

Notes on African plants

VARIOUS AUTHORS

FABACEAE

A SURVEY OF ANTIPODALS IN THE GAMETOPHYTE OF THE TRIBES PODALYRIEAE AND LIPARIEAE

Antipodal cells in the female gametophyte of the Fabaceae are variable (Prakash 1987). In the Mimosoideae and Caesalpinioideae, antipodals tend to persist at least until fertilization, whereas they are mostly ephemeral in the Papilionoideae (George *et al.* 1979; Prakash 1987). The variation found in papilionoid antipodals up to 1990, is summarized by Cameron & Prakash (1990, 1994).

In a detailed study of antipodal behaviour in the Australian Bossiaceae and Mirbelieae, Cameron & Prakash (1990, 1994) established that antipodals are of considerable taxonomic value at the tribal level. They found giant antipodals in the gametophytes of some genera of the tribes, and ephemeral or no antipodals in the remaining genera. These results evidently supported tribal rearrangements proposed earlier by Crisp & Weston (1987).

Relationships amongst the genera of the tribes Podalyrieae and Liparieae have recently been investigated (Schutte 1995; Van Wyk & Schutte 1995; Schutte & Van Wyk 1997a). The study showed that the two tribes are monophyletic, but that the genus *Hypocalyptus* is incongruous. In view of these results and suggestions by Crisp & Weston (1987), that the Australian tribes may be closely related to the Podalyrieae and Liparieae, it was decided to examine the antipodals of the two tribes as an additional character. The results are presented and discussed here.

MATERIALS AND METHODS

At least one species of each genus of the Podalyrieae and Liparieae *sensu* Polhill (1976, 1981a, b) was included in the study. Voucher specimens of the material examined are listed in Table 1.

Buds (just prior to anthesis) were fixed in an ethyl alcohol-water-glycerol (70:29:1, v/v) mixture. Ovules were dissected from the buds and serially dehydrated and embedded in glycol methacrylate (GMA) according to the method of Feder & O'Brien (1968). These were sectioned with an ultramicrotome, stained in Toluidine Blue and mounted in Eukitt.

RESULTS AND DISCUSSION

From the results summarized in Table 1, it is clear that antipodal cells are present in both tribes. The antipodals are prominent and persistent at least until anthesis in *Liparia*, *Xiphotheca*, *Amphithalea*, *Coelidium* and the genera of the Podalyrieae (Figure 1). *Cyclopia* in particular, has large and deeply stained nuclei in the cells (Figure 1C). *Hypocalyptus*, however, has inconspicuous and ephemeral antipodal cells (Figure 1F), which degenerate before anthesis (several ovules had to be sectioned before the antipodals could be traced).

Unlike the Bossiaceae and Mirbelieae, antipodals are neither gigantic nor totally absent in the Podalyrieae and Liparieae. In the latter two tribes they are less than 0.25 times the length of the gametophyte cavity (Figure 1), compared with the Australian genera, where they are more than 0.5 times the length of the gametophyte cavity (see figures in Cameron & Prakash 1990, 1994). These giant antipodals persist until well after fertilization. A direct link between the Australian and South African tribes therefore seems unlikely.

The presence of persistent antipodals in the female gametophyte of the Podalyrieae and Liparieae (excluding *Hypo-*

TABLE 1.—List of species examined and the characteristics of the antipodal cells. Voucher specimens are housed in JRAU

Taxon	Voucher	Antipodals
PODALYRIEAE		
<i>Cyclopia sessiliflora</i> Eckl. & Zeyh.	Vlok 2627	Persistent
<i>Podalyria burchellii</i> DC.	Vlok & Schutte 78	Persistent
<i>Stirtonanthus taylorianus</i> (L.Bolus) B-E.van Wyk & A.L.Schutte	Van Wyk 3248	Persistent
<i>Virgilia oroboides</i> (P.J.Bergius) T.M.Salter subsp. <i>oroboides</i>	Schutte 534	Persistent
LIPARIEAE		
<i>Amphithalea tomentosa</i> (Thunb.) Granby	Vlok & Schutte 64	Persistent
<i>Amphithalea violacea</i> (E.Mey.) Benth.	Vlok & Schutte 9	Persistent
<i>Coelidium vlokii</i> A.L.Schutte & B-E.van Wyk	Schutte 665	Persistent
<i>Hypocalyptus coluteoides</i> (Lam.) Dahlgren	Schutte 730	Ephemeral
<i>Hypocalyptus sophoroides</i> (Berg.) Baill.	Schutte 480	Ephemeral
<i>Liparia genistoides</i> (Lam.) A.L.Schutte	Schutte 752	Persistent
<i>Xiphotheca canescens</i> (Thunb.) A.L.Schutte & B-E. van Wyk	Vlok & Schutte 46	Persistent
<i>Xiphotheca phyllicoides</i> A.L.Schutte & B-E.van Wyk	Vlok 2640	Persistent

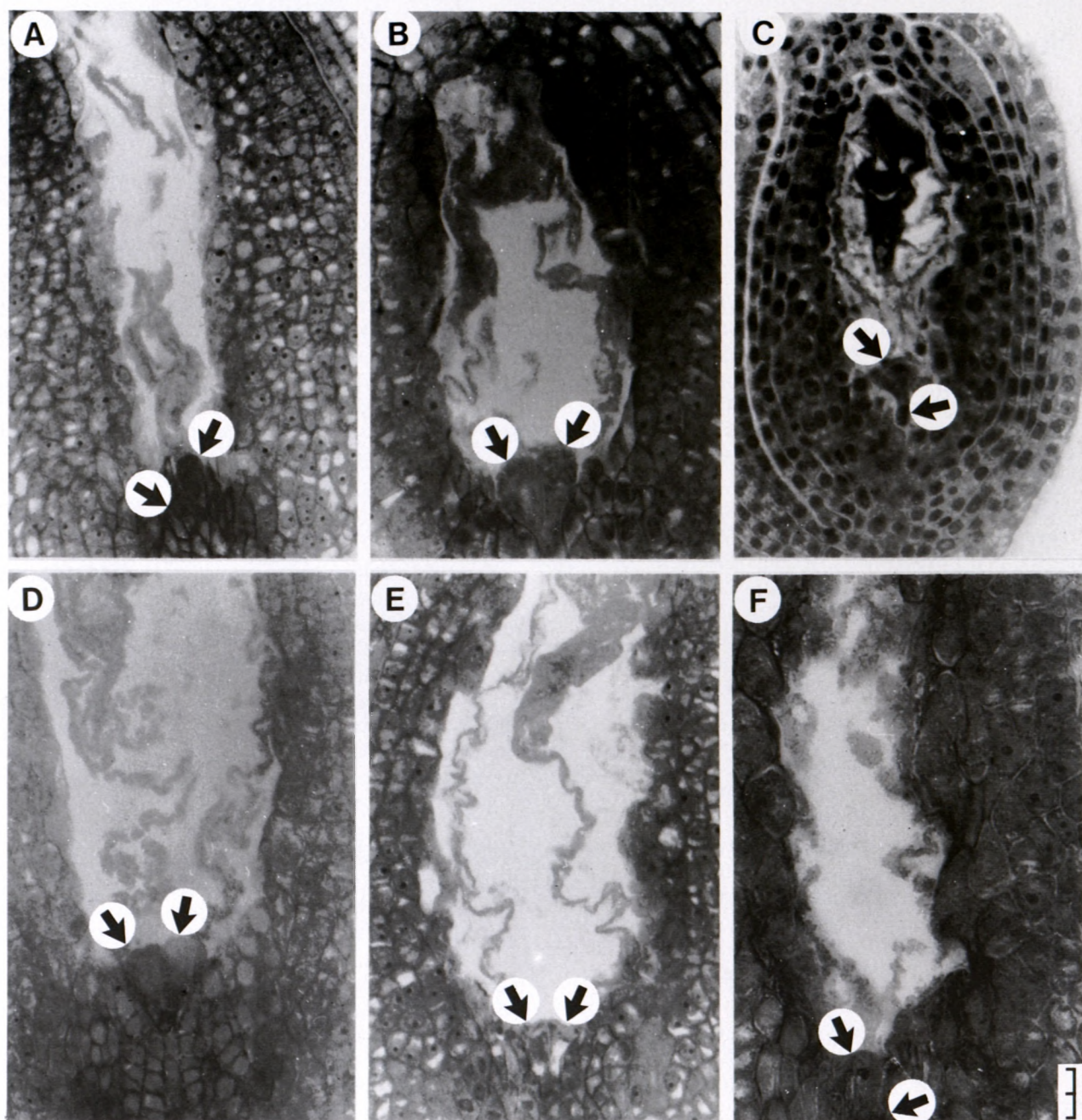


FIGURE 1.—Female gametophytes of some species of Podalyrieae and Liparieae, showing the antipodals (indicated with arrows). A, *Stirtonanthus taylorianus*; B, *Virgilia oroboides* subsp. *oroboides*; C, *Cyclopia sessiliflora*; D, *Amphithalea tomentosa*; E, *Coelidium vlokii*; F, *Hypocalyptus sophoroides*. Scale bar: 50 μ m.

calyptus) is a synapomorphy for the two tribes. In the tribe Crotalariae, which is the sister group of the Podalyrieae and Liparieae (Schutte & Van Wyk 1997a), antipodals are ephemeral (Narang 1978; Schutte unpubl.). The proposed amalgamation of the two tribes is therefore clearly supported by the antipodal characteristics. Other characters, such as the strongly reduced bracteoles and the accumulation of esters of anthocyanins in the pink, purple or orange-flowered species, also support this notion (Schutte & Van Wyk 1997a).

Hypocalyptus not only deviates from the other genera in its antipodal characteristics, but also in at least eight other significant morphological, cytological and chemical characters (Schutte & Van Wyk 1997b). This undoubtedly indicates that the genus does not fit in the Podalyrieae *sensu lato*. The tribal position of *Hypocalyptus* within the

Papilionoideae will be re-assessed and discussed elsewhere (Schutte & Van Wyk 1997b).

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