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A REVISION OF THE GENUS FOCKEA ENDL. (ASCLEPIADACEAE)

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by

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PREFACE

The flora of the Republic of South Africa, Lesotho, Swaziland, Botswana and South West Africa is currently being revised and published in the form of 33 volumes known as The Flora of Southern Africa (FSA). This major taxonomic work is being undertaken by the Botanical Research Institute (Department of Agricultural Technical Services, Pretoria) and is meant to replace the Flora Capensis (1859-1933). Of the proposed 33 volumes, 7 have been published and much remains to be done.

In 1979 Dr R.A. Dyer, retired first Director of the Botanical Research Institute, asked the author to revise the genus Fockea Endl. The findings presented in this thesis will in due course be presented in the required format and submitted for inclusion under the family Asclepiadaceae which is presently being researched for FSA.

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Dr R.A. Lubke for his supervision and advice.

The Directors and staff of the following institutions for the loan of herbarium specimens including types:

BM	British Museum, London
BOL	Bolus Herbarium, Cape Town
BR	Jardin botanique national de Belgique, Bruxelles
G	Conservatoire et Jardin botaniques, Geneva
GRA	Herbarium of the Albany Museum, Grahamstown
K	Royal Botanic Gardens, Kew, London
KMG	Alexander McGregor Memorial Museum, Kimberley
KNP	Skukuza Herbarium, Kruger National Park
NBG	Compton Herbarium, Kirstenbosch, Cape Town
NH	Natal Herbarium, Durban
NPB	Natal Parks Board Herbarium, Mtubatuba
NU	University of Natal Herbarium, Pietermaritzburg
P	Muséum National d'Histoire Naturelle, Paris
PEU	University of Port Elizabeth Herbarium, Port Elizabeth
PRE	Botanical Research Institute, Pretoria
PRU	University of Pretoria Herbarium, Pretoria
PUC	University of Potchefstroom Herbarium, Potchefstroom
RUH	Rhodes University, Grahamstown
SAM	South African Museum Herbarium, Kirstenbosch, Cape Town
SRGH	National Herbarium, Salisbury
STE	Government Herbarium, Stellenbosch
UPS	Thunberg Herbarium, University of Uppsala, Uppsala
W	Naturhistorisches Museum, Vienna
WIND	SWA Herbarium, Windhoek

The South African liason officer at Kew, Dr H.F. Glen, for advice.

Mr M.B. Bayer, Curator of the Karoo Botanic Garden, Worcester, for spirit material, seeds and juvenile plants.

The C.S.I.R. for a grant for running expenses which enabled the author to travel to the northern Cape and South West Africa in 1980.

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## ABSTRACT

A taxonomic revision of Fockea Endl. (Asclepiadaceae) is presented in which 5 species are recognised. Descriptions, illustrations and a key to the species are provided. F. comaru (E. Mey.)N.E.Br. is presented sensu lato, and because of its earlier publication in 1838 takes priority over F. angustifolia K. Schum. which was described in 1893. Historical and ecological notes on the genus are given and phylogenetic conclusions drawn.

## 1 INTRODUCTION

The genus Fockea Endl. belongs to the large family Asclepiadaceae which consists of 200 genera and approximately 2000 species (R.A. Dyer in Gen.1:473(1975)). The southern African members of this family were last revised by Dr N.E. Brown in Flora Capensis in 1909. In his revision Brown recognised six tribes. The tribe Marsdenieae, of which Fockea is a member, is characterised by the anthers having apical membranous appendages and the pollen masses (pollinia) erect in the anther thecae.

In his 'Genera of Southern African Flowering Plants' (1975) Dr R.A. Dyer dispenses with tribes and keys out Fockea on floral characters: "Pollen masses erect" and "corona tubular.....with 1-2 superposed series of teeth or filiform processes and 5 pairs of wing-like keels within the tube."

In recent years it has become increasingly obvious to those who work on Asclepiads that Fockea, in common with many other allied genera, has been "over-described" and its suspected synonymy

required investigation.

After several months of field investigation the author became aware that because Fockea possesses an underground tuber and produces seasonal aerial growth under special conditions it is nearly always collected by accident and not by design. The following incident illustrates how difficult it can be to find the genus in the field: Acting on information received from a farmer, the author arranged to visit the farm Mickberg in the district of Karasburg, S.W.A. The farmer confidently set out to a distant ridge, describing the 'Kambroe' to the author en route. Several hours of careful searching brought no Fockea plants to light. It was obvious that the plants, apparently the dwarf F. sinuata (E. Mey.) Druce, were in the dormant underground stage.

To conduct a useful investigation, therefore, it was necessary to obtain as much herbarium material as possible.

Of 31 herbaria contacted in southern Africa, material was received from 17, the rest having no specimens of Fockea in their collections. Of 4 other African herbaria, one, the Kenya Herbarium in Nairobi, sent information and the rest did not reply. Of 32 herbaria contacted in Europe, the United Kingdom and America, material was received from 7, letters intimating no material came from 17 and 8 herbaria did not reply. On the whole the exercise was very successful and a total of 393 specimens were examined. All herbaria were eager to have their material correctly identified and determinavit labels have been attached to the specimen sheets prior to their return.

Evidence of the paucity of collections of Fockea is given in a letter from the University of the Witwatersrand, in which Lynette Davidson of the Moss Herbarium writes: "This is the first time that I can recall that we have not been able to comply with a request for material."

## 1.1 HISTORICAL NOTES

A Swedish naturalist and pupil of Linnaeus, Karl Peter Thunberg worked his way to South Africa as assistant ship's surgeon, arriving at the Cape in April 1772. It is probable that the earliest collection of Fockea was made by Thunberg at some time during the three years which followed. The specimen labelled Echites edulis (Spec.ill.1) in Carro Goudsrivier (Karoo, Gouritz River) which is lodged in the Thunberg Herbarium at Uppsala was collected in this period. Despite the first epithet, Thunberg described his new species as Pergularia edulis in 1794 (Thunb., Prodr.1:38).

In 1785 two collectors, Franz Boos and Georg Scholl, were sent from Vienna to the Cape, where they assembled 280 cases of living plants. It is almost certain that this material included the famous 'Fockea capensis of Schönbrunn' (Pl.1, Fig 1, Spec.ill.4a & 4b) which for more than one hundred years was believed to be the only surviving specimen of an extinct species. In 1906 it was rediscovered near Prince Albert by the late Dr R. Marloth (Kew Bull.1909,349) but the legend survived several more decades. The Schönbrunn plant was described and illustrated in colour as Cynanchum crispum by Von Jacquin in *Fragmenta botanica* (Jacq. Fragm.31,t.34:fig 5(1809)).

In 1838 an Austrian botanist Stephen Ladislaus Endlicher delimited the genus Fockea which was figured in *Iconographia Generum Plantarum* (1838) and described in *Novarum stirpium decades* (1839). The genus commemorates G.W. Focke, a physician at Bremen, who published several botanical papers between 1832 and 1845. Endlicher's

description of F. capensis was based on the cultivated specimen at the Imperial gardens of Schönbrunn near Vienna and the type material (Plate 2) is therefore of uncertain locality. In 1897 Karl Schumann correctly cited the taxon as F. crispa, thus recognising Jacquin's earlier epithet (Pflanzenfam. f.4.1:296).

In 1838 E. Meyer tentatively described the new species comaru, sinuatum and macrorrhizum under the genus Brachystelma (Comm. Pl. Afri. Aus. F.2:195-197). B. ?comaru was based on Drège's flowerless linear-leaved specimen collected in Steerkloof (E. Meyer) or vicinity of Stykloof west of Richmond (N.E. Brown in Fl. Cap.4.1. (1909)). In his description of the Fockea species in Flora Capensis, N.E. Brown recognised F. comaru under 'imperfectly known species.' Doubt attended the locality of Meyer's B. ?sinuatum: the type material Drège 3439B (Spec.ill.5) was apparently seen by N.E. Brown who wrote that it was labelled as being collected between 'Kat and Swart Rivier' in the eastern Cape, whereas E. Meyer and Drège recorded that it came from near the Dwyka River in the vicinity of Prince Albert and from Brak vallei near Richmond. Bearing its known distribution in mind it is certain that the western Karoo locality is correct; in 1917 this species was correctly cited as F. sinuata by Druce. Meyer's description of glabrous material with 'ovate undulate-crisped leaves' from 'Oudeberg' and his references to Thunberg's Pergularia edulis clearly indicate that his B. ?macrorrhizum is none other than F. edulis.

Carl Ludwig Zeyher, a German professional botanical collector, arrived at the Cape in 1822 and collected specimens of F. edulis

in the Uitenhage district some fifty years after Thunberg's collection. In 1842 William Henry Harvey cited Zeyher 965 as the type of a new genus, Chymocormus, in Hooker's London Journal (Hook., Lond. J. Bot. 1,23). Examination of both Echites edulis and Zeyher 965 (Spec.ills. 1 & 2) has confirmed that they are the same species. In 1893 Karl Schumann correctly cited this species as F.edulis (Engl. Jahrb. 17:145). In 1844 Joseph Descaigne described another Zeyher collection of F. edulis (Zeyher 239, Spec.ill.3) and called his species F. glabra. The name F. glabra has survived for an extraordinarily long period - more than 100 years; type sheets were confirmed as F. glabra by Herbert Huber in 1956 in spite of the fact that in Kew Bulletin (1933) R.A. Dyer published the following: "Fockea edulis (Thunb.)K. Schum. and F. crispa (Jacq.) K. Schum. are under the names F. glabra Decne. and F. capensis Endl. respectively in Dyer, Fl. Cap. 4 Sect. 1:779-780. The former two specific epithets take priority according to the international rules."

Also in 1893, and in the same publication, Karl Schumann described two new species, the tropical F. multiflora and the wide-spread F. angustifolia (Spec.ills. 7a,8,9). As F. multiflora is the largest and most distinct of the Fockea species it is surprising that two years later N.E. Brown published a description of an Angolan collection of the same species under the name of F. schinzii (Spec.ill 7b). He noted the affinity with F. multiflora (which he had not seen) and used trivial floral characters for delimitation of his species: acute corolla lobes (instead of sub-acute in F. multiflora) and fine detail of the coronal-tube teeth,

which are slightly variable within the species throughout the genus. Brown again distinguishes the two taxa much later in Flora of Tropical Africa, in which Schumann's and his descriptions appear together (Fl. Trop. Af. 4.1:427-429 (1904)).

Also in 1895 N.E. Brown published his description of F. undulata (Kew Bull. 260) citing Burke's specimen (Spec.ill. 6) as the type. In his revision of Fockea in Flora Capensis in 1909 he wrote that "the type specimen of Brachystelma sinuatum in E. Meyer's herbarium, although flowerless, is identical with F. undulata" - but still upheld his own species.

In his delimitation of F. angustifolia in 1893 Karl Schumann did not take cognisance of the southern population of similar but linear-leaved plants described as F. comaru much earlier by E. Meyer. The matter of the comaru-angustifolia complex is examined in detail under the author's description of this species. The plants to which Schumann's epithet referred have been re-described on a number of occasions: In 1895 Rudolph Schlechter described F. sessiliflora (Fig 2) in Bot. Jahrb. 20 Beibl. 51: 44. In 1904 N.E. Brown described F. lugardii (Spec.ill. 10) in Fl. Trop. Af. 4, 1: 429-430. In 1905 Schlechter described F. dammarana (Spec.ill. 11) in Bot. Jahrb. 38: 56. In 1908 N.E. Brown described F. tugelensis (Spec.ill. 12) in Fl. Cap. 4, 1: 778. In 1913 Schlechter described F. mildbraedii (Wiss. Erg. 2: 545) and in 1914 Spencer le M. Moore described F. monroi (Journ. Bot. 50, 2: 149) (Spec.ill. 13). With one exception (F. mildbraedii) all of these are readily seen to be synonyms. The author was unable to trace type of F. mildbraedii (Tanzania, Lembeni, Winkler 3803).

However, not only does Schlechter's description compare very well with that of Schumann's, but he also suggests a close relationship to his Transvaal species, F. sessiliflora, which is a synonym of Schumann's F. angustifolia. The author therefore adds - albeit with caution - F. mildbraedii to the synonymy of F. comaru which takes priority over F. angustifolia because of its earlier publication.

In 1933 two species of Fockea from the eastern Cape were described by Dr R.A. Dyer (Kew Bull.: 459 (1933)): F. cylindrica (Spec.ill 14) becomes a synonym of F. edulis, and F. gracilis (Spec.ill 15) is the linear-leaved form of F. comaru.

In 1967 Herbert Huber placed F. sessiliflora, F. lugardii and F. dammarana in synonymy with F. angustifolia, and F. schinzii in synonymy with F. multiflora (Prod. Fl. S.W.A. 114: 31).

In 1976 Dr R.A. Dyer increased the synonymy of Schumann's F. angustifolia by adding the short-petalled F. tugelensis from Natal (Flow. Pl. Afr. 43: 1711).

In summary, the validly published names and corrected citations of species of Fockea appeared in the following chronological order:

<u>Pergularia edulis</u> Thunb.	1794
<u>Cynanchum crispum</u> Jacq.	1809
<u>Brachystelma ? comaru</u> E. Mey.	1838
<u>Brachystelma ? macrorrhizum</u> E. Mey.	"
<u>Brachystelma ? sinuatum</u> E. Mey.	"
<u>Fockea capensis</u> Endl.	"
<u>Chymocormus edulis</u> Harv.	1842
<u>F. glabra</u> Decne.	1844

<u>Brachystelma circinatum</u> Marl. non E. Mey.	1889
<u>F. angustifolia</u> K. Schum	1893
<u>F. edulis</u> (Thunb.) K. Schum.	"
<u>F. multiflora</u> K. Schum.	"
<u>F. schinzii</u> N.E. Br.	1895
<u>F. undulata</u> N.E. Br.	"
<u>F. sessiliflora</u> Schltr.	"
<u>F. crispa</u> (Jacq.) K. Schum	1897
<u>F. lugardii</u> N.E. Br.	1904
<u>F. dammarana</u> Schltr.	1905
<u>F. tugelensis</u> N.E. Br.	1908
<u>F. comaru</u> (E. Mey.) N.E. Br.	1908
<u>F. mildbraedii</u> Schltr.	1913
<u>F. monroi</u> S. Moore	1914
<u>F. sinuata</u> (E. Mey) Druce	1917
<u>F. cylindrica</u> R.A. Dyer	1933
<u>F. gracilis</u> R.A. Dyer	"

It will be noted that 20 specific names have been applied to Fockea species since 1794, of which 5 are upheld in this revision.



Plate 1. "Fockea capensis - Schönbrunn. The only presently known living specimen in the world. Over 100 years old." From a postcard sent from Vienna to South Africa in 1926. In the possession of STE in Stellenbosch.



Plate 2. Type specimen of F. capensis Endl. Held at W in Vienna.

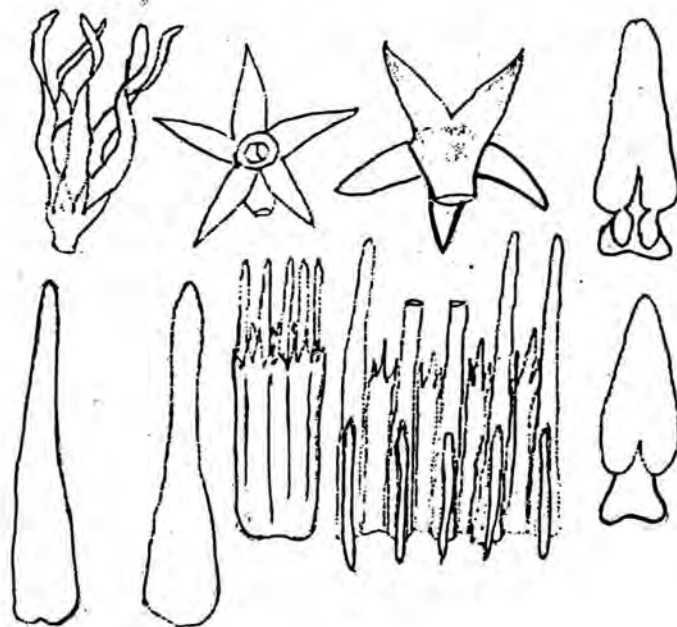


*Fockea capensis* Endl.

Nach dem Exemplar in den Glashäusern zu Schönbrunn.  
(Zur Erkennung des Größenverhältnisses ist eine Efeuwinde beigegeben).

Fig. 1 *Fockea capensis* Endl. on exhibition in Vienna.  
From a photograph held by W in Vienna.

Mai 1901. phot. Herbario Kaiserl.



*Pockea*

In saxosis pr. Klippdam  
4500'

14/II 94.

Fig. 2.

*Pockea sessiliflora* Schltr. Taken from a drawing of the Klippdam (Transvaal) specimen which has not been found. Original drawing in the possession of W in Vienna.

## 2. TAXONOMIC CHARACTERS AND THEIR RELATIVE VALUE

### TUBERS:

The swollen basal stem of Fockea varies from the small napiform completely underground tuber of F. sinuata (Plate 3) to the very extensive proportions found in the tropical F. multiflora (Plates 4, 5 & 6) in which the tuber emerges aboveground and gives rise to thick python-like stems. The presence of the tuber is not useful taxonomically even at family level, since this xerophytic feature is present in several southern African families, for example Euphorbia decidua in Euphorbiaceae, Pachypodium saundersii in Apocynaceae and Adenia in Passifloraceae. Nor is it useful at generic level in Asclepiadaceae since this feature appears sporadically, the tuberous Raphionacme, Fockea and Brachystelma all occurring in different tribes. In its extreme forms, such as the turnip-shaped organ of F. sinuata, the proportions and shape do have significance at species level, but this is doubtful in the other four species where it would appear that edaphic and climatic conditions determine the proportions of the tuber. Apart from this, there is the practical difficulty of removing a large tuber from the ground (Fig. 3) although this neglect on the part of the taxonomist has been criticised by Davis and Heywood (1963) who give examples in which the shape of the underground organ is a constant character of major importance in delimiting species.

### AERIAL STEMS:

With the exception of the short, erect branches of F. sinuata and the tufted-erect forms of F. comaru, the stems twine vigorously

around those of supporting plants, or adopt a straggling or procumbent habit. Length of internode has not proved to be a useful character. The development of a young flowering branch is often conspicuous in F. multiflora but not in the other species, in which the flowers are generally clustered at the nodes of the aerial stems. The indumentum consists of simple white adpressed hairs present to a greater or lesser degree, the only departure from this character is found in F. crispa, in which the hairs are erect, their uneven length giving a shaggy appearance.

#### LEAVES:

The leaves are opposite, simple, sessile, subsessile to petiolate, pubescent to glabrous, the blade linear, lanceolate, elliptic to rounded, often with a strongly revolute margin which is always entire but sometimes undulate or crisped. The leaf characters are the best taxonomic features of the genus. On the attributes of this organ alone can we separate F. multiflora from F. sinuata and both of these from the rest. The strongly undulate nature of the leaf of F. crispa, with its pubescence, is responsible for its separation from F. edulis.

The extensive variation in size and shape of the leaves of F. comaru has accounted for its large synonymy and yet, once this variation is recognised, the leaves of this species are not easily confused with those of the other four species.

### INFLORESCENCE:

The cymose clusters of flowers are always borne at the nodes, the peduncle up to 15mm in F. multiflora, much shorter or absent in the more southerly species. The number of flowers vary from 2-6 (-15) in one inflorescence.

### FLOWERS, FRUITS AND SEEDS

The length of the petal (corolla lobe) is too variable to be of use. The general structure of the white tubular corona remains constant throughout and is a good character at generic level. The coronal tube possesses 2 main entities, the outer 5 principal (usually filiform) lobes and the inner 5 principal lobes. In addition the outer lobe is flanked by 2 minor teeth (one on each side) which have keels decurrent on the inner surface of the tube; there is usually also a single median tooth between the outer principal lobes. The shape, length and even the number of these minor teeth vary considerably within the species, as do the shape and relative length of the principle lobes; the corona therefore is not a useful character at this level.

The inflated anther appendages and erect, flat pollinia are constant throughout the genus. Although bicarpellary it is usual for only one follicle to develop and this is fusiform. The wind-carried seeds have a coma of white silken hairs; the colour, size and shape of the seed material examined appeared to be too variable for use. In conclusion, this study has revealed that the floral characters of Fockea delimit the genus but not its species, and that the general vegetative appearance, particularly of the leaf, designates the species.



Plate 3. Entire specimen of F. sinuata collected by C.A. Smith 5344 at the Farm Palmietfontein, Orange Free State. Overall length: 280mm. Photograph and specimen in possession of PRE in Pretoria.

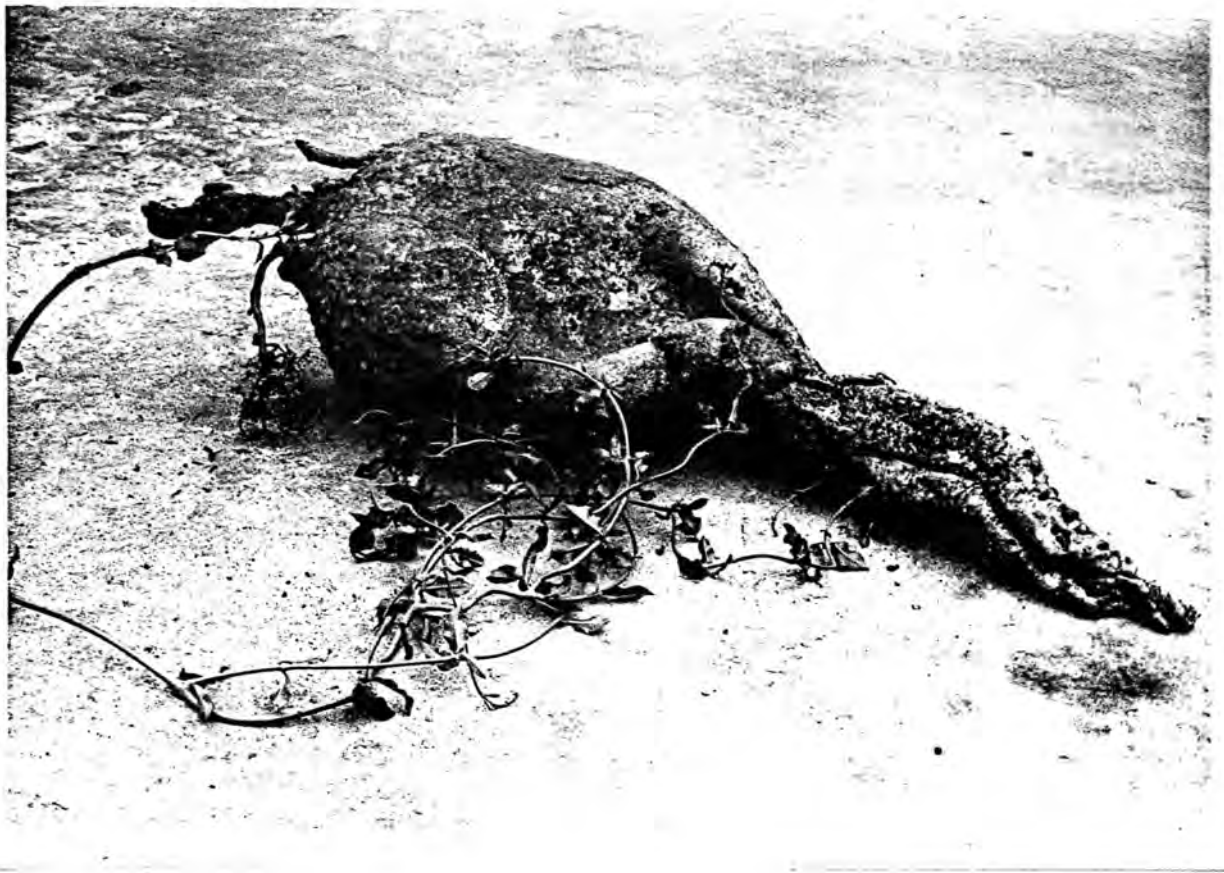


Fig. 3. The tuber of *F. edulis*, 1m in length and 310mm in diam. Two labourers took several hours to remove it from the soil at Paardekraal farm near Grahamstown. The tuberculate nature of the crown of the tuber is typical of the species.

### 3 TAXONOMIC TREATMENT OF THE SPECIES OF FOCKEA

#### 3.1 THE GENUS FOCKEA ENDL.

Fockea Endl., Iconogr. t. 91 (1838); Nov. Stirp. Dec. 17 (1839); Decne in DC., Prodr. 8 : 545 (1844); Benth, & Hook.f. Gen. Pl. 2: 773 (1876); K. Schum. in Pflanzenfam. f.4.1 : 296 (1897); N.E. Brown in Fl. Cap. 4, 1 : 777 (1908); Huber in Prodr. Fl. S.W.Afr. 114 : 31 (1967); R.A. Dyer in Gen. 1 : 499 (1975). Type species: Fockea capensis Endl. (= F. crispa (Jacq.) K. Schum.).

Chymocormus Harv. in Hook., Lond. J. Bot. 1 : 23 (1842). Type species Chymocormus edulis Harv. (= F. edulis (Thunb.) K. Schum.)

Twining, straggling or erect plants with underground tuber which may be partly exposed. Aerial stem growth seasonal, older stems fruticulose or of liana-like habit. Leaves simple, opposite, exstipulate, sessile to petiolate, pubescent to glabrous, blade elliptic, obovate, lanceolate, oblanceolate, linear, leaf base cuneate, rounded or cordate, apex acute, obtuse, emarginate, margins flattened or undulate, in dry areas revolute.

Inflorescence subsessile or pedunculate axillary or extra-axillary cymose cluster of flowers, plants in tropics proteranthous.

Flowers bisexual, greenish and white, regular, showy in long-petalled form, otherwise small and fairly inconspicuous. Sepals 5, free, shorter than corolla tube, both calyx and corolla puberulous. Corolla tube short with 5 spreading, often twisting corolla lobes plicate along their length or flattened, apices often turning. Corona complex, inserted towards base of corolla tube, with 2 main series of lobes, 5 principal outer and 5 principal inner lobes, each outer lobe flanked by one minor tooth on each

side, these teeth having keels decurrent on inner surface of corona, making 10 keels in all, usually additional median teeth lie between outer lobes. Anthers 5, erect, with large inflated bladders reaching to the mouth of the coronal tube. Pollinia erect or suberect, thin, attached by short caudicles to carriers. Style truncate; follicle many-seeded, develops singly, fusiform and dehiscent by splitting along its length. Seeds elliptic to obovate, flattened, winged marginally and with white silken coma.

A genus of 5 species, endemic in Africa, concentrated in southern Africa, there being evidence of only two species north of the Zambesi and Cunene rivers. Usual habitat is dry rocky terrain, with the exceptions of a coastal species in the southern Cape, the plants which occur in eastern Transvaal and Natal, and a tropical species which is adapted for regular summer rainfall.

The genus has not been investigated cytogenetically.

Common names: These vary somewhat with the species, the most usual being 'kambroo' or 'kambroe'.

3.2 KEY TO SPECIES

Leaves large, lamina oblong to broadly elliptic, usually larger than 65 x 35mm, aerial stems massive and twining on trees, tropical, occurring north of 20°S ..... 1. F. multiflora

Leaves small, or long and linear, lamina usually smaller than 65 x 35mm, aerial stems thin, twining on shrubs, widely distributed:

Stems shortly erect, (20-) 90 (-240)mm tall, independent of support, leaves linear-oblong, revolute margins strongly undulate ..... 2. F. sinuata

Stems usually twining on shrubs, if erect then taller than 90mm, unless grazed:

Margins of leaves undulate:

Leaves glabrous, margins wavy, in coastal and higher rainfall regions ..... 3. F. edulis

Leaves pubescent, margins markedly undulate and crisped, in rain-shadow interior ..... 4. F. crispa

Margins of leaves not usually undulate:

Stems fruticose to tenuous, leaves variable, elliptic to linear, glabrous or thinly puberulous, widely distributed ..... 5. F. comaru

### 3.3 DESCRIPTION OF THE SPECIES

(1) Fockea multiflora K. Schum. in Bot. Jahrb. 17 : 145 (1893); N.E. Br. in Kew Bull. 259 (1895); Hiern in Cat. Afr. Pl. Welw. 1, 3 : 693 (1898); N.E. Br. in Fl. Trop. Afr. 4, 1 : 428 (1904); N.E. Br. 1.c. (Add.) 620 (1904); De Wild. in Etu. Fl. Kat. : 157 (1921); Huber in Prodr. Fl. S.W.Afr. 114 : 31 (1967).

Type: Tanzania, Franciscan Mission at Ussambiro, Stuhlmann 848 (B,†; K, fragment, holo!).

F. schinzii N.E. Br. in Kew Bull. 259 (1895); Hiern in Cat. Afr. Pl. Welw. 1, 3 : 693 (1898); N.E. Br. in Fl. Trop. Afr. 4, 1 : 428 (1904); Huber in Prodr. Fl. S.W.Afr. 114 : 31 (1967).

Type: Angola, Welwitsch 4194 (K, holo!).

Climbing shrub with large, irregular, partly exposed tuberous caudex. Young stems densely tomentose towards apex, reaching up to 10,6m in supporting trees, leafless in early flowering period. Leaves oblong to broadly elliptic, often apiculate, lamina 60-140 x 30-98mm, midrib prominent below, upper surface sub-tomentose to glabrous, lower surface tomentose, petiole 9-26(-44)mm. Cymes many-flowered, axillary, peduncles 5-10mm, pedicels 5-12mm. Sepals 2-3mm, joined at base, pubescent on outer surface, glabrous within. Corolla yellowish-green to greenish-brown with white corona, scented; corolla tube 2mm long, glabrous, corolla lobes 7-9mm, oblong, puberulous within, glabrous without, margins reflexed. Coronal tube 2-3mm long, 5 inner principal lobes filiform, divided or simple (Fig.5), nearly as long as the 5 outer principal lobes which curl over at the apex. Anther appendages large, erect and inflated. Follicle straight, curved to crescent-shaped (Fig.6), produced into a beak, usually single and pendulous, with bluish-white bloom, finely rugose when dry, almost round,

glabrous, 110-193mm long. Seeds with coma of white hairs up to 50mm long.

Recorded from positions north of 20°S in Kenya, Tanzania, Angola, Zambia, Zimbabwe, Mozambique, S.W.A. and Botswana. Flowering in October.

Tanzania.- Utengule-usangu (T7) Leedal 2355 (EA). Dodoma Area (T5). Rigby 73 (EA); Mpwapwa (T5) Hornby 2144 (EA). Noubardad (T1) Newbould 6307 (EA). Lake Eyasi (T2) Bally 10617 (EA); east of Kakesio (T2) Greenway 9056 (EA, PRE); south of Kakesio (T2) Greenway 9057 (EA, PRE).

Angola.- Huila distr.: Gambos, Borges 308 (PRE, SRGH); Gambos, Pearson 2134 (BOL). Cuanhama, Mupa, Menezes 3152 (PRE, SRGH). Baixo Cunene, Rocadas, Humbe, Santos & Barrosa 2825 (PRE); Rocadas, Humbe, Menezes & Sousa 3423 (PRE).

Zambia.- Luangwa valley, Astle 5149 (SRGH); Luangwa valley, Trapnell 1877 (EA). Bombwe, Forest Office, Bombwe 318/32 (EA). Livingstone distr.: Impalela Island, Pienaar 201a (PRE).

Zimbabwe.- Kariba Gorge, Goldsmith 44/59 (SRGH). Chirundu, Wild 4852 (PRE, SRGH). Urungwe distr.: Mensa Pan, 18km E.S.E. of Chirundu Bridge, Drummond 5363 (PRE, SRGH). Copper Queen distr.: Copper Queen Purchase Area, Bingham 872 (SRGH). Salisbury distr.: Salisbury, Pardy in PRE 58456 & 58457 (PRE). Wankie distr.: Levy 1123 (SRGH); Levy 46748A (SRGH); Game Reserve, Davison 69318 (SRGH); just south of Zambesi river on Mazabuka - Salisbury road, Levy in PRE 36784 (PRE). Gokwe distr.: 35km N. of Gokwe, Goldsmith 21097 (SRGH); between Sesami river and Gokwe, West 2998 (SRGH); Gokwe - Zambesi road, Davies 1947 (SRGH).

Mocambique.- 17km from Zimbabwe border in the Mazoe river area, Wild 2584 (SRGH).

South West Africa.- Grid reference unknown: Heidelberg Farm, Walter 563 (WIND). 1712 (Posto Velho) Kaokoveld, near Ombepera (-DB), Gibson 219 (WIND). 1715 (Ondangua) Ovamboland, Ondangua (-DD) Smuts & Pole Evans 2238 (PRE). 1813 (Ohopoho) Kaoko Otavi (-BC), Owen-Smith 128 (WIND); 7km S. of Okaruwizu and 28km S. of Ombombo (-DC), Giess & Wiss. 3310 (PRE, WIND). 1821 (Andara) Cemetery at Andara mission station (-BA), de Winter & Wiss 4430 (PRE, WIND). 1917 (Tsumeb) Tsumeb town area (-BA), Nagelsbuch 18D (PRE); 10km from Tsumeb towards Ondangua (-BA), van Jaarsveld 3093 (NBG); 7km S.W. of Tsumeb on Otavi road (-BA), Hardy 2122 (PRE, WIND). 1918 (Grootfontein) Strijdfontein (-AC), Dinter 684 (SAM); Grootfontein (-CA), Schoenfelder S203 (PRE).

Botswana.- 1724 (Katima Mulilo) Ngoma on Chobe river (-DC), Miller B/1050 (PRE); south bank at Ngoma pont (-DC), Story 4809 (PRE); on hillside at Ngoma pont (-DC), Munro in Pre 6924 (PRE). 1922 (Nokaneng) Okavanga swamps (-AB), Tinley in PRE 51262 (PRE).

F. multiflora is the largest, most distinctive and least variable of the Fockea species. Its Zimbabwean name 'vegetable python' describes its aerial habit of twining around tree stems which is illustrated in plates 4 and 6. The exposed generally large caudex (200-900mm in diam.) has smooth silver-grey to pinkish-brown bark; the wood is soft and exudes white latex when cut.

The young flowering branches (Plate 7) are pubescent with adpressed simple curving hairs, becoming tomentose towards the apex of the branch. The species flowers in October, just before the onset of the rains; exceptional is a flowering specimen collected in September in the Huila district of Angola. This fixed, short flowering period is unusual in Fockea; others, like F. comaru flower over very extended periods related to the vagaries of the weather in their drier areas. The stems are bare during the

flowering period, occasionally a few felty leaves are present at the branch tips. A fragment of the type (Stuhlmann 848, destroyed in Berlin) shows the latter condition. Both the Welwitsch and Schinz (from Ombandja, Angola) flowering specimens which N.E. Brown cited in his description of the synonym, F. schinzii, are without leaves. The young leaves develop from November onwards, reaching their largest dimensions (140 x 100mm) in the wetter areas (Mensa pan near Chirundu, Zimbabwe), and are deciduous by the middle of the dry season (June-July). Even very large leaves are finely pubescent on the adaxial surface, and lightly tomentose (with suede-like texture) underneath.

The cymes have many flowers on long pedicels (also unusual in Fockea); the petals in the mature flower bend back (Plate 8) and the light-coloured corona is prominently displayed. The fruits are usually solitary follicles, occasionally double as in Tinley's collection in PRE 51262 (PRE); they ripen slowly during the dry season, opening the following September to November. The plant has two distinct stages in its cycle - a luxuriant leafy growing period from November to April, and a leafless flowering and seed dispersal stage towards the end of the dry season.

Common names of F. multiflora:

Vegetable python (H. Wild 4852 SRGH)

Dofa creeper (A.A. Pardy, 58457 PRE)

Fudze (A vernacular name used by the blacks in Mazoe district, Mocambique; these people plant the species outside the hut door to stimulate milk of a mother with child).

Otjipwiya (Herero name used in S.W.A.).



Plate 4 (above)  
F. multiflora  
 Sebungwe, Zimbabwe  
 Photo by R. Davies  
 Loaned by SRGH



Plate 5  
F. multiflora  
 Wankie, Zimbabwe  
 Photo by Mr Willis  
 Loaned by SRGH



Plate 6. F. multiflora near Hot Springs in the Kaokoveld, SWA.  
The Fockea vine is strangling the young tree.  
Photograph by P. Vorster.

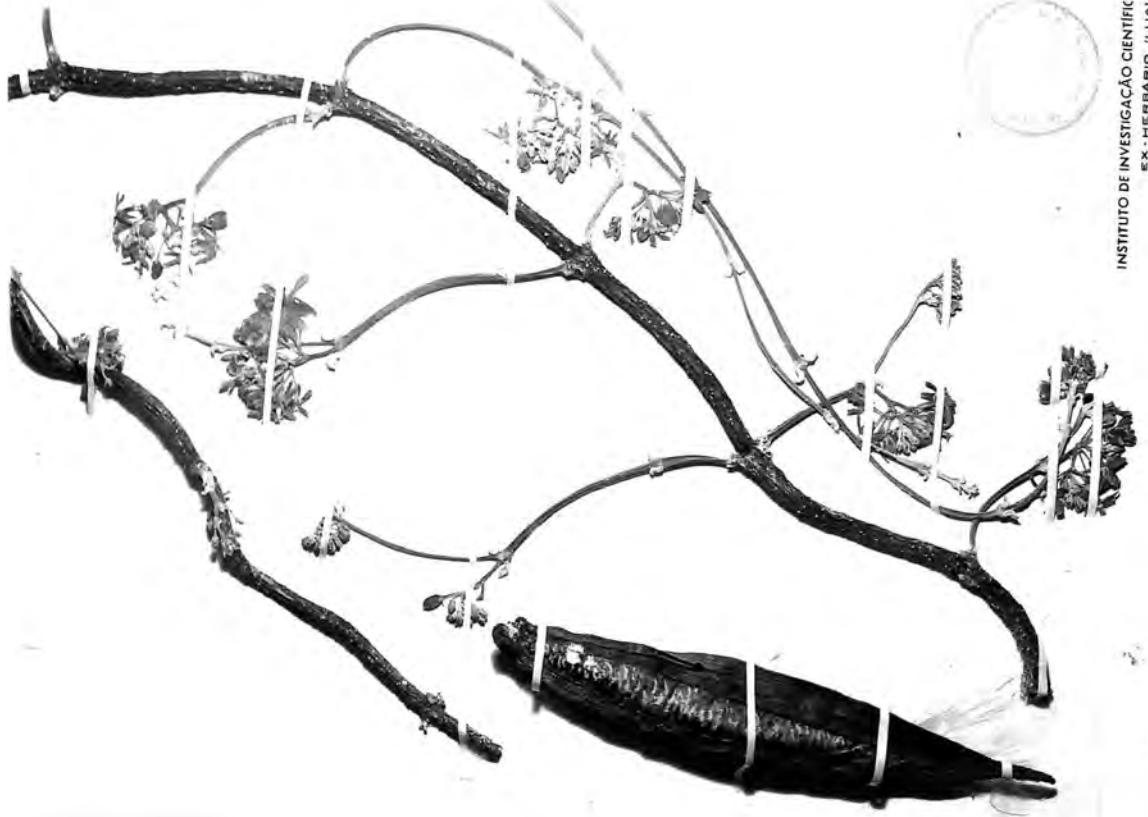


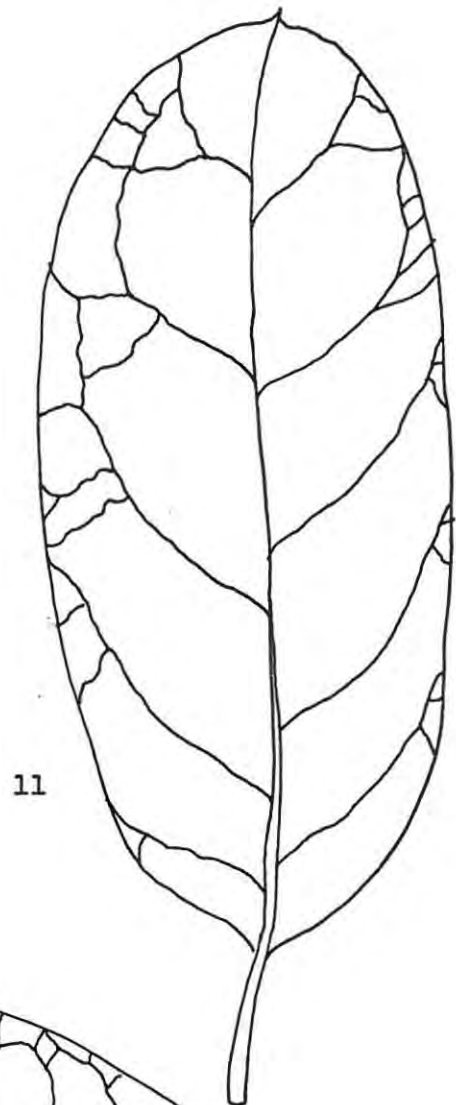
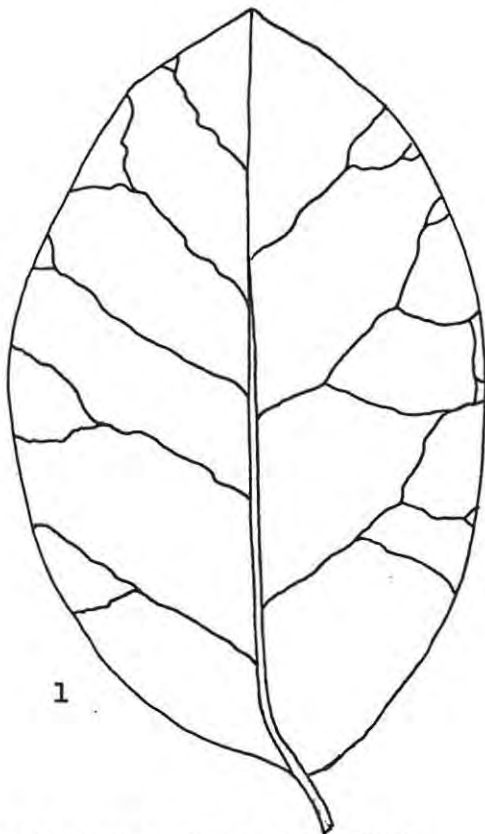
Plate 7 (above). *F. multiflora*. Young flowering branches in a specimen from Huila, Angola. Menezes 3152 (PRE).  
 Plate 8 (below). *F. multiflora*. Detail of the Schinz specimen to which N.E. Brown referred (Kew Bull. 1895).



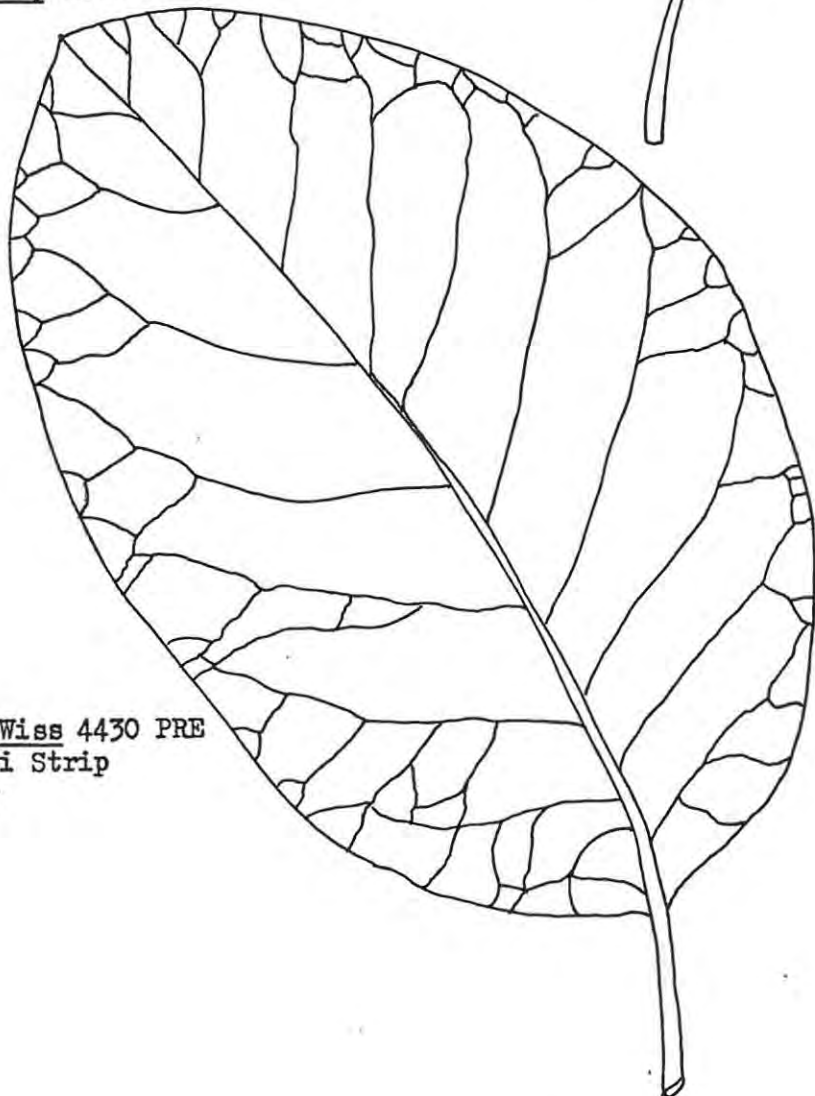


Plate 9. F. multiflora. Follicle and young leaves on specimen from southern Angola. Borges 308 (SRGH).

Fig. 4 F. multiflora. Leaves x 1



1 and 11 from Hardy 2122 PRE  
Tsumeb  
Date: April



111 de Winter & Wiss 4430 PRE  
Andara in Caprivi Strip  
Date: 26 January

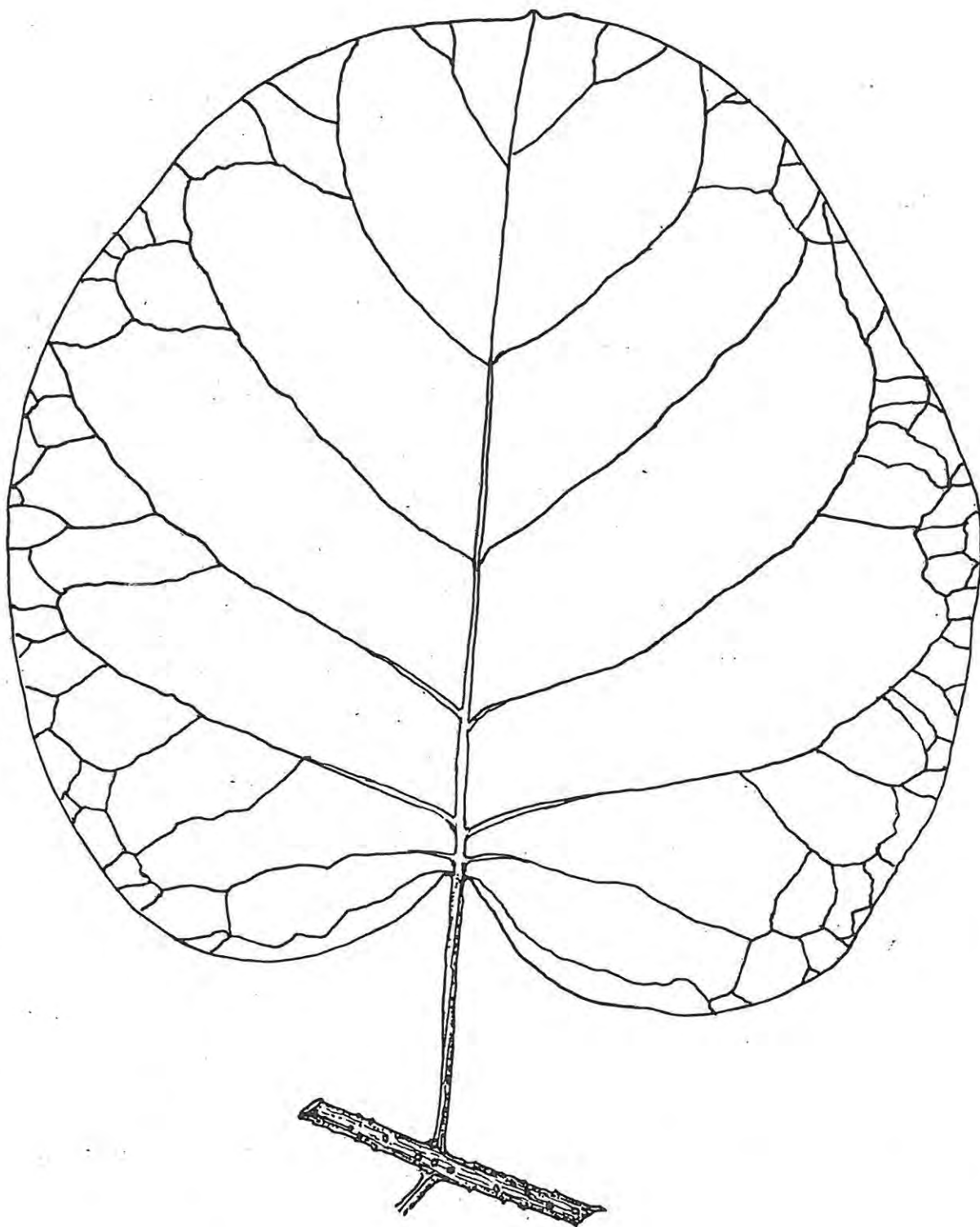


Fig. 4 *F. multiflora*. Leaves x 1

1V Drummond 5363 SRGH

Mensa Pan 18km ESE Chirundu Bridge, N Zimbabwe

Date: 30 January; no flowers on specimen



Anthers x 8

- 1 Fascicle of flowers x 2 showing bracts  
Nagelsbuch 18D PRE  
Tsumeb SWA

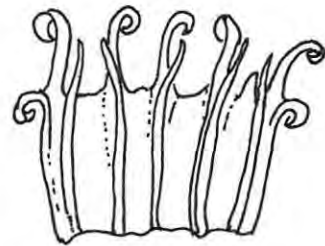


Inner coronal lobes divided

- 11 Part of corona x 10  
Tsumeb



- 111 In Angolan material the inner coronal lobe's appendage is reduced to a small 2-fingered ledge



- 1V In Greenway 9057 from Mazai district, Tanzania, the inner lobe is simple, filamentous, not bifid

Fig. 5 F. multiflora. Inflorescence, anthers and variation in the corona

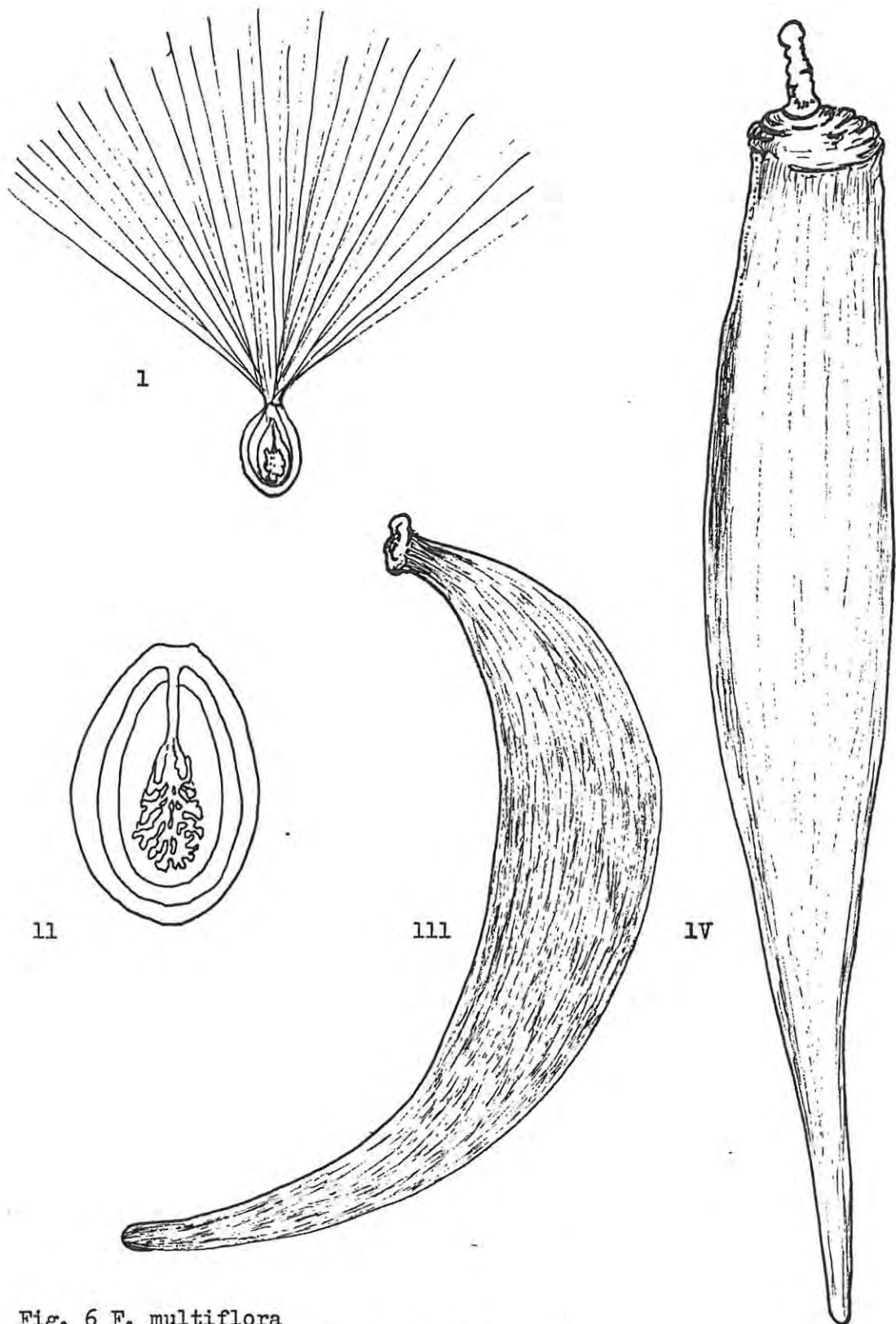
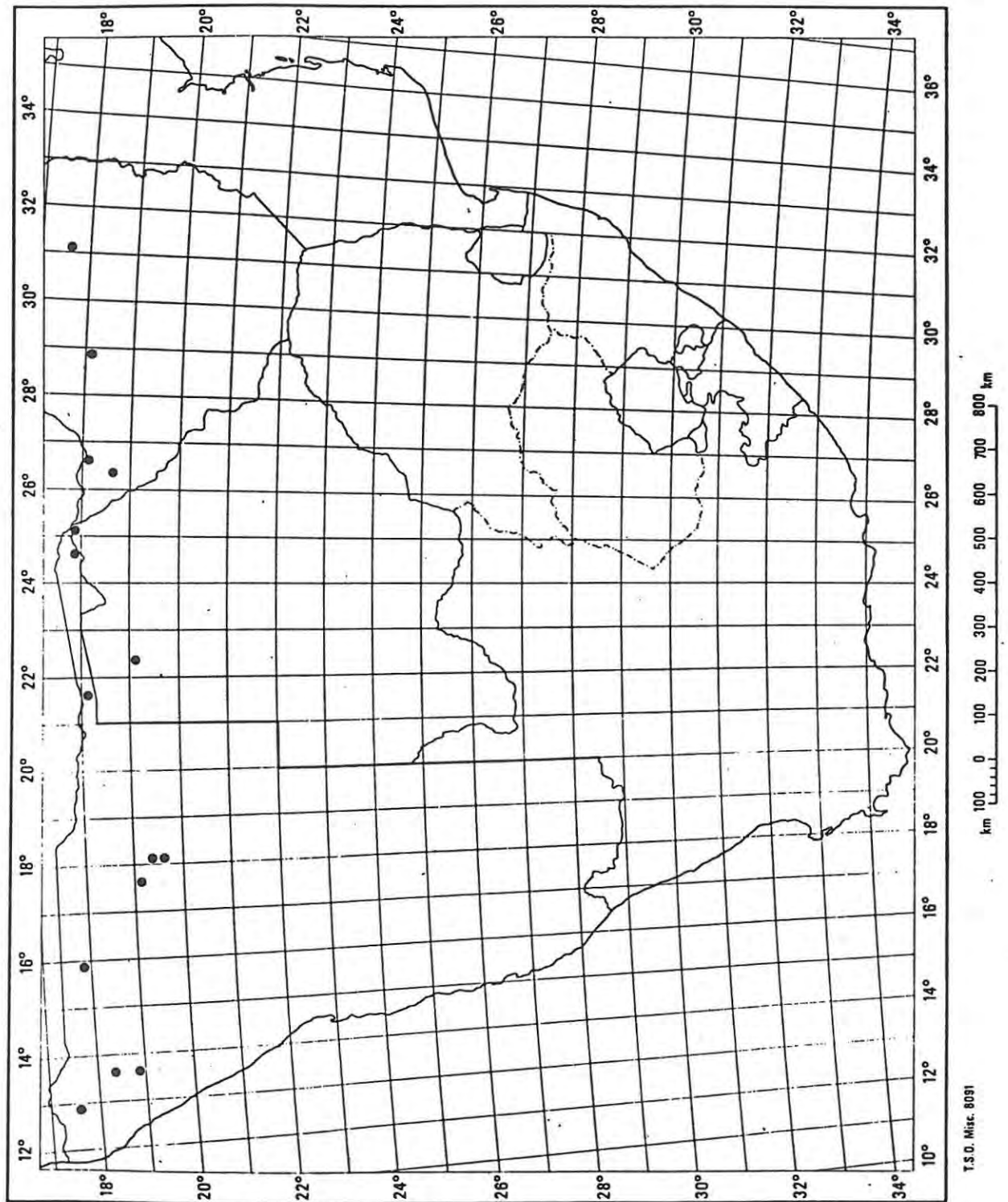


Fig. 6 *F. multiflora*  
 1 Seed with coma (Ngoma Pont, Botswana)  
 11 Seed x 3  
 111 Follicle (Grootfontein, S.W.A.)  
 1V Follicle (Wankie, Zimbabwe)



MAP 1. Distribution of *Fockea multiflora* K. Schum.

(2) Fockea sinuata (E. Mey.) Druce in Rep. Bot. Soc. Exch. C. Br. Isles : 623 (1917).

Brachystelma ? sinuatum E. Mey. in Comm. Pl. Afr. Austr. : 196 (1838); Dietr. Syn. Pl. 2 : 887 (1840). Type: Cape, Dwyka river, Prince Albert, Drège 3439B (P, holo. !; K, fragment !).

Fockea undulata N.E. Br. in Kew Bull. : 260 (1895); N.E. Br. in Fl. Cap. 4, 1 : 778 (1908). Type: Cape, Renosterkop, Burke (K, holo.!).

Shortly erect perennial herb with suberous napiform tuber; body of tuber up to 200mm in length, 40-80mm in diam., abruptly narrowing at base, with a long, narrow, woody, single neck 70-90mm in length, produced into a short simple or bifurcate stem above the ground. Aerial stem usually short, 50-120mm tall, occasionally up to 230mm. Leaves sessile, brownish-green to purplish, linear-oblong, with crisped, revolute margins, pubescent on darker upper surface and on ventral midrib only, 35-65 x 2-4mm. Cymes shortly pedunculate with 3-5 small, sub-globular flowers, brownish-green to reddish, pedicels 1-3mm. Sepals 2mm long, puberulous on outer surface, glabrous within, spreading and clasping corolla. Corolla tube 3mm long, corolla lobes 4mm with reflexed margins, puberulous on both surfaces. Corona 5-6mm in height, longer than corolla tube, white, divided into 5 principal outer filamentous lobes, each flanked by minor lobes with keels decurrent in the tube, separated by additional median teeth (Fig. 9 1V), the 5 inner principal lobes flat, nearly as long as the corona tube, with rounded, acute or bifid apices. Anther appendages nearly as long as the corona tube.

Recorded from positions south of 26°S latitude, and would appear to be under collected. This is not surprising considering its diminutive nature and narrow inconspicuous leaves. It is presently known from the Luderitz - Aus region of South West Africa, the northern Cape and western Orange Free State, and several southern collections in the Prince Albert and Willowmore areas. Flowering from January to March.

South West Africa.- 2616 (Aus) Farm Kubub, 16km south of farm houses (-CD), Giess, Volk & Bleissner 5300 (WIND); Farm Kubub (-CD), Giess, Volk & Bleissner 5299 (PRE); 62km from Helmeringhausen towards Aus (-AD), Muller 58 (PRU).

Orange Free State.- Without grid reference: Farm Rosemarie, Henrici 3659 (PRE). 2924 (Hopetown) Palmietfontein farm, 8km W of Luckhoff (-DB), Smith 5344 (PRE).

Cape.- 2819 (Ariamsvlei) 16km NE of Bladgrond (-DD), Acocks 14264 (PRE). 2921 (Kenhardt) 30km ENE of Kenhardt (-BC), Leistner 2325 (PRE, KMG). 3221 (Merweville) Tygerberg, Prince Albert, Marloth 4494 (PRE). 3323 (Willowmore) Kruitkraal, Rietbron (-AA), Bayer 328 (NBG); Willowmore (-AD), Brauns in STE 19941 (STE).

F. sinuata is the smallest and least conspicuous of the Fockea species. Unlike its allies, it grows erect and independently of other plants, and there are apparently no records of its association with other species by means of a climbing habit.

Apart from cultivated material only 12 dried specimens and spirit material from south of Calvinia (Karoo Garden, 254/76) and Kimberley (Karoo Garden, 284/76) were examined.

The short aerial stems produce leaves in summer after rain from

January to may, flowers appear from February to March. No specimens have been collected during the period June to December and it must be assumed to be leafless during this period.

It is easily distinguished by the marked crisped margin of the narrow, horizontal leaves (Plate 10, Fig.9). It is further characterised by having only several small flowers in the axillary cymes, although the specimens from south of Luderitz (Plate 11) show 5-10 flowers per cyme. There are no follicles in South African herbarium material and these have not been examined by the author.

The species appears to be rare.

Common names of F. sinuata: Vlakkambroe, vleikambroe, and veldbarroe.



Plate 10. *F. sinuata* in cultivation at Karoo Botanic Garden, Worcester. In the wild state the tuber is underground.

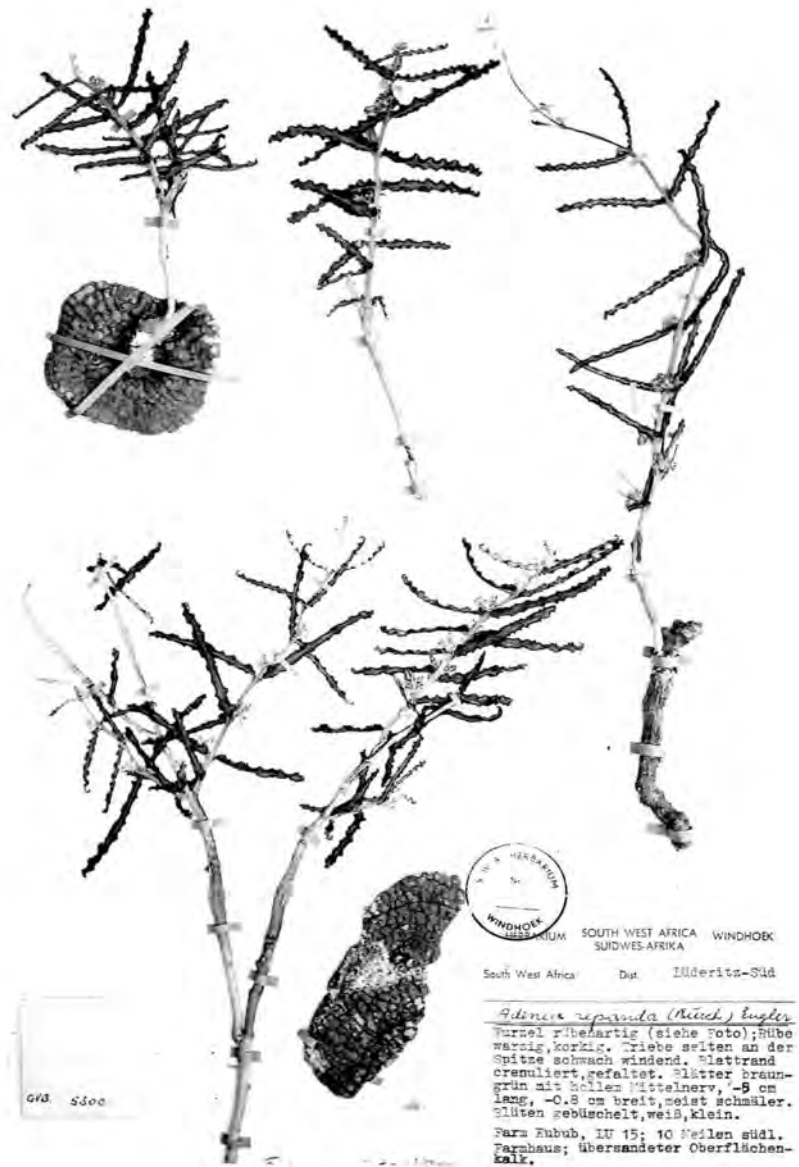


Plate 11. *F. sinuata* from south of Luderitz. Volk & Bleissner 5300 WIND  
 Plate 12 (below). Detail of revolute leaf margins (same specimen).



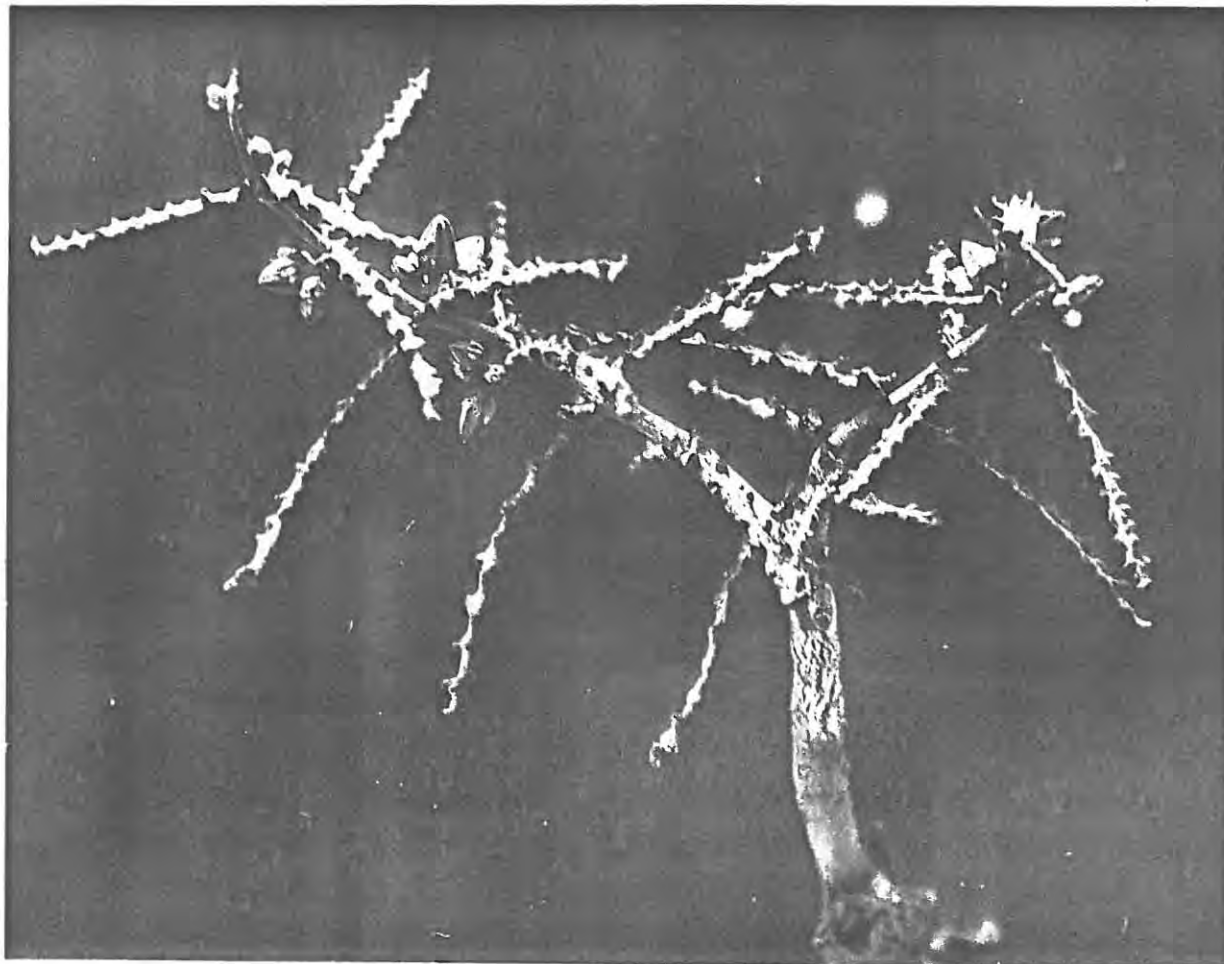


Fig. 7 & fig. 8(below): F. sinuata from the farm Kubub south of Aus, SWA.  
From photographs in possession of WIND in Windhoek.

FOTO W. GIESS



FOTO W. GIESS

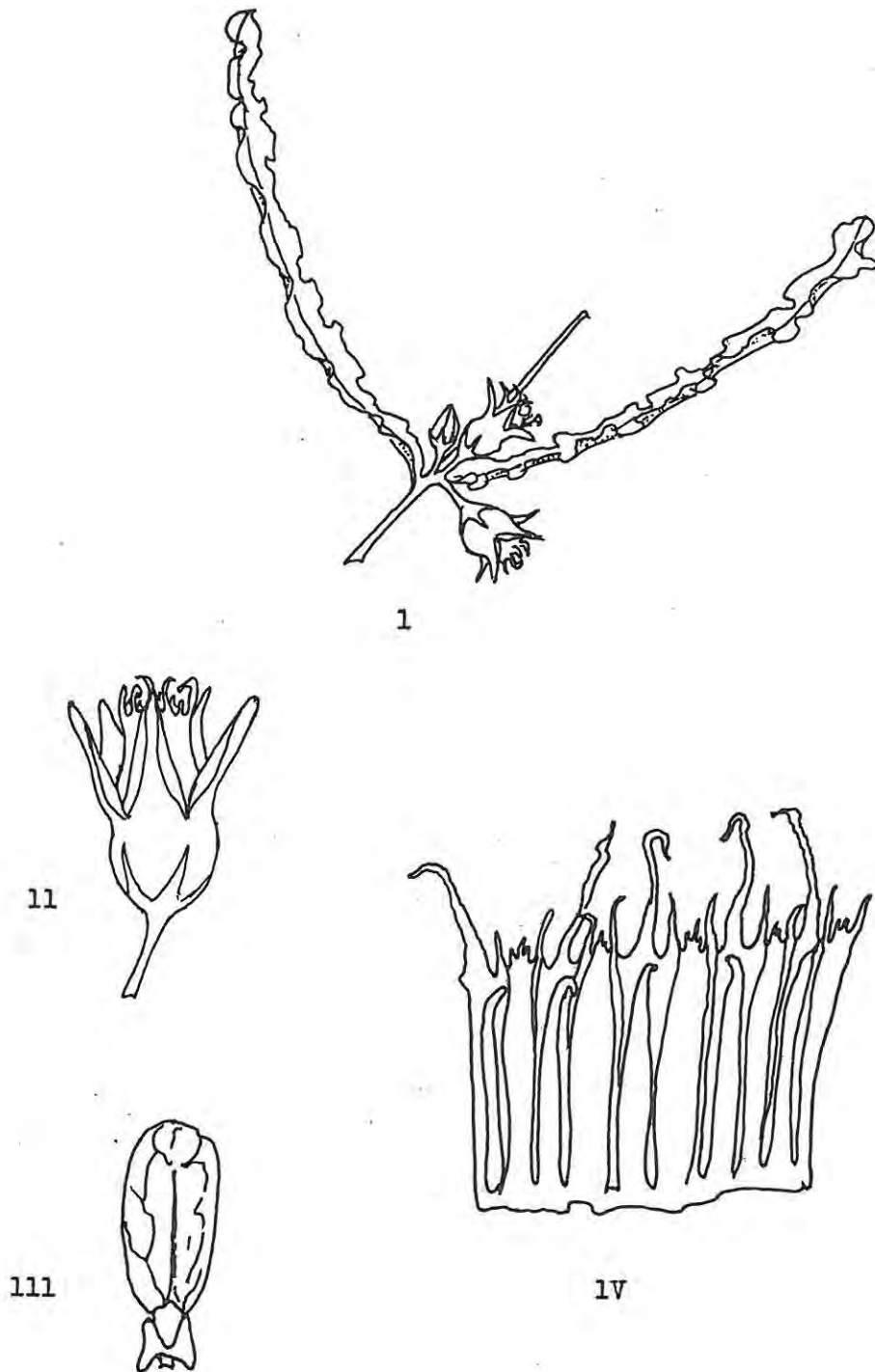
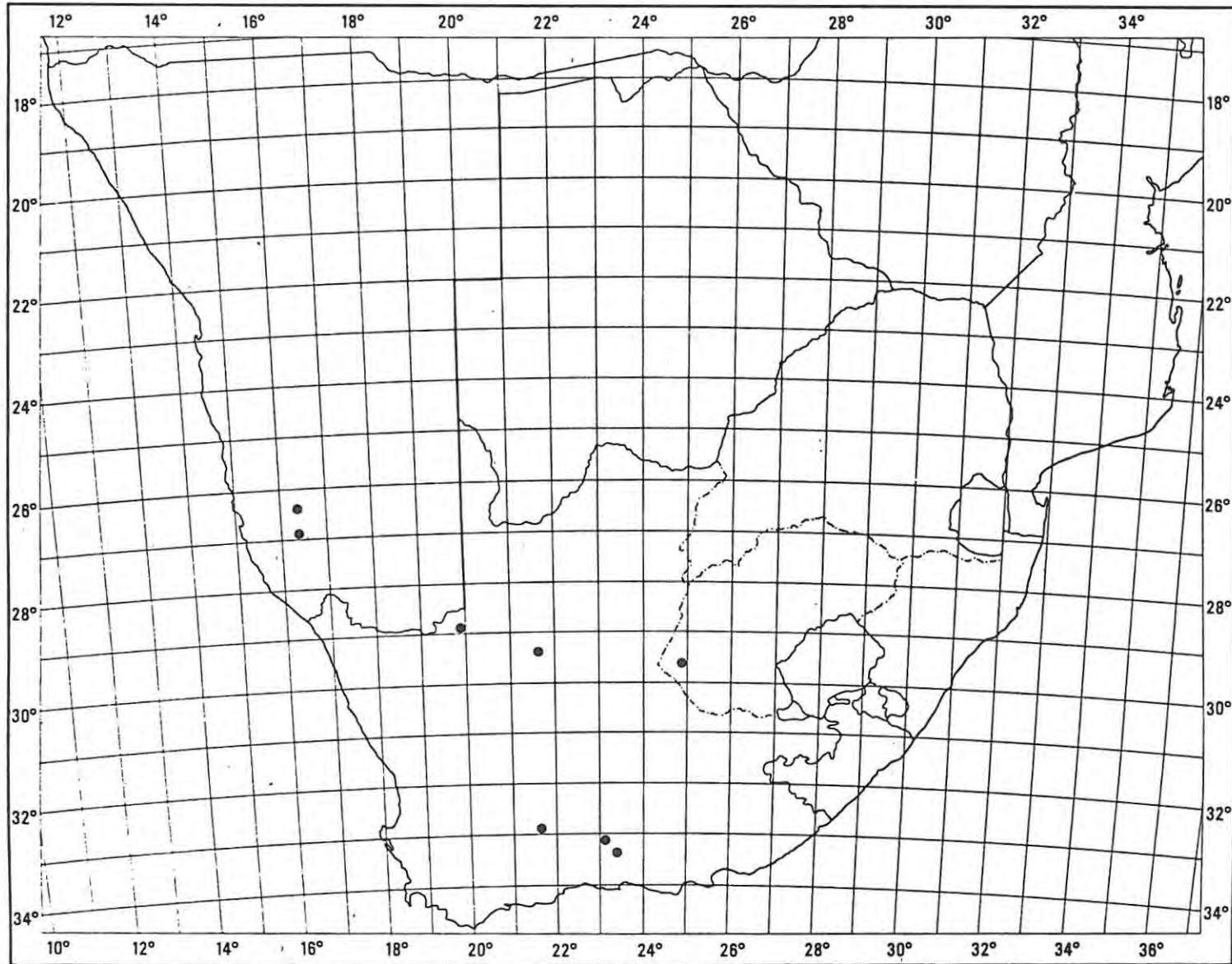


Fig. 9. F. sinuata. 1. Leaves and flowers x 2. 11. Flower x 4.  
111. Anther x 10. 1V. Corona x 8.

MAP 2. Distribution of *F. sinuata* (F. Mey.) Druce



T.S.O. Misc. 8091

km 100 0 100 200 300 400 500 600 700 800 km

(3) Fockea edulis (Thunb.) K. Schum. in Engl. Jahrb. 17 : 146 (1893), and in Engl. & Prantl, Pflanzenfam. 6 1 : 296 (1897); Schltr. in Journ. Bot. : 487 (1898) partly; N.E.Br. in Fl. Cap 4, 1 : 780 (1908); R.A. Dyer in Kew Bull. : 460 (1933). Type: Cape, Gouritz river, Thunberg in UPS 6141 (UPS, holo.!).

Echites edulis Thunb. in Diss. Echit. 5. nom. nud.

Pergularia edulis Thunb. in Prodr. 1 : 38 (1794) and in Nov. Act. Acad. Petrop. 14 : 519 (1805) and in Fl. Cap. Thunb. 233 (1823); Willd. in Sp. Pl. 1 : 1247 (1797-98); Pers. Syn. Pl. 1 : 271 (1805) Schult. in Syst. Veg. 6 : 56 (1820); G. Don in Gen. Syst. 6 : 133 (1837-38)

Brachystelma ? macrorrhizum E. Mey. in Comm. : 197 (1838)

Type: Cape, Oudeberg mountain (B+?).

Chymocormus edulis Harv. in Hook. Lond. J. Bot. 1 : 23 (1842).

Type: Cape, Uitenhage, Zeyher 965 (K, holo.!).

Fockea glabra Decne. in DC. Prodr. 8 : 545 (1844); N.E.Br. in Fl. Cap. 4, 1 : 779 (1908). Type: Without locality, Zeyher 239 (Iso. G ! P ! W !).

F. cylindrica R.A. Dyer in Kew Bull. : 459 (1933) and in Flow. Pl. Afr. (tab. 3221). Type: Cape, near Committees in Fish river valley, 32km from Grahamstown, R.A. Dyer 1635 (K, holo.! GRA !).

Perennial herb with large underground tuber which produces a single or several elongated branches below soil level. Aerial stems of two kinds depending on habitat: long permanent twining stems in bush, multiple short branches in open, young stems puberulous with short white adpressed hairs. Leaves in single pairs or tufted on short axillary leafy branches, petiolate 2-8mm, elliptic, oblong, lanceolate, oblanceolate, apex acute or rounded, usually apiculate,

margins wavy or flattened, glabrous but petiole minutely puberulous, entire leaf 16-45 x 6-21mm. Inflorescence cymose with short puberulous peduncle 2-3mm, minutely bracteate; 2-8 flowers, scented, greenish-yellow and white, rarely purplish-brown; pedicel 2mm; sepals lanceolate acute, spreading, 1.5mm; corolla tube 2-3mm, corolla lobes narrow, spreading-recurved, twisting with turned apices, margins replicate, 6-12mm long. Corona tube slightly longer than corolla tube, outer principal lobes flanked by minor lobes for more than 3/4 of their length, minor lobes keeled-decurrent for length of the tube, the median coronal tube deeply cleft (Fig. 10), inner principal lobes terete, simple or toothed. All parts of flower puberulous except corona. Follicle matures singly, spindle-shaped, produced into a beak, 55-110 x 7-19mm.

The centre of distribution of F. edulis lies in the eastern Cape, from Port Elizabeth to Grahamstown and Fort Beaufort, in which areas it is common. It is often found at the coast, and seldom grows more than 80km from the coastline. It occurs in the south western Cape where it is less common. One collection in the Oudtshoorn district is unusual and requires investigation as it is more likely to occur on the southern side of the Outeniqua range than north of it. Also unusual is the Marloth 7048 specimen from Graaff-Reinet. There are no flowers on this specimen, but it is possibly a heavily grazed F. edulis.

The normal flowering month is March, but this is known to extend from August to May.

Cape.- Without Locality: Ecklon & Zeyher in PRE 11789 (PRE)  
 3224 (Graaff-Reinet) Graaff-Reinet (-BC), Marloth 7048 (PRE).  
 3226 (Fort Beaufort) Farm Hounslow, 20km N of Grahamstown (-CD)  
Galpin 13250 (BOL, PRE), 13251 (PRE); Keiskamma (-DD); Bayer 323  
 (NBG). 3228 (Butterworth) on west bank at mouth of Gonubie river  
 (-CC), Bayer 326 (NBG). 3319 (Worcester) Klaasvoogds (-BB),  
Bayer 325 (NBG). 3322 (Oudtshoorn) Kleinspoort (-CB), Bayer in  
 NBG 110668 (NBG). 3324 (Steytlerville) Klipplaat (-BC), Bayer in  
 NBG 110680 (NBG). 3325 (Port Elizabeth) Addo (-BC), Acocks 13661  
 (PRE), Kreft 96 (BOL); 57km on road to Steytlerville (-CC), Long  
 1184 (GRA, PEU, PRE, RUH); few km from Loerie on Hankey road (-CC),  
Cowling in GRA A6091 (GRA); Springs Reserve, Uitenhage (-CD),  
Olivier 2495 (PEU); Coega (-DA), Bayer 320 (NBG); Zwartkops  
 (-DC), McLoughlin in PRE 51786 (PRE); Zwartkopsrivier (-DC),  
Ecklon & Zeyher in PRE 21264 (PRE), in PRE 11785 (PRE), Pappe 18564  
 (SAM), Hallack 3052 (PRE); Humewood, on coastal dunes (-DC),  
Dahlstrand 60 (PRE); 16km N of Port Elizabeth (-DC), Dahlstrand  
 1580 (GRA); Aloes (-DC), Long 903 (PRE, PEU); Redhouse (-DC),  
Paterson 544 (BOL, GRA, NH, PRE, SAM), Paterson 10647 (PRE); St.  
 George's Strand (-DC), Holland 3567 (BOL); Despatch (-CD), Holland  
 in BOL 31737 (BOL). 3326 (Grahamstown) Bolton Woods (-AC), Starke  
 92 (RUH); old railroad between Tootabi and Alicedale (-AC), Archibald  
 5984 (PRE); Ecca Pass (-BA), Bayer in NBG 110894 (NBG), Brink  
 136 (GRA); Pluto's Vale (-BA), Bayer 322 (NBG), Noel 8846 (RUH);  
 Botha's Ridge (-BA), Jacot Guillarmod 4450 (RUH); Trumpeter's  
 Drift (-BB), Story 2190; Committees (-BB) Dyer 2174 (PRE);  
 Adelaide road (-BC), Jacot Guillarmod 4929 (PRE, RUH); Nook  
 Boosaak Forest, Alexandria (-CB), Britten 2506 (GRA, PRE).  
 3419 (Caledon) N of Stormsvlei Pass (-BB), Bayer in NBG 110673  
 (NBG). 3421 (Riversdale) left bank, Kafferskuilrivier mouth  
 (-AD), Muir 149 (PRE). 3422 (Mossel Bay) Klein Brakrivier  
 extension no. 4, 7,5km W of Groot Brakrivier bridge (-AA),  
Taylor 8341 (STE).

F. edulis is a vigorous southern species with a large edible tuber (Fig. 3). It is more usual to find it with long climbing stems (Plate 13) than short and tufted (Plate 14).

It can be reliably identified by its leaves which, although variable, are always glabrous and undulate (wavy) as opposed to undulate (crisped) in its close ally, F. crispa (Fig 11).

Common names of F. edulis: Bergkambroo, Hotnotswaatlemoen, Kamkoo, Kon, Ku. (C.A. Smith, 1966).

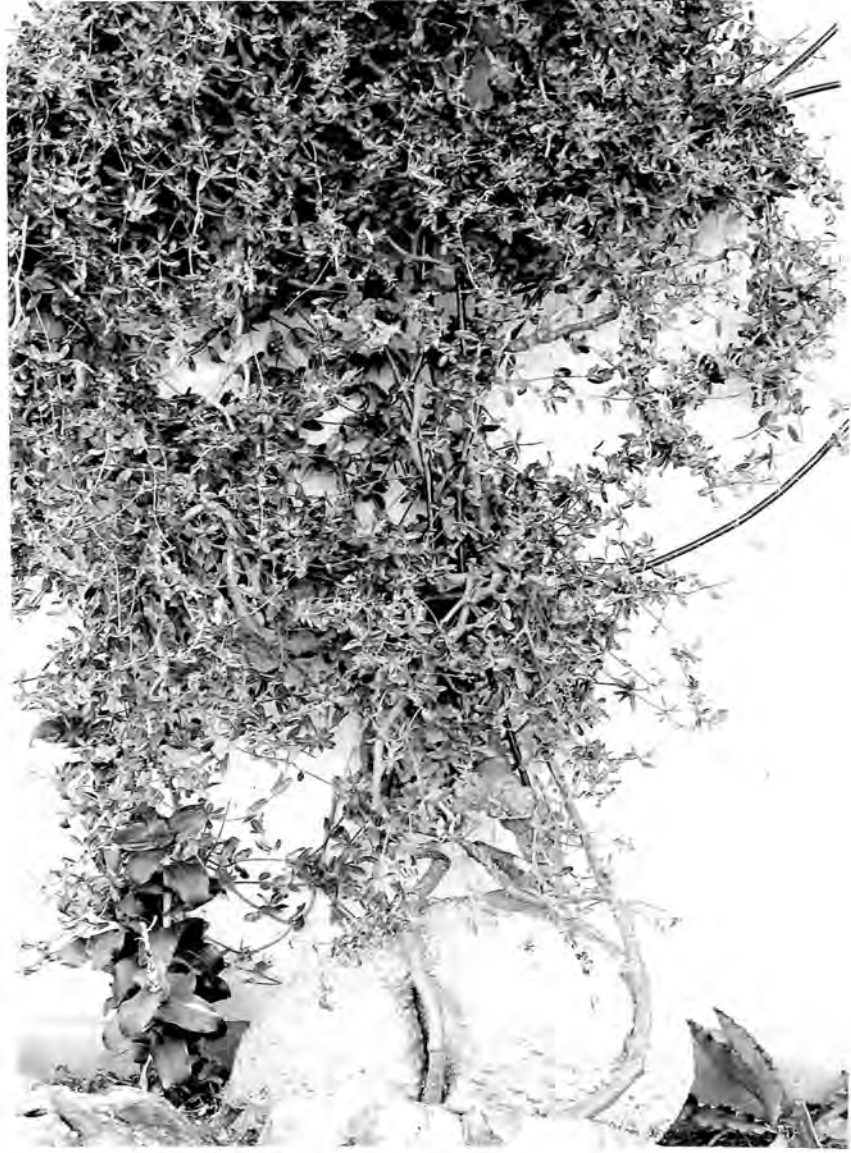


Plate 13. *F. edulis*. Cultivated plant at Karoo Botanic Garden,  
Worcester.



Plate 14. P. edulis. Twining stems in a specimen from Alicedale.  
Archibald 5984 PRE.

Plate 15 (below). P. edulis. Short erect growth in a roadside  
specimen, probably grazed, on Adelaide road.  
Jacot Guillarmod 4929 RUH





Plate 16: F. edulis. Flowering stem from a plant on the west bank of Gonubie river mouth. In this locality the plants have very large tubers, up to 1m in diam. Bayer 326a NBG



Plate 17. F. edulis. Follicles on a specimen from Blue Water Bay, Port Elizabeth. Olivier 2270 PEU.

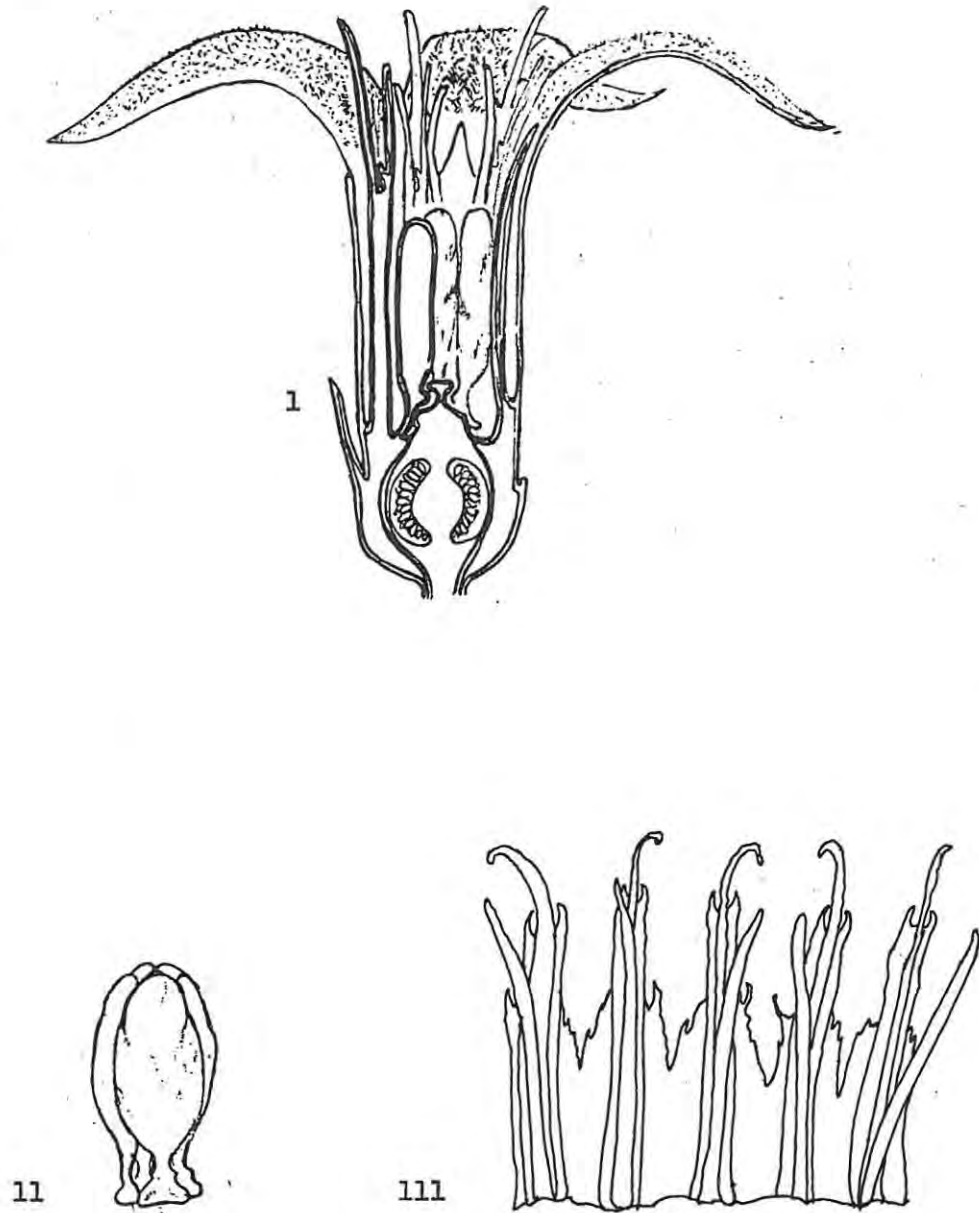


Fig. 10. *F. edulis* L. A section of a flower drawn by J. Jacques from a cultivated plant (Kirstenbosch, February, 1962)  
 II. Anthers x 20  
 III. Corona x 8 from material collected at Keiskamma (Karoo Botanic Garden 134/73).

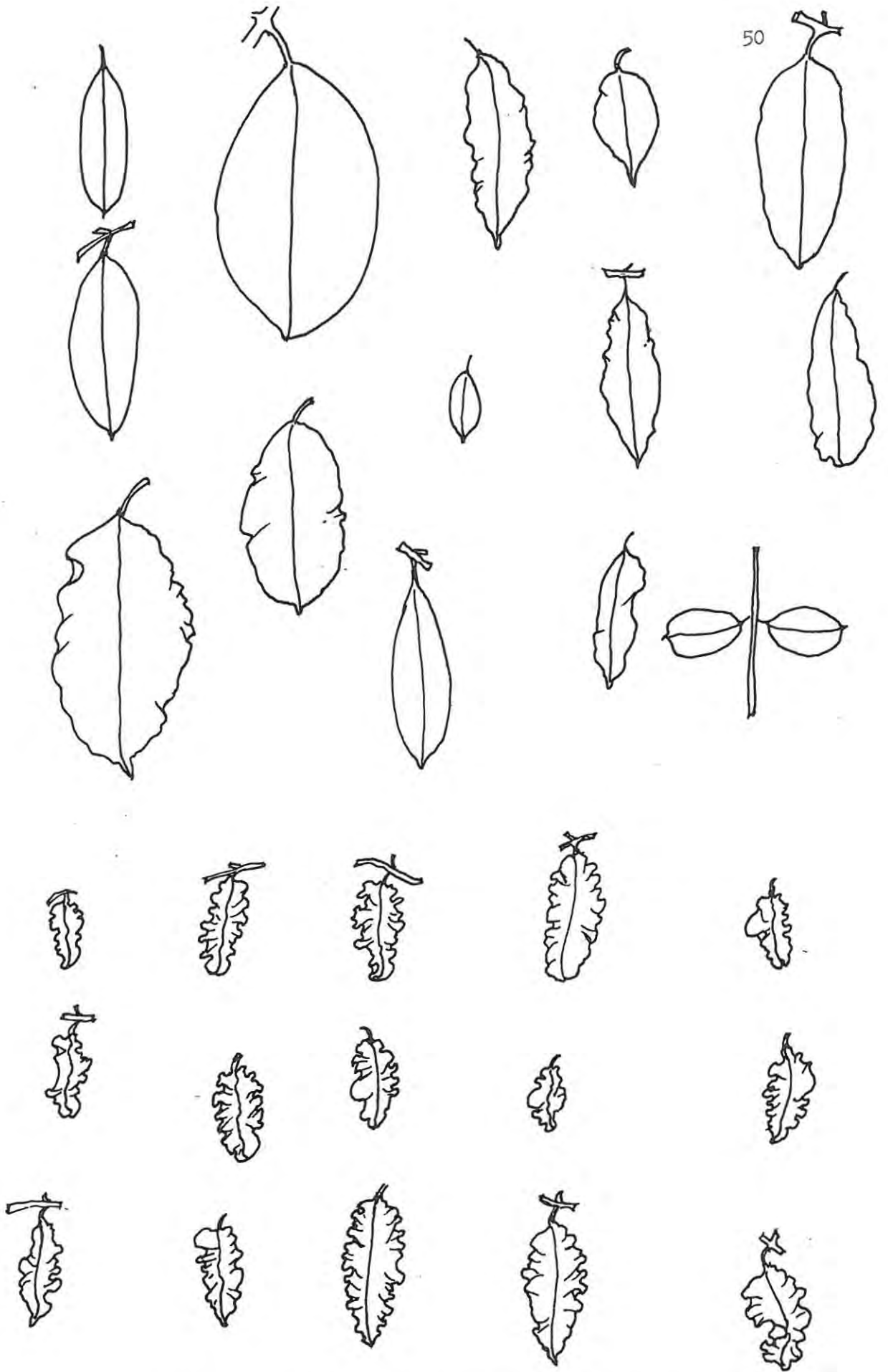
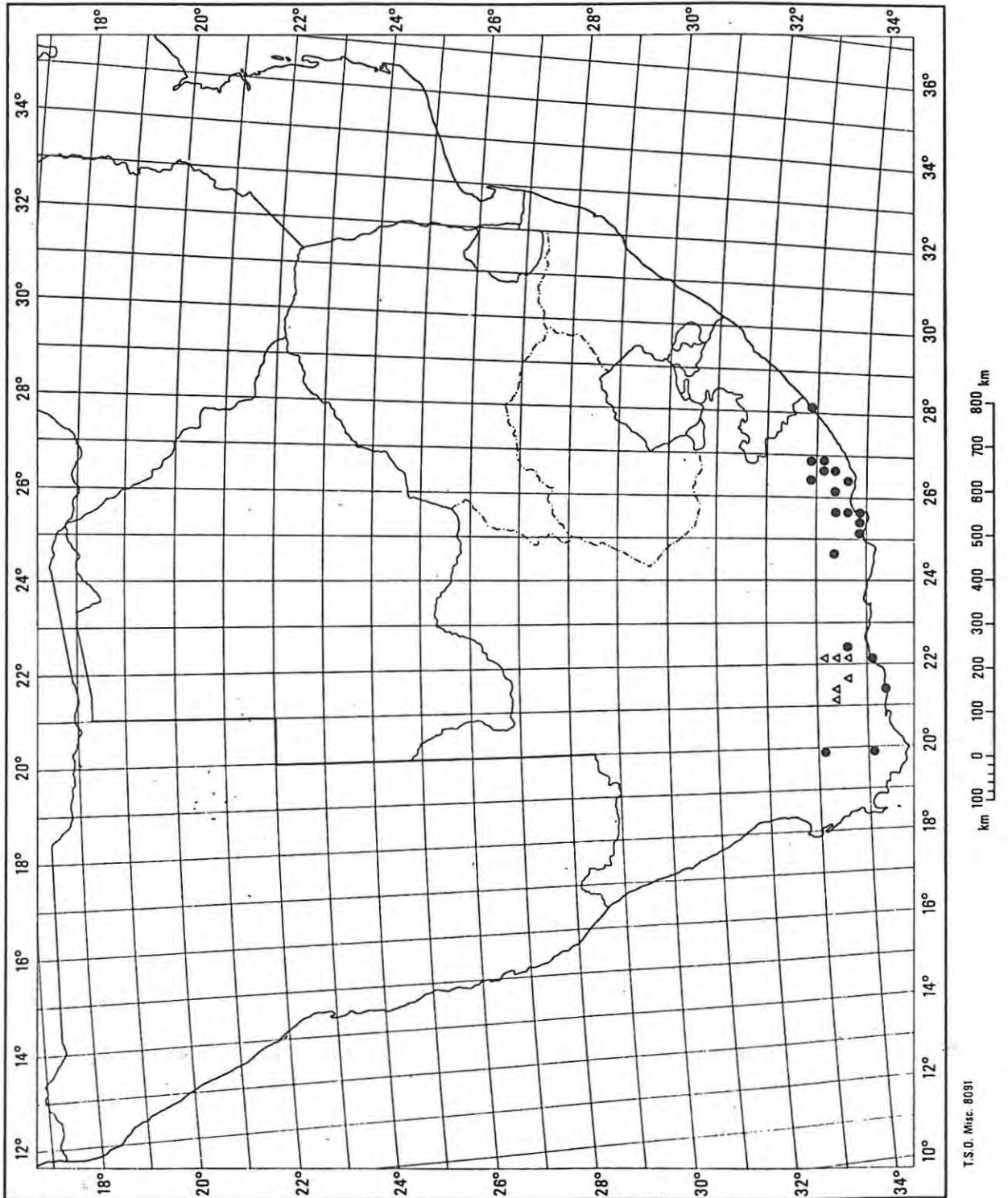


Fig. 11. Outlines of the leaves of a selection of specimens of *F. edulis* (above) and *F. crispa* (below), showing the distinguishing margin character.



MAP 3. Distribution of: ● Fockea edulis (Thunb.) K. Schum.  
 ▲ Fockea crispa (Jacq.) K. Schum.

(4) Fockea crispa (Jacq.) K. Schum. in Engl. & Prantl. Pflanzenfam. 4, 1 : 296 (1897); Schlechter in Journ. Bot.: 497 (1898), partly.

Cynanchum crispum Jacq. in Fragm. 31, t. 34, fig. 5 (1809).  
Type: Cape, without locality, cult. specimen 488 (W! K fragment!).

Fockea capensis Endl. in Iconogr. Gen. Pl. t. 91 (1839) and in Nov. Stirp. Dec. 3 : 17 (1839); Decne. in DC. Prodr. 8 : 545 (1844); Wittmack in Gartenfl. 49 : 344; N.E.Br. in Fl. Cap. 4, 1 : 780 (1908).

Perennial herb scandent or stunted-erect in the open with large tuber up to 600mm in diam., surface brown and verrucose. Aerial stems 600-900mm long, shortly pubescent with erect, simple, white hairs. Leaves shortly petiolate, pubescent on both surfaces, blade elliptic, oblong, 15-26 x 6-10, obtuse, rounded or acute apices, margins deeply and characteristically crisped. Flowers 2-4 in fascicles, buds markedly long and slender, 11-14mm; pedicels 2-3mm. Sepals puberulous, lanceolate acute, 1mm. Corolla puberulous, tube 3mm, lobes linear, spreading, folded closely along their length and twisting, green, 9-11mm. Corona white, tube length variable 1-3mm, outer principal lobes filiform, erect or curving, exerted up to 2mm from corolla tube mouth, inner lobes shorter, scarcely apparent at corolla mouth. Anther appendages equal to or slightly longer than coronal tube. Follicle borne singly, spindle-shaped, 75-80mm long, greenish-grey with brown marks.

Fockea crispa is confined to the south-western Cape in the Montagu, Ladismith, Oudtshoorn and Prince Albert areas.

The flowering period is from March to April, but may extend from January to May.

Cape.- 3321 (Ladismith) 11km W of Ladismith (-AC), Hall 2592 (NBG); Amalienstein (-AD), in STE 14888 (STE); NE of Vanwyksdorp (-DA), Bayer 317 (NBG). 3322 (Oudtshoorn) near Prince Albert (-AA), Marloth 4567 (BOL, K, W); Sand river mountains near Prince Albert (-AA), Marloth 4465 (PRE, STE); Boomplaas, Cango valley (-AC), Hugo 21 (STE); Brakpoort, between Robinson Pass and Oudtshoorn (-CA) Hugo 148 (PRE, STE).

For more than 100 years the specimen cultivated at Schönbrunn was thought to be the last surviving plant of the species. In 1906 it was re-discovered by Dr. R. Marloth on the Sandrivier mountains in the Prince Albert district (Kew Bull. : 349 (1909)). Later he found the plants on the Tygerberg in the same district (Marloth 4465 and 4498); and in May 1908 he collected material (Marloth 4567, spec. ill. 4a) which is identical with Jacquin's type. However, the Schönbrunn plant was still described as the 'rarest plant of the world' fifteen years later in 'Park und Garten von Schönbrunn' (1923) and this must have prompted Dr. H. Andreae, who worked under Dr. Marloth, to send the above details in a letter to the Natural History Museum in Vienna on 13th January, 1925.

It is not possible to separate F. crispa from its close ally, F. edulis, on the grounds of floral structure. The floral features seen elsewhere in the genus are repeated here, with variation in dimension as well as in trivial characters such as the degree to which the corolla lobes are replicate.

The most easily observed difference in vegetative structure is

the extreme crimped undulation of the leaf margin, resulting in the crimped appearance of the leaves which is referred to in the species name. This character is illustrated with random samples of leaf outlines from both F. edulis and F. crispa in Fig. 11. It should be noted that the leaf in F. edulis although larger and flatter, frequently adopts a wavy margin (but is never crimped).

The other distinguishing character is the indumentum. In F. crispa the stems and leaves are liberally covered with erect short white hairs of varying lengths, while the leaves of F. edulis are glabrous except for the occasional single white adpressed hair. It is pertinent to note that several collections made by Bayer (the plants currently in cultivation at Karoo Botanic Garden, Worcester) from Warmwaterberg, Montagu, show the corrugated leaf margin of F. crispa, and yet are glabrous. This indicates one of two things: either the leaves of F. crispa are usually pubescent, sometimes glabrous, or F. crispa is simply a geographic ecotype of F. edulis and should be sunk under that species. South African herbaria contain only 8 specimens of F. crispa; until such time as these collections are extended and the species thoroughly investigated in the field, the author has decided to recognise F. crispa as a separate entity as the available material points to it being distinct.

The erect hairs in typical F. crispa distinguish it from the other species of Fockea all of which possess white, adpressed slightly curved hairs to a greater or lesser degree: in F. multiflora these form a dense mat, in F. edulis they occur at the tips of young stems and sparingly on the petioles.

Common names of F. crispa: bergbar(r)oe, kombroo, kamb(a)roo, (Smith, 1966). The species is probably best known in the Little Karoo as the 'ghwarriekoe' because of its association with the shrub Euclea undulata ('Ghwarrie'), (Bayer, 1976).



Plate 18 *F. crispa*. The long slender buds are visible on this specimen from Brakpoort near Oudtshoorn. Hugo 148 STE

Plate 19 (below) *F. crispa*. Collected by a coloured at Amalienstein near Ladismith. 14888 STE.



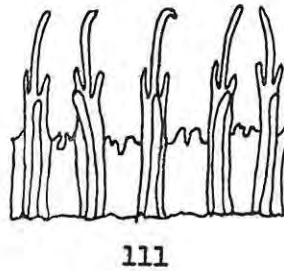
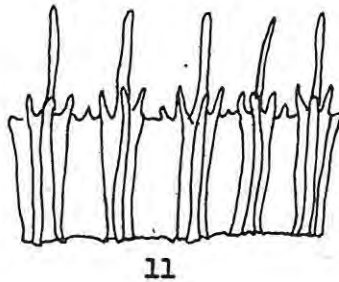
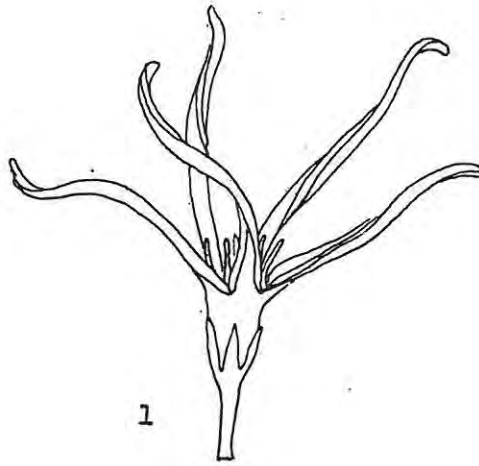


Fig. 12 F. crispa. 1. Flower x 3 showing twisting replicate petals. From material collected NW of Ladismith. NBG 843/77  
 11. Corona x 5 NBG 843/77  
 111. Corona x 7 From material collected at Warmwaterberg

(5) Fockea comaru (E. Mey.) N.E.Br. in Fl. Cap. 4, 1 : 778 (1908).  
 Type: Cape, near Stylkloof, Drège (B+).  
 Designated neotype: Without locality, Zeyher 1135 (BOL ! K ! PRE!  
 SAM! W!).

Brachystelma ? comaru E. Mey. in Comm. pl. Afr. Austr. : 195 (1838).

Brachystelma circinatum Marloth non E. Mey. in Engl. Jahrb. 10 :  
 244 (1889).

Fockea angustifolia K. Schum. in Bot. Jahrb. 17 : 146 (1893);  
 Schltr. in J. Bot. : 487 (1898); N.E.Br. in Fl. Cap. 4, 1 : 778  
 (1908). Type: Cape, Griqualand West, Groot Boetsap, Marloth  
 1008 (B+).

F. sessiliflora Schltr. in Bot. Jahrb. 20 Beibl. 51 : 44 (1895);  
 N.E.Br. in Fl. Cap. 4, 1 : 781 (1908). Type: Transvaal, Klipdam  
Schlechter 4493 (W, drawing!).

F. lugardii N.E.Br. in Fl. Trop. Afr. 4, 1 : 429 (1903).  
 Type: Botswana, Kwebe Hills, Ngamiland, Lugard 299 (K, holo!).

F. dammarana Schltr. in Bot. Jahrb. 38 : 56 (1905).  
 Type: South West Africa, Damaraland, Een 1879 (BM!).

F. tugelensis N.E.Br. in Fl. Cap. 4, 1 : 778 (1908).  
 Type: Natal, Tugela, Gerrard 1310 (K, holo!, BOL!).

F. mildbraedii Schltr. in Wiss. Ergebn. Dt. Zent. Afr. - Exped.  
 2 : 545-46 (1913). Type: Tanzania, Lembeni, Winkler 3803.

F. monroi S. Moore in Journ. Bot. 1, 2 : 149 (1914).  
 Type: Zimbabwe, Melsetter distr., Munro 828 (BOL! SRGH!).

F. gracilis R.A. Dyer in Kew Bull. : 459 (1933).  
 Type: Cape, Grahamstown, Dikkop Flats, Dyer 1251 (PRE, iso! GRA! BOL!).

F. angustifolia K. Schum. var. volkii sensu H. Huber in Volk 911 c (BR).

Perennial with erect habit or more often twining or decumbent with deep-rooted tuber. Tuber attenuate when young (spec. ill. 17, fig. 13) thickening with age (spec. ill. 16), brown, smooth to rugose or verrucose, simple or bifurcate, with very long subterranean neck, dividing near soil level into several to many branches. Stems either fruticose erect to 300mm unsupported or long, weak and twining when support is available. Leaves extremely variable (fig. 14) even on same plant, from broadly lanceolate or obovate to linear or filamentous, shortly petiolate, lamina flat or sub-undulate, glabrous or thinly puberulous above and on lower midrib, margins often revolute, 13 - 105 x 0,4 - 17mm. Flowers (2-) 3-4 (-6) at nodes; pedicels 1-3mm. Sepals lanceolate-acute, 1-3mm. Corolla greenish-yellow to blackish, twisted in bud, corolla tube 1-3,5mm with erect, spreading or twisting lobes 2-30mm long. Corona white, tube 2-4mm, outer principal lobes filamentous, rarely flat, bifid and toothed externally, 0,5-5mm long, keeled minor lobes simple or elaborate and joined to form a continuous fringe at outer edge of corona mouth, inner principal lobes flat, terete or keel-like, shorter than, equal to or longer than corona tube (fig. 15). Follicle single, long and tapering, grey with brown bands, 132-200 x 7-8mm.

F. comaru is widely distributed in southern Africa from South West Africa across Botswana and the Transvaal to Natal; it is present in the northern Cape particularly in the Kimberley and Griquatown areas, western and northern Orange Free State and continues

southwards across the Karoo to the south-western Cape. In the south it usually lies just outside the coastal belt occupied by F. edulis, but sometimes this is penetrated. The species is noticeably absent in the eastern Orange Free State, Lesotho, southern Natal and Transkei. Little evidence of it occurring in Angola or Mocambique or to the north of these countries has been found, such collections would normally be held by SRGH. Only one collection from Zambia has been seen, and the type of F. mild-braedii (Tanzania) has not been traced. The usual flowering period is from March to April, but records show that the plants may flower at any time from September to June.

Zambia.- Distr. Gwembe: near Ntoboute village, Scudder s.n. (SRGH).

Zimbabwe.- Without locality: ' Monro 942 (SRGH). 1628 (Kariba) Kariba Trans. B, Jarman 342 (SRGH). 1727 (Binga) Mwenda, Jarman s.n. (SRGH). 1732 (Mtoko) Farm Redlands, Leach & Gosden 15014 (SRGH). 1826 (Wankie) 8km W of Salt Springs, Sinamatella, Rushworth 2550 (SRGH). 1932 (Melsetter) Melsetter distr., Monro 1888 (BOL). 2031 (Bikita) Devuli river bridge, Chase 7979 (SRGH); Pole Evans & Chase 6493 (PRE); Umkondo Mine, Dale 268 (SRGH). 2130 (Nuanetsi) Buby river, Drummond 5814 (SRGH).

South West Africa.- Locality unknown: Dinter 4470, 71030 (SAM). Grid reference unknown: Sandfontein, Bleek s.n. (BOL); Sandfontein, Wilman 27111 (SAM). 1712 (Posto Velho) Otjitande (-DB), Rycroft 2460 (NBG). 1718 (Kuring-kuru) near first borehole SW of Nzinzi down Mpungu Omuramba (-DC), de Winter 3985 (PRE). 1813 (Ohopoho) Kaoko-Otavi (-BC), Barnard 33288 (SAM). 1815 (Okahakana) Etosha Park, Okaumburu, Katspruit (-C), le Roux 1099 (PRE). 1819 (Karkuwisa) Cigarette, NE of Karakuwisa (-CB), Maguire 2267 (BOL, NBG, PRE). 1917 (Tsumeb) Farm Auros 595 (-BA), Giess 12576 (WIND). 1918 (Grootfontein) Grootfontein (-CA), Schoenfelder S.128 (PRE);

Farm Kumkauas 552, near Omuramba river (-DA), Giess & Smook 10639 (PRE, WIND). 1920 (Tsumkwe) on road to Nyae Nyae pans (-DA), Giess, Watt & Snyman 11133 (PRE, WIND); Gautscha Pan, E of Karakuwisa (-DC), Maguire 2193 (BOL, NBG, PRE). 2019 (Eiseb) 24km NE of Epata (-CC), Giess 9738 (WIND); 38km NE of Epata (-CC), Giess 9751 (WIND). 2116 (Okahandja) Farm Omatako-Sicht, 256 (-BA), Woortman 78 (WIND); Okahandja (-DD), Bradfield 349a (PRE). 2117 (Otjosondu) Quickborn (-AA) Bradfield 349b (PRE); Farm Schoongelegen 152 (-CD), Seydel 2594 (WIND). 2118 (Steinhausen) Farm Sturmveld, 252, near pans at Friedrichbrunnen (-DB) Tölken 61 (WIND). 2119 (Epukiro) Epukiro reserve, Eiseb Omuramba (-AA), Giess 9760 (PRE, WIND); 64km N of Gobabis (-CA), Basson 238 (PRE). 2216 (Otjimbingwe) Okomitundu, Onjossarivier (-AB), Seydel 1419 (PRE). 2217 (Windhoek) Farm Neudam, Giess 3921 (WIND); Farm Orumbo-noord 199 (-BB), Giess 8403 (PRE, PRU, WIND); Farm Gammans 36, 7,5km NW of Windhoek (-CA), Wantorp 91 (PRE); municipal area, Windhoek (-CA), Hanekom 334 (WIND); Farm Voigtland 77, Gambakka camp (-CB), Leippert 4355 (WIND). 2218 (Gobabis) Okasewa (-AD), Dinter 7450 (SAM); Witvlei townlands (-AD), Mason & Boshoff 2579 (PRE); Farm Dawis (-BD), Merxmüller & Giess 1200 (PRE, WIND). 2317 (Rehoboth) 48km S of Windhoek (-AA), van Vuuren 585 (PRE, WIND); 64km N of Kalkrand (-CB), Acocks 18149 (PRE). 2718 (Grunau) Great Karas mountains, 48km S of Narubis towards Grunau (-BC), de Winter 3314 (PRE).

Botswana.- 1822 (Kangara) Dobe, Lee D64/61 (SRGH). 2026 (Nata) 128km WNW of Francistown, Drummond 5283 (SRGH). 2121 (Ghanzi) Eaton's Farm, Brown 1197 (SRGH); Farm 48, de Hoogh 89 (SRGH); Farm 56, Brown 7745 (SRGH). 2125 (Lothlekane) 8km W of Lothlekane (-BC), Wild & Drummond 7244 (PRE, SRGH). 2220 (Kalkfontein) Makundu (-AC), Gibson 144 (WIND). 2425 (Gaborone) Content farm, Kelaole A69 (SRGH).

Transvaal.- 2229 (Waterpoort) Masikwaspoort (-DD), van der Merwe 1691 (PRE). 2327 (Ellisras) Farm Alfred, 3km W of P.O. Monte Christo (-BC), Codd 6606 (PRE). 2331 (Phalaborwa) Manyeleti Game Reserve, Bredenkamp 1784 (PRE). 2426 (Mochudi) Krokodil draai,

3km S of Rooibokkraal P.O. (-BB), Leistner 3190 (PRE); Schwerin, 3km ESE of Rooibokkraal (-BB), Leistner 3192 (EA, PRE). 2427 (Thabazimbi) 9,5km SW of Bulge river (-BA), Louw 3545 (PUC, PRU). 2428 (Nylstroom) Sterkrivierdam Nature Reserve (-BD), Jacobsen 2809 (PRE). 2429 (Zebediela) 58km N of Marble Hall, Olifantsrivier valley (-CA), Vorster & Jackson 2160, 2163, 2164, 2165, 2167, 2168, 2174 (PRE); Potgietersrus (-AA), Bolus 11014 (BOL, NH, PRE); 16km on road from Immerpan to Middelburg (-AC), Meeuse 9600 (PRE, SRGH). 2431 (Acornhoek) Kruger Park (-BC), Gertenbach 5446 (PRE). 2527 (Rustenburg) 6,5km WNW of Rustenburg (-CA), Acocks 19169 (PRE). 2528 (Pretoria) Hammanskraal (-AD), Mogg 14864 (PRE). 2531 (Komatipoort) Ngwenyere (-AD), - 4995 (KNP); N of Gomandwane (-BC), van der Schijf & Marais 3644 (PRE, PUC). 2626 (Klerksdorp) Maquassie (-CC), Morris & Engelbrecht 6924/3 (PRE).

Orange Free State.- 2727 (Kroonstad) between Renoster river and Vaal river ? Zeyher 1135 (BOL, K, PRE, SAM, W). 2825 (Boshof) Olifantsrug (-CA), Power 6682 (BOL, KMG, SAM). 2924 (Hopetown) Driekop, Luckhoff (-DD), van Zyl 1046 (PRE).

Swaziland.- Without grid reference: 1,6km E of Sicusha, E. Bayliss 564 (PRE). 2631 (Mbabane) St. Philips, Hlatikulu (-CD), Dlamini s.n. in PRE 51201 (PRE); Sicush (-BD); Karsten in NBG 84054 (NBG).

Natal.- 2731 (Louwsburg) Magut (-DA), Gerstner 3157 (NH, PRE). 2732 (Ubombo) Nibela store, Zululand (-CD), Ward & Guy 80 (PRE); Bangonoma, Gerstner in NH 22908 (NH). 2831 (Nkandla) Bekamuzi (-AD), Gerstner 3894 (NH, PRE, SRGH); Umfolozi Game Reserve (-BD), Mthonti 16 (NU, PRE); Bourquin 450 (NH, NPB, NU, PRE); White Umfolozi, Swynnerton 16 (PRE); Mfule valley (-DA), Venter 5107 (PRE). 2832 (Mtubatuba) Hluhluwe Game Reserve (-AA), Ward 2061 (NPB, PRE).

Cape.- Locality unknown: Marloth 7148 (PRE). 2722 (Olifantshoek) Langkloof (-BA), Leistner 2099 (KMG, PRE). 2817 (Violsdrif)

Kliphoogte, Richtersveld (-CD), Herre in STE 12334 (STE). 2822 (Glen Lyon) Oumeidkloof, Hay (-BA), Cooke 6421 (BOL, KMG); Padkloof, (-DA), Acocks 2207 (PRE); Hay (-DD), Acocks 2014 (PRE); Paauwfontein, Hay (-DD), Cooke 6420 (-KMG); Hay, Esterhuysen 5399 (BOL, KMG, PRE). 2824 (Kimberley) Koopmansfontein, Barkly West (-AA), Acocks 18792; Knockbarragh, Barkly West, Brueckner 248 (KMG, PRE); Newlands (-AD), Wilman 3165 (KMG); River View, Acocks 1503 (KMG, PRE); Best Pan, Tapscott 119 (KMG); 48km W of Kimberley (-CB), Lewis 67535 (PRE, SAM); 51km W of Kimberley (-CB), Hall 652, 654 (NBG); Riverton (-DB), Tapscott 16353 (BOL). 2917 (Springbok) Steinkopf (-BD), Marloth 13300 (PRE); Hester Malan Reserve (-DB), Rösch & le Roux 729 (PRE, PRU). 2919 (Pofadder) Gannapoort (-BC), Leistner 2447 (KMG, PRE). 2922 (Prieska) on Asbestos mountains, Bryant 1096 (PRE). 2923 (Douglas) Strydenburg (-DC), Wiese 640 (NBG). 2924 (Hopetown) Rode Pan, near Orania (-CD), Wenger 1324 (PRE). 3019 (Loeriesfontein) Loeriesfontein (-CD), Marloth 12848 (PRE). 3118 (Van Rhynsdorp) 16km S of Klaver (-DC), Hall in NBG 44077 (NBG). 3119 (Calvinia) Botterkloof (-CD), Hall 700 NBG. 3121 (Fraserburg) Farm Grootfontein (-CD), Coetzer 59 (PRE). 3123 (Victoria West) Farm Nuwerus (-CB), Bayer in NBG 110663 (NBG). 3221 (Merweville) Prince Albert (-DC), Marloth 7147 (PRE). 3222 (Beaufort West) Kruitkraal, Rietbron (-DD), Snyman in NBG 114049 (NBG). 3319 (Worcester) 19km SE Worcester (-CB), Bayer 319 (NBG); 4km W of Robinson (-DD), Schwegman in NBG 110679 (NBG); 2km SW of Robertson (-DD), Bayer 136 (NBG); Doornrivier, Stokoe in PRE 51243 (PRE); Veld Reserve, Olivier 255 (PRE). 3320 (Montagu) Avondrust, Touwsrivier (-AC), Bayer 318 (NBG); Whitehill (-BA), Archer 18286 (BOL); Compton 3346 (BOL). 3321 (Ladismith) Calitzdorp (-DA), Oddie 559/36 (BOL). 3323 (Willowmore) Zuurbergpoort (-AD), Hall 1645 (NBG). 3324 (Steytlerville) near Steytlerville (-AD), Compton 4998 (NBG). 3326 (Grahamstown) Dikkop Flats (-AB), Dyer 1251 (BOL, GRA, PRE). 3419 (Caledon) 4km NW of Stormsvlei Pass (-BB), Bayer 329 (NBG).

Fockea comaru was first described under Brachystelma by Meyer in 1838 from material without flowers collected by Drége. This

specimen was seen by N.E. Brown who, in his 1908 revision of *Fockea* in *Flora Capensis*, noted that it closely resembled *F. angustifolia*. Meyer cited the locality as 'near Steerkloof, altitude 3500 - 4000 feet' and this was interpreted by Brown as being Steerkloof near Richmond (central Karoo), Cape. Drège's specimen is presumed destroyed in Berlin. Meyer's description refers to linear leaves with revolute margins, the young stem velvety, and a tuber with rugose outer cover. This name is still actively applied to all narrow-leaved material in the south-western Cape by NBG (Compton Herbarium) but not by other herbaria (in particular PRE) who refer to it as either *F. angustifolia* or, occasionally, *F. gracilis*, a 1933 synonym of *F. comaru*.

When Karl Schumann came to work on the genus in 1891 he found that, in listing Marloth's plants, Engler had placed Marloth 1008 under Meyer's *Brachystelma circinatum*, which was based on a Drège specimen from Rietvallei at the foot of the Wittebergen (*Comm. Pl. Afri. Austr.* : 196 (1838) ). He published this finding in *Pflanzenreich* in 1891, and described *Fockea angustifolia* in 1893 with Marloth 1008 as its type. The Marloth specimen is presumed destroyed in Berlin.

In the absence of both types, and in consideration of the fact that the leaf of the *comaru-angustifolia* complex is its most variable factor (fig. 14) the author cannot confidently separate the two species. The earlier described name, *F. comaru*, is therefore applied.

A second variable feature in the complex is the length of petal,

which in South West Africa reaches a length of 30mm, while in the northern Cape it shortens to 12mm, and diminishes to 4mm in the southern Cape and 2mm in parts of Natal. Likewise the corona in the larger flowers to the north gradually becomes more elaborate, the minor lobes joining to form a fringed collar which surrounds the principal lobes, this collar is absent in the smaller flowers, but the gross appearance of the corona remains essentially the same.

The problem that remains is that a vast and variable complex is left without typification. According to Davis and Heywood (1963) a neotype is "not really a type but a specimen chosen to serve as a standard reference point; it simply represents a later taxonomic opinion" and in this case a standard is required. The neotype Zeyher 1135 is therefore designated. It matches Meyer's original description and at least 5 important herbaria (including Kew) hold identical material.

Its locality remains in doubt. The inscription on Kew sheets (by Brown) states that Zeyher 1135 comes from between the Renoster and Vaal rivers (in northern Orange Free State). Zeyher himself has written 'Rhenosterkop' on one of his specimen sheets (41886 SAM) and 'Rhenosterkop by Vaalriver' on identical material in another collection (Zeyher 510, K).

Synonymy in F. comaru: In 1967 Huber placed F. lugardii N.E.Br., F. dammarana Schltr. and (tentatively) F. sessiliflora in synonymy under F. angustifolia (Prodr. Fl. S.W.Afr.). On evidence at hand none of these distinguish themselves from F. comaru. It may be added that the broad-leaved F. lugardii, described as "a ground

creeper on rocks" by Captain E.J. Lugard who collected it in the Kwebe Hills, Lake Ngami, Botswana, is not unusual, since plants with some shade and sufficient water assume generous leaf proportions.

In 1976 Dr R.A. Dyer added the Natal species, F. tugelensis to the synonymy of F. angustifolia (Fl. Pl. Afr. 43 : Pl. 1711).

This decision followed the investigation of a population of shorter-petalled plants from the Olifants river valley, northern Transvaal by Mr. O.A. Jackson and Mr. P. Vorster. A wide range of variation in leaves, corolla and corona was found, which provided a connecting link between the typical F. angustifolia and F. tugelensis.

The author has reduced the following species to synonymy:

F. mildbraedii Schltr., tentatively, as the type (Winkler 3803) has not been found.

F. monroi S. Moore of Zimbabwe which matches material of F. comaru from Botswana and South West Africa.

F. gracilis R.A. Dyer which is identical in all respects to the linear-leaved southern form of F. comaru. Dr. Dyer sent this material to PRE for confirmation as a new species. It is obvious that the western Cape collections were not represented at PRE in the 1930's, nor, regrettably, are they represented today. This resulted in the publication of a new species based on material which must be very similar to the missing Drège type of F. comaru. The reduction of F. angustifolia has already been discussed, and the author adds to this F. angusti-

folia var. volkii Huber, which epithet appears on a specimen held at BR in Bruxelles which is patently the South West African form of F. comaru. Publication of var. volkii has not been traced.

Common names of F. comaru: Bergkambroo, Gameroo(n), Gameru(n), Kambroe, Kambroo, Comaru, Komaru. In South West Africa and Botswana it is also called water root (waterwortel). (C.A. Smith, 1966).

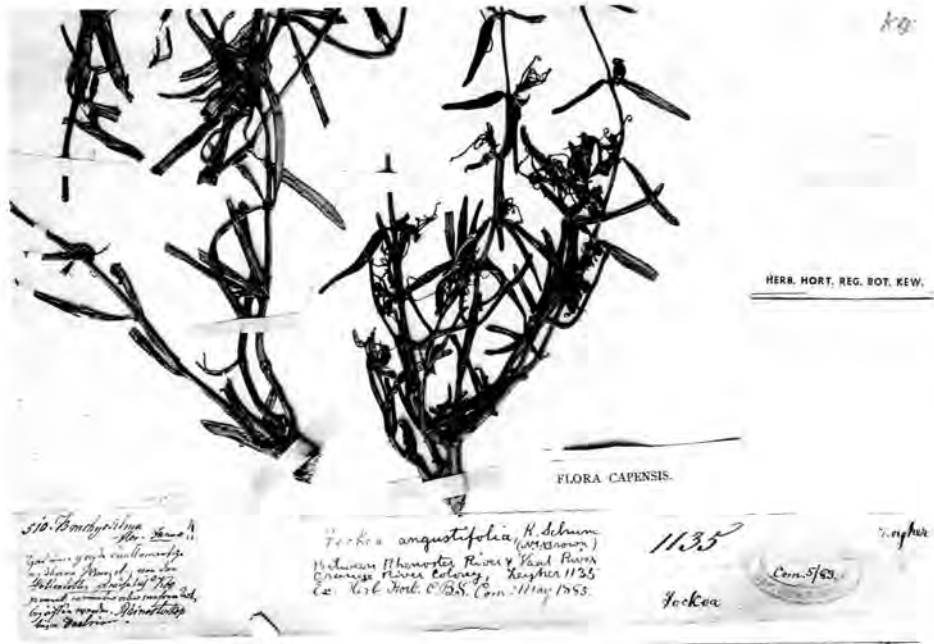


Plate 20. The neotype of *F. comaru*, Zeyher 1135 (on right).



Plate 21 The type of *F. tugelensis*, Gerrard 1310.



S.W.A. HERBARIUM WINDHOEK

1917 B: Tsumeb

Grid Ref./  
Ruitverw.

Regio: South West Africa



S

Plates 22/23. Variation in leaves of F. comaru in S.W.A. specimens.



Plares 24/25. F. comaru. The linear-leaved Worcester form.

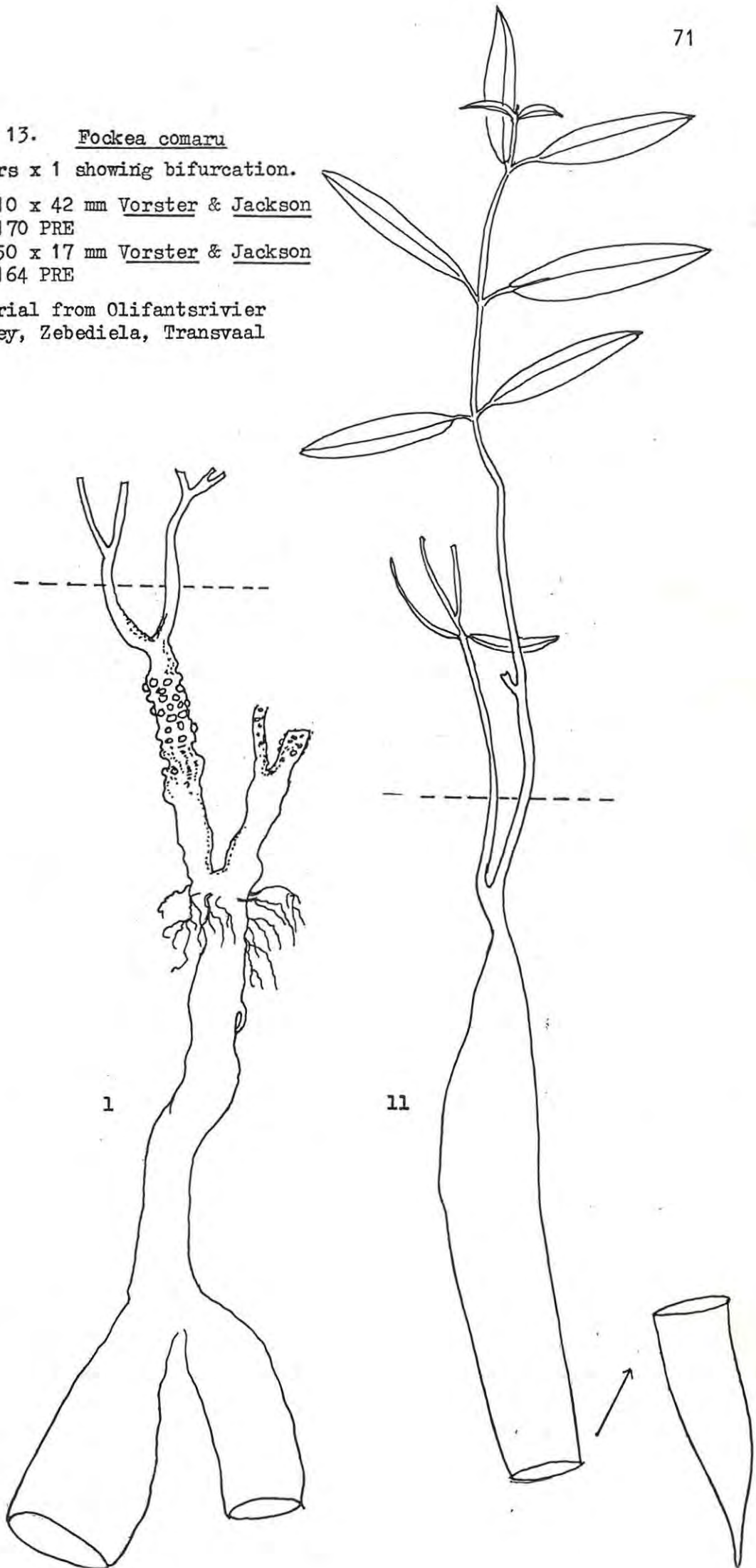
Fig. 13. Fockea comaru

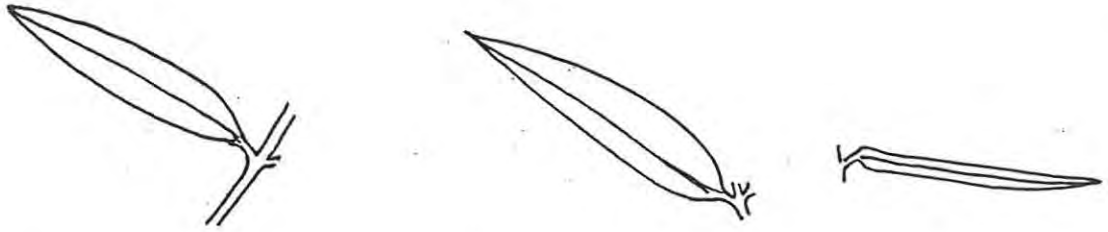
Tubers x 1 showing bifurcation.

1. 210 x 42 mm Vorster & Jackson  
2170 PRE

11. 150 x 17 mm Vorster & Jackson  
2164 PRE

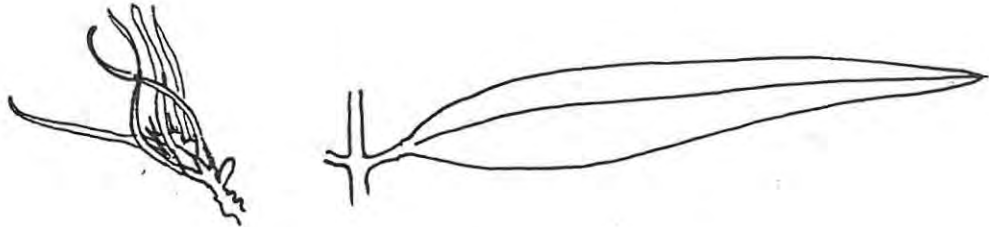
Material from Olifantsrivier  
valley, Zebediela, Transvaal



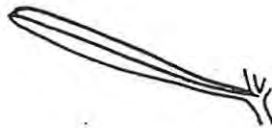


Van Der Merwe 1691 Masekwaspoort

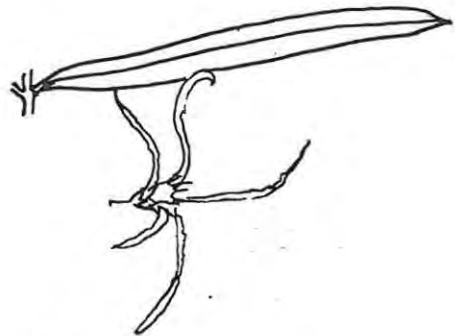
Bredenkamp 1784 Phalaborwa



Codd 6606 Waterberg (large flowers)



Leistner 3190 Rooibokkraal



Low 3545 Bulge river, Waterberg  
(large flowers: petals 16mm long)



Jacobsen 2809 Sterkrivierdam, Nylstroom



Bolus 11014 Near Potgietersrust  
(flowers have long petals)

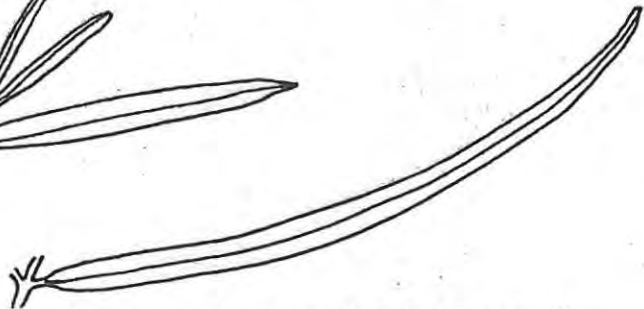
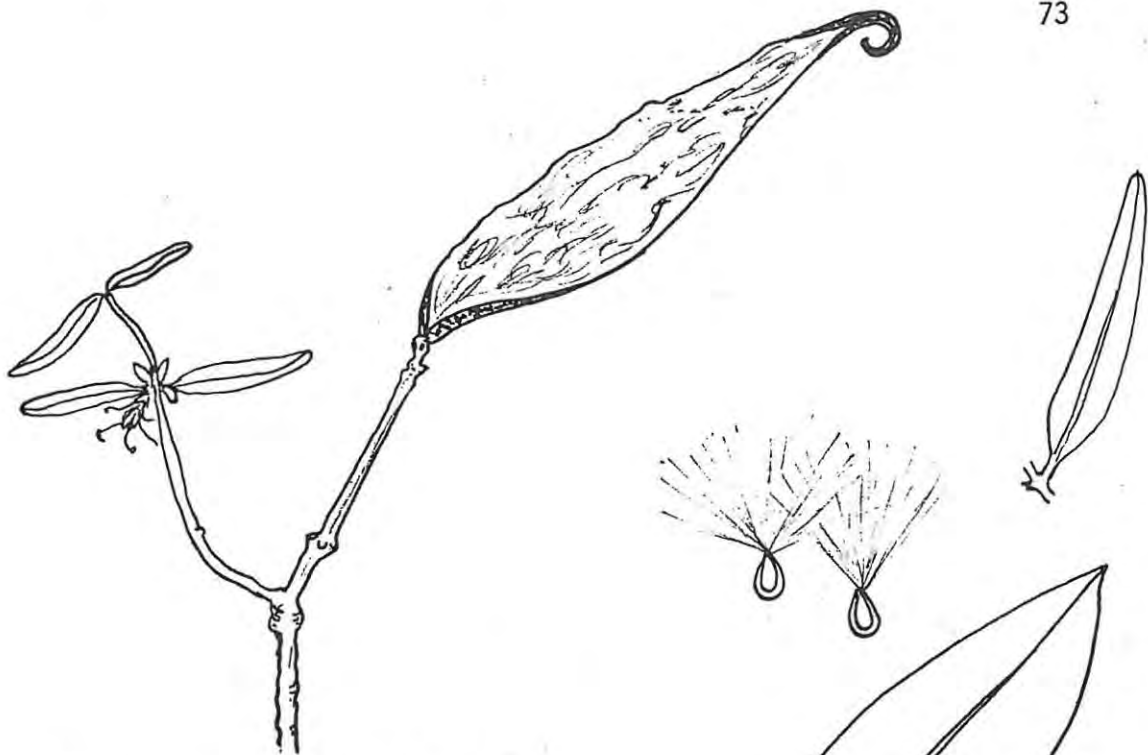


Fig. 14. F. comaru. Leaf variation in Transvaal specimens. x1

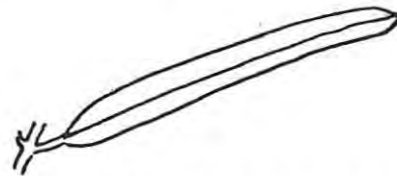


Vorster & Jackson 2165 Zebediela  
(small flowers)

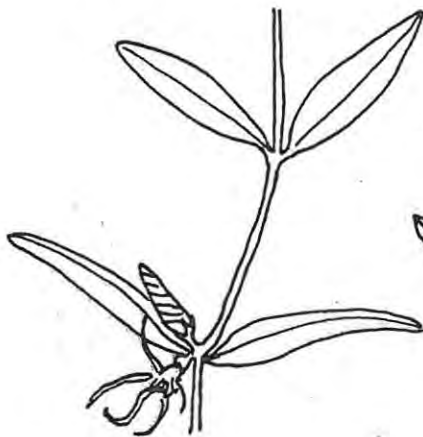


Vorster & Jackson 2163 Zebediela  
(with small flowers)

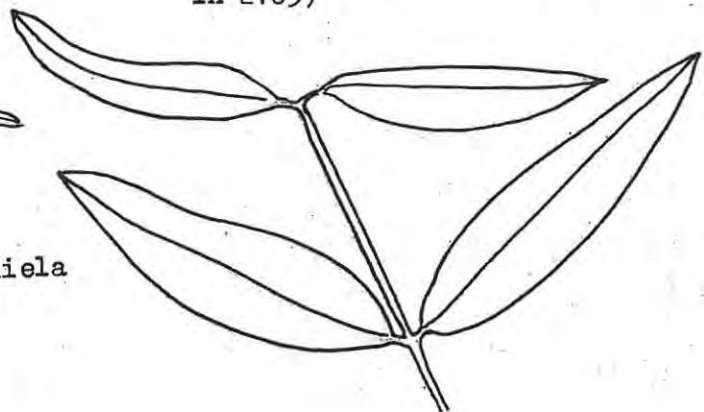
Vorster & Jackson 2174 Zebediela  
(with small flowers)



Vorster & Jackson 2167 Zebediela  
(flowers slightly larger than  
in 2163)



Vorster & Jackson 2165 Zebediela



- 4995 KNP Komatipoort

Fig. 15. F. comaru. Variation in Zebediela and Komatipoort specimens  
x 1

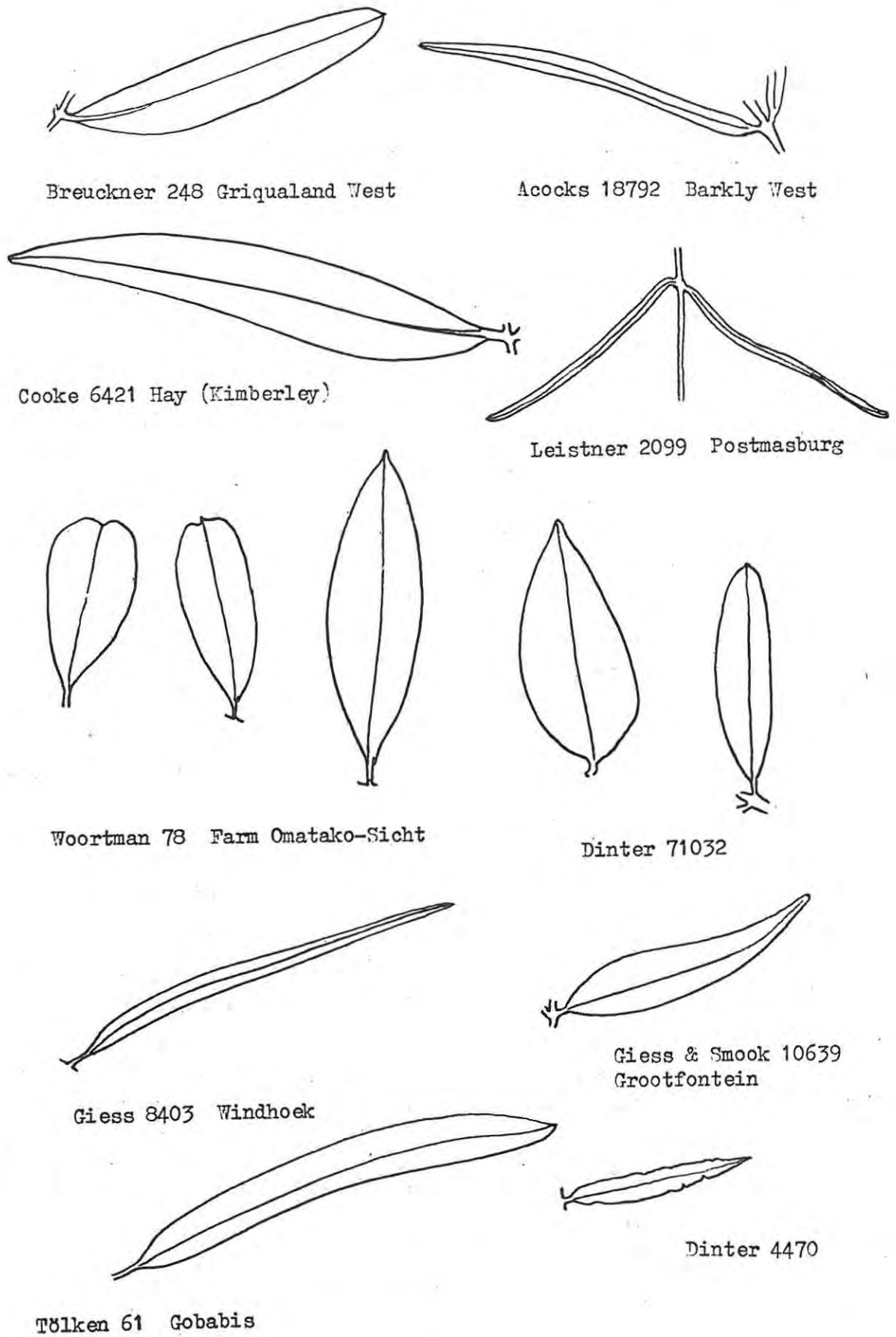
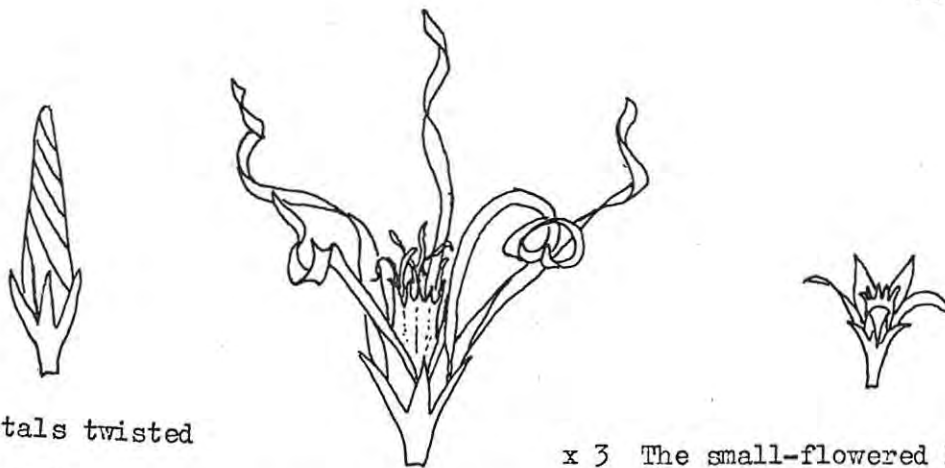


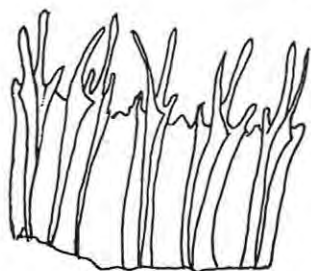
Fig. 16. F. comaru. Variation in Northern Cape & S.W.A. specimens  
x 1



x 3 petals twisted  
in bud

x 3 The small-flowered Natal form

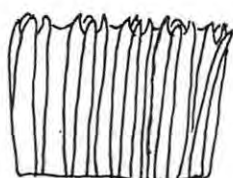
x 3 Spirit material from Botswana  
Wild & Drummond 7244



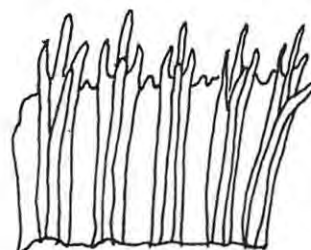
x 6 corona of the Rietbron form  
inner principal lobe raised like a keel



x 17 Corona of the Natal form



x 6 corona of the Worcester form



x 6 corona of Dyer's 'gracilis' form  
from Dikkop flats

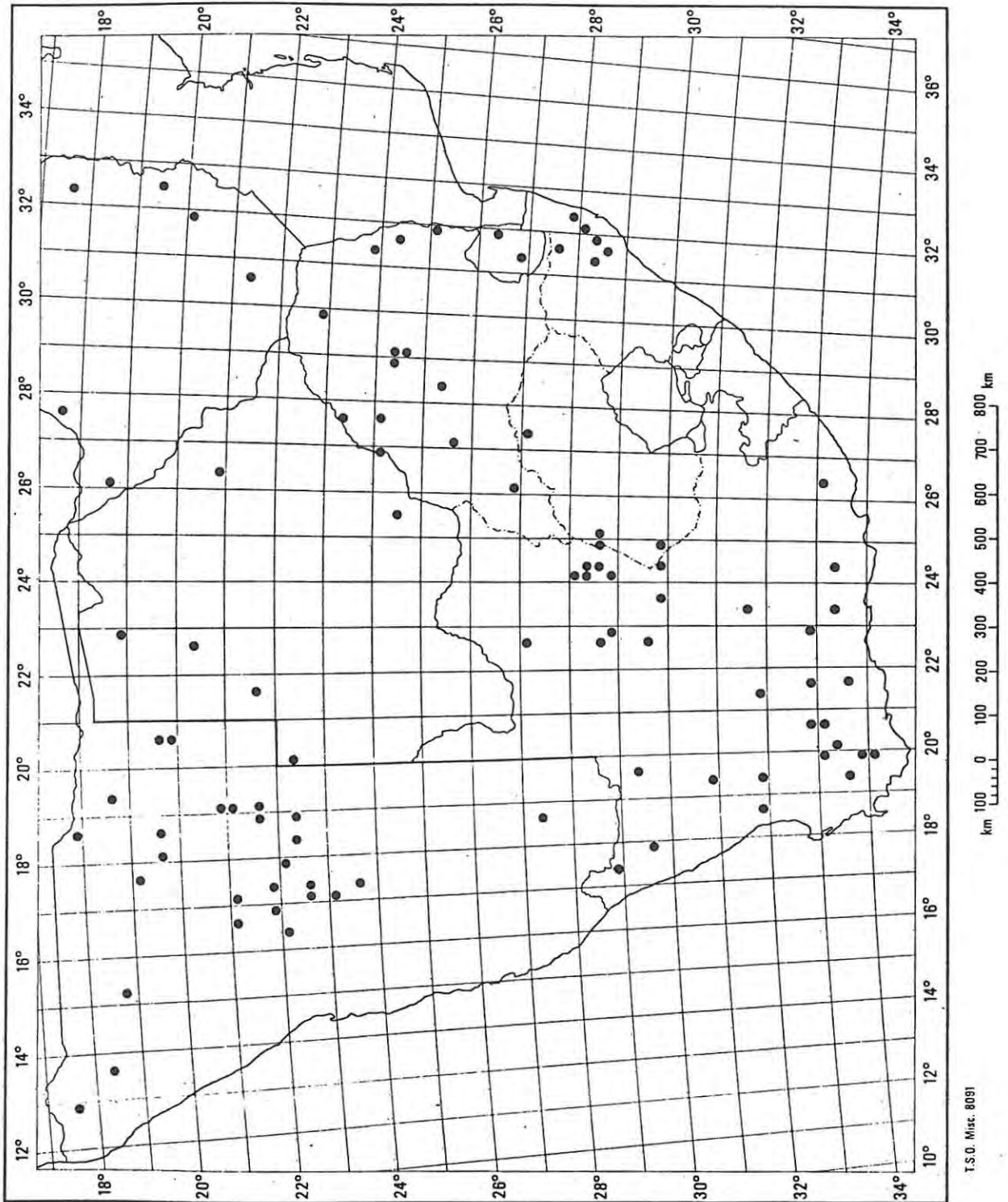


external view of Kimberley form;  
tooth at back of principal outer lobe



x 7 external view of one principal  
lobe in Zimbabwe specimen  
showing complete collar

Fig. 17. F. comaru. Variation in flower and corona.



MAP 4. Distribution of Fockea comaru (E. Mey) N. E. Br.

#### 4. PHYLOGENETIC AFFINITIES OF THE SPECIES OF FOCKEA ENDL.

There is a high degree of endemism in southern Africa. Ten families and 29% of genera are endemic; a further 50 genera (approx.) have most of their species in southern Africa with a few species penetrating into tropical Africa (Goldblatt, 1978). The small genus Fockea falls into the second category. A member of the large cosmopolitan family Asclepiadaceae (200 genera), Fockea contains 3 endemic species, one tropical species and a fifth which has its main distribution in southern Africa and its further distribution is not fully known.

The species of Fockea are compatible in broad morphological character and in floral character in particular. One can assume that the characters common to all of them must be the characters possessed by their ancestor, and that at a much earlier period there existed a form with the primitive features of the weak twining stem and opposite leaves. It is probable that the development of a thickened caudex, which today is the characteristic tuber, was a later adaptive feature in response to climatic fluctuations since the mid-Pliocene with the climate becoming increasingly arid. Having achieved a means of drought survival in the form of a tuber, no attempt is made to store water in the leaves, which often exhibit xerophytic features (revolute margins, pubescence) but never become succulent. This is in keeping with many other members of the Asclepiadaceae e.g. the tribe Stapelieae, in which the stem becomes the storage organ and the leaves reduced.

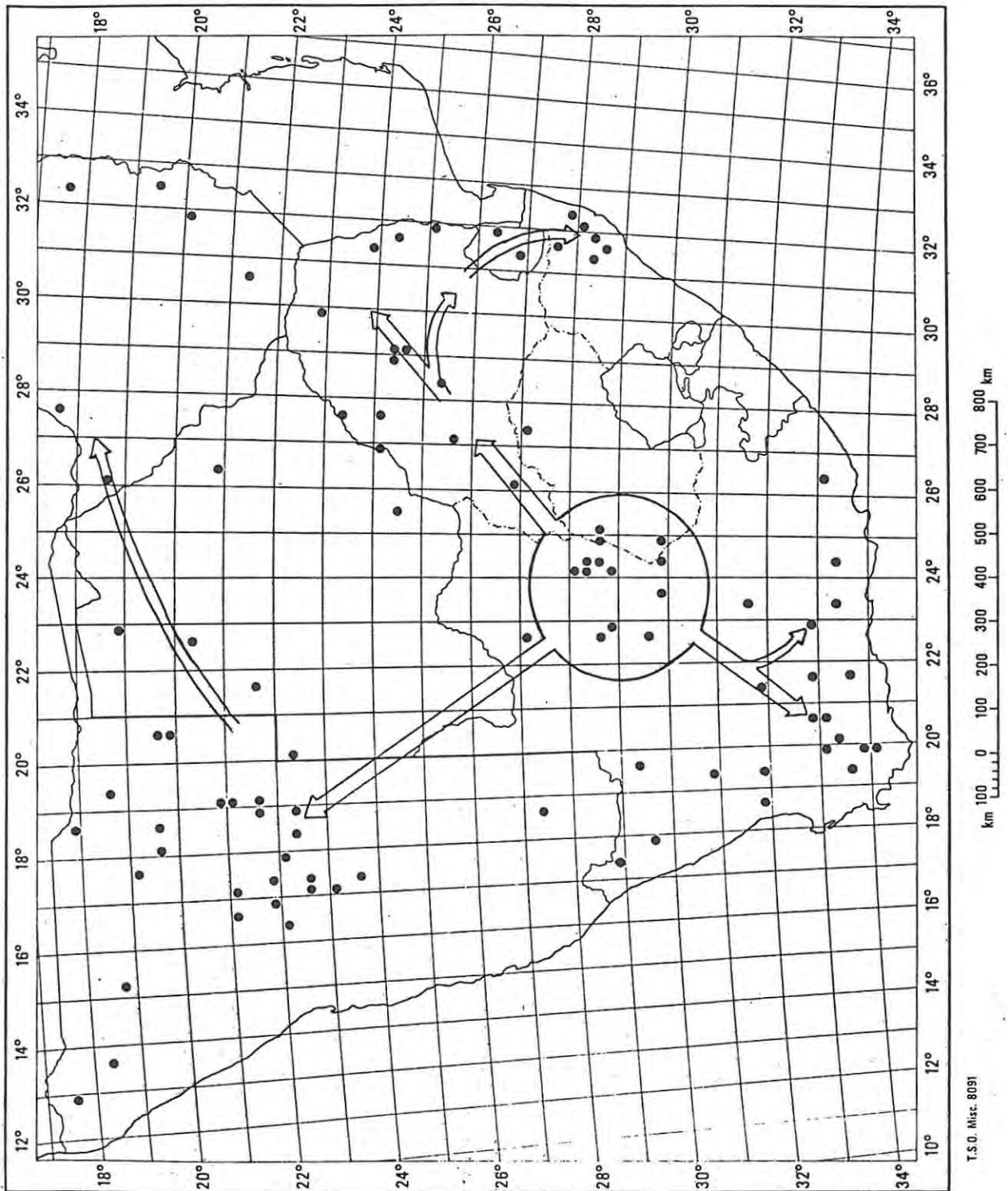
While the general habit of each species demonstrates adaptation to

climate and habitat, the flowers and fruits are remarkably constant throughout. The shortly gamopetalous, 5-lobed corolla varies only in size, not in shape or indumentum and only slightly in colour; the tubular corona in spite of extra crenations and varying dimensions always possesses 5 inner and 5 outer lobes, with intermediate teeth between the former. The anthers are always erect with peculiar inflated sacs - the purpose of which is not yet understood. At an early stage one of the two carpels aborts and a single follicle develops which produced the flat seeds tufted with long silky hairs.

Two species show a high degree of specialisation and both have a very low degree of variability: F. multiflora assumes giant liana-like proportions in the tropics and F. sinuata is a diminutive, geophytic species found in the most arid areas of the Cape and South West Africa.

F. edulis, which never occurs very far from the southern Cape coastline, shows a fair degree of variability. Unlike the other species it possesses almost fleshy, rubbery climbing stems. It is vigorous and fairly common over a wide area, while its close ally, F. crispa, is far less abundant and has a restricted distribution. It is very likely that F. crispa, which has distinctive hairy xerophytic leaves, originated from the coastal entity and adapted to the harsh extreme climate of the Little Karoo and escarpment area immediately north of the Swartberg mountains.

The species with the largest distribution in southern Africa is F. comaru. It is a variable, wide-spread, dynamic complex which



MAP 5. Possible migration routes of *Fockea comaru* (E. Mey) Druce

appears to have its origin in the Kimberley - Glen Lyon area in the northern Cape, where the plants are less specialised than the outliers from this point (Map 5). Although variation is often continuous there is much evidence to show that at least three areas of specialisation within the species have developed - the broad-leaved, long-petalled form in South West Africa, Botswana and northern Zimbabwe; the small-flowered form in Natal, and the linear-leaved form in the south-western Cape.

It is hoped that, with a further opportunity of field work, particularly in Natal, a more detailed delimitation within the species F. comaru will be achieved.

#### 5. ECOLOGICAL NOTES

F. multiflora always grows in association with savannah trees, most often in Mopane woodland, attaining heights of up to 10m by twining around the stems of Colophospermum mopane Kirk ex J. Leonard. Greenway recorded it in association with Commiphora sp. in the Masai district of Tanzania (Greenway 9057 PRE). The species is not rare or elusive, as are several of its southern allies : in the Urungwe district in Zimbabwe Levy recorded that 'just south of the Zambesi in mopane forest hundreds of these lianas were seen; many trees were killed by the plant, the dead wood however remaining standing, in other cases the tree had broken off under the weight.' (Levy in PRE 36784 PRE). The mopane trees in this case died from the physical stress of strangulation. In the Kaokoveld of South West Africa the species has been observed twining into 'Purple pod Terminalia,' T. prunioides Lawson (Giess & Wiss 3310 WIND). There

are no reports of F. multiflora growing independently as sometimes occurs in this genus.

F. multiflora occurs on dolomite outcrops in South West Africa at Tsumeb and in the vicinity of Kaoko Otavi in the Kaokoveld. It is recorded on sandy soils in the Luangwe valley in Zambia (Astle 5149 SRGH) and on 'greyish-yellow powdery loam' in Tanzania (Greenway 9057 PRE).

In the Orange Free State F. sinuata has been found on brak soils associated with Salsola sp. F. sinuata is a small erect species which is not support-seeking. Acocks mentions its occurrence along the Orange river in 'broken veld of flats, rare, in the bushes' (Acocks 14264 PRE). On the farm Mickberg near Karasburg (SWA) the plants grow on rocky ridges in red soil, in association with another geophyte, Lithops karasmontana (Dinter & Schwant.) N.E.Br.

F. comaru is essentially a dry region species which shows preference for hill slopes where the tubers are wedged in between the rocks, only occasionally on flats: red sandy clay flats at Hester Malan Reserve, Springbok, (Rösch & le Roux 729 PRE), and on a 'braklaagte' (salt flat) in the Kruger National Park. Nearly every record indicates occurrence on limestone or granitic rocks: 'rare on surface limestone' (Acocks 1503 KMG); 'on granite' (Vorster & Jackson 2168 PRE); on quartzite outcrop (Louw 3345 PUC). These records refer to Kimberley, Zebediela and Waterberg (Transvaal) areas. In the western Transvaal Leistner found specimens on sandy gravel river terraces. In Mfule valley in Zululand Venter

(5107 PRE) collected the species pendulous on the rock face.

A lactiferous and somewhat weak-stemmed species, F. comaru is often associated with Acacia thornveld, e.g. Acacia mellifera Vahl. & Benth. The linear-leaved form in the southern Cape occurs in very rocky sparsely vegetated areas where it is inconspicuous along rock ledges. The leaves of F. comaru respond strongly to shady and exposed positions, becoming larger, broader and green in shade, and linear, revolute and brown in direct sunlight.

The southernmost species, F. edulis, is nearly always directly associated with shrubs; in the eastern Cape it often forms a canopy on Euphorbia pentagona Haw., and twines into Euclea undulata Thunb. In the Robertson Karoo it grows with Carissa haematocarpa and near Mossel Bay it is found with the red-fruited C. bispinosa (Bayer in *Excelsa* 6 : 89 (1976)). The closely related F. crispa which occurs in the Little Karoo is called 'ghwarriekoe' because it is found with Euclea undulata ('ghwarrie'); often however it is non-climbing due to the sparsity of vegetation and then spreads between the rocks on hills, which accounts for its other name, 'bergbaroe'.

A principal feature of the genus is the slender stem which always (except in the dwarf geophyte, F. sinuata) seeks support resulting in direct association with shrubs or trees. Another major feature is the water-storing tuber which extends species distribution as the plants can survive long dormant periods with dry winters or dry summers.

The tuber of both F. comaru and F. edulis is eaten raw by the African

or can be boiled with sugar as a preserve. F. crispa is inedible. The leafy stems are freely browsed by animals which results in the shortened tufted specimens which appear very dissimilar from the typical plants.

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