STUDIES IN TROPICAL AFRICAN UMBELLIFERAE I:

Frommia ceratophylloides and the Diplolophium buchananii complex

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ABSTRACT. *Frommia ceratophylloides*, formerly a very obscure member of the Umbelliferae, is now quite well known as a result of recent collecting in Tanganyika and Malawi. *Diplolophium buchananii* and *D. swynnertonii* are shown to be best treated as subspecies occurring in montane habitats separated by the lowlands of the Zambezi valley.

THE REDISCOVERY OF FROMMIA CERATOPHYLLOIDES—AN OBSCURE MEMBER OF THE UMBELLIFERAE

In 1908 a German expedition lead by Hauptmann P. Fromm visited the Ufipa district of Tanganyika. A small botanical collection of 268 specimens was made by Max Munzner, a junior member of the expedition. The collection included a number of plants new to science, one of which was an umbelliferous plant of most unusual appearance. The specimen eventually came into the hands of Hermann Wolff, who found it necessary to describe a new genus to accommodate Munzner's plant. Despite the warm praise accorded to Munzner by Fromm himself, in his account of the Journey *Ufipa—Land und Leute*, Wolff dedicated the new genus to the leader of the expedition. The type specimen, which was at Berlin, was destroyed during the war and apparently no duplicates were distributed to other institutions. This is hardly surprising as the collection was small and the botanical activities were clearly only a subordinate aspect of the work of the expedition.

Until ten years ago I had seen only two specimens that could be referred to this species. One at Kew was collected by Whyte in 1896 at 2100 m on the Nyika Plateau in what is now Malawi, the other, which came from 2100–2400 m at the same locality, was collected by Sanderson in 1932 and is now in the British Museum (Natural History) herbarium. Both these specimens are sterile and generally of very poor quality. The Sanderson gathering, which was made in November, consists of a group of very young leaves; it would appear that the plant had just started growth at the onset of the rainy season following a period of dormancy.

In the course of examining a mixed batch of Umbelliferae duplicates from the Rhodesian Government Herbarium at Salisbury, I found a completely unfamiliar plant, the leaves of which reminded me at once of a rough sketch in our herbarium of the type of *Frommia*. This was made at Berlin in 1925 by or for Cecil Norman, an amateur botanist who worked with distinction on the Umbelliferae for many years at the British Museum (Natural History). The most unusual division of the leaves, to which the highly appropriate specific epithet draws attention, enabled me readily to identify this plant with the original description and later published plate of the obscure *Frommia ceratophylloides* Wolff. Subsequently, while naming

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accumulated accessions of Umbelliferae from tropical Africa at Kew, five additional collections of *Frommia* came to light. Later still, Professor Lincoln Constance drew my attention to an unknown plant growing in his extensive collection of living members of the Umbelliferae maintained at the Botanic Garden of the University of California at Berkeley. Once again the tell-tale configuration of the leaf segments gave away the identity of the plant and raised the totally unexpected possibility that the scientific renaissance of this obscure species could be accompanied by details of its cytology. Professor Constance has been kind enough to give me full details of the three gatherings of *Frommia* that have been sent to him by Mrs J. Pawek from Malawi, and this information is given in full in the enumeration of known specimens. He has drawn attention to the following features of the living plants that have not previously been apparent from dried specimens. The glaucous stem rises from a vertical, tuberous rootstock that is almost turpentine-scented. The foliage is yellowish-green and the flowers are sulphur-yellow. After my visit Professor Constance was able to determine the chromosome number of *Frommia* as n = 11, from *Pawek* s.n. (Hort. Berkeley number C–721). Voucher specimens are deposited at UC and BM. In spite of the substantial increase in the number of specimens, the known distribution of the species has only been slightly extended from the Ufipa District of Tanganyika and the Nyika Plateau of Malawi. It seems likely that it does in fact have a very limited range, since the extensive collecting stimulated by the Flora Zambesiaca, the Flora of Tropical East Africa and other African Floras has failed to reveal its occurrence elsewhere.

At Sumbawanga, where according to Whellan it is "very common", *Frommia* occurs in rough pasture. On the Nyika Plateau, Mrs Richards found it "in damp peaty soil on the flat tops of rocks", while Mrs Pawek in the Nyika and the Vipya found it "in shallow soil over rock slabs and over decomposed granite". In his *Pflanzenreich* monograph of this part of the Umbelliferae in 1927, Wolff placed *Frommia* with *Volkensiella* and *Pseudocarum* at the end of the Series *Ammiformes* as genera *incertae sedis*. Norman subsequently transferred *Volkensiella* to *Oenanthe*, but the true affinities of *Frommia* have remained dubious and until such time as the tropical African Umbelliferae have been completely revised, it seems best to retain *Frommia* as a monotypic genus. Collectors working in tropical Africa are invited to look out for this species. By the standards of the family, *Frommia* has characters that make it readily recognisable by the non-specialist; its yellow flowers and *Ceratophyllum*-like foliage are highly distinctive.

The following enumeration includes all the collections of this species that are known to me at present:

Frommia ceratophylloides Wolff in Engl., Bot. Jahrb. 48: 266 (1912). Engler, Pflanzenwelt Afrikas 3/2: 809, t. 333 (1921). Wolff in Engl., Pflanzenreich 4.228 Ammin.-Carin.: 184, t. 16 (1927). Figs. 1, 2.

TANGANYIKA. Msamvia in "Myombowald", 24 ii 1909, *Munzner* 154 (Holotype destroyed at B). Ufipa Plateau near Sumbawanga, 1820 m, 27 ii 1957, *Whellan* 1204 (BM; K; SRGH). Ufipa District, Malonje Plateau, Nsanga Mt., 13 iii 1959, *Richards* 12106 (K). Ufipa District, Sumbawanga, Malonje Farm, 2100 m, 5 iii 1957, *Richards* 8445 (K). Ufipa District, Sumbawanga, Ilembe, 2400 m, 18 iii 1957, *Richards* 8802 (K).

FIG. 1. *Frommia ceratophylloides* Wolff: a, habit × ½; b, leaf segments × 3; c, mericarp × 12; d, commissural face of mericarp × 12; e, T.S. of mericarp × 12.

MALAWI. Nyika Plateau, 2100 m, 1896, *Whyte* 237 (K). Nyika Mts., 2100–2400 m, xi 1932, *Sanderson* 55 (BM). Nyika Plateau, 2400 m, 14 iii 1961, *Robinson* 4499 (K). Rumpi District, Nyika Plateau, Chelinda River Bridge, 2280 m, 12 iv 1969, *Pawek* 2173 (UC). Rumpi District, Nyika Plateau, Chowo Rock, 2150 m, 30 iii 1970, *Pawek* 3434 (UC). Vipya Plateau, Mzuzu, 1670 m, v 1966, *Pawek* s.n., grown at Berkeley as C–721 (UC; BM). S Vipya, Bimbyai Hills, 1740 m, rocky outcrop, 7 i 1967, *Hilliard & Burtt, B.* 4343 (E; NU).

THE DIPLOLOPHIUM BUCHANANII COMPLEX

In 1891 Bentham described a handsome, robust new species of the Umbelliferae from a plant that had been collected by John Buchanan on the top of Mount Zomba in the Shire Highlands, an area now included in Malawi. Bentham attributed his new species to the genus *Physotrichia* and commemorated the collector in its specific epithet. Twenty-five years later E. G. Baker encountered another somewhat similar plant in the collections made by C. F. M. Swynnerton, at that time a farmer naturalist in S Rhodesia, and later to become director of the Tsetse Research Organisation in Tanganyika. Swynnerton's collections were made around Melsetter, in the area then known as Gazaland, in the highlands along the border between Rhodesia and Mozambique. Baker also described his new plant as a species of *Physotrichia* and named it after the collector. After a further ten years, Engler published a third name, *P. gorungosensis*, but his intentions are far from clear and he appears to be citing *P. swynnertonii* Bak. f. as a synonym. In 1923 Norman transferred both species to *Diplolophium*, a genus that had been founded in 1847 by Turczaninow for *D. africanum*, a robust species originally collected by Kotschy in Ethiopia and now known to be widely distributed in northern and central tropical Africa. Norman pointed out that *Physotrichia welwitschii* Hiern, the type species of the genus, which had been collected by Welwitsch in Pungo Andongo, Cuanza Norte, Angola, was a very different kind of plant to the two species subsequently described from southeast tropical Africa. Whereas it was a low, slender herb, the plants of Buchanan and Swynnerton were tall, robust forms with an obvious affinity in facies and detailed structure to Turczaninow's *Diplolophium*. In a short paper published in 1923, Norman made the new combinations under *Diplolophium*, with the comment that if the hairy-fruited plants were placed in *Diplolophium* and "*Physotrichia* is restricted to papillose-fruited plants, the distinction between the two is, as Umbelliferous genera go, well marked."

In the course of work on the Umbelliferae for Flora Zambesiaca, I have had occasion to make a close study of *D. buchananii* and *D. swynnertonii* and have come to the conclusion that, since they are obviously very closely related, they are best regarded as geographically isolated subspecies, the former to the north and the latter to the south of the lowlands formed by the Zambezi valley. It is assumed that the plant Engler had in mind in connection with his name *P. gorungosensis*, was a specimen collected in the Serra de Gorungosa in that part of Mozambique that is adjacent to the Rhodesian localities. The collector is not known and the specimen was presumably destroyed at Berlin during the war. It must have been, as Engler implied, *D. swynnertonii*, which has subsequently been collected by the Portuguese

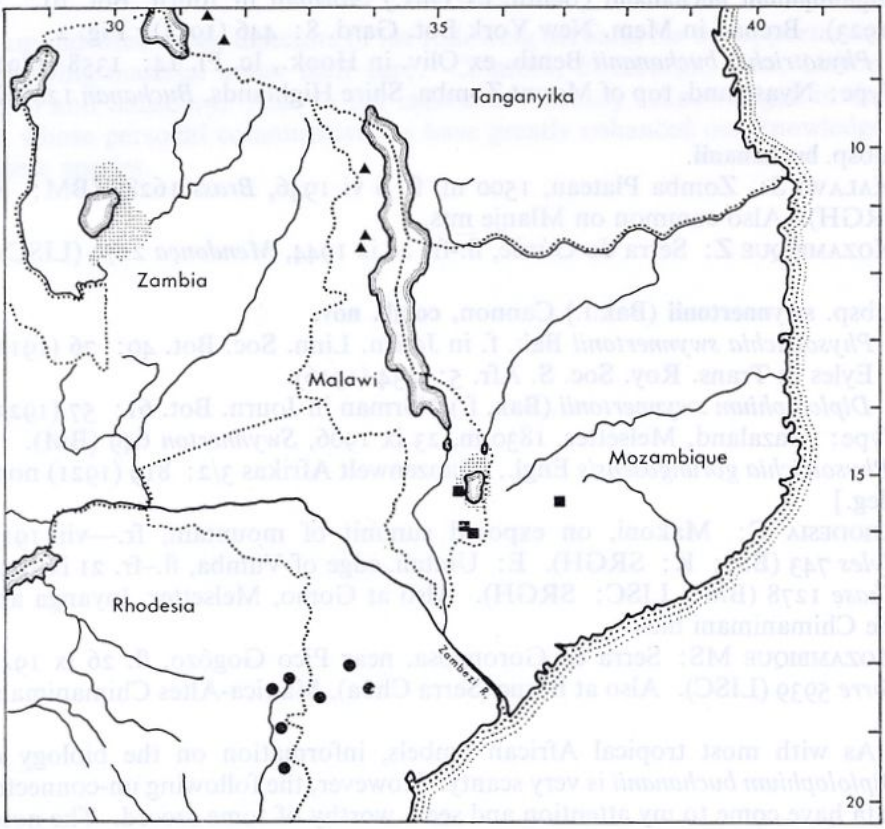

FIG. 2. Distribution of: ▲ *Frommia ceratophylloides*; ■ *Diplolophium buchananii* subsp. *buchananii* and ● *D. buchananii* subsp. *swynnertonii*.

botanists in that area. The subspecific differentiation that has occurred between the populations to the north and south of the Zambezi valley may supposedly have been initiated through isolation caused either by the elimination of geographically intermediate populations, or by the long range dispersal of seeds from one area to the other. It seems likely that further light can only be shed on this problem through wide ranging study of the phytogeography of the area as a whole.

Unlike *Frommia ceratophylloides* the subspecies of *D. buchananii* are quite well represented in herbaria and accordingly the citations that follow are limited to one specimen from each of the Flora Zambesiaca divisions in which the species occurs; localities are briefly listed.

1. Ultimate leaf segments normally broadly-ovate to suborbicular, rarely elliptic; often with 2 or more large teeth near the apex. Rays of fully expanded terminal umbels 5–9 cm . subsp. *buchananii*

\+ Ultimate leaf segments narrowly elliptic, apices always entire and lacking terminal teeth. Rays of fully expanded terminal umbels 3–5 cm . . . . . subsp. *swynnertonii*

Diplolophium buchananii (Benth. ex Oliv.) Norman in Journ. Bot. 61: 57 (1923). Brenan in Mem. New York Bot. Gard. 8: 446 (1954). Fig. 2.

Physotrichia buchananii Benth. ex Oliv. in Hook., Ic. Pl. 14: 1358 (1891). Type: Nyasaland, top of Mount Zomba, Shire Highlands, *Buchanan* 128 (K).

subsp. **buchananii**.

MALAWI S: Zomba Plateau, 1500 m, fl. 6 vi 1946, *Brass* 16289 (BM; K; SRGH). Also common on Mlanje mts.

MOZAMBIQUE Z: Serra do Gúrûe, fl.-fr. 20 ix 1944, *Mendonça* 2179 (LISC).

subsp. **swynnertonii** (Bak.f.) Cannon, **comb. nov.**

Physotrichia swynnertonii Bak. f. in Journ. Linn. Soc. Bot. 40: 76 (1911). Eyles in Trans. Roy. Soc. S. Afr. 5: 434 (1916).

Diplolophium swynnertonii (Bak. f.) Norman in Journ. Bot. 61: 57 (1923). Type: Gazaland, Melsetter, 1830 m, 23 ix 1906, *Swynnerton* 649 (BM).

[*Physotrichia gorungosensis* Engl., Pflanzenwelt Afrikas 3/2: 819 (1921) nom. illeg.]

RHODESIA C: Makoni, on exposed summit of mountain, fr.—vii 1917, *Eyles* 743 (BM; K; SRGH). E: Umtali, edge of Vumba, fl.–fr. 21 ix 1948, *Chase* 1278 (BM; LISC; SRGH). Also at Gomo, Melsetter, Inyanga and the Chimanimani mts.

MOZAMBIQUE MS: Serra de Gorongosa, near Pico Gogôzo, fl. 26 ix 1943, *Torre* 5939 (LISC). Also at Barue (Serra Chôa), Manica-Altes Chimanimani.

As with most tropical African umbels, information on the biology of *Diplolophium buchananii* is very scanty. However, the following un-connected data have come to my attention and seem worthy of some record. The notes given by collectors regarding the ecology may be summarised as follows. It is a plant of rocky, montane grassland and from moist spots in *Brachystegia* woodland. It has been described as having a "cane type of growth with side shoots breaking out well below old dead inflorescences". The palest green flowers are said to be aromatic "slightly celery-lemon like". Mr B. L. Burtt has very kindly drawn my attention to a specimen of subsp. *buchananii* collected by Burtt and Hilliard (6189, E) which shows examples of juvenile leaves from new basal shoots. These have leaflets that are strikingly different from the broad, leathery, subentire leaflets of the mature leaves. The juvenile leaflets vary from deeply divided, with segments 2–3 mm by up to 10 mm, to ovate-elliptic with deep, coarse, somewhat irregular teeth. It is highly probable that the juvenile leaves of seedlings are similar to those of the young shoots. Mr R. B. Drummond of Salisbury has noted (in private communication), that the fresh sap of subsp. *swynnertonii* causes a severe blistering of the skin some 48 hours after contact. It seems likely that this is an allergic reaction similar to that caused by *Heracleum mantegazzianum* which received considerable notice in the popular press of this country a few years ago. Since the *Diplolophium* has been quite widely collected without previous record of its unpleasant properties, it is probable that degree of exposure to the sap and individual susceptibility greatly influence the severity of the reaction, as has already been noted in the case of the *Heracleum*. Both these genera may well repay biochemical study as, in so far as I am aware, these toxic properties have only been reported in a single species in each case.

Acknowledgments

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