

Apiaceae subfamily Apioideae in Madagascar

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An account of the Apiaceae (Umbelliferae) for the *Flore de Madagascar et des Comores* (Paris) has recently been completed and submitted for publication (Sales and Hedge 2004). The flora account deals with 15 genera and 31 species in the subfamilies Hydrocotyloideae, Saniculoideae and Apioideae; some of the species are globally widespread and/or doubtfully native. Five new

species will be described in *Peucedanum* (2), *Phellolophium* (1) and *Pimpinella* (2). Here, we concentrate on subfam. Apioideae, draw attention to some features of special interest and provide a checklist of the native 11 genera and 20 species currently known to occur in Madagascar.

Introduction

The Apioideae in Madagascar have 11 native genera with 20 species (Table 1). Six genera with 10 species are endemic; a further eight species are endemic in genera not restricted to Madagascar. These totals are very small in comparison with some arid regions of the world. In Iran, Afghanistan and Pakistan, for example, there are 135 genera and c. 500 species (Hedge and Lamond 1987); here, there is an enormous diversity in life form and fruit size and structure. In southern Africa, the totals are 38 native genera (19 endemic) with c. 195 species (Burt 1991). In Madagascar, the taxa are clear-cut and oligomorphic. They have a limited range of morphology, habit and fruit form and give every impression of not being highly specialised (Van Wyk 2001). From the information we have, they also seem not to be a vigorous family in Madagascar; fruit production is not plentiful. Several taxa are known only from a few gatherings and some are surely very rare or perhaps on the verge of extinction.

The interest of the Madagascan Apioideae lies in their inter-relationships and position in the phylogeny of the family. The broad affinities of the endemic taxa are within Madagascar or, less often, in eastern Africa (the genus *Pseudocarum* occurs in both regions) or southern Africa (a possible affinity with several woody taxa now grouped in a new tribe, the Heteromorphaeae). The main problems in Madagascar are: (1) the circumscription and affinities of the five genera segregated from *Heteromorpha* (Humbert 1956, Van Wyk *et al.* 1999); (2) the status of the endemic *Anisopoda* (poorly known) and *Phellolophium*. Assessing the precise affinities of the Madagascan taxa is fraught with difficulties partly because of the frequently inadequate material, especially the fundamentally important ripe fruit.

Habit

The most frequent habit in the native Apioideae genera is shrubby with thick woody rootstocks and often evergreen leaves; thick woody rootstocks are unusual in the family but also occur in southern African and central Asiatic species. There are no annuals or bi-annuals.

Pollen

So far, the pollen of nine species has been studied (Figure 1): *Andriana coursii*, *A. marojejensis*, *Peucedanum* sp. nov. A (Figure 1c, 1d), *Peucedanum* sp. nov. B, *Phellolophium* sp. nov. (Figure 1e, 1f), *Pimpinella ebracteata*, *Pseudocannaboides andringitrensis*, *Pseudocarum laxiflorum* and *Tana bojeriana* (Figure 1a, 1b). The pollen is isopolar, radially symmetrical and 3-zono-colporate. The P/E ratio is between 1 and 2.5. The colpi are very narrow and slit-like, and the pori are elongated. Costae are present and the sexine is distinctly columellated. Except for *T. bojeriana*, the pollen is quite uniform in shape (elliptic or sub-rectangular) and sculpturing (rugulate). Interestingly, that of *T. bojeriana* is distinct in being sub-rhomboidal and having reticulated sculpturing (Figure 1b). According to some authors, sub-rhomboidal pollen is more primitive than elliptic or sub-rectangular pollen.

Fruit

The fruits are always without wings, \pm round in section (in almost all the species) and short in length. Other than the externally widespread *Agrocharis melanantha*, no species have fruits with hooks or bristles. Fruits vary from homomorphic to heteromorphic. Calcium oxalate crystals are present

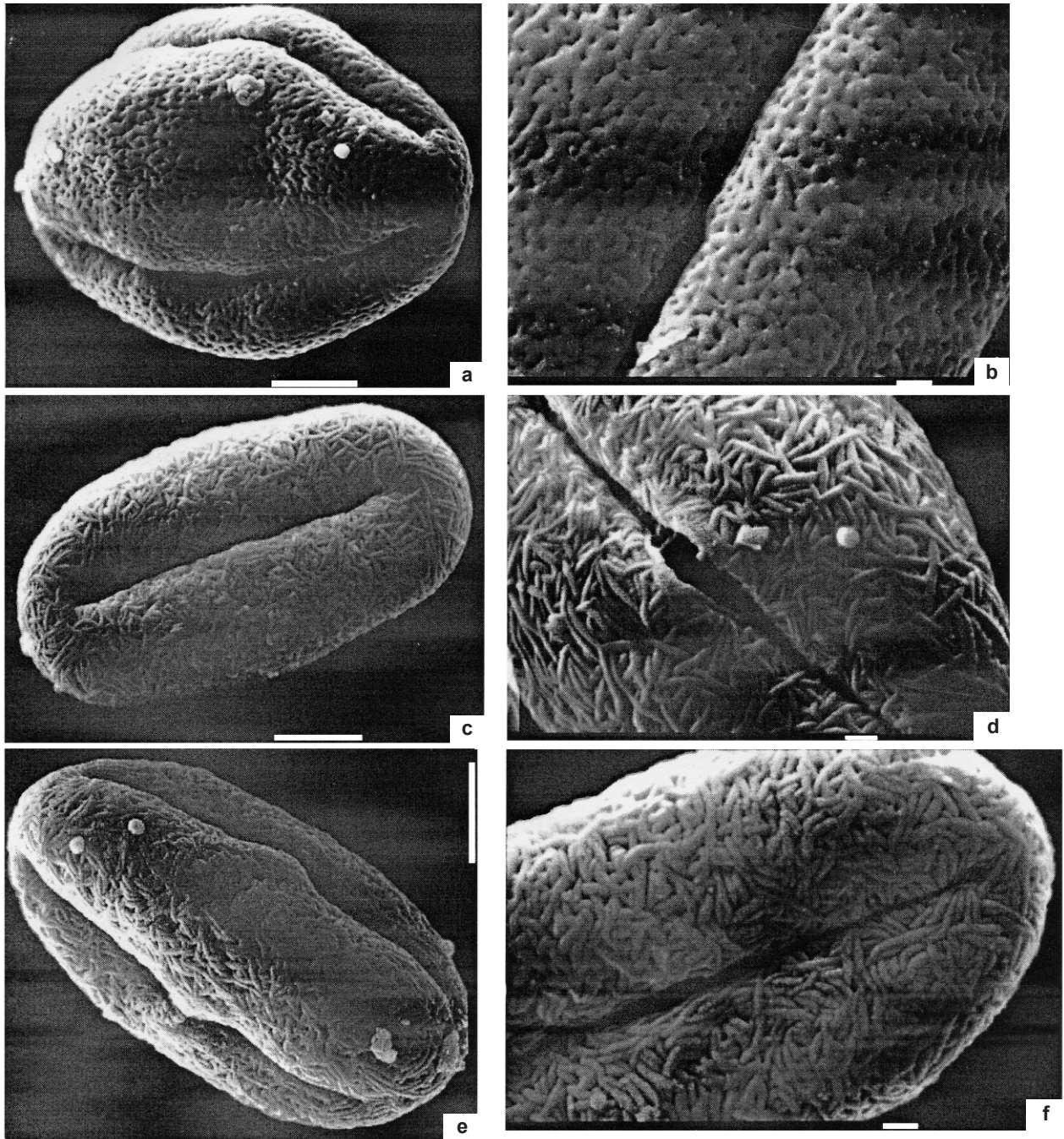


Figure 1: SEM photographs of the pollen of some Madagascan Apiaceae. (a) *Tana bojeriana*, equatorial view (scale bar = 5µm); (b) *T. bojeriana*, sculpturing with colpi (scale bar = 1µm); (c) *Peucedanum* sp. nov. A, equatorial view with colpus (scale bar = 5µm); (d) *Peucedanum* sp. nov. A, sculpturing with colpus (scale bar = 1µm); (e) *Phellolophium* sp. nov., equatorial view (scale bar = 5µm); (f) *Phellolophium* sp. nov. sculpturing with colpus (scale bar = 1µm)

in various species; they also occur in various southern African woody genera (e.g. *Anginon*, *Glia*, *Heteromorpha*, *Polemanna*). Humbert (1956) gave strong weighting to this character (as was customary in earlier classifications), and placed eight otherwise disparate Madagascan species in the African genus *Heteromorpha*. Today, these species are in five separate genera (Van Wyk *et al.* 1999), namely *Andriana*, *Cannaboides*, *Pseudocarum*, *Pseudocannaboides*

and *Tana* (see Table 1).

Geography and Ecology

But for one species in southern and south-eastern Madagascar, the subfamily is restricted to central and northern part of the country. Most species grow at altitudes above 1 000m; *Andriana tsaratananensis*, for example, occurs up

Table 1: List of genera and species of Apiaceae subfamily Apioideae in Madagascar. Endemic taxa are shown in bold; naturalised aliens are marked with an asterisk

Genus and Author	Species in genus (no.)	Species in Madagascar	Literature ^a
<i>Agrocharis</i> Hochst	4	<i>A. melanantha</i> Hochst.	3
<i>Andriana</i> B-E. van Wyk	3	<i>A. coursii</i> (Humbert) B-E. van Wyk	1,2,3
		<i>A. marojejyensis</i> (Humbert) B-E. van Wyk	1,2,3
		<i>A. tsaratananensis</i> (Humbert) B-E. van Wyk	1,2,3
<i>Anisopoda</i> Baker	1	<i>A. bupleuroides</i> Baker	3
<i>Cannaboides</i> B-E. van Wyk	2	<i>C. andohalensis</i> (Humbert) B-E. van Wyk	1,2,3
		<i>C. betsileensis</i> (Humbert) B-E. van Wyk	1,2,3
* <i>Ciclospermum</i> Lagasca	1	<i>C. leptophyllum</i> (Pers.) Sprague ex Britton	3
<i>Lilaeopsis</i> Greene	c. 14	<i>L. aff. mauritiana</i> G. Petersen & Affolter?	3
<i>Peucedanum</i> L.	c. 120	<i>P. sp. nov. A</i>	3
		<i>P. sp. nov. B</i>	3
<i>Phellolophium</i> Baker	2	<i>P. madagascariensis</i> Baker	3
		<i>P. sp. nov.</i>	3
<i>Pimpinella</i> L.	c. 150	<i>P. ebracteata</i> Baker	3
		<i>P. tenuicaulis</i> Baker	3
		<i>P. sp. nov. A</i>	3
		<i>P. sp. nov. B</i>	3
		<i>P. nom. nov.</i>	3
<i>Pseudocannaboides</i> B-E. van Wyk	1	<i>P. andringitrensis</i> (Humbert) B-E. van Wyk	1,2,3
<i>Pseudocarum</i> C. Norman	2	<i>P. laxiflorum</i> (Baker) B-E. van Wyk	1,2,3
<i>Tana</i> B-E. van Wyk	1	<i>T. bojeriana</i> (Baker) B-E. van Wyk	1,2,3

^a Literature: 1, Humbert (1956); 2, Van Wyk *et al.* (1999); 3, Sales and Hedge (2004)

to the summit of the highest mountain (2 500m, on Mount Tsaratanana). Dry slopes, edge of streams, edge of shady forests and ericoid scrub are the most common habitats.

With the available herbarium material, the use of morphological characters has probably gone as far as is practically possible in resolving the taxonomy of the Madagascan *Apioideae*. Thorough field studies to record habit (above and below ground) and to collect more complete material (especially mature fruits) of some of the rare species will no doubt lead to new insights. Further resolution of generic relationships requires new data sources. Palynology, anatomy and molecular analyses are surely some of the ways forward.

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