

## Short Communication

Pollinium structure in *Epistemma*: Periplocoideae (Apocynaceae)

RL Verhoeven\* and HJT Venter

Department of Plant Sciences, University of the Free State, PO Box 339, Bloemfontein 9300, South Africa

\* Corresponding author, e-mail: [verhoevr@sci.uovs.ac.za](mailto:verhoevr@sci.uovs.ac.za)

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**The pollinium in *Epistemma rupestre* H. Huber, an epiphyte from Africa, is described for the first time. The****pollinium consists of loosely aggregated pollen-tetrads without any special wall.**

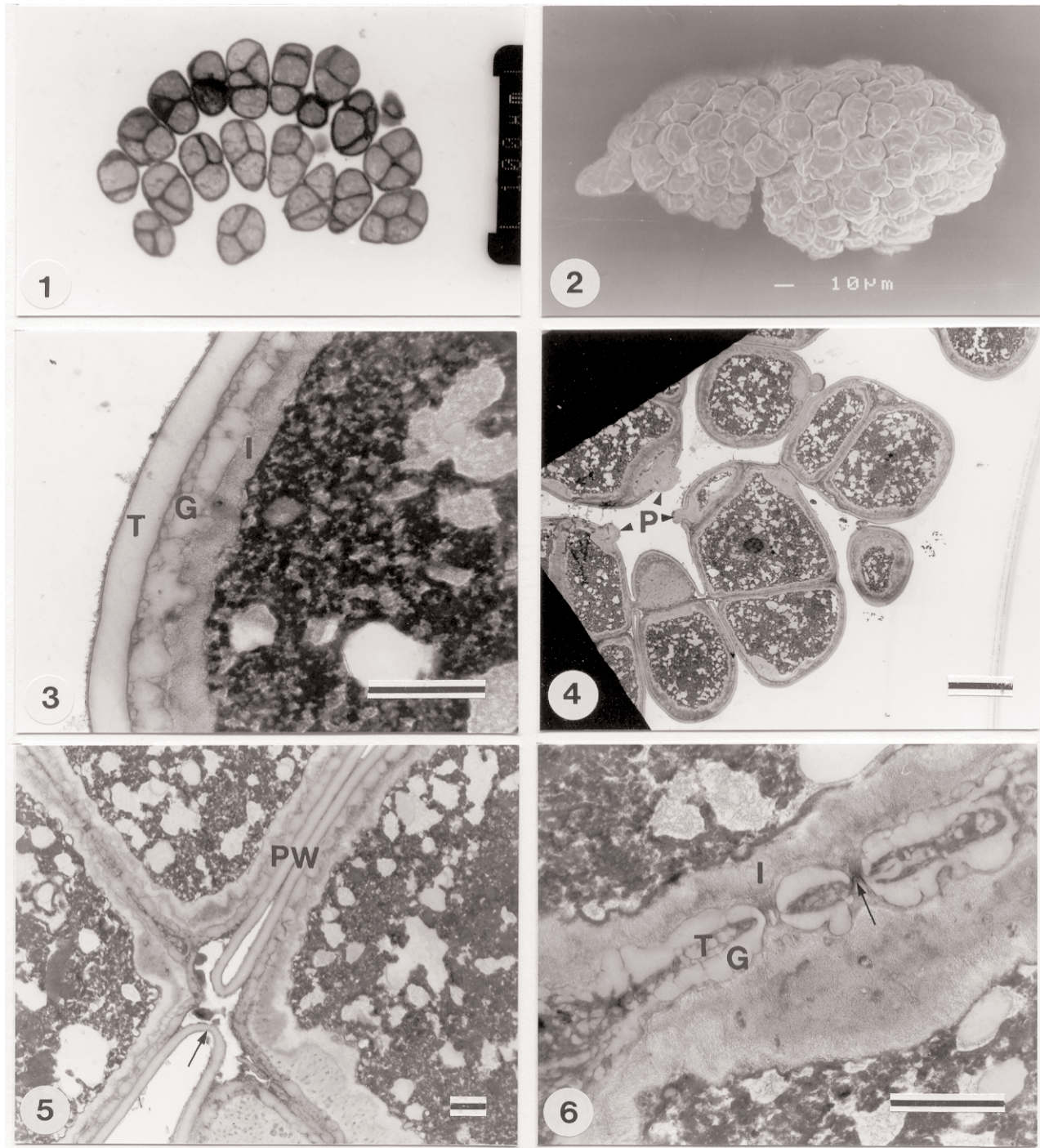
The Periplocoideae is one of five subfamilies presently acknowledged in the Apocynaceae s.l. (Endress and Bruyns 2000, Victor *et al.* 2000). Historically the Periplocoideae (Periploceae) were regarded as part of the Asclepiadaceae (Schumann 1895) or as a separate family (Schlechter 1924). The basis of separation between the Apocynaceae, Periplocaceae (Periplocoideae) and Asclepiadaceae depended on the structure of the pollen and the pollination mechanism. The Apocynaceae were seen as a taxon with single-grained pollen and no differentiated pollen translators present in the flower, the Periplocoideae as a taxon with pollen in tetrads and a spoon-shaped pollen translator on which the tetrads fall and to which they adhere, and the Asclepiadaceae as taxon with pollinia fused to a wish-bone type of translators. The pollinium morphology of six genera (*Decalepis* Wight and Arn., *Finlaysonia* Wall., *Gymnanthera* R. Br., *Hemidesmus* R. Br., *Schlechterella* K. Schum. and *Streptocaulon* Wight and Arn.) of the Periplocoideae has been described (Verhoeven and Venter 1998a, b, 2001). All of these genera are from Asia and Australia, with the exception of *Schlechterella* which is endemic to north-eastern Africa. Originally eleven genera with pollinia were known in the Periplocoideae (Verhoeven and Venter 1998a, b). Subsequently, *Utleria* Bedd. ex Benth. & Hook. f. was transferred to *Decalepis*, and *Atherolepis* Hook. f., *Gongylosperma* King & Gamble, *Meladerma* Kerr and *Stelmacrypton* Baill., were transferred to *Finlaysonia* (Venter and Verhoeven 2001). In the ongoing investigation of the pollen morphology of the Periplocoideae we have investigated another African genus, *Epistemma* D. V. Field & J. B. Hall. This is one of only two epiphytic genera in the subfamily, the other genus being the monotypic *Sarcorrhiza* Bullock from tropical Africa. *Sarcorrhiza* has pollen tetrads.

*Epistemma* has three species, *E. assianum* D. V. Field & J. B. Hall from the Ivory Coast (Field and Hall 1982), *E. decurrens* H. Huber (Cameroon) and *E. rupestre* H. Huber (Cameroon) (Huber 1989). All three species inhabit emer-

gent trees in moist tropical forest. Pollinia from *E. rupestre* were obtained from a herbarium specimen (Leeuwenberg 5455, April 1965, near Nkolbisson, Cameroon (P)). Flowering material of *E. assianum* and *E. decurrens* was not available for study. Pollinia for SEM and TEM were prepared as described by Verhoeven and Venter (1998a).

The tetrads from one microsporangium are grouped together forming a pollinium (Figures 1 and 2) 218–275 x 108–114µm in size. The distal wall exine (Figure 3) is smooth and consists of a compact stratum (tectum), 0.5–0.7µm thick, subtended by a granular stratum. The intine is 0.4–0.9µm thick. The proximal wall has the same exine stratification as the distal wall (Figure 5). Pores were observed in proximal walls only (Figure 4). Where pores of adjacent tetrads are opposite each other, the tectum of adjoining tetrads may be fused (Figure 5) otherwise the tetrads are only loosely coherent. The inner walls consist of a tectum, granular stratum and intine. Wall bridges are present in the inner walls (Figure 6).

Palynologically the Periplocoideae are distinguished from Secamonoideae and Asclepiadoideae by the presence of tetrads (24 genera) or free pollinia (seven genera including *Epistemma*) which are shed onto translators at anthesis. The presence of free pollinia in the Periplocoideae was described for the first time by Verhoeven and Venter (1998a and b). There are four pollinia per anther and the pollinia consist of loosely coherent, but not fused tetrads. The pollinia (observed in seven genera of the Periplocoideae) can be regarded as more derived than single tetrads. However, in the Periplocoideae, genera with pollinia are not necessarily more advanced in flower structure and genera with pollinia do not group in the same clade (based on morphological and palynological characters) (Venter and Verhoeven 2001). The only African Periplocoideae with pollinia are *Schlechterella* and *Epistemma*. In contrast to *Epistemma* and the other pollinia-bearing Periplocoideae, where the distal wall of the tetrads forming a pollinium is



**Figures 1–6:** *Epistemma rupestre* [Leeuwenberg 5455 (P)]. **Figure 1:** Section of pollinium (LM). **Figure 2:** Pollinium (SEM). **Figure 3:** Section of distal wall showing tectum (T), granular stratum (G) and intine (I). **Figure 4:** Section of pollinium showing pores (P) in proximal walls and fusion of tetrads. **Figure 5:** Section of pollinium showing proximal walls (PW) between tetrads and fusion (arrow) of two tetrads. **Figure 6:** Section of inner wall showing tectum (T), granular stratum (G), intine (I) and wall bridges (arrow). Scale bars: 1 = 100µm; 2 and 4 = 10µm; 3, 5 and 6 = 1µm

inaperturate or only vistically porate (Civeyrel 1996), *Schlechterella* has multi-porate tetrads which form a pollinium (Verhoeven and Venter 1998b). This suggests that pollinia may have arisen twice within the Periplocoideae. The only other genus of Periplocoideae with multi-porate tetrads is *Raphionacme*, suggesting a relationship between the two genera.

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