

## Pollen Morphology of Wild *Vitis sylvestris* Gmelin (Vitaceae)

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**Abstract:** Pollen grains from two samples of *Vitis sylvestris* Gmelin (*Vitaceae*) were examined using a light microscope and scanning and transmission electron microscopes. The pollen grains were radially symmetrical, isopolar, 3-colporate, prolate-spheroidal and sub-prolate; amb triangular. Exine sculpture at the mesocolpia was obscurely reticulate under LM, foveolate-rugulate at the mesocolpia and reticulate towards the poles and at the poles in SEM, psilate along the ectoapertures (colpi) margins as observed with both LM and SEM. The tectum was subtectate. The sexine was slightly thinner than the nexine. Nexine 1 was much thicker than Nexine 2. The ectoapertures were narrow and long and with tapering ends. The endoapertures (ora) were circular with thickened margins.

**Key Words:** Pollen morphology, *Vitis sylvestris*, Vitaceae.

### Yabani *Vitis sylvestris* Gmelin'in (*Vitaceae*) Polen Morfolojisi

**Özet:** Bu çalışmada *Vitis sylvestris* Gmelin'e (*Vitaceae*) ait iki örneğin polenleri ışık mikroskobu, taramalı ve geçirmeli elektron mikroskopları ile incelenmiştir. Polenler radyal simetridir, izopolar, 3-kolporat, prolat-sferoid ve sub-prolat olup, amb üçgenlidir. Ekzin süslemesi mezokolpiyumlarda ışık mikroskobu altında belirsiz rekitülüt, taramalı elektron mikroskobu altında ise mezokolpiyumlarda foveolat-rugulat, kutuplara doğru ve kutuplarda retikülatır. Ektoapertürlerin (kolpusların) kenarları hem ışık hem geçirmeli elektron mikroskobunda psilattır. Tektum subtektattır. Sekzin nekzinden biraz incedir. Nekzin 1 Nekzin 2'den çok kalındır. Ektoapertürler dar ve uzun olup, kutuplara doğru sivrilmektedir. Endoapertürler (ora) yuvarlak ve kalın kenarlıdır.

**Anahtar Sözcükler:** Polen morfolojisi, *Vitis sylvestris*, Vitaceae.

### Introduction

According to Flora of Turkey [1], there are two *Vitis* L. (*Vitaceae*) species in Turkey, *V. sylvestris* Gmelin and *V. vinifera* L. However, in later studies, *V. sylvestris* has been regarded as subspecies within the *V. vinifera* crop complex because of its close morphological similarities and interconnections with the complex [2].

More attention has been paid to the pollen morphology of *V. vinifera* [3] and its cultivated varieties [4, 5, 6]. Grape production is of great importance in Anatolia which is rich in *Vitis* cultivars. However, most ampelographic studies have focused on the morphology, physiology and flower biology of Anatolian cultivated *Vitis* varieties [7]. However, there exists no detailed work on pollen of *V. sylvestris*. Therefore, the main aim of this study was to examine this wild species pollen in detail using LM, SEM and TEM.

### Materials and Methods

Pollen grains were taken from two samples of *V. sylvestris* deposited in the herbarium of Ankara University (ANK), (Çorum-Kargı, M. Kılınc 3892 and Sündiken Mountain, near Ilica, T. Ekim 877).

The acetolysis method was followed for light microscope study. LM observation (polar and equatorial axes length, pollen shape, amb, apocolpium size, exine sculpturing, ectoaperture (colpi) and endoaperture (ora) features) and photography were conducted with a Leitz-Wetzlar microscope (x12.5; x 100). Measurements were taken on at least 30 pollen grains.

For SEM study, unacetolysed pollen grains were applied to stubs and covered with gold. Some of the acetolysed pollen grains were used for TEM. They were first treated with 2% OsO<sub>4</sub>, then stained with uranyl acetate. After being embedded in araldite, ultrathin

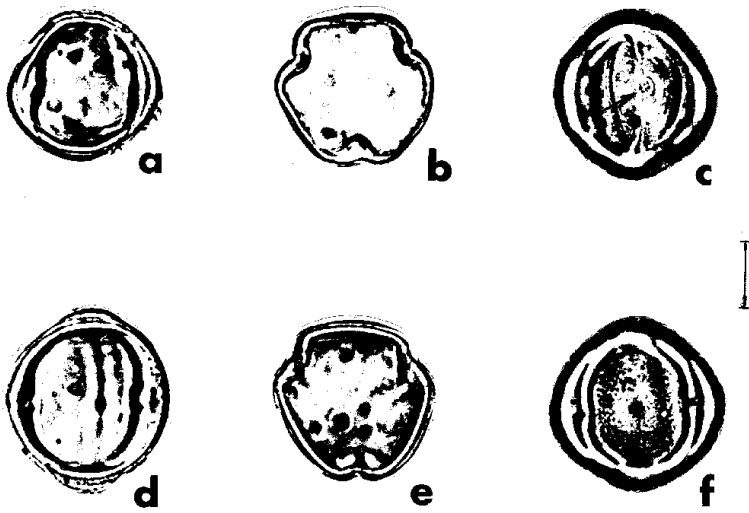


Figure 1. Pollen grains in LM, a-c *Vitis sylvestris* from Çorum-Kargı, a. equatorial view, b. polar view, c. endoaperture (arrowed), d-f. *V. sylvestris* from Sündiken Mnt., d. equatorial view, e. polar view, f. exine sculpturing and apertures. Scale=10µm.

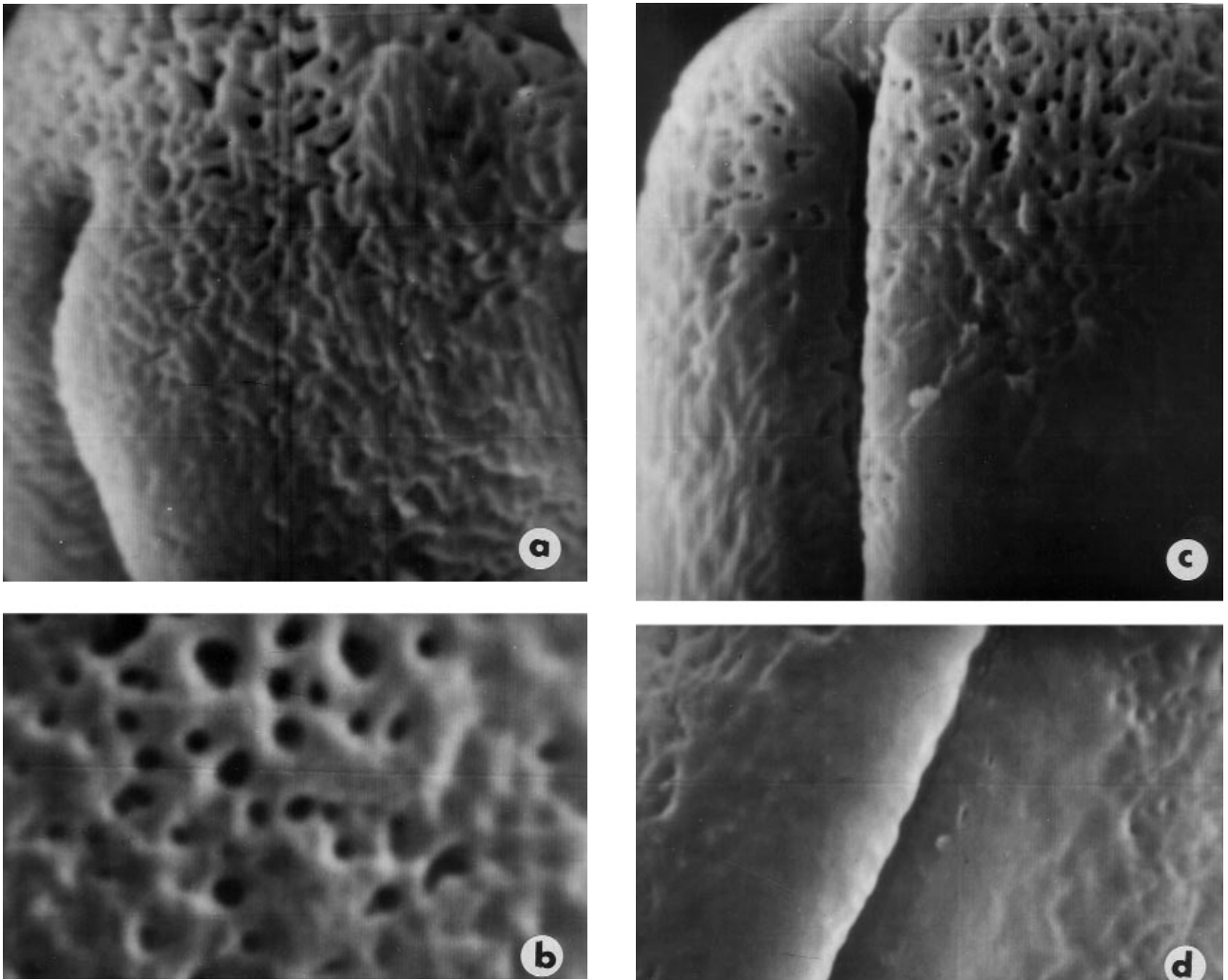


Figure 2. Pollen grains in SEM, a-b *V. sylvestris* from Çorum-Kargı, a. exine sculpturing at the mesocolpium and near the pole, x8000, b. exine sculpturing at the pole, x16000, c-d. *V. sylvestris* from Sündiken Mnt., c. exine sculpturing at the mesocolpium and near the pole, x8000, d. exine near the colpus, x8000.

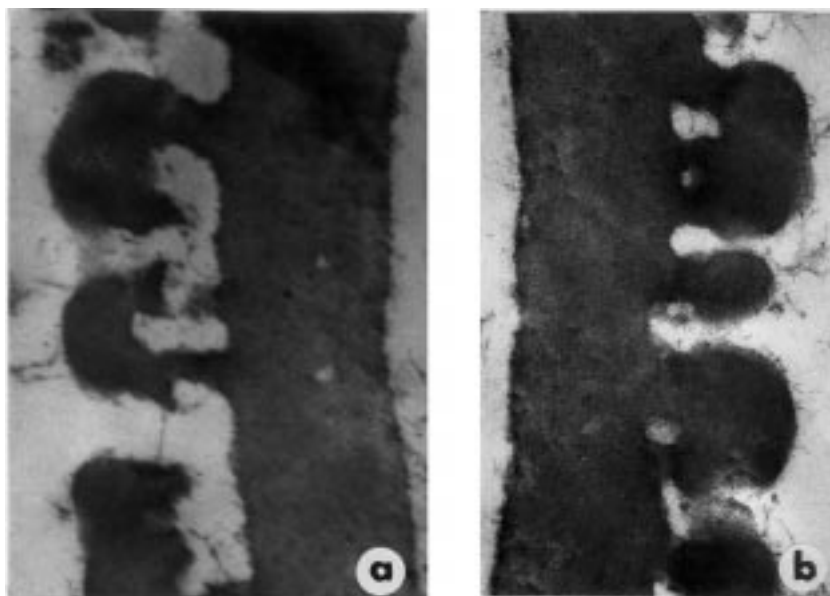


Figure 3. Pollen grains in TEM, a. *V. sylvestris* from Çorum-Kargı, section showing exine at the mesocolpium, x29000, b. *V. sylvestris* from Sündiken Mnt., section showing exine at the mesocolpium, x29000.

sections were taken with a LKM III 800 Ultratome and these sections were post-stained in lead citrate and uranyl acetate.

Scanning electron micrographs (SEMG) were taken with a S4-10 Cambridge Stereoscan microscope while transmission electron micrographs (TEMG) were taken with a Jeol 100 CXII microscope. Lumina size at the poles was measured on SEMG while exine subunit thickness was measured on TEMG.

The terminology of Erdtman [3] and of Faegri and Iversen [8] has been used in this study.

#### Pollen description

Pollen grains radially symmetrical, isopolar, 3-colporate; prolate-spheroidal (25x23 µm) (P/E: 1.08) in M. Kılınç 3892 and sub-prolate (27x22 µm) (P/E: 1.22) in T. Ekim 877. Amb triangular. Apocolpium 8 µm (Fig. 1 a, b, d-e).

Exine sculpturing obscurely reticulate under LM (Fig. 1 f), foveolate-rugulate at the mesocolpia and distinctly reticulate towards the poles and at the poles under SEM, psilate near the margins of ectoapertures under both LM and SEM (Fig. 2 a-d). Lumina size at the poles ranges from 0.065 to 0.5 µm. Exine 0.75-0.98 µm thick at mesocolpia and thicker at poles (c. 4.5 µm). Tectum 0.17-0.27 µm thick, subtectate. Columellae 0.051-0.25 µm high. Nexine 1 very thick, 0.34-0.53 µm, having circular internal foramina. Nexine 2 very thin, 0.017-0.068 µm, continuous. S/N=1/1 (Fig. 3 a-b).

Ectoapertures narrow and long, tapering towards the poles. Endoapertures circular, thick bordered (Fig. 1 c).

#### Conclusions

Our studies revealed that the two samples of *V. sylvestris* examined were similar in terms of pollen morphology. There was only one slight difference in pollen shape. Prolate-spheroidal pollen grains were found in the material from Çorum-Kargı whereas sub-prolate pollen grains were observed in that from Sündiken Mountain, near Ilıca.

A number of palynological investigations into cultivated *Vitis* varieties also showed that pollen shape and P/E ratio change from one sample to another. These features were found to be the most important parameters for characterization [4]. Although there was a slight difference in pollen shape of the *V. sylvestris* samples under investigation, it can be concluded that the pollen of the wild-type *Vitis (sylvestris)* from various localities also exhibit differences in shape.

Erdtman [3] reported reticulate pollen grains in members of the family *Vitaceae*. Faegri and Iversen [8], on the other hand, reported that the exine sculpturing of *Vitis* was reticulate, foveolate-perforate and that lumina size increased towards the poles under LM. Our study showed that in *V. sylvestris*, exine sculpturing was obscurely reticulate under LM, and foveolate-rugulate at the mesocolpia and distinctly reticulate at and around the poles in SEM. An increase in lumina size towards the poles, observed by SEM, supports the results for Faegri and Iversen [8].

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