.iv/7.vi.1895, *Porta & Rigo* 119 (L U); Sierra de Palma, 25.vi/29.vii.1887, *Reverchon* (G, L U).

PORTUGAL

Alto Alentejo: Vila Viçosa, Tapada Real, 4.v.1947, *Fernandes & Sousa* 7700 (COI); Herdade das Palhas, Serra d'Ossa, 7.v.1947, *Fernandes & Sousa* 1704 (COI); Évora-Monte, 6.v.1947, A. *Fernandes & Sousa* 1667 (COI); Redondo, v.1891, *Moller* (COI, LU). **Baixo Alentejo:** prope Vidigueira versus Serra de Mendro, 23.v.1938, *Rothmaler* 13283 (G).

MOROCCO

Xauen, 24.v.1928, *Font Quer* 173 (G); **Yebel Sugna** (Yebala), 1.vi.1928, *Font Quer* 72 (G); **Beni Hadifa**, **Suk-el-Tnin**, 26.v.1927, *Font Quer* 279 (G); **Atlas Rifain**, **Bab Marelllo**, 16.v.1929, *Jahandiez* 239 (G); **Tetuan**, 15.iii.1911, *Pitard* 694 (G); **Atlas Rifain**, **Beni Musa** près Targuist, 19.vi.1933, *Sennen & Mauricio* 8751 (G).

DE CANDOLLE confused *Cytisus telonensis* Loisel. with part of the *A. complicatus* complex when he effected the generic transfer of the former species to *Adenocarpus*, so that the description and localities given by him for *A. telonensis* do not in fact refer to this species (see REYNIER 1922 for full discussion). As a consequence, the name *A. grandiflorus* Boiss. has been employed by a number of authors (WILLKOMM & LANGE, 1877; VICIOSO, 1955) although BOISSIER (1840, p. 146) subsequently realised that *A. grandiflorus* was a synonym and reinstated *A. telonensis* DC. «excl. syn. Gou. et loc. Pyrennaeis et Italia».

11. *A. cincinnatus* (Ball) Maire in Bull. Soc. Hist. Nat. Afr. Nord 13: 210 (1922).

Cytisus cincinnatus Ball in J. Linn. Soc. 16: 404 (1878)

Icon.: Fig. *nostra* 14 (corolla only).

Erect shrub with the indumentum of the young branches and leaves subfarinaceous. Leaves trifoliolate, sometimes in

fascicles, petioles 3-10 mm; leaflets 5-15 × 3-6 mm, elliptic or oblanceolate, margins involute, both surfaces with sparse to dense, minute, circinnate hairs, appearing lepidote to the unaided eye. Flowers borne in terminal racemes. Bracts c. 3 mm, simple, lanceolate; bracteoles c. 2-3 mm, narrowly lanceolate, borne just below the calyx; pedicels 1-2 mm. Calyx 6-8 mm, with dense, villous hairs; upper lip as long as the lower, upper teeth as long as the lip, lower teeth c. 1/2 the length of the lip. Standard 12-15 mm, broadly ovate, with appressed, sericeous hairs. Legumes c. 25 X X 4 mm, narrowly oblong, with dense, glandular papillae, 3-5 seeded.

Type: Morocco, prov. Mtouga, *Rein & Fritsch* (x, *holotypus*).

Distribution: Morocco, Grand Atlas and S. W. region (map 6).

MOROCCO

Djebel Hadid, 19.V.1935, *Gattefossé* (G, K); Sidi-Ouamin, Marve, 13.vi.1889, *Ibrahim* (G); Djebel Amsiten, entre Mogador et Agadir, 17.V.1877, *Ibrahim* (G); Grand Atlas, Ida-ou-Tanan, Imouzen, 24.iv.1931, *Jahandiez* 231 (G); Grand Atlas, Djebel Amsitten, 17.V.1926, *Lindberg* 2319 (x, LU); Djebel Hadid, entre Mogador et Saffi, 31.V.1936, *Maire* (LU); Talaint-Goulimine, 3.iv.1935, *Maire & Wilczek* 114 (G); Inter Tifermit et Toum el Massane, 16.iv.1935, *Maire & Wilczek* 545 (LU); Anti Atlas, Akhas, Souk el Tieta, 15.iv.1952, *Vindt* 4593 (G); Djebel Hadid, 31.iii.1926., *Wilczek, Dutoit & Girardet* (G, K);

Cytisus cincinnatus Ball has been listed in *Cytisus* sect. *Teline* in a recent synopsis of the generic classification of the genus *Cytisus* by HOLUBOVÁ-KLÁSKOVÁ (1964). The taxon is certainly a species of *Adenocarpus* however.

12. *A. boudyi* Batt. & Maire in Bull. Stat. Rech. Forest. Afr. Nord **1(6)**: 214 (1921).

Icon.: Maire in Bull. Stat. Rech. Forest. Afr. Nord **1(6)**: t. 23 (corolla only); fig. *nostra* 15 (corolla only).

Erect shrub. Leaves trifoliolate, sometimes in fascicles, petioles 0-4 mm; leaflets 4-6 X 2 mm, oblanceolate or obovate, both surfaces but particularly the upper with dense, minute, circinnate hairs. Inflorescence a capitate cluster of usually 4 flowers, sometimes with the flowering apex extended and bearing a second whorl of flowers. Bracts c. 3 mm, simple; bracteoles c. 3 mm, sublinear; pedicels 0.5-2 mm. Calyx 5-9 mm, with dense, sericeous or villous hairs, lips more than twice as long as the tube, upper teeth as long as the lip, lower teeth c. $\frac{1}{2}$ the length of the lip. Standard 9-11 mm, broadly ovate, with appressed, sericeous hairs. Legume c. 15 X 4 mm, narrowly oblong, with glandular papillae and patent hairs, 2-5 seeded.

Type: Hab. in Atlante medio Morocco, in cedretis prope Azrou, 1920, Powell 6080 (AL, *holotypus* MAIRE, 1920). Specimen not seen.

Distribution: Morocco, Moyen Atlas (map 6).

MOROCCO

Moyen Atlas, Ifrane, 10.vii.1937, Gattefossé (G, \times); Ras-el-Ma, prope Azrou, 29.iv.1926, Lindberg 4392 (\times); Moyen Atlas, Azrou, 7.viii.1924, Jahandiez 900 (\times); Moyen Atlas, Daïet Achlef, 8.vi.1923, Jahandiez 465 (G).

13. *A. umbellatus* Coss. & Dur. ex Battandier in Batt. & Trabut, Fl. Alg. (Dicot.): 206 (1889).

A. umbellatus Coss. & Dur. in Ann. Sci. Nat., sér. 4, **1**: 222 (1854) *nomen nudum*.

Icon.: Fig. *nostra* 16 (corolla only).

Erect shrub. Leaves trifoliolate, usually in fascicles, petioles 0-1 mm; leaflets c. 6×1.5 mm, narrowly elliptic, margins markedly involute, appearing sublinear and ericoid, both surfaces but particularly the lower with dense, circinnate hairs. Inflorescence a capitate cluster of 4-6 flowers, sometimes with the flowering apex extended and bearing a second whorl of flowers. Bracts c. 4 mm, simple, narrowly elliptical; bracteoles 3-4 mm, sublinear; pedicels 1-3 mm. Calyx 6-8 mm, with dense, sericeous hairs; lips more than 2 X the length of the tube, upper teeth as long as the lip, lower teeth c. $\frac{1}{2}$ the length of the lip. Standard 11-13 mm, broadly ovate, with short, appressed hairs. Legumes c. 15 X 4 mm, narrowly oblong, with sparse glandular papillae and patent hairs, 2-5 seeded.

Type: «Hab. in dumeis collium in littore Mauritaniae c. urbem Oran.» Specimen not traced.

Distribution: Algeria, prov. Oran; coastal ranges (map 6).

ALGERIA

Oran: basin pérreux de St. André, env. d'Oran, v.1852, *Cosson* (K); Oran 30.V.1906, *Doumergue* (G); Kredija, 2.vi.1891, *Doumergue* (COI); Djebel Santo à Oran, vi.1921, *Maire* (G).

14. *A. faurei* Maire in Bull. Stat. Rech. Forest. Afr. Nord 1(6): 213 (1921).

Icon.: Maire, *op. cit.*, t. 22 (1921) (corolla only); fig. *nostra* 17 (corolla only).

Erect shrub with leafy branches. Leaves trifoliolate, sometimes in fascicles, petioles 1-5 mm; leaflets 6-12 X 2-4 mm, oblanceolate, lower surface with circinnate hairs, upper subglabrous, margins somewhat involute. Inflorescence a capitate cluster of 4-6 flowers. Bracts c. 3 mm, narrowly lanceolate; bracteoles c. 3-4 mm, narrowly elliptical or linear;

pedicels 0-3 mm. Calyx 6-7 mm, with dense, villous hairs; lips 2 X as long as the tube, upper teeth as long as the lip, lower teeth c. $\frac{1}{2}$ the length of the lip. Standard c. 10 mm, broadly ovate, with short, appressed hairs. Legumes c. 20-25 X 5 mm, narrowly oblong, with glandular papillae and sparse hairs, 1-3 seeded.

Type: «Hab. in Mauretania Caesarea prope Tiaret, Faure» (AL, *holotypus* MAIRE, 1921). Specimen not seen.

Distribution: Algeria, near Tiaret; known only from the type locality.

ALGERIA

Tiaret, lieux rocailleux au vallon de l'Oued-Sidi-Kahled, 1100 m, 23.vii.1926, Faure (G).

A. cincinnatus has in common with the three capitate species *A. boudyi*, *A. umbellatus* and *A. faurei* the characters of minute, hygroscopic, circinnate hairs on the leaves and prominent bracts and bracteoles. The four species are probably closely related. Relatively few specimens of the latter three taxa have been seen and studies on more plentiful material may well suggest that recognition as three distinct species is not tenable.

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**ESTUDOS
NAS ANACARDIACEAE AFRICANAS**

V — COMBINAÇÕES NOVAS NO GÉNERO *RHUS* L.
E NOTA SOBRE *RH. ENGLERI* BRITT.

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Δ O estudarmos o material africano do género *Rhus*, tivemos necessidade de efectuar frequentes consultas à Monografia das Anacardiáceas de ENGLER (in A. & C. DC, Mon. Phan. 4, 1883) e ao trabalho de SCHONLAND «The South African species of *Rhus* L.» (in Bothalia, 3: 3-115, 1930). Verificámos, assim, que numerosas combinações deste último autor e algumas do primeiro não obedeciam às Regras Internacionais de Nomenclatura Botânica. Na primeira parte do presente trabalho, estabelecemos as combinações que julgamos correctas, devendo dizer-se que apenas foi encarado o ponto de vista nomenclatural, não se fazendo, portanto, nenhuma apreciação crítica do valor dos taxa tratados. Os nomes das espécies são ordenados alfabeticamente; para as espécies e taxa infraespecíficos, indicam-se os basónimos e os principais sinónimos, designando-se ainda os respectivos tipos, os quais nem sempre foi possível localizar. Em nota final, apresentamos algumas observações sobre *Rh. Engleri* Britt.

Rhus carnosula Schonl. in Bothalia, 3: 41, fig. pag. 42 (1930).

Var. *carnosula*

Rh. carnosula var. *typica* Schonl. loc. cit.

Rh. laevigata var. *dentata* E. Mey. ex Sond. in Harv. & Sond., Fl. Cap. 1: 514 (1860).

Rh. crassinervia Presl, Bot. Bem.: 42 (1844), nom. nud.

Holotypus: Drège 5569 (K?).

SONDER refere para a var. *dentata* de *Rh. laevigata* apenas o exemplar Drège, colhido «near Gekau». SCHONLAND indica na sua var. *typica* de *Rh. carnosula* o n.º 5569, de DRÈGE, também herborizado em Gekau. Como não faz referência a mais nenhum espécime deste colector, conclui-se que esse é o holótipo da var. *dentata* Sond. e, portanto, também o de *Rh. carnosula* Schonl.

SCHONLAND (loc. cit.: 51) inclui *Rh. crassinervia* Presl na sinonímia de *Rh. Legatii* Schonl. (= *Rh. cherindensis* Bak. f. = *Rh. laevigata* Thunb. et auct., non L.), o que nos parece estar errado. Com efeito, PRESL indica explicitamente que a *Rh. laevigata* E. Mey. in Drège, Pl. Cap. é a sua *Rh. crassinervia*.

Rhus dentata Thunb., Prodr. Pl. Cap. 1: 52 (1794).

Var. *dentata*

Rh. dentata var. *typica* Schonl. in Bothalia, **3**: 37 (1930).

Forma *dentata*

Rh. dentata var. *typica* forma *genuina* Schonl., loc. cit.: 38, fig. pag. 37.

Rh. Sonderi var. *glaberrima* Engl. in A. & C. DC, Mon. Phan. **4**: 436 (1883) fide BURTT-DAVY, Man. Fl. Pl. Tr. 2: 499 (1932).

Lectotypus: Thunberg s. n. (UPS, 7325).

Forma *sparsepilosa* R. Fernandes, nom. nov.

Rh. dentata var. *typica* forma *pilosa* Schonl., loc. cit., nom. illeg.¹.

¹ SCHONLAND emprega o mesmo epíteto também para uma outra forma da mesma espécie.

Rh. Sonderi var. *pilosa* Engl. in A. & C. DC, Mon. Phan. 4: 436 (1883) p. p. quoad specim. *Cooper* 274, nom. illeg.¹.

Lectotypus: *Cooper* 274 (K).

Var. **parvifolia** Eckl. & Zeyh., Enum.: 149 (1836)².

Rh. parvifolia Harv. ex Sond. in Harv. & Sond., Fl. Cap. 1: 510 (1860).

Rh. dentata var. *parvifolia* (Harv. ex Sond.) Schonl., loc. cit.

Forma **parvifolia**

Rh. dentata var. *parvifolia* (Harv. ex Sond.) Schonl. forma *glabrescens* Schonl., loc. cit.

Rh. Sonderi var. *pilosa* Engl. in A. & C. DC, Mon. Phan. 4: 436 (1883) p. p. quoad specim. *Sutherland* n., nom. illeg.

Holotypus: «ad fluminis Keyrivier, ripam dextram», *Ecklon & Zeyher* s. η. (SAM?).

Forma **vilosissima** R. Fernandes, nom. nov.

Rh. dentata var. *parvifolia* (Harv. ex Sond.) Schonl. forma *pilosissima* Schonl., loc. cit., nom. illeg.³.

Lectotypus: *Schlechter* 3348 (COI).

Var. **puberula** Sond. in Harv. & Sond., Fl. Cap. 1: 513 (1860).

Rh. dentata var. *grandifolia* Schonl., loc. cit.: 38.

¹ A var. *pilosa* Engl. de *Rh. Sonderi* Engl. é nome ilegítimo, visto ENGLER ter citado como seu sinónimo a var. *puberula* Sond. de *Rh. dentata*.

² Pela descrição, é evidente que esta variedade é idêntica à *Rh. parvifolia* Harv. ex Sond., a qual, no entanto, se baseou sobre outros espécimes e não sobre o citado por ECKLON & ZEYHER.

³ Existe uma outra forma na mesma espécie com o mesmo epíteto, pelo que, segundo o art. 64 das Regras Internacionais de Nomenclatura, este é ilegítimo.

Forma **puberula**

Rh. Sonderi var. *pilosa* Engl., loc. cit. p. p. quoad *Cooper* 275, nom. illeg.

Rh. dentata var. *grandifolia* forma *pilosa* (Engl.) Schonl., loc. cit.: 39.

Holotypus: in Zuurebergen, Drège s. η. (K).

Forma **glabra** (Schonl.) R. Fernandes, nov. comb.

Rh. dentata var. *grandifolia* forma *glabra* Schonl., loc. cit.

Lectotypus: *Fraser* 5048 (GRA?).

Forma **pilosissima** (Engl.) R. Fernandes, nov. comb.

Rh. Sonderi var. *pilosissima* Engl., loc. cit.

Rh. dentata var. *grandifolia* forma *pilosissima* (Engl.) Schonl., loc. cit.: 40, fig. pag. 39.

Lectotypus: Wak, Kloof nr. Page's Hotel, *Rehmann* 6863 (x).

Rhus discolor E. Mey. ex Sond. in Harv. & Sond., Fl. Cap. 1: 507 (1860).

Var. **discolor**

Rh. discolor var. *typica* Schonl. in *Bothalia*, 3: 95 (1930).

Lectotypus: Vanstaadenberg, Katberg, between Buffelrivier and Key, Drège s. η. (K?)¹.

¹ SONDER refere um único espécime de DRÈGE (citado igualmente por ENGLER, loc. cit.: 448), que consideramos como o *lectotypus* da espécie. SCHONLAND indica os números 3449 e 5584 do mesmo colector, os quais foram colhidos «Between Sandplaats and Komgha». BURTT-DAVY (Man. Fl. Pl. Tr. 2: 509, 1932) cita os números 1449 e 5584 de DRÈGE como sendo os tipos desta espécie, não se referindo ao local de colheita de nenhum deles. Supomos que há engano de citação no primeiro número, não sabendo, no entanto, quem cometeu o erro, se SCHONLAND, se BURTT-DAVY. Como se vê, há divergências entre SCHONLAND e SONDER no que se refere ao local da colheita caso se trate dos mesmos espécimes, o que não podemos verificar.

Var. **paucinervia** Engl. in A. & C. DC, Mon. Phan. 4: 448 (1883).

Rh. discolor var. *grandifolia* (Engl.) Schonl., loc. cit.: fig. pag. 94.

Rh. grandifolia Engl., loc. cit.: 434¹.

Lectotypus: *Gerrard* 1403 (K).

Rhus dissecta Thunb. in Hoffm., Phyt. Blätt.: 29 (1803).

Var. **dissecta**

Rh. dissecta var. β Sond. in Harv. & Sond., Fl. Cap. 1: 509 (1860).

Rh. dissecta var. *pinnatifida* Schonl. in Bothalia, 3: 111 (1939).

Holotypus: *Thunberg* s. n. (UPS, 7330).

Var. **brevifolia** (Eckl. & Zeyh.) Engl. in A. & C. DC, Mon. Phan. 4: 409 (1883).

Rh. argentea Eckl. & Zeyh., Enum.: 149 (1836).

Rh. argentea var. *brevifolia* Eckl. & Zeyh., loc. cit.

Rh. dissecta var. α Sond., loc. cit.

Rh. dissecta var. *obovata* Schonl., loc. cit.: fig. pag. 109 et 110.

Holotypus: In lateralibus montium pr. «Brackfontein», *Ecklon & Zeyher* 1127 β (SAM?).

Rh. argentea Eckl. & Zeyh., sinónimo da var. *brevifolia* Engl. de *Rhus dissecta*, tem como tipo o espécime *Ecklon & Zeyher* 1127 (cf. ENGL., loc. cit.; SCHONL., loc. cit.), o qual foi colhido em Brackfontein (cf. ECKLON & ZEYHER, loc. cit.). Ora ENGLER indica esse local de colheita não

¹ Se, como afirma WOOD (cit. por SCHONLAND), o seu espécime 742, colocado por SCHONLAND na var. *grandifolia*, é idêntico a *Gerrard* 1403, tipo da var. *paucinervia* Engl., aquela variedade é sinónimo desta última.

para o n.º 1127 mas para o n.º 1128 dos mesmos colectores, espécime que ele, bem como SONDER e também SCHONLAND, referem à *Rh. dissecta* típica, ao passo que aponta Swartland como o local do n.º 1127. Mas Swartland é a localidade onde foi herborizado o exemplar 1128¹ («In *sabulosis* campestrium terrae Zwartland», cf. ECKLON & ZEYHER, loc. cit.: 150). Além deste desacordo entre SONDER e ENGLER, há ainda outra falta de concordância, porquanto ENGLER atribui à *Rh. dissecta* típica os exemplares Zeyher 332 e Drège s. n. (Blauweberg), os quais são incluídos por SONDER na sua var. α (= *Rh. argentea* Eckl. & Zeyh. = var. *brevifolia* Engl.), e refere à var. *brevifolia* os espécimes Beil s. n. (Groenekloof)² e Drège s. n. (Langvallei et Bergvallei), considerados por SONDER como pertencentes ao tipo. Não tendo examinado este material, não podemos decidir de que lado se encontra a razão.

Rhus incisa L. f., *Suppl.*: 183 (1781).

Var. *incisa*

Rh. incisa var. *typica* Schonl. in *Bothalia*, 3: 103, fig. pag. 103 (1930).

Lectotypus: *Thunberg* s. n. (UPS, 7341).

Var. *effusa* (Presl) R. Fernandes, nov. comb.

Rh. sinuata var. *effusa* Presl, *Bot. Bem.*: 42 (1844).

Rh. sinuata sensu Ecklon & Zeyher, non Thunb.

Rh. obovata Sond. in *Harv. & Sond., Fl. Cap.* 1: 508 (1860).

Rh. incisa var. *obovata* (Sond.) Schonl., loc. cit.: fig. pag. 104.

Holotypus: *Ecklon & Zeyher* 1111 (SAM?).

¹ SCHONLAND não indica o local de colheita do n.º 1128, referido por ECKLON & ZEYHER a *Rh. dissecta* Thunb. SONDER cita-o como sendo Zwartland.

² Também ECKLON & ZEYHER referem *Rh. dissecta* Thunb. para esta localidade e não a var. *brevifolia*.

Rhus laevigata L., Sp. Pl. ed. 2: 1672 (1762), non Thunb. (1794).

Var. **laevigata**

Rh. elongata Jacq., Hort. Schoenbr. 3: 52, t. 345 (1798).

Rh. mucronata Thunb. var. β *Jacquini* Sond. in Harv. & Sond., Fl. Cap. 1: 513 (1860) excl. specim. β herb. THUNB.

Rh. mucronata var. *laevigata* (L.) Schonl. in Bothalia, 3: 21 (1930).

Lectotypus: specim. 378-23¹ in herb. LINN. (LINN).

Var. **atomaria** (Jacq.) R. Fernandes, nov. comb.

Rh. atomaria Jacq., Hort. Schoenbr. 3: 51, t. 343 (1798).

Rh. mucronata var. *atomaria* (Jacq.) Schonl., loc. cit.

Holotypus: in herb. JACQUIN. (W).

Var. **latifolia** (Schonl.) R. Fernandes, nov. comb.

Rh. mucronata var. *latifolia* Schonl., loc. cit.: 22, fig. pag. 22.

Lectotypus: *Pillans* 5012 (GRA?).

Var. **mucronata** (Thunb.) R. Fernandes, nov. comb.

Rh. mucronata Thunb. in Hoffm., Phyt. Blätt.: 27 (1803).

Rh. nervosa Poir. var. *mucronata* (Thunb.) DC. in DC, Prodr. 2: 70 (1825).

Rh. Burmannii DC, loc. cit.: 69.

¹ Este exemplar, além da determinação na escrita de LINEU, possui uma etiqueta da autoria de A. TURRA (cf. SAVAGE, Cat. Linn. Herb.: 55, 1945), com os dizeres: «An *Rhus tomentosum*? quanquam folia levia sint? an a cultura glaberrimus factus est?».

Rh. mucronata var. α *Burmanni* (DC.) Sond. in Harv. & Sond., Fl. Cap. 1: 513 (1860).

Rh. mucronata var. *Jacquini* Sond., loc. cit. p. p. quoad specim. β herb. THUNB.

Rh. mucronata var. *typica* Schonl., loc. cit.: 21, fig. pag. 21.

Lectotypus: *Thunberg* s. n. (UPS, 9353)¹.

Var. **villosa** (L. f.) R. Fernandes, nov. comb.

Rh. villosa L. f., Suppl.: 183 (1781), non Auct. plur.

Rh. mucronata var. *villosa* (L. f.) Schonl., loc. cit.: 22, fig. pag. 23.

Rh. incana Mill., Dict. ed. 8, n.º 8 (1768).

Lectotypus: ?

Existe em LINN um exemplar (378-26), sem identificação de LINEU f., que foi posteriormente determinado por J. E. SMITH como *Rh. villosa*.

Rhus Gerrardii (Harv. ex Engl.) Schonl. in Bothalia, **3**: 76 (1930): vide *Rh. montana* Diels.

Rhus lucida L., Sp. Pl.: 382 (1753).

Var. **lucida**

Rh. lucida var. *subdentata* DC. in DC, Prodr. **2**: 69 (1825).

Rh. lucida var. *elliptica* Sond. in Harv. & Sond., Fl. Cap. 1: 517 (1860).

Rh. lucida var. *typica* Schonl. in Bothalia, **3**: 55-56, fig. pag. 55 (1930).

Lectotypus: in herb. CLIFFORT. (BM).

Isolectotypus: Specimen 378-29 in herb. LINN. (LINN).

¹ Há dois exemplares no herb. de THUNBERG (α , β), os quais, segundo SCHONLAND, pertencem ambos à var. *mucronata*.

Rhus montana Diels in Bot. Jahrb. **40**: 86 (1907).

Var. **montana**

Rh. Gerrardii var. *montana* (Diels) Schonl. in Bothalia, 3: 78, fig. pag. 78 (1930).

Lectotypus: *Bolus* 8837 (K).

Var. **Gerrardii** (Harv. ex Engl.) R. Fernandes, nov. comb.

Rh. Gerrardii Harv. Mss.

Rh. viminalis var. *Gerrardii* Harv. ex Engl. in A. & C. DC, Mon. Phan. 4: 442 (1883).

Rh. Gerrardii (Harv. ex Engl.) Schonl. var. *typica* Schonl., loc. cit.: 77, fig. 76.

Lectotypus: *Gerrard* 1396 (K).

Var. **latifolia** (Schonl.) R. Fernandes, nov. comb.

Rh. Gerrardii var. *latifolia* Schonl., loc. cit.: fig. pag. 77.

Lectotypus: *Evans* 5096a (GRA).

Var. **basutorum** (Schonl.) R. Fernandes, nov. comb.

Rh. Gerrardii var. *basutorum* Schonl., loc. cit.: 78.

Rh. viminalis var. *Gerrardii* sensu Phillips in Fl. Basutoland sec. Schonl., loc. cit.

Holotypus: *Dieterle* 691 (SAM, 6055).

Rhus mucronata Thunb. in Hoffm., Phyt. Blätt.: 27 (1803).

— Schonland in Bothalia, **3**: 19 (1930): vide **Rh. laevigata** L.

Rhus pyroides Burch., Trav. 1: 340 (1822).

Var. **pyroides**

Rh. pyroides var. *typica* Schonl. in Bothalia, 3: 30, fig. pag. 30 (1930).

Holotypus: *Burchell* 1796 (K).

Rhus rosmarinifolia Vahl, Symb. 3: 50 (1794).

Var. **rosmarinifolia**

Rh. rosmarinifolia var. *caledonica* Eckl. & Zeyh., Enum.: 143 (1835).

Rh. rosmarinifolia var. *capensis* Eckl. & Zeyh., loc. cit.

Rh. rosmarinifolia var. *uitenhagensis* Eckl. & Zeyh., loc. cit.

Rh. lavandulifolia Presl, Bot. Bem.: 42 (1844), nom. nud.

Rh. rosmarinifolia var. *typica* Schonl. in Bothalia, 3: 107, fig. pag. 105 (1930).

Isotypus: In herbario VAHL. (C) ¹.

Var. **swellendamensis** Eckl. & Zeyh., Enum.: 143 (1835).

Rh. rosmarinifolia var. *brevifolia* Schonl., loc. cit.

Rh. stenophylla Eckl. & Zeyh. var. *brevifolia* Sond. in Harv. & Sond., Fl. Cap. 1: 507 (1860).

Holotypus: «Rivier Zonder Einde» (Swellendam), Ecklon & Zeyhers. n. (SAM?).

Na sinonímia da sua var. *brevifolia*, SCHONLAND não introduziu a variedade do mesmo nome de SONDER. Este último autor refere à sua var. *brevifolia* o espécime Zeyher 2228, o qual não é citado por SCHONLAND em qualquer das variedades de *Rh. rosmarinifolia*. Pelas descrições apresentadas respectivamente por SCHONLAND e por SONDER para as vars. *brevifolia*, conclui-se, no entanto, que se trata de taxa idênticos.

¹ Agradecemos penhoradamente ao Ex.^{ma} Sr. Dr. A. SKOVSTED a informação referente à existência deste exemplar no herbário de Copenhague.

Rhus undulata Jacq., Hort. Schoenbr. 3: 52, t. 346 (1798).

Var. *undulata*

Rh. undulata var. *genuina* Schonl. in *Bothalia*, **3**: 63, fig. pag. 62, 1-2 (1930).

Forma *undulata*

Holotypus: in herb. JACQUIN. n.º 379¹ (w).

Forma *excisa* (Thunb.) R. Fernandes, nov. comb.

Rh. excisa Thunb., Prodr. Pl. Cap.: 187 (1800).

Rh. excisa var. *Thunbergiana* Sond. in Harv. & Sond., Fl. Cap. **1**: 507 (1860).

Rh. undulata var. *genuina* forma *excisa* (Thunb.) Schonl., loc. cit.: 63-64, fig. pag. 62, 4 (1930).

Lectotypus: *Thunberg* s. n. (UPS, 7334).

Forma *contracta* (Schonl.) R. Fernandes, nov. comb.

Rh. undulata var. *genuina* forma *contracta* Schonl., loc. cit.: 64.

Lectotypus: *Schlechter* 11434 (GRA).

Var. *tricrenata* (Engl.) R. Fernandes, nov. comb.

Rh. Burchellii Sond. ex Engl. in A. & C. DC, Mon. Phan. **4**: 412 (1883).

Rh. Burchellii var. *tricrenata* Engl., loc. cit.

Rh. Rangeana Engl., Pflanzenw. Afr. 3, 2: 205 (1921).

Rh. undulata var. *Burchellii* (Sond. ex Engl.) Schonl. loc. cit.: fig. pag. 62-3.

Holotypus: *Cooper* 2172 (K).

¹ Há em W três espécimes deste taxon, provenientes do herbário de JACQUIN. Consideramos como *holotypus* o que possui, preso ao caule, um recorte de papel com os dizeres: «Hb. Jacq. 379, *Rhus undulata* mihi nova species», embora seja menos representativo que os outros, os quais, no entanto, não trazem identificação do autor da espécie.

Rhus Engleri Britt. in Journ. of Bot. 38: 316 (1900).

O nome *Rh. Engleri* foi criado por J. BRITTEN para a espécie que ENGLER (in A. & C. DC, Mon. Phan. 4: 428, 1883) designara por *Rh. incana*, porquanto existia já a *Rh. incana* Mill., descrita em 1768. Na sua espécie, ENGLER incluiu apenas dois exemplares *Rehmann* (s. n.), ambos do Transval, um deles colhido perto de Klippan e outro em Eland's river. A espécie é descrita com folhas incano-tomentosas na página inferior e incluída no grupo de *Rh. Welwitschii* Engl. e *Rh. ampla* Engl., espécies estas reduzidas presentemente a sinónimos de *Rh. Kirkii* Sond. (cf. Consp. Fl. Angol., 2: 110 et 111, 1954). SCHONLAND (in Bothalia, 3: 66 et 67, 1930), no trabalho sobre as *Rhus* da África do Sul, indica *Rh. Engleri* Britt. (= *Rh. incana* Engl., non Mill.) também apenas para o Transval, referindo-lhe um (ou mais?) espécimes de *Rehmann*, sem data, nem número, nem local de colheita¹.

Ao passarmos em revista os exemplares de *Rhus* do herbário geral de Coimbra, encontrámos o exemplar *Rehmann* 4913, do Transval, determinado como *Rh. incana* Engl. (em caracteres manuscritos) e herborizado no Boshveld, Eland's river (Neu Halle)². As indicações sobre o local de colheita encontram-se em caracteres impressos, mas de tipo diferente dos outros também impressos do cabeçalho da etiqueta. Parece, pois, tratar-se da etiqueta de um dos espécimes que ENGLER citou na sua *Rh. incana*. Sucede, porém, que esse exemplar pertence a *Rh. angustifolia* L., taxon muitíssimo diferente de *Rh. Engleri* Britt., na acepção que lhe deu SCHONLAND. Como, no entanto, *Rh. angustifolia* não existe no Transval e como, por outro lado, ENGLER não indica número para os exemplares de REHMANN, surge-nos a dúvida de que tenha havido engano relativamente à atribuição da referida etiqueta a este exemplar de COI, ao fazerem a distribuição de duplicados.

¹ A referência de SCHONLAND é a seguinte: Transvaal, Bushveld, *Rehmann* sine n.º

² Este exemplar é também citado por BURTT-DAVY (Man. Fl. Pl. Tr. 2: 504, 1932) como *Rh. Engleri*.

No caso, porém, de não ter havido essa troca, *Rh. incana* Engl. corresponderia, pelo menos em parte, a *Rh. angustifolia* L. Assim se explicaria que ENGLER tivesse descrito as folhas como incano-tomentosas na página inferior e tivesse considerado a sua espécie afim de *Rh. Kirkii*, taxon no qual a face inferior dos folíolos é igualmente mais ou menos tomentosa¹. Aguardamos que a pesquisa em outros herbários nos permita esclarecer definitivamente este problema.

¹ Em 1921 (*Pflanzenw. Afr.* 3, 2: 211), ENGLER continua a usar nome específico por ele criado e não o de BRITTEN.

A TAXONOMIC
STUDY OF THE *COMBRETUMCOLLINUM*
GROUP OF SPECIES

II. THE SUBSPECIES OF *COMBRETUM COLLINUM*

by

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DURING the Academic Year 1964-5 I was seconded to the Forest Herbarium of the University of Oxford and made a study there of the geographical patterns of variation shown by *Combretumcollinum* Fresen. and the 53 related species of Section *Glabripetalae* which have been regarded, at one time or another, by various authors, to be distinct from it (OKAFOR, 1965). Collectively this group of species occupies almost the whole of the Sudano-Zambezian Region as circumscribed by WHITE (1965) except for the Oriental Domain and its Sahelian extension.

In recent years three authors have studied this group over certain parts of its total range and have reached different taxonomic conclusions. For approximately half of the total area thorough studies had not previously been made. Clearly there was a great need to revise the group over its entire range in an attempt to produce a consistent taxonomic treatment.

In the second edition of the *Flora of West Tropical Africa* KEAY (1954) maintains the following 5 species—*C. binderranum*, *crotonoides*, *geitonophyllum*, *hypopilinum* and *lampnocarpum*.

In the same year, EXELL & GARCIA (1954), in a publication dealing with the *Combretum* species of Mozambique,

undertook a tentative revision of this group of species for the whole of Southern Africa and united nine species (*C. abercornense*, *album*, *angustilanceolatum*, *burtii*, *eylesii*, *gazense*, *griseiflorum*, *milleranum* and *suluense*) with *C. mechowianum*, the first species described from the region. EXELL & GARCIA suggested that further work might show that *C. mechowianum* should be united with *C. binderanum* and *C. collinum* from northern tropical Africa, although, on the evidence available at that time, they were not prepared to do this. They also pointed out that a careful study might enable subspecies and varieties of *C. mechowianum* to be recognized.

On the basis of considerable field experience and population samples, DUVIGNEAUD (1956) revised *C. mechowianum* sensu EXELL & GARCIA for the southern Congo and recognised three, reasonably distinct subspecies (*gazense*, *kwangense* and *taborense*).

The results of my own study, which was based on an analysis of about 1050 gatherings representing all parts of the geographical range, will be published in full elsewhere. Insufficient evidence was found to keep up any of the 53 «species» mentioned above, but it was considered that 11 reasonably distinct subspecies could profitably be recognised.

Since some of these may be needed for the *Conspectus Florae Angolensis*, *Flora Zambesiaca* and other floras in advanced stages of preparation, the new combinations are made below, before the publication of the main work. I have examined all of the type-specimens cited, except where indicated, and am grateful to the Directors of the institutions where they are located for making them available for study. A full account of the variation pattern of *C. oollinum* will be given elsewhere. In the meantime the following key to the subspecies might be useful.

1. Leaves distinctly hairy beneath, at least on the midrib:
2. Fruit usually less than 3.6 cm. long, densely hairy, red scales if present usually not conspicuous; some leaves usually in whorls of 3 or 4:

3. Lower leaf-surface densely pubescent to tomentose with long spreading hairs which are usually clearly visible to the naked eye; red scales on fruit often conspicuous . . . subsp. *elgonense*
- 3a. Lower leaf-surface puberulous to tomentellous with much shorter hairs; red scales on fruit inconspicuous:
 4. Scales on lower leaf-surface cup-shaped or bowl-shaped, usually more than 2 scale-diameters apart, frequently difficult to see; lower leaf-surface frequently with prominently reticulate venation or with a dense, matted tomentum of short curly hairs subsp. *hypopitulum*
 - 4a. Scales on lower leaf surface peltate, usually contiguous or almost so; venation not prominent, indumentum not matted:
 5. Leaves markedly tapering to the acuminate apex; petiole usually more than 2 cm. long subsp. *collinum*
 - 5a. Leaves variable in shape but not markedly tapering, apex usually rounded to subacuminate or shortly and suddenly acuminate subsp. *geitonophyllum*
- a. Fruit usually more than 3.6 cm. long, usually without hairs but densely covered with conspicuous red scales; leaves usually opposite, subopposite or alternate:
 6. Lower leaf-surface with prominent reticulate venation and long spreading hairs subsp. *gazense*
 - 6a. Lower leaf-surface with inconspicuous venation and a densely matted tomentum of short curly hairs subsp. *dumetorum*
 - Leaves glabrous beneath or almost so:
 7. Fruit usually less than 3.6 cm. long, densely hairy; inflorescence unbranched; some leaves usually in whorls of 3 or 4:
 8. Scales on fruit inconspicuous:
 9. Leaves markedly tapering to the acuminate apex; petiole usually more than 2 cm. long subsp. *collinum*
 - 9a. Leaves variable in shape but not as above subsp. *geitonophyllum*
 - 8a. Scales on fruit red and conspicuous subsp. *binderanum*
 - 7a. Fruit 3.8-5 cm. long, densely hairy, red scales conspicuous; inflorescence unbranched; leaves variable as to insertion subsp. *suluense*
 - 7b. Fruit usually more than 3.8 cm. long, glabrous, red scales conspicuous; inflorescence branched; leaves usually opposite, subopposite or alternate:
 10. Branchlets nearly always dark red; inflorescence-axis and lower receptacle densely covered with red scales; leaves drying golden-brown beneath subsp. *kwangense*
 - 10a. Branchlets grey or brown; inflorescence-axis and lower receptacle with a sparse cover of red scales:
 11. Leaves usually acute to acuminate, silvery beneath with

- darker venation; fruit dark red-brown subsp. *taborense*
 11a. Leaves usually rounded to subacute, yellowish beneath
 without conspicuously darker venation; fruit pale red-
 brown subsp. *ondongense*

Combretum collinum Fresen. in Mus. Senckenb. **2**: 153 (1837).

TYPE. Ethiopia: Kulla, 2000 m., fl., *Rüppell* s. η. (P, holotypus).

Subsp. *collinum*

Combretum bongense Engl. in Engl., Monogr. Afr. Pfl. 3: 53, t. 17A (a-f) (1899). Typus. Sudan: Dokuttu, fl., fr., *Schweinfurth* 2773 (B, holotypus, destroyed; x, isotypus).

Ethiopia, Eritrea, Sudan.

Subsp. *geitonophyllum* (Diels) J. C. Okafor **comb. et stat. nov.**

Combretum geitonophyllum Diels in Engl., Bot. Jahrb. 39: 495 (1907). Typus. Guinea: Balondougou, fl., *Chevalier* 323 (P, holotypus).

Combretum kerstingii Engl. & Diels in Engl., tom. cit.: 499. Typus. Togo: Loso, *Kersting* 615 (B, holotypus, destroyed).

Combretum lamprocarpum Diels in Engl., tom. cit.: 500. Typus. Togo: Amlame, *Busse* 3548 (B, holotypus, destroyed).

Combretum crotonoides Hutch. & Dalz., F. W. T. A. 1: 220 (1927); in Kew Bull. 1928: 224 (1928). Typus: Senegal: Bondou, fl., *Heudelot* 187 (x, holotypus). From Senegal to Western Nigeria.

C. kerstingii and *C. lamprocarpum* are provisionally included in the above synonymy for reasons of practical convenience. In certain respects they are intermediate between subsp. *geitonophyllum* and subspp. *binderanum* and *hypopilinum*. The type of *C. kerstingii* is now destroyed. *Busse* 3561 (FHO) from the type-locality is undoubtedly the

same. The type of *C. lamprocarpum* has also been destroyed. My interpretation of it is based on certain specimens (e. g. *MacGregor* 138) compared with the type by previous workers.

Subsp. **binderanum** (Kotschy) J. C. Okafor comb. et stat. nov.

Combretum binderanum [«binderianum»] Kotschy in Sitz.-Ber. Math.-Nat. Akad. Wiss. Wien Cl. 51: 363, t. 5 (1865). Typus. Sudan: White Nile, nr. Kabet and Sakkadir, fl., *Binder* 46 (w, holotypus, not seen; BM, isotypus, fragment).

Combretum eleagnifolium Planch. ex Oliv. in Appendix to Speke, Journ. Disc. Nile: 634 (1863) nom. nud.

Combretum karaguense Engl. & Diels in Engl., Monogr. Afr. Pfl. 3: 55, t. 18 A (a-c) (1899). Typus. Tanganyika: Karagwe, fl., *Scott Elliot* 8130 (B, holotypus, destroyed; BM, isotypus).

Combretum populifolium Engl. & Diels in Engl., tom. cit.: 54. Syntypi. Sudan: Seriba Ghattas, fr., *Schweinfurth* 1374 (B, syntypus, destroyed; K). Tanganyika: Turu, Ulagesa, v. *Trotha* 148 (B, syntypus, destroyed).

Combretum tenuipes Engl., Pflanzenw. Afr. 3(2): 703 (1921) nom. illegit. non *C. tenuipes* Engl. & Diels (1899). Typi: as for *C. engleranum*.

Combretum engleranum [«englerianum»] Exell in Journ. of Bot. 67: 141 (1927). Typi. Cameroun: Jade Plateau, *Elbert* 350 (B, paratypus, destroyed); Bosum, fl., *Tessman* 2253 (B, holotypus, destroyed; BM, \times , isotypi); Mbussa, Kongola, *Mildbraed* 9113 (BM, paratypus); Buar, Uham, *Mildbraed* 9425 (\times , paratypus).

From Nigeria to Kenya and northern Tanganyika. A few specimens from the Ivory Coast, Ghana and Dahomey possibly belong here.

EXELL (loc. cit.) pointed out that the name *tenuipes* was already occupied and provided the epithet «*engleranum*».

Subsp. **hypopilinum** (Diels) J. C. Okafor **comb.** et stat. nov.

Combretum hypopilinum Diels in Engl., Bot Jahrb. **39**: 497 (1907). Typi. Oubangui-Chari: Ndellé, fl., *Chevalier* 7431, (**P**, **syntypus**), fl., 7469bis (κ , **P**, **syntypi**), fl., 8462 (p, **syntyus**), fr., 8466bis (**P**, **syntypus**). Chad: Fort Archambault, *Chevalier* 10474 (p, **syntypus**).

Combretum verticillatum Engl. in Engl., Monogr. Afr. Pfl. 3: 52, t. 16 B (a-h) (1899). Typi. Sudan: Gir, in Bongoland, fl., *Schweinfurth* 1411 (**B**, **syntypus**, destroyed; κ , **isotypus**); Seriba Ghattas, fl., fr., *Schweinfurth* 1595 (**B**, **syntypus**, destroyed; κ , **isotypus**).

Combretum kottoense Exell in Bull. Soc. Linn. Normand. 1936, Sér. VIII, 9: 133 (1937). Typus. Oubangui-Chari: Haute Kotto, fl., *Le Testu* 3675 (**BM**, **holotypus**; p, **isotypus**).

Combretum flaviflorum Exell, loc. cit., pro parte quoad *Tisserant* 961 (**P**, **holotypus**) tantum.

From Guinea to the Sudan, northern Congo and the north-western corner of Uganda.

The type specimen of *C. kottoense*, *Le Testu* 3675 (**P**), is not quite typical in its coarser indumentum. It was probably collected from a coppice shoot.

The three paratypes of *C. flaviflorum* cited by Exell—*Le Testu* 2520, 2655 and 4549 are intermediate between subspp. *hypopilinum* and *binderanum*.

Subsp. **elgonense** (Exell) J. C. Okafor **comb.** et stat. nov.

Combretum elgonense Exell in Kew Bull. 1932: 491 (1932). Typus. Kenya: Mt. Elgon, fl., *Lugard* 524 (κ , **holotypus**; **BM**, **isotypus**).

Combretum laboniense M. B. Moss, op. cit. 1929: 195 (1929). Typus. Sudan: Imatong Mts., nr. Laboni Forest, fl., *Chipp* 45 (κ , **holotypus**; **BM**, **isotypus**).

Combretum kabadense Exell in Journ. of Bot. **75**: 165

(1937). Typus. Sudan: Mongalla, Kabada Hills, fl., *Dandy* 460 (**B M**, holotypus).

Combretum abercornense Exell, op. cit. 77: 167 (1939). Typus. Zambia: Abercorn, Kalambo Falls, fr., *Burt* 5963 (**B M**, holotypus; **E A**, **K**, isotypi).

Combretum mwanzense Exell, tom. cit.: 168. Typus. Tanganyika: Uzinza area, west of Mwanza, fr., *Burt* 6455 (**B M**, holotypus; **E A**, **K**, isotypi).

Occurring scattered, chiefly at high altitudes, in the Sudan, north-eastern Congo, eastern Congo between Lakes Kivu and Tanganyika, Uganda, western Kenya, Tanganyika, Rwanda and Zambia (Abercorn).

Subsp. **suluense** (Engl. & Diels) J. C. Okafor comb. et stat. nov.

Combretum suluense Engl. & Diels in Engl., Monogr. Afr. Pfl. 3: 54, t. 14 G (1899). Typus. Swaziland: Horomine, fr., *Galpin* 264 (ζ, holotypus, not seen; x, **P R E**, isotypi).

Combretum fischeri Engl., Pflanzenw. Ost. Afr. C: 290 (1895). Typi. Tanganyika: Irunde, Ugalla River, *Bohm* 19a (**B**, syntypus, destroyed) ; Salanda, *Fischer* 246 (**B**, syntypus, destroyed).

Combretum brosigianum Engl. & Diels in Notizbl. Bot. Gart. Berl. 2: 192 (1898). Typus. Tanganyika: Kilossa, *Brosig* s. n. (**B**, holotypus, destroyed).

Combretum fulvotomentosum Engl. & Diels in Engl., tom. cit.: 39, t. 12 B (a-c). Typus. Angola: Benguela, Huilla, fl., *Antunes* 300 (**B M**, holotypus, destroyed; **COI**, isotypus, not seen; **B M**, fragment).

Combretum schinzii Engl. ex Engl. & Diels in Engl., tom. cit.: 54, t. 17 B (a-d). Typus. South West Africa: Onkumbi, fl., *Schinz* 1051 (**B**, holotypus, destroyed; ζ, isotypus).

Combretum pachycarpum Engl. & Gilg in Warb., Kunene-Sambesi Exped.: 316 (1903). Typus. Angola: Makopi, fr., *Baum* 983 (**B**, holotypus, destroyed; **B M**, **K**, isotypi).

Combretum junodii Dümmer in Gard. Chron. Ser. III,

- 53: 183 (1913). Typus. Transvaal: Shilouvane, fl., *Junod* 613 (x, holotypus; PRE, isotypus).
- Combretum angustilanceolatum* Engl., Pflanzenw. Afr. **3**(2): 702 (1921). Typus. Mozambique: Gazaland, Lower Umswirizwi River, fl., *Swynnerton* 45 (B, holotypus, destroyed; B M, isotypus).
- Combretum makindense* Gilg ex Engl., tom. cit.: 703. Typus. Kenya: Makindu, fl., *Scheffler* 10 (B, holotypus, destroyed; B M, isotypus).
- Combretum griseiflorum* S. Moore in Journ. of Bot. **59**: 227 (1921). Typus. Transvaal: Nelspruit, fl., *Breyer* in *Herb. Rogers* 24018 (BM, holotypus).
- Combretum millerianum* [«millerianum»] Burt Davy in Kew Bull. **1921**: 279 (1921). Typus. Swaziland: Lubombo Flats, fr., *Burt Davy* 10681 (BOL, holotypus, not seen; x, fragment).

From Kenya to Swaziland and extending across south-central Africa through Rhodesia to South West Africa and Angola.

The type of *C. fulvotomentosum* is not quite typical of the subspecies in having very hairy leaves. The types of *C. fischeri* have been destroyed; *Goetze* 348 (x) from Uluguru, Tanganyika, which was distributed from Berlin as «*C. fischeri*» may serve as a neotype. *Semsei* 976, collected from near the type-locality of *C. brosigianum*, allows that species to be interpreted. ENGLER (1921) did not cite the types of *C. angustilanceolatum* and *C. makindense*. Information about them was kindly supplied by Dr. A. W. EXELL, who examined them before the war. *C. junodii* is placed here with some hesitation since the type is a poor specimen. *C. pachycarpum* is not quite typical; in its somewhat hairy leaves it approaches subsp. *gazense*.

Subsp. *taborense* (Engl.) J. C. Okafor comb. nov.

- Combretum taborense* Engl., Pflanzenw. Ost-Afr. **C**: 290 (1895). Typus. Tanganyika: Tabora, *Stuhlmann* 506 (B, holotypus, destroyed).

- Combretum goetzenianum* Engl. apud Diels in Engl., Bot. Jahrb. 39: 500 (1907). Typus. Tanganyika: Dondoland, between Kwa and Likemba, fr., *Busse* 570 (**B**, **holotypus**, destroyed; **B M**, **EA**, **isotypi**).
- Combretum psammophilum* Engl. & Diels in Engl., tom. cit.: 502. Typus. Tanganyika: Lindi, Ruaha, fr., *Busse* 1112 (**B**, holotypus; **B M**, **EA**, **isotypi**).
- Combretum burtii* Exell in Journ. of Bot. **77**: 169 (1939). Typus. Zambia: Kasama to Isoka km. 32, fl., *Burt* 5951 (**B M**, holotypus; **EA**, **K**, isotypi).
- Combretum mechowianum* O. Hoffm. subsp. *taborense* (Engl.) Duvign. in Bull. Soc. Roy. Bot. Belg. 88: 80, t. 8b (1956). Typus. As for *Combretum taborense*.

From central and southern Tanganyika to Katanga and the northern half of Mozambique.

The type-specimen of *C. taborense* has been destroyed but certain specimens (e. g. *Busse* 1122, the type of *C. psammophilum*) have been compared with it by Dr. A. W. EXELL.

Subsp. *gazense* (Swynn. & Bak. f.) J. C. Okafor comb. nov.

- Combretum gazense* Swynn. & Bak. f. in Journ. Linn. Soc. Bot. 40: 68 (1911). Typus. Mozambique: Mt. Umterene, fl., *Swynnerton* 1587 [*«517»*] (**B M**, holotypus; κ , isotypus).
- Combretum coriaceum* Schinz in Verh. Bot. Ver. Brand. **30**: 247 (1888). Typus. South West Africa: Hereroland, between Otjozondjupa and Otjiheveta, fr., *Fleck* 422a (z, holotypus).
- Combretum bajonense* Sim, For. Fl. Port. E. Afr.: 63 (1909). Typus. Mozambique: Maganja da Costa, *Sim* 5715 (not seen, see below).
- Combretum album* De Wild. in Fedde Rep. **13**: 195 (1914). Typus. Congo: Katanga, Elisabethville, fl., fr., *Bequaert* 513 (**BR**, holotypus).
- Combretum ritschardii* De Wild. & Exell in De Wild., Pl. Bequaert. **5**: 366 (1932). Typi. Congo: Kiluba country, fl., *Ritschard* 1478 (**BR**, syntypus); id.,

Ritschard 1479 (BR, syntypus); Lualaba, Ruwe, Hock s. n. (BR, syntypus).

Combretumsingidense Exell in Journ. of Bot. 77: 169 (1939). Typi. Tanganyika: Singida, fl., *Burt* 5071 (BM, paratypus; \times); between Singida and Kanda-jega, nr. Wembari Steppe, fl., *Burt* 5251 (BM, holotypus; FHO, K, isotypi).

Combretum eylesii Exell, tom. cit.: 170. Typi. Rhodesia: Salisbury, fl., *Eyles* 849 (BM, holotypus), fl., *Eyles* 4497 (\times , paratypus).

Combretum mechowianum O. Hoffm. subsp. *gazense* (Swynn. & Bak. f.) Duvign. in Bull. Soc. Roy. Bot. Belg. 88: 81, t. 8 c-d (1956). Typus. As for *C. gazense*.

From Tanganyika, Katanga and Zambia through parts of Mozambique, Zambia, Malawi and Rhodesia to the north-east corner of South West Africa and the Transvaal.

Some specimens from South West Africa (e. g. *Le Roux* 15, Runtu, Okavango) approach subsp. *dumetorum* in indumentum and venation.

I have not been able to locate the type-specimen of *C. bajonense*. *Sim* 20901 from the type-locality may very well be it since there is evidence that he re-numbered his specimens towards the end of his life.

Subsp. *kwangense* (Duvign.) J. F. Okafor comb. et stat. nov.

Combretum mechowianum O. Hoffm. subsp. *kwangense* Duvign. in Bull. Soc. Roy. Bot. Belg. 88: 78, t. 8a (1956). Typi. Congo: Kwango, Panzi, fl., *Duvigneaud* 991 C (BRLU, holotypus); Munene, *Duvigneaud* 781 C (BRLU, paratypus); Fumukutu, *Duvigneaud* 812 C1 (BRLU, paratypus); id., *Duvigneaud* 813 C1 (BRLU, paratypus); Kibunda, *Duvigneaud* 1029 C (BRLU, paratypus); between Feshi and Luie River, *Duvigneaud* 1052 C1 (BRLU, paratypus); Panzi, *Duvigneaud* 996 C2 (BRLU, paratypus); id., *Duvigneaud* 1003 C1 (BRLU, paratypus); id., *Duvigneaud* 1004 C (BRLU, paratypus); id., *Duvigneaud* 1014 C4 (BRLU,

paratypus); *id.*, Duvigneaud 999 C2 (BRLU, paratypus); Kahemba, Duvigneaud 950 C1 (BRLU, paratypus).

?*Combretum mechowianum* O. Hoffm. in *Linnaea*, 43: 131 (1881). Typus. Angola: Malange, fl., *Mechow* 227 (B, holotypus, destroyed; BR, isotypus).

Combretum rubiginosum Welw. ex Laws. in Oliver, F. T. A. 2: 428 (1871). Typus. Angola, Pedras de Guinga, fr., *Welwitsch* 4369 (BM, holotypus; α , ρ , isotypi).

Combretum laeteviride Engl. & Gilg in Warb., *Kunene-Sambesi Exped.*: 316 (1903). Typus. Angola: between Meschekke and Katumba, fr., *Baum* 986 (B, holotypus, destroyed; BM, BR, K, isotypi).

Confined to Kalahari Sands of northern Angola, Kwango and Kasai (Congo) and Barotseland (Zambia).

The type specimen of *C. mechowianum* is without leaves and was probably obtained from a vigorous shoot so that there is some doubt as to whether it and DUVIGNEAUD'S *G. mechowianum* subsp. *kwangense* are the same.

Subsp. **dumetorum** (Exell) J. C. Okafor **comb.** et stat. nov.

Combretum dumetorum Exell in *Journ. of Bot.* 66, *Suppl.* 1: 169 (1928). Typus. Angola: Cassuango, Cuiriri, fr., *Gossweiler* 3008 (BM, holotypus; P, isotypus).

Confined to the Kalahari Sands of south-eastern Angola and the adjacent parts of Barotseland (Zambia).

Subsp. *ondongense* (Engl. & Diels) J. C. Okafor **comb.** et stat. nov.

Combretum ondongense Engl. & Diels in Engl., *Monogr. Afr. Pfl.* 3: 56, t. 18 N (a-d) (1899). Typus. South West Africa: Ovamboland, between Ondonga and Unkuassyana, fl., *Rautanen* 234 (B, holotypus, destroyed; BM, fragment; α , isotypus).

Chiefly in South West Africa and Bechuanaland, but also in the extreme south of Angola and Zambia and the eastern fringe of Rhodesia. Probably confined to Kalahari Sands.

Synonyms of *Combretum collinum* sens. **lat.** impossible to place more exactly.

Combretum cognatum Diels in **Engl.**, Bot. Jahrb. 39: 501 (1907). Typus. Rhodesia: Pasipas, *Engler* 2885a (**B**, holotypus, destroyed).

Combretum frommii Gilg ex **Engl.**, Pflanzenw. Afr. 3(2): 700 (1921). Typus. Tanganyika: Lake Tanganyika, *Münzner* 269 (**B**, holotypus, destroyed).

Combretum kerengense **Engl.** apud Diels in **Engl.**, Bot. Jahrb. 39: 500 (1907). Typus. Tanganyika: Usambaras, between Kerenge and Kwaschemsi, *Engler* 919a (**B**, holotypus, destroyed).

Combretum leuconeurum Gilg & Ledermann ex **Engl.**, Pflanzenw. Afr. 3(2): 702 (1901). Typus. Cameroun: *Ledermann* 4103 (**B**, holotypus, destroyed).

Combretum maclaudii Aubrév. in *Combret. Savan. Bois Afr. Occ. Franç.*: 40 (1944), gallice tantum descripta. Typus. Guinea: near the boundary with Portuguese Guinea, fl., *Maclaud* 22 (♂, holotypus).

Combretum monticola **Engl.** & Gilg in **Warb.**, Kunene Sambesi Exped.: 317 (1903). Typi. Angola: between Chihinde and Ediva, fl., *Baum* 54 (**B**, syntypus, destroyed); behind Chihinde, fl., *Baum* 56 (**B**, syntypus, destroyed).

ENGLER did not cite type-specimens for *C. frommii* and *C. leuconeurum*. The information given above was kindly supplied by Dr. A. W. EXELL who worked on *Combretum* in the Berlin herbarium before the war. It is also on Dr. EXELL'S authority that *C. cognatum*, *C. frommii* and *C. kerengense* are included under *C. collinum* sens. **lat.** According to **MILDBRAED** [in **Engl.**, Bot. Jahrb. 65: 34 (1933)], *C. leuconeurum* is a synonym of *C. verticillatum* but as I have not seen

specimens I cannot confirm this. Fruiting specimens of *C. maclaudii* and *C. monticola* are needed before they can be placed more closely.

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Acknowledgements will appear in full in the main work, but here I would like to express my special debt of gratitude to Dr. A. W. EXELL, who has been a constant source of help, and to Mr. F. WHITE, who supervised the study on which this account is based and, in preparing it for publication, has checked all the bibliographic references and has kindly provided the key to the subspecies.

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**TAXA ANGOLENSIA NOVA VEL MINUS
COGNITA — V**

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Centri Botanices
Junctae Investigationum Ultramaris

Tessmania camoneana Torre, sp. nov., aff. *T. lescrowetii* (De Wild.) Harms et *T. burtii* Harms, sed frutice multicaule 4-5 m alto, foliolis oppositis vel suboppositis 2-3-jugis, sepalis glabris, petalis lilacineis et stipite 2-3 mm longo differt.

Frutex multicaulis, 4-5 m altus, ramulis glabris. *Folia* alterna, pinnata; petioli rugosi, 1.5-4 mm longi, rhachide canaliculati 1-3 cm longa; foliola 2-3-juga, opposita vel subopposita, subsessilia, ovato-subelliptica, apice acuta vel subcaudata, saepe emarginata, basi inaequaliteralia, glabra, 1.5-7 X 1-3 cm, costa media subtus prominenti et reticulo denso, utrinque conspicuo; stipulae caducae. *Inflorescentiae* racemosae terminales vel axillares, pauci vel multiflorae, 5-7 cm longae; pedunculi cum rhachide pedicelloque glabri; bractee lanceolatae, caducae; pedicelli 1.5-2 cm longi. *Sepala* 4, subvalvata, basi connata, integra, inaequalia, unum ovatum ± 1.2 X 0.5 cm, cetera lanceolata, 1.5-1.7 X 0.2-0.3 cm, extus glabra intus dense fulvo-tomentosa, margine membranacea; *petala* 5, libera, lilacinea, angustata, unguiculo carnosio extus pubescenti; petalum unum obovato-lanceolatum, 1.8-2.2 X 0.3-0.5 cm, cetera obovata, 2.5-3 X 1-1.5 cm, cum unguiculo ca. 0.5 cm longo; *stamina* 10, unum liberum, cetera filamentis 9 inferiore parte in vaginam ca. 0.8 cm longam extus dense fulvo-lanosam, intus pubescentem, connata; *antherae* 10, dorsifixae; *ovarium* oblongum, verrucosum, sericeo-hirsutum, stipitatum, 7-ovulatum, stipite 0.2-0.3 cm longo; *stylus* glaber,

ca. 2 cm longus. *Legumen* lignosum, plano-compressum, oblique subellipticum, $\pm 5 \times 3.5$ cm, verrucis subglobosis, diametro 1-2 mm obsitum, dense villosum. *Semina* compressa, oblonga, $\pm 1.3-0.6$ cm, fusca.

Icon. nostr.: **T A B.** I et II.

ANGOLA: Luanda, Muxima, Quiçama (Cf), alt. ca. 100 m, arbusto multicaule, de 4-5 m, na formação de *Guibourti* sp., flores lilacíneas, 10-VI-1966, B. Teixeira 10532 (LUA, holotypus), fr., 10-VI-1966, B. Teixeira 10532A (LUA; LISC).

O nome específico é dedicado a CAMÕES, em virtude do colector, Eng. BRITO TEIXEIRA ter manifestado esse desejo pelo facto de ter herborizado esta planta em 10 de Junho, dia consagrado ao nosso Épico.

Cynometra leonensis Hutch. & Dalz. in Bull. Misc. Inform. Kew, 1928: 381 (1928).

subsp. *Teixeirae* Torre, subsp. nov.; aff. *C. leonensis* subsp. *leonensis*, sed frutice multicaule 2-3 m alto (non arbor), foliolis 3-4-jugis, foliolis pedicellis que majoribus differt. **T A B.** III et IV.

Frutex multicaulis, 2-3 m altus. *Rami* flexuosi, glabrescentes, cortice lenticulis instructo. *Folia* usque 10 cm longa; foliola 3-4-juga, oblique-oblonga, apice rotundata et emarginata, (2)3-5 \times (1)1.5-2.5 cm, utrinque glabra; rhachis canaliculata, 2-7 cm longa. *Inflorescentiae* paniculatae, axillares vel terminales, ± 5 cm longae, rhachidibus pubescentibus. *Flores* luteoli; pedicelli (5)6-10(12) mm longi, pubescentes; bractea et bracteolae caducae, ovatae, ca. 1 mm longae, pubescentes. *Sepala* ovata, ca. 3 mm longa, basi puberula, apice glabra. *Petala* oblonga vel subelliptica, ca. 4 mm longa, glabra. *Ovarium* lanosum, stipite 1-1.5 mm longo, 2-ovulatum. *Fructus* oblongus, $\pm 6 \times 3$ cm; semina obovata, basi cuneata, $\pm 2 \times 1.5$ cm.

ANGOLA: Luanda, Icolo e Bengo, «plateau» Viana, Mata de «mutolo», picada I 2, arbusto multicaule, ca. 4 m, flores cor creme, fl. 24-III-1966, B. Teixeira 10342 (LUA, holotypus);

Icolo e Bengo, «plateau» Viana, arbusto multicaule, frutos imaturos 6-VI-1966, *B. Teixeira* 10457 (LUA, paratypus); Icolo e Bengo, «plateau» Viana, picada V 2, a 7.600 m da estrada de Catete, no sentido N-S, alt. ca. 100 m, *B. Teixeira* 10367 (LUA).

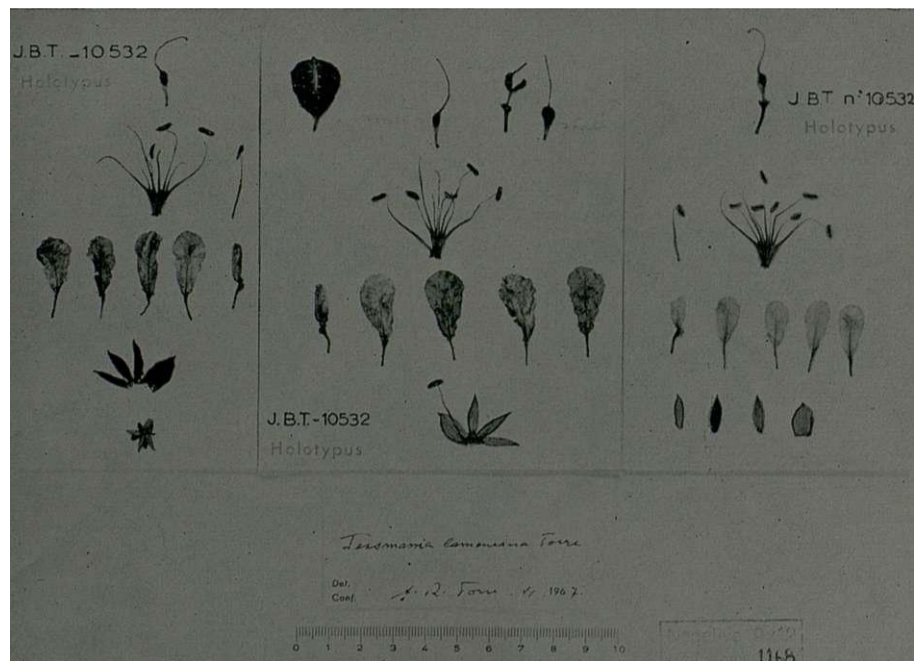
Nunc **restat** ut Cl. Vir. Prof. Dr. A. FERNANDES, **Centr** i Botanices Directori, et Eng. BRITO TEIXEIRA, pro vario auxilio gratias **habeamus**.

Etiam Rev. P. M. ESTEVES pro auxilio in revisione textus latini gratias habemus.

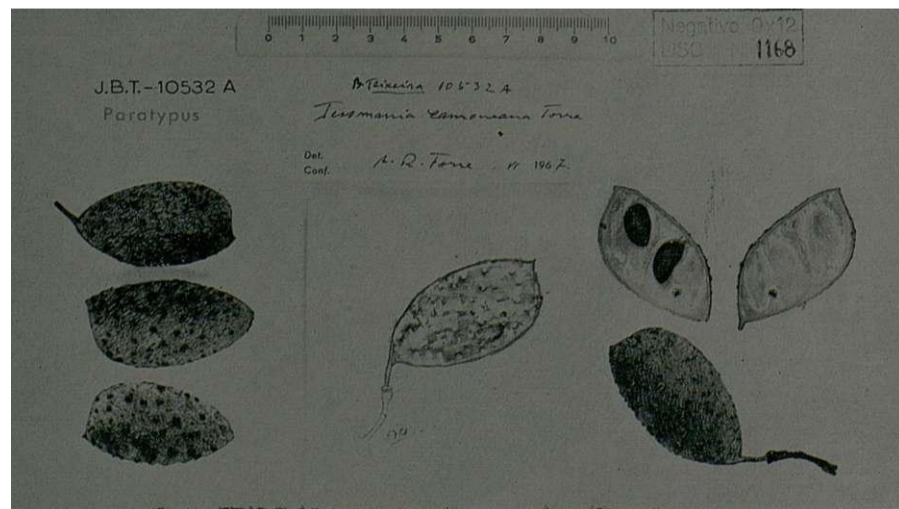


Tessmania Camoneana Torre
Specimen *B. Teixeira* 10532 (LUA, holotypus)

TAB. II



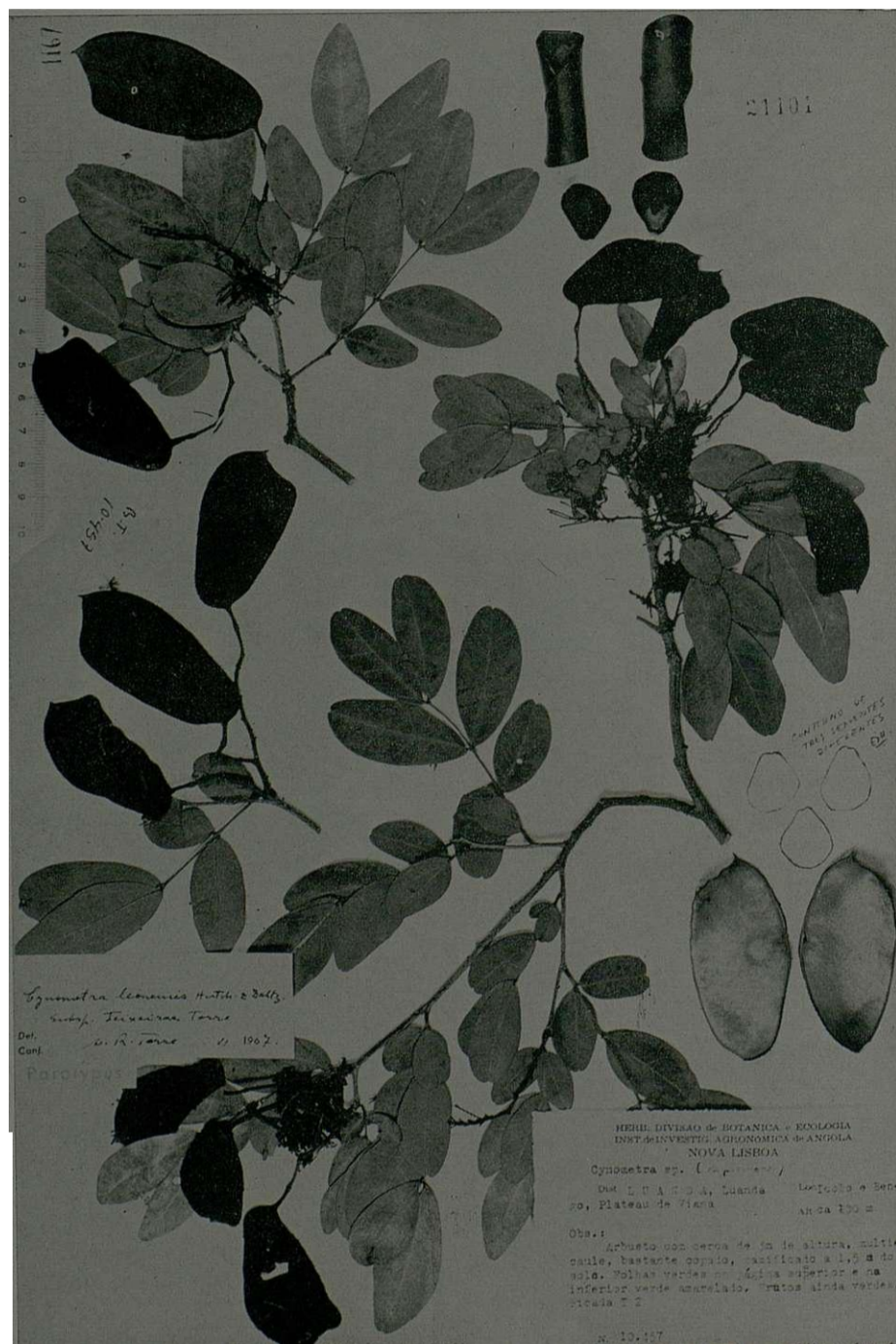
A — Flores de *Tessmania Camoneana* Torre
Specimen *B. Teixeira* 10532 (LUA)



B — Vagens de *Tessmania Camoneana* Torre
Specimen *B. Teixeira* 10532A (LUA)



Cynometra leonensis Hutch. & Dalz. subsp. *Teixeirae* Torre
Specimen B. Teixeira 10342 (LUA, holotypus)



Cynometra leonensis Hutch. & Dalz. subsp. *Teixeirae* Torre
Specimen B. *Teixeira* 10547 (LUA, paratypus)

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ADDITIONES ET ADNOTATIONES
FLORAE ANGOLENSI — X

E. J. MENDES
Centrum Botanices
Junctae Investigationum Ultramaris

1 — *Commiphoradiscolor*, nov. sp.

Fruticosa scandens vel arbor ad 9 m alta, cortice papyraceo, macroblastos \pm rectos ad 40 cm longos, brachyblastos ad 2.5 cm longos et interdum ramos spinescentes gerens. *Folia* glabra, siccitate discoloria, alterna et regulariter disposita (3-5 cm distantia) secus macroblastos vel 4-6 apice brachyblastorum congesta; folia macroblastorum 3-foliolata, petiolo ad 15 mm longo, foliolis ellipticis, serratis, sessilibus, apice acutis, basi cuneatis, terminalibus ad 6 X 2.5 cm, lateralibus ad 3 X 1.5 cm; folia brachyblastorum 1(3)-foliolata, petiolo (2)5-8(13) mm longo, foliolis subintegris vel serrulatis, margine \pm revoluta, terminalibus subcircularibus usque late ellipticis, apice rotundatis usque acutis, basi rotundatis, ca. 3.5-6 X 3-3.5 cm, lateralibus (rarissime praesentibus) ellipticis, apice acutis, basi cuneatis, ad 1.5 X 0.7 cm. *Cymae* abbreviatissimae, masculae pauciflorae, femineae 1-3-florae, ad apicem brachyblastorum in axillis foliorum dispositae; *bracteae* ca. 1.2 X 0.8 mm, ovatae, \pm carinatae, glabrae, margine ciliatae, ciliis glanduloso-capitatis. *Flores* atropurpurei, glaberrimi; *calyx* tubulosus, ad $\frac{1}{4}$ lobatus, lobis acute triangularibus, glabris; *petala* 5-6 mm longa, anguste oblonga. *Fructus* subglobosus, ca. 9 mm diam., apiculatus; pericarpium carnosum, purpurascens, 2-valvatum, valvis valde inaequalibus; pseudo-arillus (3)4-brachiatus, brachiis undu-

latis, crassis, fere usque ad apicem endocarpii decurrentibus; endocarpium laeve, hinc valde convexum, illinc leviter convexum.

Icon. nostr.: TAB. I et II.

Angola — HUÍLA: andados 20 km de Cavalaúa para Gambos, *Mendes* 1693 (BM; COI; LISC, holotypus). MOÇÂMEDES: andados 20 km do Posto Experimental do Caraculo para Moçâmedes, *Santos* 996 (LISC; LUAI), *Santos* 998 (LISC; LUAI).

Sudoeste Africano — Ombepera, de *Winter & Leistner* 5490 (M; PRE).

Fl. V; fr. II, V.

2— Reabilitação de *Commiphora antunesii* Engl.

Commiphora antunesii Engl. foi relegada, com reservas, para a sinonímia de *C. mulelame* (Hiern) K. Schum. tanto por EXELL & MENDONÇA (Consp. Fl. Angol. 1, 2: 299, 1951) como por WILD (in Bol. Soc. Brot., Sér. 2, 33: 92, 1959). Dá-se, no entanto, a circunstância de os *syntypi* de *C. mulelame*¹, a saber, *Welwitsch* 4489 (BM) e *Welwitsch* 4502 (BM), tal como as folhas de herbário de LISU com colheitas de *Welwitsch* subordinadas a estes números, apresentarem apenas ramos com algumas inflorescências muito atrasadas e de o *holotypus* de *C. antunesii*, a saber, *Antunes* 302 (COI), ser material precário, pelo que, quanto a nós, é temerário decidir, em face dos materiais actualmente conhecidos, que *C. mulelame* e *C. antunesii* correspondam a um mesmo *taxon*, tanto mais que os tipos de uma e outra (materiais incom-

¹ Os espécimes *Welwitsch* 4490 e 4499 referidos por HIERN (Cat. Welw. Afr. Pl. 1, 1: 125, 1896), com reservas, sob *Balsamea mulelame* Hiern são, na realidade, *G. angolensis* Engl.

² Quando ENGLER descreveu *C. antunesii*, este exemplar tinha certamente folhas (cf. ENGL. & PRANTL, Nat. Pflanzenfam., ed. 1, 3, 4: 253-255, 1896 in *clavis*; Bot. Jahrb. 26: 370, 1899, *descr. orig.*) que hoje faltam no *holotypus*, tal como as flores (à excepção de um ou outro botão floral).

pletos, como se disse) são provenientes de localidades não só muito afastadas, mas também correspondendo a zonas fitogeográficas distintas: região do Golungo Alto para a primeira, planalto da Huíla para a segunda.

Nesta conjuntura, e dado que actualmente já se pode definir bem *G. antunesii*, pois que nos últimos anos têm sido herborizados materiais completos na região donde provém o *holotypus*, parece-nos de interesse ajustar a descrição original desta espécie e referir os espécimes arquivados, até à data, nos herbários que consultámos:

Commiphora antunesii Engl. in Engl. & Prantl, Nat. Pflanzenfam., ed. 1, 3, 4: 255 (1896) *nomen in clave*; in Bot. Jahrb. 26: 370 (1899).

G. mulelame sensu Exell & Mendonça, Consp. Fl. Angol. 1, 2: 299 (1951) *pro parte quoad specim. Antunes 302.*

Descriptio Cl. Engleri hic amplificatur atque emendatur:

Frutex vel *arbor* ad 6 m alta, trunco spinoso et ramis crassis, cortice papyraceo tenuissimo facile desquamanti instructis, spinescentibus vel inermibus. *Folia* 3-foliolata, raro imparipinnato-2-jugata, ad 15(25) cm longa, foliolis semper glabris; petiolus ad 7(10) cm longus, glaber; foliolum terminale ellipticum usque ovatum, ad 8(11) X 3.5(4.5) cm, apice acuminatum vel acutum, basi saepe subito attenuata petiolulum simulante; foliola lateralia elliptica usque late ovata, saepe asymetrica, ad 6(9) X 3.5(4.5) cm, apice acuminata vel acuta, basi subrotundata usque transverse cuneata, subsessilia; foliola discoloria (siccitate brunnea), reticulatione subtus impressa, costa media straminea supra valde prominente, margine integro et revoluta; rhachis, locis insertionis foliolorum (supra pilis glanduloso-capitatis et pilis longis flexuosis pluricellularibus sparse obsitis) exceptis, glabra. *Inflorescentiae* dichasio-cymosae, ad 8(11) cm longae, glabrae, pluries ad apicem ramulorum dispositae; pedunculus

tenuis, glaber, ad 6(8) cm longus; *bractee* subulato-lanceolatae, ca. 2 mm longae, apice acutae, margine ciliatae, sessiles; pedicelli tenues, ad 5(8) mm longi, 1-2(4) mm supra basin articulati. *Flores masculi*: *calyx* glaber, campanulatus, ca. 2 mm longus, ad $\frac{1}{3}$ lobatus, lobis triangularibus; *petala* anguste oblonga, mucronulata, ca. 6 mm longa, glabra, purpurascens; *stamina* 2-serialia, 4 longiora quam *petala* paullo breviora, *antheris* obtusis et 4 breviora *antheris* mucronatis; filamenta compressa; *discus* glaber, 4-lobatus, lobis sub-2-lobulatis. *Flores feminei* masculis similes, paullo minores, ovario conoideo, ca. 4 mm longo. *Fructus* in sicco ca. 14X10 mm, apiculatus; epicarpium carnosum, 2-valvatum, glabrum; pseudo-arillus (mesocarpium) ruber, 4-brachiatus, brachiis undulatis, crassis, fere ad apicem endocarpii decurrentibus; endocarpium colliculosum, demum nigrum, c. 10 X X 8 mm, hinc valde convexum, illinc leviter convexum.

Icon. nostr.: T A B . III-V.

HUILA: Lubango, Huila, *Antunes* 302 (COI, *holotypus*; LISC, *isotypus ex numero*); Lubango, Tchivinguiro, *Barbosa* 9528 (LISC; LUAI); Chibia, Quihita, margens do Caculovar, *Barbosa & Moreno* 10160 (LISC; LUAI); Lubango, Tchivinguiro, alt. 1750 m, *Gossweiler* 12624 (LISC); Lubango, Tchivinguiro, *Henriques* 753 (LUAI); Gambos, Chibemba, Chimbolelo, *Menezes* 717 (LISC; LUAI); Lubango, Tchivinguiro, Escola de Regentes Agrícolas, *Menezes* 1225 (LISC; LUAI), *Menezes* 1462 (COI; LISC; LUAI); Quilengues, Negola, *Menezes* 1843 (LISC; LUAI); Chibia, Jau, Cangalongue, *Menezes* 2332 (LISC; LUAI); Lubango, Bata-Bata, Tchipembe, *Santos* 611 (LISC; LUAI), entre Bata-Bata e Cangalongue, Opotemo, *Santos* 676 (LUAI); Lubango, Huila, Mupangue, alt. ca. 1700 m, *Teixeira & Andrade* 5165 (LISC).

Nom. vern.: MUBOBO (*Menezes* 717 e 1843), MUCANGUE (*Santos* 611), MUNENGUEME (*Teixeira & Andrade* 5165), MUSSACATA (*Menezes* 2332) e OMUHOVO (*Barbosa* 9528).

Fl. v, VIII-IX; fr. X-II, VII.

3 — Revisão do género *Cadaba* Forsk. em Angola

Quando foi elaborado o estudo das *Capparidaceae* em *Conspectus Florae Angolensis*, 1, 1 (1937), apenas foi reconhecida a existência de uma espécie de *Cadaba* em Angola (tom. cit.: 61) e, dado que os materiais eram poucos e deficientes, EXELL & MENDONÇA foram levados a concluir que se trataria de *C. farinosa* Forsk.

Nos últimos anos, diversos colectores herborizaram materiais completos de *Cadaba*, o que nos habilitou a reconhecer existirem em Angola duas espécies, qualquer delas afim de *C. farinosa*, espécie esta que, no entanto, parece não ter sido colhida naquela província até à data presente. Das duas espécies assinaladas, uma foi reconhecida como nova para a ciência, e vamos descrevê-la seguidamente, enquanto que a outra corresponde a uma espécie descrita em 1951 sobre materiais descobertos no Sudoeste Africano.

Os dois taxa em questão podem distinguir-se facilmente pela chave seguinte:

- Folhas oliváceas no seco, ca. 20 X 10mm; pecíolos ca. 6 mm longos; estames (3)4; apêndice nectarífero campanuliforme, conato ao andróforo em cerca de $\frac{4}{5}$ da sua extensão e atingindo cerca de metade do comprimento das sépalas; pétalas nulas ou 4. . . 1. *C. benguellensis*
- Folhas acinzentadas no seco, ca. 8 X 4mm; pecíolos ca. 2mm longos; estames 5; apêndice nectarífero tubuloso, conato ao andróforo nos 3-5 mm basais e \pm do comprimento das sépalas; pétalas nulas. . . 2. *C. schroepelii*

1 — *Cadaba benguellensis*, nov. sp.

Cadaba farinosa sensu Exell & Mendonça, Consp. Fl. Angol. 1, 1: 61 (1937).

Maerua sp. — Oliv., Fl. Trop. Afr. 1: 87 (1868) in adnot. sub *M. currori*.

Maerua angolensis sensu Hiern, Cat. Afr. Pl. Welw. 1, 1: 29 (1896) pro parte quoad spec. Welwitsch 977.

Frutex ad 3 m altus, macroblastos ad 30 cm longos et brachyblastos ad 10 mm longos gerens, partibus juvenilibus dense luteolo-lepidotis, demum glabrescentibus. *Folia* elliptica usque obovata, ca. 20 X 10 mm, crassiuscula, dense luteolo-lepidota, in sicco olivacea, 2-4(6) congesta ad apicem brachyblastorum, vel alterna et regulariter disposita (ad 10 mm distantia) secus macroblastos, petiolis ca. 6 mm longis, dense luteolo-lepidotis. *Flores* solitarii vel 2-4(7), subcorymbosi, ad apicem brachyblastorum dispositi, pedicellis 8-10 mm longis, dense luteolo-lepidotis, lepidibus \pm pediculatis. *Sepala* 4, exteriora 2 sub-cymbiformia ca. 8-12 X 3-4 mm, interiora 2 elliptica paullo minora, omnia acuta, luteolo-lepidota, lepidotis \pm pediculatis, margine \pm ciliato. *Petala* nula vel 4, lamina anguste subrhombica ca. 5 X 1 mm, longe (ca. 8 mm) unguiculata. *Androphorum* glabrum, 13-16 mm longum, appendiculo nectarifero \pm campanuliformi, glabro, ca. 4 X 2.5 mm, usque $\frac{4}{5}$ androphoro conato, fauce irregulariter crenulato. *Stamina* (3)4, parte libera filamentorum (7)8-10(12) mm longa. *Gynophorum* (quoad partem supra androphorum liberam) 4-6 mm longum, sparse luteolo-lepidotum, lepidotis pediculatis. *Ovarium* sub anthesi 5-7 mm longum, cylindricum, aliquantum arcuatum, dense luteolo-lepidotum. *Fructus* subcylindricus, irregulariter torulosus, in sicco 3.5-5 X 0.5 cm, interdum tarde aegre 2-valvatus, glabratus. *Semina* ca. 3 X 2 mm, subreniformia, irregulariter compressa et angulosa, matrice farinosa cinnabarina inclusa; testa atrovina, verruculosa, verruculis in lineis longitudinalibus \pm regularibus dispositis.

Icon. nostr.: Fig. 1.

Affinis *C. farinosa* Forsk., a qua appendiculo nectarifero \pm campanuliformi, androphoro usque $\frac{4}{5}$ conato, ad dimidium sepalorum attingente, facile distinguenda.

BENGUELA: Benguela, Gossweiler 3610 (BM¹; COI); Catengue, alt. 560 m, Gossweiler 12171 (BM¹; LISC, holotypus;

¹ Ambos estes espécimes, que não observei na presente data, achavam-se determinados como *G. farinosa* Forsk.

L U A); Dombe Grande, andados 30 km para Mundas do Hambo, *Menezes* 392 (LISC; LUA1); entre Benguela e o rio Catumbela, *Welwitsch* 977 (BM¹; LISU); andados 34 km de Lobito para Novo Redondo, *Wild, Barbosa & Santos* 10861 (LISC; LUAU).

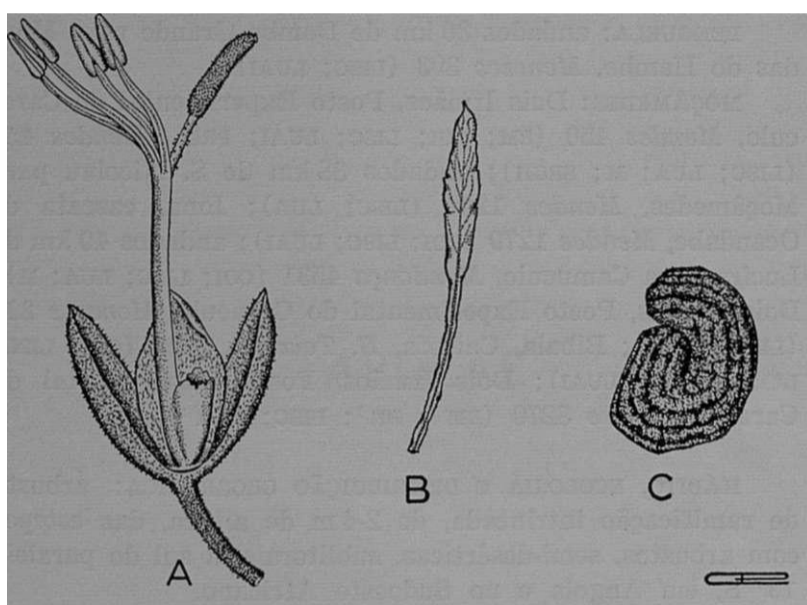


Fig. 1. — *Cadaba benguellensis* E. J. Mendes

- A — Flos a latere visus, sepalo interiore amoto. *Wild, Barbosa & Santos* 10861 (LISC), X 3.
 B — Petalum antice visum, *Mendes* 421 (LISC), X 3.
 C — Semen a latere visum, *Menezes* 392 (LISC), X 8.

MOÇÂMEDES: Lucira, flanco direito do rio Carunjamba, *Mendes* 421 (EBV¹; LISC; WAG¹).

HÁBITO, ECOLOGIA E DISTRIBUIÇÃO GEOGRÁFICA: arbusto de 3 m da estepe com arbustos, semi-desértica, sublitoral, entre os paralelos 12° e 14° S.

Fl. VII-X; fr. XII, III, VI.

¹ Todos estes três espécimes, que não observei na presente data, achavam-se determinados como *C. farinosa* Forsk.

- 2 — Cadaba **schroepelii** Suessenguth ex Suessenguth & Merxm. in Mitt. Bot. Staatssamml. München, 1, 3: 78 (1951). *Holotypus* do Sudoeste Africano: Namib-Rand, auf Nagelfluh, Volk 2676 (M).

BENGUELA: andados 30 km de Dombe Grande para Munda do Hambo, *Menezes* 393 (LISC; LUAI).

MOÇÂMEDES: Dois Irmãos, Posto Experimental do Caraculo, *Mendes* 450 (BM; COI; LISC; LUAI; PRE), *Mendes* 458 (LISC; LUA; M; SRGH); andados 38 km de S. Nicolau para Moçâmedes, *Mendes* 1209 (LISC; LUA); Iona, cascata de Oandabe, *Mendes* 1279 (COI; LISC; LUAI); andados 40 km de Lucira para Camucuo, *Mendonça* 4531 (COI; LISC; LUA; M); Dois Irmãos, Posto Experimental do Caraculo, *Menezes* 234 (LISC; LUAI); Bibala, Cairofa, *B. Teixeira* 2920 (COI; LISC; LISJC; LUA; LUAI); Dois Irmãos, Posto Experimental do Caraculo, *Torre* 8270 (BM¹; BR¹; LISC; LUA¹).

HÁBITO, ECOLOGIA E DISTRIBUIÇÃO GEOGRÁFICA: arbusto de ramificação intrincada, de 2-4 m de altura, das estepes COM arbustos, semi-desérticas, sublitorais, a sul do paralelo 13° S, em Angola e no Sudoeste Africano.

Fl. X-I; fr. XII-I, V.

NOTA—Esta espécie, que agora é assinalada para Angola pela primeira vez, distingue-se facilmente de *C. farinosa* Forsk. pelas suas flores apétalas; pelas sépalas muito menores; pelo androceu de 5 estames (dos quais um se liberta do andróforo mais abaixo que os quatro restantes); e pelo apêndice nectarífero que é conato em uma maior extensão (3-5 mm na antese) à base do andróforo, não fazendo com este um ângulo quase recto.

¹ É possível que todos estes três espécimes, que não observei na presente data, tenham sido distribuídos como *C. farinosa* Forsk.

TABULAE

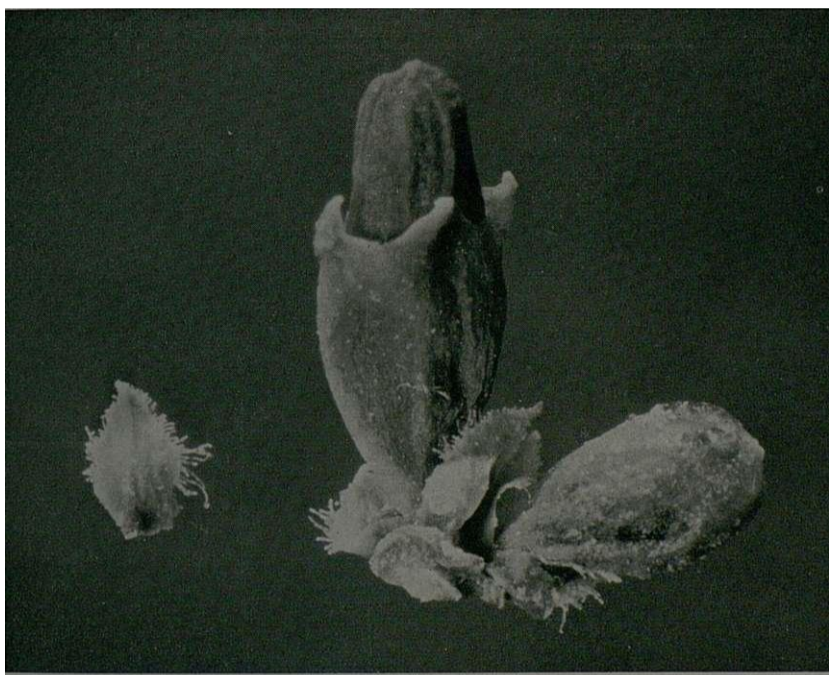
TABULA 1

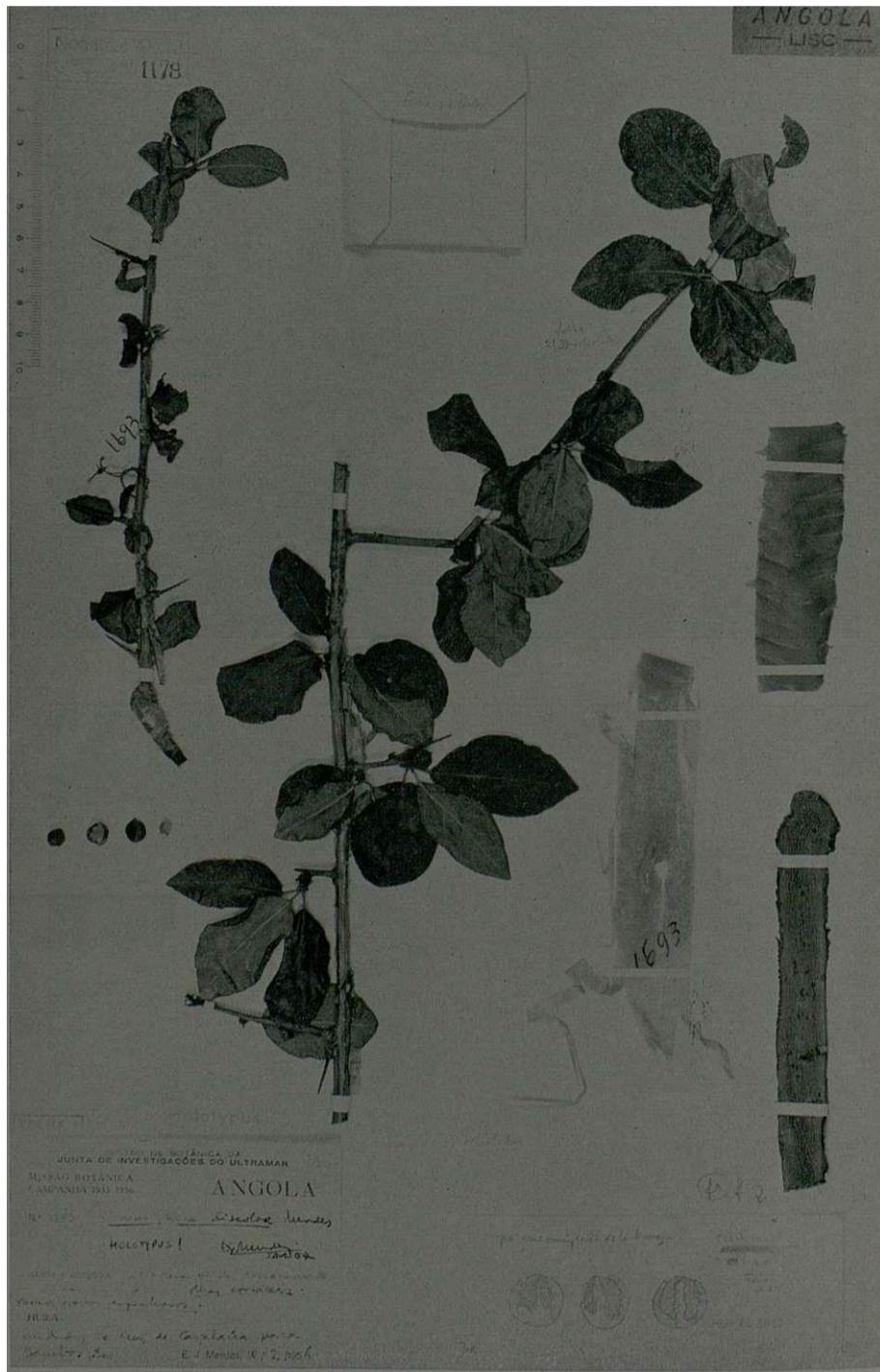
Commiphora discolor E. J. Mendes

Pars inflorescentiae bracteam exhibens. X 16
Specimen *Santos* 998 (LISC, **paratypus**)

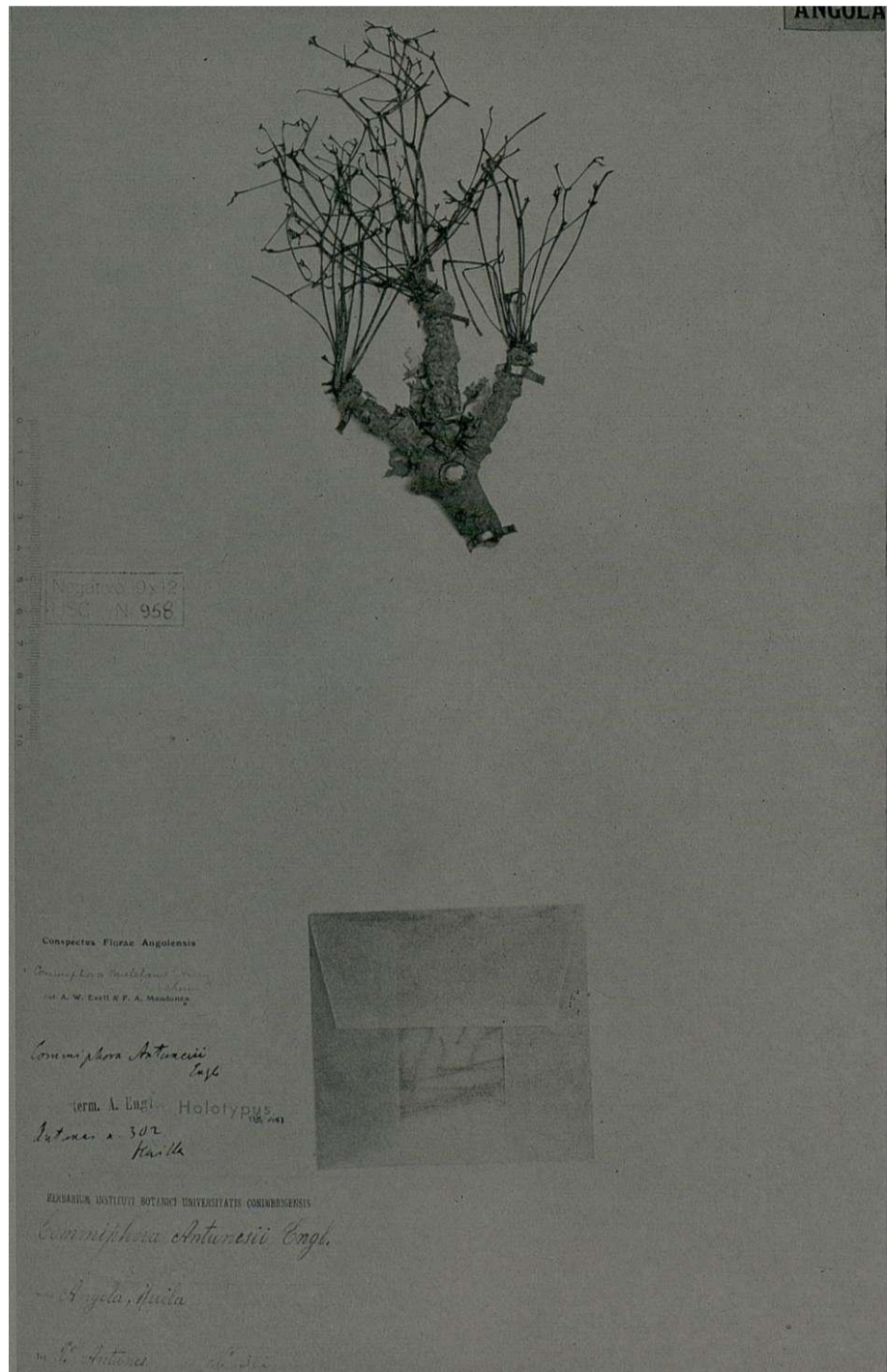
Commiphora discolor E. J. Mendes

Endocarpium pseudo-arilum exhibens. X 16
Specimen *Mendes* 1693 (LISC, holotypus)

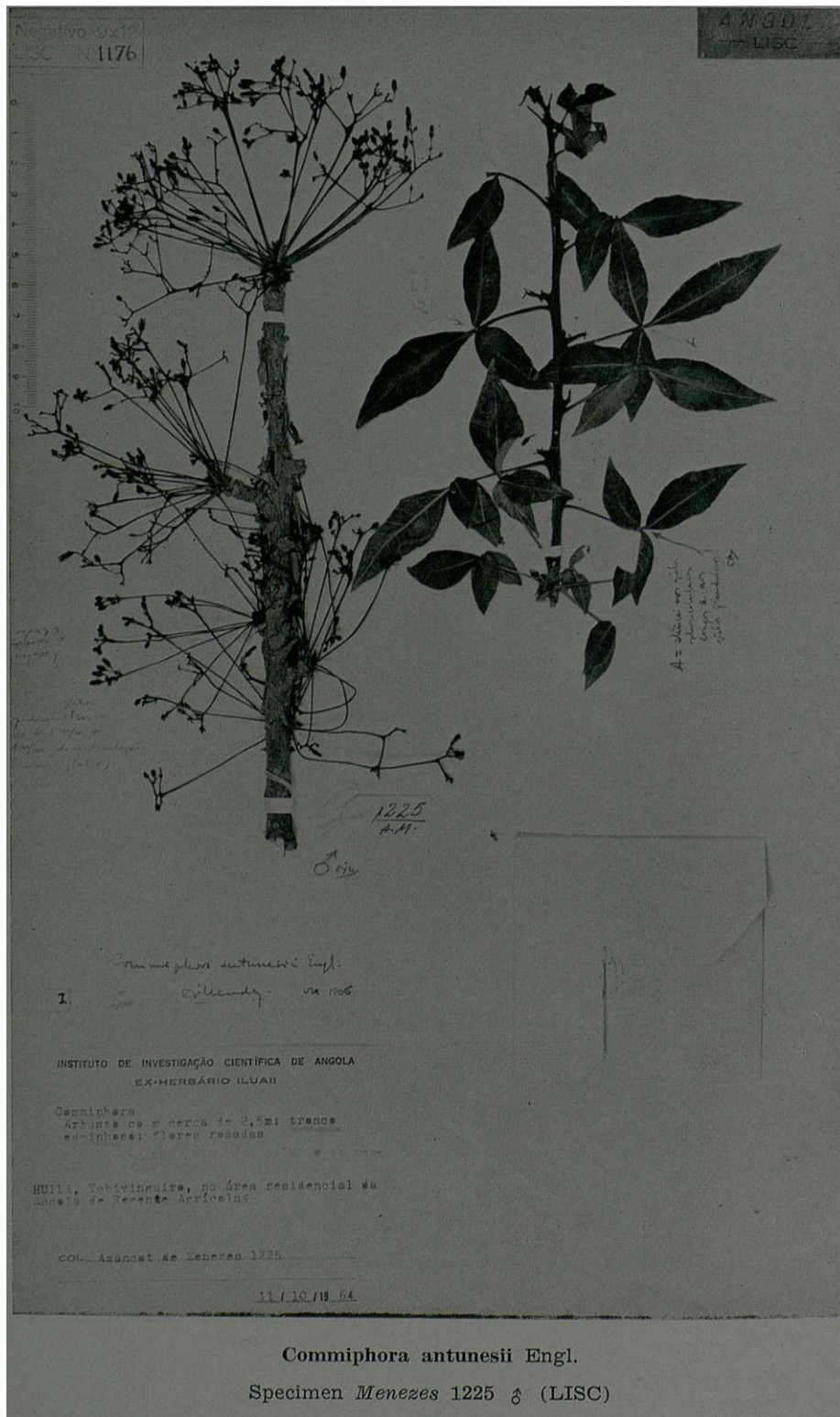




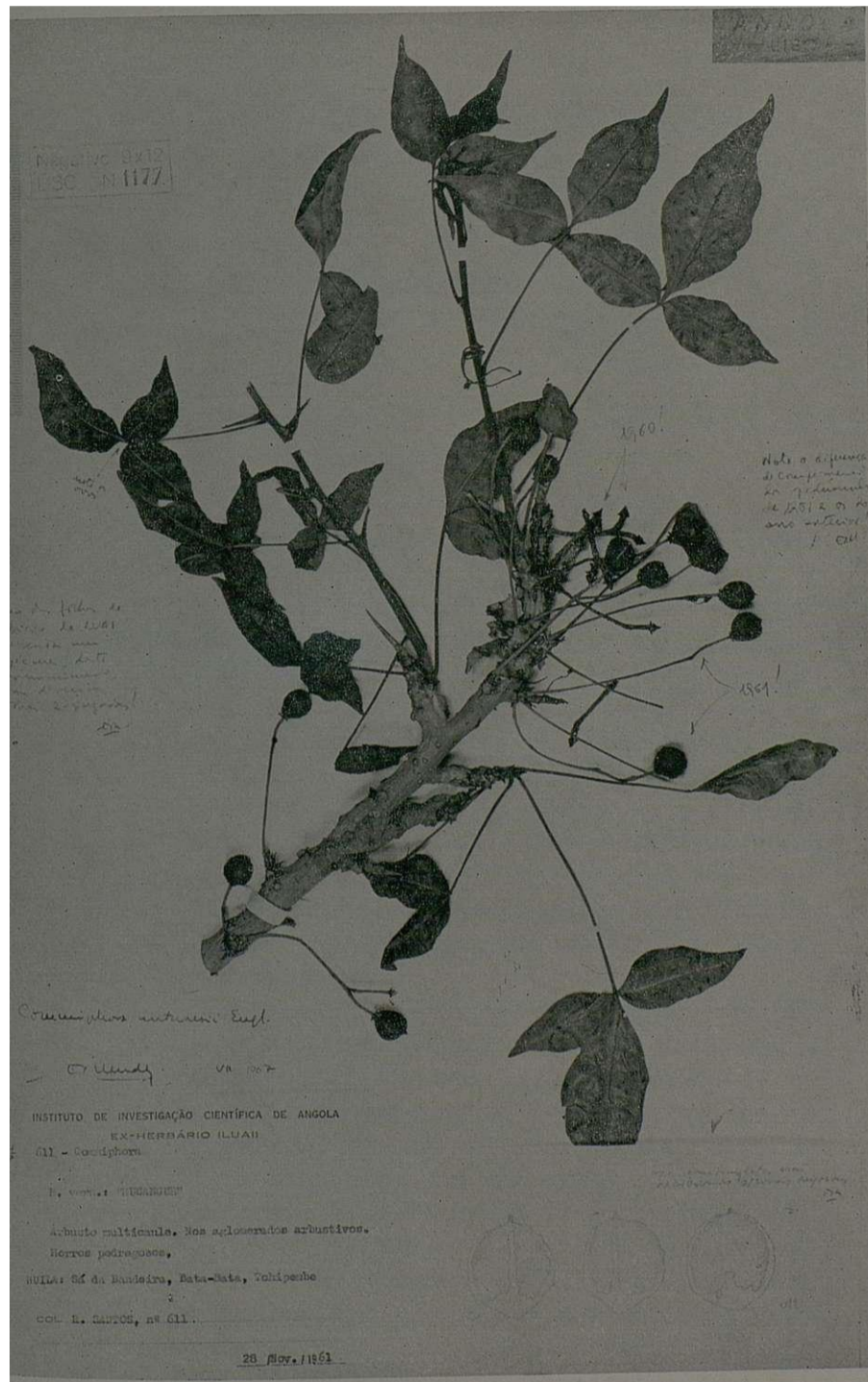
Commiphora discolor E. J. Mendes
Specimen *Mendes* 1693 (LISC, holotypus)



Commiphora antunesii Engl.
Specimen Antunes 302 (COI, holotypus)



TAB. V



Commiphora antunesii Engl.
Specimen Santos 611 (LISC)

ON THE TAXONOMY OF *TRIPOGON*
IN WEST AFRICA

by

D. GLEDHILL

University College of Sierra Leone

Tripogon major Hook. f.

THE genus *Tripogon* has three distinct areas; one in North America, one Oriental (Java to China) and one in Africa. Thirteen species have been described from Africa, of which nine are endemic in Ethiopia, Uganda, Tanzania and Madagascar. One species occurs in the dry regions of Senegal, Nigeria, Shari and Ethiopia and three species are endemic on the Tibesti, Cameroon and Sierra Leone mountains, respectively. The distribution pattern in Africa suggests that the genus now occupies only relict pockets of a formerly wider distribution. Madam A. CAMUS named the first Sierra Leone collection for PAUL JAEGER, its collector, but I am unable to separate *T. jaegerianus* adequately, from *T. major*, and our materials can only be accommodated in part by Madam CAMUS' diagnosis.

The Sierra Leone materials are very variable in leaf size, with leaf lengths from 5 to 25 cm, although the diagnosis of *T. jaegerianus* restricts leaf length to between 7 and 10 cm. Similarly, spike length varies up to 20 cm (against the 5.5 to 10 cm diagnosed), the number of spikelets up to 30 (against 7 to 9 diagnosed) and the length of the aristae of the lemmas from 2 to 5 mm (up to 3 mm diagnosed). A parallel degree of variability can be seen in Cameroon material of *T. major* (*Boughey* 12,512, *Morton* K 1066, *Morton* K 1096), Cameroon plants have, in general, a slightly longer lower glume (7 mm, compared with 6 mm), a slightly

broader spikelet (up to about 3 mm, compared with about 2.5 mm) and shorter aristae, than Sierra Leone material.

More conspicuous differences exist between plants from the Loma Mountains and plants from the Tingi mountains than between Sierra Leone plants collectively and Cameroon plants. I propose to recognise the Sierra Leone representatives of this genus as two subspecies of *T. major* Hook. f.

T. major Hook. f. subsp. *major*

Cameroon Mt. from 7,000 feet to 8,000 feet, on well drained soils in grassland and on lava flows.

T. major subsp. *jaegeriana* D. Gledhill subsp. nov.

Differt a subsp. *maiore* glumis brevioribus (ad 6 mm), spiculis angustioribus (ad 2.5 mm), aristis longioribus (ad 3 mm).

Type: *J. K. Morton* SL 2649 (SL). Isotypes in K.GC.WAG. FHL.IFAN. On doleritic pavement on summit of Bintumane, Loma Mts. Also pertaining, *Jaeger* 549 (α), *Jaeger* 8.215 (SL.K) and *Jaeger* 8.216 (SL.K) from the same locality. *Jaeger* 7.860 from Da Oulen, 5600 feet.

T. major subsp. *deflexa* D. Gledhill subsp. nov.

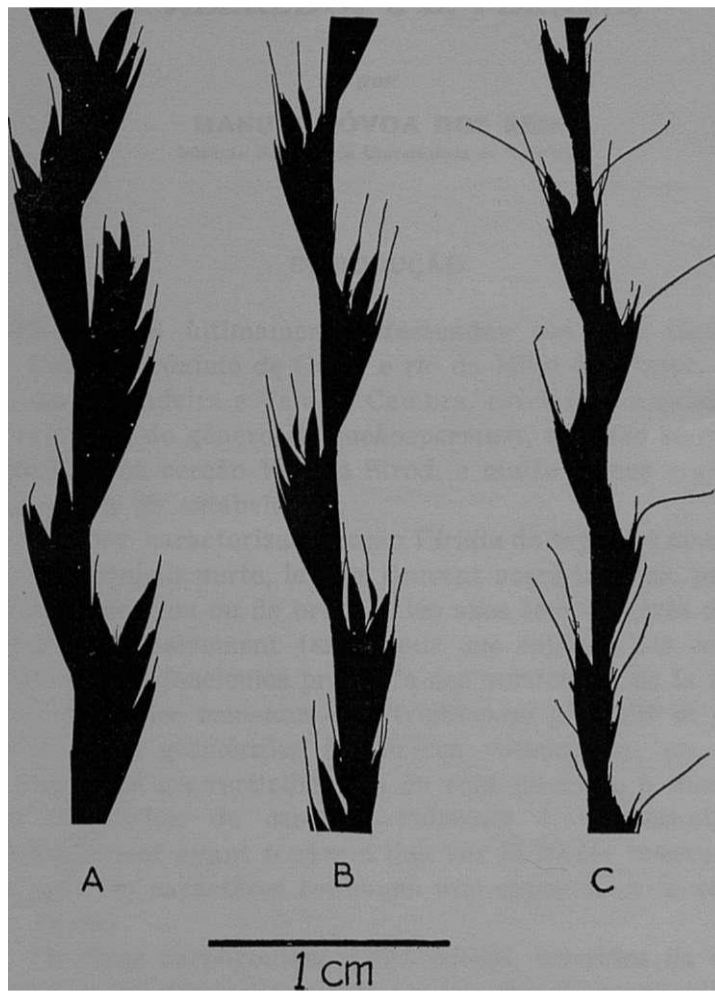
Differt a subsp. *jaegeriana* pedunculis rhachidibusque rigidioribus, lemmatibus arctius imbricatis alte bifidis, aristis longioribus et maturitate reflexis.

Type: *Morton & Gledhill* SL 3112 (SL). Isotype in K. In rock crevices from about 5,500 feet to 6,080 feet on Sankan Biriwa, Tingi Mts.

REFERENCE

- CAMUS, A.
1954 in Jour. Agric. Trop. 1: 212.

TAB. I



Silhouettes of portions of the inflorescences of A) *Tripogon major* Hook. f. subsp. *major*, B) *T. major* subsp. *jaegeriana* D. Gledhill, and C) *T. major* subsp. *deflexa* D. Gledhill.

DUAS ESPÉCIES NOVAS
DE *BATRACHOSPERMUM* ROTH.:
B. AZEREDOI E *B. FERRERI*

por

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INTRODUÇÃO

DESQUIS AS ultimamente efectuadas nos rios Gonde e Caster, próximo de Ovar, e rio da Mina do Pintor, entre S. João da Madeira e Vale de Cambra, revelaram a existência de dois taxa do género *Batrachospermum*, que não se enquadram bem na secção *Viridia* Sirod. e muito menos em qualquer outra já estabelecida.

SIRODOT caracteriza a secção *Viridia* da seguinte maneira:

«La couleur verte, le plus souvent assez franche, parfois mélangée de bleu ou de brun, — les axes femelles très courts naissant exclusivement (sauf pour une espèce) des cellules basilaires des fascicules primitifs des verticilles, de la même manière que les rameaux — le trichogyne pédicellé et cylindroïde, — les glomérules fructifères volumineux, un, deux au plus dans les verticilles qui en sont pourvus, à insertion très rapprochée du centre, — l'absence d'un prothalle, le développement ayant toujours lieu sur la forme assexuée, — tels sont les caractères communs aux types dans la section des *Verts*».

Os eixos carpogoniais muito curtos, inseridos na célula basilar, a cor dominante verde e o número de gonimoblastos, *um a dois*, são particularidades comuns às secções *Turficola*, *Virida* e *Hybrida*, não podendo ser consideradas como exclusivas da secção *Viridia*.

Resta-nos por conseguinte ter em consideração:

- 1.º — O tricogínio pedicelado e cilindróide;
- 2.º — A ausência de protonema.

As plantas encontradas nos rios Gonde e Caster não apresentam esses caracteres, mas sim:

- 1.º — Tricogínio pedicelado ou sésil e claviforme, muito excepcionalmente cilíndrico;
- 2.º — Presença de um protonema filamentososo.

Estas e outras características importantes, como a estrutura da *Pseudochantransia*, mostram que se trata de uma nova espécie de *Batrachospermum*, em tanto à margem da típica secção *Viridia*, a que damos o nome de *Batrachospermum Azeredoi*.

Relativamente ao taxon do rio da Mina do Pintor, foram observados os seguintes caracteres:

- 1.º — Tricogínio curtamente pedicelado, obtruncónico ou claviforme, muito excepcionalmente cilíndrico;
- 2.º — Protonema parenquimatoso.

Estes dois caracteres, além de outros, como os eixos carpogoniais geralmente longos, etc., não se harmonizam com os da secção *Viridia*, afastam-se muito dos da espécie acima mencionada e revelam claramente uma espécie nova que designamos sob o nome de *Batrachospermum Ferreri*.

Do mesmo parecer, relativamente às duas espécies, foi o eminente algólogo, Prof. H. SKUJA que, em carta, nos incitou à sua publicação.

***Batrachospermum Azeredoi*, sp. nov.**

Protonemate viridescenti, filamentis reptantibus formato, sive parallele, sive intertexte dispositis, cellulis forma variabili constitutis.

Pseudochantransia 1-1,5 mm alta, caespitulosa, saturate viridi, stipite brevissimo, ramos plures, erectos longosque sistenti, formata; filis simplicibus aut paucis ramulis instructis, cellulis cylindroideis diametro 1,5-2-plo longioribus, constitutis; monosporangiis terminalibus vel lateralibus secus

extrema filamenta, glomeratim dispositis, sphaeroideis, 7-10 latis.

Thallo 5-6 cm, glauco-subcinereo, exsiccatione glauco-violaceo, satis mucoso, caespitoso, basi filis corticalibus **incrassato**, solido-tereti, **demum** denudato, **callo** rhizoidali substratui affixo; ramificatione primo pyramidata, deinde **corymbiformi**, patenti, irregulari, quoquoersum **exeunti**, sub angulo fere recto, prope **basim** fundamentalis axis copiosa, quasi nulla in **origine** primariorum **ramorum**, veruntamen numerosa in eorundem parte superanti; **ramis** secundariis longis, simplicibus, flagelliformibus, raro uno vel altero **ramulo** praeditis, in extremitatibus insensibiliter **attenuatis**; apicibus obtusis; polygamo: fronde **mascula** minus ramosa quam feminea, verticillis generatim discretis, **laxis**, transverse ellipsoideis, aliquando **sphaeroideis**; verticillorum cellulis basalibus cylindroideis, 3-5 **fasciculos secundarios**, in superiore parte, **formantibus**, sic **distributos**: — apice, 2-3 **fasciculos** adparenter di-trichotome **ramosos**, cellulis longe conicis aut piriformibus in duobus tertiis internis verticillorum, et fusoides vel obovoideis in exteriori tertio constitutos, — laterali parte superiore, 1-2 **fasciculos**, brevibus cellulis, generatim obovoideis seu fusoides, **formatos**; **summis pili-geris**, pilis raris, brevibus, basi **vix inflatis**; filamentis interverticillaribus nullis vel **raris**; spermatangiis in peripheria verticillorum evolutis; fronde feminea abunde confertinque ramosa in inferiore medietate, rara **autem in superiore**; verticillis contiguis, transverse ellipsoideis, exceptione facta **ultimorum** ramulorum graciliumque **axium**, verticillis respective **disciformibus** et sphaeroideis praeditorum; filamentis **interverticillaribus** generatim parum numerosis; filis corticalibus longis cellulis **cylindricis** constitutis; verticillorum cellulis basalibus cylindroideis, raro **ovoideis**, 2-5 **fasciculos secundarios** in superiore parte, similes aut dissimiles (hos **dissimiles** aliquando 1-2, cellulis **brevioribus articulatos**), saepe pseudo-di-trichotome ramosos formantibus, cellulis piriformibus, conodeis, raro cylindroideis in duobus tertiis internis, aut obovoideis, ellipsoideis et sphaeroideis in externo **constitutos**; axibus carpogonialibus cellulis basalibus verticillorum et in fasciculorum initio secundariorum **insertis**, iis

vero 3-6 articulis constitutis, ex quibus duo superiores curta fila bracteoidea carpogonium circumdantia gerentes; carpogonio trunco-cupulif ormi, 4-6,6 μ longo; trichogyno sessili vel pedicellato, clavaeformi, 23,3-33,3 μ longo, gonimoblastis paulo numerosis, singulis aut binis intra verticillum centralibus, sphaeroideis vel semi-sphaeroideis, magnitudine variabili, 120-180 μ in diametro, medietatem radii verticilli aequantibus, filamentis gonimoblasticis cellulis cylindroideis in externa parte et trunco-conicis in centrali constitutis; carposporangiis obovoideis, 16,6-13,3 X 10-8,3 μ ; fronde monoica minus ramosa quam feminea; verticillis seu contiguis, transverse ellipsoideis aut trunco-conicis, seu dissitis, disciformibus aut conicis, veruntamen sphaeroideis in gracilibus axibus; filamentis interverticillaribus generatim parce numerosis; filis corticalibus regulariter cylindricis; verticillorum cellulis basalibus cylindroideis, raro ovoideis, basi dilatatis, 3-5 fasciculos secundarios in superiore parte, similes aut dissimiles (hos dissimiles nonnunquam 1-2 cellulis brevioribus formatos), saepe pseudo-di-trichotome ramosos, formantibus, cellulis longe piriformibus, conoideis vel fusoideis in duobus tertiis internis verticillorum, et obovoideis aut fusoideis in externo constitutos; axibus carpogonialibus cellulis basalibus verticillorum et in f asciculorum initio secundariorum insertis, iis vero 3-6 articulis constitutis, ex quibus duo superiores curta fila bracteoidea carpogonium circumdantia formantes; carpogonio trunco-cupulif ormi, 4-6,6 μ longo, trichogyno sessili vel pedicellato clavaeformi, 23,3-33,3 μ longo, gonimoblastis numerosis, singulis aut binis intra verticillum plus minus centralibus, sphaeroideis vel semi-sphaeroideis, magnitudine variabili, 150-300 μ in diametro, medietatem radii verticilli aequantibus; filamentis gonimoblasticis sicut in fronde feminea formatis; carposporangiis obovoideis, 16,6-13,3X10-8,3 μ .
Icon. nostr.: tab. I-IV.

Habitat ad saxa in rivo vulgo Caster, pr. Vila da Feira, 17-VI-1966, P. Reis et A. Santos 482 (COI, holotypus); r. Caster pr. Ovar, 26-VII-1966, P. Reis et A. Santos 511 (COI); in rivo vulgo Gonde, pr. Ovar, 28-VI-1960, P. Reis et J. Matos 166 (COI).

Affine *Batrachospermo helminthoso* Bory (= *B. coerulescenti* Sirod.) a quo tamen praesentia *Protonematis*, structura *Pseudochantransiae*, cellulis internis verticillorum, trichogyno clavaeformi (cylindroideo in *B. helminthoso* Bory), etc., multo aliter abest.

Species praeclarissimo Doctori AZEREDO PERDIGÃO, ornatissimo Praesidenti «Foundationis Calouste Gulbenkian», dicata.

Protonema esverdeado, formado por filamentos reptantes, quer paralelos, quer entrelaçados, constituídos por células de forma variável.

Pseudochantransia de 1-1,5 mm, em pequenos tufos intensamente verdes, constituída por um estipe muito curto produzindo vários ramos erectos e longos.

Filamentos simples ou providos de alguns ramúsculos, formados por células cilíndricas, de comprimento 1,5-2 vezes a largura. Monosporângios dispostos nos ápices ou lateralmente em grupos ao longo das extremidades dos filamentos, esf eróides, com 7-10 μ de diâmetro.

Talo de 5-6 cm, azul-acinzentado, após dessecação azul-violáceo, bastante mucilaginoso, cespitoso, de base engrossada por filamentos corticais, troncoidal, desnudada por fim, aderente ao substrato mediante um «callus» rizoidal.

Ramificação a princípio piramidal, depois corimbiforme, patente, irregular, dirigindo-se em todos os sentidos, sob ângulo quase recto, abundante junto da base do eixo fundamental, quase nula na origem dos ramos primários, mas numerosa na parte restante dos mesmos. Ramos secundários longos, simples, flageliformes, raro providos de um ou outro ramúsculo, insensivelmente atenuados nas extremidades. **Âpices** obtusos. Fronde masculina menos ramificada que a feminina. Verticilos geralmente separados, **laxos**, transversalmente elipsóides, por vezes esferóides. Células basais dos verticilos **cilindróides**, produzindo na parte superior 3-5 fascículos secundários, assim **distribuídos**: no cimo, 2-3 fascículos, sendo estes aparentemente ramificados em di-tricotomias, formados por células longamente cónicas ou

piriformes nos dois terços internos, e fusóides ou obovóides no terço externo; e na parte superior lateral, 1-2 fascículos constituídos por células curtas, geralmente obovóides ou fusóides. Ápices pilíferos com pêlos raros e curtos, levemente inflados na base. Filamentos interverticulares nulos ou raros. Espermatângios nascendo na parte externa dos verticilos. Fronde feminina com ramificação numerosa e densa na metade inferior, rara na superior. Verticilos contíguos, transversalmente elipsóides, com exceção dos últimos ramúsculos e dos eixos gráceis providos de verticilos respectivamente disciformes e esferóides. Filamentos interverticulares geralmente pouco numerosos. Filamentos corticais constituídos por grandes células cilíndricas. Células basais dos verticilos cilindróides, raro ovóides, produzindo 2-5 fascículos secundários na parte superior, semelhantes ou não (por vezes 1-2 formados por células mais curtas), sendo estes frequentemente ramificados em pseudo-di-tricotomias e constituídos por células piriformes ou cónicas, raro cilindróides nos dois terços internos, e obovóides, elipsóides ou esferóides no terço externo. Eixos carpogoniais inseridos nas células basais dos verticilos e no princípio dos fascículos secundários, sendo aqueles, no entanto, formados por 3-6 artículos, produzindo os dois superiores curtos filamentos que cercam o carpogónio, sendo este tronco-cupuliforme e de 4-6,6 μ de comprimento. Tricogínio sésil ou pedicelado, claviforme, de 23,3-33,3 μ de comprimento. Gonimoblastos raros, 1-2 no centro de cada verticilo, esferóides ou semi-esferóides, de tamanho variável, com 120-180 μ de diâmetro, igualando metade do raio do verticilo. Filamentos gonimoblásticos constituídos por células cilindróides na parte externa e troncóides no centro. Carposporângios obovóides, de 16,6-13 X 10-8,3 μ . Fronde monóica menos ramificada que a feminina. Verticilos quer contíguos, transversalmente elipsóides ou tronco-cónicos, quer separados, discoidais ou cónicos, no entanto esferoidais nos eixos gráceis. Filamentos interverticulares geralmente pouco numerosos. Filamentos corticais regularmente cilíndricos. Células basais dos verticilos cilindróides, raro ovóides, dilatadas na base, produzindo, na parte superior, 3-5 fascículos secundários, seme-

lhantes ou não (por vezes 1-2 compostos por células sensivelmente mais pequenas), sendo aqueles, frequentemente, divididos em pseudo-di-tricotomias, e constituídos por células longamente piriformes, obcónicas ou fusóides nos dois terços internos dos verticilos, e fusóides ou obovóides no terço externo. Eixos carpogonais inseridos nas células basais dos verticilos e no princípio dos fascículos secundários, sendo aqueles no entanto constituídos por 3-6 artículos, produzindo os últimos (2 artículos) curtos filamentos bracteóides que cercam o carpogónio. Este é tronco-cupuliforme e mede 4-6,6 μ de comprimento. Tricogínio sésil ou pedicelado, claviforme, medindo 23,3-33,3 μ de comprimento. Gonimoblastos numerosos, 1-2 no interior de cada verticilo, mais ou menos centrais, esferoidais ou semi-esferoidais de tamanho variável, com 150-300 μ de diâmetro, igualando a metade do raio do verticilo. Filamentos gonimoblásticos organizados como na fronde feminina. Carposporângios geralmente obovóides, de 16,6-13,3 X 10-8,3 μ .

Observações:

1.^a—Fez-se uma colheita de *B. Azeredoi* em 9-III-1965, quando a *Pseudochantrisia* encontrava em pleno desenvolvimento, com *Batrachospermos* muito jovens.

Em 26-VII-1966, havia ainda muitos tufo desta alga em perfeita actividade vegetativa. Consequentemente, a duração da planta vai de Março a Julho, ou seja cerca de 5 meses.

2.^a—Há várias espécies de *Batrachospermum* no rio Gonde, próximo de Ovar, tais como: *B. ectocarpum* Sirod., *B. Gallaei* Sirod. e *B. helminthosum* Bory (= *B. coerulescens* Sirod.).

A presença de *B. helminthosum* Bory no rio Gonde, vivendo lado a lado com a nossa espécie, afasta inteiramente a hipótese de *B. Azeredoi* poder ser interpretado como forma ecológica da espécie de BORY.

Batrachospermum **Ferreri**, sp. nov.

Protonemata aenue crustaceo, parenchymatoso, cellulis inordinatis, rotundato-angulosis, constituto.

Pseudochantransia 00-850 μ alta, minutissimos caespitulos conferte semi-sphaeroides sistenti, fasciculatim ramosa; filis articulatis, articulis dolioliformibus, diametro plerumque aequilongis aut $1\frac{1}{2}$ longioribus. Sporangii ignotis.

Thallo 4-7 cm alto, saturate viridi, exsiccatione glauco-violaceo, satis mucoso, solitario aut caespituloso, basi solidoteteri, demum denudato, disco terminato; ramificatione irregulari, patenti, primitus pyramidata, dein corymbo-pyramidata, ramis passim in angulum rectum insertis, quoquo-versum exeuntibus; axi principali inter ramos primarios aliquando abeunti; ramis primariis, paulum supra originem, abunde confertisque ramosis; ramis secundariis simplicibus, flageliformibus aut parce ramosis; ramis tertiariis simplicibus, raro uno aut altero ramusculo praeditis; apicibus obtusis; polygamo: verticillis frondis masculae contiguis compressisque, transverse ellipsoideis, veruntamen discretis, sphaeroideis aut semi-sphaeroideis in gracilibus ramis; verticillorum cellulis basalibus cylindroideis, basi dilatis, 2-5 fasciculos secundarios, saepe pseudo-di-trichotome ramosos in peripharia fasciculatos, formantibus, articulis diversis in forma: cylindroideis, fusoides, longe obconicis aut piriformibus, in duobus internis tertiis, in externo tamen fusoides vel obovoideis (aliquando asymmetricis) constitutos; summis piliferis, pilis vix numerosis brevibus seu longis, basi parce inflatis; filamentis interverticillaribus numerosis, internodii partem superiorem occupantibus; filis corticalibus in inferiore parte copiosis, cylindricis; spermatangiis ad apices verticillorum evolutis; fronde feminea: verticillis generatim distinctis, sphaeroideis vel transverse ellipsoideis, sed in extremitatibus disciformibus, et in inferiore parte axium primariorum trunco-conicis; verticillorum cellulis basalibus cylindroideis aut ovoideis, 2-5 fasciculos secundarios, frequenter aliquantum arcuatos in peripharia, pseudo-di-trichotome ramosos formantibus, articulis piriformibus, obconicis vel fusoides in duobus internis tertiis verticillorum, in externo autem

fusoideis, ellipsoideis vel obovoideis **constitutos**; pilis nullis aut raris et **brevissimis**; filamentis **interverticillaribus** nullis vel raris; filis corticalibus in inferiore parte numerosis, **cylindratis**; axibus carpogonialibus, cellulis basalibus verticillorum, raro **primis** fasciculis **secundariis** insertis; iis vero 3-12 articulis, brevibus et crassis (**diametro** 10-16 μ) constitutis, ex quibus duo vel **tres** superiores curta **fila** bracteoidea carpogonium circumdantia, et inferiores unum vel alterum filamentum unilaterale formantes; carpogonio trunco-cupulif ormi, 4-6,6 μ longo; trichogyno breviter pedicellato, clavaeformi aut **trunco-conico**, raro cylindroideo, 20,3-33,3 μ longo; gonimoblastis raris, singulis aut binis intra verticillum, plus minus centralibus, **irregulariter** semi-sphaeroideis, magnitudine variabili, 130-180 μ in **diametro**, radii verticilli **aequantibus**; carposporangiis obovoideis, 13,3-10 X 10-6,6 μ . Fronde monoica abunde ramosa in **inferiore** parte sicut fronde **mascula**; verticillis sive contiguis, ellipsoideis aut semi-sphaeroideis, sive discretis, sphaeroideis in **gracilibus** ramis aut trunco-conicis in inferiore parte axium primariorum; verticillorum cellulis basalibus cylindroideis vel obovoideis, in basi dilatatis, 2-5 fasciculos **secundarios** (1-4, maiores in apice, et 1-3, minores lateraliter supra) formantibus; fasciculis secundariis pseudo-di-trichotome ramosis, non raro ramellis periphericis arcuatis coronatis, cellulis sive cylindroideis, **obconoideis**, fusoideis aut **piriformibus** in duobus internis tertiis seu obovoideis vel, **raro**, **caliciformibus** in externo constitutis; apicibus piliferis, pilis raris et brevibus, basi vix **inflatis**; spermatangiis raris, ad **apices** verticillorum evolutis; axibus carpogonialibus arcuatis aut rectis, generaliter fasciculis **primariis**, raro secundariis insertis, **2-8** cellulis barriliformibus constitutis ex quibus 2-3 superiores curta fila bracteoidea carpogonium amplexantia formantes; carpogonio trunco-cupulif ormi; trichogyno clavaeformi, trunco-conico vel, raro, **cylindroideo**; gonimoblastis numerosis, **irregulariter** semi-sphaeroideis, plus minus centralibus intra verticillum.

Icon. nostr.: tab. V-VIII.

Habitat in rivulo vulgo dicto «da Mina do Pintor», pr. «Vale de Cambra», 15-VI-1965 et 17-VI-1966, P. Reis et A. Santos, respective 430 et 485 (COI, holotypus).

A Batrachospermo Azeredoi, *Protonemate* parenchymatoso (non filamentoso), structura *Pseudochantransia* trichogyno trunco-conico, axibus carpogonialibus longis et crassis, permagna quantitate phycoerytrinae, etc. multum difert.

Affine Batrachospermo helminthoso Bory (= *B. coerulescenti* Sirod.), a quo tamen *Protonemate* parenchymatoso, *Pseudochantransia fasciculata* (non dendriformi), verticillis frondis masculae, trichogyno trunco-conico, axibus carpogonialibus longis et crassis, permagna quantitate phycoerytrinae, etc., multum abest.

Species quam clarissimo Doctori ANTÓNIO DE ARRUDA FERRER CORREIA, Culturae ornatissimo Fautori in Lusitania, dicata.

Protonema constituído por uma película parenquimatosa, de células irregulares, esférico-poliédricas.

Pseudochantransia de 300-850 μ , formando pequenos agregados densamente semi-esferoidais. Ramificação fasciculada. Filamentos constituídos por células barriliformes, geralmente de comprimento igual à largura ou $1\frac{1}{2}$ maior. Esporângios desconhecidos.

Talo de 4-7 cm, intensamente verde, após dessecação azul-violáceo, bastante mucilaginoso. Estipes solitários ou reunidos em tufos, de base troncoidal, finalmente desnudada, terminando em disco. Ramificação irregular, patente, a princípio piramidal, depois corimboso-piramidal. Ramos inseridos frequentemente em ângulo recto e dirigindo-se em todos os sentidos. Eixo principal extinguindo-se, algumas vezes, entre os ramos primários, sendo estes, um pouco acima da origem, abundante e densamente ramificados. Ramos secundários simples, flageliformes ou pouco ramificados; ramos terciários simples, raro munidos de um ou outro ramúsculo. Ápices obtusos. **Polióico:** verticilos da fronde masculina contíguos e comprimidos, transversalmente elipsóides, mas separados e esferóides ou semi-esferóides nos ramos gráceis. Células

basais dos verticilos cilíndricas, dilatadas na base, produzindo 2-5 fascículos secundários. Estes, ramificados em pseudo-tricotomias e fasciculados na periferia, sendo constituídos por células de formas muito diversas, umas cilindróides, outras fusóides, outras longamente cónicas ou ainda piriformes nos dois terços internos, todavia fusóides ou obovóides (por vezes assimétricas) no terço externo. **Âpices pilíferos** com pêlos pouco numerosos, curtos ou longos, levemente inflados na base. Filamentos interverticilares numerosos, **cobrimdo** a parte superior do entrenó. Filamentos corticais abundantes na parte inferior, cilíndricos. Espermatângios nascendo nos ramúsculos periféricos dos verticilos. Fronde **feminina**: verticilos geralmente distintos, esferóides ou transversalmente elipsóides, mas **discoides** nas extremidades e troncónicos na parte inferior dos eixos primários. Células basais dos verticilos cilindróides ou ovóides, produzindo 2-5 fascículos secundários, frequentemente um tanto curvos na periferia, ramificados em pseudo-tricotomias e constituídos por artículos piriformes, obconóides ou fusóides nos dois terços internos dos verticilos, mas fusóides, elipsóides ou obovóides no terço externo. Pêlos nulos ou raros e muito curtos. Filamentos interverticillares nulos ou raros. Filamentos corticais numerosos na parte inferior da planta, cilíndricos. Eixos carpogoniais inseridos nas células basais dos verticilos, raro no princípio dos fascículos **secundários**; aqueles, porém, constituídos por 3-12 artículos curtos e grossos (com 10-16 μ de diâmetro), produzindo os dois ou três superiores curtos filamentos bracteóides que envolvem o **carpogónio**, e as inferiores originando um ou outro filamento unilateral. **Carpogónio** trunco-cupuliforme de 4-6,6 μ de comprimento. Tricogínio curtamente pedicelado, **claviforme** ou troncóide, raro **cilindróide** de 20,3-33,3 μ de comprimento. Gonimoblastos raros, 1-2 em cada verticilo, ocupando mais ou menos a parte central daquele, irregularmente **semi-esferoidais**, de tamanho variável, entre 130-180 μ de diâmetro, atingindo $\frac{1}{3}$ - $\frac{1}{2}$ do raio do verticilo. Carposporângios obovóides, de 13,3-10 X 10-6,6 μ .

Fronde monóica muito ramificada na parte inferior, como a fronde masculina. Verticilos quer contíguos, elipsóides ou

semi-esferóides, quer separados, esferóides nos ramos gráceis ou troncóides na parte inferior dos eixos primários. Células basais dos verticilos cilindróides ou ovóides, dilatadas na base, produzindo 2-5 fascículos secundários (1-4 maiores, no ápice e 1-3 menores, lateralmente, em cima). Aqueles com ramificação pseudo-di-tricotómica, terminando frequentemente em ramúsculos periféricos encurvados, sendo constituídos por células quer cilindróides, obconóides, fusóides ou piriformes nos dois terços internos, quer obovóides ou, raro, caliciformes no terço externo. Ápices pilíferos, com pêlos raros, curtos, levemente inflados na base. Espermatângios raros, nascendo nos ramúsculos periféricos dos verticilos. Eixos carpogoniais encurvados ou rectos, inseridos geralmente nos fascículos primários, raro nos secundários, formados por 2-8 células barriliformes, produzindo as duas ou três superiores curtos filamentos bracteóides que envolvem o carpogónio, sendo este tronco-cupuliforme. Tricogínio claviforme, troncónico ou, raro, cilindróide. Gonimoblastos numerosos irregularmente semi-esferóides, mais ou menos próximos do eixo da fronde.

Observações:

1.^a—Quem estuda pela primeira vez esta espécie sente-se desorientado. A princípio, julga-se em presença de várias espécies: umas monóicas, outras dióicas e ainda outras provavelmente polióicas. Se, nesta ordem de ideias, pretende estabelecer um método de selecção, nada consegue. É preciso estudar a planta atendendo aos graus sucessivos de desenvolvimento, para julgar das suas características. Com efeito, a *Pseudochantransia* quando adulta, dir-se-ia igual à de *B. helminthosum* Bory (= *B. coerulescens* Sirod.). No entanto, a desta espécie é perfeitamente identificável desde o início, pois que é desprovida de Protonema e não forma pequeníssimos tufos, muito densos, aparentando papilas de cianofíceas.

A *Pseudochantransia* em questão, pelo contrário, mesmo à lupa, disfarça-se inteiramente e só pode notar-se ao microscópio, esmagando-se os pequeninos agregados entre a lâmina e a lamela.

A forma masculina, com verticilos contíguos, mas distintos, apresenta-se num ou outro caso cilindróide, sendo impossível distinguir os verticilos, mesmo à lupa.

A ramificação piramidal, nas plantas jovens, desaparece com o desenvolvimento dos ramos inferiores e a extinção, a breve trecho, do eixo fundamental, tornando-se corimbiforme. No entanto, os ramos primários, que originam aquela ramificação, conservam-se piramidais. As células basais dos verticilos, a princípio muitas vezes cuneiformes ou cilindróides, pela dilatação da base, passam a ovóides.

O tricogínio apresenta de início duas formas: uma troncónica e outra um tanto cilindróide. Mais tarde, em pleno desenvolvimento, manifesta-se frequentemente a forma claviforme, não raro a forma troncóide e excepcionalmente a cilindróide.

Compreende-se que as plantas mais novas, apresentando um conjunto de caracteres diferentes dos das que se encontram em idade adulta, necessariamente dão a impressão de espécies diferentes, pertencendo, no entanto, a uma única espécie, polióica.

2.^a—No mesmo local vivem:

- B. anatinum* Sirod.
- B. Galaei* Sirod.
- B. lusitanicum* P. Reis

Et nunc opus est nobis gratias agere:

- Cl. Prof. ABÍLIO FERNANDES, ornatissimo Directori Instituti Botanici Universitatis Conimbriensis, pro universis auxiliis et revisione huius operis.
- Cl. Prof. H. SKUJA, a quo facultatem huius studii gerendi accepimus.
- D. Canonico JOSÉ RODRIGUES AMADO pro correctione latini textus.
- Praeparatori Instituti Botanici, JOSÉ LUÍS FERREIRA CABRAL, qui photos elaboravit.
- Collectori ANÍBAL DA CONCEIÇÃO SANTOS qui nobiscum plantas collegit.

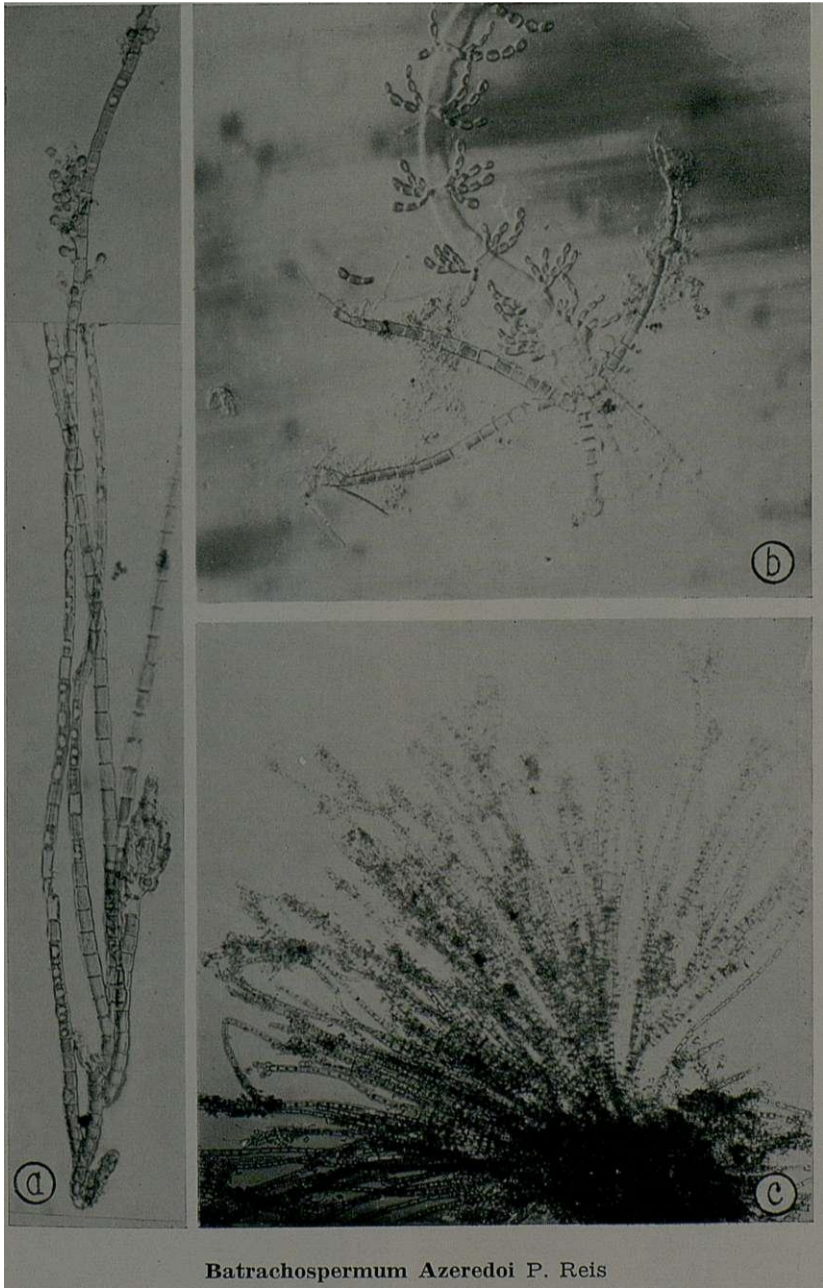
TABULAE

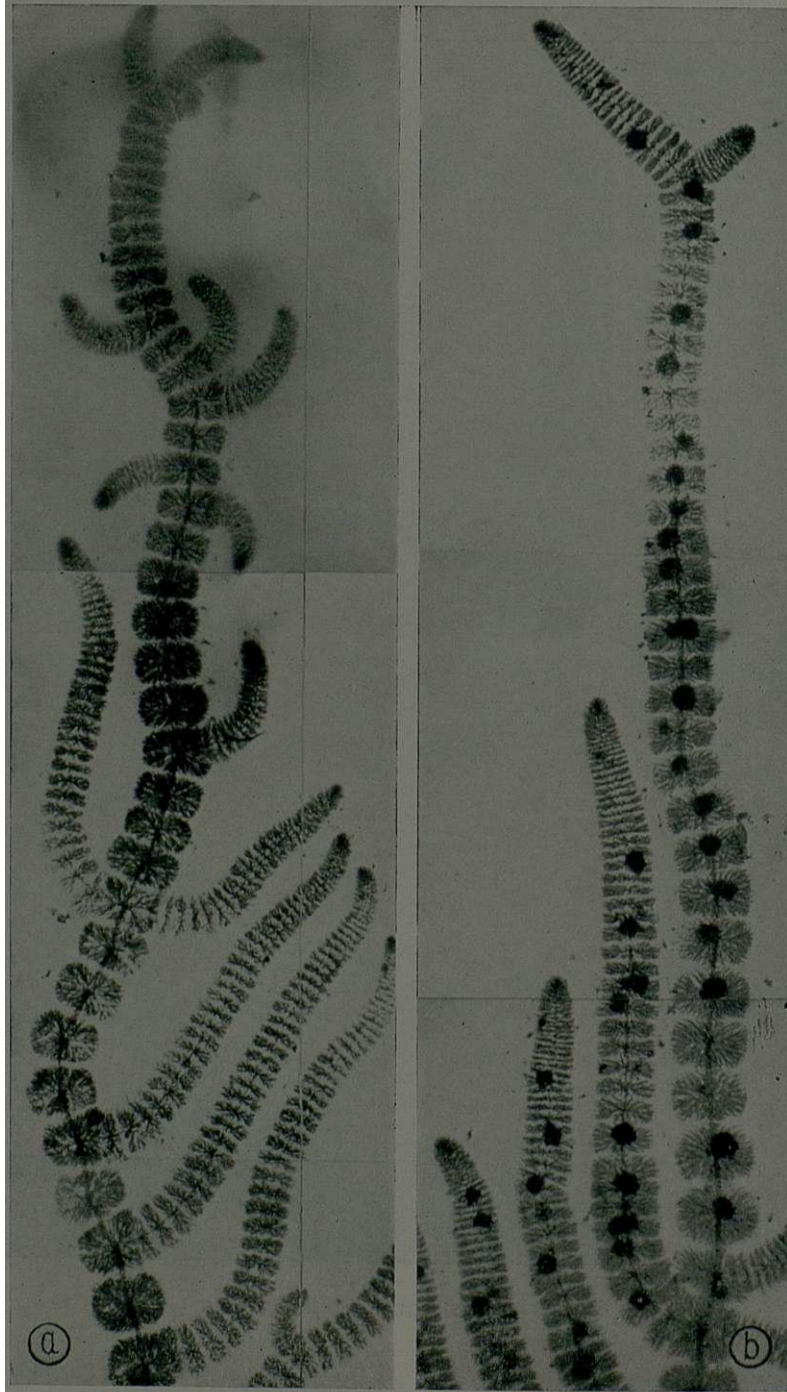
TABULA I

Batrachospermum Azeredoi P. Reis

- a) *Pseudochantransia* ramificada na base. \times 150.
Espécime *P. Reis et A. Santos* 482.
- b) Jovem Batracospermo proveniente da metamorfose realizada no centro de um fascículo composto de 3 ramúsculos. \times 150.
Espécime *P. Reis et A. Santos* 482.
- c) Aspecto geral da *Pseudochantransia* \times 75.
Espécime *P. Reis et A. Santos* 482.

TAB. 1





Batrachospermum Azeredoi P. Reis

TABULA II

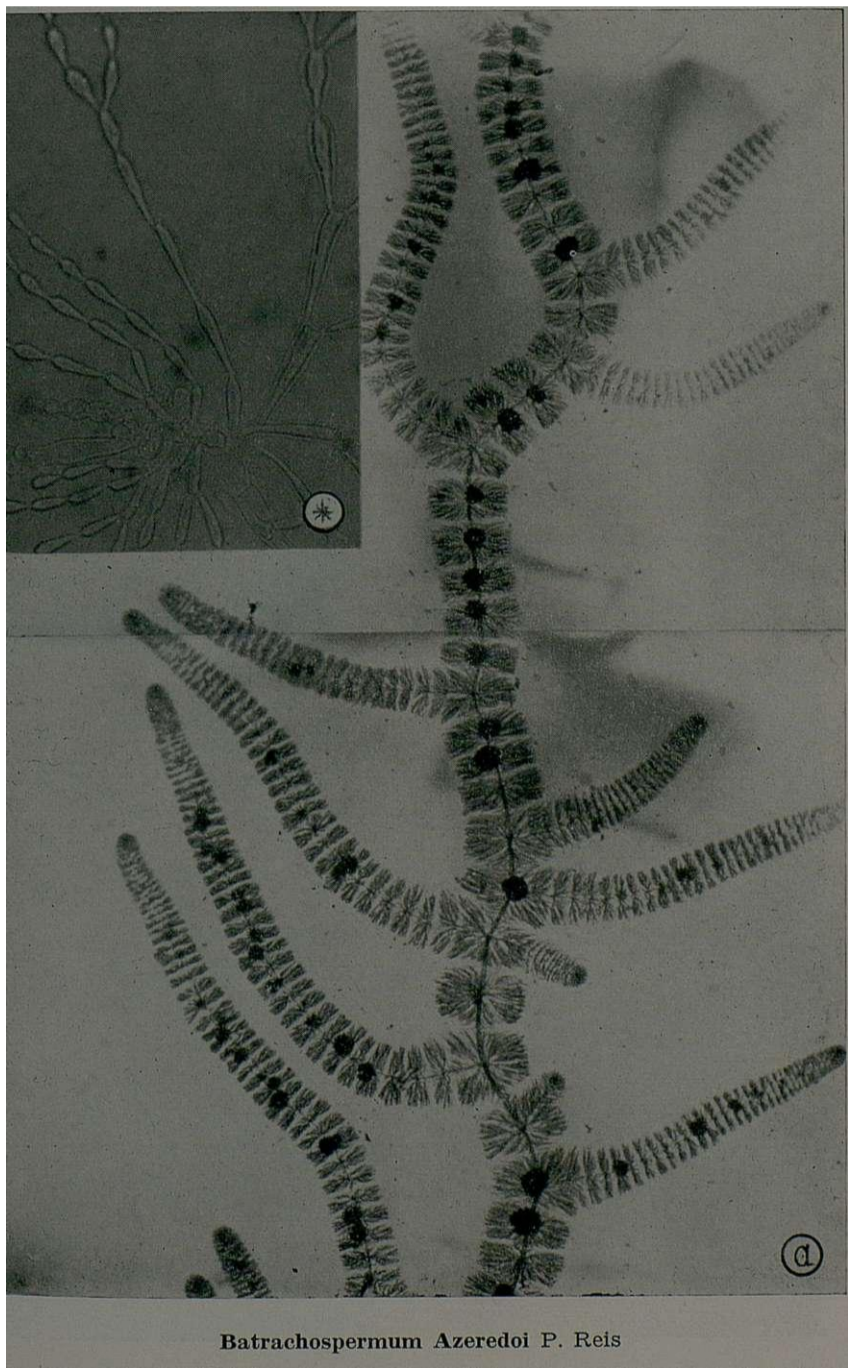
Batrachospermum Azeredoi P. Reis

- a) Ramo secundário masculino, com ramos terciários simples. X 7,5.
Espécime *P. Reis et A. Santos* 482.
- b) Ramo monóico. Notar a forma dos verticilos bastante igual à do exemplar masculino. X 7,5.
Espécime *P. Reis et A. Santos* 482.

TABULA III

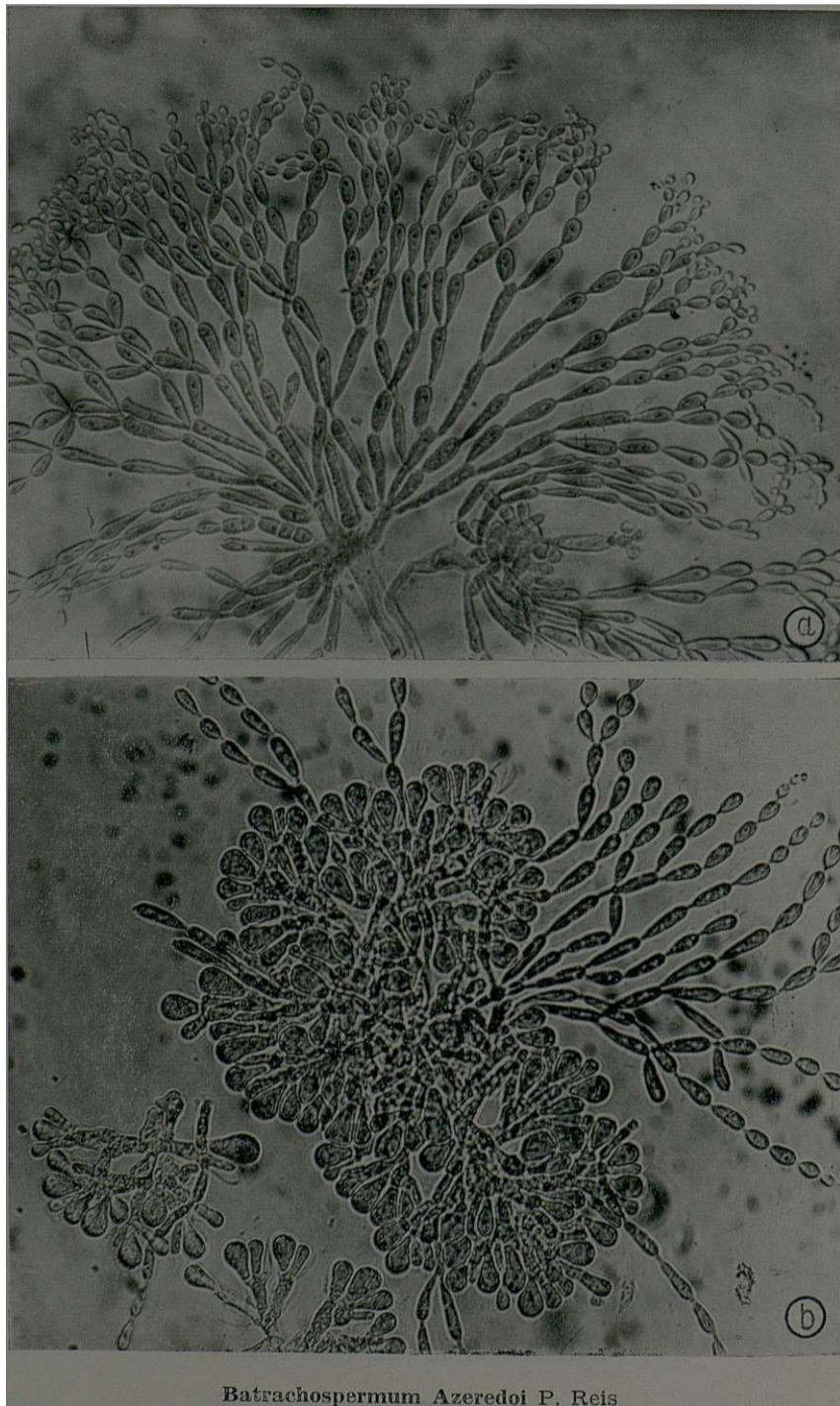
Batrachospermum Azeredoi P. Reis

- a) Aspecto de um ramo secundário feminino. Notar os verticilos **discoidais** ou elipsoidais. X 7,5.
 - *) Célula basal de um fascículo primário, produzindo um fascículo secundário, constituído por quatro filamentos e um eixo carpogonial. \times 200.
- Espécime *P. Reis et A. Santos* 482.



Batrachospermum Azeredoi P. Reiss

TAB. IV



Batrachospermum Azeredoi P. Reis

TABULA IV

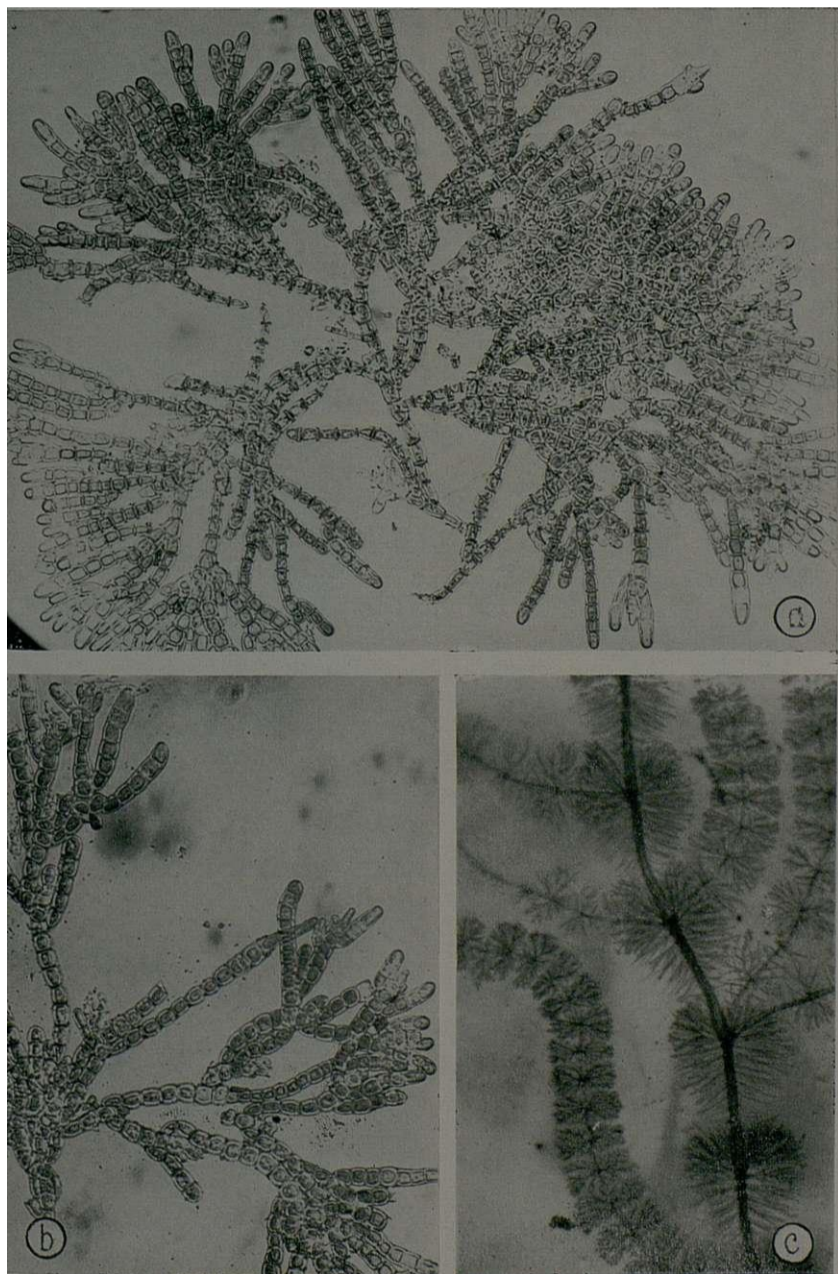
Batrachospermum Azeredoi P. Reis

- a) Verticilo composto de quatro fascículos primitivos e um eixo carpogonial (separado do conjunto na foto).
X 340.
Espécime *P. Reis et A. Santos* 482.
- b) Porção de um gonimoblasto com carpósporos maduros.
X 340.
Espécime *P. Reis et A. Santos* 482.

TABULA v

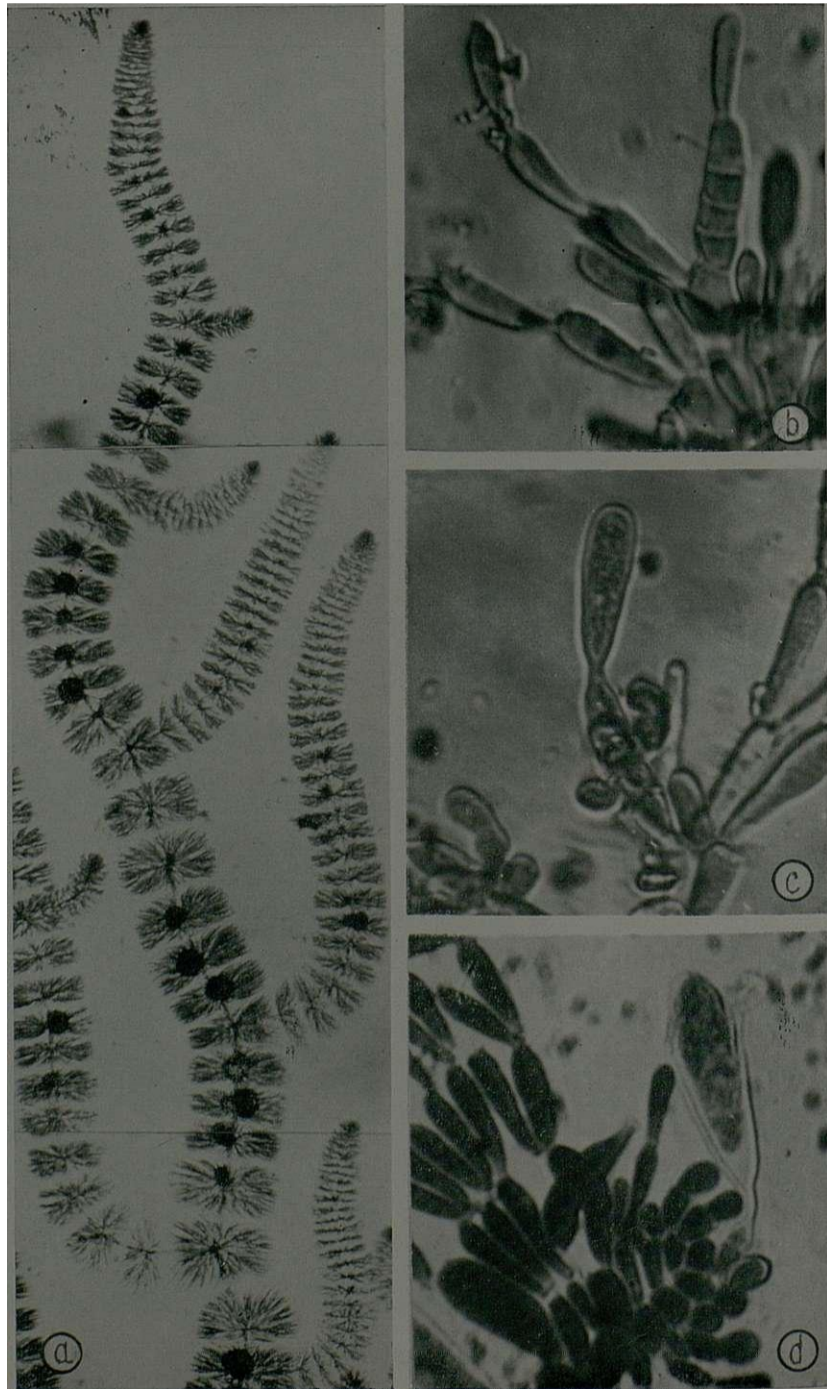
Batrachospermum Ferreri P. Reis

- a) Aspecto geral da *Pseudochantransia* adulta, fasciculada. X 120.
Espécime *P. Reis et A. Santos* 485.
- b) Jovem *Pseudochantransia* que fazia parte de um tufo denso. X 120.
Espécime *P. Reis et A. Santos* 485.
- c) Porção de um talo masculino COM ramificação irregular. X 7,5.
Espécime *P. Reis et A. Santos* 485.



Batrachospermum Ferreri P.

TAB. VI



Batrachospermum Ferreri P. Reiss

TABULA VI

Batrachospermum Ferreri P. Reis

- a) Extremidade superior de um ramo primário feminino. Notar os verticilos **discóides**, elipsóides e até **semi-esferóides**. X 7,5.
Espécime *P. Reis et A. Santos* 485.
- b) Jovem ramo carpogonial, constituído por 3 células, apresentando um carpogonio **tronco-cupuliforme** e um tricogónio **troncóide** curtamente pedicelado. X 1000.
Espécime *P. Reis et A. Santos* 485.
- c) Tricogónio curtamente pedicelado e **claviforme**. X 110.
Espécime *P. Reis et A. Santos* 485.
- d) Ramo carpogonial engrossado **com o carpogónio** disposto lateralmente. X 980.
Espécime *P. Reis et A. Santos* 485.

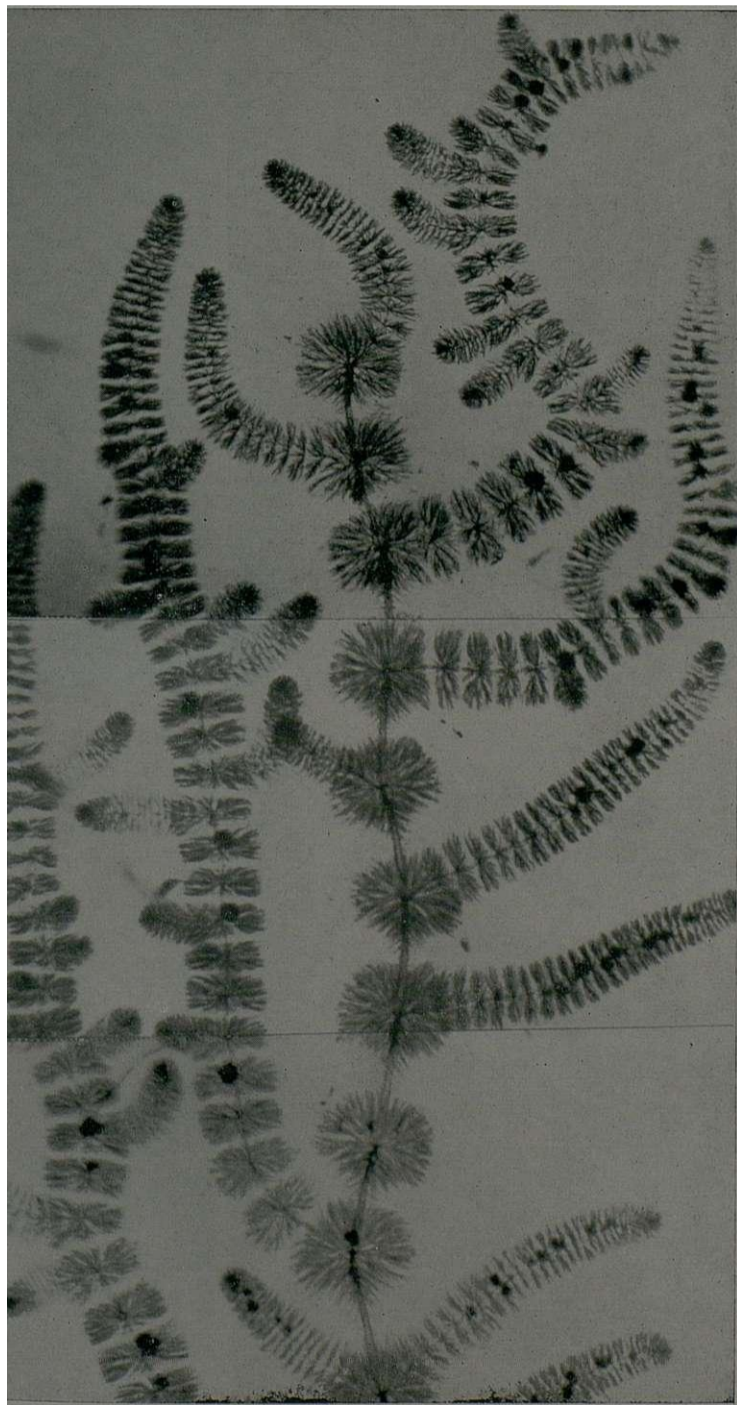
TABULA VII

Batrachospermum Ferreri P. Reis

Talo monóico.

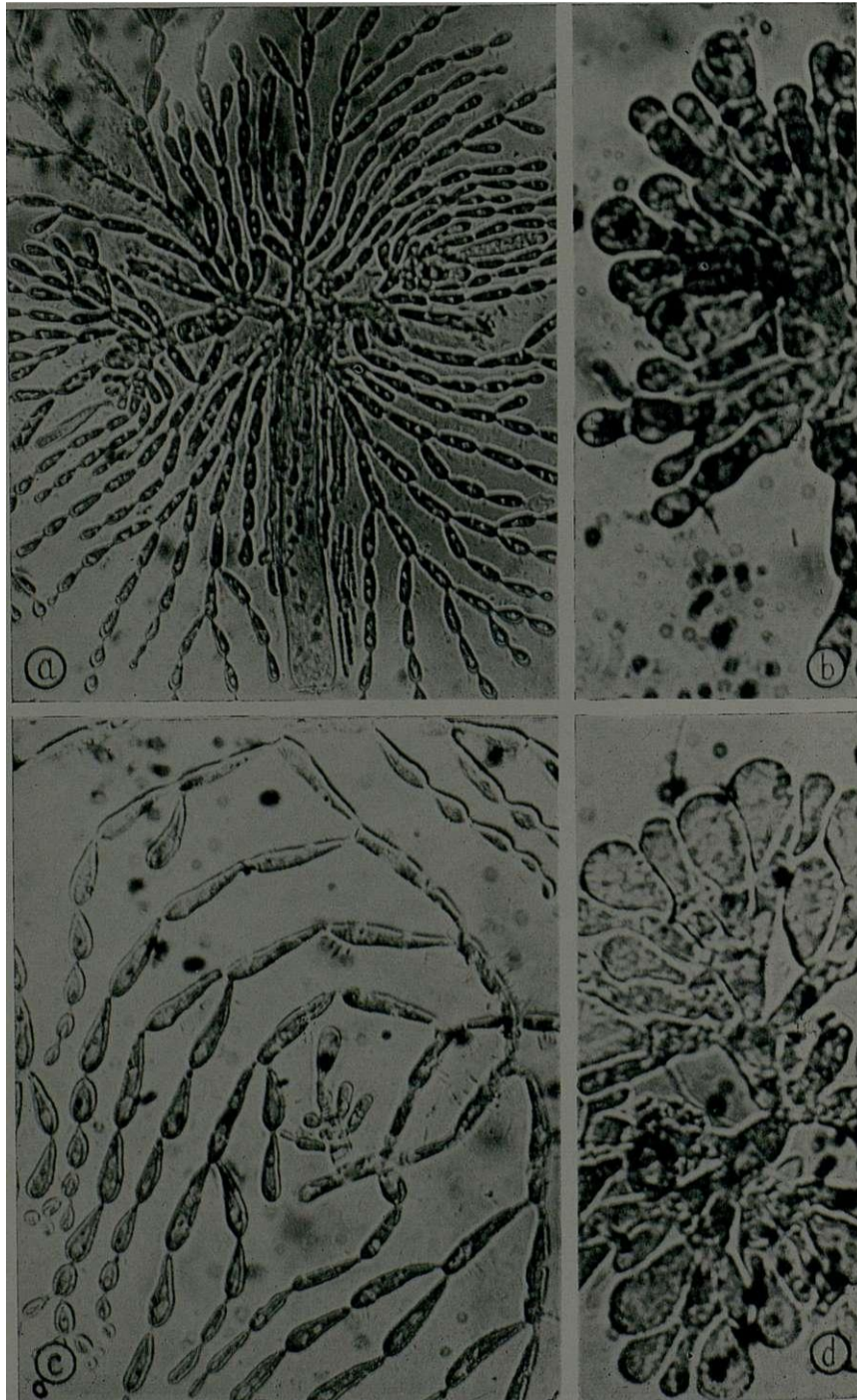
Parte superior de um ramo primário, grácil, com os verticilos afastados e esferóides. X 7,5.
Espécime *P. Reis et A. Santos* 485.

TAB. VII



Batrachospermum Ferreri P. Reis

TAB. VIII



Batrachospermum Ferreri P. Reis

TABULA VIII

Batrachospermum Ferreri P. Reis

- a) Verticilo composto de seis fascículos primitivos, compreendendo dois eixos **carpogoniais**, um dos quais em derivação **de** um eixo carpogonial engrossado. Notar três células basilares longas e cilindróides. $\times 150$.
Espécime *P. Reis et A. Santos* 485.
- b) Porção de um gonimoblasto **imaturo**. $\times 1030$.
Espécime *P. Reis et A. Santos* 485.
- c) Célula basilar de um verticilo **com** três filamentos secundários. Notar a forma da célula, cilindróide.
 $\times 360$.
Espécime *P. Reis et A. Santos* 485.
- d) Fragmento de um gonimoblasto **maduro**. $\times 1000$.
Espécime *P. Reis et A. Santos* 485.

ESTUDOS
NAS ARUNDINELLEAE (GRAMINEAE)

VII. UM NOVO GÉNERO, TRÊS NOVAS ESPÉCIES
E NOVAS COMBINAÇÕES

por

R. I. DE S. CORREIA¹, R. A. LUBKE
and J. B. PHIPPS²

Danthoniopsis aptera Correia & Phipps, *sp. nov.*

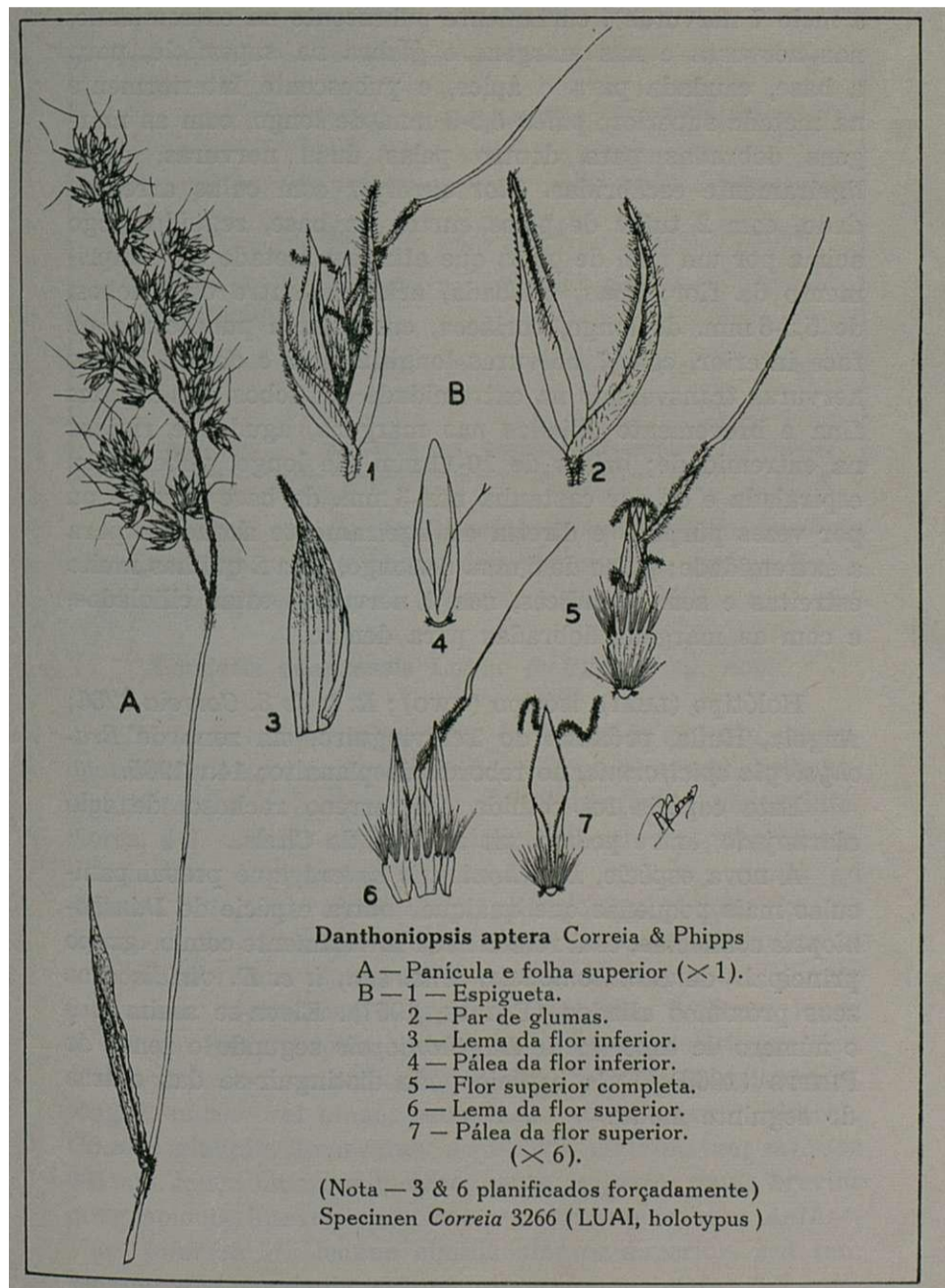
Herba perennis, usque ad 80 cm. alta. *Culmi* simplices, erecti, breviter villosi; *nodi* 4-8, villosi. *Foliae*: *vaginae* villosae, breviores internodis, inferiores longiores superioribus; *ligula* ad seriem *ciliorum* 1 mm. longam redacta; *lamina* usque ad 1.2 X 16 cm. grande, angustissima lanceolata, base attenuata, apice acuminata, asymmetrica (una margine corrugata, una *blanda*), marginibus scabridibus antrorse distale et retrorse proximale, villosa breviter denseque *ambis* superficiebus. *Inflorescentia* usque ad 9.5 X 4 cm. magnitudine, *axe* breviter villosa, ramis curtis, paulum divisis, spiculis tribus secundum ramos quemque laxissime dispositis, ± terminalibus. *Spicula* 9 mm. longa, *bif lora*, viride-purpureo-variegata. *Glumae* *trinervatae*; *inferior* 7 mm. longa, ovato-caudata, acuta, pubescens et pilosa margine; *superior* 9 mm. longa, lanceolata, acuta, nerva media paulum excurrente, ciliata in dimidio margine apicale. *Anthoecium inferum* ♂; *lemma* usque ad 8 mm. longum, ovatum, *acutum*, 5-7 nervis a base usque ad apicem, aliquando duis interioribus curtis, breviter pubescens distale exteriori, interiori pubescente in dimidio apicale; *palea* 5.5-6.0 mm. longa; *antherae* 3. *Anthoe-*

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cium superum hermaphroditum; *callus* obtuso-truncatus; *lemma* 5.5-6.0 mm. longum, bilobatum, inter lobos aristatum, breviter pubescens interiore, 7 nervis a base usque ad apicem, in maximam partem glabrum, lobis ciliatis marginibus, *pilorum* fasciculis 8 in una serie transversa dispositis prope medium *barbatum*; *arista* 10-11 mm. longa, pubescens, *columna* castanea, subula viride; *palea* 5 mm. longa, bicarinata, carinis (vide alias *Danthoniopsis*) apteris (iter nomen triviale), sulco glabro.

Erva vivaz, até 80 cm. de altura. *Colmos* simples, erectos, cilíndricos, curtamente vilosos; nós vilosos, até ± 8 . *Bainhas* vilosas, as da base mais longas, as superiores mais curtas que os entrenós; *lígula* formada por uma franja de pêlos de 1 mm. de longo; *limbo da folha* longamente lanceolado, atenuado para a base e acuminado no ápice, assimétrico, até 16 X 1,2 cm. (margem da metade mais larga do limbo finamente ondulada e ambas as margens escábridas, antrorsamente do meio para o ápice e antrorsa e retrorsamente do meio para a base), breve mas densamente viloso tanto na página inferior como na superior. *Inflorescência* em panícula de ramificações curtas, até 9,5 X 4 cm. incluindo as aristas, mas normalmente mais pequenas (3-4 cm. longas), com as espiguetas em pseudo-triades nas extremidades das ramificações; *râquis* curtamente viloso; *ramificações* breves até 4 cm. longas, mas por vezes sub-sésseis e pouco numerosas. *Espiguetas* 9 mm. longa (excluindo a arista), biflora, ligeiramente assimétrica, de cor verde matizada de púrpura. *Glumas* com as margens glandulosas e ciliadas e a nervura central escábrida do meio para o ápice; a *inferior* de 7 mm. de longo, caudada, com 3 nervuras correspondentes a outras tantas quilhas, completamente pubescente; a *superior* caudada, obtusa no ápice, com 9 mm. de longo, glabra na superfície, com 3 nervuras. *Flor inferior* ♂; *lema* até 8 mm. de longo, 7-nérveas (5 nervuras desde a base e mais 2 suplementares interiores que se estendem apenas do meio para o ápice, enquanto ao contrário, as duas nervuras laterais que partem da base não atingem o ápice, coexistindo, portanto,



a meio 7 nervuras), curtamente pubescente na extremidade, nas nervuras e nas margens e glabra na superfície, para a base, caudada para o ápice, e pubescente interiormente na metade superior; *pálea* 5,5-6 mm. de longo, com as margens dobradas para dentro pelas duas nervuras, estas ligeiramente escábridas. *Flor superior* com *calus* arredondado, com 2 tufo de pêlos curtos na base, seguidos logo acima por um anel de pêlos que atingem metade do comprimento da flor; *lema*, bilobada, aristada entre os 2 lobos, de 5,5-6 mm. de longo, coriácea, curtamente pubescente na face interior, com 7 nervuras longitudinais e de 1-3 breves nervuras transversais na extremidade dos lobos, sendo estes *finas* e brevemente ciliados nas margens, agudos e rígidos na extremidade; *arista* de 10-11 mm. de longo, pubescente, espiralada e de cor castanha nos 3 mm. da base e verde ou por vezes púrpura e direita ou ligeiramente arqueada para a extremidade; *pálea* de 5 mm. de longo, com 2 quilhas muito estreitas e sem apêndices, nas 2 nervuras, estas cilioladas, e com as margens dobradas para dentro.

Holótipo (LUAI), isótipo (uwo); R. I. de S. Correia 3266; Angola, Huíla, próximo do Tchivinguiro, em zona de *Brachystegiaspiciformis* no rebordo do planalto; 14.V.1965.

Esta espécie foi colhida em terreno rochoso, de solo alaranjado, entre pedras, na escarpa da Chela.

A nova espécie, *Danthoniopsis aptera*, que possui panículas mais pequenas que qualquer outra espécie de *Danthoniopsis* conhecida, está relacionada intimamente com o «grupo principal» de *Danthoniopsis*, *sens. str.*, i. e. *D. viridis* e os seus próximos aliados (PHIPPS, 1967). Eleva-se assim a 9 o número de espécies de *Danthoniopsis* segundo o senso de PHIPPS (1966). Esta espécie pode distinguir-se das outras do seguinte modo:

QUADRO I

	Cor da espiguetta	Asas largas na metade inferior da quilha da pálea superior	Sulco da pálea superior
<i>D. aptera</i>	Matizada de púrpura	Ausentes	Glabro
<i>D. viridis</i> e próximos	Matizada de púrpura	Presentes	Glabro
<i>D. wasaensis</i>	Dourada a parda, lustrosa	Ausentes	Glabro
<i>D. chevalieri</i>	Matizada de púrpura	Ausentes	Papiloso

A descoberta de *Danthoniopsis aptera* não suscitou nenhuma alteração à chave dos géneros no «grupo D» — o grupo *Danthoniopsis* — (PHIPPS, 1966, p. 240).

Loudetia cuanzensis Lubke & Phipps, *sp. nov.*

Herba perennis, caespitosa. *Culmi* 45-60 cm. alti, ascendentes usque ad erecti, aliquando geniculati inferne, graciles, rigidi, ramosi praecipue inferne, radicanes in nodos inferiores, 4-7 *nodosi*; *internodi* glabri vel minute pubescentes, inferioribus brevibus. *Vaginae* laxae, glabrae; *ligula* ad densam ciliarum redacta cum pilis longis paucis; *lamina* usque ad 20 cm. longa et 3 mm. lata, linearis, attenuata in apicem subtilem, plana vel involuta, scaberula vel minute pubescens. *Inflorescentia* panicula angusta, 6-15 cm. longa et 1-2 cm. lata; *rhachis* scabra; *rami* 1-3 cm. longi, graciles, scabri, ascendentes; *pedicelli* 1-10 mm. longi. *Spiculae* 9-11 mm. longae, uncae vel binae, lanceolatae, pallide brunneoluteae. *Glumae* glabrae, 3-nervatae, acuminato-mucronatae; *inferior* 4-6 mm. longa mucrone incluso, ovata; *superior* paulo brevior quam spicula, lineare-lanceolata, subulato-mucronata. *Anthodium inferum* ♂; lemma similis glumae superiori sed tam longum quam spicula et non mucronatum; *palea* 6-7 mm. longa, linearis, membranacea; *antherae* 3, 3 mm. longae.

Anthoecium superum hermaphroditum; *callus* 0.75 mm. longus, acutus, barbatus; *lemma* 8-9 mm. longum lobis inclusis, breviter pubescens, 5-7 nervatum, lobis 0.33 mm. longis, acutis; *arista* 1.5-2 cm. longa, gracilis, cum *columna* 6-9 mm. longa, pallide brunnea, minute pubescenti; *palea* 3-3.5 mm. longa, hyalina; *anthera* 3, 2.5 mm. longae; *ovarium* glabrum.

Caespitose perennial herb. *Culms* 45-60 cm. tall, ascending to erect, sometimes \pm geniculate below, slender, rigid, branched, especially below, rooting at the lower nodes; 4-7 noded; lower internodes glabrous or minutely pubescent, short. *Sheaths* loose, glabrous; *ligule* a densely ciliate rim with a few long hairs; *blade* to 20 cm. long and 3 mm. wide, linear, tapering to a fine tip, plane or inrolled, scaberulous or minutely pubescent. *Inflorescences* narrow panicle, 6-15 cm. long, 1-2 cm. broad; *rhachis* scabrous; *branches* 1-3 cm. long, slender, scabrous, ascending; *pedicels* 1-10 mm. long. *Spikelets* 9-11 mm. long, single or paired, lanceolate, pale brownish-yellow. *Glumes* glabrous, 3-nerved; *lower* 4-6 mm. long (mucro included), ovate, acuminate-mucronate; *upper* slightly shorter than the spikelet, linear-lanceolate, subulate-mucronate. *Lower floret* σ ; *lemma* similar to the upper glume, but as long as spikelet and not mucronate; *palea* 6-7 mm. long, linear, membranous; *anthers* 3, 3 mm. long. *Upper floret* hermaphrodite; *callus* 0.75 mm. long, acute, bearded; *lemma* 8-9 mm. long (lobes included), shortly pubescent, 5-7-nerved, lobes 0.33 mm. long, acute; *awn* 1.5-2 cm. long, slender, *column* 6-9 mm. long, pale brown, minutely pubescent; *palea* 3-3.5 mm. long, hyaline; *anthers* 3, 2.5 mm. long; *ovary* glabrous.

Type: *J. Gossweiler* 10695 (holotype US) — Angola, Cuanza Norte, Filomeno de Câmara bridge, rocky slopes in vicinity of Cuanza R., alt. 100¹ metres. Also seen: *J. Gossweiler* 9634 (us): Angola, Cuanza Norte, Cambambe, in vicinity of Cuanza R., alt. 50¹ metres.

¹ The altitudes given by GOSSWEILER show great discrepancy from those found by the authors in Carta de Angola, 1:100,000; sheet 128, 1960. Respectively they should be ca. 325 m. and 135 m.

The only two records of this species come from the Cuanza Norte district of Angola, after which the species is named. At both localities, the plants were found in the proximity of the Cuanza River which drains this area and flows westwards into the Atlantic Ocean.

Subsection *Acuminatae* of *Loudetia* is extremely homogeneous and displays reticulate variation. Superficially, the most similar species to *Loudetia cuanzensis* is *L. migiurtina*. *L. cuanzensis* differs vegetatively from the latter species in having fewer nodes, loose leaf-sheaths and prop roots developing from the lower nodes. It is a taller plant than *L. migiurtina*. The spikelets of the two species are very similar, but *L. cuanzensis* has a fertile lemma with 5-7 nerves and awn 1.5-2.0 cm. long, whereas in *L. migiurtina*, there are 9 nerves on the upper lemma and the awn is up to 3.0 cm. long. Differences among the six species now known for subsection *Acuminatae* are illustrated in table 2.

The six species may also be distinguished one from another in the following key:

Culms simple and unbranched, usually more than 45 cm. and mostly from 60 to 150 cm. tall:

Rhachis, branches and pedicels villous with long white hairs . . .

L. pennata

Rhachis, branches and pedicels glabrous or puberulous to shortly pubescent (a few long white hairs rarely present in *L. acuminata*):

Lemma of the lower floret with a subulate tip; lemma of the upper floret minutely pubescent to glabrescent; panicle 22-25 cm. long

L. acuminata

Lemma of lower floret acute to acuminate; lemma of the upper floret loosely to densely pubescent; panicle 7.5-25 cm. long

L. flavida

Culms mostly branched towards the base; usually not more than 60 cm. high (sometimes up to 100 cm. in *L. filifolia* subsp. *humbertiana*)

Culms 7 or more noded, up to 35 cm. tall; awn of the upper lemma 2.5-3 cm. long

L. migiurtina

Culms less than 7-noded, 45-60 (-100) cm. tall, or if 35 cm. or less, delicate plants with 1-2 nodes; awn of the upper lemma 1.5-2.5 cm. long:

Culms 4-6-noded, rooting from the lower nodes; leaf sheaths loose, blades up to 20 cm. long, leaves both basal and cauline; upper glume acuminate, mucronate; upper lemma 5-7-nerved

L. cuanzensis

Culms 1-5 noded; roots all basal; leaf sheaths tighter, blades up to 10 cm. long, leaves mostly or all basal; upper glume acute or truncate; upper lemma 9-nerved . . . *L. filifolia*

Plants small and delicate, up to 35 cm. tall; culms 1-2 noded; panicle 3.5-10 cm. long . . . subsp. *filifolia*

Plants robust and wiry, 45-60 cm. or more tall; culms 3-5 noded; panicle 8-12 cm. long . . . subsp. *humbertiana*

Apochaete auronitens (Duvign.) Phipps, *comb. nov.*

Tristachya auronitens Duvign. in Bull. Soc. Bot. Belge, 90: 187 (1958). Type: *Duvigneaud & Timperman 2473 T1* (BRLU, uwo); also seen 2513 T (BRLU) and 3420 T12 (BRLU).

This species is closest to *Apochaete hispida* (L. f.) Phipps, differing principally in its glabrous spikelets and leaves and in the 3-nerved lemma of the lower floret (7-nerved in *A. hispida*) and 9-nerved lemma of the upper floret (7-nerved in *A. hispida*). It has the hairy ovary and general morphology of the other two *Apochaete* species. It raises to 3 the number of species of *Apochaete*.

Due to the glabrous glumes of *A. auronitens* this species will key down to *Tristachya* in PHIPPS, 1966 (p. 239). The glabrous ovary of *Tristachya* will however reliably separate that genus from *A. auronitens*.

In view of the brief description given by DUVIGNEAUD (1958) the following lengthened description is offered.

Perennial, strongly caespitose; culms erect, ca. 0.45 m. tall, 2-noded, nodes pubescent; dead basal sheaths very conspicuous, hard, grey-brown, finely striate, sericeous below; basal leaves narrow, ± erect, hard-tipped, with many fine nerves, blades of culm leaves less than 3 cm. long; plant ± glabrous vegetatively. Panicle very small, bearing 1-2 triads; spikelets in dense triads about 30 mm. long, shining golden to olive-brown. Glumes very narrow and sharply pointed, 3-nerved, glabrous; lower about $\frac{2}{3}$ length of spikelet; upper as long as spikelet. Lower floret male; lemma very similar to the upper glume but about $\frac{1}{5}$ shorter; palea present. Upper floret hermaphrodite; lemma about 11 mm.

TABLE 2
 Characteristics of *Loudetia* subsect. *Acuminatae*

	VEGETATIVE				PANICLE					SPIKELET										
	Culm			Length of internodes	Leaf		Length (cm.)	Breadth (mm.)	Indumentum on rachis, branches and pedicels	Length (mm.)	Lower Glume		Upper Glume		Lemma 1	Lemma 2		Awn		
	Length (cm.)	Branching	N.° of nodes		Length (cm.)	Breadth (mm.)					Shape	Tip	Shap	Tip	Tip	Indumentum	Nerva-tion	Length (cm.)	Length of column (mm.)	Indumentum of column
<i>Loudetia pennata</i>	≤ 90	—	2-3	± equal	≤ 20	2	≤ 20	≤ 5	Villous; long white hairs	10-12	Lanceolate to ovate	Acute or acuminate, mucronate	Lanceolate	Acute or acuminate, mucronate	Acute or acuminate	Sparsely to densely pubescent	7-9	≤ 4.5	≤ 20	Scabrous to short pubescent
<i>L. acuminata</i>	120-150	—	4	± equal	15-30	≤ 3	22-25	4-8	Pubescent; occasional long hairs on pedicels	10-15	Narrowly ovate	Acuminate	Narrowly lanceolate	Long acuminate	Long subulate	Minutely pubescent	9	≤ 4.5	± 20	Pubescent
<i>L. flavida</i>	50-150	—	2-5	± equal	12-30	≤ 4	8-25	2-10	Scabrous; pubescent at nodes	8-15	Ovate to lanceolate	Acute or acuminate, mucronate	Lanceolate, linear-lanceolate	Acuminate	Acuminate	Glabrous to pubescent	7-9	≤ 4.5	10-14	Scabrous to shortly pubescent
<i>L. migiurtina</i>	≤ 35	+	7	shorter at the base	≤ 11	≤ 2.5	≤ 7	1.5	Puberulous to pubescent	8-9	Ovate	Acuminate, mucronate	Linear-lanceolate	Truncate or obtuse	Acuminate	Pubescent	9	≤ 3.0	10-12	Scaberulous
<i>L. cuanzensis</i>	45-60	+	6	shorter at the base	≤ 20	2-2.5	8-15	2	Scabrous	8-10	Lanceolate	Acuminate, mucronate	Linear-lanceolate	Acuminate, mucronate	Acuminate	Pubescent	5-7	1.5-2.0	6-8	Scaberulous
<i>L. filifolia</i> ssp. <i>filifolia</i>	≤ 35	+	1-2	± equal	≤ 10	2	3,5-10	≤ 3	Minutely pubescent	6-8.5	Ovate	Acuminate, mucronate, 2-toothed	Lanceolate	Acute	Acute	Densely pubescent	9	1.5-2.0	5-7	Scabrous
ssp. <i>humbertiana</i>	45-60 (100)	+	3-5	shorter at the base	7-10	2-2.5	8-12	4-5	Scabrous	7-10	Lanceolate	Acuminate, mucronate, 2-toothed	Lanceolate	Acute or truncate	Acuminate	Densely pubescent	9	1.5-2.0	6-8	Scabrous

long, including the 3.5 mm. long acute lobes, 9-nerved, glabrous, its *callus* long-conical and pungent, awned; *awn* about 7 cm. long, its column 3.5 cm. long; *palea* present; *ovary* hairy.

MITWABACHLOA Phipps, *gen. nov.*

Type: *M. brunnea* Phipps.

Gramen perenne, ca. 0.4 m. altum, dense caespitosum. *Culmi* erecti, 3-nodosi. *Inflorescentia* parva, 6-12-flora; *ramis* inflorescentiarum sigmoideis prope triades. *Spiculae* in compactis triadibus dispositae, biflorae. *Gluma inferior* ovato-lanceolata, tri-nervata, tuberculato-setosa; *gluma superior* similis sed major et glabra. *Anthoecium inferum* ♂; *lemma* simile glumae inferiori sed majus et quinque-nervatum; *palea* adest; *antherae* 3; *lodicae* adsunt. *Anthoecium superum* hermaphroditum; *callus* obtusus; *lemma* ovato-lanceolatum, 9-nervatum, capillis a lobis, pubescens, pilorum fasciculis 8 in una serie transversa dorso dispositis barbatur, *arista* a sinu; *palea* sulco pubescenti; *lodicae* adsunt; *antherae* 3; *ovarium* glabrum.

Perennial grass, about 0.4 m. tall, densely caespitose. *Culms* erect, 3-noded. *Inflorescence* small, 6-12-f lowered; *branches* of the inflorescence sigmoid towards the triads. *Spikelets* 2-flowered, arranged in compact triads. *Lower glume* ovate-lanceolate, 3-nerved, setose-tuberculate; *upper glume* similar but larger and glabrous. *Lower floret* ♂; *lemma* similar to the lower glume but larger and five-nerved; *palea* present; *stamens* 3; *lodicles* present. *Upper floret* hermaphrodite; *callus* obtuse; *lemma* ovate-lanceolate, 9-nerved, with capilli from the lobes, pubescent, bearded across the back with eight fascicles of hair in a transverse row, awned from the sinus; *palea* pubescent in the sulcus; *lodicles* present; *stamens* 3; *ovary* glabrous.

The discovery of *Mitwabachloa* further complicates the systematics of the Tristachyoid group of Arundinelleae. Possessing a large number of highly specialised characters,

e. g. : dense triadism; sigmoid hook with disarticulation below the triad; eight tufts of hair and bristles to the lobes of the upper floret, it must be regarded as a highly advanced monotypic genus with no very close affinities to other Tristachyoid genera.

In PHIPPS (1966, p. 239) *Mitwabachloa* will key down to *Piptostachya*. *Mitwabachloa* with its eight tufts of hair to the lemma of the upper floret is, however, readily separable from that genus. One species, as below:

M. brunnea Phipps, *sp. nov.*

Gramen perenne, fortiter caespitosum. *Culmi* erecti, ca. 0.4 m. alti, 3-nodosi, *nodis* glabris; *cataphyllis* sericei. *Ligulae* dense ciliatae; *laminae* dense tuberculato-pilosae. *Panicula* parva, gerens 2-4 triades, *ramis* secundis, sigmoideis prope apices, frangentibus. *Triades* densi, 13 mm. longi, perbrunnei. *Gluma inferior* 8 mm. longa, ovato-lanceolata, subulata ad apicem, 3-nervata, tuberculato-setosa; *gluma superior* 10 mm. longa, lanceolata, acuminata, 3-nervata. *Anthoecium inferum* <S; *lemma* 11 mm. longum, lanceolatum, subulatum, tuberculato-setosum, 5-nervatum; *palea* adest; *lodicae* adsunt; *antherae* 3. *Anthoecium superum* hermaphroditum; *callus* obtusus; *lemma* 7 mm. longum, 9-nervatum, pubescens, pilorum fasciculis 8 in una serie transversa dorso dispositis barbatus, lobis duobus 1.5 mm. longis, excurrentibus in capillos; *arista* a sinu, 0.9 cm. longa, geniculata; *palea* 6 mm. longa, bicarinata, in sulco pubescens; *ovarium* glabrum.

Perennial grass, strongly caespitose. *Culms* erect, ca. 0.4 m. tall, 3-noded, nodes glabrous; *cataphylls* sericeous. *Ligules* densely ciliate; *blades* densely tuberculate-pilose. *Panicle* small, bearing 2-4 triads, *branches* secund, sigmoid towards the apices, breaking. *Triads* dense, 13 mm. long, dark brown. *Lower glume* 8 mm. long, ovate-lanceolate, subulate at the tip, 3-nerved, tuberculate-setose; *upper glume* 10 mm. long, lanceolate, acuminate, 3-nerved. *Lower floret* ♂; *lemma* 11 mm. long, lanceolate, subulate, tuberculate-setose, 5-nerved; *palea* present; *lodicules* present; *anthers* 3. *Upper floret*

hermaphrodite; *callus* obtuse; *lemma* 7 mm. long, 9-nerved, pubescent, bearded with 8 fascicles of hair disposed across the back in a transverse row, with two lobes 1.5 mm. long excurrent into capilli; *awn* from the sinus 9 mm. long, geniculate; *palea* 6 mm. long, 2-keeled, its sulcus pubescent; *ovary* glabrous.

Type: *M. Lukwesa* 495 (holotype EBV; isotype SRGH; photo and fragment at uwo). Congo-Kinshasa, Mitwaba (Plateau des Kibara), steppe à l'W. de la route de Mukana; alt. env. 1550 m.; 18 Oct. 1958.

This species is called brunnea on account of its deep brown spikelets.

The key to «GROUP C» —The Tristachyoid Group — (PHIPPS, 1966, p. 239) now requires amendment with the fuller information available on *Apochaete auronitens* and with the discovery of *Mitwabachloa*. The revised key is as follows:

Key to Tristachyoid (Group C) Arundinelleae

- No bristles to lobes of lemma of the upper floret:
 - Tufts of hair across back of lemma of upper floret . . . *Zonotriche*
 - No such tufts of hair:
 - Stamens 2 *Diandrostachya*
 - Stamens 3:
 - Glumes glabrous; triads sometimes only barely evident; ovary glabrous *Tristachya*
 - Glumes nearly always bearing tubercle-based setae; triads invariably dense; ovary hairy:
 - Spikelets at most 10 mm. long; awn column short *Muantijamvella*
 - Spikelets 25-45 mm. long; awn column much longer than bristle *Apochaete*
- Lobes of lemma of fertile floret bristle-tipped (bristles sometimes sufficiently short and broad as to be difficult to differentiate from subulate-tipped lobes, e. g. some New World *Tristachya* species):
 - Sigmoid hook in peduncle below each triad:
 - Annual; callus acute; six vertical rows of hair on lemma of upper floret *Veseyochloa*
 - Perennial; callus blunt; 0 or 8 tufts of hair across lemma of upper floret:

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Indumentum of spikelet fulvous; no tufts of hair across lemma of upper floret *Piptostachya*

Indumentum of spikelet white; tufts of hair across lemma of upper floret 8 *Mitwabachloa*

No such sigmoid hook:

Tufts of hair across back of lemma of upper floret:

Tufts of hair 6-8 *Isalus*

Tufts of hair 2 *Dolichochaete bicrinita*

No such tufts of hair:

Ovary hairy (African) *Dolichochaete*

Ovary glabrous (American) *Tristachya*

Diandrostachya scaettae (A. Camus) Phipps,
comb. nov.

— *Tristachya scaettae* A. Camus in Bull. Soc. Bot. Fr. 1938, 85: 556 (1939).

Type: *Scaetta* 2303 (P), Sindou, Mali.

Although this taxon is listed in his *Flore Agrostologique* (1962) by JACQUES-FÉLIX the necessary formal new combination was not made.

Diandrostachya glabrinodis (C. E. Hubbard) Phipps,
comb. nov.

— *Tristachya glabrinodis* C. E. Hubbard in Kew Bull. 1949: 358 (1949); — *Loudetiopsis glabrinodis* (C. E. Hubbard) Conert in Engl., Bot Jahrb. 77: 288 (1957).

Type: *Hinds* 3853 (K), Lawra, Ghana.

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NEW TAXA OF *PTERIDOPHYTA*
FROM SOUTH EAST TROPICAL AFRICA

by

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URING the revision of the ferns of south-east tropical Africa for the Fern Supplement to the Flora Zambesiaca, thirteen new taxa have come to light and a number of nomenclatural changes have become necessary. The author wishes to thank the University of Cape Town for study leave to complete this project and for a Bremner Travel Grant which made visits to European herbaria possible.

Adiantum patens Willd. subsp. **oatesii** (Bak.) Schelpe stat. nov.

Adiantum oatesii Bak. in Oates, Matabeleland, App. 5: 369 (1881) — basionym.

Adiantum patens Willd. var. **oatesii** (Bak.) Ballard in Kew Bull. 1937: 31 (1937).

The typical South American *A. patens* exhibits darker rhizome scales than the continental African material.

Arachniodes foliosa (C. Chr.) Schelpe comb. nov.

Dryopteris foliosa C. Chr. in Dansk Bot. Arkiv 9: 61 (1937).

This species has been confused previously with the Australian and Polynesian *A. aristata* (Forst.) Tindale which has denser and narrower scales at the base of the stipe. *A. foliosa* differs from *Arachniodes webbiana* (R. Br.) Schelpe comb. nov. [Basionym — *Aspidium webbianum* R. Br.

in Flora 1841: 711 (1841)] from Madeira in having longer marginal spines on the pinnules and rather broader pinnules.

Asplenium atroviride Schelpe sp. nov.

Rhizoma erectum, paleis griseo-fuscis lanceolato-subulatis **subintegris**, usque ad 10 mm longis et 1.5 mm latis. Frondes caespitosi erecti carnosos-coriacei, non gemmiferae. Stipes impolitus griseo-viridis vel fuscis, usque ad 50 cm longus, 3 mm diam., subglabrus. Lamina atroviridis imparipinnata, in ambitu oblonga, usque ad 40 cm longa et 19 cm lata. Rachis impolita purpureo-fusca, paleis atro-fuscis irregulariter fimbriatis usque ad 2 mm longis obsita, **demum** glabrescens. Pinnae usque ad **6-jugatae** suboppositae, pinna terminali ceteri similis, lanceolatae vel oblongae, acutae vel acuminateae, petiolatae, ad **basim** inaequaliter cuneatae, **irregulariter** non profunde undulato-crenatae. Sori lineares, secus venas prope **costam** ad supra dimidium extensi; indusium circa 0.5 mm latum, integrum, membranaceum.

Type: RHODESIA, Vumba Mtns., Witchwood, 27.vi.1955, Schelpe 5446 (BOL, holotype; BM, isotype).

RHODESIA: Umtali, 27.vi.1955, Chase 5623 (LISC; SRGH).
MALAWI: Shire Highlands, 6.iv.1906, Adamson s. η. (K).
MOZAMBIQUE: Namuli, 1887, Last s. η. (x); Manica e Sofala, Vila Gouveia, serra de Chôa, 4.vii.1941, Torre 3006 (LISC).

Among the African ferns, *A. atroviride* most closely resembles *A. gemmiferum* Schrad. in herbarium specimens. However it is consistently not gemmiferous, and in the field has erect very deep green fronds, in contrast to the lighter green arching gemmiferous fronds of *A. gemmiferum*.

Asplenium boltonii Hook. ex Schelpe sp. nov.

Asplenium anisophyllum Kunze var. *elongata* Mett., Farngatt., Aspl.: 99 (1859).

Rhizoma erectum, paleis fuscis linearo-lanceolatis **integris** usque ad 18 mm longis, 2 mm latis. Frondes caespitosi

arcuati, leviter carnosu-coriacei, ad basim segmentorum terminalium proliferae. Stipes impolitus griseo-viridis usque ad 14 em longus, 4 mm diam., paleis ferrugineis primum dense obsitis, demum subglabrescens. Lamina imparipinnata, usque ad 33 cm longa, 8 cm lata, in ambitu ovato-lanceolata, pinnis infimis leviter reductis. Rachis impolita griseo-viridis subglabra. Pinnae 10-28-jugatae, usque ad 7.5 cm. longae 1.5 cm latae, lanceolato-attenuatae, cuneatae petiolatae, attenuato-acuminatae, inciso-crenatae vel inciso-dentatae, ad maturitatem subglabrescentes. Sori lineares, c. 4 mm longi, ad maturitatem late elliptici; indusium e. 1 mm latum integrum membranaceum.

Type: NATAL, *Bolton* s. n. (α , holotype; BM, isotype).

CAPE PROVINCE: Albany, Grahamstown, *Bolus* 1692 (BOL); Engcobo, *McLoughlin* s. n. (PRE); Pirie, *Sim* 522 (BOL); Hogsback, *Britten* 6453 (GRA); Umzimkulu, *Schlechter* 6629 (GRA).

NATAL: Inanda, *Medley Wood* s. n. (PRE); Karkloof, «Braco», *Schelpe* 5127 (BM; BOL); Ngotshe, Ngome Forest, *Schelpe* 6219 (BM; BOL); Qudeni, *Fisher* 904 (BOL; NH; NU); Pietermaritzburg, Winterskloof, *Doidge* s. n. (PRE; S-PB); Umzinto, Dumisa, *Rudatis* 1365 (PRE); Vryheid, Enyati, near Hlobane, *Johnstone* 411 (NH; NU).

TRANSVAAL: Barberton, *Thorncroft* 8 (GRA, PRE); Woodbush, *Rehmann* 5589 (BM; S-PB); Woodbush, *Schelpe* 6055 (BOL); Kowyns Pass, *Schelpe* 1640 (BOL; NH); Zoutpansberg, Shefeera Estate, *Schelpe* 5952 (BM; BOL); Zoutpansberg, *Rodin* 4025 (PRE).

RHODESIA: Inyanga, Romneydale, *Chase* 2038 (BM, PRE, SRGH); Melsetter, Mt. Pesa, *Chase* 3007 (SRGH).

MOZAMBIQUE: Barué, serra de Chôa, *Torre & Correia* 13655 (LISC); Chimanimani Mtns., Martins Falls, *Mitchell* 341 (BOL; SRGH); serra de Gorongosa, *Torre & Pereira* 12562 (LISC); Manica, serra Zuira, *Torre & Pereira* 12860 (LISC).

In southern Africa and in the Flora Zambesiaca area, *A. boltonii* is a distinct member of the *A. anisophyllum* complex with gemmiferous fronds which have densely scaly

stipes and rachises when young and with pinnae margins which are alternately deeply and shallowly incised. [see *Sim*, Ferns S. Africa, ed. ii: t. 53 (1915)]. However, in tropical Africa the distinction does not appear to be as clear and both seem to grade into *A. elliotii* Bak. and *A. ruwenzoriense* Bak.

Asplenium chaseanum Schelpe sp. nov.

Rhizoma erectum, 4 mm diam, paleis subulatis atrofusciis integris clathratis 2-3 mm longis. Frondes caespitosi arcuati tenuiter coriacei non gemmiferae. Stipes ater, usque ad 11 cm longus, paleis attenuatis fuscis clathratis c. 2 mm longis sparsim obsitis. Lamina profunde bipinnatifida, usque ad 12 cm longa, 7 cm lata, in ambitu oblonga acuta, pinnis infimis leviter reductis. Rachis atra, anguste virido-alata supra dimidium, glabrescens. Pinnae elongato-trapeziformes usque ad 5 cm longae, 1.5 cm latae, profunde pinnatifidae, lobis oblongis vel anguste oblongis, ad apices irregulariter serratis, glabrae, venulis obscuris. Sori lineari, usque ad 1 cm longi; indusium lineare membranaceum integrum.

Type: ZAMBIA, Fort Rosebery Distr., 28.viii.1952, *White* 3163 (BOL, holotype; κ , isotype).

ZAMBIA: Abercorn Distr., Chilongwelo Escarpment, 21.i.1963, *Richards* 17529 (κ); Lake Bangweulu, Samfya, 23.iv.1960, *Symoens* 7574 (BOL).

A. chaseanum is a small member of the *A. aethiopicum* complex which is readily distinguished by its relatively short, deeply bipinnatifid, oblong acute fronds. It appears to be endemic to northern Zambia.

Asplenium pseudoauriculatum Schelpe sp. nov.

Rhizoma erectum c. 8 mm diam., paleis atrofusciis concoloris lanceolatis attenuatis subintegris 5-7 mm longis et 2 mm latis. Frondes caespitosi arcuati leviter coriacei, ad basin segmentorum terminalium profunde pinnatifidum

lanceolatorum gemmiferae. Stipes griseoviridis c. 15 cm longus, paleis atrofuscis lanceolatis usque ad 2 mm longis obsitis. Lamina profunde bipinnatifida, usque ad 43 cm longa, 13 cm lata, in ambitu oblongo-lanceolata acuminata, pinnis basalibus vix reductis. Rachis impolita griseo-viridis, paleis minutis substellatis vel peranguste lanceolatis atrofuscis obsitis. Pinnae usque ad 8.5 cm longae et 2 cm latae, petiolatae, lanceolatae attenuatae, ad basim inaequaliter cuneatae, profundae pinnatifidae in lobos lineares vel peranguste oblongos acutos vel oblanceolatos bifidos usque ad 8 mm longos, lobis basalibus acroscopicis late cuneatis crenatodentatis in dimidio superiore infra paleis substellatis atrofuscis minutis sparsim obsitis. Sori lineares, leviter curvati, usque ad 6 cm longi; indusium peranguste oblongum membranaceum integrum.

Type: MOZAMBIQUE, Manica e Sofala, Garuso, «Jaegersberg», ll.vii.1955, *Schelpes* 5626 (BOL, holotype; BM, isotype).

RHODESIA: Umtali district, Vumba Mtns., Elephant Forest, *Chase* 7146 (BOL; K; SRGH).

MOZAMBIQUE: Gorongosa Mtn., *Schelpes* 5592 (BM; BOL).

MALAWI: Cholo Mtn., *Brass* 17762 (SRGH); Nchisi Mtn., *Brass* 17007 (K; SRGH).

A. pseudoauriculatum differs from the other members of the *A. preussii* complex in having wedge-shaped crenate-serrate acroscopic basal pinna lobes. The texture of the fronds is apparently thicker than in both typical *A. preussii* and in *A. preussii* var. *austroafricanum*.

Asplenium erectum Bory ex Willd. var. *usambarense* (Hieron.) Schelpe comb. nov.

Asplenium sphenolobium (Kunze) Hieron. var. *usambarense* Hieron. in *Deutsche Zentral-Afr. Exped., Bot.* 2: 14 (1911).

Judging from the type material of *A. erectum* and a few available specimens of this species from the Mascarene Islands, it seems that this Mascarene material is interme-

diate between the tropical African fern referred to *A. usambarense* or *A. quintasii* Gand., and the South African plants referred by SIM and others to *A. erectum*. It is clear that a new evaluation of specific and subspecific concepts will have to be undertaken covering the Asiatic, African and American members of this complex.

***Asplenium pellucidum* Lam. subsp. *pseudohorridum* (Hieron.)**

Schelpe comb. nov. et stat. nov.

Asplenium protensum Schrad. var. *pseudohorridum*
Hieron. in Engler, Pflanzenw. Ost-Afr., C: 82
(1895). — Basionym.

Asplenium pseudohorridum (Hieron.) Hieron. in Bot.
Jahrb. 46: 362 (1911).

The Mauritian type of *A. pellucidum* seen in Herb. Lamarck in Paris has black or very dark rhizome scales whereas the continental African subspecies exhibits clearly clathrate rhizome scales.

***Asplenium preussii* Hieron. subsp. *austroafricanum* Schelpe**
subsp. nov.

Differt a subspecie typico, lobis pinnarum duplo maioribus laxioris dispositis.

Type: NATAL, nKandhla Forest, 19.vi.1946, Schelpe 1688 (BOL).

During a review of the *A. preussii* complex for the Flora Zambesiaca treatment it became clear that there were three closely related taxa involved. The typical *A. preussii* from West and Central tropical Africa has numerous closely set and almost overlapping pinna lobes and has a pinnatifid acroscopic basal lobe. In South Africa, a plant which has previously been erroneously referred to *A. auriculatum* (Thunb.) Kuhn or *A. thunbergii* Kunze, differs from typical *A. preussii* in having larger and more widely spaced pinna lobes of a thinner texture and which is proposed here as a

new geographically isolated subspecies. *A. pseudoauriculatum* differs from both in having the acroscopic basal pinna lobe wedge-shaped and crenate dentate.

Asplenium simii Braithwaite et Schelpe sp. nov.

Asplenium cuneatum var. *angustatum* Sim, Ferns S. Afr., ed. i: 152, t. 78, fig. 2 (1892); Ferns S. Afr., ed. ii: 162, t. 63, fig. 2 (1915).

Rhizoma erectum, paleis linearis attenuatis atris integris usque ad 8 mm longis. Frondes caespitosi erecti leviter coriacei non gemmiferi. Stipes impolitus fuscis usque ad 17 cm longus glabrus. Lamina profunde 2-pinnatifida vel 2-pinnata, in ambitu anguste oblonga, pinnis infimis non reductis. Rachis impolita fusca paleis atris lanceolatis clathratis usque ad 2 mm longis sparse obtectis. Pinnae trapeziformes, usque ad 3.8 cm longis 2.8 cm latis discolores profunde incisae, lobis 3-5 cuneatis crenatis, lobo terminali acuminato caudato. Sori lineares usque ad 8 mm longi; indusium linearum integrum membranaceum.

Type: RHODESIA, Vumba Mtns., Elephant Forest, 28.xii. 1954, Chase 6274 (BOL, holotype; SRGH, isotype).

RHODESIA: Umtali District, Vumba Mtns., Cloudlands, Chase 7253 (BOL; K); Vumba Mtns., Elephant Forest, Chase 6044 (BOL; K; SRGH); Masetter District, Chimanimani Mtns., Mitchell 267 (BOL).

MOZAMBIQUE: Garuso, Schelpe 5611 (BM; BOL).

CAPE PROVINCE: Knysna, Barklys. n. (SAM 50586).

A. simii is easily distinguishable from the other members of the *A. aethiopicum* complex in Southern Africa by its long (6-8 mm) attenuate black rhizome scales and by its narrow fronds.

Asplenium torrei Schelpe sp. nov.

Rhizoma adscendens, usque ad 4 mm diam., paleis linearo-lanceolatis attenuatis integris clathratis c. 3.5 mm longis. Frondes leviter coriacei discolores ad basim segmentorum

terminalium proliferae. Stipes **impolitus** ater, usque ad 30 cm longus, subglabrus. Lamina imparipinnata usque ad 35 cm **longa** et 10.5 cm lata, segmento terminale segmentes cetera simulans. Rachis **impolitus** ater, paleis minutis dispersis. Pinnae **elongato-trapeziformes** usque ad 6.2 cm longae, 2 cm **latae**, leviter falcatae, serratae, ad basim **cuneatae** et petio-**latae**, glabrae, pinnis infimis leviter acroscopice auriculatis. Sori lineares usque ad 1.5 cm longi, 0.1 cm latae, sub angulum acutum costam dispositi; indusium membranaceum integrum.

Type: MOZAMBIQUE, Manica e **Sofala**, Serra de Gorongosa, vertente do monte Nhandore, 1320 m, 22.X.1965, *Torre & Paiva* 12563 (LISC).

A. torrei is easily distinguished from *A. blastophorum* Hieron. (the only other proliferous African species of the *A. aethiopicum* complex) by its imparipinnate fronds with the terminal segment resembling the pinnae.

Asplenium pumilum Sw. subsp. **hymenophylloides** (Fée) Schelpe stat. nov.

Asplenium pumilum Sw. var. **hymenophylloides** Fée, **Mém. Fam. Foug.** 7: 54, t. 15, fig. 4 (1857).—
Basionym.

Asplenium eylesii Sim, **Ferns S. Afr.**: 147, t. 61, fig. 2 (1915).

Although the South and Central American typical *A. pumilum* varies in pinna shape, texture and degree of pubescence, the pinnae are generally more attenuate and of thicker texture than in the African populations.

Asplenium theciferum var. **concinnum** (Schrad.) Schelpe comb. nov. et stat. nov.

Davallia concinna Schrad. in **Göt. gel. Anz.** 1818: 918 (1818).—
Basionym.

The South American specimens referable to *A. theciferum* (HBK) Mett. show considerable variation in the shape

of the lamina, the length of the stipe. In these specimens the «horn» subtending the sorus is usually long but in some specimens it is almost as obsolescent as in the Southern African var. *concinnum*.

Asplenium varians Wall. ex Hook. & Grev. subsp. **fimbriatum**
(Kunze) Schelpe comb. nov. et stat. nov.

Asplenium fimbriatum Kunze in *Linnaea* 18: 117 (1844).
— Basionym.

Typical Asiatic specimens of *A. varians* have rhizome scales with longer hair-points and are composed of smaller cells than in specimens of the African subspecies.

Athyrium scandicium (Willd.) Presl var. *rhodesianum*
Schelpe var. nov.

Differt a varietate typico pinnis longe attenuatis, segmentis pinnularum crenatis.

Type: RHODESIA, Inyanga district, Pungwe Gorge, 15.vii. 1955, *Schelpe* 5722 (BOL, holotype; BM, isotype).

RHODESIA. Pungwe Palls, *Chase* 5827 (BOL; SRGH), *Chase* 6643 (BOL; SRGH).

Blotiella *crenata* (Alston) Schelpe comb. nov.

Lonchitis crenata Alston in *Bol. Soc. Brot., sér. 2*, **30**:
18 (1956). — Basionym.

B. crenata was originally described from material from the Congo, but specimens referable to it have been seen from Zambia, Angola and Uganda.

Cheilanthes *inaequalis* (Kunze) Mett. var. **buchananii** (Bak.)
Schelpe comb. nov. et stat. nov.

Notholaena buchananii Bak., *Syn. Fil.*: 373 (1868). —
Basionym.

Typical *G. inaequalis* has a narrower and more densely hairy frond than the typical var. *buchananii* but a number of intermediate forms preclude the recognition of these two taxa as separate species. The var. *buchananii* occurs in more moist or sheltered localities than the typical variety.

Cheilanthes leachii (Schelpe) Schelpe comb. nov.

Notholaena leachii Schelpe in Journ. S. Afr. Bot. 30: 185, t. 1, fig. a (1964).—Basionym.

An examination of all the African species of *Cheilanthes* and *Notholaena* has led the present author to the view that they should be treated as a single genus.

Diplazium nemorale (Bak.) Schelpe comb. nov.

Asplenium nemorale Bak. in Journ. Linn. Soc., Lond. 15: 417 (1876).—Basionym.

East Tropical African specimens of this large species of the pantropical *D. polypodioides* Blume complex have been referred to *D. hyophilum* (Hieron.) C. Chr. and *D. stolzii* Brause. However, they do not appear to be distinguishable from the Madagascan *D. nemorale*.

Doryopteris concolor (Langsd. & Fisch.) Kuhn. var. **nicklesii** (Tardieu) Schelpe comb. nov. et stat. nov.

Doryopteris nicklesii Tardieu in Notul. Syst. 3: 166 (1948).—Basionym.

In view of the wide range in the degree of disintegration of the sori and the ornamentation of the spores in the African material referable to *D. concolor*, *D. nicklesii* cannot be regarded as a species distinct from the American *D. concolor* or the African var. *kirkii* (Hook.) Fries.

Dryopteris inaequalis (Schlechtend.) O. Kuntze var. atropaleacea Schelpe var. nov.

Differt a varietate typico paleis stipitis rhizomatique atris.

Type: TANGANYIKA, Sumbawanga, Mbisi, Ufipa, Mbisi Forest, 7500 ft., 18.i.1958, *Vesey Fitzgerald* 1390 (BOL, holotype).

ZAMBIA: Abercorn District, Itembwe Gorge, *Richards* 18774 (x).

Elaphoglossum rhodesianum Schelpe sp. nov.

Rhizoma repens c. 5 mm diam., paleis concoloribus lanceolatis subintegris acuminatis pallide fuscis usque ad 9 mm longis et 2 mm latis. Frondes caespitosi tenuiter coriacei erecti. Stipes frondis fertilis usque ad 56 cm, stipes frondis sterilis usque ad 32 cm, stramineus supra articulum, infra atrofuscus, nitidus, paleis dispersis fuscis anguste ovatis, leviter fimbriatis, obsitis. Lamina sterilis usque ad 43 cm longa et 3.5 cm lata, anguste oblanceolata acuminata, ad basim attenuata decurrentis, glabra; costa supra leviter sulcata, infra convexa. Lamina fertilis usque ad 25 cm longa et 1.3 cm lata, lineare-elliptica, attenuata versus basim et apicem, glabra.

Type: ZAMBIA, Shiwa Ngandu, 21.vii.1938, *Greenway* 5449 (x, holotype; EAH, isotype).

CONGO-KINSHASHA: Plateau de Kundelungu, *Malaisse* 4709 (BOL).

The vigorous forms of this species (such as the type) resemble *E. subarborescens* Rosenst. from Brazil. The oblanceolate acuminate glabrous sterile fronds render *E. rhodesianum* quite distinct from the other tropical African species.

Elaphoglossum zambesiacum Schelpe sp. nov.

Rhizoma repens c. 4 mm diam. paleis fuscis concoloribus lanceolatis acuminatis usque ad 5 mm longis 1 mm latis integris vel subintegris. Frondes caespitosi coriacei. Stipes usque ad 11 cm longus pallide fuscus, paleis patentibus linearibus c. 5 mm longis irregulariter ciliatis pallide fuscis primum dense obsitis, demum subglabrescens. Lamina sterilis usque ad 10 cm longa et 3 cm lata oblanceolata vel anguste elliptica acuta, ad basim anguste cuneata decurrens, margine pallide cartilaginei, supra glabra, infra paleis minutis substellatis atrofuscis (minus 0.4 mm longis) sparsim obsitis. Lamina fertilis peranguste oblanceolata, ad basim decurrens glabra.

Type: ZAMBIA, Luwingu, 29.V.1964, *Fanshawe* 8708 (SRGH, holotype).

ZAMBIA: Abercorn District, Kambole Escarpment, *Robinson* 4398 (α).

E. zambesiacum is distinguishable from the other African members of the *E. conforme* (Sw.) Schott complex by the numerous patent linear scales on the stipes of the young fronds.

Lycopodium carolinianum L. var. affine (Bory) Schelpe comb. nov. et stat. nov.

Lycopodium affine Bory, Voy. Quatre Princ. Iles 2: 204, 262 (1804). — Basionym.

The Mascarene and continental tropical African plants referable to *L. affine* have more slender leaves than the typical temperate *L. carolinianum*, but in Africa at least, they intergrade to such an extent that it is not possible to maintain a distinction at specific level.

Pellaea viridis (Forsk.) Prantl var. *involuta* (Sw.) Schelpe comb. nov. et stat. nov.

Pellaea involuta Sw. in Schrad. Journ. 1800 (2): 69 (1801). — Basionym.

P. involuta was described from a South African plant from the south-western Cape Province with patent hair-like scales on the stipe. However, this intergrades northwards with *P. viridis* var. *glauca* Sim and cannot be maintained as a distinct species.

Polystichum zambesiicum Schelpe sp. nov.

Rhizoma repens c. 2.5 cm diam., paleis ferrugineis anguste lanceolatis acuminatis subintegris usque ad 2 cm longis et 0.2 cm latis. Frondes caespitosi arcuati herbacei. Stipes usque ad 73 cm longus pallide fuscus, versus basim paleis anguste ovatis castaneis pallido-limbatis usque ad 8 mm longis obsitis. Lamina usque ad 66 cm longa et 52 cm lata, in ambitu ovata acuta, pinnis basalis aliquantum reductis et deflexis, tripinnatifida. Rachis straminea, paleis subulatis castaneis vel fuscis obsitis. Pinnae lineares conspicue attenuatae, usque ad 28 cm longae et 5.2 cm latae; pinnulae petiolatae glabratae, in ambitu anguste ovato-triangulares, late acute, ad basim inaequaliter late cuneatae, lobo acrosspico basale maximo. Sori circulares, c. 1 mm diam.; indusium c. 0.5 mm diam., evanidum.

Type: RHODESIA, Umtali district, Stapleford, 16.vii. 1955, *Schelpe* 5751 (BOL, holotype).

RHODESIA: Inyanga district, Pungwe Gorge, *Schelpe* 5699 (BM; BOL); Stapleford Forest Reserve, *Chase* 8371 (BOL; K), *Chase* 8373 (BOL; K); Vumba Mtns., *Chasse* 8343 (BOL; K), *Chase* 8344 (BOL; K), *Chase* 8345 (BOL; K).

MOZAMBIQUE: Manica e Sofala, Penhalonga, *Schelpe* 5325 (BOL); Gorongosa Mtn., Gogogo Peak, *Schelpe* 5518 (BM; BOL).

P. zambesiicum is easily recognised among the continental African species by its longly attenuate pinnae and by its blunt pinnule lobes. This species has formerly been confused with *P. ammiifolium* (Poir.) C. Chr. which is apparently endemic to Mauritius.

Polystichum setiferum (Forsk.) Moore ex Woynar var. *fuscopaleaceum* (Alston) Schelpe comb. nov. et stat. nov.

Polystichum fuscopaleaceum Alston in Bol. Soc. Brot., sér. 2, 30: 22 (1956). — Basionym.

Many tropical African forms with dark stipe scales have been referred to *P. fuscopaleaceum* but these intergrade with the temperate or tropical high mountain forms with pale stipe scales to such an extent that a clear differentiation at specific level is not possible.

Pteris catoptera Kunze var. **horridula** Schelpe var. nov.

Differt a varietate typico, rachidi, et costa infra spinulosa.

Type: RHODESIA, Umtali District, Inyamatshira Range, Chase 4890 (BOL, holotype; BM; SRGH, isotypes).

RHODESIA: Umtali District, Vumba Mtns., Excelsior, Chase 7171 (BOL; K; SRGH).

MALAWI: Kasupe District, Chaone Hill, Adlard 446 (BM; BOL; SRGH).

The frequency of spinules on the stipes, rachises and lower costal surfaces varies considerably and it is consequently felt that specific distinction is not warranted.

Thelypteris friesii (Brause) Schelpe comb. nov.

Dryopteris friesii Brause in Fries, Wiss. Ergebn. Schwed. Rhodesia-Congo Exped. 1911-12, Bot. 1: 1 (1914). — Basionym.

T. friesii is similar to *T. longicuspis* (Bak.) Schelpe in having the base of the lamina abruptly decrescent into a long series of much reduced pinnae, but differs in having a creeping rhizome and pilose indusia.

Thelypteris prismatica (Desv.) Schelpe comb. nov.

Nephrodium prismaticum Desv. in Mém. Soc. Linn. Paris
6: 256 (1827).—Basionym.

Dryopteris prismatica (Desv.) C. Chr. in Dansk Bot.
Arkiv **7**: 202 (1932).

Cyclosorus prismaticus (Desv.) Ching in Bull. Fan Mem.
Inst. Biol. Bot. **10**: 248 (1941).

This species, which was previously only known from Mauritius, the Comoro Islands and Madagascar, has been found in the Misuku Hills of northern Malawi.

Xiphopteris cultrata (Bory ex Willd.) Schelpe comb. nov.

Polypodium cultratum Bory ex Willd. in L., Sp. Pl.,
ed. iv, 5: 187 (1810).—Basionym.

The African specimens of this species have in the past been referred to *X. elastica* (Bory ex Willd.) Alston which is based on a plant from Reunion.

Xiphopteris flabelliformis (Poir.) Schelpe comb. nov.

Polypodium flabelliforme Poir. in Lam., Encycl. Méth.
Bot. 5: 519 (1804).—Basionym.

Grammitis flabelliformis (Poir.) Morton in Contrib. U. S.
Herb. 38: 57 (1967).

According to Morton (loc. cit.), *P. flabelliforme* Poir. is the earliest name applicable to the plant usually known as *Xiphopteris rigescens* (Bory ex Willd.) Alston.

NEW AND LITTLE
KNOWN SPECIES FROM THE FLORA
ZAMBESIACA AREA

x x

TEPHROSIA

bg

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THE species of *Tephrosia* mentioned here are treated in groups, but this is purely for convenience of discussion. The groups should not be regarded in any way as formal taxonomic categories; some may be very artificial. The arrangement is as follows:

GLABRISTYLED SPECIES

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BARBISTYLED SPECIES

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Specimens from the Flora Zambesiaca area are cited under subdivisions of countries as in the Flora, those from Uganda, Kenya and Tanzania are arranged according to the Flora of Tropical East Africa, and others according to the Times Atlas (Mid Century Edition). For newly described taxa all specimens seen have been cited. All types cited have been seen unless an indication is given to the contrary. Abbreviations used for herbaria are according to Index Herbariorum ed. 5, 1964 (Regnum Vegetabile 31).

It is a pleasure to thank Mr. J. B. GILLET (Nairobi) for discussion of many problems. His prior work on the genus in connection with the Flora of Tropical East Africa (unpublished), and his arrangement of the Kew material for all tropical Africa, have made the present author's task very much simpler.

In Flora Zambesiaca the segregate genera *Ptychlobium* Harms, *Requienia* DC, *Caulocarpus* Bak. f. and *Lupiniphyl- lum* Hutch. will be recognised. This necessitates one new combination :

Requienia pseudosphaerosperma (Schinz) Brummitt, comb. nov. ---,

Basionym: *Tephrosia pseudosphaerosperma* Schinz in Viert. Naturf. Ges. Zürich **57**: 557 (1912). Type: S. W. Africa, Kalahari, Udschi, *Fleck* 334a (z).

Group 1. TEPHROSIA VILLOSA, T. RHODESICA AND ALLIED SPECIES

These are glabristyled species with \pm densely pubescent to villous pods, leaf-opposed or axillary racemes, and numerous leaflets. *T. villosa* and *T. noctiflora* have a conspicuously twisted style such as was illustrated for *T. uniflora* by GILLET in *Kew Bull.* **13**(1): 113 (1958).

1. *Tephrosia villosa* (L.) Pers.

The variation of this species has given rise to diverse taxonomic treatments. LINNAEUS'S *Cracca villosa* was based on material from Ceylon (see below) in which the indumen-

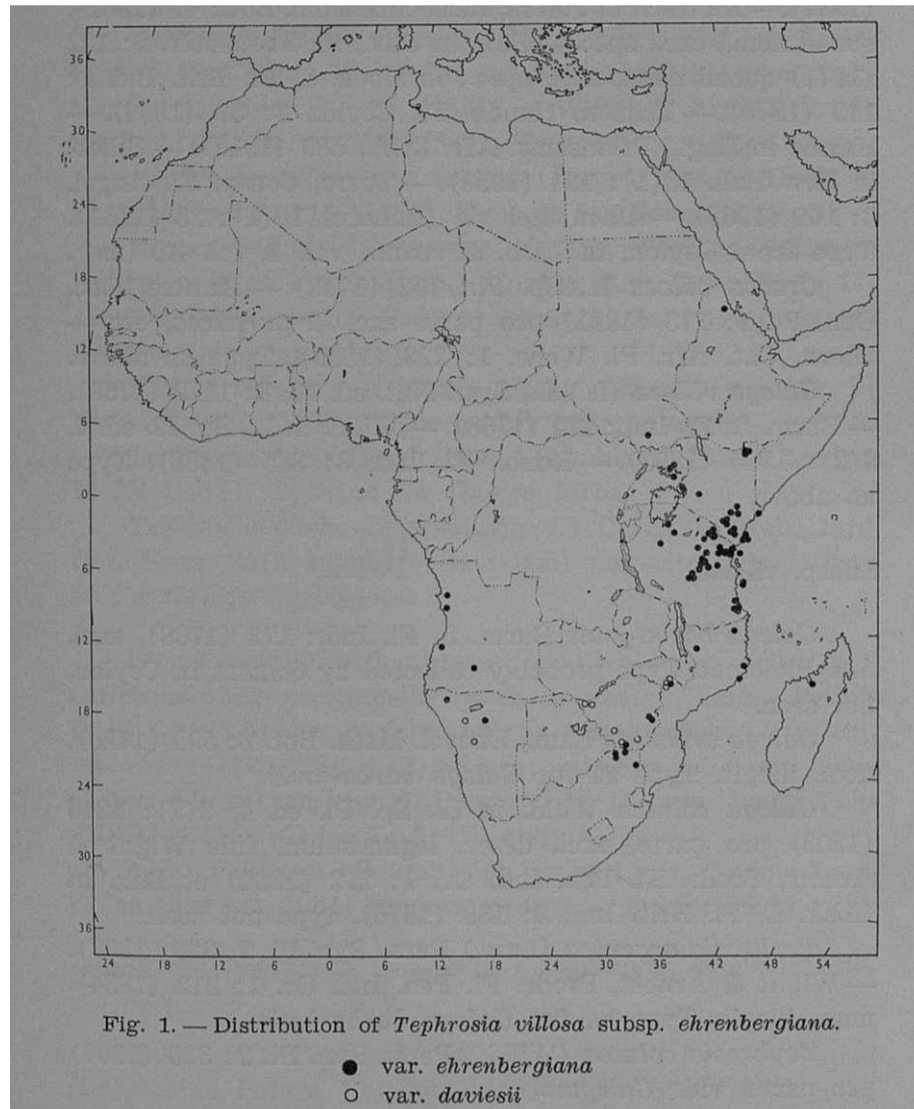
turn of the stem was closely appressed (the specific epithet presumably referring to the pods). *Galega barba-jovis* Burman f., also based on material from Ceylon, and *Galega colutea* Willd., *Galega hirta* Buch.-Ham. and *Galega incana* Roxburgh described from Indian plants, are all apparently conspecific with LINNAEUS'S species. The type of *G. incana* [*T. incana* (Roxb.) Wight] differs from that of *T. villosa* in having the stem hairs spreading, and some authors have maintained it as a distinct species on the basis of its retuse leaflets, but this character does not seem taxonomically significant. The name *T. villosa* was first used for an African plant by KLOTZSCH in 1841, but this was in fact a misidentification of *T. noctiflora*, while specimens now referred to *T. villosa* were incorrectly called *T. apollinea*. In 1867 SCHWEINFURTH published another name, *Tephrosia ehrenbergiana*, based on three African collections, from Ethiopia, Kenya and Mozambique respectively. This, however, has not always been accepted as specifically distinct from the Indian plants and in the Flora of Tropical Africa in 1871 BAKER reduced it to a synonym of *T. incana*, preferring this name to *T. villosa* presumably because of the spreading pubescence. (At the same time BAKER incorrectly referred specimens of *T. noctiflora* to *T. villosa*). Shortly afterwards, however, BAKER himself reduced *T. incana* to a variety of *T. villosa* in the Flora of British India in 1876. In the present century African collections have been variously referred to *T. ehrenbergiana* Schweinf., *T. villosa* (L.) Pers., *T. incana* (Roxb.) Wight (often cited as *T. incana* Graham) or *T. villosa* var. *incana* (Roxb.) Bak., while Indian plants have been referred to *T. villosa*, *T. hirta*, *T. incana* or *T. villosa* var. *incana*. Recently CUFODONTIS has regarded the name *T. villosa* (L.) Pers. as illegitimate [see GILLET in *Kew Bull.* 13(1): 121 (1958)] and has used the name *Tephrosia barba-jovis* for the species, but this combination has never been validly published and, as GILLET points out, the objection to the name *T. villosa* seems to be incorrect.

Taking the group as a whole, the most conspicuously varying character is perhaps the indumentum of the stem. In most plants in India, including the type of *T. villosa*, the

stem is appressed-pubescent with whitish and often subsericeous hairs, but occasionally in India the stem hairs are conspicuously spreading. Such spreading-pubescent plants have been recognised at varietal rank as *T. villosa* var. *incana*, but as ALI has recently pointed out in *Biologia (Lahore)* **10(1)**: 25-26 (1964), this variation seems to follow no geographical pattern in India and is not worth formal taxonomic recognition. In Africa the great majority of specimens are spreading-pubescent and for this reason the name *T. villosa* var. *incana* has recently been extensively applied to African plants. This emphasis on the indumentum as a taxonomic character has however, obscured what is here regarded as a more fundamental character, that of the size of the flowers and pods. This shows a much more marked correlation with geographic distribution than does stem indumentum, the Indian plants having consistently shorter calyx, petals and pods than have African plants, with only a very small overlap in the variation range between the two continents. There is similarly a tendency to smaller vegetative parts in India, where the branches tend to be rather stiffer giving a more twiggy habit. It is here, therefore, proposed to recognise one species, *T. villosa*, with two subspecies, the typical subspecies in India having the smaller range of size of flowers and fruits and generally (though not always) appressed whitish stem hairs, and subsp. *ehrenbergiana* in Africa having larger flowers and fruits and generally spreading brownish stem hairs.

There is, however, a further interesting feature in Africa in that a number of plants from south tropical Africa have a closely appressed, whitish, often subsericeous indumentum such as is characteristic of the majority of Indian plants of the species. Such plants are apparently restricted to the river valleys of the drier parts of Rhodesia and Mozambique and to parts of S. W. Africa, and are unknown from north of the Zambesi and Cunene valleys. They agree more or less in flower and fruit size with other African plants of the species but do tend sometimes to be rather smaller and so to be somewhat intermediate between most African plants and the typical subspecies of India. Since these plants are

easily distinguishable and appear to have a fairly restricted distribution it seems useful to give them a name and they



are described below as var. *daviesii* under subsp. *ehrenbergiana* of *T. villosa*. Distributions of the two varieties in Africa are shown in the map, fig. 1.

Tephrosia villosa (L.) Pers., Syn. Pl. 2: 329, no. 23 (1807).—Wight & Arnott, Prodr. Fl. Pen. Ind. Or. 1: 212 (1834).—Klotzsch in Peters, Reise Mossamb. Bot.: 47 (1861), quoad nom., excl. spec.—Bak. in Oliv., Fl. Trop. Afr. 2: 122 (1871) quoad nom., excl. spec.; in Hook. f., Fl. Brit. Ind. 2: 113 (1876).—Trimen, Handb. Fl. Ceylon 2: 33 (1894).—Harms in Engl., Pflanzenw. Afr. 3(1): 589 (1915).—Gillett in Kew Bull. 13(1): 121 (1958).—Torre, Consp. Fl. Angol. 3: 161 (1962).—Ali in Biologia (Lahore) 10(1): 25 (1964). Type from Ceylon, in herb. *Hermann* vol. 1, fol. 31 (BM).

Cracca villosa L., Sp. Pl.: 752 (1753).—Kuntze, Rev. Gen. Pl. 1: 173 (1891) pro parte excl. *β purpurea*, etc.—Hiern, Cat. Afr. Pl. Welw. 1: 223 (1896). Type as above.

Galega villosa (L.) L., Syst. Nat. ed. 10, 2: 1172 (1759).—Burm. f., Fl. Ind.: 171 (1768).—Willd. in L., Sp. Pl. ed. 4, 3(2): 1245 (1803).—Roxb., Fl. Ind. 3: 385 (1832). Type as above.

Subsp. *villosa*

Galega barba-jovis Burm. f., Fl. Ind.: 172 (1768), excl. tab. Plukenet. Type probably collected by GARCIA in Ceylon, not seen.

Galega argentea Lam., Encycl. Meth. Bot. 2: 599 (1786), nom. illegit. Type as for *Galega barba-jovis*.

Galega colutea Willd. in L., Sp. Pl. ed. 4, 3(2): 1246 (1803) pro parte, excl. descr. leguminium, fide Wight & Arnott, Prodr. Fl. Pen. Ind. Or. 1: 212 (1834) et Bak. in Hook. f., Fl. Brit. Ind. 2: 133 (1876), type not seen.

Tephrosia argentea (Lam.) Pers., Syn. Pl. 2: 329 (1807).—Wight & Arnott, Prodr. Fl. Pen. Ind. Or. 1: 212 (1834), nom. illegit. Type as for *Galega barba-jovis*.

Tephrosia colutea (Willd.) Pers., Syn. Pl. 2: 329 (1807) pro parte, vide *Galegam coluteam*.

Galega hirta Buch-Ham. in Trans. Linn. Soc London 13: 546 (1822). Type: India, Mysore, *Dr. Buchanan* (BM).

Galega incana Roxb. [Hort. Bengal.: 57 (1814), nom. nud.] Fl. Ind. ed. 2, 3: 385 (1832). Type from India, without locality, *Roxburgh* (K, chosen here as lectotype — see notes

below; BM, probable isoelectotype); see also ROXBURGH'S unpublished icones, t. 1630 (κ) and WIGHT, *IC. PL Ind. Or.* 2: t. 371 (1840-43).

Tephrosiaincana (Roxb.) [Sweet, *Hort. Brit.* ed. 2: 142 (1830), nom. nud.; Wall., Cat. no. 5644 (1831-2), nom. nud.] Wight, *Cat. Ind. Pl.*: 57 (1833).—Wight & Arnott, *Prodr. Fl. Pen. Ind. Or.* 1: 212 (1834). Type as for *Galega incana*.

Tephrosia villosa var. *incana* (Roxb.) Bak. in Hook. f., *Fl. Brit. Ind.* 2: 113 (1876). Type as for *Galega incana*.

Cracca villosa ζ *argentea* Kuntze, ♂ *incana* (Roxb.) Kuntze, ι *hirta* (Buch.-Ham.) Kuntze, *Rev. Gen. PL* 1: 174 (1891). Types as for *Galega argentea*, *Galega incana* and *Galega hirta* respectively.

Cracca villosa var. *incana* (Roxb.) Hiern, *Cat. Afr. PL Welw.* 1: 223 (1896). Type as for *Galega incana*.

Tephrosia hirta (Buch.-Ham.) Gamble, *Fl. Presid. Madras* 1: 38 (1918). Type as for *Galega hirta*.

Tephrosia barba-jovis (Burm. f.) Cufod. in Bull. Jard. Bot. **Brux.** 25(3 suppl.): 280 (1955) non rite public. Type as for *Galega barba-jovis*.

Stems usually with appressed whitish hairs, often subsericeous, but occasionally with spreading hairs. Petiole 0.1)0.3-0.8(1.5) cm, petiole and rhachis together 1-7(9) cm; leaflets (4)7-20(25) x (2)3-8 mm; stipules 2.5-6 mm long. Calyx 6-9(10) mm long. Petals 7-10(11) mm long. Pods (20)22-32(34) x (4)4.5-5.5(6.5) mm; seeds 6-8.

West Pakistan (**Punjab**), plains of India, Ceylon, Indo-China (see ALI, 1964) Indonesia [**Java**—*Backer* 35097 (κ)].

Subsp. *ehrenbergiana* (Schweinf.) Brummitt, **comb. et stat. nov.**

Basionym: *Tephrosia ehrenbergiana* Schweinf. [apud Klotzsch in Peters, *Reise Mossamb. Bot.*: 576 (1864) nom. nud.] *Beitr. FL Aethiop.*: 18 (1876).—Bak. f., *Leg. Trop. Afr.* 1: 209 (1926).—Forbes in *Bothalia* 4(4): 972 (1948), pro parte, excl. *T. rhodesicam*.—Brenan, *Check List Trees Shrubs Brit. Emp.* 5: Tanganyika Territory: 446 (1949).—Cronquist, *Fl. Congo Belge* 5: 100 (1954).—Täckholm, *Stud.*

Fl. Egypt: 301 (1956). Type: Ethiopia, «reg. Scholes» (Eritrea), Ehrenberg (B t, chosen here as lectotype —see notes below).

Tephrosia incana sensu Bak. in Oliv., Fl. Trop. Afr. 2: 123 (1871). —sensu Harms in Engl., Pflanzenw. Afr. 3(1): 589 (1915).

Tephrosia apollinea sensu Klotzsch in Peters, Reise Mosamb. Bot.: 47 (1861). —sensu Eyles in Trans. Roy. Soc. S. Afr. 5(4): 375 (1916).

Stems usually with spreading to deflexed brown or brownish-grey hairs, but sometimes (var. *daviesii*) with appressed whitish hairs. Petiole (0.2)0.5-1.6(2.1) cm, petiole and rhachis together (2)3-10(15) cm; leaflets (7)12-35(42) X (3)6-11(14) mm; stipules 4-9(11) mm long. Calyx (7)9-12(14) mm long. Petals (11)12-15 mm long. Pods (30)35-46(54) X 4.5-6.5(7) mm; seeds 7-9.

In eastern Africa from Egypt (see TÄCKHOLM, 1956) to the Transvaal, and in Angola and S. W. Africa, and Madagascar.

Var. *ehrenbergiana*

Stems with spreading or deflexed brown or brownish-grey hairs.

The following have been seen from the Flora Zambeziaca area:

RHODESIA. Eastern Div. Chipinga Distr., Sabi valley, mopane-acacia veld, 534 m, fl. & fr. i.1957, Davies 2401 (x, SRGH). Southern Div. Beibridge, shallow soil over granite, fl. & fr. 16.ii.1955, Exell, Mendonça & Wild 454 (BM; LISC; SRGH).

MOZAMBIQUE. Niassa. Mozambik, fl. 5.iv.1894, Kuntze (K — «*Cracca villosa* var. *mozambicensis* O. K.»). Mossuril, Lumbo, proximo do aeródromo, fl. & fr. 5.V.1948, Pedro & Pedrógão 3117 (x; LMJ). Quinga, fl. & fr. 25.vii. 1948, Pedro & Pedrógão 4642 (LMJ). From Macomia towards Chae, fl. & fr. 10.ix.1948, Pedro & Pedrógão 5138 (LMJ). Tete. Between Lupata and Tete, fl. & fr. ii.1859, Kirk (K). Road to Tete,

sandy soil at side of road, 900 m, fl. 28.ii.1961, *Mrs. Richards* 14496A (K).

The following are more or less intermediate between var. *ehrenbergiana* and var. *daviesii*:

RHODESIA. Southern Div. Ndanga Distr., Lundi River, Chipinda Pools, 305 m, fl. & fr. 22.i.1961, *Goodier* 70 (x; SRGH).

MOZAMBIQUE. Tete. Near Tete, 300 m, fl. & fr. 28.ii.1961, *Mrs. Richards* 14500 (K; SRGH). 2 miles E. of Tete, open woodland savanna, sandveld, fr. 13.V.1961, *Leach & Rutherford-Smith* 10825 (K; SRGH).

Var. **daviesii** Brummitt, var. nov.

A subsp. *ehrenbergiana* typica pilis valde appressis, albis, saepe subsericeis, differt.

Typus: Rhodesia, Gwanda Distr., Gwanda Special Native Area G, Chimameli camp, fl. & young fr. 15.xii.1956, *R. M. Davies* 2285 (x, holotypus; SRGH, isotypus).

RHODESIA. Western Div. Victoria Falls, 915 m, fl. 10.ii.1912, *Rogers* 5558 (x; SRGH). Deka River, Wankie, fl. & fr. 21.vi.1934, *Eyles* 7962 (x; SRGH). Southern Div. Gwanda Special Native Area G, Chimameli camp, basalt, mopane-*Commiphora-Grewia-Combretum*, & young fr. 15.xii.1956, *R. M. Davies* 2285 (x; SRGH-types). Beitbridge Distr., Pioneer Memorial, Shashi Drift, Tuli, gravelly basalt soil in sparse mopane bush, fl. & fr. 23.iii.1959, *Drummond* 5960 (x; PRE; SRGH).

MOZAMBIQUE. Tete. Tete, fl. & young fr. 3.ii.1845, *Peters* (K; isosyntype of *T. ehrenbergiana*). Tete, fl. & fr. ii.1859, *Kirk* (K). Tete, fl. & fr. i.1932, *Pomba* 63 (COI); fl. ii.1932, *Pomba* 10c (COI).

SOUTH WEST AFRICA. Ameib, Granitbänke, fl. & fr. 19.i.1934, *Dinter* 6852 (x). Farm Lusthof 243, 22.5 miles ESE of Kamanjab, fl. & fr. 6.iv.1955, *de Winter* 3067 (x). Omaruru, Ohere-Oos, Granit, fl. & young fr. 14/15.ii.1958, *Merxmüller & Giess* 1586 (K).

Some problems arise in typification of some of the names involved. Miss FORBES took the type of *T. villosato* to be a figure in BURMAN'S Thesaurus Zeylanica, but this is incorrect; as ALI has indicated, the original description by LINNAEUS in his Flora Zeylanica was undoubtedly based on a specimen from Ceylon collected by HERMANN, now at the British Museum. It is not certain what specimens ROXBURGH had when describing *Galega mcana*, but a specimen at Kew said to have been collected by ROXBURGH for ROTTLE, and labelled '*Galega mcana* Roxb.' with no locality but with a latin description, matches the original description well and is here taken as a lectotype; a specimen at the British Museum is almost certainly an isotype of this. These agree well with plate no. 1630 in ROXBURGH'S icones at Kew, reproduced in black and white by WIGHT, Ic. Pl. Ind. Or. 2: t. 371 (1840-43). SCHWEINFURTH'S *T. ehrenbergiana* was clearly based on three collections, from Eritrea (*Ehrenberg*), Kenya (*Bojer*) and Mozambique (*Peters*), and he commented that while the first two had spreading pubescence the last had appressed pubescence. The specimens examined by SCHWEINFURTH are presumed to have been destroyed at Berlin and duplicates have not been traced except for the *Peters* collection which is represented at Kew. Despite this, in view of SCHWEINFURTH'S comments and the epithet he chose, it seems best to regard the *Ehrenberg* collection from Eritrea as the lectotype and the *Peters* collection is here referred to var. *daviesii*. One collection from Eritrea—Hamasen, Dongollo near Ghinda, fr. 12.iii.1902, Pappi 65 (K) — has been seen, and this is here regarded as a neotype.

2. *T. noctiflora* Bojer ex Bak. in Oliv., Fl. Trop. Afr. 2: 112 (1871). Type: Zanzibar, *Bojer* (K).

This species is very similar to *T. villosa* and is best distinguished by its calyx in which the teeth are relatively much shorter, the lateral ones being only about as long as the tube. Its pods are generally longer, (42)45-55(60) mm, straighter and less densely villous than those of *T. villosa*. The two species have very similar Afro-Asian distributions

and show and somewhat analogous variation in stem pubescence. In south tropical Africa the hairs are appressed in all material available for examination, but in parts of East Africa (S. W. Kenya, N. W. Tanganyika, Pemba and Zanzibar) the hairs are most commonly spreading. The type specimen — Zanzibar, *Bojer* (K) — is in fact more or less spreading-pubescent. In Asia most plants have appressed stem hairs but very occasionally they may be more or less spreading. There does not seem to be sufficient geographical correlation to recognise this variation formally.

3. *Tephrosia rhodesica* Bak. f., Leg. Trop. Afr. **1**:208 (1926).
Type: Rhodesia, Bulawayo, ii.1902, *Eyles* 1062 (BM, holotype; \times , isotype).

This species has frequently been confused with *T. villosa*, which is most reliably distinguished from it by its twisted style. Miss FORBES, in her revision of the S. African species, reduced *T. rhodesica* to synonymy under *T. ehrenbergiana* (= *T. villosa* subsp. *ehrenbergiana*), while referring a number of S. African specimens to *T. polystachyoides* which was distinguished apparently mainly on the basis of stipule length. Earlier BURTT DAVY & HUTCHINSON in 1932 had recognised both *T. polystachyoides* and *T. rhodesica* in S. Africa, distinguished by the length of the calyx lobes. Re-examination of these species shows that while *T. rhodesica* is quite distinct from *T. villosa* it appears to differ from *T. polystachyoides* only in the pubescence of its pods (see descriptions below) though the calyx tends to be somewhat longer in *T. rhodesica*. Most specimens certainly can be placed readily into either one or the other group on the basis of pod indumentum but some few are difficult to place with certainty, and *T. polystachyoides* is here regarded as only varietally distinct from *T. rhodesica*, restricted geographically to a fairly narrow belt of the Flora Zambesiaca area between 15° and 21° S. The S. African material currently referred to *T. polystachyoides* seems to be uniform, and despite previous accounts it is closest to typical *T. rhodesica* in the indumentum of the pods, rather than

to *T. polystachyoides*. However, in material so far examined, the S. African (S. W. African) plants differ from typical *T. rhodesica* in having narrower pods, 3.5-4 mm broad as against (4)4.5-5.5(6) mm further north. It may thus prove possible to distinguish the S. African plants as a further taxon, but until adequate material is available they are referred to typical *T. rhodesica*. Finally examination of specimens from the Transvaal (Kruger National Park) referred to *T. evansii* Burt Davy suggests that this is only a local variant of *T. rhodesica* with conspicuously grey, rather than brown, pubescence, matched by two known collections from the south of Rhodesia and one from Botswana; this is here also recognised at varietal rank. Distribution of the three varieties is shown in the map, fig. 2.

Var. *rhodesica*

Tephrosia polystachyoides sensu Burt Davy & Hutch. in Burt Davy, Fl. PL Ferns Transvaal 1(2) : 376, 378 (1932) pro parte; sensu Forbes in Bothalia 4(4) : 971 (1948) pro parte, quoad spec. S. Afr.

Tephrosia ehrenbergiana sensu Forbes op. cit. 972 (1948) pro parte.

Indumentum of stem, leaf-rhachis and pods light to rusty brown. Calyx 6-9(11) mm long (or in S. Africa 5-8 mm). Pods (28)34-46(55) X (4)4.5-5.5(6) mm (or in S. Africa 28-42 X 3.5-4 mm), densely tomentose to villous with matted hairs.

Uganda, Kenya, Tanzania, Congo, Zambia, Malawi, Mozambique, Rhodesia, S. Africa, S. W. Africa.

Var. *polystachyoides* (Bak. f.) Brummitt, comb. et stat. nov.

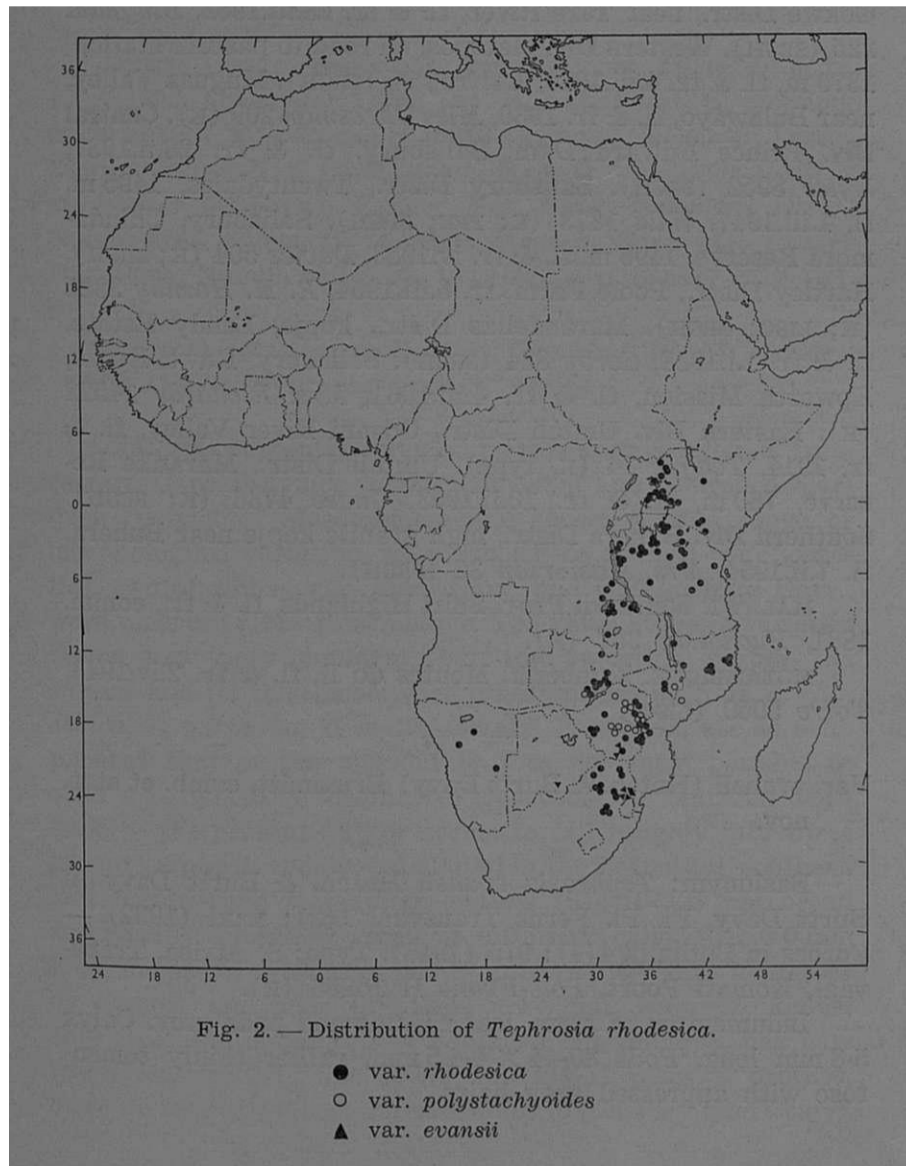
Basionym: *Tephrosia polystachyoides* Bak. f., Leg. Trop. Afr. 1: 193 (1926). Type: Rhodesia, Umtali Div., Odzani River Valley, Teague 14 (♂, holotype).

Indumentum of stem, leaf-rhachis and pods light to rusty brown. Calyx 4-6(8) mm long. Pods (28)30-45 X (3.5)4-5(5.5) mm, fairly densely pubescent with shortish hairs but

not tomentose or villous, pale straw-coloured to light brown.

S. W. Zambia, Malawi, Mozambique, Rhodesia. The following specimens have been seen:

ZAMBIA. Southern Prov. Mazabuka Distr., Mochipapa to Sinazongwe mile 24, fl. & fr. 2.iii.1960, *White* 7548 (x).



RHODESIA. **Northern Div.** Trelawny Tobacco Station, 23. xii.1942, *Jack* 50 (κ ; SRGH); fl. & fr. 22.ii.1943, *Jack* 90 (κ ; SRGH); fl. 29.iii.1944, *Jack* 50/90 (K). Miami, Exp. Farm, f l. & fr. 7.iii.1947, *Wild* 1823 (SRGH). Mrewa Distr., fl. & fr. ii.1954, *Davies* 778 (κ ; SRGH). Mtoko Distr., Mudzi Dam, 1220 m, fl. & young fr. 16.ii.1962, *Wild* 5671 (K; LISC; SRGH). Gokwe Distr., near Tare River, fl. & fr. 28.iii.1962, *Bingham* 225 (SRGH). **Western Div.** Matopos, on road to pasture station, 1370 m, fl. & fr. 4.iii.1930, *Rattray* 95 (SRGH). Mugusa Valley, near Bulawayo, fl. & fr. 1930, *Miss Cheesman* 209 (K). **Central Div.** Prince Edward Dam, Salisbury, fl. & fr. 28.ii.1937, *Eyles* 8952 (SRGH). Salisbury Distr., Twentydals, 1495 m, fl. 1.iii.1947, *Wild* 1873 (κ ; PRE; SRGH). Salisbury, Chindamora Reserve, 1495 m, fl. & fr. iv.1953, *Davies* 504 (K; SRGH). Hartley Distr., Poole Farm, fr. 6.iii.1954, *R. M. Hornby* 3335 (κ ; LISC; SRGH). Marandellas Distr., kopje, Lendy Estate, fl. & fr. 1.i.1958, *Corby* 834 (SRGH). Salisbury, Ruwa Rocks, Epworth Mission, fl. & fr. 4.iii.1961, *Mrs. Richards* 14522 (K). **Eastern Div.** Umtali Distr., Odzani River Valley, fl. & fr. 1914, *Teague* 14 (κ , type). Umtali Distr., Maranke Reserve, 760 m, fl. & fr. 10.ii.1953, *Chase* 4736 (κ ; SRGH). **Southern Div.** Buhera Distr., high granite kopje near Buhera, fl. 7.ii.1954, *Mrs. Masterson* 36 (SRGH).

MALAWI. **Southern Prov.** Shiri Highlands, fl. & fr., comm. 1881, *Buchanan* 357 (κ).

MOZAMBIQUE. **Zambézia.** Montes do Il, fl. & fr. 2.iv.1943, *Torre* 5050 (LISC).

Var. **evansii** (Hutch. & Burt Davy) Brummitt, *comb. et stat. nov.*

Basionym: *Tephrosia evansii* Hutch. & Burt Davy in Burt Davy, Fl. Pl. Ferns Transvaal 1(2): xxxi (1932).—Forbes in Bothalia 4(4): 975 (1948). Type: S. Africa, Transvaal, Komati Poort, *Pole-Evans* H 16853 (K).

Indumentum of stem, leaf rhachis and pods grey. Calyx 5-8 mm long. Pods 30-44 X 4-4.5 mm, rather thinly tomentose with appressed grey hairs.

BOTSWANA. South-eastern Div. On road from Kalkia to Kanye, low red sandstone mountain on undulating sandy flats, fl. 24.ii.1960, *de Winter* 7503 (κ ; SRGH).

RHODESIA. Southern Div. Nuanetsi Div., Malangwe River, south-west Mateke Hills, sandy ground near stream, 625 m, fl. & fr. 6.V.1958, *Drummond* 5640 (COI; κ ; SRGH). Nuanetsi Distr., Sibongla Hills, among rocks, fl. & fr. 1.v.1962, *Drummond* 7835 (SRGH).

SOUTH AFRICA. Transvaal. Komati Poort, 330 m, fl. & fr. 15.xii.1897, *Schlechter* 11763 (K). Komati Poort, fl. & young fr. 29.xi.1917, *Pole-Evans* H 16853 (κ , type). Nelspruit Distr., Kruger Nat. Park, 300 m, fl. & fr. 6.ii.1949, *Codd & de Winter* 5087 (κ). Kruger Nat. Park, Nelspruit Distr., Numbi area, 660 m, fl. 14.i.1953, *Acocks* 16683 (κ). Kruger Nat. Park, Numbi, 610 m, fl. 14.i.1953, *v. d. Schyff* 1619 (κ).

4. *Tephrosia polystachya* E. Mey., *Comment. Pl. Afr. Austr.*: 109 (1836). Syntypes from S. Africa.

Material currently referred to this species extends from eastern Cape Province to the Transvaal and Lourenço Marques District of Mozambique, and shows a wide range or morphological variation. Miss FORBES recognised four varieties, two of which, var. *hirta* Harv. and var. *latifolia* Harv., were recorded from Mozambique. The value of these varieties seems now very doubtful, but the variation within the species and its relationships to other species such as *T. rhodesica*, *T. purpurea*, *T. multijuga* and *T. amoena* are so complicated that at the moment it does not seem possible to offer a satisfactory alternative classification. Material available to the present author seems to fall roughly into three groups: *group 1*, widely distributed in the Transvaal, southern Mozambique and Natal, has leaflets (3)4-10(13) mm broad and usually pubescent above, in 5-8 pairs, calyx (3)3.5-6 mm long or up to 8 mm in plants referred to var. *longidens* by FORBES, and pods (38)45-52 x 4-5 mm; *group 2*, known only from the mountains of southern Mozambique, has narrower leaflets 2-4.5 mm broad, in (4)7-11 pairs, a profuse, more or less corymbose inflorescence, but a very short calyx

2.5-3 mm long; and *group 3*, occurring in the eastern Cape Province, again has narrow leaflets 2.5-5(6) mm broad, in 5-9 pairs, calyx (3)4-5 mm long, and pods 33-38 X c. 3 mm. Group 2, for which unfortunately no pods are available, might perhaps be worthy of varietal or even subspecific rank within *T. potystachya*, but it also shows a striking similarity to *T. amoena* E. Mey. from eastern Cape Province and Natal. This difficult complex requires further investigation when more adequate material is available.

The specimens cited below, apparently referable to *T. potystachya*, have been seen from the Flora Zambesiaca area. A number of others which have previously been identified as *T. potystachya* are now referred to *T. purpurea*.

Group 1

MOZAMBIQUE. Lourenço Marques. Incanhini, fl. & fr. 15.i.1898, *Schlechter* 12036 (K). Old garden near fresh-water lake, S. E. Maputo, fl. & fr. 4.iv.1947, *R. M. Hornby* 2621 (LMJ; PRE; SRGH). Near Infulene, fl. & fr. 29.i.1948, *Pedro* 3655 (LMJ).

Group 2

MOZAMBIQUE. Lourenço Marques. Goba Fronteira, near the Swaziland border, st. 8.i.1947, *Pedro & Pedrógão* 408 (LMJ; PRE). Montes de Goba (Fonte), fl. 11.i.1948, *Torre* 7112 (LISC). Namaacha, Mte. Mpondium, base, fl. 22.ii.1955, *Gomes Pedro* 5025 (LMJ). Libombos, near Namaacha, Mt. Mpondium, 800 m, fl. 22.ii.1955, *Exell, Mendonça & Wild* 521 (LISC; SRGH). Libombos, near Namaacha, Mt. Mpondium, 800 m, fl. 22.ii.1955, *Exell, Mendonça & Wild* 534 (LISC; SRGH) — approaching group 1 in leaflet breadth and calyx length. Namaacha Falls, fl. 22.ii.1955, *Exell Mendonça & Wild* 540 (LISC; SRGH).

Group 2. TEPHROSIA PURPUREA
AND ALLIED SPECIES

This group of glabristyled species with glabrous to sparsely appressed-pubescent pods, leaf-opposed racemes and usually numerous leaflets is already notorious for its taxonomic difficulties. *T. purpurea* itself, as here defined, is a highly variable pan-tropical weedy species to which many specific names have been applied, and a number of species here regarded as distinct have commonly been confused with it. In the present notes a taxonomic treatment is offered for *T. purpurea* in tropical Africa and south-east Asia, and for the closely allied species in tropical Africa. No attempt is made, however, to include plants of this group from the Americas, from south-west Asia or from Australia, where further problems undoubtedly wait to be solved. In South Africa, too, the variation of *T. capensis* (Jacq.) Pers. and the relationship of this and other species to *T. purpurea* require further investigation. Within tropical Africa, and particularly in the Flora Zambesiaca area, doubt remains as to the taxonomic status of most of the taxa here recognised, and some of the problems may not be solved without detailed field studies of the variability of the group.

In tropical Africa the blanket name *T. purpurea* was long used uncritically for a wide range of plants. A lead in a more critical approach was given by MORTON in *Journ. W. Afr. Sci. Ass.* 2(1): 69-76 (1956), who showed that *T. pumila* (as *T. procumbens*) was specifically distinct and that the native West African plant (*T. leptostachya*) differed markedly in habit and other characters from the Asian plant introduced in Ghana (*T. wallichii*). The two latter are here regarded as only subspecifically distinct and ALI in *Biologia (Lahore)* 10: 28-32 (1964) has shown that *T. wallichii* is not taxonomically separable from *T. purpurea*. The widespread African representative is thus here named *T. purpurea* subsp. *leptostachya*; the commonly made distinction of two varieties (var. *leptostachya* and var. *pubescens* Bak.) on the basis of spreading or appressed pubescence seems justifiable on the grounds of different geographical tendencies; and

varietal rank is here accorded to a variant in the lowlands of south-east tropical Africa which has the stiffly erect habit of the Asian subspecies of *T. purpurea* but otherwise resembles the African subsp. *leptostachya*. This last variant, var. *delagoensis* (H. Forbes) Brummitt, which had been given specific status by Miss FORBES, may thus be compared with *T. villosa* var. *daviesii* in its geographical distribution and its morphological intermediateness between widespread African and Asian plants.

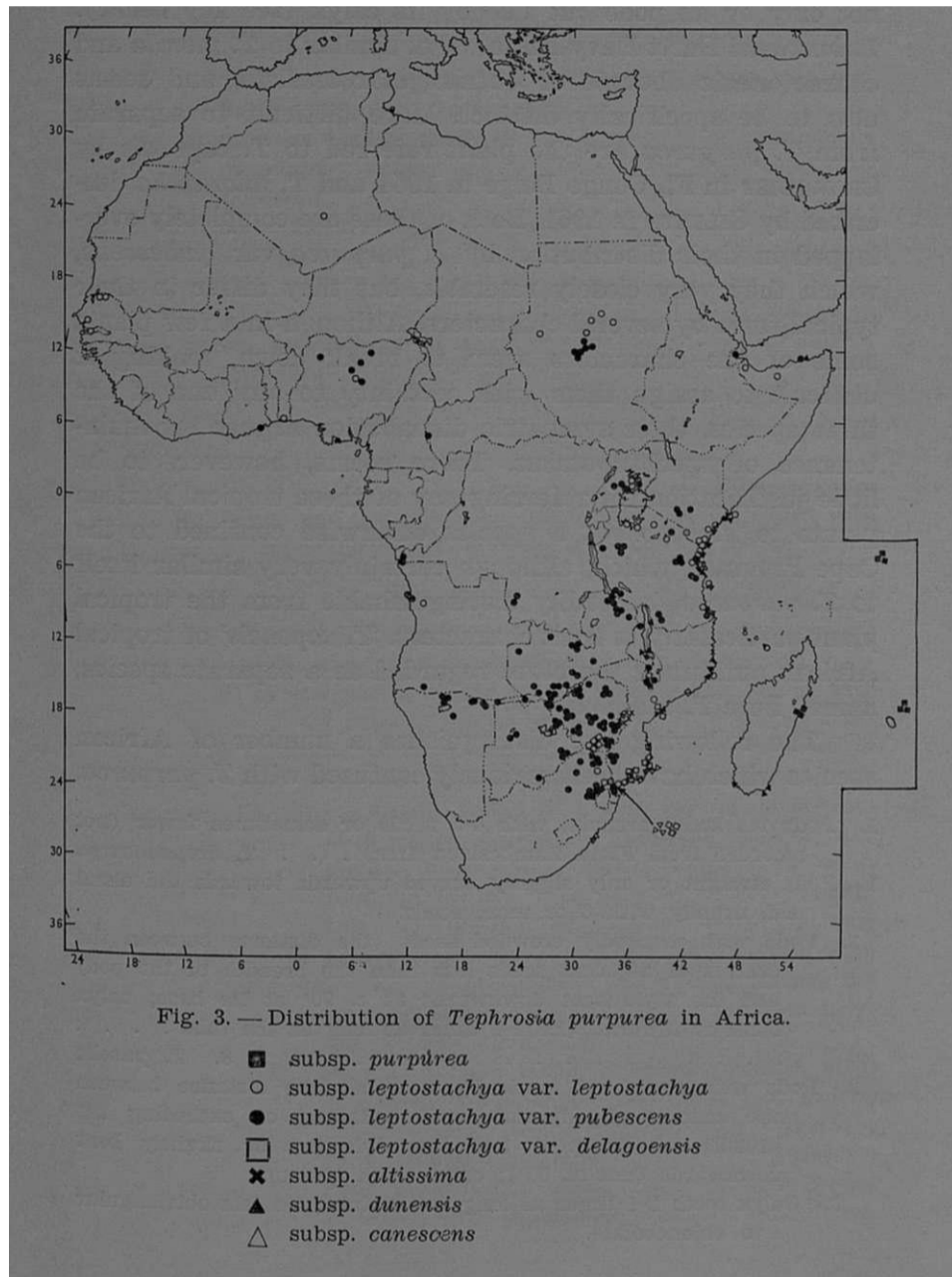
The coastal sand-dune plant of southern Mozambique and Natal, *T. canescens* E. Mey., has previously consistently been regarded as specifically distinct from *T. purpurea*, but in fact seems now to be connected to that species by such a continuous series of intermediates extending northwards along the coasts of eastern Africa that despite its very characteristic general facies it is here reduced to subspecific rank in *T. purpurea*. The series of coastal intermediates, some of which have previously been referred to *T. purpurea*, some to *T. canescens*, and some regarded as intermediates, are here grouped as a further subspecies, subsp. *dunensis*, which intergrades into subsp. *canescens* with no marked disjunction in middle Mozambique. Intermediates between both these coastal subspecies and subsp. *leptostachya* seem to occur where they meet near the coast.

Finally, a number of plants with a very distinctive habit and general facies and larger in most parts than other African plants of this species, mainly from the mountains of middle Mozambique but also apparently occurring further north in Malawi and northern Mozambique, are described as a new subspecies of *T. purpurea*, subsp. *altissima*; it is possible that further investigation may show that these are better regarded as specifically distinct.

Distribution of specimens examined of native African taxa within *T. purpurea* is shown in the map, fig. 3.

Several other taxa which have commonly been included in *T. purpurea* are here recognised as distinct species. In fruit *T. drepanocarpa* Welw. ex Bak. is readily distinguished by its few-seeded arcuate pods, though in the absence of fruit it is almost indistinguishable from *T. purpurea* var. *pubes-*

cens. Plants from Mozambique which have been identified with *T. drepanocarpa* appear to be only *T. purpurea* with deformed pods, and although it is widespread from Angola



to tropical east Africa this species is not yet known to occur in the Flora Zambesiaca area. *T. pumila* (Lam.) Pers., long regarded as a variety of *T. purpurea*, is distinguished not only by its pods but also by its calyx (see key below). *T. burchelli* Burt Davy has a calyx similar to *T. pumila* and characteristic obovate or obtriangular leaflets, and seems also to be specifically distinct. More difficult to separate from *T. purpurea* are the plant referred to *T. capensis* by CRONQUIST in Fl. Congo Belge in 1954 and *T. micrantha* described by GILLET in 1961. Both of these are completely overlapped in their distribution by *T. purpurea* var. *pubescens*, which they very closely resemble, but they differ in their typical form by several characters. Although in a few plants some of the characters seem to break down, making it difficult to assign them with certainty to any one of the three species, their sympatric distribution argues for maintenance of specific status. There seems, however, to be little justification for referring any of these tropical African plants to *T. capensis*, a species otherwise confined to the Cape Province, which, although certainly very similar itself to *T. purpurea*, is readily distinguishable from the tropical plant particularly in fruit characters. '*T. capensis*' of tropical African authors is therefore regarded as a separate species, named here *T. malvina*.

The following key distinguishes a number of African species which have been variously confused with *T. purpurea*.

1. Pods markedly arcuate, with 4-5 seeds or sometimes fewer (not recorded from Flora Zambesiaca area) . . . *T. drepanocarpa*
1. Pods straight or only slightly curved upwards towards the distal end, usually with 6 or more seeds.
 2. Pods with markedly crowded seeds (the distance between the centres of adjacent seeds less than the breadth of the pod) and the style bent downwards at c. 90° at its base; calyx teeth ± filiform, (1.5)2-4 times as long as the tube 8. *T. pumila*
 2. Pods with seeds not markedly crowded (the distance between the centres of adjacent seeds equalling or exceeding the breadth of the pod) and the style not or slightly bent downwards (not at 90°); calyx teeth various.
 3. Calyx teeth 2-4 times as long as the tube; leaflets obtriangular to oblanceolate.

4. Perennial with a woody base and erect stems 25-45 cm high; stems, leaf rhachides and calyces brown-pubescent 9. *T. coronilloides*
4. Annual or short-lived perennial with procumbent or ascending stems; stems, leaf rhachides and calyces inconspicuously greysh-pubescent or glabrescent *T. burchellii*
3. Calyx teeth equalling or up to 1 ½ times as long as the tube, ± linear-triangular; leaflets various.
 5. Stems erect (except rarely in *T. multijuga* in S. Mozambique mountains), slender and subglabrous to thinly appressed-pubescent.
 6. Calyx (1.5)2(3) mm long; leaflets ± linear-elliptic, acute at apex 10. *T. multijuga*
 6. Calyx 3-4(4.5) mm long; leaflets obtuse at apex 5. *T. purpurea*
 5. Stems procumbent to ascending or tufted or forming a low shrub, variously pubescent.
 7. Stems and leaf rhachides densely and conspicuously covered in spreading brown hairs; calyx 5-7 mm long; petals 8-11 mm long (South Africa only) *T. semiglabra*
 7. Stems and leaf rhachides not conspicuously covered with spreading brown hairs, or if ± so then calyx 2-5 mm and petals 4-8 long or up to 10 mm in *T. malvina*
 8. Stems and inflorescence axes densely white pubescent (sandy shores) 5. *T. purpurea*
 8. Stems and inflorescence axes not white-pubescent.
 9. A low shrub, woody in the lower parts; leaves with 1-2 pairs of lateral leaflets *T. limpopoensis*
 9. Herbaceous, or if somewhat woody below then leaves with 3 or more pairs of lateral leaflets.
 10. Stems usually tufted (i. e. with several much-branched stems ascending from the base of the plant), occasionally more elongate or mat-forming; leaflets often grey or silvery beneath; calyx (1.5)2-3 mm long; petals 4-5(6) mm long 6. *T. micrantha*
 10. Stems usually procumbent, not tufted; leaflets not grey or silvery beneath; calyx 2-5(6) mm long; petals (5)6-10 mm long.
 11. Pods 4.5-5.5 mm broad, ± straw coloured, 6(7)-seeded; inflorescence axis stout and usually ± winged; petiole usually longer than the lower pair of leaflets 7. *T. malvina*
 11. Pods 3-4.5(5) mm broad, dark or dull brown, 6-10-seeded; inflorescence axis ± slender, not

winged; petiole longer or shorter than the lowest pair of leaflets.

12. Racemes few-flowered and usually shorter than the supporting peduncle; petioles usually longer than the lower pair of leaflets *T. capensis*
12. Racemes many-flowered and usually longer than the supporting peduncle; petioles usually shorter than the lower pair of leaflets 5. *T. purpurea*

5. *Tephrosia purpurea* (L.) Pers., Syn Pl. 2: 329 (1807). — DC, Prodr. 2: 251 (1825). — Wight & Arn., Prodr. Fl. Pen. Ind. Or. 1: 213 (1834). — Bak. in Oliv., Fl. Trop. Afr. 2: 124 (1871). — Bak. in Hook. f., Fl. Brit. Ind. 2(1): 112 (1876) pro parte, excl. vars.; Fl. Maurit. Seychell.: 71 (1877). — Robinson in Bot. Gaz. 28(3): 201 (1899). — Fawcett & Rendle, Fl. Jamaica 4: 19 (1920). — Bak. f., Leg. Trop. Afr. 1: 190 (1926). — Forbes in Bothalia 4(4): 974 (1948). — Wood in Rhodora 51(612): 379 (1949). — Hepper in Fl. W. Trop. Afr. ed. 2, 1(2): 530 (1958). — Torre in Consp. Fl. Angol. 3: 153 (1962). — Ali in Biologia (Lahore) 10(1): 28 (1964). Type: Ceylon, *Hermann*—Herb. *Hermann* vol. 1, fol. 37, no. 301 (BM).

Cracca purpurea L., Sp. Pl. 2: 752 (1753). — Vail in Bull. Torrey Bot. Club 22: 31 (1895). — Rydberg in N. Amer. Fl. 24(3): 179 (1923). Type as for *T. purpurea*.

Galega purpurea (L.) L., Syst. Nat. ed. 10, 2: 1172 (1759). — Roxb., Fl. Ind. 3: 386 (1832). Type as for *T. purpurea*.

Cracca villosa β *purpurea* (L.) Kuntze, Rev. Gen. Pl. 1: 174 (1891). Type as for *T. purpurea*.

Annual or perennial, stems procumbent, ascending or erect, up 70(100) cm high or sometimes (subsp. *altissima*) up to 150 cm, sometimes forming a low bush and becoming woody in the lower parts. Stems thinly pubescent with appressed to spreading hairs or densely white or silvery-grey pubescent and sometimes sericeous. Leaves pinnate with (3)4-10(11) pairs of leaflets; petiole 0.1-3.5 cm long, petiole and rhachis together (1.5)3-10(13) cm; leaflets

(0.5)0.8-4(4.5) X (0.2)0.3-1.0(1.3) cm, elliptic or obovate to oblong or oblanceolate, cuneate at the base, rounded to truncate at the apex; upper surface glabrous to densely appressed-pubescent and sericeous, lower surface thinly appressed-pubescent to **sericeous**; stipules (0.5)1-8 X 0.2-1.5 mm, very shortly triangular to linear-triangular. Flowers in terminal and leaf-opposed racemes **2-20(24)** cm long; bracts 0.5-5 X 0.1-0.7 mm; pedicels 2-6(8) mm. Calyx (1)2-4(6) mm long, appressed- or **spreading-pubescent**; lateral teeth approximately equalling the tube; upper teeth connate. Petals (5)6-10 mm long, purple or pinkish. **Staminal** tube connate above. Ovary pubescent; style **glabrous**; pods 26-60 X 4-6.5 mm, dark, shortly pubescent; seeds (4)6-10(11), 3-4 X 2-2.5 X 1-1.2 mm, ± rhomboidal or oblongoid with a very small caruncle at the middle of one the longer sides, or sometimes ± subreniform.

Key to subspecies in tropical Africa and S. E. Asia

1. Young stems and inflorescence axes white or silvery-grey pubescent with dense appressed hairs (sandy maritime or lake shores).
 2. Upper surface of leaflets subglabrous to thinly appressed-pubescent, not sericeous; pods **c.** 4.5 mm broad . . . subsp. ***dunensis***
 2. Upper surface of leaflets densely appressed-pubescent and ± sericeous when young; pods 4.5-6.5 mm broad subsp. ***canescens***
1. Stems and inflorescence axes not white or silvery-grey pubescent.
 3. Plant 60-150 cm high, erect, slender lax, not bushy; pods (40)48-60 mm long subsp. ***altissima***
 3. Plant procumbent or ascending or ± bushy, up to 70(100) cm high; pods 26-50(56) mm long.
 4. Plant erect and forming a low bush, becoming woody in the lower parts; inflorescences (1)2-10(15) cm, short and compact; seeds usually 5 or 6, occasionally 7, very rarely 8 (Asia and Indonesia; naturalised in W. Africa and America) subsp. ***purpurea***
 4. Plant procumbent or ascending, or sometimes (var. ***dela-goensis***) ± erect and bushy; inflorescences (2)5-18(25) cm, usually lax; seeds 7-10 or rarely 6 (Africa; ? naturalised in America) subsp. ***leptostachya***

Subsp. *purpurea*

Tephrosia purpurea sensu Trimen, Handb. Fl. Ceylon **2**: 31 (1894).—Gamble, Fl. Presid. Madras **1**(2): 317, 320 (1918).—Tadulingham & Venkatanarayana, Handb. S. Ind. Weeds: 113, t. 48 (1932).—Santapau, Fl. Saurashtra: 136 (1962).—J. K. Maheshwari, Fl. Delhi: 121 (1963); Ill. Fl. Delhi: 63, t. 63 (1965).

Tephrosia lanceæfolia Link, Enum. Hort. Berol. **2**: 252 (1822).—DC., Prodr. **2**: 251 (1825). Fide Bak. in Hook. f., Fl. Brit. Ind. **2**(1): 113 (1876), type not seen, presumably cultivated at Berlin from seeds sent from Bengal.

Galega colonila Buch.-Ham. in Trans. Linn. Soc. **13**: 545 (1822). Type not traced.

Galega sericea Buch.-Ham. in Trans. Linn. Soc. **13**: 545 (1822). Type not traced.

Galega diffusa Roxb., [Hort. Bengal.: 57 (1814), nom. nud.] Fl. Ind. **3**: 387 (1832). Type a plant from India figured in Roxburgh's Fl. Ind. icones (x).

Galega lanceæfolia Roxb. [Hort. Bengal.: 57 (1814) nom. nud.] Fl. Ind. **3**: 386 (1832). Type: without locality, Roxburgh, as *T. lanceolata* (x, chosen here as lectotype).

Tephrosia diffusa (Roxb.) Wight & Arn. in Wight, Cat.: 54 (1833); Prodr. Fl. Pen. Ind. Or. **1**: 213 (1834). Type as for *Galega diffusa*.

Tephrosia purpurea var. *diffusa* (Roxb.) Aitchison, Cat. Pl. Punjab Sind: 42 (1869). Type as for *Galega diffusa*.

Tephrosia wallichii Graham [in Wallich, Cat. no. 5640 (1831-2) nom. nud.] ex Fawcett & Rendle in Journ. Bot. **55**: 35 (1917); Fl. Jam. **4**: 20 (1920).—Morton in Journ. W. Afr. Sci. Ass. **2**(1): 71 (1956).—Gooding, Loveless & Proctor, Fl. Barbados: 217 (1965). Type: Segam (or? Segaoon) 31 October, herb. Wallich 5640 (Herb. Wallich, x—chosen here as lectotype).

Tephrosia hamiltonii J. R. Drummond ex Gamble, Fl. Presid. Madras **1**(2): 317, 320 (1918).—Haines, Bot. Bihar Orissa: 243 (1922).—Parker, For. Fl. Punjab, ed. **2**: 133 (1924).—Osmaston, For. Fl. Kumaon: 155 (1927).—San-

tapau, Fl. Saurashtra: 138 (1962). Type: Peninsula Ind. Orientalis, *Wight* 898 (x).

Tephrosia purpurea var. *maritima* Haines, Bot. Bihar Orissa: 244 (1922). Type: India, Orissa, Chandpur, near the sea, *Haines* 5162 (x, chosen here as lectotype).

Cracca wallichii (Graham ex Fawcett & Rendle) Rydberg in N. Am. Fl. 24(3): 180 (1923). Type as for *Tephrosia wallichii*.

Tephrosia purpurea var. *elongata* Craib, Fl. Siam Enum. 1(3): 384 (1928). Type: Siam, Prachuap, Sam Roi Yawt, *Kerr* 10979 (x).

Tephrosia taylorii Graham ex Wallich, Cat. no. 5637 (1831-2), nom. nud.

Tephrosia stricta Graham ex Wallich, Cat. no. 5639 (1831-2), nom. nud.

Tephrosia lobata Graham ex Wallich, Cat. no. 5646 (1831-2), nom. nud.

Tephrosia galeoides Graham ex Wallich, Cat. no. 5649 (1831-2), nom. nud.

Tephrosia lanceolata Wallich, Cat. no. 5636 (1831-2) sphalm. (*T. lanceaefolia* Link).

Indigofera flexuosa Graham ex Wallich, Cat. no. 5473 (1831-2), nom. nud.

Tephrosia inctoria sensu Wallich, Cat. no. 5643 (1831-2).

Annual or short-lived perennial, stems stout, erect, becoming woody in the lower parts, forming a low bush up to 70(100) cm high. Stems thinly appressed- or spreading-pubescent. Leaves with (3)5-10(11) pairs of leaflets; petiole (0.2) 0.5-1.5(2.0) cm, petiole and rhachis together (1.5)2.5-9(10) cm; leaflets 0.8-2.5(3.2) x 0.3-1(1.1) cm; upper surface glabrous to thinly pubescent; stipules 2-8(10) x 0.2-1 mm. Inflorescences (1)2-10(15) cm long, compact, the axis not white-pubescent; bracts 1-3 mm long. Petals (5)6-7(9) mm long. Pods 26-40(44) x 3.5-5 mm; seeds usually (4)6, occasionally 7, very rarely 8.

From W. Pakistan through India, Ceylon, Burma, Indo-China and the Malay Peninsula to Indonesia and possibly Australia; also probably native, but possibly introduced, in

Madagascar, Mauritius and the Seychelles; certainly introduced in Africa and possibly in the W. Indies and Americas.

The following introduced specimens have been seen from continental Africa:

COTE D'IVOIRE. Forêt de l'Abouabou, between Abidjan and Grand Bassam, open place near Cocos-plantation, fl. & fr. 6.i.1959, *Leeuwenberg* 2342 (K).

GHANA. 1 mile from the beach, Prampram, fl. & fr. V.1930, *Irvine* 1437 (x). Accra, just back from the beach, fl. & fr. 22.i.1950, *Baldwin* 14038 (K). On coast at Prampram, fl. & fr. xi. 1951, *Morton* 6087 (x). Nungua, Agricultural Research Station, 5° 40' N : 0° 66' W, fl. & fr. 20.vi.1956, *Rose Innes* GCH 30117 (x). Kpeshi Lagoon grassland, fl. & fr. 10.xi.1956, *Adams* 4383 (K). Tema, waste ground, fr. 13.i.1962, *Hall* 2157 (x). Near Legon, Accra, fl. & fr. 3.xi. 1963, *Obeng-Darko* 5141 (x).

RHODESIA. Central Div. Salisbury, near lab., fr. 25.iv.1932, *Ratray* 510 (K; SRGH).

The status of the following from Madagascar, Mauritius, Rodrigues and the Seychelles is somewhat doubtful, but it seems probable that they are native and not introduced:

MADAGASCAR. Without locality, recd. 1883, *Humboldt* 115 (x). Tamatave to capital, comm. 1891, *Baron* 6022 (x). Tamatave, viii.1917, *Decary* (K).

MAURITIUS. Mauritius. Champ de Mars, fl. and fr. iii.1857, *Ayres* (K). Maurit., *Telfair* (K). Maurit., *Blackburn* (K). Common everywhere on the island, *Boulon* (K). Fl. Maurit. II No. 156, anon. (K). Rodrigues. fr. viii-xii. 1874, *Balfour*, Transit of Venus Expedition 1326 (x). Baie Malgache, fl. and fr. 25.iv.1924, *Gorbett* 25 (K).

SEYCHELLES. Îles Seychelles, fr. 1841, *Pervillé* (K). Seychelles, fr. 1874 *Home* 480 (x).

Although Roxburgh's *Galega diffusa* has commonly been identified with *T. pumila* (or *T. purpurea* var. *pumila*) examination of the illustration in ROXBURGH'S *Icones* at Kew, which is to be taken as the type of the name, shows that this clearly is incorrect. The illustration shows clearly a pod

with six well-spaced seeds and leaves with up to 10 pairs of leaflets. As ALI has indicated in *Biologia (Lahore)* **10**: 29 (1962) this seems to correspond with Indian specimens of *T. purpurea* rather than *T. pumila*.

Subsp. leptostachya (DC.) Brummitt, comb. et stat. nov.

Basionym: *Tephrosia leptostachya* DC, Prodr. 2: 251 (1825).— Benth. in Mart., Fl. Bras. **15**(1): 48 (1859).— Grisebach, Fl. Brit. W. Ind. Is.: 182 (1860).— Bak. f., Leg. Trop. Afr. **1**: 191 (1926).— Hutch. & Dalziel, Fl. W. Trop. Afr. **1**(2): 385 (1928).— Morton, Journ. W. Afr. Sci. Ass. **2**(1): 70 (1956). Type: Senegal, Perrottet (G, proposed here as lectotype, seen in microfiche only).

Tephrosia lineata Schum. & Thonn. in Schum., Beskr. Guin. Pl.: 376 (1827). Type in Isert & Thonning herbarium (C, seen in microfiche only).

Cracca leptostachya (DC.) Rusby in Mem. Torrey Bot. Club 33: 18 (1893). Type as for *Tephrosia leptostachya*.

Annual or short-lived perennial, stems procumbent or ascending, weak and straggling, or sometimes (var. *dela-goensis*) stouter, erect and ± bushy. Stems thinly appressed-to spreading-pubescent. Leaves with (3)4-10(11) pairs of leaflets; petiole (0.1)0.2-2.0(2.5) cm, petiole and rhachis together (1)2.5-9(10) cm; leaflets (0.5)0.8-2.5(3.0) X 0.2-0.9 (1.1) cm; upper surface glabrous to thinly appressed-pubescent; stipules 2-7(8) X 0.2-1 mm. Inflorescences (2)5-18 (25) cm, lax, the axis not white-pubescent; bracts (1)2-5 mm long. Petals 5-8(10) mm long. Pods (20)32-50(56) X 3-4.5 (5) mm; seeds (6)7-10(11).

Africa; introduced in the West Indies and America.

Var. leptostachya

Stems procumbent or ascending, usually ± straggling, subglabrous or with closely appressed hairs.

Widespread in tropical Africa but apparently local and absent from large areas (see map, fig. 3); Algeria, Senegal, Gambia, Dahomey, Nigeria, Sudan, Ethiopia, Somali Repu-

blic, Uganda, Kenya, Tanzania, Mozambique, Comoro Islands, Botswana, Rhodesia, Angola and South Africa (Transvaal). The following specimens from southern Africa have been seen:

BOTSWANA. **South-east.** 60 km N. W. of Serowe, fr. 24.iii.1965, *Wild & Drummond* 7206 (SRGH).

RHODESIA. **Eastern Div.** Chipinga Distr., Lower Sabi, east bank, Hippo Mine area, fl. & fr. 12.iii.1957, *Phipps* 594 (SRGH).

MOZAMBIQUE. **Niassa.** Mozambik, fl. & fr. 5.iv.1894, *Kuntze* (K). Mocimboa da Praia 5 km towards Diaca, fl. & fr. 14.iv.1964, *Torre & Paiva* 11949 (LISC). **Zambesia or Manica e Sofala.** Shupanga, fl. 2.viii.1859, *Kirk* (x). Margens do Zambezi, fl. & fr. 1884-1885, *Carvalho* (COI). **Lourenço Marques.** Cidade de Lourenço Marques, fl. & fr. 25.ii.1945, *Esteves de Sousa* 46 (LISC; PRE), Maputo, Bela Vista, fl. & fr. 16.ii.1952, *G. Barbosa & Balsinhas* 4709 (LISC).

COMORO ISLANDS. Mayotte, *Boivin* (x).

ANGOLA. **Cuanza Norte.** Rio Cuanza, prox. de Mopopo, *Welwitsch* 2099 (K).

SOUTH AFRICA. **Transvaal.** Shilouvane, fr. ii-iii, *Junod* 1125 (x). Komati Poort, fl. & fr. iii.1918, *Rogers* 20814 (x).

Plants from the Sahara region here referred to var. *leptostachya* often appear to have the habit of a low bush and may be taxonomically separable — see for example *Chipp* 49 from southern Algeria (K), *Vogel* 38 from Lake Chad, Nigeria (x) and recent collections from the same region by *Léonard* (BR).

Three further collections from southern Rhodesia may be referable to *T. purpurea* var. *leptostachya* but their relationship to *T. limpopoensis* Gillett in *Kew Bull.* **13(3):** 418 (1958) requires further investigation:

RHODESIA. **Southern Div.** Gwanda Distr., Shashi Plain, Beit Bridge alluvium, fl. xii, 1954, *R. M. Davies* 890 (SRGH). Gwanda Distr., Special Native Area G, fl. & fr. 15.xii.1956, *R. M. Davies* 2307 (x; SRGH); 2318 (x; SRGH): Beitbridge, between Customs Post and Limpopo River, fl. & fr. 25.iii.1959, *Drummond* 6000 (K; LISC; PRE; SRGH).

T. limpopoensis differs from *T. purpurea* in its leaves with only 1-2 pairs of leaflets and its low shrubby habit and woody stems, but its flowers and fruit seem to differ little from those of *T. purpurea*. The four Rhodesian collections cited are all woody towards the base, and if they had been grazed by animals, as all available specimens of *T. Umpopoensis* appear to have been, they would show a marked resemblance to that species; furthermore they have leaves with 1-4(5) pairs of leaflets, the lowermost ones having usually only 1-2 pairs. More collections and field observations from the Limpopo valley are required before the position of these plants and the status of *T. Umpopoensis* can be satisfactorily determined. Specimens of *T. uniflora* Pers. from the same area — see for example *R. M. Davies* 2291 (x; SRGH) from Gwanda and *Wild* 5352 (K; SRGH) from Beitbridge — tend to have a remarkably similar facies, but are distinguished by their wholly axillary flowers, longer calyx teeth and twisted style.

Var. *pubescens* Bak. in Oliv., Fl. Trop. Afr. 2: 125 (1871).
— Bak. f., Leg. Trop. Afr. 1: 191 (1926). — Cronquist, Fl. Congo Belge 5: 98 (1954). — Torre in Consp. Fl. Angol. 3: 153 (1962). Type: Tanzania/Mozambique, Rovuma River, *Meller* (x, chosen here as lectotype).

Tephrosia laurentii De Wild., Miss. Laurent: 111 (1905); Pl Bequaert. 3: 330 (1925). — Bak. f., Leg. Trop. Afr. 1: 192 (1926). Type from the Congo, not seen, referred to this variety by Cronquist loc. cit.

Tephrosia transvaalensis Hutch. & Burtt Davy in Burtt Davy, Fl. Pl. Ferns Transvaal 1(2): xxxii, 376, 378 (1932). — Forbes in Bothalia 4(4): 975 (1948) pro parte, excl. spec. *Rogers* 6881. Type: S. Africa, Transvaal, Komati Poort, fr. 16.xii.1897. *Schlechter* 11783 (11785 in Hutch. & Burtt Davy in error) (x).

T. burchellii, *T. semiglabra*, *T. capensis*, *T. polystachya* etc. sensu auctt. S. Afr. pro parte.

Stems procumbent or ascending, usually ± straggling, covered with spreading or ascending hairs.

This the commoner form of this species in most parts of Tropical Africa, from Ghana to Ethiopia and Somalia and south to S. W. Africa and the Transvaal.

Var. **delagoensis** (H. Forbes) Brummitt, **comb.** et stat. nov.

Basionym: *Tephrosia delagoensis* H. Forbes in *Bothalia* 4(4): 968 (1948). Type: Mozambique, in arenosis Lourenço Marques, *Schlechter* 11521 (PRE, holotype not seen; COI, α , isotypes).

Tephrosia indigofera Bertol., *Misc. Bot.* 19: 9, t. 5 (1858). Type: Mozambique, Inhambane, *Fornasini* (BOLO; photograph K).

T. polystachya sensu auctt. S. Afr. pro parte.

Stems \pm stout, erect, forming a low bush up to 70 cm high, sometimes becoming woody in the lower parts, the younger stems with appressed to spreading hairs.

Coastal lowlands and river valleys of south-eastern tropical Africa.

BOTSWANA. **Northern Prov.** Corner of Makarikari Pan (N. E.), fl. & fr. 15.i.1959, *West* 3826 (LISC; PRE; SRGH).

ZAMBIA. **Barotseland.** Banks of Zambesi 10 miles below Senanga, fl. & fr. 8.ii.1952, *White* 2029 (α — 'shrub 1.5 m high').

RHODESIA. **Northern Div.** Sebungwe Distr., Zambesi Valley, Bumi R. walk, *Kirkia*, mopane, *Combretum* veld, fl. & fr. ix.1955, *R. M. Davies* 1486 (α ; SRGH). Urungwe Distr., near Chirundu Sugar Estates, on Zambesi River sand dunes, fl. & fr. 2.ix.1964, *Corby* 1142 (K). **Southern Div.** Ndanga Distr., Triangle Ranch, 610 m, fr. 6.xi.1946, *Bates* (K). Sabi-Lundi Junction, near Lundi River, mopane woodland, fr. 8.vi.1950, *Wild* 3460 (α ; PRE; SRGH). Gwanda Distr., Gilchrist's Causeway, Bubyia river, 245 m, fl. & fr. v.1955, *R. M. Davies* 1276 (α ; SRGH). Beitbridge Distr., Chikwarakwara, Limpopo River, fl. & fr. 23.ii.1961, *Wild* 5340 (α ; LISC; PRE; SRGH). Ndanga Distr., Hippo Valley, fl. & fr. 20.iv.1961, *Whellan* 1837 (α ; SRGH). Nuanetsi Distr., Lundi R., near Fishans, fl. & fr. 28.iv.1962, *Drummond* 7781 (α ; SRGH).

MALAWI. Southern Prov. Symon's Village on Lisungwe R., fl. & fr. 5.xi.1937, *Lawrence* 467 (K). Port Herald, road to Agric. House, roadside, fl. 26.i.1938, *Lawrence* 569 (x). Lower Mwanza River, Chickwawa Distr., fl. & fr. 4.X.1946, *Brass* 17972 (x; SRGH). Port Herald Distr., between Muona and Shire River, 80 m, fl. & fr. 20.iii.1960, *Phipps* 2579 (x; PRE; SRGH).

MOZAMBIQUE. Niassa. Fernão Veloso, Nacala, fl. & fr. 17.V.1937, *Torre* 1425 (COI). Zambézia. Quelimane, 30 m, fr. 1908, *Sim* 20551 (PRE). Manica e Sofala. About 5 km from Chemba on the road to Tambara, fr. 23.iv.1960, *Lemos & Macuácuá* 42 (COI; K; LISC; LMJ; PRE; SRGH). Sul do Save. Guilala, near Inhambane, coconut plantation, fl. & fr. ix.1935, *Gomes e Sousa* 1649 (COI; K). Near Morrumbene, fl. & fr. ix.1937, *Gomes e Sousa* 2027 (COI; x; LISC). Inhambane, fl. & fr. 15.i.1939, *Torre* 1605 (COI; LISC). Homoine, Maxixe, fl. & fr. 10.x.1945, *Gomes Pedro* 293 (LMJ; PRE; SRGH). Arredores do Guijá, fl. & fr. 14.iii.1948, *Torre* 7487 (LISC). Entre Dinga e Sairté, Caniçado, fr. 15.V.1948, *Torre* 7828 (LISC). Caniçado região da Chamasca, fr. 19.V.1948, *Torre* 7871 (LISC). Inharrime, Mangôro, Est. Exp. Malamba, fl. & fr. 7.iv.1954, *Barbosa & Balsinhas* 5538 (LISC; LMJ). Between Morrumbene and Massinga, fl. & fr. 26.ii.1955, *Ewell, Mendonça & Wild* 658 (LISC; SRGH). Near Chibuto, road to Alto Changane, fl. & fr. 12.ii.1959, *Barbosa & Lemos* 8382 (COI; K; LISC; LMJ; PRE; SRGH). Lourenço Marques. Marracuene, fl. & fr. v.1893, *Quintas* 4 (COI). Delagoa Bay, fl. & fr. 29.iii.1894, *Kuntze* (K, as *Cracca villosa* var. *cinerea*). Lourenço Marques, in arenosis, fl. & fr. 29.xi.1897, *Schlechter* 11521 (COI; K; isotypes of *T. delagoensis*). Rikatla, fr. xi.1917, *Junod* 221 (PRE). Lourenço Marques, fr. xii.1917, *Moss & Rogers* 742 (K). Lourenço Marques?, fr. 1917-18, *Junod* 540 (LISC). Lourenço Marques, fl. & fr. 1.ii.1920, *Borle* 292 (PRE). Polana Flats, fr. 27.viii.1940, *A. J. Hornby* 2059 (K—«small tree»). Chobela-Magude, fr. 9.i.1941, *Viana* 12 (PRE). Polana Flats, fl. vi.1941 *Hornby* 864/A, 864/B (K). Near Lourenço Marques, fl. & fr. xii.1945, *Pimenta* 17301 (LISC; SRGH). Km 7 of the road L. Marques—R. Garcia (Boane), fl. & fr. 17.ii.1945, *Estêves de Sousa* 18 (LISC;

PRE). Lourenço Marques town, fl. & fr. 25.ii.1945, *Esteves de Sousa* 45 (LISC; PRE). Near Lourenço Marques, fl. & fr. xii.1945, *Lab. Quím.* 2031 (PRE). Lourenço Marques, Ponta Vermelha, fl. & fr. 25.ix.1945, *Gomes Pedro* 135 (LMJ; PRE). Near Marracuene, 35 km northwards Lourenço Marques, fl. & fr. 27.ii.1946, *Gomes e Sousa* 3391 (K). Lourenço Marques, fl. & fr. 29.ii.1947, *Pedro* 3138 (LMJ). Between Umbeluzi and Boane, new road, fr. 24.iv.1947, *Pedro & Pedrógã* 629 (PRE). Lourenço Marques commonage, fl. & fr. 181.1948, *Mrs. Faulkner* 185 (x). About 3 miles north of Lourenço Marques, strand association, fl. & fr. 29.iii.1948, *Rodin* 4163 (x; PRE). New Capitania do Porto, fl. & fr. 5.iii.1949, *Myre* 405 (LISC). 4.2 km from Marracuene towards Manhiça, fl. & fr. 28.ii.1952, *Barbosa & Balsinhas* 4840 (LISC; LMJ). Alvor, fr. 1.iii.1952, *Barbosa & Balsinhas* 4871 (LISC; LMJ). Near Polana Hotel, 60 m, fl. ix.1960, *O. B. Miller* 7458 (PRE). Lourenço Marques, Costa do Sol, fl. & fr. 15.ix.1961, *Moura* 13 (COI). Lourenço Marques, Povoação de Arricata, 23 km towards Marracuene, f 1. & fr. 30.iv.1964, *Balsinhas* 714 (LISC).

Subsp. **altissima** Brummitt, subsp. nov.

Annua (? vel interdum perennis) caulibus erectis usque 1.5 m altis, plus minusve gracilis et laxis. Caules juveniles pilis appressis vel patentis vestiti. Folia (5)6-8(9) foliolorum praedita; petiolus 0.3-1.4 cm, petiolus et rhachis coniunctim (4)5-10(12) cm; foliola (1.5)1.8-4(4.5) X 0.4-1.0(1.3) cm, elliptico-oblonga, basi cuneata, apice rotundata ad truncata; pagina superior glabra; stipulae (3)4-8 X 0.2-1 mm. Inflorescentiae usque 20(24) cm, laxae, non albo-pubescentes; bractae 2-5 X 0.2-0.6 mm. Petala 7-10 mm longa. Legumina (40)48-60 X (4)4.5 cm; semina 7-9.

Typus: Mozambique, Manica e Sofala, Serra do Garuzo, Chimoio, fl. & fr. 5.iii.1948, *Barbosa* 1137 (LISC, holotypus).

Mountain areas of Mozambique, eastern Rhodesia and southern Malawi.

RHODESIA. Eastern Div. Umtali Distr., Darlington, sand-pits, 1130 m, fl. & fr. 10.ii.1955, *Chase* 5468 (BM; COI; K; LISC; SRGH).

MOZAMBIQUE. Niassa. Entre Fernão Viloso e Itoculo (Nacala), fl. & fr. 15.X.1948, *Barbosa* 2439 (LISC). Manica e Sofala. Encosta da Serra do Garuzo, Chimoio, fl. & fr. 5.iii.1948, *Barbosa* 1111 (LISC). Serra do Garuzo, Chimoio, fl. & fr. 5.iii.1948, *Barbosa* 1137 (LISC; type). Serra do Garuzo, Chimoio, f l. & f r. 5.iii.1948, *Garcia* 539 (LISC). Região de Garuzo, Chimoio, fl. and fr. 20.iii.1948, *Barbosa* 1220 (LISC). Região de Bandula, fl. & fr. 9.iii.1948, *Barbosa* 1152 (LISC).

MALAWI. Southern Prov. Port Herald Distr., Malawe Hill, 700 m, fl. & fr. 23.iii.1960, *Phipps* 2641 (x; PRE; SRGH).

Subsp. *dunensis* Brummitt, subsp. nov.

?*Tephrosia leuoclada* Scott Elliot in Journ. Linn. Soc. 29: 13 (1891). Type: Madagascar, Fort Dauphin, sand dunes, comm. 1890, *Scott Elliot* 2297 (K). See notes below.

Tephrosia evansii auctt. pro parte, non Hutch. & Burt Davy.

Perennis caulibus procumbentibus vel adscendentibus ad suberectis, in partibus inferioribus lignosis. Caules juveniles dense albo-pubescentes pilis valde appressis vel rarissime (in planta unica ad lacum Malawi) patentibus. Folia (3)5-9(10) partibus foliolorum praedita; petiolus 0.7-3.5 cm, petiolus et rhachis conjunctim 2-8.5 cm; foliola 1.0-2.7 X (0.3)0.4-0.9 mm; pagina superior subglabra ad tenuiter appresse-pubescentis, non sericea; stipulae (0.5)1-3(3.5) X 0.8-1.5 mm. Inflorescentiae (1)2-12(22) cm, breves et compactae ad elongatae et laxae, axibus dense albo-pubescentibus, bractaeae 0.5-2(3) X 0.5(1) mm. Petala (5.5)6-8 mm longa. Legumina 30-45 X (4)4.5 mm; semina 6-8.

Typus: Tanganyka, ? Uzaramo Distr., 16 miles N. of Dar-es-Salaam, sand dunes, fl. & fr. 2.vii.1960, *Leach & Brunton* 0164 [x, holotypus (sheet 2) et isotypus (sheet 1); SRGH, isotypus].

Sand dunes on east coast of Africa from Somali Republic to northern Mozambique, and on shores of Lake Malawi.

SOMALI REPUBLIC. **Northern Region.** Las Koreh, 48° 11' E; 11° 09' N, shingle and coarse sand on sea shore, fl. & fr. 9.viii.1957, *Newbould* 870 (x).

KENYA. K7. **Lamu Distr.** Sheila sand dunes, fl. & fr. 16.ii.1956, *Greenway & Rawlins* 8914 (K). Lamu Town, south side, dominant in large patches on sand in coconut plantations, fl. & fr. 16.ii.1956, *Greenway & Rawlins* 8923 (x). 30 m (48 km) N. of Lamu, fl. & fr. ix.1956, *Rawlins* 100 (K). Nazi Moja, W. of Lamu Township, fl. & fr. 3.xi.1957, *Greenway & Rawlins* 9436 (x). **Kilifi Distr.** Malindi, sand dunes, fl. & fr. 13.viii.1949, *Bogdan* 2577 (x). **Distr. uncertain.** N. of Mombasa to Lamu and Witu, fl. & fr. 1902, *Whyte* (K).

TANZANIA-INDIAN OCEAN. T3. **Pangani Distr.** Mbuyuni, dunes on shore, fr. 21.xii.1915, *Peter* K258 (0.III.240), 48919 (x). Ushongo, Mwera, sandy soil, sea level, fr. 7.ix.1955, *Tanner* 2129 (K). Kigombe Plantation, border of Dhali wood, sandy soil, fl. & fr. 20.V.1958, *Mrs. Faulkner* 2149 (x). T6. **?Uzaramo Distr.** Kawi, north of Dar-es-Salaam, fl. & fr. vii. 1958, *Mrs. Tweedie* 1655 (K). 16 m (26 km) N. of Dar-es-Salaam, fl. & fr. 2.vii.1960, *Leach & Brunton* 10164 (x; SRGH — types). T8. **Mikindani Distr.** Msimbati, coral sand under coconut trees, fl. & fr. 10.iii.1963, *Mrs. Richards* 17804 (K). Mtwara, sea shore, coral sand dunes, fl. & fr. 12.iii.1963, *Mrs. Richards* 17855 (K). T6. **Mafia Island.** Boyjuu Is., sand in coconut plantations, fl. & fr. 29.ix.1937, *Greenway* 5333 (K).

TANZANIA-LAKE MALAWI. T8. **Songea Distr.** Mbamba Bay, sandy ground near shore of L. Nyasa, fl. & fr. 5.iv.1956, *Milne-Redhead & Taylor* 9537 (K).

MALAWI. **Central Prov.** Kota-Kota, sandy soil, fl. 15.ii.1944, *Benson* 339 (PRE). Lake Nyasa Hotel, near Salima, eroded sand bank above lake beach, fl. & fr. 15.ii.1959, *Steele & Robson* 1606 (K; LISC; SRGH). Between L. Nyasa Hotel and Senga Bay Hotel, sand hills beside lake, fl. 17.ii.1959, *Robson* 1637 (x; LISC). Salima, shore of Lake Nyasa, sand dune coloniser, fl. & fr. 10.vii.1962, *Verboom*

651 (K; SRGH). Prov. uncertain. Lake Nyasa, Uvera, (received 1901) *Miss Kenyon* (κ).

MOZAMBIQUE. Niassa. Quinga, old dunes, fr. 25.vii.1948, *Pedro & Pedrógão* 4643 (LMJ). Maputo, by the lighthouse of Ponta do Ouro, fl. & fr. 21.ii.1952, *Barbosa & Balsinhas* 4806 (LMJ). Goa mainland, sand dunes about 1 mile N. of Lumbo, fr. 20.V.1961, *Leach & Rutherford-Smith* 0937 (K; SRGH). Mogincual, praia da Quinga, fr. 28.iii.1964, *Torre & Paiva* 11452 (LISC). **Zambezia**. 20 miles (32 km) N. of Quelimane, fl. & fr. 10.viii.1962, *Wild* 5872 (PRE). **Manica** e Sofala. Beira, fl. & fr. iv.1921, *Dummer* 4669 (K).

MADAGASCAR. Fort Dauphin, sand dunes, comm. 1890, *Scott Elliot* 2297 (K—type of *T. leucoclada*). Mourondava, comm. 1890, *Grevé* 43 (K). Delta de la Linta (côte sud-ouest), sables, fl. & fr. 24-28.viii.1928, *Humbert & Swingle* 5462 (K). Andrahanana (distr. Fort Dauphin) fl. 21.ix.1932, *Decary* 10693 (κ).

The position of the Madagascar plants (*T. leucoclada*) is somewhat doubtful; some of them resemble subsp. *canescens* as much as subsp. *dunensis* in habit and indumentum, but they all lack the characteristic broad pods of the former and are here referred to subsp. *dunensis*.

Subsp. *canescens* (E. Mey) Brummitt, **comb. et stat. nov.**

Basionym: *Tephrosia canescens* E. Mey., *Comment Pl. Afr. Austr.*: 109 (1836).—Harv. in Harv. & Sond., *Fl. Cap.* 2: 204 (1862).—Forbes in *Bothalia* 4(4): 962 (1948).—Mogg in Macnae & Kalk, *Nat. Hist. Inhaca Is.*: 146 (1958). Type: S. Africa, Natal, prope Omsamculo, *Drege* (K, ? isotype).

Cracca canescens (E. Mey.) Kuntze, *Rev. Gen. Pl.* 1: 174 (1891). Type as for *Tephrosia canescens*.

Perennial with procumbent branches, woody in the lower parts. Young stems densely appressed-pubescent with silvery-white hairs. Leaves with (3)4-7(8) pairs of leaflets; petiole (0.5)1.0-2.2(3.0) cm, petiole and rhachis together (2)3.5-

7(8) cm; leaflets 0.8-2.0(2.5) X 0.4-1.0 cm, the margins often undulate; upper and lower surfaces densely and closely appressed-pubescent with silvery hairs, \pm sericeous; stipules 1-2(3) X 1-1.5 mm, \pm broadly triangular. Inflorescences short and compact, 2-8(10) cm; bracts 0.5(1) mm long, broadly triangular. Petals 6-7 mm long. Pods (30)35-47 X 4.5-6.5 mm; seeds 6-7(9).

Sandy shores of southern Mozambique (Sul do Save and Lourenço Marques) and Natal, with a single record from northern Mozambique, Niassa Prov., NejoVo Island, 16° 33' S : 39° 48' E, fl. & fr. 27.X.1965, *Gomes e Sousa* 4899 (\times).

Some specimens seen appear to be intermediate between subsp. *canescens* or subsp. *dunensis* and subsp. *leptostachya*:

MOZAMBIQUE. Zambézia. Quelimane, fr. 1908, *Sim* 20718 (PRE). Sul do Save. Vilanculos, fl. 27.iii.1952, *Barbosa & Balsinhas* 5029 (K). Lourenço Marques. Inhaca Island, $\frac{1}{4}$ mile south of marine biological station, fl. & fr. 31.viii.1959, *Watmough* 391 (K).

6. *Tephrosia micrantha* J. B. Gillett in Kew Bull. **15**(1): 41 (1961). Type: Tanzania, Songea Distr., by R. Nakawali about 2.5 km S. W. of Kitai, *Milne-Redhead & Taylor* 9112 (\times , holotype).

Annual to biennial with a fairly stout tap root and usually tufted habit with several ascending, much-branched stems arising from the base and 10-25 cm high, or sometimes \pm mat-forming with more elongate \pm procumbent branches up to 30 cm long. Stems pubescent with appressed to ascending or occasionally spreading hairs. Leaves pinnate with (2)3-6(9) pairs of leaflets; petiole 0.1-1.8(3.0) cm, varying from much shorter to much longer than the lower pair of leaflets, petiole and rhachis together (1)2-6(8) cm, pubescent like the stem; leaflets (0.5)0.8-2.0(2.5) X (0.1)0.2-0.5(0.6) cm, oblanceolate or narrowly elliptic to linear-elliptic, subcuneate at the base, subacute to rounded at the apex; upper surface glabrous or appressed-pubescent,

lower surface appressed-pubescent, sometimes densely so and conspicuously greyish, or rarely \pm sericeous; stipules 3-7(8) \times 0.1-0.5 mm, subulate, usually persistent and often conspicuous near the base of the plant. Flowers in terminal and leaf-opposed racemes 1-6(11) cm long; bracts 2-5 \times 0.2-0.5 mm, \pm subulate; pedicels 2-3(4) mm. Calyx (1.5)2-3 mm long, shortly appressed-pubescent; teeth about equalling the tube, the two upper connate for up to $\frac{1}{2}$ their length. Petals 4-5(6) mm long, pink to purplish. Staminal tube connate above. Ovary pubescent; style glabrous; pods 20-37 \times 3.5-4.5 mm, brown to straw-coloured; seeds (4)5-6(7), c. 3 \times 2 \times 1.5 mm, subreniform-oblong.

Southern Tanzania, Zambia, Rhodesia, Malawi, Mozambique. The following collections have been seen in addition to those cited by GILLETT with the original description of the species:

ZAMBIA. Northern Prov. Kalambo Falls, path along cliff at edge of gorge, fl. 15.ii.1964, Mrs. Richards 19028 (α). Near Katete River, Mfuwe, Luangwa Valley, bud 10.ii.1966, Astle 4526 (α). Western Prov. Ichimpi, Kitwe, fl. & fr. 7.X.1964, Mutimushi 087 (K). Central Prov.? Eastern Forest Reserve, fl. & fr. 4.iii.1962, Lusaka Natural History Club 102 (K). Southern Prov. Mazabuka Distr., P. DeVilliers Louw's farm, Choma to Pemba mile 10, fl. & young fr. 15.ii.1960, White 7068 (K; SRGH).

RHODESIA. Northern Div. Urungwe Distr., Zwipani, fl. & fr. 6.iii.1958, Phipps 1034 (α ; LISC; SRGH). Gokwe Distr., near the source of the Guye R., fl. & fr. 28.iii.1962, Bingham 192 (α ; LISC; SRGH). Selukwe Distr., 15 m. S. of Selukwe on Great Dyke, fl. & fr. 16.iii.1963, Wild 6371 (K). Gokwe Distr., about 3 miles N. of Gokwe on road to Chinyenyeni, fr. 18.iv.1963, Bingham 608 (SRGH). Central Div. Hartley Distr., Poole Farm, fl. & fr. 27.ii.1952, R. M. Hornby 3282 (K). Marandellas Distr., fl. & fr. 2.ii.1958, Corby 835 (SRGH). Eastern Div. Umtali Distr., on granite near Nyamakari River, Burma Farm, Burma Valley, fl. & fr. 22.ii.1962, Chase 7632 (K; SRGH).

MALAWI. Central Prov. Lilongwe, fl. 21.ii.1959, *Joan Wright* 240 (x). Southern Prov. Plateau of Mt. Zomba, *Whyte* (K).

MOZAMBIQUE. Niassa. Tambala, fl. 6.iii.1942, *A. J. W. Hornby* 1135 (PRE). Malema Distr., Mutuáli, near road to Malema, fr. 29.V.1947, *Pedro* 3281 (LMJ; PRE). Mutuáli, fl. & fr. 12.V.1948, *Pedro & Pedrógão* 3348 (LMJ). Vila Cabral, fl. 26.ii.1964, *Correia* 153 (LISC). Vila Cabral, Posto Zootécnico, 9 km from town, f l. & fr. 1.iii.1964, *Torre & Paiva* 10935 (LISC). Zambezia. Gurue Distr., monte Currarre, by rio Loussi, fl. & fr. 11.ii.1964, *Torre & Paiva* 10549 (LISC).

7. *Tephrosia malvina* Brummitt, sp. nov.

Tephrosia capensis sensu Cronquist, Fl. Congo Belge 5: 99 (1954) et auctt. Afr. trop., non (Jacq.) Pers.

T. purpureae affinis sed fructibus stramineis latioribus seminibus circiter 6, axibus inflorescentiarum crassis alatis, petiolis quam foliola infima plerumque longioribus differt; a *T. micrantha* et *T. capensi* similiter fructibus et inflorescentiis differt.

Perennis, caudice verticali et caulibus compluribus herbaceis prostratis vel ascendentibus. Caules pilis brevibus appressis vel patentibus vestiti. Folia pinnata, foliolis 3-7(8)-jugis; petiolus 1.0-3.5(4.5) cm longus, par inferius foliolorum (nisi in foliis superioribus) excedens, petiolus et rhachis coniunctim (3)5-8(12) cm; foliola 1.0-2.6 X 0.4-0.8 cm, elliptica usque elliptico-oblonga vel interdum lanceolata usque oblanceolata, basi cuneata usque rotundata, apice subacuta usque rotundata; venae secundariae et tertiariae plerumque in pagina superiore prominentes; pagina superior glabra vel subinde breviter pubescens, pagina inferior tenuiter appresse pubescens; stipulae 3-8 X 0.3-1 mm, lineari-triangulares. Flores in racemis terminalibus et oppositifoliis (5)7-20 cm longis dispositi, axibus crassis, conspicue porcatis vel tenuiter alatis; bractea 3-7 X 0.5-0.8 mm, lineari-triangularis, plerumque conspicua; pedicelli 3-6 mm. Calyx (2.5)3-5 mm longus, pilis appressis vel interdum patentibus pubescens;

dentis laterales tubo parum breviores usque sesquilingiores; dentis superiores per longitudinem dimidiam connati. Petala (6)7-10 mm longa, malvina vel interdum rosea. Tubus staminalis dorsaliter connatus. Ovarium pubescens; stylus glaber; legumina 33-47 X 4.5-5.5 mm, straminea, breviter pubescentia, semina 6(7).

Typus: Zambia, Abercorn District, Katula, top escarpment, fl. & fr. 12.V.1955, Mrs. Richards 5674 (x, holotypus).

Burundi, Tanzania, Congo, Zambia and Malawi. In open grassy and sandy places etc.

BURUNDI. Msindosi River near Mukayagoro, 1310-1400 m, fl. & fr. 6.iii.1926, Peter 38382 (K).

TANZANIA. T7. Iringa Distr. Iringa, fl. 26.vi.1936, Emson 566 (K). Iringa, rocky hills N. E. of the town, *Brachystegia-Isobertinia-Acacia-Combretum* scrub woodland, 1720 m, fl. & fr. 9.iii.1962, Polhill & Paulo 1695 (K; SRGH). Chunya Distr., Road Chunya-Itigi 36 miles from Chunya, fl. 20.iii.1965, Mrs. Richards 19763 (EA; K). Kepembawe, path to Muzibini village, miombo woodland, fl. 23.iii.1965, Mrs. Richards 19835 (EA; K). Rungwe Distr. Uniyiha (Unyika), Lupata, 1220 m, fl. & fr. 12.iii.1932, R. M. Davies 384 (K). T8. Songea Distr. Between R. Lumecha and R. Luhira about 12 km N. of Songea by roadside through regenerating *Brachystegia* woodland on sand, 1050 m, fl. & fr. 17.iii.1956, Milne-Redhead & Taylor 9181 (x). About 10.5 km W. of Songea in sandy soil by roadside in secondary *Brachystegia-Uapaca* woodland, 960 m, fl. & young fr. 19.iii.1956, Milne-Redhead & Taylor 9194 (x).

ZAMBIA. Northern Prov. Firebreak above Kasulo House, Abercorn, 1525 m, fl. 1.ii.1952, Mrs. Richards 609 (x). Mpu-lungu-Abercorn road close to Isoko turning, in bush, 1220 m, fl. & fr. 10.iii.1952, Mrs. Richards 1086 (x). Abercorn Distr., Kiwimbi Mission, close to hospital, fl. & fr. 9.ii.1955, Mrs. Richards 4369 (x). Abercorn, Kellett's Farm, 1525 m, fl. & fr. 25.ii.1955, Mrs. Richards 4678 (x). Firebreak, Kasulo, 1740 m, fl. & fr. 2.iii.1955, Mrs. Richards 4758 (K). Firebreak, top of escarpment above Katula, 1555 m, fl. 14.iii.1955, Mrs. Richards 4927 (K; SRGH). Firebreak, Katula, top escarpment,

1525 m, fl. & fr. 12.v.1955, Mrs. Richards 5674 (α , holotype). Among rocks under cliffs in Ilembe gorge, Abercorn, 1525 m, fl. & fr. 24.iv.1959, Miss McCallum-Webster 18 (κ). Abercorn Distr., hill above Mwambe Village, 1800 m, fl. & fr. 15.iii.1960, Mrs. Richards 12745 (κ ; SRGH). Western Prov. Luanshya, plateau woodland, fl. & fr. 12.iii.1955, Fanshawe 2136 (α ; SRGH). Luano, miombo woodland, fl. & fr. 21.ii.1966, Fanshawe 9524 (α).

MALAWI. Southern Prov. Ncheu Distr., Lower Kirk Range, Chipusiri, 1460 m, fr. 17.iii.1955, Exell, Mendonça & Wild 960 (BM; LISC; SRGH).

8. *Tephrosia pumila* (Lam.) Pers., Syn. Pl. 2: 330 (1807). — DC, Prodr. 2: 254 (1825). — Torre in Consp. Fl. Angol. 3: 154 (1962). Type from Madagascar (p, not seen, see note below).

Galega pumila Lam., Encycl. Meth. Bot. 2: 599 (1786). Type as for *Tephrosia pumila*.

Tephrosia purpurea var. *pumila* (Lam.) Bak. in Hook. f., Fl. Brit. Ind. 2: 113 (1876); Fl. Maurit. Seychell.: 71 (1877). — Bak. f., Leg. Trop. Afr. 1: 191 (1926). — Cronquist, Fl. Congo Belge 5: 99 (1954). Type as for *Tephrosia pumila*.

Tephrosia commersonii Scott Elliot in Journ. Linn. Soc. 29: 13 (1891), nom. illegit. Type as for *Galega pumila*.

The species was described from Madagascar. In a note on a specimen from Madagascar at Kew (Scott Elliot 2464). Mr. J. B. GILLET has commented that this is a good match for the specimen at Paris thought to be the type and although the pod is rather wider (5.5-6 mm) than in continental African material they appear to be clearly conspecific. Further investigation is required with respect to pod size in Madagascar, but in the absence of further evidence no distinction is made between these plants and the widespread plant in continental Africa.

Var. **pumila**

Tephrosia purpurea var. *pubescens* auctt. Afr. pro parte.
Tephrosia procumbens sensu Morton in Journ. W. Afr. Sci. Ass. 2(1) : 71 (1956).

Stems densely spreading-pubescent with brown or greyish hairs. Calyx 3.5-5 (6) mm long. Petals 6-8 mm long. Pods 32-42(45) mm long; seeds (9)11-13(15).

Widespread in tropical Africa from Ghana to Ethiopia and Somali Republic and south to Angola and Flora Zambesiaca area, Comoro and Madagascar. Although apparently widespread in the Flora Zambesiaca area it seems to have been seldom collected and very rarely correctly recognised as this species. The following specimens from the area have been seen:

BOTSWANA. **Northern Div.** Ngamiland, Thamalakane River, Okavanga, 900 m, fl. & fr. 13.iii.1961, *Mrs. Richards* 14694 (K; SRGH).

ZAMBIA. **Eastern Prov.** Fort Jameson Distr., Luangwa Valley, Lusengazi Camp, fl. & fr. 14.iv.1963, *Verboom* 821 (SRGH) ?**Eastern Prov.** Luangwa Valley, bank of Luangwa River, Mfuwe, fl. & fr. 4.xii.1965, *Astle* 4174 (K). Luangwa Valley, *Echinochloa* and *Setaria* grassland, Mfuwe, fl. & fr. 7.ii.1966, *Astle* 4501 (x).

RHODESIA. **Western Div.** Wankie Distr., Kazungula, fr. iv.1955, *R. M. Davis* 1118 (COI; K). **Eastern Div.** Chipinga Distr., Sabi Valley Expt. Station, fl. & fr. xi.1959, *Soane* (K; LISC; PRE; SRGH).

MALAWI. **Northern Prov.** Karonga Distr., Lupembe Farm, fl. & fr. 22.iv.1963, *Salubeni* 22 (SRGH).

MOZAMBIQUE. **Lourenço Marques.** Chobela-Magude, very common, fl. & fr. 10.iii.1942, *Viana* 25 (PRE); 26 (PRE); 27 (PRE). E. E. do Umbeluzi, prox. da propriedade do Sr. Revez Duarte, fl. & fr. 5.iv.1949, *Myre* 422 (LISC).

Var. **aldabrensis** (J. R. Drummond & Hemsley) Brummitt, comb. et stat. nov.

Basionym: *Tephrosia aldabrensis* J. R. Drummond & Hemsley in Journ. Bot. 54 (Suppl. 2): 11 (1916). Type: Aldabra group, fl. & fr. 1906, *Dupont* 11 (\times , chosen here as lectotype).

Stems closely appressed-pubescent to subglabrous. Calyx 3.5-5(6) mm long. Petals 7-9(10) mm long. Pods 25-42 mm long; seeds (9)10-12(13).

Coasts of east Africa from Zanzibar to Kenya, and Aldabra.

KENYA. K7. **Lamu Distr.** Kui Island of Kiunga, fl. vi.1956, *Rawlins* 17 (\times). **Kilifi Distr.** Malindi, sea cliffs, fl. & fr. X.1951, *Mrs. Tweedie* 74 (\times). Mouth of Miada Creek, 3 m above sea level, fl. & fr. 11.i.1962, *Greenway* 10457 (\times). **Kwale Distr.** Near Mombasa, fl. & fr. 1900, *White* (K). Twiga, 14 miles south of Mombasa, coastal bushland, fl. 31.i.1958, *Verdcourt* 138 (\times). Twiga Beach, top of coral cliff, fl. & fr. 30.X.1959, *Miss Napper* 1350 (K). Bamburi, near factory along road to Mtwapa, fl. & fr. 4.viii.1965, *Williams Sangai* 826 (\times).

TANZANIA. T3. **Tanga Distr.** Coast near Bomandani 8 miles south of Moa, sandy foreshore, fl. & fr. 10.viii.1953, *Drummond & Hemsley* 3681 (K). **Zanzibar.** Without precise locality, fl. & fr. 1908, *Last* (\times , 3 sheets); Bweleo, fl. 28.i.1929, *Greenway* 1218 (\times). Mbweni, just above high water mark, fr. 7.ii.1930, *Vaughan* 1053 (\times). Chukwani, fl. & fr. 21.i.1930, *Vaughan* 1115 (K). Jezani, fl. & fr. 19.ii.1930, *Vaughan* 1252 (\times). Chwaka, fl. 21.xii.1930, *Vaughan* 1737 (K). Without precise locality, fl. & fr. 1931, *Vaughan* 1355 (K). Chukwani, scrub land near mangrove swamp, sea level, fl. & fr. 23.iv.1950, *Williams* 22 (K). Fumba, 14 miles from Zanzibar town on E. side of island, coastal bush, fl. & fr. 10.V.1959, *Mrs. Faulkner* 2253 (K). Massizine, near Zanzibar town, with coconut palms on foreshore, fl. & fr. 13.V.1959, *Mrs. Faulkner* 2254 (K).

ALD AB RA. Aldabra Island, fl. & fr. x-xii.1892, *Abbott* (K). Aldabra, comm. 1903, *Thomasset* (x). Aldabra Group, fl. & fr. 1906, *Dupont* 11 (x). Aldabra, fl. & fr. iv.1907, *Thomasset* 230 (x). Aldabra, fl. 1909, *Fryer* 59 (x).

Var. **ciliata** (Craib) Brummitt, comb. nov.

Basionym: *Tephrosia purpurea* var. *ciliata* Craib, Fl. Siam, Enum. 1(3): 384 (1928). Type. Siam, Bangkok, *Kerr* 11022 (x).

Galega procumbens Buch.-Ham. in Trans. Linn. Soc. 13: 547 (1822). Type not seen.

Tephrosia timoriensis DC, Prodr. 2: 254 (1825). Type from Indonesia (Timor), not seen.

Tephrosia procumbens (Buch.-Ham.) Gamble, Fl. Presid. Madras 1: 320 (1918), non Macfadyen (1837). Type as for *Galega procumbens*.

Tephrosia parviflora Wight in Wallich, Cat. no. 5462 (1831-2), nom nud.

Stems spreading-pubescent or rarely (Madras) appressed-pubescent, with brown or greyish hairs. Calyx 2-3 (4) mm long. Petals 4-6 (7) mm long. Pods 25-34 (40) mm long; seeds (8)9-11 (12).

From India to Indonesia, and also apparently in Mauritius. Although specimens from Madagascar and Comoro Islands seem to agree with those from continental Africa in dimensions of flowers and fruit (apart from breadth of fruit as noted above), the three at Kew from Mauritius seem clearly to correspond with those from Asia. This distribution would then appear to be comparable with that in *T. purpurea* where the Mascarene plants resemble those from Asia rather than from Africa.

The earliest varietal name available for the Asian plant seems to be *T. purpurea* var. *ciliata* Craib, applied originally to a single Siamese gathering. It is unfortunate that the type specimen of var. *ciliata* is the most extreme of all those available from Asia, having a robust habit, calyx 3-4 mm long, and one pod 38 mm long.

9. *Tephrosia coronilloides* Welw. ex Bak. in Oliv., Fl. Trop Afr., 2: 123 (1871).—Bak. f., Leg. Trop Afr. 1: 195 (1926).—Gillett in Kew Bull. 13(1): 120 (1958).—Torre in Consp. Fl. Angol. 3: 155 (1962). Type: Angola, Pungo Andongo, *Welwitsch* 2080 (BM, K—*isotypes*).

Tephrosia longana Harms in Warburg, Kunene-Samb.-Exped. Baum: 259 (1903).—R. E. Fries, Wiss. Ergebn. Schwed. Rhod.-Kongo-Exped.: 83 (1914) *quoad nom.*, *excl. spec.* Type: Angola, Napalanca, *Baum* 612 (\times , *isotype*).

Tephrosia pallens (Ait.) Pers. var. *angolensis* Bak. f., Leg. Trop. Afr. 1: 191 (1926). Type: Angola, rio Cassuango-Cuiriri, *Gossweiler* 3681 (BM, holotype; \times , *isotype*).

This species is known mainly from Angola, but one collection from Barotseland, *White* 2001, was recorded by GILLETT (*loc. cit.*). Since then further collections have been made in southern Zambia, and, somewhat surprisingly, in central Rhodesia:

ZAMBIA. Southern Prov. *Machili*, Kalahari sand woodland, fl. & fr. 24. ii.1961, *Fanshawe* 6319 (\times ; SRGH).

RHODESIA. Central Div. Charter Distr., Wiltshire Native Purchase Area, fr. 30.iv.1965, *Corby* 1312 (\times ; SRGH).

T. coronilloides has a rather woody tap root, erect habit up to 45 cm high, rather densely brown-pubescent stems and leaf rhachides, and brown pubescent calyx with linear-triangular teeth 2-4 times as long as the tube.

10. *Tephrosia multijuga* R. G. N. Young in Ann. Transvaal Mus. 14(4): 402 (6 July 1932).—Forbes in Bothalia 4(4): 981 (1948), *pro parte*. Type: S. Africa, Transvaal, Johannesburg, Houghton Ride, *Moss* 7473 (PRE, not seen; photograph K).

Tephrosia capensis var. *angustifolia* E. Mey., Comment. Pl. Afr. Austr.: 110 (1836), *quoad lectotypum sensu* Burtt Davy. Type: S. Africa, Cape Province, Kei River, *Drege* (K).

Tephrosia woodii Burt Davy, Fl. PL Ferns Transvaal 1(2): xxxii (28 July 1932). Type as for *T. capensis* var. *angustifolia* E. Mey.

Cracca capensis var. *rufoincana* Kuntze, Rev. Gen. PL 3(2, pt. 2): 57 (1898). Type: S. Africa, Orange Free State, Bloemfontein, 15.ii.1894, Kuntze (K).

This species, known from Cape Province to the Transvaal in S. Africa, has not previously been recognised from the Flora Zambesiaca area. It differs from *T. polystachya* in its thinly appressed-pubescent to glabrescent pods, usually sparsely appressed-pubescent to glabrous stems, leaf-opposed (not axillary) racemes, and usually very short calyx (1.5)2(3) mm long; it has a rather lax habit, narrowly elliptic to linear-elliptic and often acute leaflets, and very shortly appressed-pubescent pods (27)30-40 X 3-4 mm. The following collections closely resemble the typical S. African plant:

MOZAMBIQUE. **Lourenço** Marques. Between Matola and Umbeluzi, fr. 29.iv.1947, *Pedro & Pedrógão* 866 (LMJ; PRE). Goba, Lebombo Mts., facing N. E., deep ravine, *Androstachys* forest, fl. & fr. 30.iv.1947, *Pedro & Pedrógão* 1040 (LMJ; PRE).

The following two collections are apparently referable to *T. multijuga* but have a prostrate straggling habit unlike any S. African plants of this species seen. Their relationship to group 2 of *T. polystachya* (see above) from the same area requires investigation.

MOZAMBIQUE. **Lourenço** Marques. Libombos, near Namaacha, Mt. Mpondium, 800 m, among rocks, basaltic lava, fl. 22.ii.1955, *Ewell, Mendonça & Wild* 498 (LISC; SRGH). Namaacha, near the Canada Dry factory, fl. & fr. 26.iii.1957, *Barbosa & Lemos* 7535 (COI; LISC; LMJ).

Group 3. TEPHROSIA **LEPIDA** AND ALLIED SPECIES

This group of glabristyled species is characterised by the grey or silvery under-surface of the leaflets and usually densely pubescent pods with the margins often contrasting markedly in colour with the surfaces. The following key distinguishes five species in the Flora Zambesiaca area. For discussion of seed characters, which also serve to separate the species, see GILLETT in *Kew Bull.* **13(1)**: 118-119 (1958).

1. Flowers in dense terminal heads 1-3(4) cm long surrounded or exceeded by the upper leaves, with some also in the axils of the uppermost leaves 13. *T. richardsiae*
1. Flowers in elongate, fairly lax racemes exceeding the upper leaves, sometimes with some also in the axils of the uppermost leaves
2. Leaflets (1)1.5-4(5) X (0.08)0.1-0.4 cm, 9-15 times as long as broad 12. *T. linearis*
2. Leaflets (0.5)0.7-2.7(3.5) X 0.15-0.6(1.0) cm, 3-5(6) times as long as broad
3. Petals (10)12-15(16) mm long 11. *T. lepida*
3. Petals 6-9 mm long
4. Pods 3-3.5 mm broad, dark brown-pubescent at the margins and grey-sericeous on the surfaces; petioles 0.1-0.3 cm *T. argyrotricha*
4. Pods 3.5-4.5 mm broad, brown, only thinly pubescent or sometimes densely so at the margins only; petioles (0.2)0.3-1.2 (2.2) cm *T. decora*

11. *Tephrosia lepida* Bak. f. in Bull. Soc. Roy. Bot. Belge **57(2)**: 121 (1925). Types from the Congo.

This species seems to be quite frequent, and in places common, in woodland between 27° and 32° E from central Rhodesia (as far south as Gwelo) through Zambia to Katanga and Ufipa District of Tanzania, with a further more easterly locality known in Njombe District of Tanzania. The most northerly plants, from Abercorn and Mporokoso Districts and Tanzania, differ markedly from others in their much longer, broader and darker pods which are blackish-grey rather than brownish, and to some extent in their habit

and leaflet breadth. It seems necessary to recognise two subspecies.

Subsp. **lepida**

Often perennial and woody towards the base, sometimes almost shrubby, but sometimes \pm slender annual. Leaflets (2)4-8(9) mm broad. Pods 36-48(51) X (2.5)3-3.5 mm, the margins usually brown and surfaces silvery-brown; seeds 8-10(11).

Prom central Rhodesia to Katanga and N. Province of Zambia (to Kawambwa and Kasama, but not Abercorn and Mporokoso Districts).

Subsp. **nigrescens** Brummitt, subsp. nov.

Annua, gracilis, erecta. Foliola 2-5(7) mm lata. Legumina (52)60-76 X 3.5-4 mm, ad margines subnigra, ad paginas grisea vel argentea, quam in subspecie typica obscuriora; semina (9)10-12.

Typus: Zambia, Abercorn Distr., Nmbulu Island, Lake Tanganyika, fl. & fr. 11.iv.1955, Mrs. Richards 5398 (κ , holotypus).

Zambia (Abercorn and Mporokoso Districts) and Tanzania.

ZAMBIA. Northern Prov. Abercorn, *Brachystegic* woodland, 1700 m, fl. 8.iii.1950, *Bullock* 2611 (K). Abercorn Distr., Chisungu Farm, open bush by side of road, fl. 25.ii.1952, Mrs. Richards 797 (κ). Abercorn Distr., Chilongowelo, 1460 m, fl. & fr. 5.iii.1952, Mrs. Richards 1083 (κ); 10.iv.1952, Mrs. Richards 1443 (K). Abercorn, 1525 m, f l. & f r. 21.iii.1955, Mrs. Richards 4598 (κ). Abercorn, «Little Poland», grass by track, 1525 m, fl. 4.iii.1955, Mrs. Richards 4764 (K). Kalambo Falls, fl. & fr. 29.iii.1955, *Exell, Mendonça & Wild* 1275 (BM; LISC; SRGH). Nmbulu Island, Lake Tanganyika, steep side, rocky dry ground, 730 m, f l. & fr. 11.iv.1955, Mrs. Richards 5398 (κ , type). Mpulungu-Abercorn road near Chilongowelo, verge of road, 1220 m, fr. 2.V.1955, Mrs. Ri-

Richards 5458 (x). Abercorn Distr., Kawimbe, everywhere, 1650 m, fl. 1.iii.1957, *Mrs. Richards* 8419 (x; LISC). Abercorn-Mpulungu road, 1500 m, fl. 20.iii.1957, *Mrs. Richards* 8835 (x). Kambole road, 16 km from Abercorn, fl. & fr. 5.iv.1959, *M. McCallum-Webster* 847 (x). Chilongowelo, 1460 m, fl. & fr. 7.iv.1959, *M. McCallum-Webster* 849 (x). Abercorn-Mpulungu road, 1350 m, fl. 16.ii.1960, *Mrs. Richards* 12509 (x). Abercorn Distr., Niamkolo, Lake Tanganyika, stony sandy road on edge of woodland, fl. 22.iii.1960, *Mrs. Richards* 12775 (x). Abercorn Distr., hill above Mwambe Village, near Kawimbe, 1770 m, fl. & fr. 15.V.1960, *Mrs. Richards* 12751 (x). Abercorn-Tsauya road, edge of *Brachystegia* woodland, 1440 m, fl. 3.iii.1962, *Mrs. Richards* 16224 (x; LISC). Mporokoso Distr., 60 km ESE of Mporokoso, *Brachystegia* woodland, fr. 13.V.1962, *Robinson* 5182 (x; SRGH).

TANZANIA. T4. **Ufipa** Distr. Near R. Kalambo above Kalambo falls, *Brachystegia* woodland, fl. & fr. 29.iii.1955, *Exell, Mendonça & Wild* 1319 (SRGH). Escarpment above Kasanga, sandy soil on verge of road, 900 m, f l. & f r. 30.iii.1959, *Mrs. Richards* 11005 (K). T6. **Iringa** Distr. Great North Road between Matanana and Malangali, 85 miles (136 km) S. of Iringa, *Brachystegia* woodland, 1730 m, f l. & fr. 27.iii.1962, *Polhill & Paulo* 1896 (x).

12. *Tephrosia linearis* (Willd.) Pers., Syn. Pl. 2(2): 330 (1807). Type from W. Africa.

Var. *discolor* (E. Mey.) Brummitt, stat. nov.

Basionym: *Tephrosia discolor* E. Mey., Comment. Pl. Afr. Austr.: 111 (1836). Type from S. Africa (Natal).

Synonym: *Tephrosia linearis* subsp. *discolor* (E. Mey.) J. B. Gillett in Kew Bull. 13(1): 119 (1958). Type as for *T. discolor*.

The differences between this and typical *T. linearis*, and relevant synonymy, are given by GILLETT (loc. cit.). Extremes appear very different but there appears to be continuous variation from one to the other and there is a very wide geographical overlap between them. The distinction

between them may in fact often be arbitrary, especially when both are found growing at the same locality. Plants from Mozambique and Madagascar seem particularly difficult to place satisfactorily. There is, however, some difference in overall altitudinal distribution and the geographical overlap is perhaps not complete, all W. African material being probably annual and small-flowered (var. *linearis*). Varietal rank seems most appropriate.

13. ***Tephrosia richardsiae*** J. B. Gillett in Kew Bull. **13**(1): 117 (1958). Type: Zambia, Northern Prov., Mpulungu, Lake Tanganyika, fl. & fr. 8.iii.1952, Mrs. *Richards* 1079 (x, holotype).

A number of good collections of this species are known from south-western Tanzania and the northern part of the Northern Province of Zambia, with a single recent collection from Eastern Province — Lundazi Distr., mica mine hill, fl. iii.1962, *Verboom* 10 (K). Three other collections, all of which have at various times been identified with other species, occurring further to the south-west, seem also to be referable to this species but differ markedly in their stem pubescence, and also, significantly in this group of species, in the coloration of the indumentum of the pods. They seem to merit subspecific recognition.

Subsp. ***richardsiae***

Stems with white to grey-brown, appressed to ascending hairs. Calyx with appressed to ascending hairs. Pods (3.5)4-5 mm broad, with hairs uniformly grey or grey-brown, or those at the margin sometimes slightly darker.

South-western Tanzania and north-eastern Zambia.

Subsp. ***erucifera*** Brummitt, subsp. nov.

Caules pilis ferrugineis deflexis vel fere patentibus vestiti. Calyx pilis longis irregulariter patentibus vestita. Legumina 3.5-4 mm lata, ad margines pilis fuscis praedita, eis paginarum griseis dissimilibus.

Typus: Zambia, Mpika Distr., low rocky hills by Serenge-Mpika road, 1200 m, fr. 6.iv.1961, *Mrs. Richards* 14978 (α , holotypus).

ZAMBIA. Northern **Prov.** Kaloswe, 62 km SW of Mpika, young fr. 24.vii.1930, *Hutchinson & Gillett* 4064 (K; LISC; SRGH). Mpika Distr., low rocky hills by Serenge-Mpika road, 1200 m, fr. 6.iv.1961, *Mrs. Richards* 14978 (α , type). Central Prov. Serenje, plateau woodland, fl. 18.ii.1955, *Fanshawe* 2091 (α).

The subspecific epithet is derived from the latin *eruca*, a caterpillar; the two-coloured pods in this group of species have been likened to caterpillars crawling over the plant.

Group 4. VARIOUS GLABRISTYELD SPECIES
WITH FEW LEAFLETS

14. *Tephrosia elongata* E. Meyer, *Comment. Pl. Afr. Austr.*: 111 (1835).— *Sonder* in *Linnaea* 23: 30 (1850).— *Harvey* in *Harvey & Sonder, Fl. Cap.* 2: 208 (1862).— *Forbes* in *Bothalia* 4(4): 977 (1948). Type: Natal, between Omsamculo [Umzinkulu] and Omcomas [Umkomaas], *Drège* (not seen, holotype presumed destroyed at Berlin).

This species is frequently confused with *T. longipes* or *T. lurida*, from which it may be distinguished with certainty by its glabrous style and penicillate stigma.

In her revision of the S. African species Miss FORBES recognised a variety with 'leaflets, stems and legumes pubescent'. The pubescence of the stems and leaves is in fact in some specimens conspicuously spreading, unlike the more usual condition where the hairs are closely appressed, but both types are found from northern Transvaal to Natal and might perhaps not be considered to merit taxonomic recognition. However in Rhodesia all available material is of the spreading pubescent type, and it is perhaps useful to maintain the two varieties. Miss FORBES referred the spreading pubescent plants to 'var. *pubescens* E. Mey.' but

it seems that E. MEYER never published this name. *T. elongata* var. *pubescens* Sonder in *Linnaea* 23: 30 (1850) was clearly stated to include the type of the species, and must now be regarded as an illegitimate name. Miss FORBES'S var. *pubescens* is nomenclaturally and taxonomically different but a later homonym and not validly published since it had no latin description. A new name is proposed below.

Var. *lasiocaulos* Brummitt, var. nov.

Caules, foliorum petioli et rhachides et paginae inferiores pilis patentis vestiti.

Typus: Rhodesia, Matobo Distr., Farm Chesterfield, fl. X.1958, *O. B. Miller* 5493 (κ , holotypus; SRGH, isotypus).

Rhodesia (known only from Matobo and Inyanga Districts) and S. Africa (Transvaal and Natal), probably also in Swaziland (FORBES, 1948). The following have been seen from the Flora Zambesiaca area:

RHODESIA. Western Div. Matobo Distr., Farm Besna Kobila, xii.1957, *O. B. Miller* 4865 (κ ; SRGH). Matobo Distr., Farm Chesterfield, fl. x.1958, *O. B. Miller* 5493 (κ ; SRGH —types). Matobo Distr., Quariaga Farm, fl. i.1961, *O. B. Miller* 7650 (K; SRGH). Eastern Div. Inyanga Mts., Manika, 1830-2130 m, fl. 10.ii.1899, *Cecil* 223 (κ). Inyanga Distr., opposite Dannakay turn-off on way to Juliasdale, fl. 25.x.1946, *Rattray* 1025 (κ ; SRGH). Inyanga Distr., Farm Pamushana, fl. & young fr. xi.1957, *O. B. Miller* 4724 (SRGH). Inyanga Mountains Hotel, fl. 6.iv.1958, *Corby* 876 (K).

Miss FORBES also described a new species, *T. tzaneenensis*, distinguished from *T. elongata* only by its sessile or only shortly petioled leaves. This was known to her only from Pietersburg District in the Transvaal, and these plants tend to be more robust than typical *T. elongata* and have rather broad leaflets rounded at the apex. However, recent collections from the mountains of extreme southern Mozambique have the subsessile or shortly petioled leaves and robust, erect growth of *T. tzaneenensis* but very long and

narrow, acute leaflets. Petiole length is somewhat variable in *T. elongata* and it seems better to recognise *T. tzaneensis* as only a variety of *T. elongata*. Despite the marked difference in leaflet shape between the Pietersburg and Mozambique plants it does not seem advisable at the moment to separate them taxonomically.

Var. *tzaneensis* (H. Forbes) Brummitt, comb. et stat. nov.

Basionym: *Tephrosia tzaneensis* H. Forbes in *Bothalia* 4(4): 977 (1948). Type: S. Africa, Transvaal, Tzaneen, *Pole-Evans* 4024 (PRE, not seen).

Differs from var. *elongata* in its subsessile or shortly petioled (up to 6 mm) leaves. Transvaal (Pietersburg Distr.) and southern Mozambique (Lourenço Marques Prov.). The following have been seen from our area:

MOZAMBIQUE. **Lourenço** Marques. Marracuene, road from Namaacha, 200 m, fl. & fr. 27.xi.1940, *Hornby* 938 (LISC). Serra da Goba, road from Fonte dos Libombos, fl. & fr. 31.iii.1945, *A. E. Sousa* 129 (LISC). Namaacha, near frontier, fl. & fr. 25.iv.1947, *Pedro & Pedrógão* 771 (LMJ). Maputo to Goba, fl. & young fr. 8.i.1947, *Pedro & Pedrógão* 486 (LMJ). Montes da Namaacha, fl. 10.i.1948, *Torre* 7089 (LISC). Namaacha, near the Canada Dry factory, fl. & fr. 27.iii.1957, *Barbosa & Lemos* 7549 (COI; LISC; LMJ). Goba, near the R. Maiuana, fl. & fr. 2.xi.1960, *Balsinhas* 159 (x; LMJ; PRE).

Var. *elongata*

Tephrosia elongata E. Mey. var. *pubescens* Sond. in *Linnaea* 23: 30 (1850).—Harv. in Harv. & Sond., *Fl. Cap.* 2: 208 (1862); *nom. illegit.* Type as for *Tephrosia elongata* E. Mey.

Tephrosia elongata E. Mey. var. *glabra* Sond. in *Linnaea* 23: 30 (1850).—Harv. in Harv. & Sond., *Fl. Cap.* 2: 208 (1862).—Bak. f., *Leg. Trop. Afr.* 1: 183 (1926). Type from S. Africa, not seen.

Tephrosia zambesiaca Taub. in Engl., Bot. Jahrb. **23**: 183 (1896).— Bak. f., Leg. Trop. Afr. 1: 182 (1926). Type: Malawi, top of Zomba, *Buchanan* 213 (α , chosen here as lectotype).

Tephrosia dissitiflora Bak. in Kew Bull. 1897: 257 (1897). Type: Malawi, Mt. Zomba, *Whyte* (K).

Tephrosia coriacea Benth. ms. in schaed. ined. — Harv. in Harv. & Sond., Fl. Cap. 2: 208 (1862) in synonym. sub *T. elongata* var. *glabram*.

Tephrosia ensifolia Harv. ms. in schaed. ined.; in Harv. & Sond., Fl. Cap. 2: 208 (1862) in synonym. sub *T. elongata*

var. *pubescentem*.

The typical variety of *T. elongata* is represented in the Flora Zambesiaca area apparently only by an isolated population on the Zomba Plateau in Malawi, some 1000 km north of the nearest known station in the Transvaal. The Zomba plants are rather more robust than this variety in S. Africa (mostly about 50 cm high), with rather broad leaflets (mostly 8-15 mm broad) but it does not seem advisable to separate them taxonomically without more adequate material. Only the following four collections are known:

MALAWI. Southern Prov. Top of Zomba, fl. & fr. 1881, *Buchanan* 213 (α , lectotype of *T. zambesiaca* Taub.). Without precise locality, fl. & fr. 1891, *Buchanan* 609 (α , isotype of *T. zambesiaca* Taub.). Mt. Zomba, 1220-1830 m, fl. & fr. xii.1896, *Whyte* (K, type of *T. dissitiflora* Bak.). Zomba Plateau, 1830 m, fl. 23.X.1941, *Greenway* 6358 (α).

15. *Tephrosia pentaphylla* (Roxb.) G. Don in Sweet, Hort. Brit. ed. 3: 170 (1839). — Gamble, Fl. Presid. Madras **1**(2): 318 (1918). — Andrews, Fl. PL Anglo-Egypt. Sudan 2: 238 (1952). Type: plate 1628 in Roxburgh's unpublished ícones, plant originally from India (α).

Galega pentaphylla Roxb. [Hort. Bengal.: 57 (1814), nom. nud.] Fl. Ind. 3: 384 (1832). Type as above.

Tephrosia pentaphylla [Roxb.] Sweet, Hort. Brit. ed. 2: 142 (1830), nom. nud.—J. C. Loudon, Hort. Brit.: 303 (1830), nom. nud.—Graham ex Wallich, Cat. 5650 (1831-32), nom. nud.

In recent years the name of this species has generally been cited as *T. pentaphylla* (Roxb.) Sweet ex Gamble. Sweet had used the name in his Hortus Britannicus (1830) prior to publication of the description by ROXBURGH in 1832, but it appeared again in 1839 in the third edition revised by G. DON. The correct citation appears therefore to be *T. pentaphylla* (Roxb.) G. Don.

Although the species is apparently widespread—southern India, Persia, Arabia, Ethiopia, Sudan, Kenya and Tanzania—it seems to have been seldom collected. The following specimen, found among undetermined material of the genus in the Lisbon herbarium, appears to be the first and only record of the species in the Flora Zambesiaca area:

MOZAMBIQUE. Niassa Prov. Cabo Delgado, entre Mucojo e Macomia, fl. 29.ix.1948, *Barbosa* 2265 (LISC).

16. *Tephrosia paniculata* Welw. ex Bak. in Oliv., Fl. Trop. Afr. 2: 122 (1871).—Bak. f., Leg. Trop. Afr. 1: 207 (1926).—Cronquist, Fl. Congo Belge 5: 95 (1954).—J. B. Gillett in Kew Bull. 13(1): 115 (1958).—Torre, Consp. Fl. Angol. 3: 160 (1962). Type: Angola, Cuanza Norte, Pungo Andongo, *Welwitsch* 2075 (BM; α —isotypes).

Cracca paniculata (Welw. ex Bak.) Kuntze, Rev. Gen. Pl. 1: 175 (1891). Type as above.

This species has leaves with usually 1 or 2 pairs of lateral leaflets, and *T. holstii* Taub. has always been maintained as a distinct species having unifoliate leaves. GILLETT (loc. cit.) has however pointed out that some specimens of *T. paniculata*, referred to var. *schizocalyx* (Taub.) Gillett, also have unifoliate leaves, and although *T. holstii* does also have a usually shorter inflorescence than typical *T. pa-*

niculata the characters separating the two do not seem to be sufficiently clear to maintain specific rank. The two taxa are fairly well geographically separated, typical *T. paniculata* occurring west of the Rift Valley and *T. holstii* to the east, and they seem to form good geographical subspecies (see map, fig. 4).

Subsp. *paniculata*

Tephrosia dimorphophylla Welw. ex Bak. in Oliv., Fl. Trop. Afr. 2: 116 (1871).—Bak. f., Leg. Trop. Afr. 1: 207 (1926). Type: Angola, Huíla, Missão de Montino, *Welwitsch* 2073 (BM; K—*isotypes*).

Tephrosia eriosemoides Oliv. in Trans. Linn. Soc. 29: 57, t. 32 (1872).—R. E. Fries, Wiss. Ergebn. Schwed. Rhod.-Kongo-Exped. 1: 83 (1914).—Robyns, Fl. Parc Nat. Albert 1: 310 (1948).—Brenan, Tanganyika Check List: 446 (1949). Type: Tanganyika, Bukoba Distr., Karagwe, *Grant* 414 (α , holotype).

Cracca dimorphophylla (Welw. ex Bak.) Kuntze, Rev. Gen. Pl. 1: 175 (1891). Type as for *Tephrosia dimorphophylla*.

Tephrosia preussii Taub. in Engl. Bot. Jahrb. 23: 182 (1896).—Hepper, Fl. W. Trop. Afr. ed. 2, 1: 529, 531 (1957). Type: Cameroun, *Preuss* 629 (BM; K—*isotypes*).

Tephrosia schizocalyx Taub. in Engl., Bot. Jahrb. 23: 183 (1896). Types: Malawi, Shiri Highlands, 1885, *Buchanan* 494 (α , chosen here as *isolectotype*); 1891, *Buchanan* 7 (α , *isolectoparatype*).

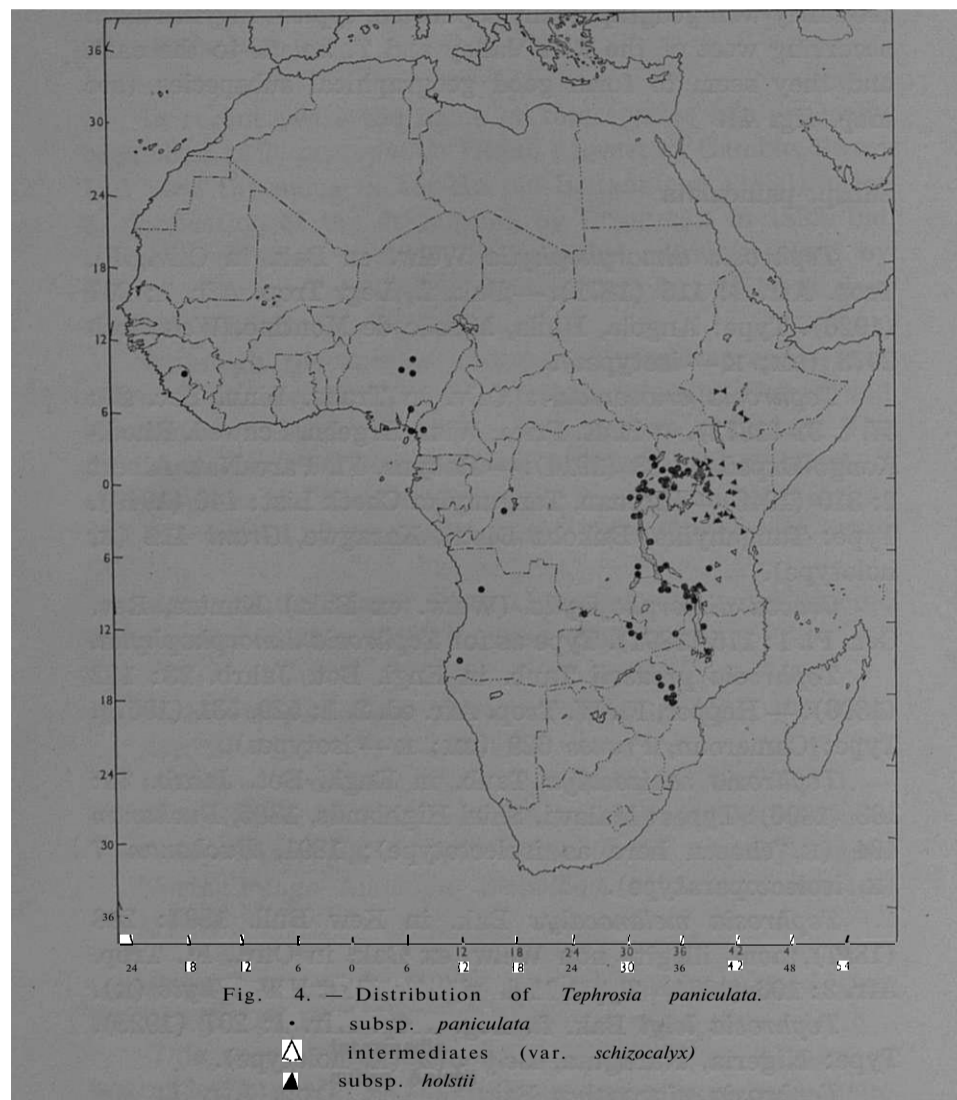
Tephrosia melanocalyx Bak. in Kew Bull. 1897: 258 (1897), nom. illegit., non Welw. ex Bak. in Oliv., Fl. Trop. Afr. 2: 106 (1871). Type: Malawi, near Fort Hill, *Whyte* (K).

Tephrosia lelyi Bak. f., Leg. Trop. Afr. 1: 207 (1926). Type: Nigeria, Naraguta, *Lely* 572 (α , holotype).

Tephrosia nigrocalyx Bak. f., Leg. Trop. Afr. 1: 208 (1926). Type as for *Tephrosia melanocalyx* Bak. (1897).

Tephrosia paniculata var. *schizocalyx* (Taub.) J. B. Gillett in Kew Bull. 13(1): 115 (1958).—Torre in Consp. Fl. Angol. 3: 161 (1962). Type as for *Tephrosia schizocalyx*.

Leaves with 1-2(3) pairs of lateral leaflets, or occasionally unifoliolate. Racemes up to 16(22) cm long, with usually



more than six distinct nodes. Calyx (7)9-13(14) mm long. Petals (10)12-16 mm long.

West Tropical Africa (to Sierra Leone) to Uganda, Kenya and Tanzania west of the Rift Valley and south to Angola, Rhodesia and northern Mozambique. Unifoliolate

plants of this subspecies are known from central and south-western Tanzania, southern Malawi — Shiri Highlands, *Buchanan* 494 and 7 (x) — and adjacent Mozambique — Tete Prov., near Vila Coutinho, *Torre & Paiva* 11124 (LISC). These would be referable to var. *schizocalyx* (Taub.) Gillett, but it is difficult to make a clear distinction of this, some plants having the leaves on the main stem 3-5-foliolate and on the lateral branches unifoliolate. The isotypes seen of *T. dimorphophylla*, referred by Torre to var. *schizocalyx*, have leaves not unifoliolate but 3-foliolate.

Subsp. *holstii* (Taub.) Brummitt, comb. et stat. nov.

Basionym: *Tephrosia holstii* Taub. in Engl., Pflanzenw. Ost.-Afr. C: 211 (1895). Type: Tanzania, Usambaras, *Holst* 2 (chosen here as lectotype — x, photograph only).

Tephrosia riva Taub. ex Harms in Annuar. Ist. Bot. Roma 7: 92 (1897). Type: Ethiopia, Giaribuli, *Riva* 1222 (x, photograph only).

Tephrosia kassneri Bak. f. in Bull. Soc. Roy. Bot. Belge 57(2): 120 (1925). Type: Kenya, Muka, *Kassner* 27 (chosen here as lectotype — K).

Leaves unifoliolate. Racemes up to 9(16) cm long, with usually fewer than six distinct nodes and often subcapitate at the apex. Calyx 7-10 mm long. Petals 9-13 mm long.

Ethiopia, Kenya and Tanzania, east of the Rift Valley.

17. *Tephrosia forbesii* Bak. in Oliv., Pl. Trop. Afr. 2: 116 (1871). — Bak. f., Leg. Trop. Afr. 1: 205 (1926). — Forbes in Bothalia 4(4): 956 (1948). Type: Mozambique, Delagoa Bay (Lourenço Marques), *Forbes* (K, holotype).

This readily recognisable species with unifoliolate leaves and wholly axillary flowers is well known in the coastal area around Lourenço Marques, where the ovary and pod are consistently pubescent. A number of recent collections have been made, however, on Inhaca Island and in inland

areas in the Transvaal and southern Rhodesia, in all of which the ovary and pod are glabrous except on the margins. The *Inhaca* plants seem to be significantly smaller in most parts than those inland and are here recognised as a distinct subspecies. The inland plants show considerable variation in petal and calyx length and particularly in pedicel length, and may be taxonomically divisible, but until there are more collections available it seems best to include them all in one new subspecies.

Subsp. **forbesii**

Tephrosia junodii De Wild. in Ann. Mus. Congo (Bot.) 1: 261 (1906). Type: Mozambique, Lourenço Marques, *Junod* 168 (BR).

Larger leaves on each plant 3.5-6(7) X 0.4-0.7(0.8) cm, linear-oblong to linear-elliptic. Pedicels 2-5(6) mm. Calyx (4)5-7(8) mm long, the teeth (1½)2-3 times as long as the tube. Petals 8-11 mm, slightly to distinctly exceeding the calyx. Pods 25-40 X 3.5-4(4.5) mm, appressed-pubescent on both surfaces.

Coastal areas of southern Mozambique.

MOZAMBIQUE. Sul do Save. Arredores de Vila João Belo, fl. & fr. 10.xii.1940, *Torre* 2307 (LISC). Manjacaze, fl. & fr. 25.iii.1948, *Torre* 7545 (LISC). **Lourenço** Marques. Delagoa Bay, *Forbes* (K, type). Lourenço Marques, f l. & f r. 29.xi.1897, *Schlechter* 1519 (COI; κ); fl. & fr. 25.i.1910, *Mrs. Howard* 25 (LISC); fl. & fr. v.1916, *Pimenta* (LISC). Rikatla, fl. & fr. xi.1918, *Junod* 546 (LISC; PRE). Lourenço Marques, Ponta Vermelha, fl. & fr. 25.ix.1945, *Pedro* 134 (LMJ; SRGH). Near Marracuene, 33 km N of Lourenço Marques, fl. 27.ii.1946, *Gomes e Sousa* 3376 (COI; κ). Lourenço Marques—Mus. Álvaro de Castro, fl. & fr. 7.iii.1947, *Pedrogão* 94 (LMJ). Lourenço Marques commonage, fl. & fr. 18.i.1948, *Mrs. Faulkner* 183 (COI; K; SRGH).

Subsp. **inhacensis** Brummitt, subsp. nov.

Folia matura 3.5-5.5 X 0.4-0.6 mm, lineari-oblonga. Pedicelli 1-3 (5 in statu fructifero) mm longi. Calyx 4-8 mm longa, dentibus quam tubum 1.5-2.5-plo longioribus. Petala 8-10 mm longa, calycem excedentia vel aequantia. Legumina circiter 3.5 mm lata, marginibus pubescentibus, paginis glabris.

Typus: Mozambique, Lourenço Marques Distr., Inhaca Island, w. coast ridge grassland, fl. & fr. 30.i.1962, Mogg 29869 (x, holotypus; SRGH, isotypus).

Known only from Inhaca Island.

MOZAMBIQUE. **Lourenço** Marques. Inhaca Island, S. of station, in forest remnant, fl. & fr. 30.i.1958, Noel 98 (K). Inhaca Island, Langani Ridge woodland, fl. & fr. 4.iii.1958, Mogg 27757 (x). Inhaca Island, Ponta Rasa fresh water swamp, fl. & fr. 17.vii.1959, Mogg 29425 (x; SRGH). Inhaca Island, w. coast ridge grassland, fl. & fr. 30.i.1962, Mogg 29869 (x; SRGH — types).

Subsp. interior Brummitt, subsp. nov.

Folia matura 5.5-8.0 X (0.6)0.7-1.0 cm, lineari-oblonga vel lineari-lanceolata. Pedicelli 1-15 mm longi. Calyx (6)7-14 mm longa, dentibus quam tubum 3-5-plo longioribus. Petala 7-13 mm longa, calycem excedentia vel aequantia. Legumina circiter 4.5 mm lata, marginibus pubescentibus, paginis glabris.

Typus: Rhodesia, Nuanetsi Distr., Mozambique border, Vila Salazar, 26.iv.1961, Drummond & Rutherford-Smith 7543 (SRGH, holotypus; x, isotypus).

Southwestern Rhodesia and adjacent Mozambique and the Transvaal.

RHODESIA. Southern Div. Nuanetsi Distr., Mozambique border, Vila Salazar, mixed tree savanna on sandstone, fl. & fr. 26.iv.1961, Drummond & Rutherford-Smith 7534 (K; SRGH — types). Nuanetsi Distr., Kapateni, ± 64 km NE

of Malvernia, sandy ground by roadside, fr. 25.iv.1962, Drummond 7730 (K; SRGH).

MOZAMBIQUE. Sul do Save. Gaza, Rhodesia border, Malvernia, mixed tree savanna on sandstone, fl. & fr. 26.iv.1961, Drummond & Rutherford-Smith 7533 (K; SRGH).

SOUTH AFRICA. Transvaal. Without locality, 1875-1880, Rehmann 4927 (K —syntype of *T. salicifolia* Schinz). Waterberg Distr., Mosdene, Naboomspruit, sandveld, fl. 31.i.1932, Galpin 11667 (K). Kruger National Park, 10 m E. by N. of Punda Maria, mopane-veld, 430 m, fl. & young fr. 20.i.1953, Acocks 16770 (K). Kruger National Park, Punda Maria distr., 520 m, fl. 20.i.1953, van der Schuyff 1832 (x).

18. *Tephrosia uniflora* Pers., Syn. Pl. 2: 329 (1807). Type: Senegal, Roussillon (herb. Lamarck, P, not seen).

Subsp. *uniflora*. — Gillett in Kew Bull. 13(1): 114 (1958).

Synonym: *Tephrosia mossambicensis* Schinz in Bull. Herb. Boiss., sér. 2, 2: 948 (1902). — Bak. f., Leg. Trop. Afr. 1: 205 (1926). Type: Mozambique, Boruma, Menyhart 632 (Z, photograph K).

Other synonymy is given by GILLETT (loc. cit.). The type of *T. mossambicensis* was cited by SCHINZ as Menyhart 682 in error for 632 (see note attached to specimen at Zurich).

Group 5. TEPHROSIA REPTANS, T. LONGIPES AND ALLIED SPECIES

These are barbistyled species with few to numerous pairs of linear to linear-oblong or (*T. reptans*, *T. faulknerae*) oblanceolate leaflets, linear stipules, mostly lax racemes with linear bracts, and linear thinly pubescent pods, usually with 10-22 seeds (except in *T. paucijuga*).

This difficult group has hitherto been in a state of great confusion. Material previously referred to four or five species (the great majority to either *T. reptans* or to *T. longipes*) in the herbaria examined is here redistributed among twelve

species with a further two subspecies and six varieties. Few specimens have been adequately identified, and in view of the widespread confusion all specimens seen are cited in the account below. The following key should allow identification of specimens to the taxa recognized.

1. Stems with spreading hairs, at least in the lower parts
 2. Annuals with a ± slender tap-root, not strongly decumbent.
 3. Inflorescence axis terminated by a dense head of flowers with numerous conspicuous and persistent bracts, also often with flowers at 1-3(5) nodes below the terminal head 23. *T. ringoetii*
 3. Inflorescence elongate, ± lax, without a terminal head
 4. Plant 20-50(90) cm high, branching in the lower parts only; stem hairs usually brown; pods with long appressed hairs as well as short ones 22. *T. euprepes*
 4. Plant usually 60-100 cm high, stems branching rather regularly for most of their length; stem hairs grey; pods shortly pubescent with usually irregular geniculate hairs 24. *T. stormsii* var. *pilosa*
 2. Perennials with a woody stock, or if annual then with robust stems strongly decumbent and up to 1 m or more long.
 5. Leaves unifoliolate or trifoliolate 28. *T. lurida* var. *drummondii*
 5. Leaves with 5-9 pairs of leaflets.
 6. Stems erect from a woody stock; stem hairs up to 2.5 mm long; petiole (1.2)2.5-5 cm, petiole and rhachis together (7)12-18(23) cm; pods with long appressed hairs 21. *T. caerulea* subsp. *caerulea*
 6. Stems decumbent, up to 1 m or more long; stem hairs up to c. 1 mm long; petiole 0.2-2.4(4.4) cm, petiole and rhachis together 4-11(13) cm long; pods shortly pubescent with irregular or ± parallel appressed hairs 20. *T. reptans* var. *reptans*
1. Stems glabrous or appressed- to ascending-pubescent.
 7. Stems simple or 1(2)-branched, up to 45(75) cm high, from a woody underground stock; stems glabrous to sparsely and shortly appressed-pubescent; leaves with (0)1-3(4) pairs of leaflets, the lower surface subglabrous to sparsely and shortly appressed-pubescent, the veins prominent on both surfaces
 8. Pods 3.5-4(5) mm broad, with 8-12(15) seeds 29. *T. laxiflora*
 8. Pods 8-9.5 mm broad, with 2-5 seeds 30. *T. paucijuga*
 7. Stems regularly branched and up to 140(180) cm high, or decumbent, or if simple or 1(2)-branched then stems and leaflet under-surface ± densely appressed-pubescent; stems

- glabrous to densely appressed-pubescent; leaves with 1-11 pairs of leaflets, variously pubescent beneath, the veins not prominent on both surfaces
9. Stems subglabrous, robust, erect or often prostrate, about 130-150 cm long, mostly 3-4 mm diameter; leaflets 3.5-6.5 × 0.5-0.8 cm, linear-elliptic (Angola) . . . 26. *T. rigidula*
9. Stems densely pubescent, or if subglabrous then either always erect and more slender, rarely exceeding 3 mm diameter (see *T. stormsii*, *T. paradoxa*) or leaflets up to 3.2(4.0) cm long (*T. reptans*)
10. Plant bushy, c. 1.5 m, high; inflorescences short, 7-10 cm, and ± crowded at least in the upper part, on very short peduncles or usually with the lowermost flowers in the axil of the uppermost leaf; stems densely clothed with long appressed to ascending hairs; petioles mostly 0.1-0.4 cm long . . . 19. *T. faulknerae*
10. Plant decumbent to erect, not bushy, up to 1.5 m high; inflorescences elongate, 7-32 cm, lax, on ± long peduncles 5-18 cm long; stems subglabrous to shortly appressed-pubescent; petioles mostly 0.4-2.5 cm long
11. Leaflets up to 3.2(4.0) cm long, oblanceolate to elliptic-oblong or linear-oblong; stems decumbent or erect
12. Perennial with robust stems, decumbent, woody towards the base; seeds 11-13(16) . . . 20. *T. reptans* var. *arenicola*
12. Annual with rather slender stems, not woody, the main stem ± erect but often with decumbent branches from the base; seeds (12)15-18 . . . 20. *T. reptans* var. *microfoliata*
11. Leaflets (1.5)4-14(18) × (0.1)0.2-1.2(1.4) cm, linear or linear-oblong; stems erect, or if ± decumbent at the base then only up to 40(50) cm long
13. Leaflets linear-oblong, (3)4-7.5 × (0.3)0.5-1.2(1.4) cm, in 5-9 pairs; petiole and rhachis together (7)12-18(23) cm (S. W. Africa) . . . 21. *T. caerulea* subsp. *otaviensis*
13. Leaflets linear (1.5)4-14(18) × (0.1)0.2-0.9(1.1) cm, in (1)2-7(8) pairs, or if leaflets linear-oblong (*T. longipes* subsp. *swynnertonii*) then petiole and rhachis together 2-6(8) cm long
14. Racemes terminal and axillary (sometimes in the axil of a bract); stems glabrous to sparsely appressed-pubescent (peduncles and inflorescence axes sometimes densely pubescent); annual or perhaps biennial

15. Lateral racemes stout (axis 1-2 mm diameter) and rather stiffly erect, all in the axil of a foliage leaf, the axis densely pubescent to tomentose; calyx (4)5-8(10) mm long, densely pubescent to villous; stipules (8)13-18(24) X 1-2 mm; bracts 5-8(11) X 0.7-1.5(2) mm 25. *T. paradoxa*
15. Lateral racemes slender (axis 0.2-1 mm diameter) and usually rather flexuous and curving upwards, often subtended by only a small linear bract, the axis subglabrous to shortly appressed-pubescent; stipules (3)4-12 X 0.3-0.8 mm; bracts 2-4(5) X 0.2-0.5 mm 24. *T. stormsii* var. *stormsii*
14. Racemes all terminal or leaf-opposed; stems densely appressed- or ascending-pubescent; annual or perennial
16. Perennial with a stout woody underground stock giving rise to usually numerous slender stems up to 1.5(2) mm diameter, usually simple or sparingly branched (except in Kenya), up to 40(50) cm high; leaves with up to 3 pairs of leaflets, the lowermost leaves often unifoliate or digitately trifoliate; petiole (1.5)2.5-7.5 cm, usually exceeding the rhachis
17. Pods with short, usually irregular, geniculate hairs 28. *T. lurida* var. *lurida*
17. Pods with long parallel appressed hairs 28. *T. lurida* var. *lissocarpa*
16. Annual or perennial with a stout tap-root, often becoming woody below, with stems 2-3(5) mm diameter, ± regularly branched, up to 100(150) cm high; leaves with (3)4-7(8) pairs of leaflets; petiole (0.5)0.9-4.2(5.5) cm long, usually much shorter than the rhachis
18. Stems with dense, brown, conspicuously ascending hairs, especially on the angles; inflorescence usually short and compact; leaflets linear-oblong, usually truncate to emarginate at the apex 27. *T. longipes* subsp. *swynnertonii*

18. Stems shortly appressed- grey-pubescent, sometimes also with some longer ascending hairs; inflorescence elongate, lax, leaflets linear to rarely linear-elliptic, usually strongly acute at the apex
19. Annual or perennial; pods (62)70-88 mm long, with (16)17-22 seeds; stipules (5)7-14(17) mm long
27. *T. longipes* var. *icosisperma*
19. Perennial; pods (40)50-70(77) mm long, with 10-16(17) seeds; stipules 4-9(11) mm long . . .
27. *T. longipes* var. *longipes*

19. *Tephrosia faulknerae* Brummitt, sp. nov.

T. reptanti probabiliter affinis sed habitu et indumento et proprietatibus ceteris distincta.

Herba robusta, ramosa, annuus vel biennis vel forsitan perennis, circa 1.5 m altus. Caules juveniles dense pilis griseis vel brunneis appresse vel ascendenter pubescentes. Folia (6)8-11-jugata; petiolus 0.1-0.4(0.7) cm, petiolus et rhachis coniunctim 5-12 cm, appresse pubescentes vel subtus glabrescentes; foliola 1.0-3.2 X 0.5-1.0 cm, oblongo-oblanco-lata, basi rotundata ad subcuneata, apice plus minusve truncata et valde mucronata; pagina superior glabra, pagina inferior tenuiter et breviter appresse vel irregulariter pubescens; stipulae 6-10 X 1.5-2.5 mm, anguste triangulares, pubescentes. Flores in racemis plerumque terminalibus, breviter pedunculatis vel infimo axillo folii supremi, dispositi; bractea 5-8 X 0.7-1 mm, lineari-triangulares; pedicelli circa 3 mm. Calyx 4-5 mm longus, breviter et aliquantum irregulariter pubescens; dentes superiores per $\frac{3}{4}$ longitudinis connati triangulum acutum formantes. Petala purpurea; vexillum 15-17 mm longum, carinam plus minusve aequans. Tubus staminalis supra connatus. Ovarium appresse pubescens; legumina 50-64 X 4-5 mm, puberula ad brevissime irregulariter pubescentes; semina 12-14.

Holotypus: Mozambique, **Zambézia**, Namagoa, fl. 23-34. iii.1949, Mrs. Faulkner 404 (κ , holotypus; COI, SRGH, isotypi).

This species is named after Mrs. HELEN FAULKNER, collector of much valuable material from the Flora Zambesiaca area and East Africa. Known only from two collections from Mozambique (see also notes under *T. repans* var. *microfoliata*).

MOZAMBIQUE. Niassa. Nampula, abundant in woods by roadsides, fl. & fr. 17.ii.1937, Torre 1192 (COI; LISC). **Zambézia**. Namagoa, Mocuba and Moebede road, Lugela, fl. 23-24. iii.1949, fr. 3.iv.1949, Mrs. Faulkner 404 (COI; κ ; SRGH — types).

20. *Tephrosia reptans* Bak. in Oliv., Fl. Trop. Afr. 2: 121 (1871). — Oliv. in Trans. Linn. Soc. 29: 56, t. 27 (1872). — Bak. f., Leg. Trop. Afr. 1: 197 (1926). — Suessenguth & Merxmüller in Trans. Rhod. Sci. Ass. 43: 26 (1951). Type: Tanzania, Tabora Distr., near Tabora, Speke & Grant (K).

Tephrosia kirkii Bak. in Oliv., Fl. Trop. Afr. 2: 115 (1871). — Bak. f., Leg. Trop. Afr. 1: 200 (1926). Type: Mozambique, Zambesi land, Luawe [Luabo] River, Kirk (κ).

Cracca reptans (Bak.) Kuntze, Rev. Gen. Pl. 1: 175 (1891). Type as for *Tephrosia reptans*.

Cracca kirkii (Bak.) Kuntze, Rev. Gen. Pl. 1: 175 (1891). Type as for *Tephrosia kirkii*.

Annual or short-lived perennial with the rootstock often becoming woody, with several stout prostrate or decumbent-ascending, straggling, branched stems up to 1 m or more long, or (var. *microfoliata*) with the main stem \pm erect with usually decumbent branches from near the base. Stems with conspicuous, brown, spreading hairs up to c. 1 mm long, or (var. *arenicola*, var. *microfoliata*) appressed-pubescent to glabrous. Leaves with 4-9 pairs of leaflets; petiole (0.2)0.4-2.4(4.4 rarely on occasional leaves), petiole and rachis together 4-11(13) cm long, pubescent like the stem; leaflets (1)1.5-4(5.5) X (0.2)0.5-1.0(1.3) cm, oblanceolate to elliptic-

oblong or rarely linear-elliptic to linear-oblong, rounded to subcuneate at the base, rounded to truncate or emarginate at the apex, mucronate; upper surface shortly pubescent, lower surface rather shortly appressed- or irregularly pubescent; stipules (4)8-13(16) × 1-1.8 mm, narrowly triangular to linear, ± persistent. Flowers in terminal and axillary, long-peduncled racemes (4)7-22(32) cm long; bracts 3-7 × 0.2-0.6 mm, linear-triangular; pedicels 2-4(6) mm. Calyx (3)4-7(8) mm long, shortly spreading- (or appressed- in var. *arenicola* and var. *microfoliata*) pubescent with brown or grey hairs; two upper teeth connate for length, all teeth long-acute and ± filiform towards the apex. Petals pink to purple or blue, the keel paler; standard 12-17 mm long, the other petals somewhat shorter. Stamen tube connate above. Ovary shortly pubescent; style pubescent; pods (38)50-65(76) × 4-5 mm, puberulent to very shortly pubescent with irregular to ± parallel hairs, straw-coloured to brown; seeds (10)14-16(18), at maturity (seen only in 2 Kenya specimens) ± rhomboidal, 2.5-3 × 1.5-2 × c. 1, with the hilum near the middle of one or the longer sides, brown with dark markings.

This species is typically conspicuously clothed with spreading brown hairs on stems etc. and leaf rachides. However, two groups of plants with glabrous to appressed-pubescent stems, one group found mainly on sandy lake shores and the other in the grasslands of northern Mozambique, do not seem to be specifically distinct and are here accorded varietal rank. Further investigation of these plants is desirable however. The type of *T. kirkii* Bak., included in synonymy above, appears to be intermediate between var. *reptans* and var. *arenicola* (see below).

Var. *reptans*

Tephrosia carvalhoi ['*carvalhoi*'] Taub. in Engl., Bot. Jahrb. 23: 183 (1896). Type: Mozambique, Gorongosa, *Carvalho* (B, holotype t; COI, isotype).

Tephrosia godmaniae ['*godmaniae*'] Bak. f., Leg. Trop. Afr. 1: 194 (1926). Type: Rhodesia, Salisbury, *Miss Godman* 144 (BM, holotype).

Tephrosia granitica Viguiet in Not. Syst. (Paris) 14: 63 (1950). Type: Madagascar, Maevatanana, ii.1920, Perrier 13046 (chosen here as lectotype— κ , isotype).

Annual to perennial (?), the branches prostrate or decumbent-ascending. Stems and leaf rachides with hairs conspicuously spreading or (in northern Kenya and Uganda) ascending. Leaves with 4-7(9) pairs of leaflets of varying shape; stipules (4)8-13(16) mm long. Calyx with \pm spreading hairs. Pods with (10)14-16 seeds.

Uganda, Kenya, Tanzania, Zambia, Rhodesia, Malawi, Mozambique, Madagascar.

The northernmost specimens cited below, those from Uganda and from Kenya K1 and K2 are generally less pubescent than others, with short spreading hairs or \pm appressed hairs, and so tend towards var. *arenicola*.

UGANDA. U1. **Karamoja** Distr. Kacheliba Escarpment, 1525-1830 m, fl. & fr. 13.ix.1956, Hardy & Bally 10827 (κ). Turkana Escarpment, 1430 m, fl. iv.1960, Wilson 878 (κ).

KENYA. K1. Northern Frontier Prov. Near Lake Marsabit, 1898, Lord Delamere (BM). Dandu, 825 m, fl. & fr. 5.V.1952, Gillett 13064 (κ). Dandu, 1035 m, fl. & fr. 14.V.1952, Gillett 13194 (κ). Moyale, 1100 m, fl. & fr. 2.ix.1952, Gillett 13772 (BM; κ). K2. Turkana Distr. Lorukon, near Turkwell Gorge, fl. & fr. viii.1962, Wilson 1266 (κ). West Suk Distr. West Suk Reserve, 40 miles (64 km) N of Kitale, 1430 m, fl. & fr. 10.vi.1952, Bogdan 3445 (κ). Foot of Suk Escarpment, 1370 m, fl. iii.1964, Tweedie 2784 (EA; FI; κ). K3. Rift Valley. Mt. Suswa, near summit 1830 m, fl. & fr. 23.iii.1963, Bally 12652 (κ). K4. Machakos Distr. Ngomeni, 1893-94, Scott Elliot 6269 (BM; κ). 8 miles (13 km) N. of Simba, 1190 m, fl. & fr. 9.ii.1952, Bogdan 3363 (κ).

TANZANIA. T4. Tabora Distr. Near Tabora, 1170 m, fl. & fr., Speke & Grant (κ , type). T5. **Manyoni** Distr. Manyoni, 1360 m, fl. & fr. 24.iv.1962, Polhill & Paulo 2157 (κ). T8. **Mikindani** Distr. Mikindani-Lindi road, 45 m, fl. & fr. 11.iii.1963, Mrs. Richards 17834 B (κ).

ZAMBIA. Central Prov. Chakwenga Headwaters, 100-129 km E. of Lusaka, fl. & fr. 27.iii.1965, Robinson 6516 (κ).

Southern Prov. Mochipapa, near Choma, 1220 m, fl. 10.iii.1962, *Astle* 1497 (\times ; SRGH). Kasusu, Kalomo, roadside in tsetse clearing in woodland, fl. & fr. 28.iv.1964, *Mitchell* 25/61 (\times).

RHODESIA. Northern Div. Trelawney, Tobacco Expt. Station, fl. & fr. 22.ii.1943, *Jack* 67 [SRGH 9587] (\times ; SRGH); fi. 22.ii.1943, *Jack* 124 [SRGH 9596] (SRGH); fl. 29.iii.1944, *Jack* 67 [SRGH 11940] (\times ; PRE; SRGH). Darwendale, fr. iv.1953, *Vincent* 149 (\times ; SRGH). Darwin Distr., Umsengedsi River, fr. 16.V.1955, *Watmough* 117 (\times ; SRGH). Urungwe Distr., sandy river bank, Urungwe Reserve, 1065-1220 m, fr. iv.1956, *R. Davies* 1898 (SRGH). Gokwe Distr., Gokwe, fl. & fr. 6.iii.1962, *Bingham* 150 (K; SRGH). Central Div. Salisbury, 1460 m, fl. & fr. ii.1920 *Eyles* 2107 (\times ; SRGH). Salisbury, fl. & young fr. 16.iii.1921, *Miss Godman* 144 (BM; type of *T. godmaniae*). Salisbury, 1400 m, fl. & fr. iii.1920, *Eyles* 2107 (PRE). Salisbury, Gatooma road 13 miles (21 km), fl. & fr. 17.xii.1932, *Eyles* 7273 (\times ; SRGH). Inyazura Distr., fl. & fr. 26.ii.1940, *Hopkins* SRGH 7659 (SRGH). Marandellas, fl. 12.iii.1942, *Dehn* 622 (SRGH). Inyazura, 1370 m, fl. 28.ii.1946, *Hopkins* SRGH 14554 (SRGH); SRGH 14555 for parasite *Striga gesnerioides* (SRGH). Hartley District, Poole Farm, fl. & fr. 4.iii.1948, *R. M. Hornby* 2868 (\times ; LISC; SRGH). Marandellas, fl. & fr. 17.iii.1949, *Corby* 420 (PRE; LISC); *Corby* 421 (\times ; SRGH). Makoni Distr., Headlands, fl. & fr. 15.ii.1952, *Corby* 769 (PRE; SRGH). Salisbury, Marirangwe P. A., 1460 m, fl. & fr. ii.1960, *R. M. Davies* 2795 (SRGH). Hartley District, Msengezi P. A. fl. & fr. iii.1961, *R. M. Davies* 2887 (SRGH). Eastern Div. Odzani River Valley, fr. 1914, *Teague* 198 (K). Umtali Distr., fl. 25.ii.1940, *Hopkins* SRGH 7642 (SRGH). Umtali Distr., Maranta Reserve, 760 m, fl. & fr. 10.ii.1953, *Chase* 4764 (BM; COI; K; LISC). Umtali Distr., Darlington suburbs, municipal sand pits, 1100 m, fl. & fr. 8.iii.1960, *Chase* 7280 (BM; K; LISC; SRGH).

MALAWI. Southern Prov. Ntondwe, fl. & fr. 1905, *Cameron* 150 (\times). Ncheu Distr., Msasa Escarpment, Dedzi-Golomoti road, 1250 m, fl. & fr. 19.iii.1955, *Exell*, *Mendonça* & *Wild* 1037 (BM; LISC; SRGH).

MOZAMBIQUE. Niassa. Massangulo, fl. & fr. iv.1933, *Gomes e Sousa* 1350 (BM; COI; K). Malema Distr., Mutuáli, right bank of the R. Nalume, fr. 28.V.1947, *Pedro* 3258 (LMJ). Mutuáli, road to Malema, fr. 28.V.1947, *Pedro* 3262 (LMJ). Ribáuè Distr., 80 km from Nampula towards Ribáuè, 700 m, fl. & fr. 31.i.1964, *Torre & Paiva* 10355 (LISC). Maniamba Distr., Metangula, edges of L. Niassa, 500 m, fl. 29.ii.1964, *Torre & Paiva* 10925 (LISC). **Zambézia**. Zambesi, fl. xi.1866, *Kirk* (K). **Manica** e Sofala. Zambesi, 1863, *Stewart* (BM). Gorongosa, fl. 1884-5, *Carvalho* (COI; isotype of *T. carvalhoi*).

MADAGASCAR. Central Madagascar, comm. 1885, *Baron* 4742 (K). Maevatanana, fl. & fr. ii.1920, *Perrier* 13046 (x, lectotype of *T. granitica*).

Var. *microfoliata* (P. Lima) Brummitt, comb. nov.

Basionym: *Cracca bracteolata* (Guill. & Perr.) Kuntze var. *microfoliata* P. Lima in Bol. Soc. Brot. sér. 2, 2: 137 (1924). Type: Mozambique, near Palma, *P. Lima* 34 (PO).

Cracca bracteolata sensu P. Lima in Broteria, sér. bot. 19 (3): 123 (1921).

Tephrosia auringae sensu Cronquist, Fl. Congo Belge 5: 105 (1954) quoad spec. Mossamb. (*Faulkner* 151, 226).

Annual with rather slender stems, not woody, the main stem usually erect but often with decumbent branches from near the base. Stems and leaf rachides shortly appressed-pubescent. Leaves with 4-9 pairs of leaflets; leaflets 1-4X0.2-0.6(0.8) cm, mostly 5-9 times as long as broad, linear-oblong; stipules 5-9(12) cm long. Calyx shortly appressed-pubescent. Pods with (12)15-18 seeds.

Known only from northern Mozambique.

MOZAMBIQUE. Niassa. Near Palma, fr. 24.viii.1916, *Pires de Lima* 34 (PO, type). Road from Palma to Kionga, fl. & fr. 8.xi.1916, *Pires de Lima* 46 (PO). Palma, fl. & fr. 2.iv.1917, *Pires de Lima* 169 (PO). Nampula, fl. & fr. 2.ii.1937, *Torre* 1223 (COI; LISC). Nampula, fl. & fr. 13.iii.1937, *Torre* 1231 (COI). Metangula, fl. & fr. 24.V.1948, *Pedro & Pedrógão* 3866

(LMJ). Zambézia. Mocuba Distr., Namagoa, 60 m, fl. iii.1943, Mrs. Faulkner 151 (PRE — mixed, apparently in error, with pieces of var. *reptans*, of which duplicate at SRGH); fl. & fr. i.1945, Mrs. Faulkner 151 (x; SRGH); fl. & fr. 26.ii.1948, Mrs. Faulkner 226 (COI; K; PRE; SRGH).

This taxon was first described as a variant of *T. bracteolata* by PIRES DE LIMA but differs markedly from that species in its linear bracts and in other characters. In its inflorescences, flowers, pods and leaflets it closely resembles *T. reptans*, under which it is here placed, but it differs from typical plants of that species in its appressed pubescence and its slender tap root with apparently usually erect, rather short and slender stems. Pedro & Pedrógão 3866 in particular looks most unlike *T. reptans* in its slender erect habit and subglabrous stems, and may be wrongly referred here. Further collections and observations may show that this group should be excluded from *T. reptans*, and its relationship to *T. faulknerae*, with which it is apparently also sympatric (c. f. specimens of both from Nampula and Namagoa), requires investigation. *T. faulknerae* is distinguished by its bushy habit, more compact and short-peduncle or sessile racemes, much denser and longer stem hairs, broader oblanceolate leaflets and broader stipules.

Var. *arenicola* Brummitt & J. B. Gillett, var. nov.

Perennis (?), caulibus robustis, plerumque basim versus lignosis, prostratis usque ad 2 m longis vel caule terminale plus minusve erecto. Caules et rhachides foliorum glabri ad breviter et sparse appresse pubescentes. Folia 5-9-jugata; foliola plerumque 3-5-plo longiora quam lata, anguste elliptica ad oblanceolata; stipulae 4-8 mm longae. Calyx breviter appresse pubescens. Legumina seminis 11-13(16) praedita.

Typus: Tanzania, Mpanda Distr., Kibwesa point, a secondary coloniser of bare sand of dunes, fl. & fr. 17.vii.1958, Juniper & Jefford 48 (x, holotypus); 'sub-shrub — erect main stem, prostrate branches — plants from 18" to 3-4 yards diameter, up to 18" high, branches red, flowers pale

lilac, standard green on outer surface, flowers opening in evening, closed during day'.

This variety, which is described jointly with Mr. J. B. GILLET (Nairobi), appears to be the usual one on sandy shores of Lakes Tanganyika and Nyasa and perhaps other lakes, but other plants from elsewhere (e. g. *McClounie* 113 from 2440 m. alt. in Malawi, also *Bogdan* 2295, *Bally* 796) seem to more or less indistinguishable and are included in this variety below.

BURUNDI. Nyanza, Lake Tanganyika, 7.iii.1920, *Shantz* 704 (x).

KENYA. K4. Machakos **Distr.** Kibwezi, on 'Dwa-rock' in bush country, 915 m, fl. & fr. 16.V.1938, *Bally* 8208 (x). Kiboko, tsetse fly exp. area, solid lava rock with grass cover, 915 m, fr. 17.ii.1949, *Bogdan* 2295 (x).

TANZANIA. T1. **Musoma Distr.** Musoma, hillside grassland, fl. & fr. 1933, *Emson* 337 (x). T4. **Mpanda Distr.** Kibweza, lake shore, fl. & fr. 6.vii.1958, *Mahinde* HSM/8 (K). Kibweza Point, bare sand of dunes, fl. & fr. 17.vii.1958, *Juniper & Jefford* 48 (x, type). Kibweza point, sandy raised beach, fl. & fr. 11.vii.1958, *Jefford & Newbould* 1637 (K). T8. **Songea Distr.** Lukoma, Lake Nyasa, viii.1887, *Bellingham* (BM).

ZAMBIA. Northern **Prov.** Kamba Bay, shore of Lake Tanganyika, deep red sand, fl. & fr. 15.iv.1957, *Mrs. Richards* 9196 (x).

MALAWI. Northern **Prov.** Nyika Plateau, Mwanemba, 2440 m, fl. ii-iii.1903, *McClounie* 113 (x). Karonga, sandy foreshore, fl. & fr. 4.vii.1952, *Williamson* 21 (BM). Kaporo, N. Karonga, margin of lake, st. 22.iii.1953, *Jackson* 1176 (BM; LISC).

MOZAMBIQUE. **Niassa.** Metangula, on sands, fr. 24.V.1948, *Pedro & Pedrógão* 3864 (LMJ).

The type of *T. kirkii* is from perhaps as similar habitat but has rather long appressed or ascending hairs on the stem and is more or less intermediate between var. *arenicola* and var. *reptans*: MOZAMBIQUE. **Manica e Sofala.** Luawe (Luabo) River, sandy soil, fl. & fr. 8.ii.1961, *Kirk* (x).

21. *Tephrosia caerulea* Bak. f., Leg. Trop. Afr. 1: 197 (1926).
Type: Zambia, Mazabuka, Mrs. Woods 51 (BM).

Annual ? with a tap root, to perennial with a woody stock and herbaceous robust, rather sparingly branched, erect stems up to 1.4 m high. Stems covered with spreading or appressed, brown or grey hairs (see subspecies). Leaves with 5-9 pairs of leaflets; petiole (1.2)2.5-5 cm long, petiole and rhachis together (7)12-18(23) cm long, with hairs similar to those on the stem; leaflets (3)4-7.4 × (0.3)0.5-1.2(1.4) cm, linear-oblong or linear-elliptic to linear, rounded to subcordate at the base, ± truncate to emarginate at the apex; upper surface glabrous, lower surface covered with longish appressed hairs; stipules (7)8-16(19) × (0.8)1-1.2(1.5) mm, linear or somewhat falcate, ± persistent. Flowers in mostly terminal racemes, (8)12-26(32) cm long; bracts 3-6 × 0.2-0.6 mm, ± linear; pedicels 3-4 (6 in fruit) mm. Calyx 5-6 (7) mm long, with long, brown or grey, ascending to spreading hairs, the tube 2-2.5 mm, equalling or exceeding the lateral teeth; upper teeth connate for $\frac{1}{3}$ - $\frac{1}{2}$ length. Petals pink to pale purplish or bluish, the keel paler; the standard 13-18 mm long, the other petals somewhat shorter. Stamen tube connate above. Ovary appressed-pubescent; style pubescent; pods 55-70(90) × 4.5-5.5 mm, with long appressed hairs overlying much shorter hairs, or with ± geniculate semi-appressed hairs, ± straw coloured; seeds 13-17(19), at maturity (known only in subsp. *caerulea*, Mutimushi 73) rhomboidal, c. 2.5 × 2 × 1 mm, with the hilum near the middle of one of the longer sides, dark brown with raised lighter patches radiating from the hilum.

South-western Tanzania, south-western Zambia, western Rhodesia, northern Mozambique, Bechuanaland, S. W. Africa.

Subsp. *caerulea*

Usually perennial with a woody stock. Stems and leaf rhachides with long, spreading, often geniculate, brown hairs 1-2.5 mm long.

Distribution of the species except S. W. Africa.

TANZANIA. T4. Mpanda Distr. Rukwa, Sonta, in *Sclerocarya caffra* woodland, 780 m, fl. & fr. 1.xi.1963, *Mrs. Richards* 18321 (x). Ufipa Distr. Rukwa, Milepa, fl. & fr. iii.1949, *Burnett* 49/105 A (x).

ZAMBIA. **Barotseland.** Situmpa forest, fl. 24.iii.1937, *Martin* 712 (BM). Sesheke Distr., Sichinga Forest near Sesheke, in open, tall grass, *Combretum* woodland, fringing mukusi mutemwa on Kalahari sands, fl. 28.xii.1952, *Angus* 1057 (FHO; K; PRE). Central Prov. Kafue, on banks of the Kafue river upstream from the railway bridge, black clay soil with *Hyparrhenia* and *Sporobolus*, fl. 28.i.1963, *van Rensburg* KBS 1273 (K; SRGH). Herb sward in *Hyphaene* sp. tree savanna on Kafue Flats, Chikupi Extension, Chilanga ICA, Lusaka Distr., fr. 13.ix.1963, *Farrell* 396 (SRGH). Southern Prov. Mazabuka, 1220 m, fl. 20.i.1921, *Mrs. Woods* 5 (BM). Mazabuka Distr., Central Research Station ox paddock, 1005 m, fl. 26.iii.1931, *Vet. Officer* CRS 234 (PRE). Mazabuka, loam soils of thorn country, 1100 m, fl. i.1934, *Parsons* 1376 (x). Muckle Neuk, 12 miles (19 km) N. of Choma, drier parts of dambo 1280 m, fl. & fr. 28.ii.1954, *Robinson* 595 (K). Namwala, sandy places, fl. & fr. 19.X.1959, *Mutimushi* 73 (x). Mazabuka Distr., Mochipapa to Sinazongwe mile 39.4, karroo mudstone hills at foot of escarpment, in small gorge, fl. & fr. 2.iii.1960, *White* 7565 (FHO; K). Namwala Distr., Puku Flats, Musa-Kafue confluence, Kafue Nat. Park, fl. 14.i.1963, *Mataundi* 17/57 (SRGH).

RHODESIA. Western Div. Bulawayo, 1220 m, fl. & fr. V.1915, *Rogers* 13414 (x). Matabeleland, Glenlatagen, fl. & fr. i.1930, *Miss Cheesman* 74 (BM). Victoria Falls, 885 m, fl. ii.1945, *Martineau* 676 (SRGH). Without precise locality. Matabeleland, fr. iii.1929, *Pardy* 5020 (SRGH).

MALAWI. Southern Prov. Chipoka, Fort Johnston, sandy lake soils, fl. & fr. 22.iii.1956, *Banda* 235 (BM; LISC; SRGH).

MOZAMBIQUE. Niassa. Amaramba, Ngami Valley N of Mandimba, fl. 10.i.1942, *A. J. W. Hornby* 1118 (LISC; PRE).

BECHU AN ALAND. Northern Div. 2 miles (3 km) SE of Shakawe, fl. & fr. 24.i.1956, *de Winter* 4406 (x; M).

Of the above collections two from Zambia, *Farrell* 396 and *Mutimushi* 73, are rather less robust than others, with narrower leaflets and rather soft greyish pubescence.

The following combination is proposed jointly with Dr. ANNELIS SCHREIBER of Munich who has prepared the account of this genus for the Flora of South West Africa.

Subsp. **otaviensis** (Dinter) Schreiber & Brummitt, comb. et stat. nov.

Basionym: *Tephrosia otaviensis* Dinter in Feddes Repert. **30**: 204 (1932). Type: Hereroland, Klein Otavi, *Dinter* 5747 (NH, isotype, not seen; photo at \times seen).

Tephrosia longipes sensu Schreiber in Mitt. Bot. Staats-samml. München 19: 298 (1957).

?Annual or biennial with a tap root. Stems and leaf rachides with appressed or ascending grey hairs.

Known at present only from S. W. Africa, but may possibly be found in Bechuanaland.

SOUTH WEST AFRICA. Otavi, fl. & fr. 11.iii.1925, *Dinter* (NH, isotype, not seen; \times , photogr.) Bei Bobos auf Sandboden, fl. & fr. 2.iv.1934, *Dinter* 7570 (BM; K; M). Beulah, Distr. Outjo, fl. 1953, *H. & E. Walter* 2/176 (M). Andara Mission Station, fl. & fr. 24.ii.1956, *de Winter & Marais* 4832 (\times ; M).

22. *Tephrosia euprepes* Brummitt, sp. nov.

T. reptanti, *T. caeruleae* et *T. stormsii* affinis; a *T. reptante* habitu valde graciliore, radice tenui, foliolis anguste lanceolatis ad linearis, et petiolo longiore differt; a *T. caerulea* typica habitu annuo valde graciliore, radice tenui, foliis plerumque minoribus differt; a *T. stormsii* habitu brevior, caule simplicibus vel tantum in parte inferiore ramoso, pilis patentibus brunneis, et leguminibus pilis longis appressis vestitis differt.

Planta annua gracilis; radix longa tenuis; caules parce ramosi in parte inferiore, 20-50(90) cm alti. Caules pilis

plerumque (saltem in parte inferiore) conspicue patentibus brunneis sparse ad dense pubescentes. Folia pauca in parte inferiore inserta, **1-4(5)-jugata**; petiolus (1.5)3-8 cm longus, petiolus et rhachis **conjunctim** (2)3-15 cm, pilis longis plus minusve sparsis, **saltem** aliquis conspicue patentibus, vestitis; foliola (1)2-5(7) X (0.2)0.4-0.9(1.3) cm, anguste lanceolata vel elliptico-oblonga ad linearia, basi **rotundata** ad subcuneata, apice rotundata ad truncata vel emarginata; pagina superior glabra, pagina inferior pilis plus minusve longis appresse pubescens; stipulae (3)5-11(15) X 0.3-0.8 (1) mm, lineares plerumque conspicue persistentes post casum foliorum. Flores in racemis simplicibus elongatis **laxis** ad 25 cm longis **dispositis**; bractee usque ad 6 X c. 0.3 mm, lineares, inconspicuae; pedicelli **3-6** mm. Calyx (3.5)4.5-7 mm longus, pilis longis brunneis laxe appressis ad patentibus vestitus; dentes superiores tubum propinque aequantes, $\frac{1}{2}$ - $\frac{2}{3}$ longitudinis connati. Petala rosea vel pallide purpurea; vexillum 15-20 mm **longum**. Tubus staminalis supra connatus. Ovarium appresse pubescens; stylus pubescens; legumina (42)58-72 X 4-5 mm, straminea, appresse pubescentia pilis longis **pilos** breviores indutis.

Typus: Rhodesia, Western Div., Nyamandhlovu Distr., Bongolo, fl. & fr. 12.ii.1948, West 2694 (SRGH, holotypus; α , isotypus).

South-western Zambia, northern Bechuanaland, western Rhodesia; also north-eastern Rhodesia and adjacent Mozambique (**Tete**).

ZAMBIA. Barotseland. Masese, ACT muTemwa [thicket] on Kalahari sand, fl. 14.iii.1961, *Fanshawe* 6424 (SRGH). Southern Prov. Livingstone Distr., Katambora, fl. & fr. **13.i.1956**, *Gilges* 540 (PRE; SRGH). Livingstone, scrub mopane on basalt, fl. **3.ii.1961**, *Fanshawe* 6182 (SRGH). Livingstone Distr., lip of 5th gorge, Victoria Falls Trust Area, basalt soil, mopane savanna, fl. & fr. 2.iii.1963, *Bainbridge* 760 (SRGH).

BECHUANALAND. Northern Div. Ngamiland, Kwebe, fl. & fr. **i.1897**, *E. J. Lugard* 152 (α). Ngamiland, Kwebe Hills,

fl. & fr. 14.ii.1898, *Mrs. E. J. Lugard* 175 (x). Francistown, fi. & fr. 1926, *Rand* 19, 20 (BM).

RHODESIA. Western Div. Victoria Falls, 1924, *Miss Close* (BM). Victoria Falls, fl. & fr. 30.i.1934, *Miss Saunders Davies* (BM). Bulawayo, Hillside, 1370 m, fl. i.1944, *Martineau* 139 (SRGH). Premier Mine, 1220 m, fl. & fr. iii.1944, *Martineau* 221 (SRGH). Nyamandhlovu Distr., Bongolo, fl. & fr. 12.ii.1948, *West* 2694 (x; SRGH — types). Nyamandhlovu Distr., near the Khami River on Fountains, fl. & fr. 23.ii.1949, *West* 2855 (x; SRGH). Nyamandhlovu, Pasture Station, fl. & fr. 10.i.1954, *Plowes* 1669 (K; PRE; SRGH). Wankie Distr., basalt near Matetsi River, fl. & fr. 28.ii.1963, *Wild* 6052 (BM; K; SRGH). Eastern Div. Inyanga Distr. north, Lawleys Concession, fl. & fr. 19.ii.1954, *West* 3359 (x; PRE; SRGH).

MOZAMBIQUE. Tete. Tete, fl. i.1932, *Sofia Pomba Guerra* 10 (COI).

The last two specimens cited above are from the lowveld area of north-eastern Rhodesia and adjacent Mozambique, somewhat separated geographically from the main area of distribution. The two areas are somewhat similar climatically and edaphically and the discontinuity in distribution is not surprising.

Specimens here referred to *T. euprepes* have previously been confused with *T. reptans* or occasionally *T. longipes*, or in one case with *T. barbiger* (*T. nana*).

23. *Tephrosia ringoetii* Bak. f. in Bull. Soc. Roy. Bot. Belge 57: 126 (1925); Leg. Trop. Afr. 1: 197 (1926). Type: Congo, Katanga, Shinsenda, fl. & fr. 29.iii.1912, *Ringoet* 5 (BR).

Tephrosia jelfiae Bak. f., Leg. Trop. Afr. 1: 202 (1926). Type: Zambia, Northern Prov., Luwingu, fl. iv.1922, *Mrs. Jelf* 23 (BM).

Tephrosia longipes Meisn. var. *ringoetii* (Bak. f.) Gillett in Kew Bull. 13: 125 (1958). Type as for *T. ringoetii*.

Tephrosia stormsii sensu Cronquist, Fl. Congo Belge 5: 106 (1954) pro parte.

An annual with a short tap root and branching stem 30-100 cm high. Stems, at least the lower parts, \pm conspicuously clothed with spreading, irregular, usually whitish, geniculate hairs up to 2 mm long. Leaves with (1)2-4(5) pairs of leaflets; petiole 5-9(13) cm long, or sometimes as short as 2 cm in the uppermost leaves, petiole and rhachis together (7)9-20(23) cm, or sometimes as short as 3.5 cm in the uppermost leaves, with spreading whitish hairs like those on the stem; leaflets (2)4-9(10.5) X 0.2-8(1.0) cm, \pm linear, rounded to subcuneate at the base, acute to rounded at the apex; upper surface glabrous, lower surface appressed- or irregularly pubescent; stipules (4)8-16(18) X (0.4)1-2.4 mm, linear-triangular, sometimes falcate, persistent. Each inflorescence axis terminated by a dense capitulum of flowers surrounded by conspicuous bracts which usually equal or exceed the calyces of the flowers, also often with flowers at 1-3(5) nodes below the terminal capitulum; bracts (4)6-8(9) X 0.5-1 mm, linear-triangular, purplish with villous whitish hairs, conspicuous and persistent; pedicels 3-5(7) mm long. Calyx 3.5-6 mm long, usually purplish with villous greyish spreading hairs; upper teeth connate for not more than $\frac{1}{2}$ their length; upper and lateral teeth about equaling the tube in length, the lower tooth up to 1.5 mm longer. Petals pale to deep pink or occasionally purplish; standard (10)11-15(16) mm long, \pm cuneate at the base. Staminal tube connate above. Ovary pubescent, particularly on the sutures; style pubescent; pods 48-65 X (3.8)4-5 mm, usually minutely puberulent as well as having short, irregular or loosely appressed, usually geniculate hairs; seeds 11-15(16).

Congo (Katanga) and Zambia.

CONGO. Katanga. Shinsenda, fl. & fr. 29.iii.1912, *Ringoet* 5 (BR, type). Elisabethville Distr., near Likasi Road, fl. 7.ii.1926, *Hirschberg* 77 (\times). Kambove, 1400 m, fl. & fr. 17.iii.1926, *Robyns* 1714 (BR). Environs Kipushi, route d'Elisabethville, fl. & fr. 29.iii.1926, *Robyns* 1814 (BM; BR, K). Munama, fr. v.1928, *Quarré* 1187 (BR). École des R. R. P. P. Salésiens, Elisabethville, young fr. 1937, *Schrooten* 3 (BR); fl. 28.iv.1939, *Schrooten* 1097 (BR). Jadotville, fl. xii.1945,

Hoffman (BR), 12 km au N. W. d'Elisabethville, open forest, 1300 m, fl. 9.iv.1958, *Gathy* 582 (\times ; SRGH).

ZAMBIA. Northern Prov. Luwingu, 1370 m, dry sandy soil in bush country, fl. iv.1922, *Mrs. Jelf* 23 (BM, type of *T. jelfiae*). Mpika Distr., low rocky hills by Serenge-Mpika road, damp sand between rocks, 1200 m, fl. & fr. 5.iv.1961, *Mrs. Richards* 14983 (K). Western Prov. Mufulira, open forest, 1220 m, fl. & fr. 4.V.1934, *Eyles* 8254 (\times ; SRGH). Mufulira, *Brachystegia* woodland, 1220 m, fl. & fr. 18.iv.1948, *Cruse* 324 (\times); fl. & fr. 29.iii.1949, *Cruse* 510 (K). Kitwe, plateau woodland, fl. & fr. 21.iii.1954, *Fanshawe* 991 (\times). Ndola, open grassy places, fl. & fr. 6.iv.1954, *Fanshawe* 1072 (\times ; SRGH). Kitwe, mushitu fringe in shade, fl. & fr. 18.iii.1955, *Fanshawe* 2151 (\times). Nkana, Kitwe sewage works, surrounding bush area, loam on laterite, fl. & fr. 2.iv.1959, *Shepherd* 56 (\times); *ibid.* fl. 10.iv.1959, *Shepherd* 63 (K). Solwezi, dry *Brachystegia* woodland, 1350 m, fl. 9.iv.1960, *Robinson* 3492 (\times ; SRGH). Lwano FR, Chingola, plateau woodland, fl. 13.iii.1961, *Mutumushi* 113 (\times ; SRGH). Mile 36 Ndola to Mufulira, ground layer in well grown *Brachystegia* woodland, fr. 12.iv.1961, *Angus* 2833 (K; SRGH). Mwinilunga Distr., Kabompo Gorge, fl. & fr. 19.iv.1965, *Robinson* 6638 (\times).

CRONQUIST (*loc. cit.*) regarded *T. ringoetii* as merely an extreme form of *T. stormsii* with a condensed raceme and spreading hairs, commenting that in some specimens the correlation is not clearly marked, and GILLETT (*loc. cit.*) regarded it as a variety of *T. longipes* sens. lat. The present author finds, however, that the character of the inflorescences is constant and unmistakable; the main axis is always terminated by a compact head of flowers whether or not there are flowers at other nodes below the head, the terminal head developing more or less simultaneously with the lower nodes. In all other species of this group the inflorescence tapers gradually to the apex. The indumentum of stem, rachides, bracts and calyces seem to be constant throughout *T. ringoetii*, being matched only in *T. stormsii* var. *pilosa*, and together with the purplish coloration of

the bracts and calyces gives the species an unmistakable appearance.

24. *Tephrosia stormsii* De Wild. in Ann. Mus. Congo, sér. 4, 1: 189 (1903).—Bak. f., Leg. Trop. Afr. 1: 203 (1926).—Brenan, Check List For. Tr. Shr. Brit. Emp. 5, Tang. Terr.: 444 (1949).—Cronquist, Fl. Congo Belge 5: 106 (1954) pro parte excl. *T. ringoetii*. Type: Tanzania, Western Prov., Mpanda Distr., Karema, *Storms*, without date or number (BR).

Tephrosia longipes sensu Gillett in Kew Bull. 13: 125 (1958) pro parte.

Annual with a tap root and rather slender, branched stems (40)60-140(180) cm high. Stems glabrous or with sparse appressed hairs in parts, or (var. *pilosa*) with rather conspicuous grey spreading hairs. Leaves with (1)2-4(6) pairs of leaflets; petiole (0.3)2-7(10) cm, petiole and rhachis together 5-18 cm, glabrous to pubescent like the stem; leaflets (2.5)4-11(14) X (0.1)0.2-9(1.1) mm, linear to linear-oblong, or the lower ones sometimes (particularly in var. *pilosa*) sometimes \pm elliptic, the apex acute to rounded or occasionally emarginate; upper surface glabrous, lower surface appressed-pubescent; stipules (3)4-12 X 0.3 X 0.8 mm, or up to 17 mm in var. *pilosa*, linear, sometimes falcate. Flowers in lax terminal and axillary racemes up to 18(25) cm long, the upper branch racemes often subtended by only a bract instead of a foliage leaf and so forming a compound inflorescence, the branches usually forming an angle of about 45° or more, their axis slender (0.2-1 mm diameter) and usually rather flexuous and curving upwards, glabrous to shortly appressed-pubescent; bracts 2-4(5) X 0.2-0.5 mm, linear-triangular, rather inconspicuous and usually caducous; pedicels 3-6 mm. Calyx 3-5.5 mm long, usually shortly appressed-pubescent with greyish hairs, or (var. *pilosa*) with longer spreading hairs; upper teeth usually connate for most of their length to form an obtuse or acute triangle, or (particularly var. *pilosa*) free for more than half their

length; lateral teeth usually about equalling the tube. Petals pink to sometimes purplish, or the keel much paler and often white; standard 12-16(18) mm long. Stamen tube connate above. Ovary pubescent; style pubescent; pods 48-70 X 4-5 mm, shortly pubescent with usually irregular geniculate hairs, sometimes with rather short appressed hairs; seeds 10-16(17), at maturity oblongoid to subdiscoid, c. 2.3 X 1.5-2 X c. 1 mm, brown or blackish, rather smooth.

Congo (Katanga) south-eastern Kenya, Tanzania, Zambia, Rhodesia, Malawi, northern Mozambique.

Var. *stormsii*

Tephrosia eylesii Bak. f., Leg. Trop. Afr. 1: 200 (1926). Type: Rhodesia, Mazoe Distr., Bernheim Hill, Eyles 265 (BM, holotype; SRGH, isotype).

Tephrosia lurida sensu Eyles in Trans. Roy. Soc. S. Afr. 5(4): 375 (1916) pro parte quoad spec. Eyles 265.

Stems glabrous to sparsely and shortly appressed-pubescent. Leaflets (2.5)4-11(14) X (1)2-6(9) mm, linear to linear-oblong; lower surface shortly and closely appressed-pubescent. Calyx appressed-pubescent with usually short greyish hairs; upper teeth usually connate for most of their length.

Distribution of the species.

CONGO. Katanga. Ecole des R. R. P. P.-Salésiens, Elisabethville, 1937, *Schrooten* 737 (BR). Route de Bunkeya, près des chutes de la Bunkeya, fl. & fr. iv.1947, *Hoffman* 883 (BR; K). Bord de la Panda, fl. & fr. iii.1949, *Hoffman* 906 (BR).

KENYA. K7. **Kwale** Distr. Nwachi, fl. & fr. 15.xi.1921, *Butler* 25 (K). Mombasa Distr. Miritini, fr. 2.i.1931, *Thorold* 1579 (K). Port Tudor, fl. & fr. 1932, *MacNaughton* 53 = *For. Dept.* 2634 (K).

TANZANIA. T4. Tabora Distr. Mburu, steppe, fr. 18.x. 1932, *Geilinger* 3165 (K). Mpanda **Distr.** Karema, fl. & fr., *Storms* (BR, type). Selambula, cultivated miombo, 825 m, fl. & fr. 14.ix.1958, *Jefford & Newbould* 2411 (K). Kasoje, *Azelia* woodland near lake shore, 790 m, fl. & fr. 28.vii.1959,

Harley & Newbould 4797 (K). **Ufipa Distr.** Ilemba Gap, road to Rukwa, 1500 m, fl. 12.iii.1959, *Mrs. Richards* 11154 (BM; K). T5. **Dodoma (Manyoni) Distr.** Mile 33.7 S. of Itigi Station on the Chunya road, ant heap in closed *Brachystegia spiciformis* - *Julbernardia Combretum Pterocarpus* - *Strychnos* woodland, 1460 m, fl. 22.iv.1964, *Greenway & Polhill* 11698 (x). T6. **Morogoro Distr.** Morogoro, tall mountain grassland, 640 m, fl. & fr. 3.ix.1930, *Greenway* 2504 (x). Morogoro, 1065 m, fl. & fr. 15.V.1935, *Rounce* 363 (x). Morogoro, 1.vii.1935, *Rounce* 457 (x). T7. **Mbeya Distr.** Mbosi, 1525 m, fl. & fr. 8.iv.1932, *Davies* 547 (K); 600 (x). **Rungwe Distr.** Kyimbila Distr., Mwasukuluwald, fl. 1.vi.1911, *Stolz* 731 (K). T8. **Songea Distr.** Lukoma, Lake Nyassa, fr. viii.1887, *Beltingham* (BM). Near R. Luhira E. of Songea, by roadside in *Brachystegia-Uapaca* woodland, fl. 20.iii.1956, *Milne-Redhead & Taylor* 9258 (K). Near R. Likuyu at bottom of Mkuanga Hill in *Brachystegia-Uapaca* woodland, 900 m, f 1. & fr. 11.iv.1956, *Milne-Redhead & Taylor* 9582 (K). About 3 km NE of Kigonsera, in cultivation on red loam, 975 m, fl. & fr. 12.iv.1956, *Milne-Redhead & Taylor* 9623 (K). **Tunduru Distr.** Road 60 miles (96 km) from Masasi, granite rocks in hill country, 900 m, fl. 20.iii.1963, *Mrs. Richards* 17991 (K). **Lindi Distr.** Tendaguru, fl. 19.iv.1926, *Migeod* 185 (BM); fl. & fr. 28.V.1929, *Migeod* 541 (BM). Lutamba-See, open woodland, 240 m, fl. 30.viii.1934, *Schlißben* 5199 (x; SRGH). **Newala Distr.** Newala, edge of road, red soil, fl. & fr. 12.V.1959, *Hay* 64 (x).

ZAMBIA. Northern **Prov.** Shambo, Chilongowelo, fl. & fr. ii.1952, *Mrs. Richards* 843 (x). Mpulungu, road from Mission, 850 m, fl. 6.iii.1952, *Mrs. Richards* 906 (x). Woodland track to Cascalawe, sandy red soil, fl. 18.iii.1955, *Mrs. Richards* 5018 (K). Kalambo Gorge, Saisi Valley, among rocks, 1830 m, fl. & fr. 24.iii.1955, *Mrs. Richards* 5120 (x). Mpulungu-Abercorn road, close to turn to Chilongowelo, red sandy soil, 1220 m, fl. & fr. 5.iv.1955, *Mrs. Richards* 5306 (x). Nmbulu Island, Lake Tanganyika, dry rocky ground, 730 m, fl. & fr. 11.iv.1955, *Mrs. Richards* 5401 (x). Crocodile Island, Mpulungu, Lake Tanganyika, pebbly beach, 730 m, fl. & fr. 17.iv.1955, *Mrs. Richards* 5442 (K). Abercorn-

Mpulungu road close to Chilongowelo turning, red soil, 1220 m, fl. & fr. 2.V.1955, *Mrs. Richards* 5453 (x; SRGH). Chilongowelo, 1370 m, fr. 23.V.1955, *Mrs. Richards* 5833 (K). Casawa sand dunes, Lake Tanganyika, 1050 m, fl. & fr. 14.iv.1957, *Mrs. Richards* 9223 (K). Kambole road 10 miles (16 km) from Abercorn, fl. 5.iv.1959, *Miss McCallum Webster* 844 (K). Chilongowelo, 1460 m, fl. 7.iv.1959, *Miss McCallum Webster* 855, 856 (K). Road to the water works, Abercorn, fr. 12.iv.1959, *Miss McCallum Webster* 845 (x). Forestry plantation near Kasama, woodland, long grass, 1300 m, fl. 1.iii.1960, *Mrs. Richards* 12653 (SRGH). Abercorn Distr., Niamkolo, sandy stony road, 780 m, fl. 22.iii.1960, *Mrs. Richards* 12785 (x; SRGH). Misamfu, N of Kasama, sandstone, fr. 4.iv.1961, *Angus* 2654 (K). Luwingu Distr., 21 miles (34 km) N of Nsombo, *Brachystegia* woodland, fl. iv.1961, *Angus* 2736 (x; SRGH). Kasama Distr., near Chibutubutu, c. 20 miles (32 km) S of Kasama, 1200 m, fl. & fr. 8.iv.1961, *Mrs. Richards* 15034 (x; SRGH). Western Prov. Kitwe, bush beyond end of Kent Avenue, Parklands, fl. 10.iii.1961, *Linley* 98 (SRGH). Kitwe, rocky miombo woodland, fl. & fr. 10.iii.1963, *Fanshawe* 7742 (x). Central Prov. Between Kafue and Lusaka, fr. 17.viii.1946, *Gouveia & Pedro* 1687 (LMJ). 10 km S of Kapiri Mposhi, *Brachystegia* woodland, fr. 27.iii.1955, *Exell, Mendonça & Wild* 1220 (BM; LISC; SRGH). 10 miles (16 km) SE of Lusaka, fl. 22.ii.1957, *Noah* 125 (K; SRGH). Chilanga, stony hillside, 1370 m, fl. & fr. iv.1958, *Benson* 233 (x). 40 km N of Broken Hill, *Brachystegia* woodland, fl. & fr. 2.iii.1962, *Robinson* 4985 (x; SRGH). Kafue Gorge, *Brachystegia* woodland and *Hyparrhenia-Andropogon* grassland, fl. 9.ii.1963, *van Rensburg* KBS 1367 (x). Between Kafue bridge and gorge, *Brachystegia-Uapaca* woodland, fl. 2.iii.1963, *van Rensburg* KBS 1566 (K; SRGH). Eastern Prov. Lunkwakwa Valley, *Brachystegia boehmii-Isoberlinia* woodland, fl. & fr. 23.iii.1955, *Exell, Mendonça & Wild* 1140 (BM; LISC; SRGH). Katete, St. Francis' Hospital, open bush, 1065 m, fr. 1.X.1955, *Joan M. Wright* 23 (x); fl. 19.iii.1956, *Wright* 87 (x). Fort Jameson Distr., Chipangali area, woodland, fl. & fr. ii.1962, *Verboom* 483 (x; SRGH). Southern Prov. Mazabuka Distr., Mochipapa to Sinazongwe mile 19, Mabwin-

gombe Hills, *Uapaca kirkiana* regrowth, fl. & fr. 2.iii.1960, *White* 7531 (x; SRGH). Mazabuka Distr., Kafue gorge above the road, pathway in *Brachystegia* woodland, fl. 9.ii.1963, *van Rensburg* 1367 (SRGH). Kalomo, Siantambo, fr. 6.iv.1964, *Mitchell* 25/18 (K).

RHODESIA. Northern Div. Mazoe Distr., Bernheim Hill, 1430 m, fl. & fr. iii.1906, *Eyles* 265 (BM; SRGH — type of *T. eylesii*). Darwin Distr., Umsengedsi River, fl. 16.V.1955, *Watmough* 118 (K; SRGH). Western Div. Wankie District, Zambesi River between Matetsi and Deka Rivers, fl. & fr. 28.ii.1963, *Wild* 6084 (x; SRGH).

MALAWI. Northern Prov. Likoma Island, fl. & fr. 24.v.1901, *Miss Kenyon* 51, comm. *Riddelsdell* (K). Kaningina, fl. & fr. 1954, *Chapman* 281 (BM). Central Prov. Nisasadzi, S. Kasungu, *Brachystegia burtii* woodland on sandy soil, fl. 11.iii.1953, *Jackson* 1137 (x; SRGH). Southern Prov. Shiri Highlands, comm. xii.1881, *Buchanan* 400 (K).

MOZAMBIQUE. Niassa. Aldeia indígena de Boronengo, fl. & fr. 14.ix.1934, *Torre* 274 (BM; COI; K; LISC). Nampula, fl. & fr. 13.iii.1937, *Torre* 1231 (LISC). Malema Distr., Mutuáli, near the Malema road, *Brachystegia* woodland, fl. & fr. 29.v.1947, *Pedro* 3367 (LMJ). Cuamba, fl. & fr. 13.V.1948, *Pedro* & *Pedrógão* 3371 (LMJ). 5 miles (8 km) S of Massangulo, *Brachystegia-Uapaca* woodland, fl. & fr. 26.V.1961, *Leach & Rutherford-Smith* 11023 (K; LISC; SRGH). Malema Distr., Murralelo, foot of serra Inago, *Brachystegia* woodland on red clay soil, fl. & fr. 19.iii.1964, *Torre & Paiva* 11249 (LISC). Nampula Distr., Namaita, between Nampula and Murrupula, Galaria area, *Brachystegia* woodland on red sandy-clay soil, fl. 26.iii.1964, *Torre & Paiva* 11388 (LISC). Montepuez Distr., 23 km from Montepuez towards Nantulo, open *Brachystegia* woodland on red sandy-clay soil, 400 m, fl. 8.iv.1964, *Torre & Paiva* 11768 (LISC). Macondes Distr., 83 km from Nantulo towards Mueda, open *Brachystegia-Julbernardia* woodland on red sandy soil, 300 m, fl. & fr. 10.iv.1964, *Torre & Paiva* 11862 (LISC). Macondes Distr., 37 km from Mueda towards Mocímboa do Rovuma, open *Parinari* woodland on red sandy soil, 800 m, fl. 15.iv.1964, *Torre & Paiva* 12013 (LISC). Zambézia. Between Quelimane and Mocuba, open woodland, fl.

& young fr. 20.iii.1943, *Torre* 4969 (LISC). Between Ile and Alto Molócuè, *Brachystegia-Isobertina* woodland, fl. & fr. 21.vi.1943, *Torre* 5535 (LISC).

Var. *pilosa* Brummitt, var. nov.

Planta quam var. *stormsii* plerumque brevior (usque ad 100 cm) et minus ramosa. Caules pilis longis griseis patentibus vestiti. Foliola 2.5-9 X (0.3)0.6-0.9(1.1) mm, illa foliorum inferiorum plerumque elliptica ad oblonga, illa foliorum superiorum lineari-oblonga ad linearia; pagina inferior laxa vel valde appresse pubescens. Calyx pilis ascendentibus vel patentibus pubescens; dentes superiores nonnunquam per maximam partem longitudinis liberi.

Typus: Tanzania, Ufipa Distr., escarpment above Kasanga, 1050 m, fl. & fr. 30.iii.1959, *Mrs. Richards* 11008 (x, holotypus; SRGH, isotypus).

Tanzania, Zambia, usually collected in disturbed habitats.

TANZANIA. T4. Ufipa Distr. Escarpment above Kasanga, verge of road, 1050 m, fl. & fr. 30.iii.1959, *Mrs. Richards* 11008 (x; SRGH — types); *ibid.* 1200 m, 30.iii.1959, *Mrs. Richards* 11011 (K; SRGH). T5. Kondoa Distr. Sambala Hills, 1700 m, *Brachystegia microphylla* zone, fl. & fr. 23.iv.1929, *Burt* 2131 (BM; K). T7. Mbeya Distr. Unyamwanga, old cultivations, 1370 m, fl. 5.iv.1932, *Davies* 195 (x). Great North Road, Iyayi, 140 ml. (224 km) S of Iringa, pale brown sandy soil, roadside in scattered *Acacia*, *Parinari*, *Isobertinia*, 1430 m, fl. & fr. 31.iii.1962, *Polhill & Paulo* 1955 (K). Njombe Distr. Great North Road, Makumbako, 125 miles (200 km) S of Iringa, old cultivations, red sandy soil, degenerate scrub woodland, 1280 m, fl. & fr. 28.iii.1962, *Polhill & Paulo* 1921 (x).

ZAMBIA. Northern Prov. Mporokoso Distr., Nsama, woodland on gritty soil, 1200 m, fl. & fr. 4.iv.1957, *Mrs. Richards* 9019 (K). Kasama, weed of disturbed ground, fl. 24.iii.1960, *Angus* 2166 (K; SRGH). Kasama Distr., Mungwi, *Brachystegia* woodland, fl. & fr. 4.iii.1962, *Robinson* 5016 (x; SRGH). Misamfu, 4 miles N of Kasama, fl. & fr. 4.iv.1964, *Angus* 2654 (SRGH).

Two further collections must be mentioned in connection with *T. stormsii*: RHODESIA. Northern Div. Sebungwe Distr., Kavira Hot Springs, fl. & fr. vi.1956, *R. M. Davies* 2014 (x; SRGH). Darwin Distr., Umsengedsi River, fl. 18.v. 1955, Watmough 1174 (SRGH). The first of these, *Davies* 2014, is somewhat similar to *T. stormsii* but has a low (15-30 cm), branching, almost bushy habit and appears, at least in the Kew sheet, to be a perennial. One of the two plants of this at Kew has a more or less woody base, 5 mm thick, though the other is more slender (2.5 mm) and the Salisbury specimen looks more like an annual. The stems are sparsely appressed-pubescent to subglabrous, and the leaflets are linear-oblong, mostly less than 2 cm long apart from the terminal ones. *Watmough* 1174 is also a low plant, 15-30 cm, branching only at the base, apparently annual or biennial, and more or less intermediate between *Watmough* 118 from the same area (cited above as *T. stormsii* var. *stormsii*) and *Davies* 2014.

25. *Tephrosia paradoxa* Brummitt, sp. nov.

Tephrosia longipes auct. sens. lat. pro parte.

Tephrosia paucijuga sensu Cronquist, Fl. Congo Belge 5: 106 (1954) pro parte quoad spec. *Lebrun* 9721.

T. stormsii affinis sed racemis robustis subtomentosis, calycibus longioribus et longe pubescentibus, stipulis et bracteis majoribus differt.

Planta ? annua vel biennis; caules erecti, aliquandem robusti, herbacei, ramosi, 60-140 cm alti. Caules in partibus inferioribus glabri ad sparse appresse pubescentes, in partibus superioribus ad pedunculos sensim pubescentiores. Folia 2-6-jugata; petiolus 5-13 cm, petiolus et rhachis coniunctim 8-26 cm, subglabri ad tenue appresse pubescentes; foliola 9-14(18) X 0.2-0.6(0.9) cm, lineares (vel raro in speciminibus Mossambicensibus foliola foliorum infimorum usque ad 1.6 cm lata et lineari-oblonga), apice acuta ad obtusa; pagina superior glabra, pagina inferior tenuiter appresse pubescens; stipulae (8)13-18(24) X 1-2 mm, lineares, nonnunquam falcatae. Flores in racemis terminalibus et axillaribus, laxis, ad

30 cm longis; racemi axillares semper a foliis (non bracteis) subtenti, angulum angustum circa 30° axibus robustis formantes, plus minusve rigide erectis, dense pubescentibus ad tomentosus; bractee 5-8(11) X 0.7-1.5(2) mm, lineari-triangularis, aliquantum conspicuae, tarde caducae; pedicelli (4)5-8 mm. Calyx (4)5-8(10) mm longus, dense pubescens ad villosus plerumque pilis longis albis inter pilos breviores brunneos interspersis; dentes superiores longitudinis liberi, dentes laterales tubum plus minusve aequantes. Petala purpurea vel rubro- aut brunneo-purpurea, vel carina pallidior; vexillum (14)15-19 mm longum. Tubus staminalis supra connatus. Ovarium pubescens; stylus pubescens; legumina 52-75 X 4.5-5 mm, pilis plerumque irregularibus geniculatis breviter pubescentia; semina (14)16-19.

Typus: Zambia, Abercorn Distr., Ndundu, road outside the drive, 1740 m, fl. & fr. 22.ii.1959, Mrs. Richards 0969 (K).

Congo (Katanga), Ruanda, Tanzania, northern Zambia, Malawi, northern Mozambique, with a single record apparently referable to this species from northern Rhodesia.

CONGO. Katanga. Lukafu, fl. & fr. 17.iii.1908, Kassner 2641a (BM).

RUANDA. Parc Nat. Kagera, Mt. Gabiro, savanna, 1500-1700 m, fl. & fr. i.1938, Lebrun 9721 (BR).

TANZANIA. T1. Bukoba Distr. Nyashozi, Karagwe, 1525 m, fl. & fr. xii.1931, Haarer 2382 (x). Shinyanga Distr. Shinyanga, foot of Shinyanga Hill, old cultivation, 1155 m, fl. & fr. 3.iv.1932, Burt 3786 (BM). District uncertain. South of Lake [Victoria], fl. 1883, Hannington (K). T4. Tabora Distr. Unyamwesi, near Kombe, eastwards km 991.6, 1100 m, fl. 28.i.1926, Peter 35755 (K). T7. Iringa Distr. Signal Hill, Iringa, *Brachystegia* woodland, 1645-1830 m, fl. 20.ii.1932, St. Glair-Thompson 489 (K). T8. Lindi Distr. Lutamba See, fl. 30.viii.1934, Schlißben 5199 (x).

ZAMBIA. Northern Prov. Abercorn, grass by path, 1525 m, fl. 29.ii.1952, Mrs. Richards 1022 (K). Abercorn, firebreak above Kasulo House, sandy soil, 1525 m, fl. 1.ii.1952, Mrs. Richards 610 (K). Abercorn Distr., Chilongwelo, grass field, 1460 m, fl. 14.ii.1952, Mrs. Richards 731 (x). Chilongwelo,

rough grass by hayfield, 1460 m, 4.iii.1952, Mrs. Richards 868 (K). Abercorn, sand verge of rough road between pans, 1525 m, fl. 20.1.1955, Mrs. Richards 4170 (x). Abercorn, tall grass on bank between road and pans, 1525 m, fl. 18.ii.1955, Mrs. Richards 4575 (x). Abercorn Distr., Ndundu, among grass under tall trees close to house, 1525 m, fl. & fr. 10.iii.1955, Mrs. Richards 4857 (x). Abercorn Distr., Ndundu, side of road outside the drive, among long grass in sandy soil, 1740 m, fl. & fr. 22.ii.1959, Mrs. Richards 10969 (x). Near bridge over Lunzua River on Kambole road, c. 32 km from Abercorn, roadside verge, fl. & fr. 5.iv.1959, Miss McCallum Webster 846 (x). Abercorn, Kanyika, 1500 m, outcrop of laterite rock, woodland, fl. 25.ii.1965, Mrs. Richards 19711 (x).

RHODESIA. Northern Div. Trelawney, Tobacco Expt. Station, fl. & fr. 27.iii.1943, Jack 86 (K; PRE; SRGH).

MALAWI. Northern Prov. Rumpi Distr., near Katumbi's village, *Isobertinia* woodland, fl. & fr. 1.v.1952, White 2546 (K).

MOZAMBIQUE. Niassa. Ribáuè Distr., 16 km from Ribáuè towards Nampula, *Brachystegia* woodland on red sandy clay soil, 570 m, fl. 31.1.1964, Torre & Paiva 10346 (LISC). Marrupa Distr., 36 km from Maúa towards Marrupa, *Uapaca-Brachystegia-Julbernardia* woodland, black sandy-clay soil, 600 m, fl. 19.ii.1964, Torre & Paiva 10663 (LISC). Marrupa Distr., 25 km from Marrupa towards Maúa, *Brachystegia* woodland, red clay soil, 720 m, fl. & fr. 19.ii.1964, Torre & Paiva 10687 (LISC).

This species is closely allied to *T. stormsii* and a few collections are somewhat difficult to assign with complete confidence to either one or the other. There are, however, a number of correlated characters in which the two differ, and most specimens can be identified readily at sight. In the numerous excellent collections of Mrs. RICHARDS from Abercorn District there is no difficulty at all in separating them. If the two taxa were more distinct geographically it would be perhaps most satisfactory to regard them as subspecifically distinct, but they are apparently sympatric

over a wide area and specific rank is here considered most appropriate. The few somewhat doubtful specimens may perhaps be the result of hybridisation.

26. *Tephrosia rigidula* Welw. ex Bak. in Oliv., Fl. Trop. Afr. **2**: 112 (1871).—Bak. f., Leg. Trop. Afr. 1: 198 (1926).—Rossberg in Fedde, Repert. 39: 162 (1936).—Brenan, Check List Tr. Shr. Brit. Emp. 5. Tang. Terr.: 445 (1949) quoad nom. excl. spec.—Torre, Consp. Fl. Angol. **3**: 157 (1962). Type: Angola, Huíla, Várzeas de Catumba, fl. V.1960, Welwitsch 2106 (BM, K—*isotypes*).

Tephrosia secunda Welw. ex Bak. in Oliv., Fl. Trop. Afr. 2: 115 (1871).—Bak. f., Leg. Trop. Afr. 1: 199 (1926). Type: Angola, Cuanza Norte, entre Condo e Quisonde, fl. & fr. iii.1857, Welwitsch 2107 (BM, K—*isotypes*).

Craccarigidula (Welw. ex Bak.) Kuntze, Rev. Gen. PL 1: 175 (1891)—Hiern, Cat. Afr. PL Welw. 1: 220 (1896). Type as for *T. rigidula*.

Cracca secunda (Welw. ex Bak.) Kuntze, Rev. Gen. PL 1: 175 (1891).—Hiern, Cat. Afr. PL Welw. 1: 221 (1896). Type as for *T. secunda*.

Tephrosia longipes var. *longipes* sensu Gillett in Kew Bull. **13**(1): 125 (1958) pro parte quoad syn. *T. secunda*.

Tephrosia longipes var. *longipes* and var. *lurida* and *T. bracteolata* sensu Torre, Consp. Fl. Angol. 3: 157-159 (1962) pro parte.

Annual (? sometimes biennial) with robust, erect or prostrate, branching stems about 130-150 cm long, mostly 3-4 mm diameter. Stems subglabrous (minutely appressed-pubescent in parts), smooth. Leaves with (1)3-9 pairs of leaflets; petiole 1.2-3(6) cm, petiole and rhachis together (3)9-16 cm, sparsely appressed-pubescent; leaflets (2.5)3.5-7(9) X (0.2)0.4-0.8 cm, ± linear-oblong, subcuneate at the base, acute to obtuse at the apex; upper surface glabrous, lower surface sparsely appressed-pubescent; stipules 7-10 X 0.8-1 mm, linear, sometimes falcate. Flowers in terminal and axillary racemes up to 30 cm long; bracts quickly cadu-

cous; pedicels 4-8 mm. Calyx 3-5 mm long, fairly densely pubescent; upper teeth free for most of their length. Petals reddish or purplish; standard 14-16 mm long. Stamen tube connate above. Ovary densely pubescent; style pubescent; pods 60-75 X c. 5 mm, rather sparsely to densely pubescent with \pm irregular loosely appressed hairs; seeds 11-15, rhomboidal, brown with a conspicuous pattern of raised lighter-coloured patches radiating from the hilum.

Known only from Angola.

ANGOLA. Cuanza Norte. Pungo Andongo Distr., near Banza do Soba Quitage, fl. & fr. iii.1857, *Welwitsch* 2108 (BM; K). Pungo Andongo Distr., between Condo and Quisondo, fl. & fr. iii.1857, *Welwitsch* 2107 (BM; K — isotypes of *T. secunda*). Benguela. Near Loudingo-Kaconga, fl. 5.iii.1907, *Gossweiler* 4260 (BM). Between Ganda and Caconda, 1700 m, fl. & young fr. v.1934, *Hundt* 964 (BM). Huambo, Chianga, 1700 m, fl. & fr. 196?, *Teixeira & Figueira* 6706 (LISC). Huíla. Várzeas de Catumbe, fl. v.1860, *Welwitsch* 2106 (BM, K — isotypes). Between Catumbe and Hay, fl. & fr. iv.1860, *Welwitsch* 2105 (BM; K). Humpata, Quilemba, 1900-1950 m, fl. 4.vi.1937, *Evell & Mendonça* 2502 (BM). Calutato (Namuculungo), sandy places, 1100 m, 25.iii.1957, *Teixeira* 2452 (LISC). Between Humpata and Caholo, red clay soil, 1900 m, fl. & fr. 21.iii.1958, *Teixeira* 3303 (LISC).

Teixeira & Figueira 6706 and *Teixeira* 3303 are described as prostrate, while *Teixeira* 2452 and the types of *T. rigidula* and *T. secunda* are said to be erect. Apart from this the specimens above appear to form a fairly natural unit, although they were variously referred to four different taxa in *Conspectus Florae Angolensis*, with *Hundt* 964 being referred at the same time to both *T. rigidula* and *T. longipes* var. *lurida*. The affinities of these plants to other species, however, are not clear. The robust, subglabrous, smooth stems mostly 3-4 mm diameter look unlike those of any other species of this group, and the seeds (as described above from *Teixeira* 2452) are unlike those of *T. stormsii* which is probably the closest species. It seems best, for the moment at least, to regard these Angolan

plants as a distinct species, though their relationship to other species requires further investigation when more Angolan material is available. It may eventually prove more satisfactory to regard this as a subspecies of *T. stormsii*.

27. *Tephrosia longipes* Meisn. in Hook., Lond. Journ. Bot. 2: 87 (1843).—Harv. in Harv. & Sond., PL Cap. 2: 208 (1862).—Bak. in Oliv., Fl. Trop. Afr. 2: 120 (1871) quoad nom. excl. spec.—Burt Davy, Fl. PL Ferns Transv. 1(2): 378 (1932).—Young in Ann. Transv. Mus. 14: 398, fotogr. 2 (1932).—Forbes in Bothalia 4: 980 (1948).—Martineau, Rhod. Wild Fl.: 26, t. 11(1) (1953).—Gillett in Kew Bull. 13: 125 (1958) sensu lat. Type: S. Africa, Port Natal, *Krauss* 20 (x).

Cracca longipes (Meisn.) Kuntze, Rev. Gen. PL 1: 175 (1891).—Hiern, Cat. Afr. PL Welw. 1: 222 (1896) quoad nom. excl. spec. Type as above.

Annual to probably short-lived perennial, with a stout tap root or sometimes becoming woody at the base, and ± erect, fairly robust stems, 2-3(5) mm in diameter in the lower parts, usually fairly regularly branched, up to 1(1.5) m high. Stems usually shortly but densely greyish-appressed-pubescent or perhaps sometimes glabrescent in the lower parts, or sometimes (in var. *icosisperma* and subsp. *swynertonii*) with longer ascending hairs, or sometimes (in var. *icosisperma*) rather sparsely appressed-pubescent. Leaves (at least the larger ones) with (3)4-7(8) pairs of leaflets (or in S. Africa sometimes with only 2 or 3 pairs); petiole (0.5)0.9-4.2(5.5) cm, usually much shorter than the rachis except perhaps in the lower leaves, the petiole and rachis together (2)3-13(18) cm long, pubescent like the stem; leaflets (1.5)2.5-8(10.5) x (0.1)2-7(8) cm, linear or rarely linear-oblong or linear-elliptic, terminated by a stout, blackish, often somewhat curved mucro; upper surface glabrous, lower surface appressed-pubescent; stipules 4-14(17) x (0.1)0.3-1 mm, linear, blackish. Flowers in terminal and leaf-opposed long-peduncled racemes (5)8-25(30) cm long; bracts

(2)3-7(9) X 0.3-1 mm, blackish, persistent and often forming a conspicuous tuft at each node of the inflorescence after flowering; pedicels 3-7(8) mm. Calyx 3-6(8) mm long, shortly appressed- or ascending-, grey or brown-pubescent or villous; upper teeth connate for $\frac{1}{3}$ - $\frac{2}{3}$ length; lateral teeth about equalling or slightly exceeding the tube. Petals purple to pink; standard 13-18(23) mm. Stamen tube connate above. Ovary pubescent; style pubescent; pods (40)50-88 X 4-5 mm, pubescent with irregular, geniculate hairs, or rarely with \pm regular, straight, appressed hairs; seeds 10-22, at maturity more or less rhomboidal, c. 3 X 2-2.5 X 1-1.5 mm, with the hilum about at the middle of one of the longer sides, brownish.

Angola, central and southern Zambia, Rhodesia, Mozambique, S. Africa.

Subsp. longipes

Stems appressed-pubescent, occasionally (in var. *icosisperma*) also with longer ascending hairs. Leaflets linear to linear-elliptic, \pm acute at the apex. Racemes (5)8-25(30) cm long, lax.

Var. longipes

Tephrosia pseudolongipes Bak. f., Leg. Trop. Afr. 1: 199 (1926). Type: Rhodesia, Central Div., Bromley, Walters 2207 (\times , holotype; SRGH, isotype).

Tephrosia lurida sensu Suessenguth & Merxmuller in Trans. Rhod. Sci. Ass. 43: 26 (1951).

Probably short-lived perennial, usually woody towards the base. Stems shortly but densely appressed-pubescent. Leaflets (1.5)2.5-6.5(9) X (0.1)0.2-0.5(0.6) cm, linear; stipules 4-9(11) mm long. Bracts persistent, but seldom forming very large tufts after flowering. Pods (40)50-70(77) mm long; seeds 10-16(17).

Angola, Zambia, Rhodesia, S. Africa.

ANGOLA. Bié-Cuando-Cubango. Menongue Distr., Vila Serpa Pinto, margem do rio Cueba, 1420 m, f l. & fr. 14.ii.

1960, *Mendes* 2570 (BM; LISC). Menongue Distr., Vila Serpa Pinto, vale do Cambumbe, 1420 m, fl. & fr. 28.ii.1960, *Mendes* 2792 (LISC). Vila de Serpa Pinto, margens do rio Cueba, fr. 14.i.1962, *Barbosa & Moreno* 9961 (LISC). Moçâmedes. Apeadeiro do C. F. Dois Irmãos, Caraculo, fl. & fr. 21.ii.1956, *Torre* 8858 (BM; LISC). Without locality or date. *Dekindt* 961 (LISC).

ZAMBIA. Central Prov. Between Kafue and Lusaka, fl. & fr. 17.viii.1946, *Gouveia & Pedro* 1683 (LMJ). Between Lusaka and Rufunsa, Maswero [?] Hills, fl. & fr. 20.viii.1946, *Gouveia & Pedro* 1716 (LMJ). Chakwenga Headquarters, 100-129 km E of Lusaka, rocky hill in *Brachystegia* woodland, fl. & fr. 14.ii.1965, *Robinson* 6638 (K). Southern Prov. Mazabuka Distr., near Choma, stunted woodland, fl. & fr. 7.iii.1952, *White* 2217 (x). Livingstone Distr., Great North Road 7.3 miles north of Livingstone, mopane woodland on karroo basalt, fl. & fr. 18.iii.1952, *White* 2280 (K). Mapanza, 10 miles SW, fl. & fr. 26.ii.1955, *Robinson* 1115 (x). Mazabuka Distr., Yates Jones Farm near Choma, woodland, fl. & fr. 27.i.1960, *White* 6506 (FHO; K). Mazabuka, escarpment miombo, fl. & fr. 20.V.1961, *Fanshawe* 6596 (x; SRGH).

RHODESIA. Northern Div. Shamva, fl. & fr. 20.xi.1932, *Leveiseur* Tv. Mus. 32892 (PRE). Trelawney, Tobacco Expt. Station, fl. & fr. 23.xii.1942, *Jack* 59 (PRE; SRGH). Gokwe Distr., Charama Escarpment, near turn-off on Gokwe Charama road, fl. & fr. 18.iii.1962, *Bingham* 177 (x; LISC; SRGH). Western Div. Bulawayo, fl. v.1914, *Rogers* 13802 (K). Matopos, fl. & fr. iii.1931, *Brain* 7620 (SRGH). Matopos, fl. & fr. 11.iv.1931, *Miss Stent* 3954 (SRGH). Matobo, Besna Kobila, fl. & fr. i.1953, *O. B. Miller* 1522 (SRGH). Besna Kobila, fl. & fr. ix.1954, *O. B. Miller* 2468 (SRGH — «woody scandent plant»). Besna Kobila, fl. & fr. i.1955, *O. B. Miller* 2615 (x; SRGH). Besna Kobila, fl. & fr. i.1959, *O. B. Miller* 5736 (x; SRGH). Central Div. Without locality, comm. 1914, *Mrs. Craster* 7 (K). Near Salisbury, fl. & fr. 1915, *Mrs. Craster* xxiv (K). Bromley, fl. & fr. i.1917, *Walters* 2207 (K; SRGH — type of *T. pseudolongipes*) Salisbury, fl. & fr. iv.1920, *Eyles* 2170 (x; PRE; SRGH). Marandellas, Ruzawi, fr. 18.iv.

1924, *Eyles* 7041 (x; SRGH). Marandellas, xi.1925, *Daphne King* 5237 (x; SRGH). Marandellas, govt. farm, fl. & fr. 26.ix.1931, *Rattray* 349 (PRE). Hunyani, fl. 31.1932, *Stent* 5697 (SRGH). Marandellas, Pasture Station, fl. & fr. 151.1932, *Stent* 5445 (SRGH). Marandellas, fl. & fr. 26.iii.1942, *Dehn* 166 (SRGH). Injina, Marandellas, fl. & fr. i.1946, *W. F. Collins* 14 (x; SRGH). Lalapanzi, bud 221.1948, *Mrs. Ingle* 4 (SRGH). Marandellas Distr., Digglefold, fl. & fr. 28.xii.1948, *Corby* 316 (x; SRGH). Rusapi Distr., Chiduku Reserve, fl. & fr. ii.1961, *Davies* 2883 (SRGH). Hartley Distr., Msengezi P. A. fl. & fr. ii.1961, *Davies* 2897 (x; SRGH). Salisbury, Ruwa Rocks, Epworth Mission, fl. 4.iii.1961, *Richards* 1452 (K). Beatrice, fl. & fr. 311.1962, *Lady Drewe* 12 (SRGH). S Marandellas, without date, *Miss Myres* 300 (K). Without locality or date, *Hislop* 153 (K). Eastern Div. Odzani River Valley, fl. & fr. 1914, *Teague* 17 (K). Nyumquarara Valley, fl. ii.1935, *Gilliland* 1586 (K). Odzi, fl. & fr. 23.V.1936, *Eyles* 8605 (K). Odzi, fl. V.1937, *Brain* 10890 (SRGH). Umtali commonage, roadside near reservoir, fl. 7.xi.1948, *Chase* 1513 (x; LISC; SRGH). Chipinga Distr., Sabi River—East Makosa, near Mahenyas, fl. 18.V.1959, *Savory* 472 (SRGH). Southern Div. Victoria Distr., Makoholi Expt. Farm, fl. & fr. 23.iii.1948, *D. A. Robinson* 309 (x; SRGH). Ndanga Distr., Chiredzi River bed, fl. & fr. 14.X.1951, *Thompson* 115/51 (SRGH). Nuanetsi Dist., Lundi R., fl. & fr. xi.1955, *Davies* 1625 (x; SRGH). Chibi Distr., Rhino Hotel, Lundi R., fl. xii.1925, *Davies* 1762 (x; SRGH). Victoria Distr., grassland outside Fort Victoria, fl. xii.1957, *O. B. Miller* 4889 (PRE; SRGH). Chibi Distr., kopje near Madzivire Dip, fl. & fr. 30.xii.1962, *Mall* 485 (SRGH).

SWAZILAND. Mbabane Distr., 3 mls SE of Komali River, fr. 10.ii.1962, *Schlieben* 9470 (PRE).

SOUTH AFRICA. Transvaal. Macalisberg, fl. 1848, *Burke* (x). Houtbosh, fl. 1875-80, *Rehmann* 6235 (x). Pretoria, hills above Aapiessriver, fr. 1875-80, *Rehmann* 4393 (x). Barberton Distr., Queen's River Valley, Roartey's Luck, fl. i.1890, *Galpin* 759 (PRE). Wonderboom bei Pretoria, fl. & fr. 24.xi.1913, *Peter* S 40 (x). Pietersburg, Modjadjis, fr.

xii.1915, *Rogers* 18129 (K). Pretoria Div., Premier Mine, st. 13.X.1917, *Moss* (x). Geelhoutkop, fl. & fr. i.1918, *Breyer* 18139 (PRE). Zoutpansberg Range, fl. & fr. i.1925, *Smuts* (FRE). Pretoria, Meintjies Kop range, fr. 21.xi.1926, *Smith* 3447 (PRE). Pretoria reg., Wonderboom poort, fr. iv.1932, *Smith* 6190 (PRE). Pretoria Distr., Donkerhack, fl. & fr. 31.i.1937, *Repton* 814 (PRE). Zoutpansberg, Laatstgevonden B74, fl. & fr. 121.1938, *van der Berg* 21 (PRE). Wonderboom Reserve, fl. & fr. 17.xi.1944, *Repton* 1914 (PRE). Wonderboom Res., N slope, fr. 21.ii.1946, *Collett & Pedro* 786 (LMJ). Waterberg Distr., 19 miles east of Vaalwater, 6 m beyond Twentyfour Rivers, fl. 12.iii.1946, *Codd* 989 (PRE). Warmbaths, Nylstroom, fr. 22.iii.1947, *Maguire* 26580 (PRE). Warmbaths, Towoomba PRS, fl. & fr. 191.1948, *Sidey* 1403 (PRE). Pretorius Kop, fl. 9.ix.1952, *van der Schyff* 441 (K). Pretorius Kop, fl. 26.xi.1952, *van der Schyff* 1479 (PRE). 10 miles E by N of Punda Maria, 430 m, fl. & fr. 201.1953, *Acocks* 16763 (x; PRE). Punda Maria, 530 m, fl. & fr. *van der Schyff* 1825 (x). Pretorius Kop, Numbi, fl. & fr. 151.1954, *van der Schyff* 3429 (PRE). Pretoria Distr., S side of ridge at Lynnwood Manor, fl. & fr. 15.iii.1962, *de Winter* 7703 (x; PRE). Cape Province. Vryburg, B. Bech., fr. 11.iv.1921, *Mogg* 8494 (PRE). Mafeking Div., 'Moshesh' near Mosila, fl. & fr. 10.iv.1945, *Brueckner* 271 (PRE). Orange Free State. Hoopstad Distr., De Rots, hill on banks of Vaal river, fl. & fr. 1.ii.1933, *R. P. Goosens* 1288 (PRE). Natal. Port Natal, fl. & fr. 1840, *Krauss* 20 (x — type). Port Natal, *Gueinzus* (K). Without locality, comm. 1865, *Gerrard* (K). Inanda, comm. 1881, *Wood* 1202 (x). Near Hay Paddock, Maritzburg, fl. 28.X.1945, *Allsup* 935 (PRE). Vryheid Distr., 5½ miles SSW of Swartfolosi P. O., fl. & fr. 13.viii.1946, *Acocks* 12836 (PRE). 4 miles S of Hlabisa, fl. & fr. 13.X.1946, *Codd* 1999 (PRE). Hlabisa Distr., W of Francis Island, Charter's Creek area, fl. 24.xi.1955, *Ward* 2755 (PRE). Hlabisa Distr., near Hluhluwe Game Reserve, fl. 5.V.1961, *Hitchens* 15 (PRE). Ubombo Distr., Mkuzi Game Reserve, fl. 291.1962, *Ward* 4002 (PRE). Ubombo Distr., Mpangazi, fl. 101.1964, *Strey* 5096 (PRE).

Of the above specimens two from near Punda Maria in the northern Transvaal, *Acocks* 10763 and *van der Schyff* 1825, have a particularly robust appearance, linear-elliptic leaflets mostly about 8 mm broad, and longer flowers than normal (23 mm).

Var. *icosisperma* Brummitt, var. nov.

Planta annua vel per paucos annos perennis. Caules pilis brevibus griseis appressis, et interdum etiam pilis longioribus brunneis ascendentibus, vestiti. Foliola 1.8-8 X 0.2-0.7 (0.8) cm, lineares ad raro lineari-elliptica; stipulae (5)7-14 (17) mm longae. Bracteaes persistentes et saepe post anthesin conspicuae 12-15 ad nodos fasciculatae. Legumina (62) 70-88 mm longa; semina (16)17-22.

Holotypus: Floresta de Nhamissanguere próximo do caminho de Gondola, Chimoio, fl. & fr. 17.ii.1948, *Garcia* 262 (LISC).

Mozambique and extreme eastern Transvaal.

MOZAMBIQUE. Manica e Sofala. Beira, open woods, fl. 25.xii.1906, *Swynnerton* 1445 (BM; K). Beira, fl. & fr. 25.ii.1912, *Rogers* 4534 (SRGH). Moribane, fl. 17.xi.1942, *Salbany* 88 (LISC). Savana de Maronga, fl. & fr. 2.viii.1945, Simão 427 (LISC). Cheringoma, between Beira and Inhaminga, 98 km from Beira, fr. 5 or 6.xi.1946, *Pedro & Pedrógão* 39 (LMJ; PRE). Dense bush by Busi Drift, fl. 5.ix.1947, *Whellan* 106 (SRGH). Near serração Braunstein, Amatongas, Chimoio, fr. 27.i.1948, *Mendonça* 3735 (LISC). Between Rutanda and Mavita, Manica, fl. & fr. 16.ii.1948, *Barbosa* 965 (LISC). Nhamissanguere, near the road from Gondola, Chimoio, fl. & fr. 17.ii.1948, *Garcia* 262 (LISC, type). East side of serra do Garuzo, Chimoio, fl. & fr. 24.ii.1948, *Garcia* 332 (LISC). Garuso, Chimoio, fl. & fr. 2.iii.1948, *Pedro* 3600 (LMJ). Foot of serra do Garuzo, Chimoio, fr. 3.iii.1948, *Barbosa* 1074 (LISC). Manica, Mavita, Rutanda, fl. & fr. 12.iv.1948, *Barbosa* 1443 (LISC). Mavita, near the settlement Chinacata, fl. & fr. 17.iv.1948, *Barbosa* 1411 (LISC). Sul do Save. Distr. Guija, along Limpopo River, fl. & fr. vii.1915, *Gaza-*

land Exped. 15798 (PRE). Inharrime Distr., Nhacoongo, between Lagoa Dongane and the railway, fl. 9.X.1945, *Pedro* 272 (κ; LMJ; PRE). Nhacoongo, Camp. Exp. CICA, fl. 9.x.1945, *Pedro* 278 (PRE). Chidenguel, near the lagoon, old sand dunes, fl. & fr. 18.viii.1947, *Pedro & Pedrógão* 1829 (PRE). Near Guijá, Limpopo, fl. & fr. 14.iii.1948, *Torre* 7499 (LISC). Panda, fl. 25.ii.1955, *Exell, Mendonça & Wild* 585 (LISC; SRGH). Chibuto, road towards Alto Changane, fl. & fr. 12.ii.1959, *Barbosa & Lemos* 8381 (COI; κ; LISC; LMJ). Lourenço Marques. Delagoa Bay, fr. 1822, *Forbes* (K—herb. Benth. & herb. Hook.). Lourenço Marques, Pessene, fr. V.1893, *Quintas* 79 (COI). Lourenço Marques, fl. & fr. 1.xii.1897, *Schlechter* 1580 (COI; κ; PRE). Near L. Marques, fl. & fr. ii.1916, *Lab. Químico* 2035 (PRE). Marracuene, Ricatla, fl. vii.1917, *Junod* (LISC). Lourenço Marques, fl. & fr. 11.i.1920 *Borle* 243 (PRE). Between Bilene and L. Marques, fl. & fr. 14.xii.1940, *Torre* 2413 (LISC). Lourenço Marques, fl. 51.1941, A. J. W. Hornby 850 (BM). Near Lourenço Marques, fl. & fr. ii.1946, *Pimenta* 17304 (LISC; SRGH). Goba, st. 81.1947, *Barbosa* 38 (LISC); *Barbosa* 49 (LISC); *Pedro & Pedrógão* 397 (LMJ); *Pedro & Pedrógão* 461 (LMJ). Namahacha, fr. 101.1947, *Pedro & Pedrógão* 543 (LMJ). Between Boane and Goba, Cabero dos Pedreiras, fl. & fr. 29.iv.1947, *Pedro & Pedrógão* 951 (LMJ; PRE). Maputo, fl. & fr. 16.V.1947, *Pedro* 3202 (LMJ). Montes de Goba, fl. & fr. 11.i.1948, *Torre* 7113 (LISC). Near Bela Vista, fl. & fr. 27.iv.1948, *Torre* 7729 (LISC). Maputo, between Catembe and Mogazine, 5 km from Catembe, fl. & fr. 18.ii.1952, *Barbosa & Balsinhas* 4748 (LMJ). Goba, fl. & fr. 23.ii.1955, *Exell, Mendonça & Wild* 554 (LISC; SRGH). Inhaca Island, W coast sand dunes, fl. & fr. 20.xii.1956, *Mogg* 26900 (κ; SRGH). Inhaca Island, W coast, open woodland, fr. 24.ix.1957, *Mogg* 27532 (κ; SRGH). Inhaca Island, Hlanganyani Hill, fl. 1.ix.1957, *Mogg* 27610 (SRGH). Vila Luiza, Campo Exp. Estud. Arbor., fl. & fr. 1.X.1957, *Barbosa & Lemos* 7879 (COI; K; LISC; LMJ). Inhaca Island, fr. viii.1959, *Brewer* CAH 3525 (κ; SRGH). Polana, fl. & fr. 3.X.1963, *Balsinhas* 646 (LMJ).

SOUTH AFRICA. Transvaal. Komati Poort, fr. xii.1917, *Moss & Rogers* 523 (K).

The diagnostic characters of this variety, pods and habit, are not always visible in herbarium material. It appears, however, that the material from Mozambique is fairly uniform, and in the above citations all material seen from Mozambique has been included with the exception of one specimen: Lourenço Marques, montes de Goba, fl. & fr. 9.xii. 1944, *Mendonça* 3454 (LISC). This has a much shorter pod (52 mm) with only about 12 seeds, and a probably perennial habit, so more closely resembling var. *longipes* or even possibly *T. lurida*.

Subsp. **swynnertonii** (Bak. f.) Brummitt, comb. et stat. nov.

Basionym: *Tephrosia swynnertonii* Bak. f., Leg. Trop. Afr. 1: 202 (1926). Type: Rhodesia, near Chirinda, 3800 feet, *Swynnerton* 369 (BM, holotype; α , isotypes).

Tephrosia grandiflora sensu Bak. f. in Journ. Linn. Soc. 40: 54 (1911).—Sensu Eyles in Trans. Roy. Soc. S. Afr. 5(4): 375 (1916).

Described as a perennial tall herb or shrub up to 1.7 m high. Stems densely ascending-pubescent, at least on the angles, the hairs usually brown. Leaflets (1.5)2.5-5.5(7) X (0.3)0.4-0.7(0.8) cm, linear-oblong, broadly rounded to truncate or emarginate at the apex; stipules 7-13 mm long. Racemes 2-7(13) cm long, usually compact or with only one or two lower nodes remote. Bracts not very conspicuous. Pods 62-80 mm long; seeds 13-17.

Known only from eastern Rhodesia.

RHODESIA. Eastern Div. Near Chirinda, 1155 m, fl. & fr. 21.vi.1906, *Swynnerton* 369 (BM; K, types). Chirinda, Mt. Silinda, fr. xi.1944, *Hack* 96 (SRGH). Chirinda area, fl. & fr. 29.iii.1950, *Hack* 175/50 (SRGH). Chipinga Distr., Gungunya Forest Reserve, fl. & fr. ii.1962, *Goldsmith* 42/62 (EM; K; LISC; SRGH); *Goldsmith* 51/62 (α ; SRGH).

A number of specimens from Manica e Sofala referred above to var. *icosisperma* seem to approach these Chirinda plants either in pubescence (see for example *Simão* 427)

or in leaf shape (see for example *Barbosa* 1443) and it does not seem possible to maintain *T. swynnertonii* as a distinct species. Furthermore a single specimen from Rhodesia, Southern **Div.**, Ndanga **Distr.**, W Sabi Chionja granite ridge, fl. 29.1.1957, *Phipps* 213 (x; SRGH), has a very compact inflorescence somewhat similar to that of the type of *T. swynnertonii*, though it has longer peduncles, acute leaves and a conspicuous grey appressed pubescence. Further collections from this area, and from Chirinda, are required.

Tephrosialongipes Meisn. var. *uncinata* Harvey in Harvey & Sonder, **Fl. Cap.** 2: 209 (1862). Type: *Zeyher* 455 (see below).

This variety was originally distinguished by HARVEY with the description 'leaflets 2 lines wide, obtuse, recurvo-mucronate', and a single collection, *Zeyher* 455, cited. More recently it was again recognised by Miss FORBES in *Bothalia* 4(4): 981 (1948) with a similar diagnosis 'Leaflets obtuse, recurvo-mucronulate', and a number of collections from the Transvaal were included. The majority of these appear to the present author to be not taxonomically separable from typical *T. longipes*, but the type collection of var. *uncinata* and three other early 19th century collections do appear to be distinct. They appear to be probably suffrutices with fairly stout stems, simple or with short axillary shoots, up to 40 cm high. The stems are only sparsely and shortly appressed-pubescent, 2-3 mm diameter and mostly strongly ridged. The leaves have usually more leaflets (mostly 4-6 pairs) than most *T. longipes* in S. Africa, and, as the previous authors have said, the leaflets are strongly obtuse with the tip recurved below. In general appearance they are somewhat similar to *T. laxiflora* from Zambia and Katanga. The specimens are *Zeyher* 455 (BM; K—herb. *Benth.*) — said by Miss FORBES to be from Pretoria District, Aapies River; Orange River, *Burke* s. η. (K—herb. *Hook.*); Aapges River, October, *anon.* (K—mounted with previous spec.); Aapges river, October, *anon.* 373 (K—herb. *Hook.*). The labelling of these collections is unsatisfactory (note

that Miss FORBES quotes Zeyher 373 as from Magaliesberg and Vaal River); the evidence points to some being from near Pretoria but one at least from the Orange River much further south. It is strange that no recent material has been traced to match these early collections and further investigation of the status of var. *uncinata* is required.

Tephrosia longipes X reptans

A remarkable recent collection from Zambia, **Central Prov.**, Chakwenga Headwaters, 100-129 km E of Lusaka, *Brachystegia* woodland, fl. & fr. 27.iii.1965, Robinson 6515 (α), closely resembles typical *T. longipes* except that it has a conspicuously spreading indumentum of brownish hairs on leaf rhachides and younger stems and greyish hairs on leaflet underface and older stems, and is apparently an annual though somewhat woody in the lower parts. It seems that this is very probably a hybrid between *T. longipes* and *T. reptans*, both of which have been collected at this locality by Mr. ROBINSON.

28. **Tephrosia lurida** Sonder in *Linnaea* 23: 30 (1850).—Harvey in Harvey & Sonder, *Fl. Cap.* 2: 208 (1862).—Eyles in *Trans. Roy. Soc. S. Afr.* 5(4): 375 (1916) quoad nom., excl. plur. spec.—Baker f., *Leg. Trop Afr.* 1: 200 (1926) quoad nom.—Burt Davy, *Fl. Pl. Ferns Transv.* 1(2): 378 (1932).—Young in *Ann. Transv. Mus.* 14: 402 (1932).—Wilman, *Check List Griqualand West*: 65 (1946).—Forbes in *Bothalia* 4(4): 980 (1948).—Suessenguth & Merxmüller in *Trans. Rhod. Sci. Ass.* 43: 26 (1951) quoad nom., excl. spec.—Martineau, *Rhod. Wild Fl.*: 37, t. 11(2) (1953). Type: S. Africa, Transvaal, Mooirivier, Magaliesberg, xi; Crocodillrivier, xii, Zeyher 456 (α , isosyntypes).

Cracca lurida (Sonder) Kuntze, *Rev. Gén. Pl.* 1: 175 (1891). Type as for *T. lurida*.

Tephrosia longipes Meisn. var. *lurida* (Sonder) Gillett in *Kew Bull.* 13(1): 125 (1958) pro parte excl. *T. laxifloram*

et *T. paucijugam* sensu Cronquist. — Torre, Consp. Fl. Angol. 3: 158 (1962) quoad syn., excl. spec. Type as for *T. lurida*.

Perennial suffrutex with a stout woody underground stock and usually numerous rather slender herbaceous stems up to 1.5(2) m diameter, usually somewhat decumbent at the base, sparingly branched with branches ascending at a rather narrow angle, or sometimes unbranched, up to 40(50) cm high. Stems sparsely to densely appressed-pubescent, or very rarely (var. *drummondii*) spreading-pubescent to tomentose. Leaves with 1-3 pairs of leaflets or the lower leaves sometimes unifoliolate or digitately trifoliolate; petiole (1.5)2.5-7.5 cm, usually much longer than the rachis but sometimes about equalling it, the petiole and rachis together (1.5)2.5-9 cm, appressed-pubescent or very rarely (var. *drummondii*) spreading-pubescent; leaflets (2)4-9 × 0.1-0.4(0.5) cm, linear (or in var. *drummondii* up to 14 mm broad, linear-elliptic), terminated by a stout, blackish, usually slightly curved mucro; upper surface glabrous, lower surface appressed-pubescent (except in var. *drummondii*); stipules (3)5-10(13) × 0.3-0.8 mm, linear, blackish. Flowers in terminal racemes 2-15(20) cm long; bracts 3-7 × 0.2-0.8 mm, ± linear, blackish, persistent; pedicels 3-5 mm. Calyx 3.5-6(7) mm long, appressed- to ascending- (or spreading- in var. *drummondii*), grey- or brown-pubescent; upper teeth connate for $\frac{1}{3}$ - $\frac{2}{3}$ length, upper and lateral teeth about equaling the tube. Petals usually pink, but sometimes purplish; standard 12-18 mm long. Stamen tube connate above. Ovary pubescent to tomentose; style pubescent; pods (40)50-70 × 4-5 mm, loosely appressed-pubescent with usually rather irregular geniculate hairs; seeds 10-14.

Var. *lurida*

Tephrosia angustissima Engler, Bot. Jahrb. 10: 29 (1888).—Forbes in *Bothalia* 4(4): 979 (1948).—Torre, Consp. Fl. Angol. 3: 158 (1962) quoad nom., ? spec. Type: S. Africa, British Bechuanaland, near Kuruman, summit of Ga Mhana Peak, fr. ii.1886, *Marloth* 1086 (PRE, isotype).

Tephrosia dowsonii Bak. f., Leg. Trop. Afr. 1: 190 (1926). Type: Kenya, Nairobi, 1675 m, 1916, *Dowson* 519 (K).

Stem, leaf petiole and rhachis, leaflet lower surface, inflorescence axis and calyx appressed-pubescent. At least the upper leaves with 2-3 pairs of leaflets; leaflets up to 5 mm broad. Pods (40) 50-70 mm long, with brownish irregular geniculate hairs; seeds 10-14.

KENYA. K4. Kiambu Distr. **Kiambu**, 1800-1830 m, fl. 121i. 1930, *Miss Napier* 97 (x). Nairobi Distr. Nairobi, **1705 m**, fl. & fr., comm. 1912, *Battiscombe* 51 (K). Nairobi, 1675 m, fl. & fr. 22.ix.1916, *Dowson* 519 (x, type). Archer's Farm, fl. & fr. 21.V.1933, *C. G. Rogers* 626 (x). Mbagathi Game Reserve, fl. 22.vi.1947, *Bally* 5106 (x). Nairobi, Dagereth Corner, **1675 m**, fl. & fr. 1949, *Mrs. Hale* 20 (x). Distr. uncertain. Naivasha or Kiambu Distr., Kukui, 12.vi.1902, *Kassner* 1012 (BM). Thika, 1525 m, fl. & fr. 25.vi.1947, *Bogdan* 789 (x); fl. 28.vi.1947, *Bogdan* 819 (x). Without locality, *Miss Napier* 816 (K).

RHODESIA. Northern Div. **Darwendale**, c. 1370 m, fl. 2.x. 1946, *Wild* 1344 (x; SRGH). **Umvukwe Mt.**, 1380 m, fl. & fr. 5.iii.1961, *Mrs. Richards* 14566 (x; SRGH). Western Div. Bulawayo, 1400 m, fl. & fr. ii.1906, *Eyles* 1206 (PRE; SRGH). Matobo, Matopos Dam, fr. 151.1950, *West* 3068 (x; SRGH). Matobo Distr., farm Besna Kobilu, fl. & fr. ii.1960, *O. B. Miller* 7141 (x). Central Div. Marandellas, msasa topland, fr. 5.vi.1947, *Newton* 60 (SRGH). Salisbury Distr., Chindamora, 1490 m, young fr. vi.1953, *Davies* 495 (SRGH). Eastern Div. Inyanga Distr., Pungwe Falls Farms, 1830 m, fl. & fr. xi.1957, *O. B. Miller* 4691 (K; SRGH). Melsetter Distr., below hut, Chimanimani Mts., *Brachystegia* woodland, fl. & fr. 29.V.1959, *Noel* 2158 (SRGH).

SOUTH AFRICA. Transvaal. Mooirivier, Magaliesberg, xi; Crocodillrivier, xii, *Zeyher* 456 (x, types). Mooie River, 1848, *Burke* (x). Aapjes River, 1848, *Burke* (K). Vaal River, 1848, *Burke* (K). Wonderboompoort, fl. & fr. 1875-1880, *Rehmann* 4611 (K). Mooi River, 1880, *Nelson* 337 (K). Without locality, comm. 1883, *Holub* (K). Lydenburg Distr., Spitzkop Goldmine, fl. & fr. ii.1888, *Wilms* 402 (K). Jeppes Ridge, Johan-

nesberg, fl. & fr. x.1898, *Gilfillan* 26 & 52a (PRE). Lydenburg Distr., near the town Lydenburg, fl. xi.1895, *Wilms* 401 (x). Rustenburg Distr., fl. 14.i.1904, *Nation* 58 (K). Aapjes River, near Pretoria, fl. ii.1904, *Bolus* 10833 (x). Pretoria, fl. & fr. 11.ix.1904, *Leendertz* 8390 (PRE). Krugersdorp, fl. & fr. i.1911, *Jenkins* 10029 (PRE). Zeerust, fl. i.1912, *Leendertz* 4277 (PRE). Barberton, fl. & fr. xii.1916, *Pott* 5328 (PRE). Pretoria, Curtis Hills, fl. & fr. 8.ii.1917, *Pole-Evans* 110 (x). Godwan River, fl. & fr. i.1919, *F. A. Rogers* 22650 (K). Pretoria Distr., Waterkloof, fl. 18.xi.1919, *Ver doorn* 31 (PRE). Observatory Ridge, Johannesburg, fl. 28.iii.1920, *Burt Davy* 18896 (K). Piet Retief, fl. xii.1921, *Leipoldt* (PRE). Waterval Boven fl. 1922, *Miss Mason* 38 (K). Malelane, fl. xii.1924, *Miss Murphy* 26220 (PRE). Pretoria, behind zoo grounds, fl. & fr. 12.iii.1925, *C. A. Smith* 20 (PRE). Lichtenburg Distr., Witstinkhoutboom, 28.i.1926, *Liebenberg* 53 (PRE). Lichtenberg Distr., Townlands, Klipveld, fl. 29.i.1926, *Liebenberg* 79 (PRE). Pretoria, Fountains Valley, fl. & fr. 18.xi.1928, *Repton* 127 (PRE). Doornkloof, Irene, fl. 1.i.1929, *Hutchinson* 2352 (K). Pretoria, Sunnyside, fl. 22.ix.1930, *Goosens* 107 (PRE). Boskop, Potchefstroom, fl. 11.xi.1939, *Louvo* 459 (PRE). Rietvlei, fl. 6.ii.1948, *Sidery* 1439 (PRE). Pretoria, Fountains Valley, fl. 4.X.1948, *de Winter* 400 (K). Nelspruit Distr., 1 1/2 miles N of Pretorius Kop, fl. 4.ii.1949, *Codd & de Winter* 4943 (K). Krugersdorp Distr., Giloolies Farm, Jo'burg, fl. & fr. 11.ii.1950, *Mogg* 18648 (SRGH). Marico Distr., 15 miles W of Zeerust, fl. 14.ii.1956, *Leistner* 547 (x). 14 miles out of Pretoria on Hartebeestpoort Dam road, fl. ii.1961, *van der Schuyff* 5280 (x; PRE). Cape Province Kosi Fontein, fl. & fr. 25.xii.1812, *Burchell* 2600 (K). Near Kuruman, summit of Ga Mhana, fl. & fr. ii.1886, *Marloth* 1086 (PRE —type of *T. angustissima*).

Var. **lissocarpa** Brummitt, var. nov.

A varietate typica leguminibus pilis pallidis valde appressis vestitis, saepe brevioribus (nonnunquam 28 mm) et saepe seminis paucioribus (nonnunquam 5 pro legumine) praeditis, differt.

Holotypus: Transvaal, Zoutpansberg Distr., c. 9 miles E of Louis Trichardt, farm Rustfontein, fr. 9.X.1955, *Schlieben* 7339 (x).

This variety appears to be found mainly to the extreme west of the distribution area of the species.

RHODESIA. Western Div. Matobo Distr., farm Besna Kobila, fl. & fr. iii.1954, *O. B. Miller* 2284 (x; SRGH).

SOUTH AFRICA. Transvaal. Zoutpansberg Distr., c. 9 miles E of Louis Trichardt, farm Rustfontein, fr. 9.X.1955, *Schlieben* 7339 (x). Cape Province. Between Kosi Fontein and Knecht's Fountain, fl. & fr. 25.xii.1812, *Burchell* 2603 (x). Hay Div., Dunmurry, fl. & fr. vii.1923, *Mrs. EyreCoote* 2325 (K). Hay, Jasper hills at Groenwater (A 20), fr. 151.1938, *Acocks* 8566 (x).

The pubescence of the pods of all the above specimens is quite unlike that of typical *T. lurida*. The type of the variety, *Schlieben* 7339, has three pods all about 28 mm long and with only 5 or 6 seeds and is the most extreme variant. *Acocks* 8566, however, has pods up to 70 mm long with 12 seeds and differs from typical *T. lurida* only in the pubescence of the pods.

Type of *T. angustissima* is from near Kuruman not far from the type locality of this variety, but its pods are clearly like those of typical *T. lurida*. There appears in fact to be no significant difference between these species and although they were tentatively kept apart by Miss FORBES (loc. cit.) *T. angustissima* is here reduced to synonymy.

Var. **drummondii** Brummitt, var. nov.

A varietate *typica* et var. *lissocarpa* habitu robustiore, pilis patentibus conspicuis in caulibus, petiolis, rhachidibus, axibus inflorescentiarum et calycibus, etiam foliis saepius trifoliolatis vel unifoliolatis, foliolis usque ad 14 mm latis, differt.

Typus: Rhodesia, Melssetter Distr., Glencoe Forest Reserve, steep grassy slope, fl. & fr. 23.xi.1955, *R. B. Drummond* 4976 (x, holotypus; PRE, SRGH, isotypi).

Only the type collection, *Drummond* 4976, is known from Rhodesia. This differs conspicuously from typical *T. lurida*, and further collections may show that it would be better regarded as a distinct species. It has a similar habit to typical *T. lurida*, producing numerous stems about 35 cm high from a woody stock, but it differs markedly in having a conspicuous indumentum of spreading brown hairs. The leaves are longpetioled (up to 8 cm) and all either trifoliate (digitately so or with a very short rhachis) or unifoliolate, some stems having only unifoliolate leaves. The leaflets are mostly broader than in typical *T. lurida*, up to 14 mm broad. There are, however, two collections from the Transvaal which approach DRUMMOND'S collection from Rhodesia, and these are probably best included in the same taxon:

SOUTH AFRICA. Transvaal. Nelspruit Distr., Schagen (farm of J. J. van Niekerk), fl.xii.1934, *Liebenberg* 3313 (PRE). Pretoria Distr., Byerespoort, sandveld, fl. & fr. 8.xii. 1959, *Strey* SKF 896 (x). Both of these have spreading pubescence, but shorter and less conspicuous than in *Drummond* 4976. The leaves are also similar, though the leaflets are only up to 8 mm broad and *Strey* 896 has some leaves with two pairs of leaflets. The latter specimen is more robust than is usual in *T. lurida*, having the stem about 3 mm diameter. Further investigation is required.

One further collection from the Transvaal, near Trichoordts Poort, fl. 24.xi.1924, *Smith* 3464B (PRE) has the suffruticose short-stemmed habit of *T. lurida*, with few leaflets, but has fairly broad (8 mm), obtuse leaflets and has been referred by Miss FORBES to *T. longipes* var. *uncinata*. Its affinity is in doubt.

T. lurida is sometimes very difficult to distinguish in the herbarium from *T. longipes*, and has been regarded as only a variety of the latter by GILLET (loc. cit.). This may prove to be the best treatment, but extremes seen to be very different in habit, and as the two are sympatric

over a wide area they are here maintained, somewhat tentatively, as species. YOUNG (loc. cit.: 398) reports that the two hybridise in the Transvaal, which may possibly explain the difficulty in drawing a clear distinction between them. The following cannot be referred by the present author with any confidence one way or the other to *T. lurida* or to *T. longipes*:

RHODESIA. Western Div. Bulawayo, fl. i.1898, *Rand* 41 (BM). Bulawayo, fl. xii.1902, *Eyles* 1206 (BM). Bulawayo, f l. & fr., *Gardner* 95, comm. 1905 *Barthelemy* (K). Bulawayo, Matopos, f l. & fr. 18.ii.1912, *Rogers* 5682 (BM; K; PRE; SRGH). Essexvale, fl. & fr. 15i.1921, *Borle* 86 (x; SRGH). Hillside, fl. ii.1944, *Martineau* 45 (SRGH). Central Div. Hartley Distr., Poole, fr. 4.iii.1948, *Mrs. R. M. Hornby* 2867 (x; PRE; SRGH).

SWAZILAND. Palata, Stegi Distr., fl. & fr. 11.i.1962, *Compton* 31203 (PRE).

SOUTH AFRICA. Transvaal. Benoni, fr. 3.xi.1934, *Bradfield* 269 (PRE). Pretoria Distr., Saltpan, fr. 2.iv.1946, *Codd* 1138 (x). Krugersdorp Distr., Strubens Valley, 9 R. miles NW of Jo'burg, fl. & fr. 6i.1954, *Mogg* 24304 (SRGH). Orange Free State. Bloemfontein, in kopje facing Tempe Farm, fl. & fr. ii.1917, *Potts* 2808 (x). Cape Province. 2 miles W by N of Kuruman, quartzite outcrop and lime, fl. 13.xii.1957, *Leistner* 1055 (K).

Critical field observations and perhaps experimental studies are required on *T. lurida* and *T. longipes*.

Other plants from Melssetter District. Apart from var. *drummondii* described above, some other collections from Melssetter District appear to be anomalous and require further investigation: Chimanimani, gully above Haroni, among grass and trees, 1310-1460 m, fl. & fr. 3.ii.1957, *Phipps* 444 (K; SRGH). On ridge facing east over Haroni R., near Dragon's Tooth, 915 m, fl. & fr. 16.ii.1958, *A. V. Hall* 484 (SRGH). Junction—Cashel Road, bud & fr. 31i.1963, *Lady Drewe* 87 (SRGH). The first of these, *Phipps* 444, has spreading brown hairs on stems and leaf rachides, so resembling

T. lurida var. *drummondii*, but has leaves with (1)2-4 pairs of linear-oblong to linear leaflets up to 5 X 0.5 cm. The stems appear to be decumbent-ascending, and it is described as a perennial herb 30 cm high from a woody stock. The pods are about 62 X 4.5 mm, 13-seeded. *Hall* 484 is rather similar but has appressed, not spreading, hairs, and more or less oblong leaflets somewhat like those of *T. longipes* subsp. *swynnertonii*. The other, *Drewe* 87, is a rather incomplete specimen but probably referable to either *T. longipes* var. *longipes* or to *T. lurida* var. *lurida*.

29. *Tephrosia laxiflora* R. E. Fries, *Wiss. Ergebn. Schwed. Rhod.-Kongo-Exped.* 1: 83, t. 8(6) (1914).—Bak. f., *Leg. Trop. Afr.* 1: 199 (1926). Type: Zambia, Malolo near Luvingo, fl. & young fr. 25.X.1911, R. E. Fries (UPS).

Tephrosia lurida sensu R. E. Fries, *Wiss. Ergebn. Schwed. Rhod.-Kongo-Exped.* 1: 83 (1914).

Tephrosia paucijuga sensu Cronquist, *Fl. Congo Belge* 5: 106 (1954).

Tephrosia longipes Meisn. var. *lurida* (Sonder) Gillett in *Kew Bull.* 13: 125 (1958) pro parte.

Perennial with a woody underground stock and herbaceous, erect, simple or (1)2-branched stems up to 45 (75) cm high, with 2-5 leaves per stem. Stems glabrous to sparsely and very shortly appressed-pubescent. Leaves with (0)1-3(4) pairs of leaflets; petiole 2-5(6.5) cm, petiole and rhachis together 2-9(12) cm, glabrous or subglabrous; leaflets 3-8(11) X (0.2)0.3-0.8(1.4) cm, linear-elliptic to linear, ± cuneate at the base, acute to rounded at the apex, the veins ± conspicuously prominent on both surfaces; upper surface glabrous, lower surface sparsely and shortly appressed-pubescent to subglabrous; stipules 6-13 X 0.7-1.2 mm, linear-triangular, sometimes falcate. Flowers in ± lax terminal racemes mostly 10-27 cm long; bracts c. 6-7 X 1 mm, quickly caducous; pedicels 3-7(11) mm long. Calyx 3.5-5 mm long, fairly densely shortly appressed-pubescent; upper teeth connate for $\frac{1}{2}$ - $\frac{5}{6}$ length, to form a rather broad trian-

gle, the upper and lateral teeth usually slightly shorter than the tube, the lower tooth about equalling the tube. Petals pale purplish or pink, or yellow with pink markings; standard (10)12-18 mm long, cuneate to subcordate at the base. Staminal tube connate above. Ovary pubescent; style pubescent; pods 35-60 X 3.5-4(5) mm, shortly pubescent with appressed or irregular hairs; seeds 8-12 (but see note on Tanzania collection).

Congo (Katanga) and Zambia, apparently also in Tanzania (see note below).

CONGO. Katanga. Kafuba, fl. 28.ix.1927, *Quarré* 485 (BR). [Without details] *Quarré* 698 (BR). Kafuba, fr. 21.X.1927, *Quarré* 707 (BR). Vallée de Kisanga, fl. viii.1933, *Quarré* 3482 (BR). Kafuba, fl. xi.1934, *Quarré* 4262 (BM; BR).

ZAMBIA. Barotseland. Mankoya Distr., 50 miles (80 km) E of Mankoya on road to Kafue Hoek, *Brachystegia* woodland, fl. & fr. 21.xi.1959, *Drummond & Cookson* 6719 (x; FRE; SRGH). Northern Prov. Malolo near Luingo, fl. & young fr. 25.X.1911, *R. E. Fries* 1115 (UPS, type). Western Prov. Ndola, fr. x.1906, *Allen* (K; PRE). Bwana Mkubwa, fl. viii. 1911, *R. E. Fries* 463 (UPS). Solwezi Distr., R. Mutana W of Boma, burnt ground in *Brachystegia* woodland, fl. 17.ix. 1930, *Milne-Redhead* 1142 (x). Solwezi Distr., chipya vegetation at edge of Solwezi Dambo, fl. 10.ix.1952, *White* 3200 (x). Solwezi, dambo margin, fl. & fr. 12.X.1953, *Fanshawe* 400 (x; SRGH). Kitwe, plateau woodland, fl. & fr. 20.ix.1955, *Fanshawe* 2447 (x). Kasempa, miombo woodland, fl. & young fr. 10.viii.1961, *Fanshawe* 6670 (x). Solwezi, Boma environs, open *Brachystegia* woodland on orange soil, fl. ix.1962, *Holmes* 1540 (x; SRGH). Southern Prov. Mumbwa, comm. 1912, *Mrs. Macaulay* 1145 (x); 1156 (x). Mumbwa-Chanobi, *Julbernardia-Brachystegia* woodland on reddish brown stony loam, 1155 m, fl. 15.ix.1947, *Greenway & Brennan* 8085 (EA; K; PRE). Mumbwa, Distr., Chunga Kafue Nat. Park, savanna woodland, fl. & fr. 14.xi.1961, *Mitchell* 10/97 (SRGH). Mumbwa, miombo woodland, fl. & fr. 10.x. 1963, *Fanshawe* 8044 (x).

T. laxiflora is closely allied to *T. paucijuga* which is distinguished mainly by its much broader, few-seeded pod. Plants from the Congo and Zambia seem to be all clearly referable to *T. laxiflora*, while *T. paucijuga* is apparently restricted to southern Tanganyika. Two collections from Tanzania, however, matching both these species in habit and leaf characters, have linear pods (3.5 mm broad in the one with pods mature) with 12-15 seeds and long racemes (up to 22 cm) and so are apparently referable not to *T. paucijuga* but to *T. laxiflora*:

TANZANIA. T7. **Chunya** Distr. Sinipala, fl. & young fr. 15.X.1932, *Geilinger* 3070 (K). Lupa Forest Reserve, 95 miles (152 km) N of Mbeya on **Itigi** road, 1310 m, fl. & fr. 15.ix. 1962, *Boaler* 675 (x).

These localities are somewhat further north than *T. paucijuga* is at present known to occur (see below). The leaves of *Boaler* 675 are all either unifoliolate or trifoliolate, and the pubescence is somewhat different from Zambian material, the stems having in places moderately dense, rather loosely appressed, greyish hairs, and the calyx and leaflet undersurfaces more or less spreading greyish hairs. *Geilinger* 3070, however, closely resembles specimens of *T. laxiflora* from Zambia. The relationships of these plants to *T. paucijuga*, particularly with reference to the constancy of the pod characters separating the species, requires further investigation.

A further similar specimen at Kew, collected by *Bullock*, unfortunately without any data at all but said by the collector to be probably from the Ufipa Plateau, must also be mentioned here. It is a **suffrutex** with robust (5 mm diameter) stems burnt off and more slender (1.5 mm) stems sprouting from the base. These flowering shoots resemble *T. laxiflora* except that they are densely and conspicuously covered with soft, grey, spreading hairs. The pods (immature) are linear with more than 12 seeds. No other collections matching this are known.

30. *Tephrosia paucijuga* Harms in Engl., Bot. Jahrb. **30**: 326 (1901). — Bak. f., Leg. Trop. Afr. 1: 196 (1926). — Brenan, Check List Tr. Shr. Brit. Emp. 5. Tang. Terr.: 445 (1949). — Cronquist, Fl. Congo Belge 5: 106 (1954) quoad nom. spec. — Gillett in Kew Bull. **13**(1): 125 (1958). Type: Tanzania, Mbeya Distr., Unyika, Umalili, Uwurungu, 2200 m, Goetze 1457 (BM, isotype).

Very similar to *T. laxiflora*, differing as follows: leaflets often broader, particularly in the distal half, 5-13 (17) mm broad, linear-elliptic to linear-oblongate; inflorescences usually shorter, 3-10(15) mm long; calyx densely appressed- to spreading-pubescent to tomentose; pods broader, 40-50 X 8-9.5 mm, with only 2-5 seeds.

Southern Tanzania.

TANZANIA. T7. Mbeya Distr. Unyika, Umalili, Uwurungu Mountain, grassy slopes, 2200 m, fl. xi.1899, Goetze 1457 (BM — type). Mbosi, 1585 m, fl. xi.1928, Haarer 1637 (x). Mbosi, 1705 m, fl. 25.iii.1932, Davies 116 (K). Mbosi, Zamboni, 1620 m, fl. 19.xi.1932, Davies 676 (x; SRGH). Mbosi, open paths of *Brachystegia-Uapaca* woodland, 1570 m, fl. & fr. 27.viii.1933, Greenway 3610 (x). Mbosi-Mbeya road, edge of woodland, burnt grassland, 1350 m, fl. 14.X.1956, Mrs. Richards 6444 (x). Mbimbe-Mbosi, fl. 18.vi.1958, Reakes-Williams 114 (x). 20 m (32 km) N of Tunduma on Mbeya road, recently burnt *Brachystegia* thicket, fl. 17.xi.1958, Napper 936 (x). Mbosi Circular Road, short rough grass, 1500 m, fl. 121.1961, Mrs. Richards 13883 (x). T8. Songea Distr. Near Lipumba, grassy bank near upper limit of *Brachystegia* woodland, 1230 m, fl. 28.ii.1956, Milne-Redhead & Taylor 8893 (x). Near R. Mkako, c. 6.5 km SW of Kitai, edge of *Brachystegia* woodland and riverside grassland, 900 m, fl. 15.iv.1956, Milne-Redhead & Taylor 9734 (x). Matengas, fl. & fr. 3.X.1956, Semsei 2501 (PRE; SRGH).

Only three of the above specimens have pods, which provide the main distinguishing character from *T. laxiflora*. The other specimens seem to agree with these in other characters, such as the densely pubescent or tomentose

calyx, and are very probably correctly referred to *T. paucijuga*, but in view of the specimens from Chunya Distr. discussed under *T. laxiflora* some slight doubt remains in the absence of fruit.

Group 6. TEPHROSIA **ELATA** AND ALLIED SPECIES

This group of species are similar to *T. longipes* and its allies but generally do not have linear leaflets, often have broader stipules and bracts, and sometimes have more densely pubescent pods. The following key distinguishes seven species which are frequently confused:

1. Stipules 0.5-1 mm broad; petals 8-12 mm long; pods 40-65 X 3-5 mm
2. Leaves with (5)6-10(14) pairs of leaflets; pods with (9)10-12(13) seeds 34. *T. elata*
2. Leaves with 4-6 pairs of leaflets; pods with (6)7-10 seeds
 3. Calyx 2-3 mm long, the ventral part with pellucid gland dots; pods with 8-10 seeds 37. *T. punctata*
 3. Calyx 3.5-5(6) mm long, without pellucid gland dots; pods with (6)7-8 seeds 36. *T. kasikiensis*
1. Stipules 1-4.5 mm broad; petals (10)12-24(28) mm long; pods (35) 58-100(110) X 4.5-8 mm
 4. Flowers in large dense heads, either all terminal or up to 12 lateral (simulating a much interrupted raceme), each head including broadly elliptic to lanceolate bracts 2-7 mm broad among the flowers; calyx 5-10(13) mm long
 5. Heads all or mostly terminal, including lanceolate bracts up to 16 X 3 mm *T. interrupta* subsp. *mildbraedii*
 5. Heads terminal and up to 12 lateral, each including broadly elliptic-acuminate bracts up to 7 X 7 mm *T. interrupta* subsp. *interrupta*
 4. Flowers in 'racemes' with small few-flowered clusters at each node; bracts all linear-triangular or sometimes the subtending bract at each node ovate to lanceolate, or if more, than one bract at each node ovate (*T. bracteolata*) then calyx 3-4 mm
 6. Style 7-9 mm; petals 18-22 mm; calyx 5-8 mm *T. interrupta* subsp. *elongatiflora*
 6. Style 4-7 mm; petals (10)11-16(18) mm, or if up to 19 mm then calyx 3-5 mm
 7. Calyx 7-10 mm long
 8. Pods 5-7.5 mm broad, light brown but covered with spreading dark brown hairs 33. *T. nyikensis*

8. Pods 4.5-5 mm broad, pale straw-coloured, thinly pubescent or glabrescent 34. *T. elata* var. *aberncornensis*
7. Calyx 3-6(7) mm long
9. Calyx shortly and closely appressed-pubescent, the tube c. 2.5 mm long; pods pale straw-coloured with (9)10-12(13) seeds 34. *T. elata*
9. Calyx conspicuously shaggy-pubescent to villous, the tube 1-2 mm long; pods brown with 12-19 seeds
10. Bracts 0.4-1 mm broad, linear-triangular, inconspicuous; leaflets (0.5)0.7-1.8(2.0) mm broad, elliptic to oblanceolate or sometimes ± linear-oblong 31. *T. nana*
10. Bracts 1-3 mm broad, ovate, conspicuous, purplish; leaflets 0.3-0.7(1.1) mm broad, linear-oblong to linear 32. *T. bracteolata*
31. *Tephrosia nana* Kotschy in Schweinfurth, *Reliq. Kotschy*: 20, t. 16 (1868). Types: Sudan, Fesoglu, *Boriani* 109 (w, syntype, not seen); Sudan or Ethiopia, Matamma, Gallabat area, *Schweinfurth* 1871 (K; BM-isotypes).

GILLETT in *Kew Bull.* **13**(1): 129-130 (1958) has pointed out that the species long known as *T. barbiger* Welw. ex Bak. seems to be inseparable from the earlier described *T. nana*. It is not necessary here to repeat the extensive synonymy involved. It is preferred here to attribute the name *T. nana* solely to KOTSCHY since it is clear that it was his description, as well as epithet, which was published posthumously in a work edited by SCHWEINFURTH.

T. nana, as now defined, is a somewhat variable species. The dwarf plants such as the syntype *Schweinfurth* 1871 seem to be restricted to the Sudan and Uganda, but as GILLETT has pointed out these may well be merely stunted by the more arid conditions and despite their markedly different facies probably do not merit taxonomic recognition. GILLETT has also referred to the variation in pubescence of the leaflet upper surface. In West Africa the upper surface is glabrous except in three specimens seen from Nigeria (*Rowland* s. n., *Jones* 2126, *Killick* 45, all at Kew). In East Africa, on the other hand, the great majority are pubescent above, but a few are glabrous (e. g. *Purseglove* 998, *Chandler* 331 both from Uganda, the dwarf plant *Scott* EA 11816 also from Uganda, *Schlieben* 1937 from Tanzania).

In the Congo the majority are pubescent as in East Africa, but, surprisingly, all those seen from extreme southern Congo, and those from adjacent Zambia, are glabrous. The distribution of the two pubescence states is shown in the map, fig. 5.

The West African plants differ furthermore from others in their generally smaller flowers, the petals being (10)12-15 mm long compared with 14-19 mm elsewhere. The pods

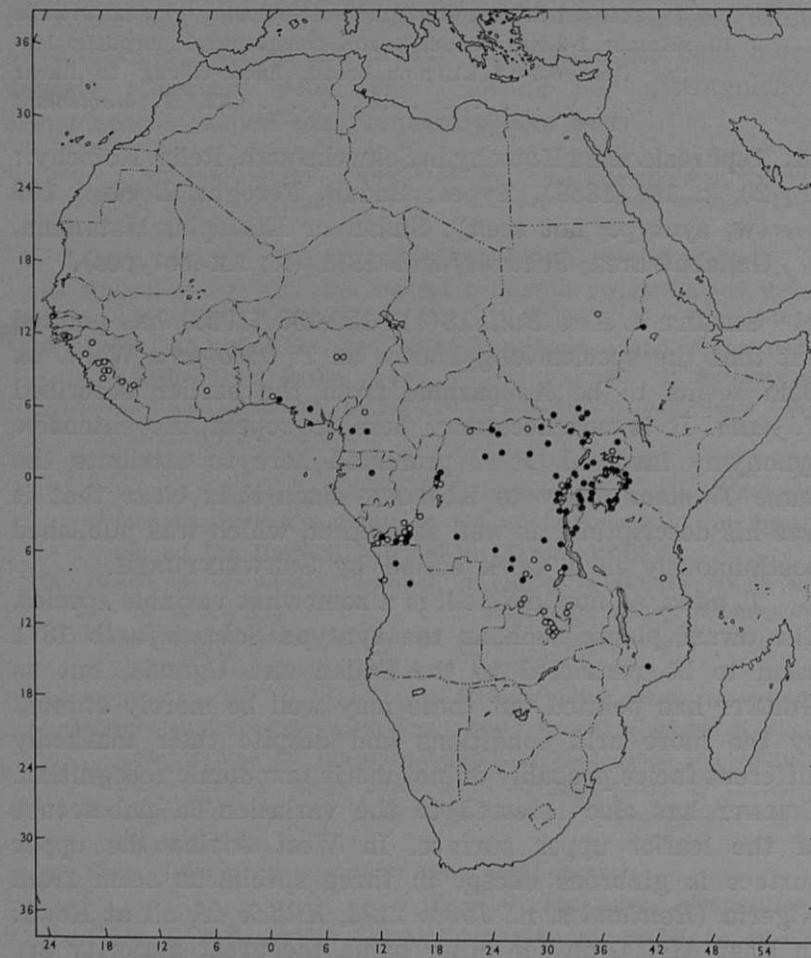


Fig. 5. — Distribution of *Tephrosia nana*.

- leaflets glabrous above
- leaflets pubescent above

also tend to be smaller in West Africa than in East Africa, 38-54 X 4-5 mm compared with (42)50-70 X (4.5)5-6 mm, but in the Congo the range is more or less intermediate, (32)40-60(65) mm. Leaflet shape also seems to show some regional variation, the few specimens available from western Zambia being exceptional in this case. Through most of the area of the species the leaflets are more or less oblanceolate to linear-oblong, 7-12(18) mm broad and about 5 times as long as broad, but in the western Zambian material they are elliptic or obovate to oblanceolate, (8)13-18(20) mm broad and only about 2-3(4) times as long as broad. The one from northern Zambia, however, has linear-oblong leaflets as in Congo plants. The following collections from our area have been seen:

ZAMBIA. Northern Prov. Kamindas, fl. 5.X.1911, *R. E. Fries* 889 (UPS). Western Prov. Mufulira, river bank, fl. & fr. 17.iii.1956, *Fanshawe* 2848 (\times ; SRGH). Kitwe, small colonies in woodland after felling, fl. 15.iii.1957, *Fanshawe* 3047 (\times). Kitwe, fr. 8.iv.1957, *Fanshawe* 3153 (\times). Nkana, Kitwe (Sewage Works), fl. & fr. 17.iii.1959, *Shepherd* 15 (\times). MOZAMBIQUE. **Zambézia**. Near Ilé, beside roads, fl. 1.iv.1943, *Torre* 5037 (LISC).

As will be seen from the map, fig. 5, the last of the above seems to be somewhat removed from the main area of the species. Unlike the Zambian specimens its leaflets are pubescent above.

32. *Tephrosia bracteolata* Guill. & Perr., Fl. Senegamb. Tent.: 194 (1832). — Bak. in Oliv., Fl. Trop. Afr. 2: 116 (1871). — Bak. f., Leg. Trop. Afr. 1: 201 (1926). — Chevalier, Fl. Archip. Cap Vert in Rev. Bot. Appl. 15: 971 (1935). — Andrews, Fl. Pl. Anglo-Egypt. Sudan: 240 (1952). — Cronquist, Fl. Congo Belge 5: 112, t. 8 (1954). — Cufodontis, Enum. Pl. Aethiop. Spermat., in Bull. Jard. Bot. Brux. 25(3 suppl.): 279 (1955). — Hepper in Fl. W. Trop. Afr. ed. 2, 2: 529, 530 (1958). — Torre in Consp. Fl. Ang. 3: 158 (1962) excl. spec. *Gossow*. 4260. Type: Senegal, Lamsar near St. Louis.

Tephrosia fasciculata Hook. f., Niger FL: 298 (1849).
Type: Nigeria, on the Quorra (Niger), *Vogel* 23 (κ).

Cracca bracteolata (Guill. & Perr.) Kuntze, Rev. Gen. Pl. 1: 174 (1891).—Hiern, Cat. Afr. Pl. Welw. 1: 221 (1896).—Pires de Lima in *Brotéria sér. bot.* **19(3)**: 123 (1921) et *Bol. Soc. Brot. sér. 2*, 2: 137 (1924) quoad syn. excl. spec. (vide *T. reptans* var. *microfoliata*) Type as for *T. bracteolata*.

Tephrosia kotschyana Hochst. in Schaed. Kotschy et Schimper, nomen nudum.

A variation pattern somewhat similar to that found in *T. elata* and *T. nyikensis* seems to allow recognition of two varieties differing conspicuously in the type of pubescence. They appear to be more or less disjunct geographically (see map, fig. 6), but in this case no other correlated characters have been found and varietal rather than subspecific rank is preferred.

Var. *bracteolata*

Tephrosia elongata Hook. f., Niger FL: 298 (1849) non E. Meyer (1835). Type: Nigeria, on the Kworra (Niger), *Vogel* 147 (κ).

Tephrosia concinna Bak. in Oliv., Fl. Trop. Afr. 2: 112 (1871).—Bak. f., Leg. Trop. Afr. 1: 190 (1926). Type: Nigeria, on the Niger, *Baikie* (κ).

Tephrosia nigerica Bak. f., Leg. Trop. Afr. **1**: 198 (1926). Type as for *T. elongata* Hook. f. non E. Meyer.

Stems and leaf rachides more or less closely appressed-pubescent.

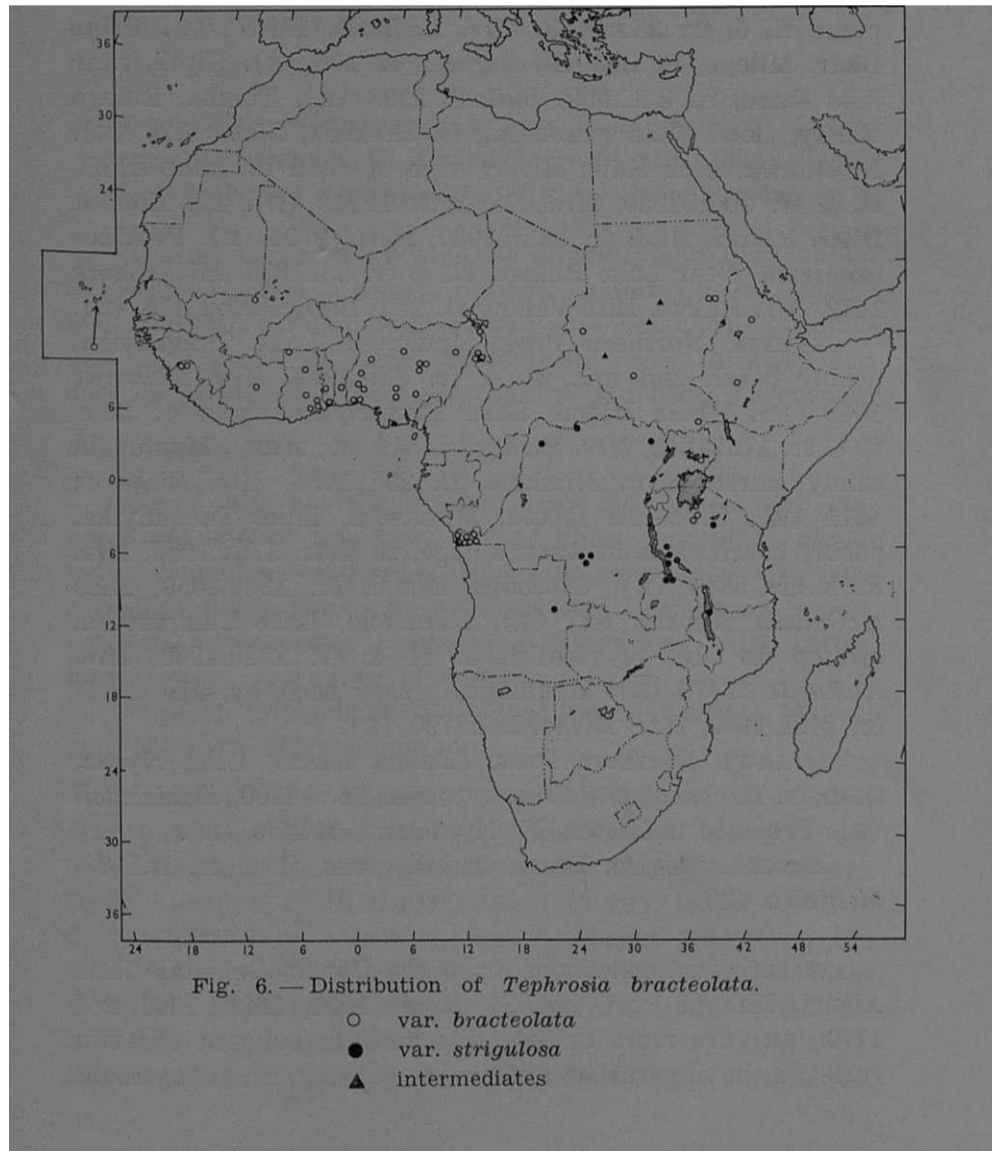
From West Africa (Senegal) to western Congo, (Boma etc.), Ethiopia, Uganda, northern Tanzania and northern Angola (Cuanza Norte, *Welwitsch* 2109) (see map 6). The west African material is very uniform with the exception of one specimen, the type of *T. fasciculata* Hook. f., which has rather soft spreading hairs and broad pods, 52-60 X 6-6.5 mm.

Var. **strigulosa** Brummitt, var. nov.

Caules et rhachides foliorum pilis angulo circa 45° plus minusve rigide ascendentibus vestiti.

Typus: Zambia, Mpulungu, Lake Tanganyika, pebbly beach and grit, fl. & fr. 8.iii.1952, *Mrs. Richards* 1049 (K).

Northern and south-central Congo, southern and central Tanzania, northern Zambia and northern Malawi.



CONGO. Equateur. Gemena Terr., Bodangabo, *Imperata* savanna, fl. 16.V.1955, *Evrard* 1010 (BR; K). Kutubongo, *Imperata* savanna, fl. & fr. 24.V.1955, *Evrard* 1053 (BR). Orientale. Monga (Uele-Itimbiri), fl. ii.1931, *Lebrun* 2241 (BR). Kasai. Dibaya Terr., Badibanga, savanna, 20.X.1956, *Liben* 1771 (K). Ganda-jika, *Loudetia* savanna, fr. 28.iii.1959, *Devred* 3936 (BR; K).

TANZANIA. T4. Mpanda Distr. Rukwa, edge of flooded plain, fl. & fr. 28.X.1963, *Mrs. Richards* 18287 (x). Ufipa Distr. Milepa, fl. iii.1949, *Burnett* 49/105 (x). Kipili, near lake shore, fl. 2.ii.1950, *Bullock* 2393 (x). Tumba, Rukwa Valley, flood plain grassland, fl. 3.ii.1952, *Siame* 126 (x). N. Rukwa, near Kabu River, edge of road in damp ditch, fl. & fr. 20.iii.1959, *Mrs. Richards* 12248 (x). T5. Kondoa Distr. Kikori, fl. & fr. 21.iii.1930, *Burt* 2704 (K). Province uncertain. Near Lake Rukwa, fl. & fr. 8.ii.1938, *Michelmores* 1472 (x). Rukwa Rift Valley, fl. 25.ii.1947, *Pielou* 114 (K).

ZAMBIA. Northern Prov. Mpulungu, Lake Tanganyika, pebbly beach and grit, fl. & fr. 8.iii.1952, *Mrs. Richards* 1049 (x). Mbulu Island, Lake Tanganyika, shore of lake, fl. & fr. 17.ii.1955, *Mrs. Richards* 4514 (x; SRGH). Mpulungu, sandy marsh below Nimkola, fl. 23.ii.1955, *Mrs. Richards* 4611 (x). Crocodile Island, Mpulungu, Lake Tanganyika, pebbly beach close to water's edge, fl. & fr. 17.iv.1955, *Mrs. Richards* 5441 (x). Crocodile Island, fr. 12.iv.1959, *Miss McCallum Webster* 842 (x). Niamkolo, Lake Tanganyika, swamp on edge of rice fields, fl. & fr. 22.iii.1960, *Mrs. Richards* 12776 (K). Mpulungu, grassy bank by lake, fl. & fr. 24.iii.1960, *Mrs. Richards* 12790 (x).

MALAWI. Northern Prov. Likoma Island, Lake Nyasa, fl. & fr. *Archdeacon Johnson*, comm. 28.vi.1900, *Riddelsdell* (K). Province unknown. N. Nyasaland, *Whyte* (K).

ANGOLA. Moxico. Boma, in tall grass, fl. & fr. iv.1873, *Monteiro* (K).

A series of collections from the Congo, Orientale, Lac Albert, Mahagi Port, ix.1934, *Bredo* 1621, 1622, 1696 and 1770 (BR) are more or less intermediate between the two varieties, having rather stiff hairs varying from appressed

to ascending. Five collections seen from the Sudan — *Kotschy* 257, *Andrews* 3112, *Wickens* 327, *Jackson* 3269 and *Schweinfurth* 1692 (all \times) — do not match var. *bracteolata* as they might be expected to do. They have more or less spreading, often geniculate or soft hairs on the stem and leaf rhachis. Their position is uncertain.

In Tanzania, Zambia and Malawi var. *strigulosa* appears to be characteristic of wet places, particularly lake shores, but plants from the Congo are recorded as from savanna, the one from Angola similarly from tall grass.

33. *Tephrosia nyikensis* Bak. in Kew Bull. 1892: 257 (1892) emend. Cronquist, Fl. Congo Belge 5: 115 (1954). Type: Malawi, Nyika plateau, *Whyte* (K, see Cronquist, loc. cit.).

This species has a somewhat discontinuous distribution in mountain areas in Kenya, Uganda, eastern Congo, western and southern Tanganyika, Malawi and northern Mozambique. It appears to show considerable local variation but may be divided into two geographically distinct subspecies.

Subsp. *nyikensis*

Stems with short appressed hairs intermixed with longer spreading or upwardly curved hairs (except in plants with bracteoles — see notes below) or sometimes with only spreading hairs. Bracts linear-lanceolate, 1-2(2.5) mm broad, not very conspicuous. Calyx (7) 8-10 mm long, with rather long, brown, ascending to spreading hairs.

Western (Mpanda Distr.) and southern Tanzania, Malawi and northern Mozambique.

TANZANIA. T4. Mpanda Distr. Kahoko, fr. 22.vii.1949, *Harley & Newbold* 4537 (K). Highland between Pasagulu and Musenabantu, fl. & fr. 8.viii.1959, *Harley* 9231 (K). T7. Mbeya Distr. Liwanga, fl. 16.iii.1932, *Jessel* 22 (K). Mbosi, Mkoma, fl. 7.iv.1932, *Davies* 543 (K; SRGH). About 6.5 km up the Tukuyu road S of Utengule, fl. & fr. 12.V.1956, *Milne-Redhead & Taylor* 10087 (\times). Mbeya, fl. & fr. 23.iv.1959, *Gaetan* 149 (\times). Below Umalila Forest Reserve, fl. & fr. vi.1961, *Procter* 1890 (K). Rungwe Distr. Kyimbila District, fl. 21.viii.

1911, *Stolz* 838 (K); *Stolz* 842 (κ). Tukuyu, fl. 20.vii.1932, *Davies* 399 (κ). Rungwe fl. 13.ix.1932, *Geilinger* 2208 (K). Rungwe, fl. 20.ix.1932, *Geilinger* 2491 (κ). Rungwe Distr., fl. & fr. 3.x.1932, *Davies* 209 (κ; SRGH). Rungwe Distr., fl. 13.X.1932, *Davies* 208 (κ; SRGH). Poroto Village, 2100 m, fl. & fr. 20.v.1957, *Mrs. Richards* 9828 (κ). Njombe Distr. Ruhudje, Lupembe, fl. 21.vi.1931, *Schlieben* 1058A (κ); 1.vii.1931, *Schlieben* 1073A (K). Distr. uncertain. Mporotos, fl. & fr. 16.vii.1932, *Davies* 763 (K). T 8. Songea Distr. About 10.5 km N of Miyau, fl. & fr. 21.V.1956, *Milne-Redhead & Taylor* 10407 (κ).

MALAWI. **Northern Prov.** Nyika Plateau, 2000-2330 m, fl. & fr. vi.1896, *Whyte* 465 (κ, type). Nyika Mountain, 1330-2000, fl. 1896, *Whyte* s. η. (K). Masuku Plateau, fl. vii.1896, *Whyte* s. η. (K). Nkata Bay escarpment, fl. & fr. 7.vii.1952, *Jackson* 930 (κ). **Southern Prov.** Chipata and Nchisi Mts., fl. & fr. 4.V.1963, *Verboom* 869 (κ; SRGH).

MOZAMBIQUE. **Niassa.** Near Vila Cabral, fl. v-vi.1934, *Torre* 259 (COI; LISC). Maniamba, Serra Geci, fl. & fr. 29.V.1948, *Pedro & Pedrógão* 4110 (LMJ); 4081 (LMJ).

This subspecies itself shows considerable variation. The specimens cited from Mpanda Distr., Tanzania, have narrower pods (4.5 mm) than others, with rather conspicuous spreading grey pubescence. Those from the Nyika Plateau (including the type) and Masuku Plateau in Malawi and some from the Rungwe Plateau in Tanzania (*Davies* 209, 399, 763; *Geilinger* 2208, 2491; *Stolz* 838) seem generally to have a denser, ovoid, often capitate, head and usually shorter leaves than have others from Southern Highlands (T7) Province of Tanzania, but others from Rungwe (*Davies* 208, 543; *Richards* 9828) have a fairly elongate raceme. Those from Southern Province (T8) of Tanzania (*Milne-Redhead & Taylor* 10407) and Maniamba in northern Mozambique (*Pedro & Pedrógão* 4110) have very large broad pods (7-7.5 mm broad). The two specimens from southern Tanzania which have been observed to have bracteoles present (*Gaetan* 149; *Milne-Redhead & Taylor* 10087) are further peculiar in this subspecies in having

only appressed pubescence on the stem. Of the specimens from Malawi other than those already mentioned, the one from Nkata Bay (*Jackson* 930) has an elongate inflorescence resembling most from Southern Highlands of Tanzania, while *Verboom* 869 from southern Malawi is peculiar in having a short stiffly spreading brown tomentum unlike any other plant of this species seen. It does not seem advisable to attempt any further subdivision of the species until more material is available.

Subsp. **victoriensis** Brummitt & J. B. Gillett, subsp. nov.

Caules breviter appresso-pubescentes. Bractee ovato-acuminatae ad lanceolatae, 3-5 mm latae, flores juveniles occultentes. Calyx 5-8(9) mm, pilis griseis ascendentibus vel appressis, vel dentium brunneis.

Typus: Kenya, S. Elgon, fl. & fr. ix.1939, *Mrs. Tweedie* 465 (x, holotypus).

Eastern Congo, Burundi, Uganda, Kenya and northern Tanzania. The following specimens have been seen:

CONGO. Orientale. Mahagi (Ituri), fr. 1931, *Lebrun* 3855 (x). Nioka, fl. & fr. 27.X.1934, *De Graeme* 227 (K). Nioka, 1700 m, fl. 20.viii.1957, *Froment* 210 (x). Without locality. *Scaetta* 1323 (F1).

BURUNDI. Kisozi, fl. & fr. 3.vii.1934, *Lejeune* 108 (x).

UGANDA. U2. Toro Distr. Near Butiti, 1525 m, fl. & fr. 15.vii.1938, *Thomas* 2276 (K). Ankole Distr. Igana, 1645 m, fl. & fr. ix.1938, *Purseglove* 367 (K). U4. Mengo Distr. Kampala, fl. & fr. 12.vii.1920, *Shantz* 892 (x). Tondola, Gomba, fl. vi.1925, *Maitland* 797 (x). Kip Lake, Kampala, fi. iii.1936, *Hancock* 169 (x).

KENYA. K3. Uasin Gishu. Kipkarren, *Mrs. Brodhurst Hill* 503, 556 (x). K5. North Kavirondo. S. Elgon, 2040 m, fl. & fr. ix.1939, *Mrs. Tweedie* 465 (x, type). South Kavirondo. Kisii, 1735m, fl. & fr. ix.1933, *Napier* 5308 (x). Kericho Distr. North-Sotik, Coxon's Farm, fl. 11.ix.1949, *Mrs. Royston* in *Bally* 7435 (K).

TANZANIA. T4. Buha Distr. Kasulu, Heru Chini, 1370 m, fl. 15.iv.1931, *Rounce* 47 (x).

This subspecies probably includes the type of *T. congestiflora* Harms in Mildbraed, Wiss. Ergebn. Deutsch Zent.-Afr.-Exped. 1907-8, 2: 255 (1911), type from Ruanda, *Mildbraed* 390 (not seen, presumed destroyed at Berlin). As this name has very seldom been adopted since and the epithet would be most inappropriate for the subspecies, the racemes being considerably more elongate than the type of *T. nyikensa*, a new epithet and new type are proposed above.

34. *Tephrosia elata* Deflers, Voy. Yemen: 130 (1889). Type: Yemen, El Mekhader, 1800 m, *Deflers* 653 (P).

CRONQUIST, in Fl. Congo Belge 5: 115 (1954), adopted a broad concept of *T. heckmanniana* Harms, including plants from eastern Congo, East Africa and Flora Zambesiaca area, with no recognition of infraspecific variants. In preparing the account for the Flora of Tropical East Africa (unpublished) GILLET has established that the plant from Arabia described by DELFERS as *T. elata* is conspecific with CRONQUIST'S concept of *T. heckmanniana*. *T. elata* is in fact the earliest available specific name and must now be adopted for this species. It seems possible, however, to recognise two subspecies, each with two varieties (see map, fig. 7), distinguished in the following key:

1. Pods (35)40-60(65) mm long, with longish, \pm villous, irregular or loosely appressed hairs; stems usually strongly ridged, appressed- to spreading-pubescent; inflorescence axis usually spreading pubescent (subsp. *elata*)
 2. Stems with closely appressed hairs var. *elata*
 2. Stems with rather conspicuous, soft, spreading hairs var. *tomentella*
1. Pods (40)55-70(80) mm long, with very short, irregular, geniculate hairs; stems smooth, minutely and closely appressed-pubescent; inflorescence axis appressed-pubescent (subsp. *heckmanniana*)
 3. Stipules 0.8-1.4 mm broad; bracts 0.2-1(1.5) mm broad; calyx 4-6 mm long, the lateral teeth shorter than to about equalling the tube var. *heckmanniana*
 3. Stipules 2-2.5 mm broad; bracts c. 2 mm broad; calyx 6-8 mm long, the lateral teeth longer than the tube var. *abercornensis*

Subsp. **elata**

Stems usually strongly ridged, appressed- or spreading-pubescent. Leaflets (1.7)2.5-6(7.5) X (0.4)0.5-1.4(1.8) cm, linear-oblongate to linear-elliptic or linear-oblong, or (in var. *tomentella*) obovate; lower surface with loosely or closely appressed, longish hairs; stipules 6-12(15) X 1-2

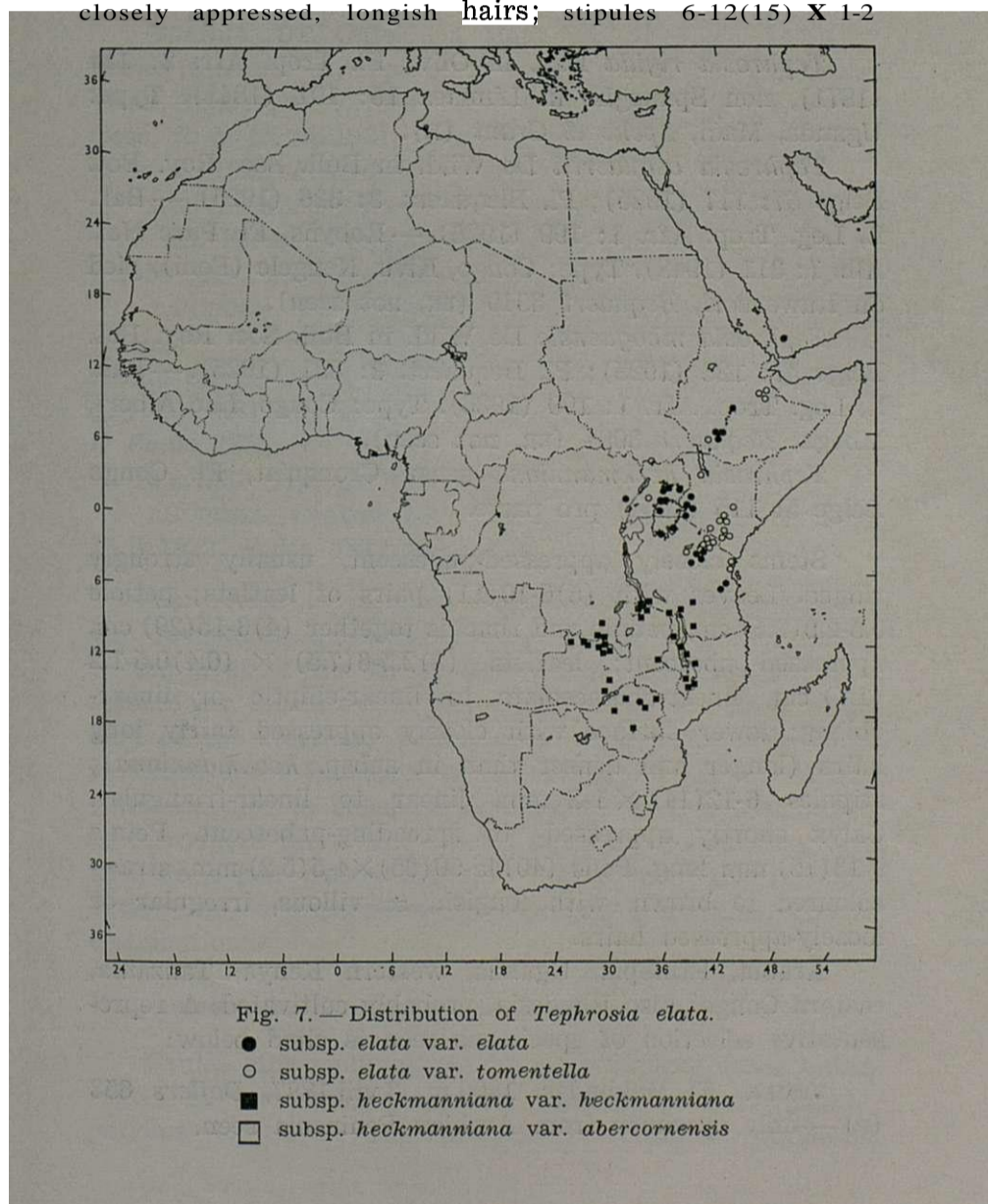


Fig. 7. — Distribution of *Tephrosia elata*.
● subsp. *elata* var. *elata*
○ subsp. *elata* var. *tomentella*
■ subsp. *heckmanniana* var. *heckmanniana*
□ subsp. *heckmanniana* var. *abercornensis*

(2.3) mm, linear to linear-triangular. Calyx shortly appressed- to spreading-pubescent. Petals (8)9-13(16) mm long. Pods (35)40-60(65) mm long, with appressed or irregular, \pm villous hairs.

Var. *elata*

Tephrosia rigida Bak. in Oliv., Fl. Trop. Afr. 2: 114 (1871), non Spanoghe in Linnaea 15: 191 (1841). Type: Uganda, Madi, *Speke & Grant* (K).

Tephrosia bequaertii De Wild. in Bull. Soc. Roy. Bot. Belge 57: 117 (1925); Pl. Bequaert. 3: 326 (1925).—Bak. f., Leg. Trop. Afr. 1: 199 (1926).—Robyns, Fl. Parc Nat. Alb. 1: 311 (1948). Type: Congo, Kivu, Kengele (Beni), pied du Ruwenzori, *Bequaert* 3949 (BR, not seen).

Tephrosia mbogaensis De Wild. in Bull. Soc. Roy. Bot. Belge 57: 123 (1925); Pl. Bequaert. 3: 331 (1925).—Bak. f., Leg. Trop. Afr. 1: 199 (1926). Type: Congo, Lac Albert, Mboga, *Bequaert* 3084 (BR, not seen).

Tephrosia heckmanniana sensu Cronquist, Fl. Congo Belge 5: 115 (1954) pro parte.

Stems closely appressed-pubescent, usually strongly ridged. Leaves with (5)6-10(11) pairs of leaflets; petiole 0.5-2.0(2.5) cm, petiole and rhachis together (4)6-15(20) cm, appressed-pubescent; leaflets (2)2.5-6(7.5) X (0.4)0.5-1.2 (1.7) cm, linear-oblong to linear-elliptic or linear-oblong; lower surface with closely appressed fairly long hairs (longer and denser than in subsp. *heckmanniana*); stipules 6-12(14) X 1-2 mm, linear to linear-triangular. Calyx shortly appressed- to spreading-pubescent. Petals 9-13(15) mm long. Pods (40)45-60(65) X 4-5(5.2) mm, straw-coloured to brown, with longish, \pm villous, irregular or loosely-appressed hairs.

Arabia, Ethiopia, Uganda, western Kenya, Tanzania, eastern Congo; also Rhodesia, probably cultivated. A representative selection of specimens seen is cited below:

YEMEN. El Mekhader, 1800 m, 3.viii.1887, *Deflers* 653 (P) — only specimen from Arabian Peninsula seen.

ETHIOPIA. **Begemdir.** Addi Arcai [Adi Arkai] to Deb-bivar, on road ascending from Tacazze crossing to Wolkefit pass, fl. 7.xi.1952, *Scott* 241 (κ). Shoa. Adis Abeba [Addis Ababa], fl. 1.1914, *Mrs. Armbruster* (κ). **Kaff** a. Giren, farm of Jimma Agricultural school, edge of coffee plantation, 1700 m, fr. 4.i.1962, *Meyer* 7909 (κ).

UGANDA. **U1.** Outside a Madi Vil., fl. & fr. 14.ii.1862, *Speke & Grant* (κ, type of *T. rigida* Bak.). **U2.** Ruwenzori, Wimi, 1830 m, fl. vi.1894, *Scott Elliot* 7925 (κ). **U3.** Serere, Teso, fl. & fr. xii.1931, *Chandler* 249 (κ). **U4.** Kampala, fl. & fr. 6.i.1922, *Snowden* 745 (κ).

KENYA. K3. Kitale, fl. & fr. iv.1934, *Mrs. Beckley* 6317 (κ). K5. Kisumu, rocky grassy slope above lake, fl. & fr. v.1958 *Mrs. Tweedie* 1548 (κ).

TANZANIA. **T1.** Ukerewe Island or Mwanza to Musoma, fl. & fr. 9.iv.1929, *Father Conrads* EAH 10392 (κ). **T2.** Mbulu Distr., Great North Road between Babati and Bonga 113 ml (181 km) S of Arusha, fl. & fr. 6.v.1962, *Polhill & Paulo* 2353 (κ) **T6.** Morogoro Distr., cult. slopes, 610 m, fl. 16.X.1932, *Wallace* 129 (κ).

RHODESIA. Central Div. Chindamora Reserve, fl. & fr. 15.iv.1922, *Eyles* 3384 (κ; SRGH).

Var. *elata* is in most respects intermediate between var. *tomentella* and subsp. *heckmanniana*. It occurs mainly to the west of the Great Rift Valley, but also seems to replace var. *tomentella* in Morogoro District and the southern part of the Northern Province of Tanganyika. The single specimen from Rhodesia is undoubtedly referable to var. *elata* and not to subsp. *heckmanniana* and is assumed to be introduced there. The species is recorded as having been used as a fish poison and for making rope, and its cultivation for such purposes may explain some anomalies of distribution.

Var. *tomentella* Brummitt, var. nov.

Caules pilis mollibus patentibus conspicue dense pubescentes ad tomentelli, plerumque striati. Folia 4-10-jugata; petiolus 0.2-1.0(1.7) cm, petiolus et rhachis coniunctim

(2.5)4-13 cm, ut in caulibus pubescentes; foliola (1.7)2.5-6 (7.5) X (0.5)0.8-1.4(1.8) cm, obovata ad lineare-oblongata vel lineare-elliptica; pagina inferior pilis longis saepe sericeis arte ad laxe appresse-pubescentibus; stipulae (6)8-12(15) X 1-2(2.3) mm lineare-triangularis. Calyx pilis mollibus patentibus breviter pubescens. Petala (8)9-13(16) mm longa. Legumina (35)40-58 (65) X 4-5(5.5), brunnea, pilis irregularibus vel laxe appressis villosa.

Typus: Kenya, N-E slopes of Kilimanjaro, Laitokitok, 1765 m, edge of forest in high grass, f l. & fr. 28.viii.1956, *Bally* 10698 (\times , holotypus).

Ethiopia, southern Sudan, Kenya, north-eastern Tanzania. A representative selection of specimens is cited below:

ETHIOPIA. Harar. **Mulka** jibri, 9° 24' N, 42° 16' E, 1645 m, fl. 21.ii.1933, *Gillett* 5103 (K). Kaffa. Near Gojeb River bridge, Bonga road, 7° 25' N, 36° 26' E, 1100 m, fr. 21.1962, *Meyer* 7901 (\times).

SUDAN. [cult. at Bell, Md., U. S. A., from seeds from] Nimule, 22.vii.1920, *Shantz* 1316 (\times).

UGANDA. **U4**. Kabamiro, Mubende, fl. & fr. 17.X.1945, *Thomas* 4322 (\times).

KENYA. **K1**. Kuwalath, Lodwar Area, fl. & fr. 27.ix.1963, *Paulo* 1052 (\times). K4. Lukenya, near Nairobi, 1525 m, fr. 22.viii.1953, *Bally* 9054 (\times). K6. Oloibortoto about 25 miles W of Lake Magadi in the foothills of the Nguruman Escarpment, river bed, 850 m, fr. 6.viii.1962, *Glover & Samuel* 3260 (\times).

TANZANIA. T2. Kilimanjaro, Alt Marchi, fl. 10.ii.1914, *Peter* 51980 (\times). T3. Muhesa, *Zimmermann* 5798 (\times).

Var. *tomentella* is found mainly to the east of the Great Rift Valley, though *Meyer* 7901, *Thomas* 4322 and *Shantz* 1316, cited above, in particular are from further west where var. *elata* would be expected. These apparent anomalies of distribution suggest that varietal rank (as adopted here) is preferable to subspecific rank, though it is possible that cultivation of this plant has now obscured its natural distribution pattern.

A specimen from north-western Tanzania, Buha Distr. Gombe Stream Reserve, valley forest, 800 m, f l. 23.iii.1969, *Pirozynski* 85 (K), has conspicuous spreading or ascending hairs, so more or less resembling subsp. *tomentella*, but it differs rather strikingly in its more or less elliptic leaflets up to 1.8 cm broad and is exceptional in the species in its very long peduncles up to 23 cm and stipules up to 3.5 mm broad.

Subsp. *heckmanniana* (Harms) Brummitt, comb. et stat. nov.

Basionym: *Tephrosia heckmanniana* Harms in Engl., Bot. Jahrb. 30: 326 (1901). — Bak. f., Leg. Trop. Afr. 1: 196 (1926). — Brenan, Check List Tr. Shr. Brit. Emp., 5., Tang. Terr.: 445 (1949). — Cronquist, Fl. Congo Belge 5: 115 (1954) pro parte. — Torre in Consp. Fl. Angol. 3: 156 (1962). Type: Tanzania, Njombe Distr., 'Kondeland, Ukangu-Berg', Goetze 889 (x, isotype).

Tephrosia emarginato-folilata De Wild., Pl. Bequaert. 3: 328 (1925). Type: Congo, Katanga, near Elisabethville, De Giorgi (BR, not seen; x, fotogr.).

Tephrosia multinervis Bak. f., Leg. Trop. Afr. 1: 201 (1926). Type: Congo, Katanga, Kundelungu Mt., Kassner 2736 (x, isotype).

Var. *heckmanniana*

Stems minutely appressed-pubescent, usually not or only slightly ridged. Leaves with (5)6-10(14) pairs of leaflets; petiole (0.5)1.0-2.6(4.5) cm, petiole and rhachis together (5)8-15(21) cm, minutely appressed-pubescent; leaflets (2.5)3-6(7.5) X (0.6)0.8-1.7(2.5) cm, oblanceolate or elliptic to linear-elliptic; lower surface shortly and thinly closely appressed-pubescent; stipules (6)9-16 X (0.5)0.8-1.4 mm, linear. Bracts (4)6-11 X 0.2-1(1.5) mm, linear. Calyx shortly and closely appressed-pubescent, the lateral teeth shorter than to about equalling the tube. Petals (10)12-15(18) mm long; standard truncate to cordate at the base. Pods (40)55-70(80) X 4-5(5.2) mm, pale straw-coloured, with very short irregular usually geniculate hairs.

South-western Tanzania, south-eastern Congo, Zambia, Rhodesia, Malawi, northern Mozambique, Angola. Representative specimens only are cited below:

CONGO. Katanga. Binga, fl. 15.iii.1908, *Kassner* 2626 (K). Kundelungu Mt., fl. 14.v.1908, *Kassner* 2736 (K). Near Elisabethville, Valle de la Lubumbashi, fl. 9.iii.1926, *Robyns* 1608 (x). Kisanga, fl. 22.ii.1927, *Quarre* 172 (BR). Keyberg, fr. 19.iii.1947, *Schmitz* 364 (x). Keyberg-Kisanga, fl. 21.ii.1957, *Detilleux* 565 (BR).

TANZANIA. T7. Mbeya Distr., Great North Road between Igawa and Chamala, 163 miles (261 km) S of Iringa, f l. & fr. 2.iv.1962, *Polhill & Paulo* 1985 (x). T8. Songea Distr., about 1.5 km W of Ruanda turn off at foot of Mkuanga Hill, 900 m, f l. 11.iv.1956, *Milne-Redhead & Taylor* 9611 (K).

ZAMBIA. Northern Prov. Abercorn Distr., Ndundu, road outside drive, 1740 m, fl. 22.ii.1959, *Mrs. Richards* 10970 (x). Western Prov. Ndola, fl. & fr. 13.iii.1954, *Fanshawe* 953 (COI; K). Central Prov. Lusaka Distr., 8 km E of Lusaka, fl. 8.ii.1957, *Noah* 95 (SRGH). Eastern Prov. Lunxwaka Valley, fl. 23.iii.1955, *Exell, Mendonça & Wild* 1143 (BM; LISC; SRGH). Southern Prov. Gwembe Distr., Zambesi escarpment, 50 miles (80 km) from Mochipapa, fl. & fr. 13.iii.1962, *Astle* 1509 (x; SRGH).

RHODESIA. Northern Div. Gokwe Distr., near the source of the Guy river in *Brachystegia tamarindoides*, fr. 28.iii.1962, *Bingham* 203 (x; LISC; SRGH). Central Div. Salisbury Distr., Rumani, fl. & fr. 22.ii.1952, *Wild* 3762 (x; SRGH). Eastern Div. Melssetter Distr., Junction Tea Room, Cashel Road, fl. & fr. 311.1963, *Lady Drewe* 86 (SRGH). Southern Div. Buhera, fl. 7.ii.1954, *Mrs. Masterson* 37 (SRGH).

MALAWI. Without locality, *Buchanan* 361, 1128, 1129 (K). Northern Prov. Likoma Island, Lake Nyasa, *Archdeacon Johnson* 14, comm. *Riddelsdell* (K). Southern Prov. Mlanje, fl. & fr. 21.iii.1958, *Chapman* 540 (x; PRE).

MOZAMBIQUE. Niassa. Mandimba, fl. 14.V.1948, *Pedro & Pedrógão* 3426, 3428 (LMJ). Zambézia. 16 km SW of Gurué, fr. 7.vii.1942, *A. J. W. Hornby* 1162 (PRE).

A single collection has been seen with spreading pubescence, apparently otherwise typical of subsp. *heckmanniana*: ZAMBIA. Western Prov. Lwano FR, Chingola, fl. & fr. 13.iii. 1961, *Mutimushi* 114 (SRGH).

Var. **abercornensis** Brummitt, var. nov.

Stipulae 2-2.5 mm latae. Bracteae 7-9 X C. 2 mm, anguste lanceolatae. Calyx 6-8 mm longus; dentes laterales tubum parum excedentes, dens inferior tubum valde excedens. Petala 15-16 mm longa; vexillum basi plus minusve cuneatum.

Typus: Zambia, Abercorn Distr., steep path from Chisungu home to Firebreak, fl. 14.iv.1952, Mrs. *Richards* 1470 (\times , holotypus).

Known only from Abercorn District. Other specimens seen:

ZAMBIA. Northern Prov. Nindi Still, Chilongowelo, 10.iv. 1952, Mrs. *Richards* 1375 (\times). Kloof D'hulmiti, 1525 m, fl. & fr. 6.V.1955, Mrs. *Richards* 5554 (K). Chilongowelo, woodland below escarpment, 1440 m, f l. 12.iv.1963, Mrs. *Richards* 18075 (\times).

These specimens from Abercorn District referred to var. *abercornensis* appear to be referable to *T. elata* subsp. *heckmanniana*, but in their broader stipules and bracts and longer calyx teeth they tend towards *T. nyikensis*. The latter is known from mountains of Malawi and southern Tanzania (see above) but has not been recorded from Zambia. It is possible, however, that it may have occurred in Abercorn District and that plants here referred to var. *abercornensis* represent the result of introgression between *T. nyikensis* and *T. elata* subsp. *heckmanniana*.

A specimen from Mozambique, Tete; Moatize, 65 km from Vila Coutinho towards Zóbuè, fl. & fr. 10.iii.1964, Torre & Paiva 11123 (LISC), is probably also referable to *T. elata* subsp. *heckmanniana*, but has conspicuously longer

peduncles (up to 24 cm), broad stipules (2.5 mm) and broader pods (70 X 6 mm). Another from Mozambique, Niassa; Malema Distr., Murralelo, propriedade dos Morgados, foot of serra Inago, fl. 19.iii.1964, Torre cê Paiva 11252 (LISC) appears to be very similar. Further collections from Mozambique are required.

T. kasikiensis has hitherto been thought to be restricted to the eastern Congo. It seems, however, that a number of specimens which have been identified with *T. sengaensis* Bak. f. from Zambia and south-western Tanzania are best referred here rather than to *T. sengaensis*. The two species are contrasted below.

<i>T. sengaensis</i>	<i>T. kasikiensis</i>
Perennial, probably with a stout woody stock.	Probably annual or perhaps sometimes biennial.
Stems weak, procumbent to ascending, often trailing or hanging over rocks.	Stems robust, erect, 1-2.3 m high.
Leaf petiole and rhachis together 2.5-7 cm.	Leaf petiole and rhachis together (4)5-12.5 cm.
Leaflets 1-2.2 X 0.2-0.6 cm.	Leaflets (1.5)2-5 X (0.4)0.8-1.5 cm.
Upper calyx teeth about 2 mm long, free from each other for 1-1.3 mm.	Upper calyx teeth very short, represented only by a pair of mucros 0.2-0.5 mm long.

35. *Tephrosia sengaensis* Bak. f., Leg. Trop. Afr. 1: 192 (1962).—Cronquist, Fl. Congo Belge 5: 105 (1954).
Type: Congo, Mt. Senga, Kassner 2983 (BM, holotype; α , isotype).

This species seems to be closely allied to *T. iringae* Bak. f. which has a similar procumbent, perennial habit and is confined to southern Tanzania. [The latter species was misunderstood by Cronquist, Fl. Congo Belge 5: 105 (1954) whose reference to Mozambique in the distribution was apparently based on specimens of *T. reptans* var. *microfoliata* (Faulkner 151, 226)]. The following specimens of *T. sengaensis* have been seen:

CONGO. Katanga: Mt. Senga, west of Baudouinville, fl. 15.v.1908, *Kassner* 2983 (BM; K—types).

TANZANIA. T4. **Ufipa** Distr.: Ilemba, alt. 2100 m, creeping and hanging over rocks on side of mountain, fl. & fr. 18.iii.1957, *Richards* 8811 (α); Nsanga Mts., Malonje Plateau, growing on rocks, a low bushy creeping plant, fl. 13.iii.1959, *Richards* 11199 (K).

A further specimen appears to match the above collections of *T. sengaensis* though it is described by the collector as a 'herb, \pm 4' (130 cm), yellow': Summit of Ufipa Range near Sumbawanga, fl. & fr. 23.V.1936, *Webb* 122 (K).

36. *Tephrosia kasikiensis* Bak. f. in Rev. Zool. Bot. Afr. 21 (4) : 301 (1932).— De Wild. & Staner, Contr. Fl. Katanga, suppl. 4: 24 (1932).— Cronquist, Fl. Congo Belge 5: 116 (1954), pro parte, excl. spec. *Ritschard*. Type: Congo, Haut Katanga, Kasiki, *de Witte* 382 (BM).

T. kasikiensis, as here defined, shows considerable variation and may well be divisible into several subspecies. Here one very striking geographically isolated variant is described as a new subspecies, but it seems desirable to have more material available before other taxa can be satisfactorily defined.

Subsp. *chinsaliana* Brummitt, subsp. nov.

Caules conspicue patenter griseo-pubescentes. Flores in capitula densa ad 2 cm longa aggregati.

Typus: Zambia, N. Prov., Chinsali Distr., Shiwa Ngandu, fl. 5.vi.1956, *Robinson* 1609 (α , holotypus; SRGH, isotypus: —shrub 7' (2.3 m) tall, fls. bright purple).

Known only from the type collection.

Although the capitulate inflorescence is strikingly different from the racemes of other plants referred to this species, no significant difference can be found in the leaves or flowers, and it seems best at the moment to adopt subspecific rather than specific rank.

Other specimens of *T. kasikiensis* have stems appressed- or sometimes shortly spreading-pubescent, and flowers in racemes 8-16(24) cm long. They appear to fall into three groups which may perhaps be subspecifically distinct.

Group a. Middle and lower stems closely appressed-pubescent or sparsely spreading-pubescent, the peduncles and inflorescence axes spreading pubescent. Petiole 8-15 (20) mm. Leaflets up to 8 mm broad, the secondary veins not prominent. Pedicel and calyx grey-pubescent, standard light brown-pubescent. Racemes dense. Lateral calyx teeth subacute to subobtuse, upper teeth c. 0.1 mm.

CONGO. Katanga: Kasisi, fl. vi.1931, *de Witte* 381 (BM); 382 (BM, holotype); 450 (BM).

Group b. Stems, peduncles and inflorescence axes shortly appressed-pubescent. Petiole (20)24-45(50) mm. Leaflets 9-14 mm broad, the secondary veins not prominent. Pubescence on pedicel, calyx, standard and pods dark chocolate brown. Racemes dense. Lateral calyx teeth strongly acute; upper teeth 0.1-0.2 mm.

TANZANIA. T4. **Ufipa Distr.:** Mbizi, 2100 m, fl. & young fr. 6.vii.1957 *Whellan* 1313 (\times ; SRGH); Nsanga Forest, 1800 m, fl. & fr. 6.viii.1960, *Richards* 12957 (\times ; SRGH); Mbisi Forest, 2100 m, fl. & fr. 11.vii.1960, *Richards* 13072 (K).

ZAMBIA. Northern **Prov.:** Abercorn Distr., Ndundu, 1740 m, fl. & fr. 6.V.1959, *Richards* 11370 (\times).

Group c. Stems, peduncles and inflorescence axes appressed- or spreading-pubescent. Petiole (16)20-35 mm. Leaflets 6-14(16) mm broad, the primary and secondary veins prominent on both upper and lower surfaces. Pubescence on pedicels, calyx, standard and pods light brown to grey. Lateral calyx teeth strongly acute; upper teeth c. 0.5 mm.

ZAMBIA. Northern **Prov.:** Kawambwa, fl. & fr. 26.viii.1957, *Fanshawe* 3644 (\times); Luwingu, fl. & young fr. 7.V.1958, *Fanshawe* 4423 (K). Western **Prov.:** Chingola, fl. & fr. 25.viii.1954, *Fanshawe* 1483 (\times).

37. *Tephrosia punctata* J. B. Gillett in Kew Bull. 13: 126 (1958). Type: Zambia, Abercorn, *Bullock* 3792 (κ).

Subsp. *punctata*

Plant usually with copious ascending axillary inflorescences forming a pseudopanicule, producing abundant flowers. Leaf petiole and rhachis together 4-6.5(11) cm long; leaflets (3)4-7(10) mm broad.

Now known from numerous collections from Abercorn Distr., Zambia, and from Sumbawanga in S. W. Tanzania.

Subsp. *redheadii* Brummitt, subsp. nov.

Planta parce ramosa racemis axillaribus laxis minus floriferis quam in subsp. *punctata*. Folia petiolus et rhachis coniunctim 5-9 cm longi; foliola (5)8-12(14) mm lata.

Holotypus: Zambia, Mwinilunga Distr., just S. of Matonchi Farm, *Milne-Redhead* 4636 (κ).

Known from Kasama Distr., northern Zambia, through Katanga to Mwinilunga Distr. to western Zambia.

ZAMBIA. Northern **Prov.:** Kasama Distr., Chishimba Falls, *Brachystegia* woodland, fr. 20.v.1962, *Robinson* 5189 (κ; SRGH). Kasama Distr., Mungwi, *Brachystegia* woodland in escarpment valley, fl. & fr. 14.iii.1962, *Robinson* 5017 (κ; SRGH). Western **Prov.:** Mwinilunga Distr., just S. of Matonchi Farm, in *Brachystegia* woodland, fl. 19.ii.1938, *Milne-Redhead* 4636 (κ, holotype).

CONGO. Katanga: 12 km au N. W. d'Elisabeth ville, fl. & fr. 2.iv.1958, *Gathy* (κ).

This subspecies is named after Mr. E. MILNE-REDHEAD, Kew, whose pioneer collections in western Zambia between 1930 and 1938 contributed so much to our knowledge of the Flora of the area.

Group 7. TEPHROSIA AEQUILATA, T. GRANDIBRACTEATA AND ALLIED SPECIES

These are shrubby, barbistyled species with usually compact inflorescences and often very conspicuous broad bracts, and with densely pubescent to villous pods. Apart from *T. aequilata* they are mostly confined to higher mountain areas of the Flora Zambesiaca area.

1. Bracts up to 3(4) mm broad, linear-lanceolate to ovate
 2. Leaves with 4-6 pairs of leaflets; young stems, leaf rhachides, bracts and calyces with appressed grey hairs 39. *T. robinsoniana*
 2. Leaves with 6-14 pairs of leaflets; young stems, leaf rhachides, bracts and calyces tomentose to villous with at least some hairs spreading and usually brown
 3. Young stems and leaf rhachides shortly brown-tomentose; pods 70-80 X 7 mm, brown-tomentose 41. *T. montana*
 3. Young stems and leaf rhachides not shortly brown-tomentose, though often with long villous brown hairs; pods 26-60 X 5-7 mm, appressed pubescent to villous
 4. Inflorescences fairly lax, with several distinct nodes clearly visible; bracts and stipules quickly caducous 40. *T. whyteana*
 4. Inflorescences very crowded, the separate nodes not easily visible; bracts and stipules persistent 38. *T. aequilata*
- 1 Bracts 4-13 mm broad, obtriangular or broadly elliptic to suborbicular-acuminate, or sometimes ovate
 5. Young stems, leaf rhachides and bracts clothed with short, fine, closely appressed, golden-brown hairs; pods closely appressed-pubescent 45. *T. grandibracteata*
 5. Young stems, leaf rhachides and bracts variously densely pubescent to tomentose, but not with short, fine, closely appressed, golden-brown hairs; pods (as far as known) tomentose to villous
 6. Bracts and calyces villous with long, spreading hairs; two upper calyx teeth free for most of their length 44. *T. chimanimaniana*
 6. Bracts and calyces shortly tomentose; two upper calyx teeth connate for most of their length to form a broad triangle
 7. Bracts broadly obtriangular and slightly apiculate; calyx 6-9 mm; petals 21-22 mm; pods 72-78 X 7-8 mm, shortly brown-tomentose 42. *T. praecana*

7. Bracts suborbicular-acuminate; calyx 9-12 mm; petals 13-17 mm; pods 52-60 X 7-8 mm, lanate-tomentose, the hairs grey at least at their tips 43. *T. festina*

Tephrosia aequilata Bak. in Oliv., Fl. Trop. Afr. 2: 113 (1871).
Type: Tanzania, Bukoba Distr., Karagwe Hills, Speke & Grant 401 (K).

This species is widespread and fairly uniform morphologically on higher ground from southern Uganda, southern Kenya, Tanzania and the eastern Congo to the extreme north (Abercorn Distr.) of Zambia. However, as it extends further south through the Flora Zambesiaca area to the Transvaal, restricted to the higher mountain masses, it shows considerable morphological differentiation and six subspecies are here distinguished.

Key to subspecies of T. aequilata

1. Leaves with (7)10-13 pairs of leaflets; pedicels 8-20 mm, grey-villous; flowers 17-24 mm; stipules 4-5 mm broad subsp. *namuliana*
1. Leaves with (5)6-11 pairs of leaflets; pedicels 2-12(13) mm, grey or brown pubescent or villous; flowers 9-20 mm; stipules 1.5-4(5) mm or rarely (Kilimanjaro) up to 8 mm broad
 2. Pods appressed-pubescent; stem and leaf-rhachis shortly grey ascending-tomentose, without longer spreading hairs; leaflets thinly pubescent beneath, green subsp. *gorongosana*
 2. Pods ± spreading-villous; leaf-rhachis and usually stem also with short tomentum interspersed with long spreading hairs except in subsp. *nyasae*; leaflets thinly to densely pubescent beneath, whitish to greyish-green, except in subsp. *australis*
 3. Leaflets thinly to fairly densely pubescent beneath, greenish, not sericeous; pedicels and calyx brown-villous subsp. *australis*
 3. Leaflets densely pubescent beneath, whitish to greyish-green, sometimes ± sericeous; pedicels and calyx (excluding teeth) grey-tomentose to -villous
 4. Calyx appressed- to ascending-tomentose; rhachis of young leaves ± appressed-pubescent without markedly longer spreading hairs subsp. *nyasae*
 4. Calyx ascending- to spreading-villous; rhachis of young leaves with a short tomentum interspersed with markedly longer villous hairs

5. Leaflets often glabrous or glabrescent above, whitish grey beneath; flowers (10)12-16 mm; standard truncate at the base. subsp. *aequilata*
5. Leaflets appressed-pubescent above, grey-green and often subsericeous beneath; flowers 17-20 mm; standard cuneate at the base. subsp. *mlanjeana*

Subsp. *aequilata*

Young stem greyish-tomentose or -villous, often with long spreading hairs intermixed with shorter tomentum. Leaves with 7-11 pairs of leaflets; indumentum of petiole and rachis similar to that of the stem; leaflets up to 42(50) X 13(17) mm, the upper surface usually glabrous or fairly quickly glabrescent, the lower surface densely whitish- or greyish- appressed-pubescent but usually not subsericeous; stipules 2-5(8) mm broad. Bracts 4-9 X 1-3 mm, ovate-acuminate; pedicels 3-10(13) mm, greyish-tomentose to -villous. Calyx (5)7-11 mm, ascending- to spreading- grey-villous. Petals (9)11-16 mm; standard truncate at the base. Pods (26)28-40(46) X 5-7 mm, villous.

Var. *aequilata*

Stems pubescent to tomentose or villous with hairs up to about 1.5 mm long. Stipules 2-4(5) mm broad.

Southern Uganda, Kenya, eastern Congo, Tanzania, northern Zambia and northern Mozambique.

The following have been seen from Flora Zambesiaca area:

ZAMBIA. Northern **Prov.**, Abercorn **Distr.**, upper end Lake Chila, fl. 9.iii.1952, *Richards* 1009 (κ). Firebreak above Chilongowelo, fl. 3.iv.1952, *Richards* 1257 (κ). Lake Chila, fl. & fr. 23.V.1952, *Richards* 182 (κ). Sunzu Hill, st. 18.xi.1952, *Angus* 793A (FH0). Near source of Lunzua R., Lunzua Agr. Coll., fl. & young fr. 25.iii.1955, *Richards* 5141 (κ). Without precise locality, *Richards* 5651A (κ). Itembwe Gorge, fl. 24.iv.1959, *McCallum Webster* 917, *Richards* 11333 (κ ; SRGH). Ningi Pans, fl. 12.iii.1960, *Richards* 12725 (κ). Sumbawanga Road 5 mls. from Kawimbe, fl. & fr. 8.vi.1961, *Richards* 15229 (K; SRGH).

MALAWI. Northern Prov. Vipya, top of hill above Rumpi Drift, fl. 24.vi.1960, *Chapman* 783 (FHO; SRGH).

MOZAMBIQUE. Niassa: Massangulo Mountain, 41 miles N. of Mandimba, fl. 26.V.1961, *Leach & Rutherford-Smith* 11040 (K; LISC; SRGH).

The specimens cited above from Malawi and Mozambique differ somewhat from specimens from Abercorn Distr., having a more compact branching, smaller leaflets [up to 22(27) mm] and rather denser heads with smaller flowers (calyx 5-8 mm, petals 9-12 mm). However, they are matched by some plants from Tanganyika where all intermediates occur, and formal taxonomic separation seems undesirable.

Var. *meyeri-johannis* (Taub.) Brummitt, stat. nov.

Basionym: *Tephrosia meyeri-johannis* Taub. in Engl., Hochgebirgsfl. Trop. Afr.: 260 (1892). Type: Tanzania, Kilimanjaro, *Meyer* 39 (B †, not seen).

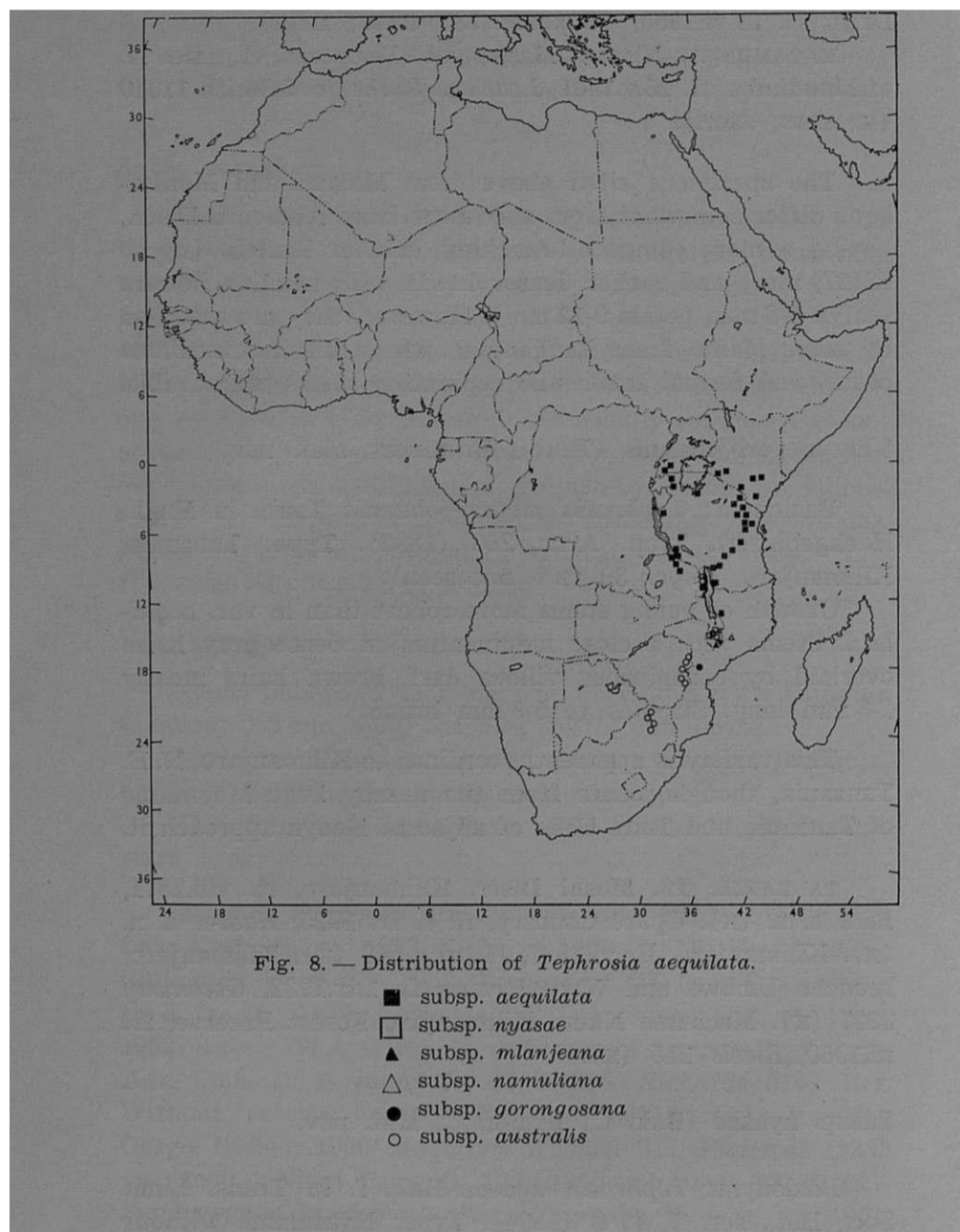
Growth of young stems more robust than in var. *aequilata*. Stems with a close indumentum of dense grey hairs overlaid by conspicuous villous dark brown hairs mostly 2-3 mm long. Stipules (4)5-8 mm broad.

This variety is apparently confined to Kilimanjaro, N. E. Tanzania, though plants from the nearby Pare Mountains of Tanzania and Teita Hills of adjacent Kenya approach it.

TANZANIA. T2. **Moshi** Distr. Kilimanjaro, fl. viii.1871, *Kirk* s. n. (K). Upare Country, fl. & fr. 1925, *Haarer* s. n. (K). Kilimanjaro, fl. vi.1927, *Haarer* 542 (K). Kilimanjaro, between Umbwe and Weru Rivers, fl. 1.ix.1932, *Greenway* 3227 (x). Machame Nkuu, Kilimanjaro Forest Reserve, fr. xi.1960, *Steele* 115 (x).

Subsp. *nyasae* (Bak. f.) Brummitt, stat. nov.

Basionym: *Tephrosia nyasae* Bak. f. in Trans. Linn. Soc. Bot. ser. 2, 4: 9 (1894). Type: Nyasaland, without precise locality, *Buchanan* 51 (x).



Tephrosia zombensis Bak. in Kew Bull. **1897**: 257 (1897).
Type: Mt. Zomba, *Whyte* 394 (x).

Young stem rather shortly appressed- to ascending-tomentose, greyish, without longer spreading hairs. Leaves with (6)7-9 pairs of leaflets; indumentum of petiole and rhachis similar to that of young stem; leaflets up to 45(52) X 18(20) mm, the upper surface appressed-pubescent, the lower surface densely greenish-grey appressed-pubescent and sub-sericeous; stipules 3-4.5 mm broad. Bracts 5-7(10) X 2-3 mm, ovate-acuminate; pedicels 5-8 mm, appressed- to ascending-grey-tomentose or rarely somewhat villous. Calyx 7-10 mm, appressed- to ascending grey-tomentose to -villous. Petals (14)16-20 mm; standard cuneate at the base. Pods 32-40 X 5-6 mm.

Apparently restricted to the Zomba Plateau and Shire Highlands of southern Malawi, possibly also on the Vipya Plateau of northern Malawi.

MALAWI. Southern Prov.: Zomba, 1830-2135 m, fl. & fr. ix.1859, *Kirk* (K). Shire Highlands, fl. vii.1885, *Buchanan* (x). Without locality, fl. 1891, *Buchanan* 1480 (x). Without locality, fl. & fr. 1891, *Buchanan* 51 (x, type). Zomba, fl. 1901, *Sharpe* 169 (K). Shire Highlands, fl. c. 1906, *Adamson* 251 (x). Zomba Mt., fl. & fr. x.1929, *Clements* 18 (FHO). Zomba Plateau Descent, fl. & fr. 31.viii.1946, *Gouveia & Pedro* 1978 (LMJ; PRE). Zomba Plateau, 1500 m, fl. & fr. 2.vi.1946, *Brass* 16154 (x; PRE; SRGH). Zomba, near top of road to plateau, fl. & fr. 3.viii.1960, *Leach* 10389 (x; LISC; SRGH). Zomba Mt., path to Cingwe's Hole, fl. 22.vi.1961, *Chapman* 1396 (FHO; K; SRGH).

A collection from Malawi, N. Prov., Vipya Mountains, Luwawa, fl. 21.ii.1962, *Chapman* 1604 (SRGH) is probably also best referred to subsp. *nyasae* but more material from this area is required. The type of *Tephrosia zombensis* Bak. is referred to this subspecies but has longer, more spreading pubescence on stem and rhachis than is usual.

Subsp. *mlanjeana* Brummitt, subsp. nov.

Caules juveniles pilis longis patentibus in tomento breve interspersis, pilis omnis plerumque brunneis. Folia 6-8(9)-foliolata; indumentum petioli et rhachidis ut in caule; foliola ad 38 X 20 mm; pagina superior appresso-pubescent, pagina inferior dense viridi-griseo- appresso-pubescent, plerumque **subsericea**; stipulae 3-4 mm latae. Bracteae 4-9 X 2-4 mm, ovatae ad obovato-acuminatae; pedicelli 5-12 mm, griseo-villosi. Calyx 7-12 mm, caesio-villosus. Petala 17-20 mm; vexillum basi cuneatum. Legumina non satis nota.

Typus: Malawi, Mt. Mlanje, Tuchila Plateau, 1830 m, f l. & fr. 25.vii.1956, *Newman & Whitmore* 98 (BM, holotypus; SRGH, PRE isotypi).

Known only from Mlanje Mountain in southern Malawi. Other specimens seen:

MALAWI. Southern Prov. Mlanje, Tuchila Plateau, 1525 m, viii.1901, *Purves* 78 (x). Mlanje Mt., Chipalombe Shelf, 2135 m, fl. 15.V.1958, *Chapman* 569 (FHO; K; PRE).

A further collection from Mlanje—L. Ruo Plateau, 1950 m, fl. 4.viii.1956, *Newman & Whitmore* 323 (BM; SRGH) differs conspicuously in its abundant long golden-brown hairs on stem, petiole and rhachis, leaflet under-surface, bracts and calyces, and also in its glabrous or quickly glabrescent leaflet upper surface, longer calyx (14 mm) and broader stipules (4-5 mm). Further collections are required.

Subsp. ***namuliana*** Brummitt, subsp. nov.

Caules juveniles pilis brunneis longis patentibus in tomento griseo breve interspersis. Folia (7)10-13-foliolata; indumentum petioli et rhachidis ut caulis pilis omnis brunneis; foliola ad 52 X 17(20) mm, pagina superior appresso-pubescent vel glabrescent, pagina inferior plus minusve tenuiter pubescent, viridis, non **sericea**; stipulae 4-5 mm latae. Bracteae 5-7 X 1-2.5 mm, ovato-acuminatae ad anguste triangulares; pedicelli 8-20 mm, longe caesio-villosi. Calyx 7-10 mm, griseo-villosus (vel brunneo-). Petala 17-24 mm; vexillum basi late cuneatum ad truncatum. Legumina matura ignota.

Typus: Mozambique, Zambézia, Namuli Peaks, W. face, 1525 m, fl. 26.vii.1962, *Leach & Schelpe* 11471 (x, holotypus; SRGH, isotypus).

Apparently found only on Namuli Peaks, Gúruè Distr., Mozambique. Other specimens seen:

MOZAMBIQUE. Zambézia. Pico Namuli, fl. without date, *Mendonça* 2290 (LISC). Picos Namuli, fl. 11.viii.1949, *Andrada* 1840 (COI; LISC).

Subsp. **gorongosana** Brummitt, subsp. nov.

Caules juveniles breviter appresso- vel ascenderent tomentosi pilis griseis, sine pilis longis patentis. Folia 5-7-foliolata; indumentum petioli et rhachidis ut in caule; foliola ad 40 X 17 mm, pagina superior juventute appresso-pubescentis, pagina inferior tenuiter appresso-pubescentis, viridis, non sericea; stipulae 2-3 mm latae. Bractee 4-5 X 2-3 mm, ovato-acuminatae; pedicelli c. 5 mm, plus minusve breviter ascenderent griseo-vel brunneo-pubescentes. Calyx c. 6-7 mm pilis griseis et brunneis ascendentibus. Petala c. 18 mm. Legumina ad 40-45 X c. 6 mm, appresso-pubescentes.

Typus: Mozambique, Manica e Sofala, Gorongosa, serra de Gorongosa, 1000 m, fl. & young fr. 6.V.1964, *Torre & Paiva* 12305 (LISC, holotypus).

Known only from Gorongosa. One other specimen seen:

MOZAMBIQUE. Manica e Sofala. Gorongosa Mts. near Morombosi Falls, fr. 13.ix.1946, *Pedro & Pedrógão* 182 (LMJ; PRE).

Two further collections from the Gorongosa Mountains Gorongosa, fl. & fr. 1884-1885, *Carvalho* (COI— as *T. aequilata* Bak. var. *grandiflora*) and serra de Nhandete, fr. 15.X.1946, *Simão* 1091 (LISC), differ markedly from subsp. *gorongosana* and may represent a further new taxon. They have more or less both long and short brown hairs on stem and leaf-rhachis, brown-villous strongly persistent lanceolate bracts, grey-villous pedicels and calyx, and brown-

villous pods up to 45 mm long. Further collections from Gorongosa are required.

Subsp **australis** Brummitt, subsp. nov.

Caules juveniles ascenderent vel patenter tomentosi vel villosi pilis brunneis plerumque distincte longis cum aliis brevibus. Folia (6)7-10(11)-foliolata; petioli et rhachides breviter brunneo-tomentosi pilis longis patentibus interspersis; foliola ad 40 X 12(15) mm; pagina superior appresso-pubescentis, pagina inferior tenuiter ad plus minusve dense appresso-pubescentis, viridis, non sericea; stipulae 1.5-4 mm latae. Bractee (4)5-10 X 1.5-2(2.5) mm, lanceolato-triungulares ad ovato-acuminatae; pediceli 4-6 mm, brunneo-villosi vel -tomentosi. Calyx 7-12 mm, ascenderent vel patenter brunneo-villosus. Petala 13-18 mm; vexillum basi truncatum. Legumina (20)24-30 X 5-7 mm, patenter brunneo-villosa.

Typus: Rhodesia, Melssetter Distr., 1675 m, fl. & fr. ix.1953, *Williams* 146 (x, holotypus; PRE, SRGH, isotypi).

Mountains of eastern Rhodesia, from Inyanga to Melssetter, and the Transvaal, and apparently also on the Nyika Plateau in northern Malawi.

MALAWI. Northern **Prov.:** Nyika Plateau, 2350 m, fl. 17.viii.1946, *Brass* 17288 (x; PRE; SRGH). Nyika Plateau, Nchena-chena Spur, 1900 m, fl. & fr. 20.viii.1946, *Brass* 17361 (x; SRGH). Nyika escarpment, between 'rain' forest tongues, Nchenachena, 1980 m, fl. vii.1953, *Chapman* 104 (FHO; K).

RHODESIA. Eastern Div. Umtali, 1525 m, ix.1922, *Eyles* 3614 (SRGH). Stapleford, Inyanga, fl. & fr. without date, *Eyles* 7157 (x; SRGH). Inyanga Downs, 2135 m, bud iv.1935, *Gilliland* 1944 (BM; K). Melssetter Distr., Melssetter Commonage, Townlands-Sawarombi road, 1525 m, fl. & fr. 12.viii.1950, *Crook* 68 (x; SRGH). Melssetter Sub-Station, fl. 22.v.1953, *West* 3317 (SRGH). Melssetter Distr., 1675 m, fl. & fr. ix.1953, *Williams* 146 (x; PRE; SRGH—types). Melssetter Distr., Chimanimani Mountains, Long Gully, 1260 m, fl. 18.v.1958, *West* 3618 (SRGH).

SOUTH AFRICA. **Transvaal.** New Agatha, Tzaneen, fl. & fr. vi.1916, *Rogers* 18886 (\times). Zoutpansberg, Pepiti Falls, fr. viii.1930, *Hutchinson & Gillett* 4342 (K). De Hoek, fl. & fr. 18.vii.1935, *L. E. Taylor* 646 (K). Zoutpansberg Distr., Entabeni Forest Res., Muchindudi Falls, fl. & fr. 5.vi.1948, *Codd* 4189 (K). Letaba Distr., 1000 m, fl. 28.V.1958, *Scheepers* 341 (\times). Letaba Distr., Duiwelskloof, end of road first turning left after McDonald's turn off on Prov. road to Duiwelskloof, 1000 m, fr. 4.vi.1958, *Scheepers* 357 (\times).

The Nyika plants tend to have broader stipules and bracts and stem hairs more clearly differentiated into long and short, but it does not seem possible to distinguish them taxonomically from the Rhodesian and Transvaal plants.

39. ***Tephrosia robinsoniana*** Brummitt, sp. nov.

T. aequilatae Bak. affinis sed foliis brevioribus 4-6-jugatis, foliis inferioribus paginis ambabus dense griseo-pubescentibus, foliis superioribus pagina superiore glabris, foliolis minoribus, dentibus duobus superioribus calycis valde connatis differt.

Frutex c. 1.5 m alta. Caules juveniles appresso- vel ascendenti- griseo-pubescentes. Folia 4-6-jugata; petiolus et rhachis appresso- vel ascendenti- griseo-pubescentes, coniunctim usque ad 4 cm longi; foliola ad 20 X 9 mm, elliptica ad obovata, basi plus minusve anguste rotundata, apice late rotundata ad subtruncata, haec folii infimi ramulorum omnium plerumque dense paginis ambis appresso- griseo-pubescentes, haec foliorum superiorum subtus appresso-pubescentes sed supra glabra, marginibus deorsum aliquantum incurvatis; stipulae 7-8 X 3-4 mm, triangulares. Flores in racemis compactis quam folia superiora brevioribus; bractae ad 5 X 2 mm, pedicellos f lorium juvenilium non occulentes; pedicelli 4-8 mm, appresso-vel ascendenti- griseo-pubescentes. Calyx c. 7 mm longus, griseo-pubescentis; dentes tubum plus minusve aequantes vel infimo parum excedente, duo superiores per maximam partem longitudinis connati, triangulum latum efformantes sed apicibus dentium ipsi liberis 0.75 mm longis arte adjacentibus. Petala 16-18 mm

longa, laete rosea. Tubus staminalis supra connatus. Ovarium appresso-pubescent; stylus pubescens; legumen ignotum.

Typus: Zambia, Central Prov., Mkushi Distr., Fiwila, rocky hillside, 1340 m, fl. 3.i.1958, *Robinson* 2576 (♂, holotypus; SRGH, isotypus). Described as a shrub, 1.5 m, flowers bright pink on inner petal-surfaces.

Known only from the type collection. The species is named after the collector, Mr. E. A. ROBINSON, who has contributed greatly to our knowledge of the Zambian Flora in recent years.

40. *Tephrosia whyteana* Bak. f. in Trans. Linn. Soc. Bot., ser. 2, 4: 9 (1894). **Type:** Malawi, Mt. Mlanje, *Whyte*(K).

This species is very similar to *T. aequilata* Bak. which appears to be more or less sympatric with it. *T. whyteana* is distinguished by its caducous stipules and bracts, the latter falling before the subtended flower opens, by its generally laxer inflorescence and slightly longer pods (4-6 cm). It appears to comprise two subspecies, one on Mlanje Mountain in Malawi and the other some 130 km to the north-east on the mountains of Gúruè Distr., in Mozambique.

Subsp. *whyteana*

Shrub up to 3.5 m. Inflorescence axis (from lowest flower) 3-8 cm; pedicels (7)9-15 mm, with long light brown spreading hairs. Calyx 6-9(11) mm, teeth (1)3-4(6) mm, without or with few long conspicuously spreading hairs. Petals 16-23 mm. Pods clothed with fairly dense ascending or spreading brown hairs similar to those on the stem.

MALAWI. Southern **Prov.:** Mt. Milanji, fl. & fr. 1891, *Whyte* s. η. (♂, holotype). Mlanje Mt., 1615 m, fl. 23.ix.1929, *Burt Davy* 21983 (FH0). Mlanje Mt., fl. 24.ix.1929, *Burt Davy* 22052 (FH0). Mlanje Mountain, Lichenya Plateau, 1860 m, fl. 26.vi.1946, *Brass* 16445 (BM; K). Mlanje Mt., L. Ruo Gorge, 1830 m, fl. 28.viii.1956, *Newman & Whitmore* 616 (BM; SRGH). Mlanje, near Lichenya forestry cottage, 1920 m, fl. & fr. 12.vii.1958, *Chapman* H 712 (PRE; SRGH).

Mlanje Mt., path to Luchanya Hut, 1950 m, fl. 9.vi.1962, *Richards* 16611 (K; LISC).

The specimens cited show quite a range of variation. *Brass* 16445 has a longer calyx than others (11 mm, teeth 6 mm) with copious long spreading hairs, and approaches somewhat subsp. *gemina*.

Two further collections from Mlanje — Hills above Great Ruo Gorge, 1200 m, fl. 18.vi.1962, *Richards* 16769 (x); Ruo, fl. 1919, *Mrs. Shinn* (B M) — differ conspicuously from the specimens cited in having stem, leaf-rhachis, pedicel and calyx shortly appressed-pubescent with only few longer hairs which are also appressed and not spreading, and the calyx c. 6 mm with the teeth short (1-3 mm). *Richards* 16769 appears to have been collected at a lower altitude than the specimens referred above to subsp. *whyteana* (no altitude is given for the *Shinn* collection) and further collections may show that these represent a distinct taxon.

Subsp. *gemina* Brummitt, subsp. nov.

Frutex ad 6 m alta. Inflorescentia brevis, 1 cm in statu florifero vel ad 3 cm in statu fructifero; pedicelli 20 mm in statu florifero, ad 28 mm in statu fructifero, pilis fulvis longis praediti. Calyx 12-13 mm, dentibus 6-7 mm, pilis fulvis longis patentibus praeditus. Petala 20-24 mm. Legumina pilis appressis vel ascendentibus griseis densissime vestita.

Typus: Mozambique, Zambézia, Montes do Gúruè, fl. & fr. 20.ix.1944, *Mendonça* 2163 (LISC, holotypus).

Known only from the type collection.

41. *Tephrosia montana* Brummitt, sp. nov.

T. grandibracteata Merxm. et *T. festinae* infra descriptae affinis, sed bracteis parvis acutis indumento brunneo breve patente differt.

Frutex ad 3 m alta. Ramuli breviter brunneo-tomentosi pilis patentibus. Folia 10-14-jugata; petiolus et rhachis breviter brunneo-tomentosi; foliola ad 38(50) x 11 mm, elliptica

ad oblonga, basi obtusa vel rotundata, apice subacuta vel obtusa, plerumque valde mucronata, marginibus **sursum** involutis, pagina superior glabra, pagina inferior tenuiter appresso-pubescentis; stipulae 6-12 X 1-2 mm, anguste triangulares vel lineares. Inflorescentia in statu florifero compacta, quam folia superiora plus minusve brevior, in statu fructifero ad 15 cm elongata; bracteae inconspicuae, caducae, 5-6 X 1-3 mm, ovatae ad lanceolatae, apice **acutae**, brunneo-tomentosae; pedicelli 7-15 mm, breviter tomentosi. Calyx 7-10 mm, breviter **brunneo-vel** griseo-pubescentis, dentes partem campanulatam aequantes, duae superiores per maximam partem longitudinis connatae, triangulum latum apicibus solum 1 mm liberis **efformantes**. Petala 20-24 mm longa, purpurea; vexillum basi truncatum. Ovarium appresso-pubescentis; stylus pubescens; legumina 7-8 X c. 0.7 cm, juventute dense brunneo-tomentosa, in statu maturo tenuiter tomentosa.

Typus: Mozambique, Manica e Sofala, summit of Monte Vengo, Macequece, 1300 m, fl. & fr. 23.xi.1943, Torre 6229 (LISC, holotypus).

Known from the type and six other collections from the mountains near the border of Rhodesia and Mozambique and Gorongosa Mountains some 150 km further east.

RHODESIA. Eastern Div. Inyanga, forest margin, fl. & fr. viii.1920, *Eyles* 2612 (PRE; SRGH). Umtali, fl., *Eyles* 7170 (κ; SRGH); Stapleford, Nyam Kombi River, fl. 8.V.1949, *Armitage* A 13/49 (SRGH). Inyanga Distr., near Nyamingura River, 970 m, fl. 24.iv.1958, *Phipps* 1236 (κ; PRE; SRGH). Inyanga Distr., Inyanga Estates, 1645 m, fl. 14.vi.1958, *Seagrief* 3034 (SRGH).

MOZAMBIQUE. Manica e Sofala. Gorongosa, Serra de Nhandete, fr. 15.X.1946, *Simão* 1107 (LISC).

T. montana differs from *T. grandibracteata* and *T. festina* in its smaller, ovate to lanceolate, acute bracts, and its short spreading brown tomentum. It appears to occur sympatrically with both of these species in the Inyanga

District and more information is required as to its distribution, ecology and range of morphological variation.

42. *Tephrosia praecana* Brummitt, sp. nov.

T. festinae infra descriptae affinis sed forma bractearum, magnitudine calycis et petalorum, et magnitudine et indumento leguminum differt; *T. montanae* supra descriptae etiam affinis sed numero foliolorum et forma bractearum differt.

Frutex vel arbuscula. Ramuli pilis griseis vel griseo-brunneis breviter tomentosi. Folia (4)6-8-jugata; petiolus et rhachis coniunctim 6-9 cm, ut ramuli tomentosi; foliola ad 38 X 10 mm, elliptica vel oblonga, basi plus minusve rotundata, apice obtusa ad subacuta, marginibus sursum aliquantum involutis; pagina superior glabra, pagina inferior appresso-pubescentis; stipulae 8-10 X 1-3.5 mm, falcato-triangulares. Inflorescentia in statu florifero compacta, subglobosa, quam folia superiora brevior, in statu fructifero elongata; bractee magnae, conspicuae sed caducae, ad 6 X 10 mm, late obtriangulares, vix apiculatae, dense et breviter griseo- vel brunneo-tomentosae. Calyx 6-9 mm, ut bractee tomentosus; dentes partem campanulatam aequantes vel minores, duo superiores omnino vel per magnam partem longitudinis connati, triangulum latum obtusum integrum vel apicibus tantum per 0.75 mm liberis formantes. Petala 21-22 mm longa, caeruleo-purpurata; vexillum basi cuneatum. Tubus staminalis c. 16 mm longus, supra connatus. Ovarium appresso-pubescentis; stylus pubescens; legumina 72-78 X 7-8 mm, breviter brunneo-tomentosa.

Holotypus: Rhodesia, E. Div., Mount Pene or 'Singwekwe', 2135 m, fl. & fr. 12-14.X.1908, *Swynnerton* 176 (BM).

Known from only the type and one other collection:

MOZAMBIQUE. Manica e Sofala. Monte Chiroso, Mavita, fl. 26.X.1944, *Mendonça* 2634 (LISC).

The holotype is described as a small shrub, while *Mendonça* 2634 is said to be a small tree ('pequena árvore'). SWYNNERTON'S specimen was not assigned to a species by

E. G. BAKER and not mentioned in the account of SWYNERTON'S collections in *Journ. Linn. Soc.* 40 (1911), although it is a fairly good specimen with flowers and fruit. It was later labelled in pencil as *T. whyteana* Bak. f. but left among indetermined *Tephrosia* material at the British Museum.

43. *Tephrosia festina* Brummitt, sp. nov.

T. grandibracteatae Merxm. affinis sed bracteis acuminato-orbicularibus dense griseo- vel brunnes-tomentosis, ramulis et rhachidibus etiam dense griseo- vel brunneo-tomentosis, et floribus minoribus differt (vide etiam *T. montanam* et *T. praecanae*).

Frutex ad 5 m altus. Ramuli breviter griseo- vel brunneo-tomentosi. Folia 7-11-jugata; petiolus et rhachis ut ramuli tomentosi; foliola et stipulae iis *T. praecanae* (vide supra) similes. Inflorescentia in statu florifero compacta, subglobosa, quam folia brevior, in statu fructifero ad 10 cm elongata; bractee magnae, conspicuae sed caducae, ad 14 X 12 mm, plus minusve acuminato-orbiculares, dense et breviter griseo- vel brunneo-tomentosae. Calyx 9-12 mm; dentes partem campanulatam aequantes vel excedentes, duo superiores per magnam partem longitudinis connati, triangulum acutum apicibus tantum per 1 mm liberis formantes. Petala 13-17 mm, purpurata; vexillum basi truncatum ad late cuneatum. Tubus staminalis 9-10 mm longus, supra connatus. Ovarium apresso-pubescens; stylus pubescens; legumina 52-60 X 7-8 mm, lanato-tomentosa pilis plus minusve griseis.

Typus: Rhodesia, E. Div., Inyanga Road kopje, fl. & fr. iii.1935, *Gilliland* 1684 (x, holotypus; BM, FHO, PRE, isotypi).

Known only from the type and seven other collections from Inyanga and Umtali Districts of eastern Rhodesia.

RHODESIA. Eastern Div. Inyanga Distr., old Fort Rhodes Estate, fl. 30.iii.1959, *Cleghorn* 491 (x; SRGH). Inyanga Distr., Punch Rock, fl. viii.1959, *Williams* 142 (SRGH). Umtali Distr., Vumba Clouds Downs, 1770 m, fl. & fr. 29.ii.1960, *Head* 161 (BM). Vumba Clouds Downs, 1525 m, fl. 8.iii.1960,

Head 306 (BM). Inyanga Distr., on the slopes of Crusader, fl. 12.iii.1964, *Corby* 1092 (K; SRGH). Inyanga Distr., Inyanga Fort, 1830 m, fr. 5.1.1965, *Wild* 6702 (K; LISC; PRE; SRGH). Inyanga Distr., Juliasdale, ¼ mile east of Punch Rock, fr. 8.1.1965, *Wild* 6738 (BR; EA; K; LISC; PRE; SRGH).

The specific epithet is chosen with reference to the very rapid shedding of the bracts, which provide the main diagnostic character in this group of species.

T. festina has been recorded as growing on granite substrata, whereas the closely related *T. grandibracteata* from the same district is recorded from dolerite soils, but further information about their ecology and distribution is required.

44. *Tephrosia chimanimaniana* Brummitt, sp. nov.

T. grandibracteata Merxm. affinis sed caulibus dense patenti-pubescentibus vel-tomentosis, stipulis brevioribus, bracteis suborbicularibus longe acuminatis dense brunneo-tomentosis vel -villosis, petalis minoribus differt.

Frutex 0.3-2 m altus. Ramuli juveniles dense brunneo-vel griseo-patenti-pubescentes vel -tomentosi. Folia (5)7-12-jugata; petiolus et rhachis appresso-ad patentitomentosi pilis nuncquam valde inaequalibus; foliola ad 25(30) X 8(10) mm, elliptico-oblonga, basi rotundata, apice rotundata ad truncata, valde mucronata, marginibus sursum parum involutis, pagina superior glabra, pagina inferior dense appresso-pubescentis saepe subsericea; stipulae 4-5 X 1-15 mm, anguste triangulares. Inflorescentia compacta globosa terminalis quam folia superiora brevior; bracteae grandae flores juveniles occludentes, ad 14 X 9 mm, suborbiculares apice longe acuminatae, dense brunneo-tomentosae ad villosae, pilis albidis longis saepe interspersis; pedicelli 5-7 mm longi, griseo-villosi. Calyx 7-10 mm longus, dense brunneo-ad albido-villosus, dentes parte campanulata longiores, duo superiores liberi vel parum connati. Petala 13-15 mm longa, purpurea vel nonnunquam subcaerulea; vexillum basi truncata ad parum cordatum. Tubus staminalis c. 9 mm longus.

Ovarium appresso-pubescent; stylus pubescens; legumina ignota.

Typus: Rhodesia, Masetter Distr., Chimanimani Mountains, among quartzite crags, fl. 20.viii.1954, Wild 4589 (κ , holotypus; PRE, SRGH, isotypi).

Apparently restricted to the Chimanimani Mountains, where it occurs from the foot of the first range to the quartzite crags, reaching an altitude of least 2,135 m. Other specimens seen:

RHODESIA. Eastern Div.: Chimanimani Mts., in the crags, 2135 m, fl. 26.ix.1906, Swynnerton 1464 (κ ; SRGH). Chimanimani Mts., at foot of «1st range», rock crevice in open grassland, fl. ix.1955, Watmough 10 (SRGH). Chimanimani Mts., Long Gully, 1310 m, fl. 29.V.1959, Noel 2023 (SRGH). Chimanimani Mts., top of Long Gully, in wet grass, fl. 29.V.1959, Noel 2156 (SRGH). Chimanimani, lower west slope of the first range, fl. 7.ix.1961, Loveridge A 73 (κ ; SRGH).

T. chimanimaniana should be added to the list of 41 species endemic to the Chimanimani Mountains given by WILD in *Kirkia* 4: 125-157 (1964).

45. *Tephrosia grandibracteata* Merxm. in Mitt. Bot. Staatssamml. Münch. 6: 200 (1953). Type: Rhodesia, Rusape, Dehn s. n. (M; photo κ).

Shrub up to 3(5) m high. Young branches shortly and closely appressed- golden-brown-pubescent. Leaves with (7)9-14(16) pairs of leaflets; pubescence of petiole and rachis similar to that of young branches; leaflets up to 40(48) X 12(15) mm, elliptic-oblong, more or less rounded at base and apex, \pm strongly mucronate, the margins somewhat incurved towards the upper surface; upper surface glabrous, lower surface shortly and closely appressed- brownish-pubescent with the hairs not or scarcely overlapping each other; stipules 5-15 X 1-1.5 mm, more or less linear. Inflorescence at first a roughly ovoid head more or less exceeded by the upper leaves, elongating to up to 10 cm in fruit; bracts large and very conspicuous but caducous, up to 20 X

13 mm, ovate to obovate and tapered gradually to a long-acute apex, shortly and closely appressed- brown-pubescent; pedicels 7-12 mm long (to 18 in fruit), appressed-pubescent. Calyx 9-13 mm, the teeth longer than the campanulate part, the two upper teeth connate for most of their length to form a broad triangle with only the terminal 1-2 mm free; the whole shortly and rather thinly appressed-pubescent. Petals 20-27 mm long, purple; standard about as broad as long, broadly rounded to emarginate at the apex, more or less truncate at the base; lower margin of keel curved through about 90°. Stamen tube 15-18 mm long. Ovary shortly appressed-pubescent; style pubescent; pods 7-8.5 X 0.6-0.8 cm, the sutures somewhat broadened, surfaces closely appressed-, dark brown-pubescent.

Mountains of Rhodesia. The following specimens have been seen:

RHODESIA. Central **Div.**: Rusape, fl. viii.1952, *Dehn* (M-type). Eastern **Div.**: Inyanga, 1830 m, fl. viii.1920, *Henkel* in *Eyles* 2566 (PRE; SRGH). Inyanga Downs, fl. ix.1934, *Eyles* 7920 (SRGH). Rhodes Inyanga Estate, fr. i.1936, *Pardy* 31/36 (κ). Inyanga Distr., Pungwe View, 1830 m, fl. 26.vii.1941, *Hopkins* SRGH 8095 (κ); 8095 (K). Inyanga Distr., top of road to Pungwe Falls, exposed site, 1830 m, fl. 23.X.1946, *Rattray* 958 (K; SRGH). Inyanga, Pungwe Hills, in open grassland, fl. & fr. 23.X.1946, *Wild* 1484 (κ; SRGH). South Inyanga, on open plateau, grass country, at edge of Iron Cliffs overlooking HonDI Gorge, 1830 m, fl. 20.viii.1947, *Chase* 579 (κ; LISC; SRGH). Viewpoint, Pungua Gorge, fl. 1947, *Chase* s. n. (PRE). Inyanga Distr., Farm Pamushana, grassland, 1830 m, xi.1955, *O. B. Miller* 3128 (PRE). Farm Pamushana, destroyed forest, 1830 m, fl. v.1956, *O. B. Miller* 3526 (SRGH). Inyanga Distr., near HonDI View, 1760 m, fl. 10.vi.1957, *Goodier & Phipps* 82 (SRGH). Inyanga Distr., HonDI View, fl. 5.iv.1958, *Corby* 869 (SRGH). Inyanga National Park, upper edge of mt. forest, fl. & fr. 15.xi.1958, *West* 3787 (κ; PRE; SRGH). Pamushana, evergreen forest edge, 1980 m, fl. & fr. 6.viii.1961, *Methuen* 16 (κ; LISC). Inyanga Distr., Pungwe view above Pungwe Falls, in

Anthospermum, *Hypericum lanceolatum* scrub, not on granite, 1830 m, fr. 7.i.1965, *Wild* 6722 (BR; EA; LISC; SRGH).

Group 8. BARBISTYLED SPECIES WITH
GLABROUS PODS AND TRANSVERSELY
ELONGATE SEEDS

46. *Tephrosia rupicola* J. B. Gillett in *Kew Bull.* 13: 131 (1958). Type: Rhodesia, Marandellas Distr., Corby 410 κ , holotype; SRGH, isotype).

Subsp. *rupicola*

Hairs on young stem and inflorescence axis spreading or upwardly somewhat appressed, brown, or grey-brown. Leaflets pubescent on upper surface. Calyx 9-11 mm. Petals 15-22 mm.

RHODESIA. Central Div.: probably near Rusape, fl. c. 1921, *Hislop* 333 (κ). Marandellas Distr., fl. 11.ii.1942, *Dehn* 588 or 384 (SRGH). Marandellas Distr., Dombi Dombi granite outcrop, 1615 m, fl. & fr. 13.iii.1949, *Corby* 410 (κ ; SRGH). Marandellas Distr., granite rocks, fr. 5.iv.1952 *Wild* 3249 (κ).

Subsp. *dreweana* Brummitt, subsp. nov.

Ramuli et axis inflorescentiae pilis deflexis griseis vestiti. Pagina superior foliolorum glabra. Calyx 7-8 mm. Petala c. 12 mm.

Holotypus: Rhodesia, Southern Div., Fort Victoria Distr., Zimbabwe, on drier rocks, fl. & young fr. 5.ii.1961, *Drewe* 25 (SRGH).

Known only from the type collection. This plant is illustrated in the magnificent paintings of Rhodesian flowers by the collector, LADY DREWE.

47. *Tephrosia gobensis* Brummitt, sp. nov.

T. grandiflorae et speciebus cognatis affinis sed stipulis linearibus nec ovatis nec cordatis et leguminibus brevioribus circa 5-seminalibus valde differt; etiam *T. radicans*

similis sed habitu lignoso non reptanti, ovario glabro et proprietatibus ceteribus differt.

Fruticulus c. 30 cm altus. Ramuli dense pilis appressis vel ascendentibus griseis vestiti. Folia pinnata, (2)3-5 paribus foliolorum praedita; petiolus 0.3-1.0 cm longus, petiolus et rhachis coniunctim (0.6)1.2-2.4 cm, appresse pubescentes; foliola (0.6)0.8-1.6 X (0.3)0.4-0.6 cm, obovata ad oblanceolata, basi cuneata, apice late rotundata ad emarginata; pagina superior glabra vel sparse pubescens, pagina inferior appresse-pubescentia, grisea; stipulae 3-5 X 0.4-0.8 mm, lineares. Flores in racemis brevibus terminalibus 0.5-3 cm longis et in axillis 1-4 foliorum superiorum dispositi; bractae 1.5-3 X 0.7-1 mm, ovatae ad anguste triangulares; pedicelli 2-4 mm. Calyx 5-6 mm longus, appresse pubescens; dentes superiores per $\frac{3}{4}$ longitudinis connati, dentes laterales tubum aequantes. Petala c. 15 mm longa, pallide rosea. Tubus staminalis supra connatus. Ovarium marginibus pilis plus minusve rigide patentibus praeditum, aliter glabrum; stylus pubescens, in statu fructifero c. 1 cm longus; legumina c. 25 X 7.5 mm, plus minusve plano-naviculiformia, stylo usque fere ad fructus maturitatem persistente praedita, praeter ad margines glabra, brunnea; semina c. 5, transverse elongata.

Holotypus: Mozambique, Lourenço Marques Div., 'Goba, junto da ponte sobre o rio Umbeluzi', fl. & fr. 31.iii.1945, A. E. Sousa 132 (LISC). Isotypus: 'Near the fountain «Fontedos-Libombos, 9.5 kilometres from Goba', bud & fr. 31.iii.1945, A. Estêves de Sousa 132 (PRE).

Known only from the type collection, which was made on shallow soil overlying basaltic rocks.

The pods of this species suggest that it is closely related to *T. incarnata*, *T. grandiflora* Ait. and allied species, but it lacks the broad auriculate stipules of that group. It is not matched by any other Mozambique or South African material seen and does not fit the descriptions of any of the species given for South Africa by Miss FORBES. More collections are required from this area of Mozambique which

seems to be particularly interesting in the study of this genus (see also following species).

48. *Tephrosia cordata* Hutch. & Burtt Davy in Burtt Davy, Fl. PL Ferns Transvaal 1(2): xxxi (1932).—Forbes in Bothalia 4(4): 995 (1948). Type: Swaziland, Mbabane, fr. i.1905, *Burtt Davy* 2886 (α).

This species, well known from Swaziland and the Transvaal, was recorded by Miss FORBES from Mozambique with the citation of a single collection by SCHLECHTER in the Berlin herbarium. This specimen is now destroyed and no other specimens from Mozambique have been seen. *T. cordata* is allied to *T. gobensis* (above) and *T. incarnata* (below), but has very characteristic strongly cordate stipules 7-14 mm broad and is unlikely to have been confused by Miss FORBES. Further confirmation of its occurrence in the Flora Zambeziaca area is desirable.

49. *Tephrosia incarnata* Brummitt, sp. nov.

T. shilwanensi Schinz affinis, sed caulibus levigatis glabris, pedunculis longioribus folia excedentibus, stipulis latioribus glabris saltem unilateraliter auriculatis differt.

Annua vel breviter perennans caulibus erectis plus minusve ramosis ad 1.3 m altis. Caules superne sparsissime pubescentes infime glabri, levigati. Folia (3)4-6(7)-jugata; petiolus (1.5)2.5-5.5 cm, petiolus et rhachis conjunctim (3.5)5-12 cm longi, sparse appresso- vel ascendenti-pubescentes; foliola (1)1.5-3.5 X 0.5-1.4 cm, elliptica vel oblonga ad obovata, basi cuneata, apice obtusa ad emarginata, pagina superior glabra, inferior appresso-pubescentis; stipulae 7-13 mm ab insertione ad apicem, 3-6(8) mm latae, apice longe acutae, margine adaxiale valde auriculatae, margine abaxiale rotundatae vel parum auriculatae, castaneae, glabrae vel marginibus ciliatis. Inflorescentiae breves, densae, terminales vel interdum nonnullae in axillis foliorum superiorum; pedunculi plerumque 9-18 cm longi, flores supra folia superiora portantes; axis inflorescentiae dense brunneo-vel albo-pubescentis; bractae grandae, conspicuae, 6-12 X

4-9 mm, late ovatae ad suborbiculares, concavae, apice acuminatae ad rotundatae, flores juveniles occulentes sed caducae, nonnunquam apice fissae ut videtur 2- vel 3-dentatae, castaneae ad purpureo-brunneae, breviter pubescentes vel raro glabrae; pedicelli 4-10 mm, dense pilis brunneis patentibus vel appressis vestiti. Calyx 3.5-5(5.5) mm longus, pars campanulata 1.5-2.5 mm, appresso- ad patenti-pubescentis, dentibus duobus superioribus ad dimidiam longitudinis connatis apicibus 1.5 mm libris. Petala 12-13 mm longa, incarnata ad purpurea; vexillum basi cuneatum ad subtruncatum. Tubus staminalis supra connatus, stamen superius valde vel laxe adfixum, vel fortasse tubus apertus et stamen superius liberum. Ovarium glabrum vel marginibus pilis paucis vestitum, nigrum; stylus pubescens; legumen 50-62 × 7.5-9.5 mm, fuscum, glabrum; semina 12-15, transverse elongata.

Typus: Rhodesia, Umtali Distr., Himalayas, Engwa, 1940 m, in *Widdringtonia whytei* scrub, f 1. & fr. 2.iii.1954, Wild 4450 (SRGH, holotypus; κ , LISC, PRE, isotypi).

Mountains of eastern Rhodesia (Inyanga to Chirinda), southern Mozambique and northern Transvaal.

RHODESIA. Eastern Div. Tandai River, fl. ii.1931, Myres 688 in Eyles 7379 (κ ; SRGH). Melsetter, 1830 m, fl. iii.1934, Brain 10532 (SRGH). Nyumquarara Valley, fl. & fr. ii.1935, Gillilanä K 1337 (BM; K). Inyanga Distr., fl. & young fr. 28.ii.1942, Hopkins SRGH 8838 (κ ; SRGH). Chirinda Distr., fl. & young fr. 28.iii.1950, Hack 167/50 (SRGH). Melsetter Distr., fl. & fr. ix.1953, Williams 116 (SRGH). Umtali Distr., Himalayas, Engwa, 1940 m, in *Widdringtonia whytei* scrub, fl. & fr. 2.iii.1954, Wild 4450 (κ ; LISC; PRE; SRGH—types). Melsetter Distr., near 'Skyline', Melsetter-Chipinga road, edge of forest in ravine, fl. & fr. 28.ii.1956, Drummond 5118 (COI; K; SRGH). Melsetter Distr., Chimanimani, west tributary of upper Bundi, grassy scrub in wooded gully, 1464 m, fl. ii.1957, Phipps 434 (κ ; PRE). Melsetter Distr., Chimanimani, Long Gully, 1464 m, fl. 2.ii.1957, Phipps 454 (SRGH). Inyanga Distr., near Nyamingura River, dense scrub, 975 m, fl. & fr. 21.iv.1958, Phipps 1167 (SRGH). Umtali Distr.,

'Nimbus' farm, S. W. Vumba, 1615 m, mountain slope in shrubs, fl. & fr. 17.ix.1958, *Chase* 7022 (BM; K; PRE; SRGH). Chipinga Distr., Mt. Selinda, open grassland near edge of forest, fl. 22.ii.1960, *Goodier* 950 (SRGH). Vumba, Leopard's Rock, 1645 m, fl. & young fr. 1.iii.1960, *Head* 185 (BM). Melsetter Distr., Skyline, fl. 23.i.1964, *Corby* 1066 (K; SRGH).

MOZAMBIQUE. **Lourenco** Marques. Sabié, Mte. Libombos, Meponduine, near the border, fl. 25.iv.1947, *Pedro & Pedró-gão* 735 (LMJ). Namaacha, near the Canada Dry factory, fl. & fr. 27.iii.1957, *Barbosa & Lemos* 7534 (COI; LISC; LMJ).

SOUTH AFRICA. Transvaal. Houtbosh, bud & young fr. 1875-1880, *Rehmann* 6229 (x). Letaba Distr., Rosendal, Westfolia, 1220 m, fl. & fr. 18.ii.1956, *Keet* 1741 (K). Letaba Distr., between provincial road and Mtataspruit, 945 m, bud 2.ii.1958, *Scheepers* 74 (K). Letaba Distr., under tall *Eucalyptus* near roadside, 915 m, fr. 3.ii.1958, *Scheepers* 161 (K).

These plants have previously usually been referred to *T. shiluwaniensis* Schinz, described from the Transvaal. Examination of the type of that species, however, shows that that differs rather conspicuously in having densely appressed-pubescent stems, shorter peduncles (about 5 cm) which probably do not exceed the upper leaves, and narrow, pubescent stipules (1-1.5 mm broad) which are not auriculate. The taxonomy of this group in South Africa is difficult and not yet fully understood, but it seems that the plants cited here must be regarded as specifically distinct from *T. shiluwaniensis*.

The two southernmost specimens, those cited from Mozambique, differ from others in having larger flowers, the petals being 19-23 mm long as against 12-18 mm, and the bracts glabrous and a conspicuous chestnut brown. More material from this area may suggest that they belong to a distinct subspecies.

Group 9. TEPHROSIA DASYPHYLLA AND ALLIED SPECIES

This group includes barbistyled species which have the vexillary stamen free, unifoliolate or trifoliolate (rarely 5-foliolate) leaves, and fairly large flowers aggregated into a dense terminal head surrounded by the upper leaves, or sometimes a short fairly dense terminal raceme. *T. cephalantha* is readily distinguished by its annual habit with woody stocks producing unbranched herbaceous stems up to 50 cm high.

T. dasyphylla was originally described from Angola, and plants closely matching the type are now known from Angola, south-eastern Congo (Katanga), Tanzania, Zambia, Rhodesia and northern Mozambique. These plants have characteristically trifoliolate leaves with oblong leaflets up to 2 cm broad, and include the types of *T. luembensis* De Wild. and *T. subfalcato-stipulata* De Wild. In Fl. Congo Belge 5 (1954) CRONQUIST adopted a broad view of *T. dasyphylla*, giving in synonymy *T. argyrolampra* Harms and *T. butayi* De Wild. & T. Dur. and including plants with unifoliolate elliptic leaves up to 4 or 5 cm broad. These broad-leaved plants seem to be confined to western Zambia and adjacent Katanga, with a single known record from central Tanzania, so apparently overlapping the distribution area of typical *T. dasyphylla*. *T. butayi* was described from the north-western Congo, and the type has unifoliolate leaves up to 28 mm broad (one single leaf has 2 leaflets), thus approaching the broad-leaved plants from Katanga and Zambia, and indeed, although the indumentum of leaves and stem is rather different, it scarcely seems possible to regard them as different species. However, other plants from eastern Congo closely resemble the type of *T. butayi* but have 3- or 5-foliolate leaves and scarcely seem specifically distinct from typical *T. dasyphylla*. Furthermore, some of the broad-leaved plants in Katanga and western Zambia frequently have one or two small lateral leaflets, so tending towards typical *T. dasyphylla*, and a clear-cut separation of them from *T. dasyphylla* does not seem possible.

The recently described *T. youngii* Torre from north-eastern Angola also seems to fall into this complex, differing from the type of *T. butayi* only in its rather broader leaves and perhaps denser and more silvery-sericeous indumentum, and from the Katangan-Zambian plants only again in this indumentum.

The position is further complicated by two other taxa, *T. muenzeri* Harms from Ufipa District of south-eastern Tanzania and an undescribed plant with quite a different indumentum from Lundazi district of eastern Zambia, both taxa thus occurring more or less within the area of typical *T. dasyphylla*. Both of these have unifoliolate broad leaves but differ from the similar Katangan-Zambia plants in that the leaves are sessile instead of shortly petiolate, and also in their respective leaf indumenta. *T. argyrolampra* Harms, from north-western Tanzania and adjacent Burundi is undoubtedly closely related to this group but has more or less sessile trifoliolate leaves with all three leaflets large, elliptic, 25-35 mm broad and a subsericeous indumentum.

A satisfactory taxonomic treatment of this complex seems difficult to achieve. To 'lump' the whole lot into one species with seven subspecies seems undesirable as the overall variation is considerable and the taxa do not appear to be replacing each other geographically, several being sympatric with typical *T. dasyphylla*. The most natural grouping might perhaps be to include the four taxa with broad predominantly unifoliolate leaves in one species which would then comprise four disjunct subspecies all differing slightly in indumentum, two having sessile leaves and two shortly petiolate leaves. This grouping would overlap in area the usually trifoliolate typical *T. dasyphylla* and *T. butayi*. *T. argyrolampra* seems to be distinct geographically and morphologically and is probably best regarded as a separate species.

On the other hand, however desirable such a grouping might appear to be at first sight, the difficulty of assigning many plants to either one or other species in the Congo and Zambia seems to argue against it, unless it can be

clearly shown in the future that the intermediates are hybrids between two sympatric species. From the evidence at present available from herbarium specimens it seems most practical to group all the four taxa with petiolate leaves as one species, despite the fact that they are not geographically disjunct, since these four seem to intergrade morphologically. This leaves *T. muenzneri* and the Lundazi plant as a second species, and *T. argyrolampra* as a third perhaps most distinct species. This arrangement is here adopted, but reconsideration of the position will be desirable when more collections and field observations are available.

50. *Tephrosia dasyphylla* Welw. ex Bak. in Oliv., Fl. Trop. Afr. 2: 118 (1871). Type: Angola, Huila, morro de Lopolo, *Welwitsch* 2084 (LISU, holotype; BM, K, isotypes).

Key to subspecies

- Stems closely appressed- greyish-pubescent or -tomentose; leaves more or less silvery-sericeous beneath; stipules 5-9 X 0.5-1.2 mm
 Leaves (always?) unifoliolate, 1.5-2 times as long as broad. subsp. *youngii*
 Leaves unifoliolate or sometimes 3-5-foliolate, leaflets 2.2-4 times as long as broad subsp. *butayi*
 Stems spreading- or sometimes ascending- brown- or rarely grey-tomentose; leaves greyish-green to whitish spreading- or appressed-pubescent beneath, but usually not sericeous; stipules (6)8-15 X 1-2 mm
 3. Leaves predominantly unifoliolate, at maturity 25-50 mm broad, leaflets elliptic subsp. *amplissima*
 Leaves predominantly trifoliolate, up to 17 mm broad (25 mm in Rhodesia E.), leaflets oblong subsp. *dasyphylla*

Subsp. *dasyphylla*

Tephrosia dasyphylla sensu Cronquist, Fl. Congo Belge 5: 104 (1954) et Torre, Consp. Fl. Angol. 3: 163 (1962) pro parte.

Stems spreading- or sometimes ascending- brown- or rarely greyish- tomentose. Leaves predominantly 3-foliolate but occasional lower leaves unifoliolate or upper leaves 5-foliolate; petiole and rhachis together 0.6-2.5(3) cm long,

the petiole usually distinctly longer than the rachis which may sometimes be almost absent, tomentose like the stem; terminal leaflets (4)5-10 X (0.6)0.8-1.7(2.5) cm, lateral leaflets 3.5-6.5(8) X 0.5-1.3(2) cm, all linear-oblong or very narrowly elliptic to narrowly lanceolate, obtuse to emarginate at the apex, the lower surface greyish-green to white appressed-pubescent but usually not sericeous; stipules (6)8-15 X 1-5.5 mm. Calyx (7)9-12(14) mm long, \pm appressed grey- or brown-villous. Petals (17)19-26(29) mm.

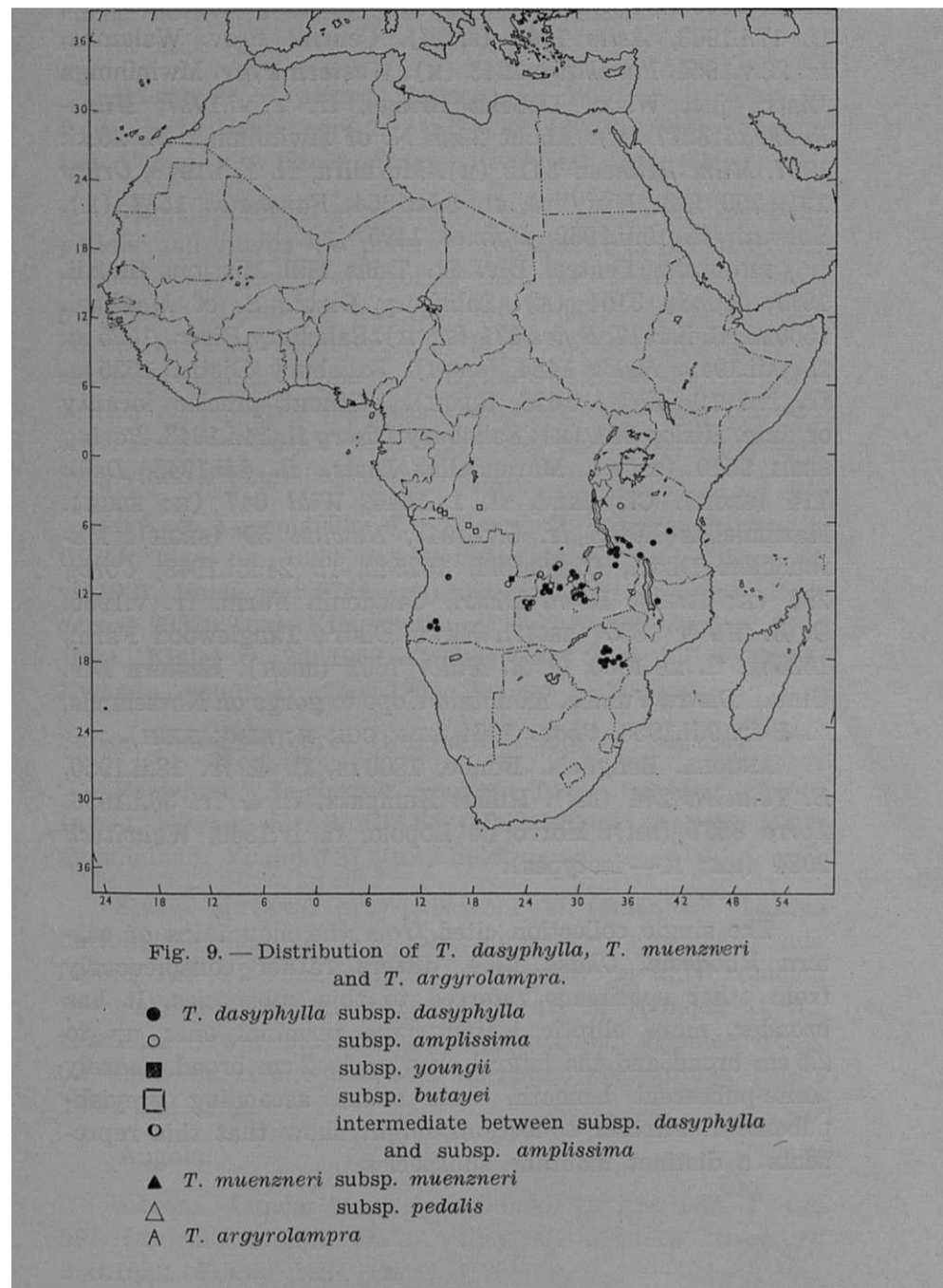
Congo (Katanga), Tanzania, northern Mozambique, Zambia, Rhodesia and Angola.

CONGO. **Katanga.** Vallée de la Petite Luembe, fl. & fr. ii.1910, *Hock* (BR; holotype of *T. luembensis* De Wild.). Plateau de Bianco, fl. xii.1912, *Homblé* 893 (BR; holotype of *T. subfalcatostipulata* De Wild.). Snelleghem, fl. xi.1928, *Quarré* 1411 (BR). Elisabethville [fide F. C. B.], fr. vi.1935, *Quarré* 4584 (BR). 12 km to N. W. of Elisabethville, fl. & fr. 6.ii.1958, *Gathy* 34 (\times).

TANZANIA. T4. **Ufipa Distr.** Old Sumbawanga Road, Malonje Plateau, 1800 m, fl. 3.i.1962, *Richards* 15890 (\times). T5. **Mpwapwa Distr.:** Kiboriani Mtn., 1525-1830 m, fr. 15.xi.1937, *Mr. & Mrs. Hornby* 937 (K). T7. **Mbeya Distr.** N. slopes Poroto Mts., below Mporoto Sawmill, 1645-2010 m, fl. 8.iii.1932, *St. Clair Thompson* 728 (K). **Iringa Distr.** Mufindi W., 1705-1890 m, 23.ii.1932, *St. Clair Thompson* 445 (\times).

MOZAMBIQUE. **Niassa.** Massangulo, fr. 15.V.1948, *Pedro & Pedrógão* 3507 (LMJ). Vila Cabral, S. slope of serra de Massangulo, 1180 m, fr. 25.ii.1964, *Torre & Paiva* 10761 (LISC).

ZAMBIA. **Northern Prov.** Lake Chila, Abercorn, 1645 m, fl. 4.i.1952, *Richards* 264 (\times). Near Lake Chila, fl. 21.i.1952, *Nash* 115 (BM). Lake Chila, 1525 m, fl. 21.i.1955, *Richards* 4202 (\times). Kawimbe, Abercorn Distr., 1630 m, fl. & fr. 24.i.1957, *Richards* 7964 (\times). Itembwe Gorge, Abercorn, 1500 m, fl. 3.i.1960, *Richards* 12054 (\times). Kasama Distr., Forestry plantation, Kasama-Abercorn road, 1275 m, fl. 1.iii.1960, *Richards* 12686 (K). Abercorn Distr., Mambole escarp-



ment, 1500 m, *Richards* 18892 (\times). Chishinga Ranch N. P., fl. 17.i.1963, *Astle* 1965 (SRGH). Central Prov. Walamba, fr. 23.V.1954, *Fanshawe* 1243 (K). Western Prov. Mwinilunga Distr., just W. of Dobeka Bridge, fr. 17.xi.1937, *Milne-Redhead* 3277 (\times). About 2 km N. of Mwinilunga, fl. 26.xi.1937, *Milne-Redhead* 3412 (\times). Mufulira, fl. 17.i.1948, *Cruse* 231, 250 (\times). Mufulira, fl. 8.ix.1954, *Fanshawe* 1537 (\times). Soiwezi, fl. 10.ii.1962, *Holmes* 1495 (\times).

RHODESIA. Central Div. St. Trias Hill Mission, fl. 2.ii.1917, *Mundy* 3154 (\times). Salisbury Distr., S. of Makbusi, 1500 m, fl. ii.1917, *Eyles* 671 (SRGH). Salisbury Distr., 1525 m, fl. 9.ii.1949, *Eyles* 1484 (SRGH). Salisbury Distr., 1525 m, fr. iv.1919, *Eyles* 1626 (SRGH). Without precise locality or date, *Hislop* 321 (K). Salisbury Distr., fl. 14.i.1943, *Baring* SRGH 9510 (SRGH). Marandellas Distr., fl. 4.ii.1943, *Dehn* 714 (SRGH). Cleveland, fl. 1.i.1946, *Wild* 647 (\times ; SRGH). Marandellas Distr. fr. 5.vi.1947, *Newton* 59 (SRGH). Marandellas Distr., Digglefold, 1525 m, fl. 24.xii.1948, *Corby* 296 (\times ; SRGH). Rewa Distr., Caledonia Farm, fr. v.1960, *O. B. Miller* 7360 (SRGH). Ruwa Distr., Tanglewood Farm, 1525 m, fl. xii.1960, *O. B. Miller* 7601 (SRGH). Eastern Div. Umtali Distr., Vumba, mountain slope to gorge on Norselands, fl. & fr. 9.ii.1950, *Chase* 1964 (BM; COI; K; LISC; SGRH).

ANGOLA. Benguela. Bimbe, 1800 m, fl. & fr. 18.ii.1950, *B. Teixeira* 244 (BM). Huila. Humpata, fl. & fr. 30.i.1956, *Torre* 8567 (BM). Morro de Lopolo, fl. iv.1860, *Welwitsch* 2084 (BM; K—isotypes).

The single collection cited from the mountains of eastern Rhodesia, *Chase* 1964, differs rather conspicuously from other specimens referred to this subspecies. It has broader, more elliptic leaflets, the terminal ones up to 2.5 cm broad and the lateral ones up to 2 cm broad, densely white-pubescent beneath, with stems ascending greyish-pubescent. Further collections might show that this represents a distinct montane subspecies.

Subsp. **butayi** (De Wild. & T. Dur.) Brummitt, comb.
et stat. nov.

Basionym: *Tephrosia butayi* De Wild. & T. Dur. in Bull. Herb. Boiss. sér. 2, 1(8): 747 (1901). Type: Congo, Bas Congo, riv. Nsele, *Butaye* in Gillett 1444 (BE).

Stems appressed greyish-pubescent. Leaves 1-5 foliolate; petiole and rachis (if present) together 6-20(26) mm, the petiole either longer or shorter than the rachis, appressed-pubescent; terminal leaflets (40)50-90 X (10)15-28 mm, lateral leaflets (when present) 30-60 X 7-20 mm, elliptic to narrowly elliptic, obtuse to emarginate at the apex, the lower surface silvery-grey appressed-pubescent, often subsericeous; stipules 5-9 X 0.5-1.2 mm. Calyx 6-9 mm long, appressed grey-villous. Petals 15-19 mm long.

CONGO. **Leopoldville**. Riv. Nsele, fl. x.1910, *Butaye* in Gillett 1444, BR, holotype). Between Ipamu and Kikart, fl. vii.1921, *Vanderyst* 746 (BR). Kisantu, without date, *Vanderyst* 20520 (BR). Kibubu, young fr. 7.ii.1950, *Callens* 2344 (BM). Kiala, fl. 2.ii.1952, *Callens* 3037 (BM). Tono-Feshi-Kwango, young fr. 25.vi.1955, *Devred* 2109 (BR).

Subsp. **youngii** (Torre) Brummitt, comb. et stat. nov.

Basionym: *Tephrosia youngii* Torre in Mem. Junta Invest. Ultram. sér. 2, 19: 63 (1960). Type: Angola, Mona Quimbundo, *Young* 587 (BM, holotypus).

Stems appressed grey-pubescent to tomentose. Leaves unifoliate; petiole 5-15 mm, appressed grey-pubescent; lamina 4-7 X 2-4 cm, elliptic to obovate, broadly rounded to emarginate at the apex, subcuneate to rounded at the base, the lower surface silvery sericeous; stipules 6-8 X 0.7-1 mm. Calyx c. 8 mm long, appressed grey-villous. Petals 16-20 mm long.

Angola.

ANGOLA. **Lunda**. Mona Quimbundo, fl. 2.ix.1932, *Young* 587 (BM, holotypus). Dala, valley of Chiumbe River, fl. 2.xi.1932, *Young* 1284 (BM).

Subsp. **amplissima** Brummitt, subsp. nov.

Caules patenter brunneo-tomentosi. Folia unifoliolata vel nonnunquam 1-2 foliolis lateralibus minoribus praedita; petiolus et rhachis (si adest) conjunctim 8-20 mm ut in caule tomentosi, rhachis (si adest) 3-13 mm; foliola solitaria vel terminalia 60-120 X (25)30-48 mm, plus minusve elliptica, apice obtusa ad retusa vel raro subacuta, basi subcuneata ad rotundata; pagina inferiora pilis griseis curvatis ad crispatis non valde appressis dense vestita, non sericea; stipulae 10-15 X 1-2 mm. Calyx 8-11 mm longus, appresse griseo- vel brunneo-villosus.

Holotypus: Zambia, Western Prov., Mufulira, fringing forest, fl. 11.i.1948, *Cruse* 249 (K).

Congo (Katanga), Tanzania (one record), western Zambia, eastern Angola.

CONGO. Katanga. Bianco-Lualaba. fl. c. 1920, *Homblé* (BR). Ruashi, 7 km NE d'Elisabeth ville, fr. iv.1950, *Schmitz* 2812 (BR).

TANZANIA. T4. Tabora **Distr.:** Unyamwesi, between Kombe and Usinge, km 1003.6, fl. 26.i.1926, *Peter* 35574 (K).

ZAMBIA. Western Prov. 1 km S. of Matonchi Farm, fl. 2.i.1938, *Milne-Redhead* 3924 (K). Mufulira, 7.xii.1947, *Cruse* 102 (x). 1220 m, fl. 11.i.1948, *Cruse* 249 (x, holotype). Kalene Hill, 1370-1525 m, fl. xi, *Marks* 4 (x). Chingola, fr. 16.i.1964, *Fanshawe* 8226 (x).

ANGOLA. Lunda. Dala, Biúla, rio Chiji, fr. 27.iv.1937, *Exell & Mendonça* 1178 (BM).

Intermediates between subsp. **dasyphylla** and subsp. **amplissima**

The following specimens have predominantly trifoliolate leaves with elliptic leaflets, the terminal ones 1.6-2.2 cm broad.

ZAMBIA. Barotseland. Balovale, fl. xii.1953, *Gilges* 301 (K; PRE; SRGH). Western Prov. Mwinilunga Distr., 64 km S. of Mwinilunga, 19 km W. of Lunga, fr. 18.viii.1930, *Milne-Redhead* 932A (x). Mufulira, fl. 16.xi.1947, *Cruse* 71 (K).

It may be noted that *Milne-Redhead* 932A was growing with *T. cephalantha*.

51. *T. muenzneri* Harms in Engler, Bot. Jahrb. **45**: 310 (1910).
Type: Tanzania, T4, Ufipa Distr, Msamwia, iii.1909, *Münzner* 197 (holotype, not seen, presumed destroyed at Berlin). The following specimen is here designated as a neotype: Tanganyika, T4, Ufipa Distr., Abercorn-Muse road, at gap of Chapota turning, 1500 m, f 1. & fr. 22.X.1960, *Richards* 13368A (x).

Subsp. *muenzneri*

Stems grey- to brown-tomentose. Leaves unifoliate; petiole (as distinct from basal pulvinus) absent, the basal pulvinus 1-3 mm; lamina up to 105 X 52 mm, elliptic, rounded to ± cuneate at the base, broadly rounded to emarginate at the apex; lower surface densely covered with silvery-grey curved or crisped hairs somewhat appressed but not strongly so; stipules 7-9 X 1-2 mm. Calyx 6-7 mm, ± grey-villous. Petals 17-23 mm. Pods 45-50 X 9 mm, densely brown villous.

S. W. Tanzania.

TANZANIA. T4. Ufipa **Distr.**: New Sumbawanga-Abercorn road turning to Chapota, 1800 m, fl. 19.X.1959, *Richards* 11509 (x); Abercorn-Muse road at gap of Chapota turning, 1500 m, fl. & fr. 22.X.1960, *Richards* 13368A (x).

Subsp. *pedalis* Brummitt, subsp. nov.

A subspecie typica indumento caulium, foliorum et leguminum, forma foliorum et magnitudine stipularum differt.

Caules pilis longis (ad 1.5 mm) brunneis flexuosis sparse vestiti. Folia ad 95 X 35 mm, obovata ad oblanceolata, basi valde cuneata; pagina inferiora pilis rigidis rectis vel geniculatis sparse vestita; stipulae 11-13 X 0.6-1 mm, lineares. Calyx 7-8 mm longa. Petala ignota. Legumina c. 45 X 9 mm, plus minusve sparse patenti-pubescentia.

Holotypus: Zambia, Eastern Prov., Lundazi Distr., Lundazi to Mzimba mile 4, fr. 28.iv.1952, *White* 2495 (FHO).

Known only from the type collection which was from *Julbernardia paniculata*, *Brachystegia manga*, *Br. spiciformis* woodland on pink, sand loam.

52. *Tephrosia argyrolampra* Harms in Engler, Bot. Jahrb. 51: 226 (1914). Type: Burundi, Nord-Uha, x.1911, Meyer 1092 (holotype, presumed destroyed at Berlin). The specimen cited below, Peter 38511, is here designated as a neotype.

Stems densely appressed light-brown pubescent, \pm sericeous. Leaves trifoliolate; petiole (as distinct from basal pulvinus) absent, pulvinus and rachis together up to 20 mm; terminal leaflets up to 98 X 38 mm, elliptic to slightly oblanceolate, lateral leaflets slightly smaller than the terminal ones, up to 80 X 30 mm, base \pm cuneate, apex rounded; lower surface densely and closely appressed silvery-pubescent, sericeous; stipules 6-7 X 1.5-2 mm. Calyx 5-6 mm long, lower part grey appressed-pubescent, upper light-brown appressed-pubescent. Petals 18-20 mm.

Burundi, Tanzania.

TANZANIA. T4. Buha **Distr.**: Uha, Nisusi to Birisa, IO.iii. 1926, Peter 38511 (\times).

53. *Tephrosia zambiana* Brummitt sp. nov.

T. manikensi De Wild. affinis, sed foliis 3-5-foliolatis, racemis magis elongatis et dentibus calycis longioribus differt.

Suffrutex ramis herbaceis simplicibus ad 35 cm altis. Rami dense albo-appresso-pubescentes. Folia plerumque 3-foliolata, raro 1- vel 5-foliolata; foliola ad 5.5 X 1.1 cm, anguste oblonga, supra glabra, subtus dense albo-appresso-pubescentes, juventute subsericea. Racemi terminales nodis distinctis saltem 5-8, folia superiora valde excedentes, etiam nonnunquam floribus inferioribus in axillis foliorum superiorum. Calyx 9-11 mm, albo-appresso-pubescent, dentibus subaequalibus 5-7 mm longis, duobus superioribus non valde connatis. Petala 18-20 mm longa, verisimiliter purpurea vel

carina alba. Tubus staminalis supra non connatus, filamentum vexillarum librum. Ovarium tomentosum; stylus pubescens; legumen ignotum.

Typus: Zambia, Kasama Distr., Mungwe, fl. 2.X.1960, Robinson 3899 (α , holotypus; SRGH, isotypus).

Known only from the type collection. *T. zambianais* similar to *T. manikensis* De Wild. from Katanga, but differs from it in having leaves mostly 3-foliolate with a petiole and rachis instead of unifoliolate and sessile, the racemes longer with at least 5-8 clearly visible nodes, and longer calyx teeth (1½-2 times as long as the tube) with the two upper ones free more or less to the base. It may also be confused with *T. dasyphylla*, from which it differs in the elongate raceme clearly exceeding the upper leaves, the rachis much longer than the petiole in the upper leaves, and the denser subsericeous white indumentum of the stem and leaflet undersurface.

54. *Tephrosia cephalantha* Welw. ex Bak. in Oliv., Fl. Trop. Afr. 2: 119 (1871). Type: Angola, Huíla, morro de Lopo, Welwitsch 2087 (BM), see notes below.

CRONQUIST, Fl. Congo Belge 5: 103 (1954), has drawn attention to the facts that two 'forms' occur in this species, distinguished by the size and shape of the leaflets, and that both forms were represented in the original material from which the species was described. It appears that most specimens from the Congo have narrow leaflets, 3-7(10) mm broad, 5-8 times as long as broad, and usually have predominantly 5-foliolate leaves. This form is not known from the Flora Zambesiaca area, where the leaves are predominantly 3-foliolate (only occasional leaves 5-foliolate), and the leaflets are 10-20(26) mm broad and only 2-5 times as long as broad. However, some specimens from the Congo appear to be somewhat intermediate, while both variants seem to occur in Angola with no geographical separation. It seems most appropriate to regard the two variants as varieties.

The original species description [BAKER in OLIVER, Fl. Trop. Afr. 2: 119 (1871)] was based on two collections of

WELWITSCH from Angola, numbers 2087 and 2089. Examination of the specimens of these numbers at Kew and the British Museum shows that no. 2089, from Pungo Andongo, is clearly referable to the variety with broader leaflets, but the other, 2087 from Huíla, Morro de Lopolo, approaches more closely to the other variety. A choice between the two for purposes of typification has been made by SCHREIBER, in Mitt. Bot. Staatssamml. München 16: 298 (1957) who gives 2087, the plant with narrow leaflets, as the type of the species. A third collection of WELWITSCH, no. 2090 from Huíla, Ferrão da Sola, was described by BAKER (loc. cit.) as var. *decumbens*, the stem being decumbent at the base, but this character does not seem to justify taxonomic recognition. However, since this plant is clearly referable to the variety recognised with broad leaflets, the epithet var. *decumbens* must be adopted for this variety, being the earliest (and only) varietal epithet applied to it. An emendation of the circumscription of *T. cephalantha* var. *decumbens* is therefore here proposed. It is unfortunate that the epithet is so inappropriate, for the variety is generally an erect herb.

Var. **cephalantha**: leaves often predominantly 5-foliolate, the terminal leaflets 3-7(10) mm broad, 5-8 times as long as broad. Angola and the Congo.

Var. *decumbens* Welw. ex Bak. emend. **Brummitt**: leaves predominantly 3-foliolate, the terminal leaflets 10-20 mm broad, 2-5 times as long as broad. Angola, S. W. Africa (incl. Caprivi Strip), Bechuanaland, Zambia, Rhodesia.

A specimen from Zambia, Northern Prov., Samfya, Lake Bangweulu, fl. & fr. 301.1959, *Watmough 200* (K; LISC; PRE; SRGH) resembles *T. cephalantha* var. *decumbens* in size and shape of leaflets, but differs markedly in several characters: the leaves are mostly 5-foliolate, with the petiole and rachis together up to 2.5(3) cm; the flowers have much larger petals, up to 22 mm, though the calyx is short, 9-10 mm, and so only about half as long as the petals; and the pods are larger, 5-5.5 X 0.7-0.8 mm, and rather closely

appressed-pubescent. The relationship of this plant to *T. tanganicensis* De Wild. from Tanzania requires investigation when more collections are available.

55. **Tephrosia manikensis** De Wild. in Fedde, Repert. **13**: 104 (1914).—Cronquist in Fl. Congo Belge 5: 103 (1954). Type: Haut Katanga, La Manika, 1911, *Hock* s. n. (BR) — see notes below.

Although apparently restricted to a fairly small geographical area — the Manika Plateau and adjacent ranges of Katanga — this species is very variable in indumentum, inflorescence, calyx size and shape, and petal size, shape and colour. Particularly striking is the indumentum of the lower surface of the leaves, which may be either thinly appressed-pubescent or densely white-tomentose and sericeous. This seems to be correlated to some extent with other characters, but there does not appear to be a marked geographical separation of the two kinds, which are therefore here regarded as varieties rather than subspecies.

Var. manikensis

Stems ± appressed brown-pubescent. Lower surface of leaves rather thinly appressed-pubescent, greyish-green. Inflorescence elongate, with 3-7 clearly visible nodes. Calyx appressed- or ascending- grey- or brown-tomentose. Petals recorded as pink or mauve.

CONGO. **Katanga**. Manika, fl. **x.1911**, *Hock* (BR — see note below). Plateau de Bianco, env. de Katentania, young fr **xi.1912**, *Homblé* 836 (BR); *ibid.* 846 (BR). Parc Nat. Upemba, Lusinga, fl. **25.vi.1945**, *de Witte* 2352 (BR). Riv. Dipidi, 1700 m, fl. **5.viii.1947**, *de Witte* 2746 (BR). Riv. Sweba, fl. **28.viii.1947**, *de Witte* 2803 (BR). Plateau de Kundelungu, partie sud, fl. **16.viii.1948**, *Schmitz* 1982 (BR). P. N. Upemba, between Kabwe-kaumo and Mukana, fl. **30.ix.1948**, *de Witte* 4365 (BR); *ibid.* **1.x.1948**, 4418 (BR); *ibid.* **18.x.1948**, 4541 (BR). P. N. Upemba, near Kadidiki, fl. **29.viii.1949**, in *de Witte* 7594 (BR).

Intermediate between var. *manikensis* and var. *albo-sericata*. Kundelungu, 1700 m, 27° 53' E, 10° 26' S, fl. 5.x. 1959, Schmitz 3093 (BR).

Var. *albosericata* Brummitt, var. nov.

Caules ± appresse brunneo-pubescens. Foliorum pagina inferior dense appresse albo-velutina, sericea. Inflorescentia capitulata, subglobosa, vel nodis 1-2 inferioribus ± remotis. Calyx ± patenter albo-villosus. Petala rosea vel azurea.

Typus: Congo, Katanga, environs de Lubudi, fl. 1937, *Cabu* 4 (BR, holotypus; K, isotypus).

CONGO. Katanga. Kausenia, fl. 13.viii.1933, *Lynes* (BR). Elvalubudi, Lukata, fl. viii.1933, *Quarré* 3361 (BR). Environs de Lubudi, fl. 1937, *Cabu* 4 (BR, holotype); *ibid.*, 17 (BR); *ibid.* 46 (BR); *ibid.* 51 (BR; K). Près du Jardin Botanique CSK, fl. xii.1937, *Quarré* (?) 5014 (BR). Without locality, fl. ix.1945, *Quarré* 6988 (BR).

The type sheet of *T. manikensis* bears three different stems, each differing in leaf and stem indumentum. The left-hand one is only thinly pubescent and not at all sericeous, the right hand one is more densely pubescent, and the central one is more or less sericeous and yellowish-green. This last is the one which corresponds most closely with the original description «foliis... infra plus minus dense velutinis, argenteo-sericeis» but it has not the same white indumentum as plants referred above to var. *albosericata* and the elongate inflorescence and appressed tomentum of the calyx also differ from that variety. It seems best therefore to regard the first of the two above varieties as the typical variety, as has been done, although the type itself is more or less intermediate.

One further specimen—P. N. Upemba, Kilube-Kundjawatango, *P. C. R.* in *de Witte* 3647 (BR)—is bigger in most parts than any other specimen seen (leaves up to 13 X 2.8 cm, stipules 11 mm, calyx 12 mm), and has an elongate raceme and brown appressed-tomentose calyx but white-sericeous leaves.

Group 10. A NEW BARBISTYLED SPECIES
OF UNCERTAIN AFFINITY

56. *Tephrosia miranda* Brummitt, sp. nov.

Species stylo barbato, foliolis numerosis, inflorescentiis foliatis, leguminibus pauciseminis, affinitate dubia.

Frutex 2-3 m altus. Caules ascendentes griseo-tomentosi. Folia plerumque **5-7-jugata** sed superiores deinceps ad **foliolum** solitarium reducta; petiolus 3-7 mm, petiolus et rhachis coniunctim ad 8 cm, griseo-tomentosi; **foliola** ad 33 X 13 mm, obovata ad oblanceolata, basi cuneata ad rotundata, apice rotundata; pagina superior pilis gracilibus tenuiter pubescens, pagina inferior pilis griseis laxè **appresso-pubescens**; stipulae 7-9 X 1.5-2 mm, lineari-triangulares, tomentosae, caducae. Flores in racemis terminalibus et axillaribus ad 10 cm longis dispositi; nodi foliis (plerumque **unifoliolatis**) ad apicem deinceps ad bracteas lineari-ellipticas circa 5 mm longas reductis praediti; pedicelli 8-11 mm. Calyx 4.5-5.5 longus, breviter appresse griseo-pubescens; dentes superiores per maximam partem longitudinis **connati** triangulum acutum apice per **0.75 mm** divisum formantes. **Petala rubra**; vexillum 14-16 mm longum, basi cuneatum; **alae** et **petala** carinae aliquantum breviora. Tubus staminalis supra **connatus**. Ovarium **appresso-tomentosum**; stylus pubescens; legumina **c.** 35 X 7.5 mm, leviter curvata et parum inter **semina** lateraliter constricta, dense et breviter pubescentia, ut videtur indehiscentia sed **irregulariter rumpentia**; semina 3-5, circa 5 X 3 X 1.5 mm, brunnea, carunculo parvo inconspicuo praedita.

Typus: Mozambique, Nampula Distr., serra da Mesa, 6 km from Nampula, 500 m alt., granite rock desert, fl. & fr. **3.iv.1964**, Torre & Paiva 11599 (LISC, holotypus).

Known from only the type and one other collection:

MOZAMBIQUE. Niassa: Nampula Distr., monte Nassapo, 23 km from Nampula towards Meconta, 400 m alt., granite rock desert, fl. **13.i.1964**, Torre & Paiva 9929 (LISC).

This species is remarkable within *Tephrosia* both in its inflorescence and its pods. Although the flowers are arranged in what may reasonably be called racemes, each fascicle is subtended, not by a bract as in other racemose species, but by a stipulate foliage leaf which shows a clear resemblance to the lower leaves even though the uppermost ones in each inflorescence are only unifoliolate and very much reduced in size. The pods on the one fruiting specimen known are slightly curved, somewhat constricted laterally between the seeds, and apparently indehiscent but breaking up irregularly, the epicarp flaking off from the endocarp. More flowering and fruiting material is required.

Addendum. NOTES FOR FUTURE COLLECTORS

The genus *Tephrosia* is taxonomically a very difficult one, and it will be clear from the notes above that many problems still await attention in the Flora Zambesiaca area. While more collections are certainly required from all parts of the area there are some districts which seem to be particularly important in the study of the genus and which will well repay further investigation. It is hoped that these few final notes will focus attention on those areas from which more collections and field observations are particularly required.

Northern Zambia. While many excellent collections have been received at Kew in recent years from Abercorn District, the rest of the Northern Province and Eastern Province remain poorly known. *T. zambiana*, *T. robinsoniana*, *T. kasikiensis* subsp. *chinsaliana* and *T. muenzneri* subsp. *pedalis* are all known from only single collections, the first three without fruit and the last without flowers. The variation of *T. lepida*, *T. richardsiae*, *T. kasikiensis* and *T. punctata* also requires particular attention in this area. In the Abercorn District field observations on the relationships of *T. malvina* and *T. micrantha* to *T. purpurea*, of *T. paradoxa* to *T. stormsii*, and of var. *abercornensis* to var. *heckmaniana* within *T. elata* would be particularly valuable.

Rhodesia. More collections are still required from the mountains of the eastern division. Of particular interest is the *T. aequilata-T. grandibracteata* group in which local endemic taxa occur and four new species are described above. The variation, distribution and ecology of these should be investigated further. *T. elongata*, *T. purpurea* subsp. *altissima*, *T. longipes* subsp. *swynnertonii* and *T. dasyphylla* subsp. *dasyphylla* are all inadequately known in this area, and the status of *T. lurida* var. *drummondii* from Glencoe Forest Reserve especially requires investigation. In other parts of Rhodesia the status of the varieties of *T. rhodesica* is in doubt, the relationship of *T. longipes* to *T. lurida* is uncertain, *T. coronilloides* has recently been collected for the first time, and *T. rupicola* and its subsp. *dreweana* are inadequately known. In the river valleys of the south the variation of *T. villosa*, *T. purpurea* and *T. forbesii* should be examined in the light of the above notes.

Mountains and lake shores of Malawi. From the mountains more material of *T. aequilata*, *T. whyteana*, *T. nyikensis*, *T. interrupta* subsp. *mildbraedii* and subsp. *elongatiflora*, *T. purpurea* subsp. *altissima* and *T. elongata* are required. On the shores of Lake Malawi *T. purpurea* subsp. *dunensis* and *T. reptans* var. *arenicola* are of particular interest.

Northern Mozambique. Despite excellent recent collections this area is still poorly known. *T. faulknerae* and *T. miranda*, newly described above, are known from only two collections each, while *T. pentaphylla* has been collected only once in the Flora Zambesiaca area. The subspecies of *T. aequilata* and *T. whyteana* are of particular interest on the Namuli Peaks.

Mountains of southern Mozambique. The mountains inland from Lourenço Marques seem to be particularly interesting for certain groups of *Tephrosia* centred in South Africa, and the area is still poorly known. The group including *T. incarnata*, *T. gobensis* and *T. cordata* is particularly interesting, while the variation of *T. polystachya* and *T. multijuga* requires elucidation. More material of *T. elongata*

from this area may show that it is taxonomieally separable from var. *tzaneensis*.

The author's thanks are due to Mrs. WINNIFRED HEBB and Mr. S. A. RENVOIZE for assistance in preparation of the text and maps for these notes.

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SUR L'IDENTIFICATION ET LA
TYPIFICATION DE *CAUCALIS DAUCOIDES* L.
ET DE *CAUCALIS GRANDIFLORA* L.

par

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Le *Caucalis daucoides* a été défini par LINNÉ (Sp. Pl. : 241, 1753) par: a) une diagnose — *Caucalis daucoides involucro universalì longitudine umbellae lanceolato*; b) un synonyme — *Caucalis dauci sylvestris folio, echinato magno fructu*, Magn. monsp.: 292; c) une description, qui a été basée sur un spécimen envoyé à LINNÉ par SAUVAGES; d) l'habitat — Montpellier.

Quelques auteurs (THELLUNG in HEGI, Fl. Mitteleur. 5, 2: 1068, 1926; DE LITARDIÈRE, Prodr. Fl. Corse, 3, 1: 62, 1938; B. K. CHICHKIN in Fl. U. R. S. S. 16: 183, 1950; etc.) admettent que *C. daucoides* L. (1753) est un synonyme de *C. platycarpus* (1753), ce dernier taxon compris dans le sens d'*Orlaya Kochii* Heywood (= *O. platycarpus* Koch)¹. D'autres auteurs, comme HEYWOOD (in Agron. Lusit. 22: 12, 1960), croient que la description de *C. daucoides* comprend l'*Orlaya grandiflora* Hoffm. et l'*O. Kochii*. D'après la description présentée, ARCANGELI (Comp. Fl. It.: 300, 301, 1882) le considère identique au *C. daucoides* L. (1767). D'autres encore, comme BRIQUET (Fl. Alpes Marit. 4: 91, 1906, in adnot.) et BERTOLONI (Fl. Ital. 3: 177, 1837), affirment que la description se rapporte exclusivement à l'*O. grandiflora*. Ce dernier point de vue est, à présent, aussi le nôtre, c'est à dire, nous croyons que le *C. daucoides* de 1753, est identique au *C. grandiflora* L.

¹ Celui-ci a été aussi notre avis en 1956 (cf. Bol. Soc. Brot. sér. 2, 30: 133, 1956).

La description de *G. daucoides* est très détaillée en ce qui concerne l'ombelle florifère, mais elle ne dit rien sur les fruits, ce qui fait croire que l'exemplaire étudié par LINNÉ en était dépourvu. Il s'agirait d'un spécimen à l'ombelle possédant 5 bractées lancéolées et acuminées, ce qui est le cas le plus fréquent chez l'*Orlaya grandiflora* (l'*O. Kochii* présente un involucre normalement à 2-3 bractées, dont, parfois, une plus longue que les autres et à sommet divisé); à fleurs nombreuses (*flosculi copiosi*), comme il arrive chez *PO. grandiflora* (chez *PO. Kochii* les fleurs ne sont pas en si grand nombre), dont trois hermaphrodites dans chaque ombellule comme chez *PO. grandiflora* (chez l'*O. Kochii* il y a seulement deux fleurs hermaphrodites dans chaque ombellule); et à pétales extérieurs rayonnants très longs et bipartis (*petalis maximis*). Après la description, LINNÉ fait la comparaison entre le *Caucalis daucoides* et le *C. grandiflora*, en affirmant que, chez celui-ci, les bractées de l'involucre sont plus courtes et les pétales extérieurs plus ronds. Comme, à notre avis, le *C. daucoides* est *YOrlaya grandiflora*, cette comparaison semble n'avoir pas de sens, puisqu'elle aurait été établie avec la même espèce, étant donné que le *C. grandiflora* L. est aussi, d'accord avec tous les auteurs, *PO. grandiflora* Hoffm. Cependant, l'échantillon de SAUVAGES pourrait présenter des différences par rapport à ceux considérés par LINNÉ dans *C. grandiflora* ce qui justifierait la

¹ Il peut y avoir jusqu'à 4 fleurs hermaphrodites dans chaque ombellule chez l'*O. grandiflora*.

² Une autre explication pourrait être aussi suggérée: LINNÉ aurait mal interprété les auteurs anciens, en prenant l'espèce décrite par ceux-ci et qu'il a considérée comme un synonyme de son *C. grandiflora*, non dans le sens de *YOrlaya grandiflora*, mais dans celui de l'*O. Kochii*. De cette façon, la comparaison serait valable, puisque cette dernière espèce possède les pétales rayonnants plus courts et plus ronds que ceux de l'*O. grandiflora*. Cette hypothèse s'accorde aussi avec l'échantillon de l'Hortus Siccus Cliffortianus qui porte sur l'étiquette la «phrase name» de BAUHIN — *Caucalis arvensis echinata, magno flore* — synonyme de l'espèce 2 (= *G. grandiflora*) de l'Hortus Cliffortianus — échantillon qu'appartient à l'*O. Kochii* et non à l'*O. grandiflora*. Néanmoins, l'*O. grandiflora* est une espèce tellement bien caractérisée et si bien décrite et représentée iconographiquement

comparaison. D'ailleurs, ce cas ne serait pas le seul dans lequel le savant botaniste suédois décrit deux fois une même espèce sous des noms différents.

En consultant les microfiches de l'herbier de LINNÉ (S), notre attention a été attirée par celle portant le n.° 118-1, laquelle, selon l'Index des microfiches et d'après C. A. M. LINDMAN (in *Ark. Bot.* 9, 2: 39, 1910), représenterait le *C. daucoides*, mais qui nous semblait correspondre à un échantillon de l'*O. grandiflora*. Grâce à l'amabilité du Directeur du Naturhistoriska Riksmuseum, de Stockholm¹, l'exemplaire correspondant à cette microfiche (Tab. 1) nous a été envoyé. D'après son étude, nous avons constaté que, comme nous Pavions supposé, il appartient à l'*O. grandiflora*, s'accordant parfaitement avec la description de *C. daucoides* L. (1753). Il porte les indications suivantes: a) sur un petit rectangle de papier, comme étiquette, la phrase *Caucalis dauci sylvestris folio echinato magno fructu*, c'est à dire, le synonyme donné par LINNÉ pour son espèce n.° 2 (*C. daucoides*) de *Species Plantarum*, de 1753; b) le numéro 2, au crayon, et la détermination 2 — *Daucoides* écrite à l'encre sur la face du papier de montage, sous l'étiquette; c) sur l'envers du papier de montage, *a Linne P.* L'écriture de l'étiquette nous semble celle de LINNÉ² et non celle de SAUVAGES (cf. S. SAVAGE, *Cat. Linn. Herb.*: t. 1-5 et 8, 9, 1945). Le numéro 2 sous l'étiquette a été écrit par LINNÉ (cf. C. A. M. LINDMAN, op. cit. 9, 2: 2, 39, 1910) et les autres indications par DAHL, son disciple, auquel il a offert beaucoup d'exemplaires. L'indication *a Linne P* n'offre aucun doute sur la provenance du spécimen.

par quelques-uns des botanistes cités par LINNÉ qu'il nous semble absurde que cet auteur ait pu la confondre avec une autre. Nous reviendrons à ce sujet plus loin.

¹ Nous remercions M. le Directeur de cette Institution par le prêt de ce précieux document.

² Selon C. A. M. LINDMAN (op. cit. 7: 7, 1908), LINNÉ a écrit les noms sur des étiquettes seulement dans sa jeunesse. Il a reçu l'herbier de SAUVAGES en 1749 (cf. W. T. STEARN, *An Introduction to the Species Plantarum*: 106, 1957), alors qu'il était âgé de 42 ans, donc quand il n'était plus un jeune homme. Mais quelques exceptions pourraient avoir eu lieu en ce qui concerne certains échantillons, sur lesquels il aurait mis des étiquettes.

Étant donné que cet échantillon s'accorde absolument (il possède une seule ombelle florifère, à bractées dont la longueur l'égalent) avec la description du *C. daucoides* L. (1753); qu'il porte le synonyme¹ indiqué par LINNÉ pour cette espèce; que le n.° 2 est celui qui correspond à cette espèce; et qu'il a été en possession de LINNÉ², nous le considérons comme le lectotypus de ce taxon.

Caucalis *daucoides* L., Sp. Pl.: 241 (1753)

Lectotypus: spécimen de l'Herbier Linnéen (microfiche 118-1) de S.

Comme cet échantillon s'identifie avec *YOrlaya grandiflora* (L.) Hoffm., *C. daucoides* L. est un synonyme de cette espèce et, par conséquent, de *C. grandiflora* L.

Le *Caucalis grandiflora* L. (Sp. Pl.: 240, 1753) a été caractérisé par: a) une diagnose — *Caucalis involucris singulis pentaphyllis foliolo unico duplo majore*, identique à celle de de l'espèce n.° 2 de l'Hortus Cliffortianus (p. 91, 1738); b) une série de synonymes, dont quelqu'uns avaient été déjà donnés dans ce même ouvrage; c) l'habitat — *Habitat in Europa*

¹ Le synonyme attribué par LINNÉ à son *G. daucoides*, de 1753, est inclus par GOUAN (Fl. Monsp.: 285, 1765) dans *G. daucoides* que cet auteur a pris dans un autre sens (= *G. daucoide* L., de 1767, = *G. Lappula* Grande). D'après la description que donne MAGNOL (Bot. Monspel.: 292, 1676) de son *Caucalis dauci sylvestris*, on ne peut pas savoir si ce taxon correspond entièrement au *C. daucoides* L., de 1767, puisqu'au moins en partie le texte se rapporte à *YOrlaya Kochii*. Mais, de toute façon, LINNÉ a interprété incorrectement l'espèce de MAGNOL.

² Probablement l'échantillon 338-2, de LINNÉ, marqué aussi avec le numéro 2, de l'écriture de LINNÉ, mais sans indication de sa provenance, serait un double de celui de S. Plus tard, LINNÉ, reconnaissant son erreur, c'est à dire que son *C. daucoides*, de 1753, était identique au *G. grandiflora*, aurait lié par un épingle avec le n.° 338-1 (LINNÉ) qui appartient à la dernière espèce et est marqué avec 1 (*G. grandiflora* est le premier dans *Species Plantarum*) et HU, ce qui montre qu'il provenait de l'Hortus Botanicus Upsaliensis. L'original qui possédait l'étiquette aurait été donné à DAHL, qui, en se basant sur le numéro 2 et le synonyme, aurait écrit la détermination *daucoides*, sans faire attention aux caractères de la plante.

australiori inter segetes. La première partie de la diagnose s'applique très bien à l'*Orlaya grandiflora*, dont les involucres sont plus fréquemment à 5 bractées, ce nombre étant aussi celui des bractées des involuclles; mais le caractère *foliolo unico duplo majore* ne s'ajuste pas à cette espèce, car toutes les bractées de son involucre sont à peu près de la même longueur, tout au moins quand complètement développées¹.

Parmi les synonymes, un des plus importants est l'*Echinophora pycnocarpus*, de COLONNA (Ecpfr.: 91, t. 94, 1606), puisque cet auteur donne une description assez exacte et une fidèle figure de son espèce, ne laissant rien à douter qu'il s'agit de l'*Orlaya grandiflora*².

Étant donné que LINNÉ répète, en 1753, la diagnose de l'Hortus Cliffortianus, on devrait s'attendre à trouver, dans l'herbier de CLIFFORD, un échantillon pouvant typifier le *Caucalis grandiflora*. En effet, il y a dans cet herbier (voir Tableau I)³ un exemplaire ayant, sur l'étiquette, la «phrase

¹ Nous croyons que LINNÉ a obtenu cette donnée de COLONNA (Ecpfr.: 92, 1606), puisque cet auteur, à propos des bractées de l'involucre de son *Echinophora pycnocarpus* (synonyme de *G. grandiflora* L.), affirme: «Umbellae verò cauliculus antequam in umbellam dividatur, basim illi construit in quinque foliolis stellatis, quorum ora limbo albo circumdantur, eorumq.; unicum in longius duplò degenerat, & antequam flores in umbellam expandantur, illos veluti folliculo inclusos servabant». Cependant, dans la figure de gauche de la Table 94 du même ouvrage, qui représente cette espèce, les bractées des ombelles semblent être à peu près de la même longueur.

² Un nouveau synonyme, donné par LINNÉ pour le *C. grandiflora* en 1753, est le *Caucalis involucro universali pinnatifido partialibus indivisis umbella multifida*, Fl. Suec.: 225 (1745), qui offre des difficultés d'identification. Nous n'avons pas vu la première édition de la Flora Suecica, mais dans la seconde (p. 463, 1755) LINNÉ range ce *Caucalis* dans les «Dubia», en disant: «Planta non dum flores explicaverat, ut poteram speciem determinare, in quam alii inquirant ulterius». D'après les caractères de l'involucre et du nombre de rayons, il semble s'agir d'un *Daucus*, mais les bractées des involuclles seraient «indivisis», ce qui ne s'accorde pas avec les espèces de ce genre. Voir ce que affirme RICHTER (Codex Linn.: 257, 1835), à propos de cette plante.

³ On trouve six spécimens de *Caucalis* (voir Tableau I) dans l'herbier de CLIFFORD, dont un dans la couverture du genre *Artemisia* et les

name» de BAUHIN, incluse par LINNÉ comme synonyme dans son espèce 2, de 1738, et dans le *C. grandiflora*, de 1753. L'étiquette porte aussi la détermination *grandiflora*, en écriture différente de l'antérieure. Malgré cela, l'échantillon n'appartient pas à *YOrlaya grandiflora* (lequel jusqu'à ce jour a eu comme basonyme le *C. grandiflora* L.), mais à *YO. Kochii* Heywood. De cette façon, on conclut que, ou bien l'échantillon correspondant à *YO. grandiflora* a disparu en se conservant son étiquette, ou LINNÉ a commis une erreur d'interprétation. Cette dernière supposition semble possible, puisque le dit exemplaire est, de tous les *Caucalis* de l'Hortus Siccus, celui qui, par ses pétales extérieurs rayonnants, se rapproche le plus de *YO. grandiflora* et, en outre, ce qui est anormal pour *YO. Kochii*, au moins une des ombelles possède un involucre à 5 et non à 3 bractées.

Si on prenait cet échantillon comme l'«obligate lectotypus» de *C. grandiflora*, puisqu'aucun autre de cet herbier ne le pourrait être, le concept qu'on a eu de cette espèce jusqu'à présent devrait changer, ce qui obligerait à une altération nomenclaturale.

Cependant, si LINNÉ a commis une erreur d'interprétation en 1738, le même peut n'avoir pas eu lieu en 1753, en étudiant les spécimens de *C. grandiflora* qu'il possédait alors. On sait que, jusqu'à 1748, cette espèce ne fut pas cultivée au Jardin Botanique d'Upsala car elle ne figure pas dans l'Hortus Upsaliensis (1748), qui inclut seulement le *Caucalis* 3 (= *C. platycarpus*, de 1753) et le *Caucalis* 4 [= (*Tordylium*) *Toriiis nodosa*] de l'Hortus Cliffortianus. Dans l'herbier de LINNÉ (LINN), les deux spécimens 338-1 et 338-3, qu'appartiennent à *YOrlaya grandiflora*, portent l'indication HU, ce qui

autres dans celle de *Caucalis*. Tous portent des étiquettes avec des «phrases names» qui n'ont pas été écrites par LINNÉ. D'autres déterminations, d'une écriture différente et en nomenclature binomiale, ont été faites par un autre inconnu, après 1762, puisque LINNÉ a transféré l'*Arbediamuricata* dans le genre *Daucus* en cette date (Sp. Pl. ed. 2, 1762). La place des étiquettes au moment où ce dernier inconnu a étudié les plantes n'était pas la même qu'à présent; en effect, faisant foi par ses déterminations, l'étiquette de D était placée en B et l'étiquette de l'échantillon F a été échangée avec celle de A.

indique son origine; la plante correspondante pourrait avoir été cultivée à l'Hortus Botanicus Upsaliensis entre 1748 et 1753. Mais, si cela ne fut pas le cas, LINNÉ a certainement examiné l'exemplaire de l'Hortus Siccus de J. BURSER qui se trouvait alors à Upsala, où il est encore (UPS). Étant donné que ce dernier botaniste fut un correspondant de BAUHIN et que son herbier est ordonné et nommé selon le Pinax (cf. W. T. STEARN, op. cit.: 116, 1957), l'Hortus Siccus de BURSER possède une grande importance, ayant permis à LINNÉ d'identifier beaucoup des espèces de BAUHIN. Dans le dit herbier, l'échantillon VII (2) 54 porte, sur l'étiquette, la «phrase name» de BAUHIN (Pinax: 152) que LINNÉ a mise dans la synonymie de son espèce n.º 2 de l'Hortus Cliffortianus et dans celle du *C. grandiflora* de 1753 — *Caucalis arvensis echinata, magno flore* — et l'indication que la plante avait été récoltée «In Saxonia». Comme la Saxe appartient à l'Allemagne (la «Germania» est une des régions citées comme l'habitat de l'espèce n.º 2 de *Caucalis*, en 1738), en considérant cette donnée et l'antérieure, nous désignons l'exemplaire de BURSER comme le lectotypus de *C. grandiflora* L. Ce spécimen s'identifiant avec *Orlaya grandiflora* Hoffm., on conclut que LINNÉ avait, en 1753, la même idée de cette espèce qu'il a eu depuis, dans le Systema (pag. 205, 1767), et qui est aussi celle que ont eue avant et après lui tous les botanistes.

Orlaya grandiflora (L.) Hoffm.

Caucalis grandiflora L., Sp. Pl.: 240 (1753).

Lectotypus: Specimen VII (2) 54 [in Horto Siccio Burseri (UPS)]¹.

Dans cet article nous avons employé le nom *Orlaya Kochii*, proposé par HEYWOOD (op. cit.: 13) en substitution d'*O. platycarpus* Koch. Selon presque tous les auteurs, cette espèce serait le *Caucalis platycarpus* L., de 1753, identique au

¹ Quelqu'un, sur une étiquette récente, a élu l'exemplaire C (voir Tableau I) de l'Hortus Cliffortianus (BM) comme le lectotypus de *Orlaya grandiflora*. Étant donné ce que nous venons de conclure, cette étiquette doit être retirée de cet échantillon.

C. platycarpus L. de 1767, mais d'après HEYWOOD, qui a suivi l'opinion de quelques autres botanistes (SCOPOLI, Fl. Carn. ed. 2, 1: 190, 1772; DANDY, List of Brit. Vasc. Pl.: 69, 1958; etc.), le *C. platycarpus*, de 1753, est identique au *C. daucoides* L., de 1767 (= *C. Lappula* Grande). Pour arriver à cette conclusion, HEYWOOD s'est basé sur l'échantillon D (voir Tableau I) de l'Hortus Siccus Cliffortianus, qu'il a désigné comme le lectotypus de *C. platycarpus* L. En effet, cet exemplaire appartient au *C. daucoides* L., de 1767, et il porte une étiquette avec une «phrase name» que quelques auteurs (cf. GOUAN, loc. cit.) considèrent comme synonyme de cette espèce. Cependant, la description de *C. platycarpus*, de 1753, est ambiguë, englobant en partie (*involucris triphyllis*) *YOrlaya platycarpus* et en partie (*umbellulistrispermis*) le *Caucalis daucoides*, de 1767, la partie restante (*umbella trifida*) pouvant s'appliquer à chacun de ces deux taxa. Etant donné qu'il y a parfois des ombellules fructifères anormales (à trois et même à quatre fruits) chez *YOrlaya platycarpus*, la description s'ajusterait parfaitement à cette espèce si les échantillons vus par LINNÉ n'étaient pas normales. D'autre part, en ce qui concerne le nombre des bractées de l'involucre, la description ne peut pas s'appliquer au *C. daucoides* L., de 1767, puisque cette espèce ou ne possède aucune ou seulement une bractée à l'involucre. De plus, les synonymes et les figures indiqués par LINNÉ pour le *C. platycarpus*, de 1753, s'accordent avec *YOrlaya platycarpus* et non avec le *C. daucoides*, de 1767. Si cette dernière espèce était la même que le *C. platycarpus*, de 1753, alors LINNÉ n'aurait pas besoin de corriger la description de celle-ci, en 1767, dans le Systema, où la phrase «*Caucalis umbella trifida, umbellulis trispermis, involucris triphyllis*», de 1753, est substituée par «*C. umbellis trifidis aphyllis, umbellulis trispermis triphyllis*», dont la signification est bien différente de l'antérieure. De plus, la figure indiquée pour le *C. daucoides*, de 1767, est la tab. 97, de COLONNA, tandis que la figure qui LINNÉ indique pour le *C. platycarpus*, de 1753, est la tab. 94 du même auteur. Il est vrai que, soit pour cette dernière espèce, soit pour le *C. daucoides*, de 1767, LINNÉ cite comme synonyme l'Hortus Cliffortianus, page 91, ce qui amènerait à croire, qu'en effet, il s'agit de la même espèce dont le type se

TABLEAU I
Spécimens de *Caucalis* de l'Hortus Siccus Cliffortianus (BM).

	Déterminations primitives («phrase-names») sur les étiquettes originales	Déterminations postérieures (binoms ou épithètes linnéens) sur les étiquettes originales	Déterminations plus récentes, au crayon, sur le papier de montage	Déterminations dactylographiées sur des étiquettes récentes	Identifications
A	<i>Daucus major</i> , <i>daucoïdes tingitana</i>	<i>Daucus muricatus</i>	<i>Turgenia latifolia</i> Hoffm.		<i>Turgenia latifolia</i> (L.) Hoffm.
B	<i>Caucalis monspeliaca</i> , <i>echinata</i> , <i>magno fructu</i>	<i>Daucoïdes</i>	<i>Turgenia latifolia</i> Hoffm.		<i>Turgenia latifolia</i> (L.) Hoffm.
C	<i>Caucalis arvensis echinata</i> , <i>magno flore</i>	<i>grandiflora</i>		[Type Specimen (imprimé)] of <i>Caucalis grandiflora</i> L., Sp. Pl. 1: 240 (1753)	<i>Orlaya Kochii</i> Heyw. (= <i>O. platycarpus</i> Koch)
D	<i>Caucalis dauci sylvestris folio echinato</i> , <i>magno fructu</i>	<i>latifolia</i>		[Type specimen (imprimé)] of <i>Caucalis platycarpus</i> L., Sp. Pl. 1: 241 (1753)	<i>Caucalis daucoïdes</i> L., 1767 (non 1753) = <i>C. Lappula</i> (Weber) Grande = <i>C. platycarpus</i> L., 1753, sec. Heywood, non Auct. pl.
E	<i>Caucalis nodoso echinata semine</i>	<i>Terdylum nodosum</i>	<i>Torilis nodosa</i>		<i>Torilis nodosa</i> (L.) Gaertn.
F	<i>Caucalis arvensis echinata</i> , <i>latifolia</i>	<i>latifolia</i>		<i>Daucus muricatus</i>	<i>Daucus muricatus</i> (L.) L.

trouverait dans l'Hortus Siccus de CLIFFORD. Mais se rappellerait LINNÉ exactement de tous les spécimens de cet herbier, après toutes les années écoulées depuis son départ de la Hollande? En prenant en considération toutes les peines qu'il s'est données pour déterminer les échantillons de *Caucalis* de son herbier (il faut voir les successives déterminations, parfois deux, avant d'arriver à la définitive), on ne s'étonnera pas que quelque confusion soit survenue dans son esprit concernant les plantes de l'herbier de CLIFFORD. D'ailleurs, l'échantillon D (voir Tableau I), c'est à dire le lectotypus proposé pour le *C. platycarpus* L., de 1753, même en ne considérant pas le caractère du nombre de bractées de l'involucre, ne s'accorde pas complètement avec les autres caractères référés dans la diagnose de cette espèce. En effet, l'ombelle supérieure possède 5 rayons et non 3 et il y a 2-3 fruits par ombellule et non toujours 3. De plus, il y a dans cet herbier un spécimen (C du Tableau I) appartenant à l'*Orlaya platycarpus*, mais avec l'étiquette *Caucalis arvensis echinato magno flore*. Alors, en supposant que le spécimen du vrai *C. grandiflora*, auquel ce synonyme se rapporte, ait disparu en se conservant son étiquette, quel des deux échantillons, le C ou le D, a été considéré par LINNÉ comme son espèce n.° 3 (= *C. platycarpus*, de 1753) de l'Hortus Cliffortianus?¹ Il faut considérer encore que toutes les «phrases names» des étiquettes de ces spécimens, à l'exception de *Caucalis dauci sylvestris folio, echinato magno fructu*, sont citées par lui comme des synonymes de ses espèces, en 1748. Pourquoi alors cette exception?

¹ Dans la note de la page 400 nous avons vu que quelques échanges d'étiquettes ont eu lieu à l'herbier de CLIFFORD. On peut admettre aussi que l'étiquette originale de l'échantillon C était celle qu'on trouve à présent sur l'exemplaire B et qui porte un synonyme indiqué par LINNÉ pour son *C. platycarpus*, de 1753. Cependant, la même étiquette pourrait être sur l'échantillon D, ce qui donnerait raison à HEYWOOD. Dans ce cas, à quel spécimen appartiendrait originellement l'étiquette de D? On peut, évidemment, mettre de côté les étiquettes et leurs «phrases names», mais, pour qu'un spécimen pût être pris comme lectotypus d'une espèce, il faut que, par ses caractères, il s'accorde avec la description de celle-ci (ce qui n'est pas tout-à-fait le cas présent) et qu'il y ait une probabilité qu'il ait été

En considérant que la diagnose de *C. platycarpus*, de 1753, est ambiguë, qu'elle ne s'applique totalement à l'échantillon D de l'herbier de CLIFFORD, qu'elle peut s'appliquer aussi, au moins en partie, au spécimen C, ne serait-il préférable de prendre ce taxon comme un «nomen confusum», ayant encore en considération qu'il a été compris en deux sens différents (comme *Orlaya platycarpus* et comme *Caucalis Lappula*) ?

HEYWOOD a employé, comme nous l'avons dit, *Orlaya Kochii* au lieu d'*O. platycarpus* Koch. D'après la figure de l'*O. Topaliana* Beauverd (in Candollea, 7: 262, t. 7, 1937), cette espèce nous semble très proche (comme il est admis par son auteur lui-même) sinon identique à celle-là. Si, par l'étude d'un nombre plus élevé de plantes (BEAUVERD a basé sa description sur une seule récolte dont les fleurs étaient apétales) on vient à établir l'identité, le nom de BEAUVERD sera celui qui devra être employé et non celui de HEYWOOD. Il y a même un nom antérieur à *YO. Topaliana*, *YO. intermedia* Boiss. (in Ann. Sc. Nat. 2: 49, 1844), que l'auteur a postérieurement (Fl. Or. 2: 1071, 1872) considéré comme une variété de *YO. platycarpus*. Dans le cas de *YO. intermedia* Boiss. n'être pas espèce indépendante, sera ce nom qu'on est obligé à prendre au lieu d'*Orlaya platycarpus*. Nous n'avons pu étudier aucun échantillon de ces taxa, mais nous attirons sur eux l'attention des botanistes intéressés à ces problèmes.

Dans l'herbier de LINNÉ (LINN) les échantillons sont groupés selon l'ordre des espèces suivie dans le Systema (ed. XII: 205, 1767), de la façon suivante:

vu par son auteur. Étant donné que LINNÉ dans l'Hortus Cliffortianus réfère cinq espèces de *Caucalis* (dont une sous *Artemisia*) et que, à présent, on trouve six exemplaires étiquetés comme *Caucalis* dans l'Hortus Siccus, un parmi eux semble n'avoir existé au temps du séjour de LINNÉ en Hollande. Lequel ?

Échantillons

Espèce n.º 1 (Syst. et Sp. Pl.)	$\left. \begin{array}{l} 338-1 \\ 338-2 \\ 338-3 \end{array} \right\}$	groupe 1
Caucalis grandiflora L.		
[Orlaya grandiflora (L.) Hoffm.]		
Espèce n.º 2 (Syst.)	$\left. \begin{array}{l} 338-4 \\ 338-5 \\ 338-6 \end{array} \right\}$	groupe 2
Caucalis daucoïdes L.		
(C. Lappula Grande=C. platycarpus L., 1753?)		
Espèce n.º 7 (Syst. ¹)	$\left. \begin{array}{l} 338-7 \end{array} \right\}$	groupe 3
Caucalis latifolia L. [Turgenia latifolia (L.) Hoffm.]		
Espèce n.º 4 (Syst.)	$\left. \begin{array}{l} 338-8 \\ 338-9 \\ 338-10 \end{array} \right\}$	groupe 4
Caucalis platycarpus L.		
(Orlaya Kochii Heywood=O. platycarpus Koch = O. Tcpaliana Beauverd? = O. intermedia Boiss.?)		
Espèce n.º 5 (Syst. et Sp. Pl.)	$\left. \begin{array}{l} 338-12 \end{array} \right\}$	groupe 5
Caucalis orientalis L.		
Espèce n.º 6 (Syst. et Sp. Pl.)	$\left. \begin{array}{l} 338-13 \end{array} \right\}$	groupe 6
Caucalis leptophylla L.		
[Torilis leptophylla (L.) Reichenb. f.]		

De cette façon, il y a correspondance entre les numéros des espèces et ceux des groupes d'exemplaires. L'échantillon 338-11 a été exclu de cette liste, puisqu'il s'agit du *Caucalis pumila* Gouan, espèce non citée dans le Systema. L'identification de l'échantillon n.º 338-13, qu'appartient au *Torilis leptophylla*, n'a pas été faite par LINNÉ, mais par SMITH qui a écrit *C. humilis* Jacq. Hort. t. 195 (synonyme du *T. leptophylla*).

¹ Avec le n.º 7, mais référé en 3ème place dans le Systema, entre les espèces n.º 2 (*C. daucoïdes*) et n.º 4 (*C. platycarpus*). Dans Species Plantarum, celle avec le n.º 3 est le *C. mauritanica* qui n'est pas représenté dans LINN.

ADDENDA

Après l'envoi de cet article pour publication, nous avons pris connaissance de l'étude «Flora der Insel Kythera gleichzeitig Beginn einer nomenklatorischen Überprüfung der griechischen Gefässpflanzenarten», par W. GREUTER & K. H. RECHINGER (in Boissiera, **13**:1967), où se trouve (pag. 92, 93) une note concernant le *C. daucoides* L.

GREUTER, l'auteur de cette note, fait l'identification de ce taxon d'après le synonyme de MAGNOL que nous avons référé ci-dessus (pag. 395). Sa conclusion est que le *C. daucoides* L., de 1753, est identique à l'*Orlaya platycarpus* Koch (= *O. Kochii* Heywood), en faisant la nouvelle combinaison *O. daucoides* (L.) Greuter, puisque, selon lui, dans le genre *Orlaya*, rien ne s'opposait à son établissement. Comme nous l'avons dit (cf. note 1, pag. 398), le texte de MAGNOL correspondant à son «*Caucalis dauci sylvestris folio, echinato magno fructu*», se rapporte, au moins en partie, au *C. daucoides* L., de 1767; d'autre part, la description de LINNÉ se réfère, à notre avis, à *Orlaya grandiflora* et s'applique complètement à l'exemplaire de l'herbier de LINNÉ (S) qui nous avons désigné comme le lectotypus de *G. daucoides* et qui est un échantillon de *YO. grandiflora*.

De plus, GREUTER considère le nom *O. platycarpus* Koch comme un nouveau nom légitime. Si cela peut être admis, ce nom doit se maintenir. Mais, si le nom de KOCH ne pourra pas être employé, on doit choisir pour l'espèce l'épithète *O. Topaliana* Beauverd, puisque GREUTER, d'après l'examen du type, a constaté que ce taxon, comme nous l'avions supposé, est identique à *YO. platycarpus*. Cependant, si l'*O. intermedia* Boiss., espèce à laquelle GREUTER ne fait aucune référence, est aussi identique à *YO. platycarpus*, le nom de BOISSIER sera celui qu'on doit choisir (cf. pag. 405).

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Onlaya grandiflora (L.) Hoffm.
Lectotypus of *Caucalis daucoides* L., ff. pp. 241, 1753
H. Fernandes Coimbra, 1967

Caucalis daucoides L.

14.8

2. Linné

Lectotypus de *Caucalis daucoides* L. (1753)
Spécimen 118-1 de l'herbier de Linné (S)

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