Pollinium in *Schlechterella*: Periplocoideae (Apocynaceae)

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The pollinium in *Schlecterella africana* (Schltr.) K. Schum., a monotypic genus distributed in eastern Africa from Mozambique to Ethiopia, is described for the first time. The significance of the similarity of the pollinium in *S. africana* and *Raphionacme abyssinica* Chiov. is briefly discussed.

Keywords: Apocynaceae, Periplocoideae, pollinium, *Schlechterella*.

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Introduction

The pollinium morphology of ten genera (*Atherolepis* Hook. f., *Decalepis* Wight & Arn. [=*Baeolepis* Decne., *Janakia* J. Joseph & V. Chandras.], *Finlaysonia* Wall., *Gongylosperma* King & Gamble, *Gymnanthera* R. Br., *Hemidesmus* R. Br., *Meladerma* Kerr, *Stelmacrypton* Baill., *Streptocaulon* Wight & Arn., *Utleria* Bedd. ex Benth. & Hook. f.) and *Raphionacme abyssinica* Chiov. of the Periplocoideae has been described (Verhoeven & Venter in press). *R. abyssinica* was always considered the only African species with pollinia. In an investigation of the pollen morphology of African Periplocoideae, pollinia were observed in *Schlechterella africana* (Schltr.) K. Schum., a monotypic genus distributed in eastern Africa from Mozambique to Ethiopia.

Materials and Methods

Pollinia were obtained from herbarium specimens [*Milne-Redhead & Taylor 7229*, 4 Nov. 1955, Pare District, Tanzania (K); *Hangen 948*, 20 Nov. 1989, Borana, Ethiopia (K)]. Flowers were rehydrated in 3% phosphate-buffered glutaraldehyde. For light microscopy (LM) the flowers were placed in 100% ethanol, pollinia removed and mounted in glycerol jelly. For scanning electron microscopy (SEM) pollinia were removed from flowers which were placed in 100% ethanol. The pollinia were air dried and mounted on stubs using doublesided tape, coated with gold and examined with a JEOL Winsem 6400 microscope. Measurements of pollinia were made with the SEM using the measurement facility of the microscope. For transmission electron microscopy (TEM) the rehydrated pollinia were postfixed in 2% osmium tetroxide, stained with 0.5% uranyl acetate, dehydrated in an alcohol series and embedded in Spurr's low-viscosity resin. Sections were stained with uranyl acetate, followed by lead citrate, and examined with a Philips CM 100 electron microscope at 60 kV.

Results

The terminology used for the walls of the pollinium and tetrads is as described by Verhoeven and Venter (in press).

Multiporate tetrads are grouped together forming a pollinium (Figures 1 and 2) 312–399 × 81–103 µm in size. The distal exine wall (Figure 4) is smooth and consists of a compact stratum (tectum), 0.5–0.8 µm thick, subtended by a weakly developed granular stratum, 0.04–0.1 µm thick. The intine is 0.3–0.4 µm thick. Proximal walls are the walls which separate tetrads on the inside of the pollinium. They have the same structure as the distal wall, but are thinner (Figure 6). Pores were observed in distal and proximal walls. There are 8–10 pores (Figures 3 and 5) per pollen grain; they are very irregular in form and vary in size from 1.5–6 µm long and 0.8–2 µm wide. Where pores of adjacent tetrads are opposite each other, the tectum, granular stratum and intine of adjoining tetrads may be fused (Figure 6). The inner walls consist of a tectum, granular stratum and intine (Figure 5). Wall bridges (Figure 5, arrowhead) are present in the inner walls. Cytoplasmic connections (Figure 5, arrow) were also observed between cells.

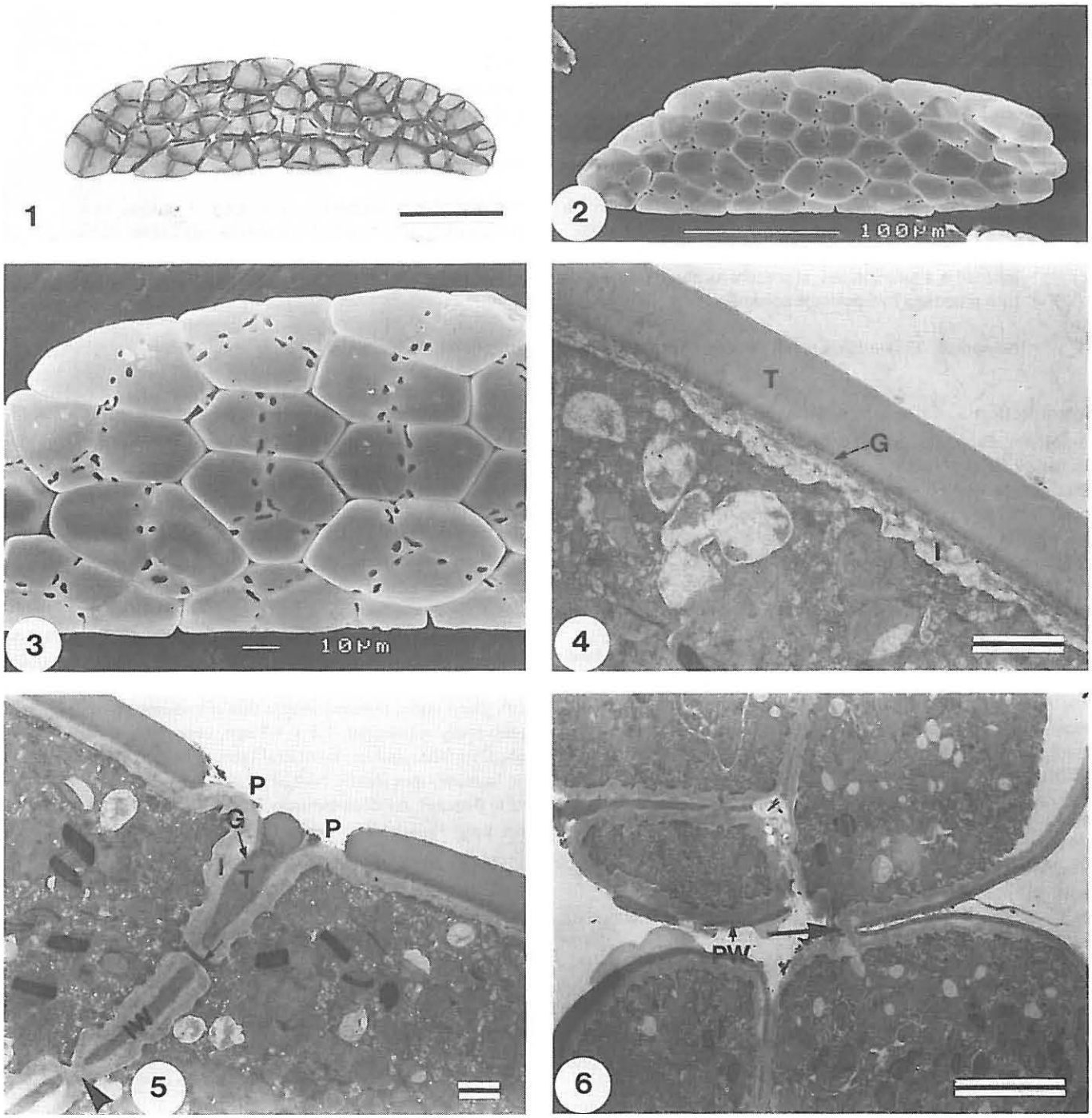
Discussion

Palynologically the Periplocoideae are distinguished from Secamonoideae and Asclepiadoideae by the presence of tetrads. Although single tetrads are present in most genera of the Periplocoideae, pollinia occur in ten genera from Asia and *Raphionacme abyssinica* from Africa (Verhoeven & Venter in press). There are four pollinia per anther and the pollinia consist of loosely agglutinated, but not fused, tetrads. This aggregation of tetrads is considered by some researchers to be massula (Nilsson *et al.* 1993). By anthesis the pollinia are deposited on the spoon of the translator. In the Secamonoideae there are four pollinia per anther which are not free but attached to caudicles. In the Asclepiadoideae there are two pollinia per anther which are also attached to caudicles.

The pollinia in *Schlechterella* K. Schum. are very similar to those in *R. abyssinica* (Verhoeven & Venter, in press). In both the pollinium consists of multiporate tetrads. Furthermore, in *R. abyssinica* the granular stratum is very thin (0.07–0.13 µm) (Verhoeven & Venter, in press) and in *S. africana* the same phenomenon was observed with a granular stratum of 0.04–0.1 µm thick. Palynologically the two species seem similar. The cytoplasmic connections between cells of a tetrad were not observed in any of the other genera with pollinia and may indicate that the sectioned pollinia were young. Although physical connection between tetrads is not common, it was observed in *S. africana*. The tectum, granular stratum and intine of adjacent tetrads were fused at the position where two pores were opposite one other.

R. abyssinica is the only species in *Raphionacme* Harv. with pollinia. These pollinia consist of multiporate tetrads, a characteristic which distinguishes *Raphionacme* from all other genera of the Periplocoideae. The presence of the same type of multiporate polliniurn in *S. africana* indicates a relationship between these two genera. The translators of *R. abyssinica* and *S. africana* are also very similar and further support this affinity. These affinities raise the question whether the two species are cogeneric.

Casually observed, the flowers of *R abyssinica* and *S. africana* are quite dissimilar, particularly in the structure and colour of the corolla. In *R. abyssinica* the corolla tube is somewhat deeper and the lobes ovate to obovate and mottled magenta. *S. africana* has a relatively shallow corolla tube and linear mauve-purple lobes. However, the concurrent annular basal fusion of the corona lobes of *R. abyssinica* and *S. africana* and the peculiar apical segmen-



Figures 1–6 *Schlechterella africana* [*Milne-Redhead & Taylor 7229* (K)]. **1**. Pollinium. (LM). **2**. Pollinium. (SEM). **3**. Part of pollinium. (SEM). **4**. Section of distal wall showing tectum (T), granular stratum (G) and intine (I). (TEM). **5**. Section of pollinium showing pores (P) in distal wall. Inner wall (IW) consisting of tectum (T), granular stratum (G) and intine (I) shows wall bridge (arrowhead) and cytoplasmic connection (arrow) between cells. (TEM). **6**. Section of pollinium showing proximal walls (PW) between tetrads and fusion (arrow) of two tetrads. (TEM). Scale bars: 1 and 2 = 100 µm; 3 = 10 µm; 4 and 5 = 1 µm; 6 = 5 µm.

tation of these two species is unique amongst the African Periplocoideae. A cogeneric relationship between these two species should thus be considered.

Acknowledgements

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