

POLLEN FLORA OF PAKISTAN - XXIV. PARNASSIACEAE

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Abstract

Pollen morphology of 3 species of the family *Parnassiaceae* from Pakistan has been examined by light and scanning electron microscope. Pollen grains are usually radially symmetrical, isopolar, tricolporate. Tectum reticulate. On the basis of pollen shape 2 distinct pollen types are recognized viz., *Parnassia palustris* - type and *Parnassia nubicola* - type.

Introduction

Parnassiaceae is a monotypic family first recognized by Martinov (1820) represented by 50 species, spread over the Arctic, N. temperate regions of Europe, N. Asia and N. America in wet places (Willis, 1973; Mabberley, 1987). In Pakistan it is represented by 4 species (Siddiqui, 1974).

Cronquist (1981) included the genus *Parnassia* L., in the family *Saxifragaceae*. Takhtajan (1980), Thorne (1983) and Dahlgren (1983) treated it, as a distinct family i.e., *Parnassiaceae*. Pollen morphology of few species of the family have been studied by Erdtman (1952), Moore & Webb (1978) and Sokolovskaya (1958). Saxena (1973), Hideux & Ferguson (1976) and Wakabayashi (1970) examined pollen morphology of the genus *Parnassia* while studying the pollen of family *Saxifragaceae*. There are no reports on the pollen morphology of the family *Parnassiaceae* from Pakistan. In the present paper, the pollen morphology of the family *Parnassiaceae* from Pakistan has been examined by light and scanning electron microscope.

Materials and Methods

Pollen samples were obtained from Karachi University Herbarium (KUH) or collected from the field. The list of voucher specimens is deposited in KUH. The pollen grains were prepared for light (LM) and scanning microscopy (SEM) by the standard methods described by Erdtman (1952). For light microscopy, the pollen grains were mounted in unstained glycerine jelly and observations were made with a Nikon Type-2 microscope under (E40, 0.65) and oil immersion (E100, 1.25), using 10x eye piece. For SEM studies, pollen grains suspended in a drop of water were directly transferred with a fine pipette to a metallic stub using double sided cellotape and coated with gold in a sputtering chamber (Ion-sputter JFC-1100). Coating was restricted to 150A. The S.E.M examination was carried out on a Jeol microscope JSM-T200.

The measurements were based on 15-20 readings from each specimen. Pollen diameter, polar axis (P) and equatorial diameter (E), aperture size, apocolpium, mesocolpium and exine thickness were measured.

The terminology used is in accordance with Erdtman (1952), Kremp (1965), Faegri & Iversen (1964) and Walker & Doyle (1976).

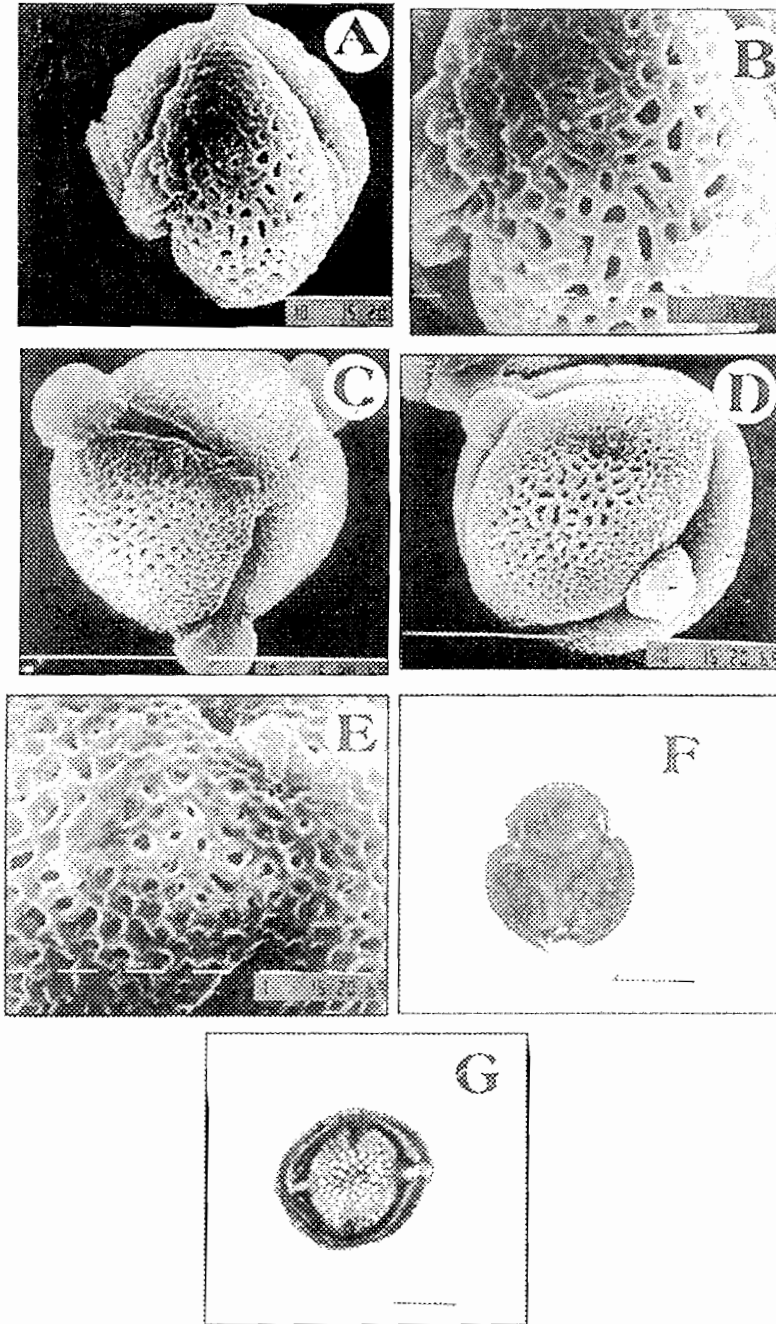


Fig. 1. Scanning Electron micrographs of pollen grains [A-E]; Light micrographs [F & G]. *Parnassia nubicola* : A, Equatorial view; B, Exine pattern. *P. palustris*: C, Polar view; D, Equatorial view; E, Exine pattern; F, polar view; G, Equatorial view. Scale bar = A, C, D & E = 10; B, E = 1 μ m; F & G = 20 μ m.

Pollen characters of the family Parnassiaceae

Pollen grains usually radially symmetrical, isopolar, prolate-subprolate or oblate-spheroidal, tricolporate, sexine thinner than or thicker than nexine. Tectum reticulate. On the basis of pollen shape 2 distinct pollen types are recognized viz., *Parnassia nubicola* - type and *Parnassia palustris* - type.

Key to the pollen types

- + Pollen grains prolate to sub-prolate *Parnassia nubicola* - type
- Pollen oblate-spheroidal *Parnassia palustris* - type

Descriptions of pollen type

Pollen type - I: *Parnassia nubicola* L. (Fig.1 A-B).

Pollen class: Tricolporate, zonoaperturate.

P/E ratio: Erect to semi-erect.

Shape: Prolate rarely sub-prolate.

Apertures: Ectoaperture - colpi long narrow, intruding.

Exine: Sexine thicker than nexine.

Ornamentation: Tectum coarsely reticulate with irregular mural pattern, lumina 0.16-1.25 µm in diameter.

Measurements: Polar axis P(15.11-) 24.16 ± 1.33 (32.5) µm, and equatorial diameter E(15.25-) 16.92 ± 0.26 (-20.51) µm. Colpi (15-) 19.63 ± 1.18 (-25) µm long, P/E ratio: 1.12-1.42, colpal membrane subsilate. Mesocolpium (12-) 17.22 ± 0.27 (-17.5) µm. Apocolpium c. 4 µm. Exine (1.25-) 1.27 ± (-2.5) µm thick. P.A.I. 0.73 - 1.16.

Species included: *Parnassia laxmannii* Pallar ex Shultes, *Parnassia nubicola* Wall. ex Royle

Key to the species

- + Exine 1.15 µm thick *Parnassia laxmannii*
- Exine 2.25 µm thick *Parnassia nubicola*

Pollen type - II: *Parnassia palustris* (Fig.1 C-G).

Pollen class: Tricolporate, zonoaperturate.

P/E ratio: Sub-transverse.

Shape: Oblate - spheroidal.

Apertures: Ectoaperture - colpi long narrow, intruding.

Exine: Sexine thinner than nexine.

Ornamentation: Tectum reticulate, with irregular mural pattern, lumina 0.01-0.83 µm in diameter.

Measurements: Polar axis P(17.5-) 19.25 ± 1.37 (-20.5) µm, and equatorial diameter E(17.5-) 20.66 ± 0.71 (22.5) µm, trilobed, fossaperturate, P/E ratio: 0.93, colpi (15-) 15.5 ± 0.49 (-17.5) µm long, ora (5-) 5.17 ± 0.17 (-6.25) µm in diameter, colpal membrane, subsilate. Mesocolpium c. 15 µm. Apocolpium (2.5-) 2.6 ± 0.06 (-2.75) µm. Exine (1.25-) 1.7 ± 0.27 (-2.5) µm thick.

Species included: *Parnassia palustris* L.

Discussion

Parnassiaceae is a stenopalynous family. It is fairly uniform in their palynology. Pollen grains generally prolate to subprolate rarely oblate-spheroidal, tricolporate with reticulate tectum. On the basis of pollen shape 2 distinct pollen types viz., *Parnassia nubicola* - type and *Parnassia palustris* - type are recognized. Pollen type-I: *Parnassia nubicola* is readily distinguished by its prolate to sub-prolate pollen. Two species of this pollen type can easily be delimited on the basis of exine thickness, which is helpful at the specific level i.e., *Parnassia nubicola* Wall. ex Royle., has 2-2.15 μm thick exine, whereas in *P. laxmanii* Pallas ex Shultes., pollen are 1.5 μm thick exine. Pollen grains of *Parnassia palustris* - type is easily recognized by having oblate-spheroidal pollen (Saxena, 1973; Hideux & Ferguson, 1976).

The pollen grains of *Saxifragaceae* is distinct from *Parnassiaceae*, since in the family *Saxifragaceae* mostly striate or spinulose or rugulate tectum is found (Qaiser & Perveen, 1997). Hence palynology also supports the exclusion of the genus *Parnassia* from the family *Saxifragaceae* by Takhtajan (1980), Thorne (1983) and Dahlgren (1983).

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