

Pollen morphology of *Primula vulgaris* Huds. (Primulaceae)

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Primula L., as one of the largest genera of the Primulaceae, including about 400 species of perennials, is centred mostly in temperate and mountainous regions of the northern hemisphere. Flowers of *Primula vulgaris* (common primrose), characterized by the development of long-styled pin and short-styled thrum flowers, with anthers midway down the corolla tube in pin flowers, and at its mouth in thrum flowers [3]. It is common for *Primula* genus, in which more than ninety per cent of species are distylous [2]. The pollen morphology in genus *Primula* is not well known, but some of those have been given by Anderberg and El-Ghazaly [1]. As pollen morphology have been essential as an aid to classification within families [6], the aim of this paper was detailed investigation pollen grains of *P. vulgaris*.

Pollen morphology was investigated using light microscopy (LM) and scanning electron microscopy (SEM). For light microscopy, fully matured anthers were removed from the fresh specimens, pollen were placed directly on slides and observed without mounting media, or prepared according to the standard acetolysis method [5] and mounted in glycerine jelly. Observations and measurements and were made with a Leica DMSL microscope and IM 1000 software. For SEM studies, the pollen grains were directly placed on prepared stubs, covered with gold and observed with JEOL 6390. Morphological analysis included determination of pollen symmetry, polarity, ornamentation, shape and size by measuring the polar axis, equatorial diameter, colpus length and exine thickness. Exine structure and ornamentation were also analyzed.

Pollen grains of *P. vulgaris*, according to Erdtman's classification [4] are small, and showing difference in size between pin and thrum flowers. Polar axis of pin pollen is $10,64 \pm 0,75 \mu\text{m}$, and of thrum pollen $15,55 \pm 0,79 \mu\text{m}$. Equatorial diameter of pin pollen is $6,62 \pm 0,40 \mu\text{m}$, and of thrum pollen $10,57 \pm 0,74 \mu\text{m}$. The pollen grains are isopolar, radially symmetric with reticulate exine ornamentation. The shape of pollen grains in polar view is circular and in equatorial view is prolate with long and narrow colpi which are equatorially constricted. Polar axis/equatorial diameter ratio is $1,61 \pm 0,15$ (pin) and $1,48 \pm 0,10$ (thrum). Exine thickness is $0,5 \pm 0,1 \mu\text{m}$. Variability in the number of furrows was also observed among individuals. Pin pollen are usually 6-7- zonocolpate, and thrum are 8-9- zonocolpate (rarely 10). The different pollen sizes restrict the possibilities of thrum x thrum and pin x pin crosses, because the pin pollen, with lower amount of food reserves is ill equipped to send its germ tube down the length of a pin style and larger diameter thrum pollen is unable to penetrate the surface of a thrum style [2]. Pollen grains polymorphism combined with heterostyly of flowers providing a physical mechanism to promote outbreeding. The differences and similarities in pollen morphology of the investigated individuals are significant and could be exploited for biosystematic purposes.

1. AA. Anderberg, G. El-Ghazaly,. Nord. J. Bot. **20** (2000) p5-14.
2. J. Richards, *Primula*, 1st ed. Timber Press, Portland, Oregon, USA. (1993) p299.
3. C.J. Webb, D.G. Lloyd. New Zealand J. Bot. **24** (1986) p163–178.

4. G. Erdtman, *Pollen Morphology and Plant Taxonomy*. Hafner Publishing, New York (1971).
5. G. Erdtman, *Svensk Bot. Tidskrift*, **54** (1960) p561-564.
6. M.S. Abu-Assab, P.D. Cantino, *Ann. Missouri Bot. Gard.* **81** (1994), p 653–686.
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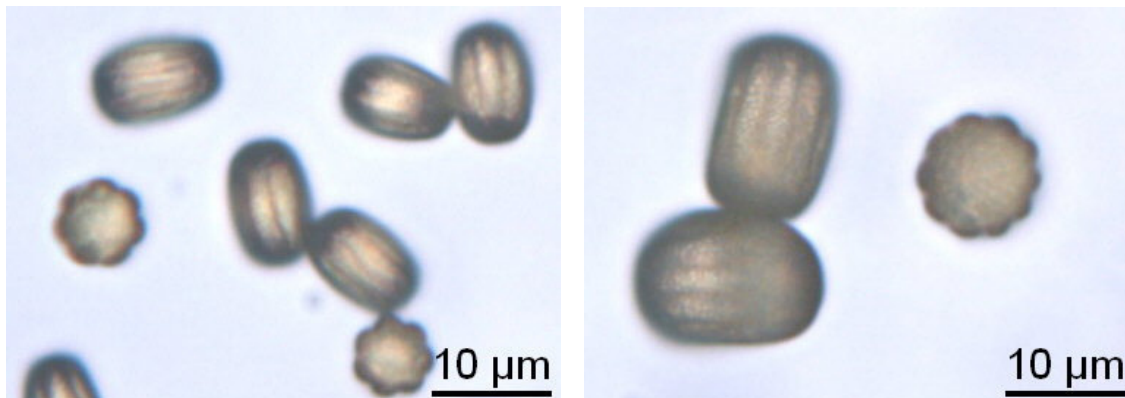


Figure 1. Pollen grains of *P. vulgaris*, pin (a) and thrum (b), LM

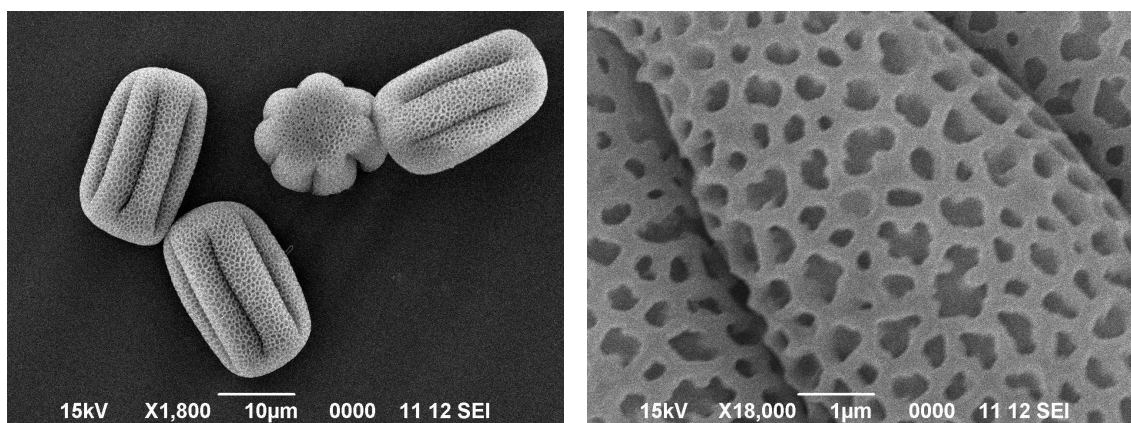


Figure 2. Pollen grains of *P. vulgaris*, polar and equatorial view (a), reticulate-heterobrochate ornamentation (b), SEM