

# APOMETZGERIA PUBESCENS FROM THE VALLEY OF FLOWERS<sup>1</sup>

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## ABSTRACT

*Apometzgeria pubescens* (Schränk) Kuwah. recently collected from alpine region (4500 m) in the valley of flowers has been described. The thallus has pointed hairs on both dorsal and ventral surfaces. The seta is 6-8 (9) cells across in diameter and is characteristic of the genus. The capsule wall is bi-stratose; in surface view, cells of the outer layer possess semicircular thickenings on the radial as well as the end walls and cells of the inner layer possess confluent nodular thickenings with extensions on the inner tangential walls. Spores are spherical, 20-25  $\mu$ m in diameter with finely papillate sporoderm under LM. It reveals a double ornamentation under SEM consisting of spinulate projections of the 'toad-stool' type with interspersed fine granules in between. The elateroderm is however, smooth and does not correspond with the sporoderm architecture. The sporoderm and elateroderm characteristics as revealed under SEM are being provided for the first time in this taxon and the sporophytic details for the first time in Indian plants.

## INTRODUCTION

The genus *Apometzgeria* Kuwah. is bipolar in distribution (Engel and Kuwahara, 1973). It is richly represented in the Indian subcontinent (eastern and western Himalayas) by two taxa, viz., *A. pubescens* (Schränk) Kuwah. and *A. pubescens* var. *kinabaluensis* Kuwah. (Srivastava and Udar, 1975; see also Kuwahara, 1966). It is interesting that the specimens from the above areas scarcely or rarely produce sporophytes. Only few thalli bearing unripe sporogonia were collected by the author (during October 1967) at one occasion from Rahla (3500 m), Kulu valley and at the other from the Alpine zone (4500 m) in the valley of flowers and Hemkund areas (during May

1980) where perpetual snow occurs during a major part of the year. The specimens from the latter sites were fortunately having fully or nearly mature sporogonia and have been utilized in the present investigation which includes the details of the sporophyte (inadequately known in Indian plants) and the structure of spores and elaters. The elateroderm and the sporoderm architecture as revealed under SEM are being provided for the first time in this taxon.

For SEM studies mature capsules were dehydrated through ethanol series and the unacetolysed spores and elaters were scanned for microcharacters at the University of Michigan, U. S. A. through the courtesy of Dr P. Dayanandan. The specimens investigated in the present

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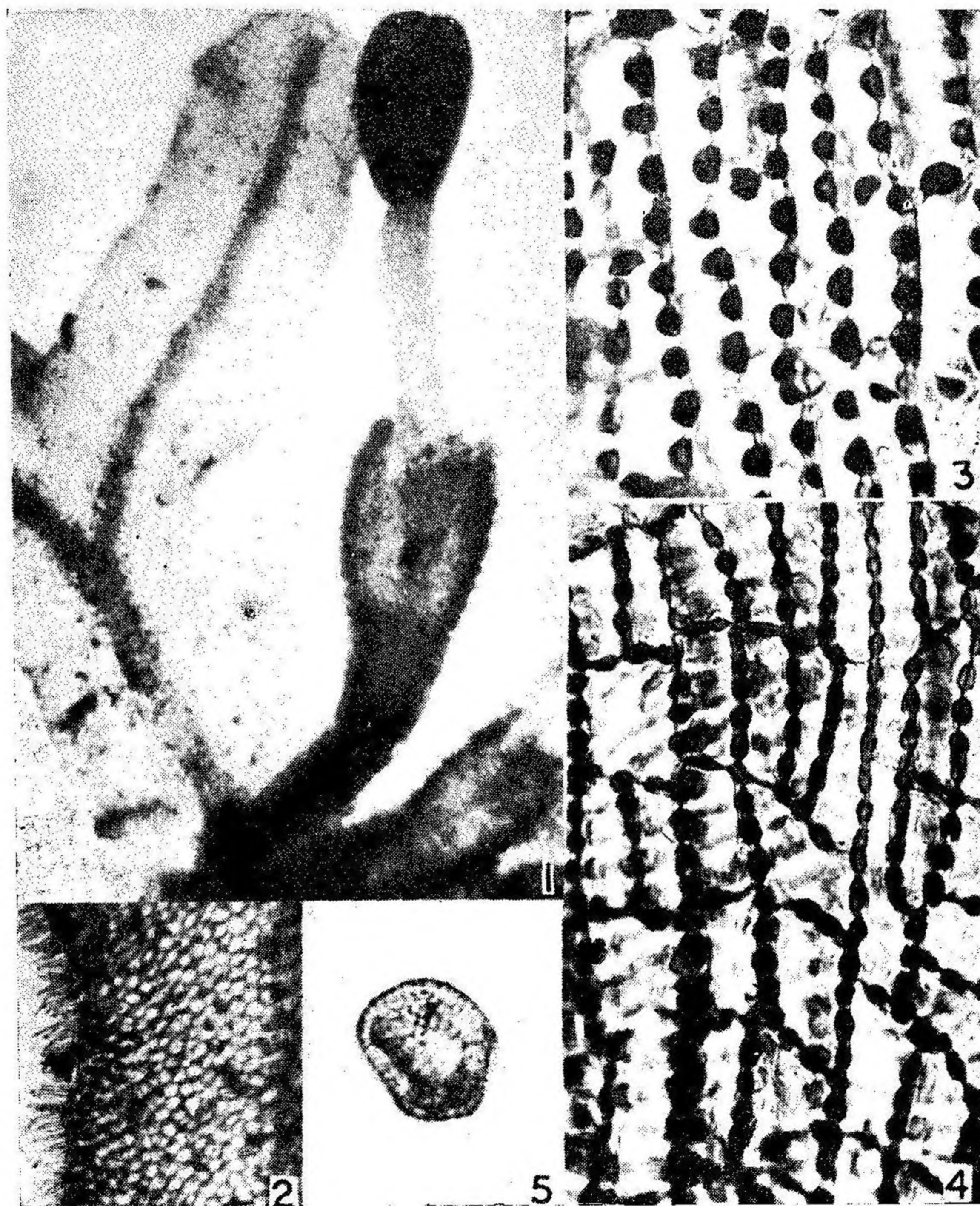


work are deposited in LWU (Nos. 4141, 4142, 4143).

### DESCRIPTION

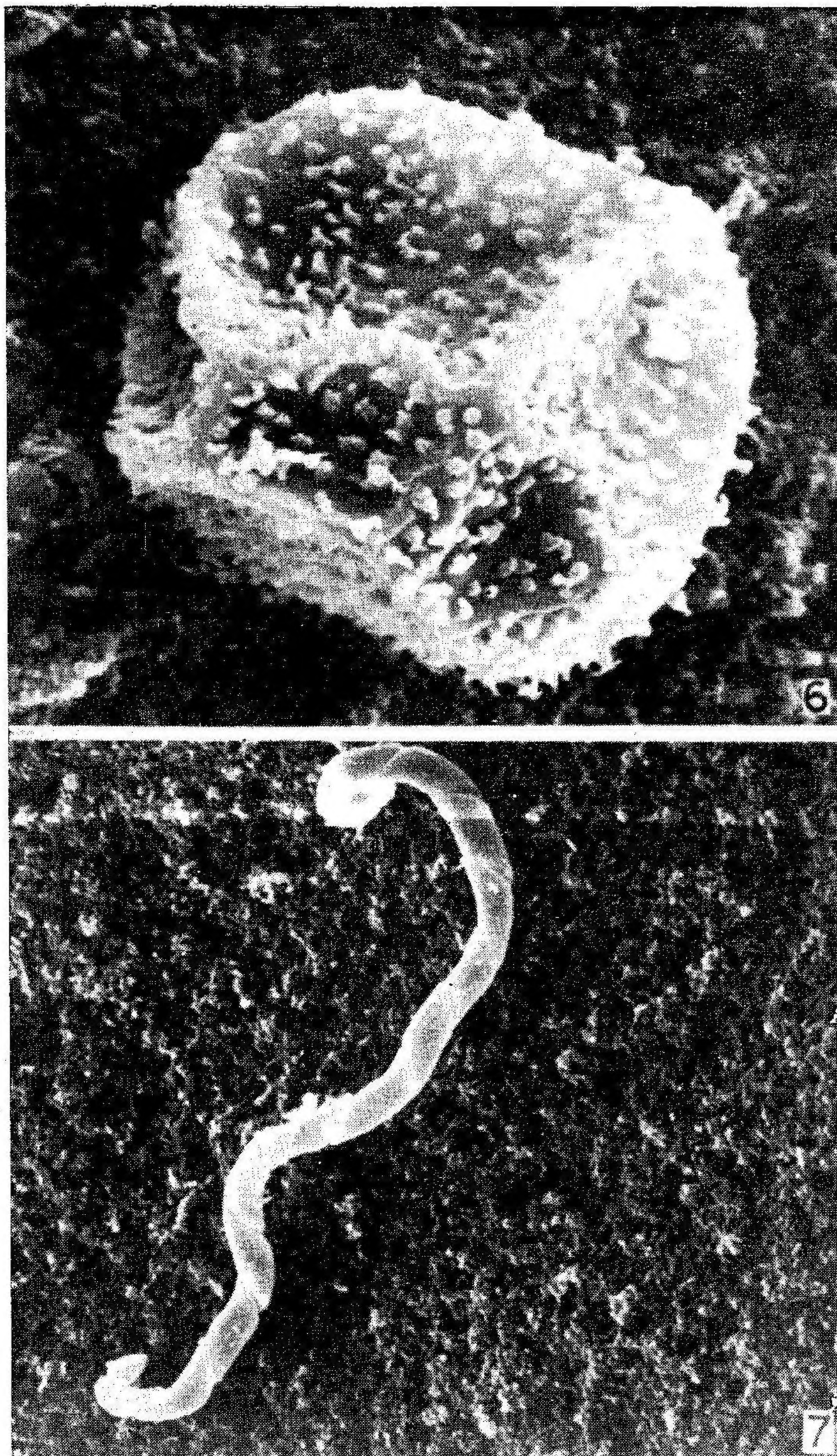
*Apometzgeria pubescens* is characterized by the presence of pointed hairs all over the dorsal and ventral surface of the thallus (Figs. 1, 2). The thallus is dichotomously branched upto 16mm long and 1-1.5 mm broad with ventral shoots. Midrib has 5-6/7 cells over the dorsal and ventral surfaces. Wing is 14-19 cells wide on

either side of the midrib. Dioecious. Male plants are less in number than the female. The sporophyte, before dehiscence of the capsule usually remains enclosed within a pyriform, 2.5-3.0 mm long, fleshy shoot calyptra (4-6 cell layers thick across) studded with numerous pointed hairs (Fig. 1). In the earlier investigated specimens from Rahla (see Srivastava and Udar, 1975) the shoot calyptra was found to be upto 10 cell layers thick. The foot is anchor-shaped with outer cells some



Figs. 1-5-. *Apometzgeria pubescens* (Schrank.) Kuwah. 1. A portion of plant with shoot-calyptra and projected sporophyte  $\times 19$ . 2. Marginal cells of thallus  $\times 46$ . 3. Outer layer cells of the capsule wall  $\times 404$ . 4. Inner layer cells of the capsule wall  $\times 404$ . 5. Spore  $\times 571$ .





**Figs. 6, 7.** *Apometzgeria pubescens* (Schränk.) Kuwah. 6. SEM of spore  $\times 3550$ . 7. SEM of Elater  $\times 888$ .



what haustorial in nature. The seta is 6-7 cells across diameter with 18-25 outer cells. The seta elongates upto 6 mm (Fig. 1) and maintains the same number of cells across diameter. Mature capsules are oval, 1-1.5 mm long, enclosing spores, elaters and elaterophore. The elaterophore hangs down from the apex up to 3/4 in to the cavity of the capsule. The capsule dehiscence typically into four equal valves with part of the elaterophore attached at the apices of each valve. The capsule wall is bi-stratose. The cells of the outer layer are elongated possessing semicircular local thickenings on one or both sides of the radial walls (Fig. 3) in surface view. The cells of the inner layer are also elongated possessing confluent nodular thickenings on the radial walls. These thickenings extend over the tangential wall of the layer appearing U-shaped in a cross section or, as transverse bands in surface view (Fig. 4).

The spores are spherical, 20-25  $\mu\text{m}$  in diameter with finely papillose sporoderm in optical view (Fig. 5) with LM. The elaters are attenuate with smooth elateroderm and uniseriate thickening band under LM. However, SEM studies have revealed that spores show a collapsible tendency after drying with double ornamentation of the sporoderm. The architectural elements consist of spinulate projections of the 'toad-stool' type with interspersed fine granules in between (Fig. 6), hitherto, unknown in this taxon. Similar sculptural elements have also been observed on the sporoderm of *Radula tabularis* (see Udar and Kumar, 1983; Udar and Srivastava, 1984). The elaters are upto 7 mm broad. The elateroderm (Fig. 7) is smooth and does not correspond

with the sporoderm.

Rare production of soprophytes in *Apometzgeria pubescens* may possibly be attributed to the dioecious sexuality and the production of relatively less number of male individuals than the female. Often the dimorphic male and female individuals grow distantly apart and eventually the two sexes become spatially separated thus presumably resulting into sexual incompetency. The plants, in nature, however, reproduce vegetatively by means of copious formation of ventral adventitious shoots thus exhibiting a remarkable predominance of vegetative propagation as also observed in several liverwort genera, viz., *Aitchisoniella himalyensis*, *Stephensoniella brevipedunculata* and *sewardiella tuberifera* (Udar and Srivastava, 1983; Udar *et al.*, 1983).

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