REDISCOVERY OF *TRICERATELLA DRUMMONDII*, AND COMMENTS ON ITS RELATIONSHIPS AND POSITION WITHIN THE FAMILY

The monotypic genus *Triceratella* Brenan was placed in a separate tribe Triceratelleae in recent classifications of the Commelinaceae (Faden & Hunt 1991; Faden 1998). However, *Triceratella* is still poorly understood because it is known only from the type collection. The genus and sole species, *T. drummondii* Brenan—named in honour of the collector, R.B. Drummond—were described by Brenan (1961a), based on a 1958 gathering from southern Zimbabwe. The holotype of *T. drummondii* is housed at Kew (K) with isotypes at PRE and SRGH (Brenan 1961a), and the New York Botanical Garden (NY, Faden pers. obs).

The new collection

In order to learn more about *Triceratella*, three intensive searches of the type locality of *T. drummondii* have been made since 1996, all without success (Faden pers. obs.). Drummond reported to the second author that he re-collected the species at the same locality ± 10 years after his initial collection. The specimens, however, cannot be located.

On 5 July 1997, a specimen of *Triceratella* was collected in Mozambique during an environmental impact assessment (EIA) survey in Moebase, Quelimane District, Zambezia Province, 220 km northeast of Quelimane (38° 45' 00" E 17° 5' 00" S). Initially, the specimen was difficult to identify to genus, but it was keyed out by the third author using Dyer (1976). The specimen, *Dold 3227* (collected with T. Avis and R. Lubke) is housed at GRA.

The new collection of *Triceratella* came from the seaward margin of seasonal vlei in the dune slack, ± 800 m west of the shoreline, and 100 m east of a forest of *Icuria dunensis* Wieringa. The latter is a new genus and species of Fabaceae: Caesalpiniodeae (Wieringa 1999) that was also collected during the same trip. The habitat in which these species were found may be described as coastal dune scrub/woodland to forest that occurs along a narrow coastal strip. *Triceratella* was growing in open wet sand immediately behind the coastal dunes, with *Digitaria eriantha* and *Fimbristylis hispida* in association with the woody *Garcinia livingstonei* and *Strychnos spinosa*. Depressions in the sand held freshwater wetlands dominated by *Eragrostis ciliaris*, *Xyris anceps* and *Utricularia* (sp. indet.). Only one population of about 20 plants of *Triceratella* was found during this survey. A single plant was collected.

This new locality for *Triceratella* is over 1 000 km from the type locality. This great distance, the differences in ecology—at the type locality *T. drummondii* was recorded as growing in moist sand on Forest Sandstone in association with *Bacopa floribunda*, *Fuirena leptostachya*, *Xyris rubella*, *Torenia spicata* and other species—and apparent differences in the seeds of the new collection (when compared to those of the original description and illustration) led us to speculate that the new specimen might be a second species of the genus. The isotype of *T. drummondii* housed at PRE was borrowed so that the identity and status of the new specimen could be determined. It was concluded that the new collection was conspecific with the type of *T. drummondii*.

The recent collection provided the opportunity to study and describe some features of this species in greater detail than had been done previously. Particular attention was given to the seeds and to the structure of the hairs on the leaves and sepals. These examinations were carried out by means of a JEOL JSM 840 Scanning Electron Microscope (SEM) at the Rhodes University Electron Microscope Unit. All samples were already dry, and thus were not further treated before being sputter-coated with gold-palladium.

Seed morphology

Seed morphology is important in the classification of Commelinaceae (Brückner 1926, 1930; Brenan 1961b; Faden 1998). Such features as the position of the embryotega (or embryostega or operculum) and shape of the hilum have been used to characterize the genera and some subtribes (Faden 1998). Because the morphology of the seeds in the new collection and in the type of *T. drummondii* initially seemed different, seeds of both specimens were examined by means of SEM. The seeds were found to be identical in shape and surface morphology. Figure 6A, B shows a seed from the specimen from Mozambique. The seed shape and ribbed nature agree with the illustration by Brenan (1961a). The details of the colliculate surface ornamentation are clarified by our SEM micrographs.

One point that confused us initially was the presence or absence of a distinct embryotega on the seed. The photomicrographs do not show the clear circular or elliptic outline that normally demarcates the embryotega on the testa of Commelinaceae seeds. Yet according to Brenan's

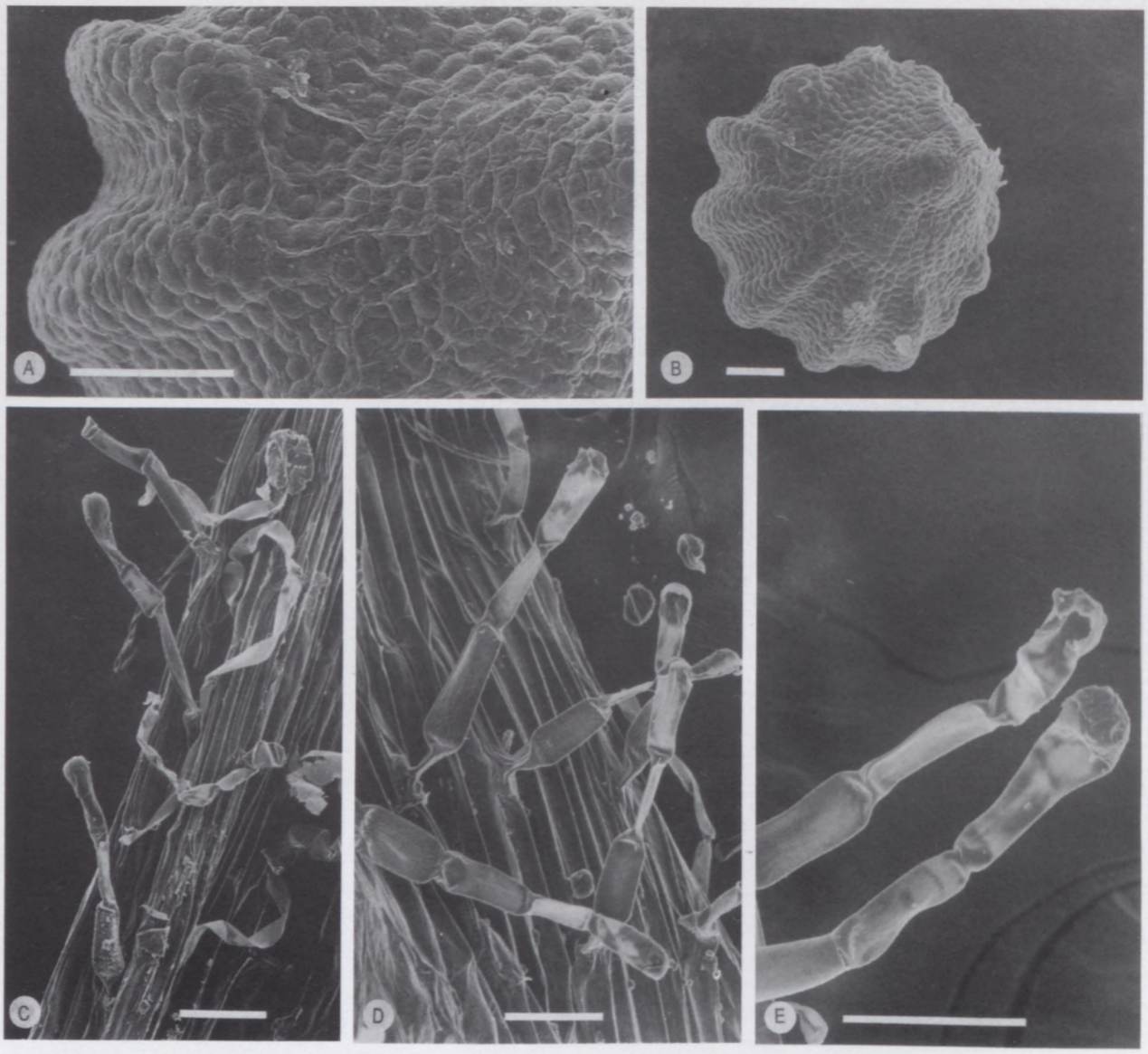

FIGURE 6.—Scanning electron micrographs of seed, leaf and sepal surfaces of *Triceratella drummondii* (*Dold 3227*). A, surface of seed, showing colliculate and ribbed nature in greater detail; B, whole seed, placed face down on hilum with embryotega uppermost, note absence of micropylar collar; C, four-celled clavate hairs on adaxial leaf surface; D, four-celled clavate hairs on abaxial sepal surface; E, close-up view of apical cells of clavate hairs found on sepal. Scale bars: 100 mm.

type description, the embryotega is dorsal and prominent in *Triceratella*. The explanation of this apparent discrepancy is that the seeds lack a micropylar collar. Thus the prominent point of the seed is the embryotega, but without a micropylar collar as there is no circular or elliptic ring surrounding it on the surface. This morphology is also found in *Cartonema* R.Br. (Grootjen 1983), and supports the relationship of *Triceratella* with *Cartonema* and their segregation as subfamily Cartonematoideae.

Leaf hairs

The abundant hairs on the leaves of *Triceratella drummondii* were described as 'very uniform, (3)4(5)-celled, uniseriate, unbranched, usually with a 3-celled terminal stalk; terminal cell clavate, very delicate walled' by Tomlinson (1964: 208). These hairs are similar to glandular microhairs, which are present in nearly all Commelinaceae, terminating in a clavate cell. Moreover, the terminal cell of occasional hairs in *Triceratella* are greatly enlarged, thereby resembling glandular microhairs more closely (Tomlinson 1964). The hairs in *Triceratella* differ from glandular hairs in being mainly 4-celled, instead of regularly 3-celled, and in the terminal cell usually being less differentiated from the cells basal to it. Although Tomlinson avoids describing these hairs as glandular, he notes that the terminal cell in each hair is thin-walled and has denser contents than the cells more basal to it. This suggests that the terminal cell may be secretory and the hairs thereby glandular, which Faden (1998) considers them to be. Our photomicrograph (Figure 6C) shows foliar hairs identical to those illustrated by Tomlinson, except that the cells have collapsed. We believe that this is a result of drying in the preparation of the herbarium specimen, and that the hairs shown by Tomlinson were either idealised or rehydrated. The terminal cell does not appear differentiated from the other cells of the hair, except in shape. We were unable to perceive the density of the cellular contents as the SEM micrographs do not show cellular contents through the cell wall.

In discussing the possible relationships of *Triceratella*, Tomlinson (1964) mentions the resemblance of its

hairs to the distinctly glandular hairs in *Cartonema*. The hairs in *Cartonema philydroides* F.Muell. are similar to those of *Triceratella* but differ in being longer, thicker, more tapered from the base, with a smaller, but distinctly enlarged terminal cell (Faden unpublished). When present in other genera, e.g. *Tinantia*, such hairs are normally confined to the reproductive parts, such as the sepals, pedicels and inflorescence axes. The presence of such glandular hairs on the vegetative parts of *Cartonema* and *Triceratella* is exceptional in Commelinaceae, and is a defining character of subfamily Cartonematoideae, as is the absence of true glandular microhairs (Faden 1998).The resemblance of some hairs in *Triceratella* to glandular microhairs, supports the conclusion of Tomlinson (1964) that *Triceratella* forms a link between *Cartonema* and the rest of the Commelinaceae.

Sepal hairs

The hairs on the sepals (Figure 6D, E) closely resemble those on the vegetative parts. While they do not exactly match the distinctly glandular hairs on some *Cartonema* species, e.g. *C. philydroides*, they closely resemble hairs on the vegetative parts of some undetermined *Cartonema* collections in the US National Herbarium (US).

In conclusion, the similarity of unusual seed and trichome morphologies in *Triceratella* and *Cartonema* strongly supports their relationship and their treatment as the separate subfamily Cartonematoideae. This study does not, however, provide the final verdict as to whether the hairs observed in *Triceratella* are glandular in nature or not.

Although they come from different habitats, the new specimen and the type collection both were growing in wet sand. This information might prove valuable in helping to identify other areas where this species might be found. Until, and unless additional populations of this species are found, it must be considered to be Critically Endangered according to the new IUCN Red Data List categories (IUCN 1994).

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