PALYNOLOGICAL STUDIES OF THE GENUS TETRATAENIUM (APIACEAE) FROM IRAN

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The pollen morphology of *Tetrataenium lasiopetalum* and *T. nephrophyllum* was studied by SEM and LM. The results confirmed the stenopalynous characteristic of the family *Apiaceae*. The palynological observations revealed that pollen grains of two studied species of *Tetrataenium* are prolate in shape and posses tricolporate aperture. The exine sculpturing of both species are rugulate. Therefore, *T. lasiopetalum* and *T. nephrophyllum* are similar in palynological characters and could be included in subrectangular pollen type as classified by Cerceau – Larrival.

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مطالعه دانه گرده جنس Tetrataenium در ایران

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مورفولوژی دانه گرده دو گونه *Tetrataenium lasiopetalum* و *T. nephrophyllum* بوسیله میکروسکوپهای الکترونی و نوری مورد بررسی قرار گرفت. نتایج بدست آمده نشان داد که دانه گرده این جنس تیپ عمومی خانواده چتریان (Stenopalynous) را نشان می‌دهد. در دو گونه مطالعه شده دانه گرده سه شیار ـ روزنی و از نظر شکل کلی استوانه‌ای– مستطیلی می باشد که در جهت محور قطبی طویل شده است. آراستار اگزین از نوع چین خورده بود. بنابراین دو گونه مطالعه شده از نظر ساختار دانه گرده شبیه به هم بوده و بر اساس طبقه بندی Cerceau – Larrival در تیپ مستطیلی (Subrectangular) قرار می گیرند.

Introduction

The genus *Tetrataenium* (DC.) Manden. (Syn.: *Heracleum* L. sect. *Tetrataenium* DC.) as a member of tribe *Peucedaneae* and family *Apiaceae* is represented in Flora Iranica area by five perennial species, two of which grow in Iran (Mandenova 1987). *T. lasiopetalum* (Boiss.) Manden. (Syn.: *Heracleum lasiopetalum* Boiss.) is distributed in southwestern parts of Iran, while *T. nephrophyllum* (Leute) Manden., an endemic species to Iran, occurs in western and northwestern provinces (Azerbaijan, Kurdestan and Lurestan). In traditional medicine, leaves and fruits of *Heracleum* and *Tetrataenium* species are used as antiseptic, carminative, digestive and a flavoring agent and spice for foods as well.

The common stenopalynous type of pollen has been reported for the *Apiaceae* (Erdtman 1952). According to Cerceau–Larrival (1971) *Apiaceae* family has been divided into five subfamilies and 38 tribes based on pollen morphology along with inflorescence, fruit and vegetative characters. From comprehensive palynological studies on over 2000 species of *Apiaceae* five principal pollen types have been characterized (Cerceau – Larrival & Roland – Heydacher 1976). In addition, there have been some reports on the palynological studies of *Apiaceae* by several authors (Nair & Kapour 1973; Tawoda 1982; Hebeda 1985; Al-Eisawi & Jury 1988). The pollen morphology of two species of *Diplotaenia* (*Apiaceae*) from Iran has recently been reported (Azizian et al., 2003). The literature survey revealed that the genus *Tetrataenium* has not been considered for previous investigation on account of its pollen morphology.

Materials and Methods

The fully grown flowers of *T. lasiopetalum* and *T. nephrophyllum* were collected at full flowering stage

Table 1. Materials used for pollen morphology of the genus *Tetrataenium.*

Species	Locality	Voucher no.
Tetrataenium lasiopetalum	Lorestan: Azna, Oshtorankuh, around Gahar lake, 2500 m	AS-684
Tetrataenium nephrophyllum	West Azerbaijan: Takab, Takht-e Soleiman, Belgheis mountain, 2500 m	AS-908

Table 2. Summary of pollen morphological data of *Tetrataenium* species (measurement in μm).

Character / Taxa	Polar length (P)			Equatorial width (E)			P/E	Colpus lenght
	Min	Mean	Max	Min	Mean	Max		
T. lasiopetalum	35	38.2	41	17	19.3	22	1.97	20.7
T. nephrophylum	34	37.4	40	15	17.5	20	2.53	21.3

from their natural habitats. The voucher specimens of the samples were deposited at the herbarium of Research Institute of Applied Science, ACECR, Shahid Beheshti University, Tehran, Iran.

The locality and voucher specimen references are presented in table 1. The pollen materials for LM studies were acetolyzed as recommended by Erdtman (1960). For scanning electron microscopy observation unacetolyzed pollen grains were dusted onto stubs and coated with gold using the TXA – 840 SEM. The mean of about ten measurements for pollen grain size (pollen axis, P, and equatorial diameter, E,) were considered for each sample. In general the terminology of Erdtman (1969) and Cerceau – Larrival and Roland – Heydacher (1976) was followed.

Results and Discussion

The pollen grain characters of *Tetrataenium lasiopetalum* and *T. nephrophyllum* are presented in table 2. The average size of pollen grains was from 37.4-38.2 μm in polar length and 17.5-19.3 μm in equatorial width (table, 2). The analysis of SEM micrographs of two studied species confirmed the stenopalynous characteristic of the family *Apiaceae*. The palynological observations revealed that pollen grains of two studied species of *Tetrataenium* are prolate in shape and posses tricolporte aperture (Figs. 1 & 2, a & c). The exine sculpturing of both species are rugulate (Figs. 1 & 2, b & d). Therefore, *T. lasiopetalum* and *T. nephrophyllum* are similar in palynological characters and could be included in subrectangular pollen type as classified by Cerceau – Larrival (1971).

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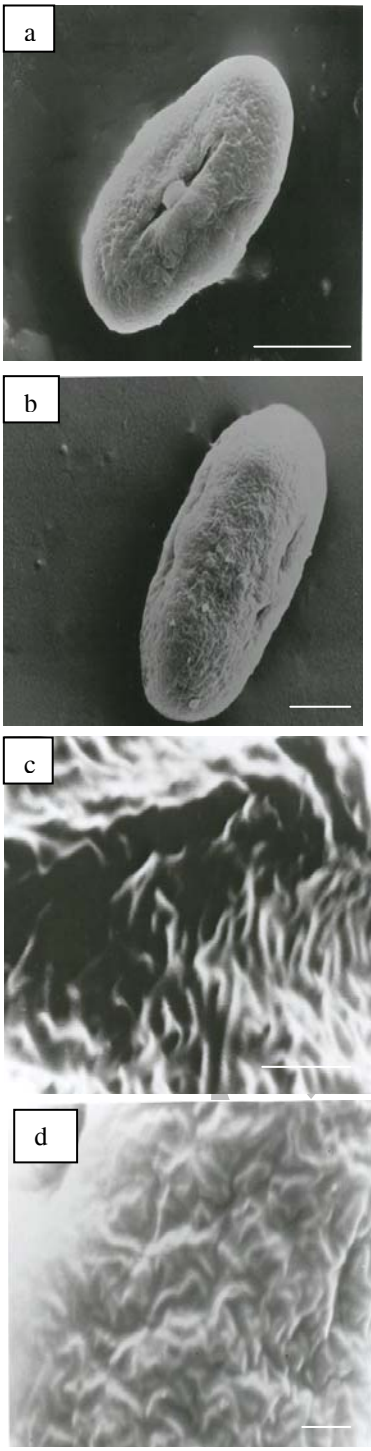

Fig.1. Pollen grain of *Tetrataenium lasiopetalum*. a & b) equatorial view, scale bar = 10 µm. c & d) ornamentation of regulate sculpture, scale bar = 1µm.

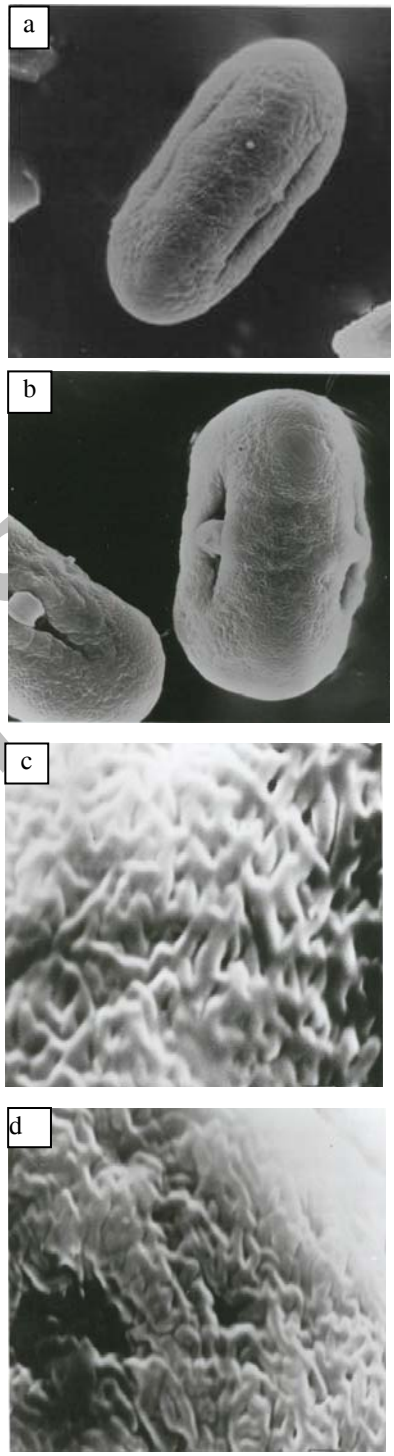

Fig. 2. pollen grains of *Tetrataenium nephrophyllum*. a & b) equatorial view, scale bar = 10 µm. c & d) ornamentation of regulate sculpture.