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Pollen Morphology of the Species Belonging to the Genus *Dontostemon* (Andrz.) C. A. Mey. (Brassicaceae Jussj)

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Abstract

Pollen grains of five species of the genus *Dontostemon* (Andrz.) C. A. Mey are studied in detail by using light and scanning electron microscopes. Pollen description of each taxon is given. Dry pollen grains are oval, tricolpate with average size of 27.4-38.1 μm in length, and 22.6-29.1 μm in width, light yellowish in color, reticulate on surface, which made of amorphous polygons, mostly pentagonal units of variable in size.

Key words: polen grans, microscopic study, Dontostemon, Mongolia

Introduction

There are 11 species in the genus *Dontostemon* (including *Dimorphostemon pectinathus* and *Nasturtium libeticitm)* that mostly growing in the Central Asian mountain steppe, steppe, desert steppe and desert zones (Al-Shehbaz & Ohba, 2000). Seven species of this genus (including *Dimorphostemon pectinathus)* are found in Mongolia (Gubanov, 1996).

The pollen grains can be preserved in soil for a long period of time, and it is accepted as a conservative character for classification to establish the evolutionary history of plants. The shape of pollen grains is specific to some taxonomic ranks, such as family, genus and species. Therefore, as an important feature, the morphology of pollen grains is used in resolving systematical problems and establishing the phylogenetic relationships (Erdtman, 1943; Golubkova, 1950; Punsalpaamuu, 1999).

There was no study on the pollen structure *of Dontostemon* until V.F. Golubkova's [1950] work, who studied such species as *D. hispidus, D. integrifolius* and *D. pectinanthus,* and she come to the conclusion that these species are closely related to *Clausia aprica* and *Hesperis sibirica.*

The main aim of this study is to reveal the detailed pollen morphology of some *Dontostemon* species by using of compound and electron microscopes.

Materials and Methods

A list of the studied and collection localities or accession numbers for each species is given Table 1. All materials were identified by the first author, and voucher specimens are deposited in the Herbarium of the Department of Botany, National University of Mongolia (UBU).

For the compound microscopic study (Carl Zeiss) the pollen slides were prepared according to the technique of Wodehouse (1936) and Erdtman (1972) and made statistic measurement of pollen grains and examinations of other characteristics. The samples were fixed in the about 96% ethylated spirits. After pollen grains were dissected on a slide in 0.05% fuchsine then squashed under a cover slip.

Pollen morphology descriptions were carried out in accordance with the method by Erdtman (1971). Sample derivation data for investigated taxa of the genus *Dontostemon* and dimensions and morphological variations in pollen of some species are given in Table 2. The photographs of pollen were taken with a Nikon Eclipse E200 microscope and some photographs of selected representatives of pollen are presented in this paper.

For scanning electron microscopic study, unacetolysed pollen grains were transferred to stubs and coated gold. Pollen nomenclature is followed by Faegri and Iversen (1975).

Table 1. Collection data of plant materials in Mongolia

Species	Locaity	Position	Date	Collector/ herbarium
D. crassifolius	Umnugobi aimag, Tsogt-Ovoo sum, Doloony khooloi, desert steppe.	N 44°24'454" E 105°21'64" h = 1448m	06.20.03	B.Oyuntsetseg /UBU
D. elegans	Bayan-Olgii aimag, Olgii sity, desert steppe.	N46°05'10" E106° 21'57" h=1470m	27.07.00.	B.Oyuntsetseg /UBU
D, integrifolhis	Tuv aimag, Batsumber sum, rocky mountain slopes.	N48° 16'26" E106° 33' 16" h=1514m	06.08.01	B.Oyuntsetseg /UBU
D. pinnatifidus	Tuv aimag Bayanunjuul sum. Mountain Zorgol Khairhan, mountain steppe.		02.06.04	B.Oyuntsetseg /UBU
D. senilis	Umnugobi aimag, Nomgon village, desert steppe.	N42°04' E105°01'	18.06.03	B.Oyuntsetseg /UBU

Table 2. Dimension the morphological variation in pollen of some species of the genus *Dontostemon.*

Species	formation		dimension (μm)		colpat number	shape of sculpture
	polar	equatorial	length	width		
D. crassifolius	circular	ellipticus	30-40	18-30	tricolpat	non-uniform (big, small)
D. elegans	circular	spheroidal	25-32	25-30	tricolpat	non-uniform (big, small)
D. integrifolius	circular	ellipticus	23-32	12-30	trjcolpat	non-uniform (big, small)
D. pinnatifidus	circular	spheroidal	27-28	.25-26	tricolpat	non-uniform (big, small)
D. senilis	circular	spheroidal	36-45	26-36	tricolpat	non-uniform (big, small)

Results

Pollen descriptions.

***Dontostemon crassifolius* Maxim**. Pollen grain tricolpat, circular polar, equatorial ellipticus, 30-40 μm long; 18-30 μm wide, with long pores, round sculpture, reticulate surface, size of sculpture is big, small and non-uniform. Color of pollen grain is light yellowish (Fig. 1A).

***Dontostemon elegans* Maxim.** Pollen grain tricolpat, circular polar, equatorial spheroidal, 25-32 μm long; 25-30 μm wide, with long pores, round sculpture, reticulate surface, size of sculpture is big, small and non-uniform. Color of pollen grain is light yellowish (Fig. 1B).

***Dontostemon integrifolius* (L.) C.A.Mey.** Pollen grain tricolpat, circular polar, equatorial ellipticus, 23-32 μm long; 12-30 μm wide, with long pores, round sculpture, reticulate surface, size sculpture is big, small and non-uniform. Color of pollen grain is light yellowish (Fig.1C).

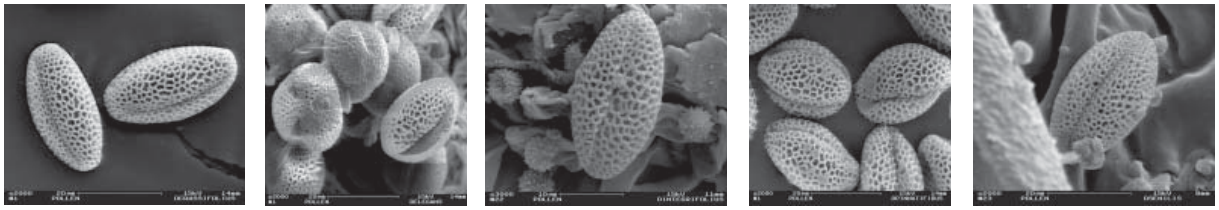
***Dontostemon pinnatifidus* Al-Sheh. ex H. Ohba.** Pollen grain tricolpat, circular polar, equatorial spheroidal, 27-28 μm long; 25-26 μm wide, with long pores, round sculpture, reticulate surface, size of sculpture is big, small and non-uniform. Color of pollen grain is light yellowish (Fig. 1D).

***Dontostemon senilis* Maxim.** Pollen grain tricolpat, circular polar, equatorial spheroid, 36-45 μm high; 26-36 μm wide, with long pores, round sculpture, reticulate surface, size of sculpture is big, small and non-uniform. Color of pollen grain is light yellowish (Fig.1E).

Conclusion

Pollen grains of five species of the genus *Dontostemon* of which morphological separation is problematical have been examined in detail using light microscopy and scanning microscopes. Dry pollen grains are oval, tricolpate and medium sized with 27.4-38.1 μm in length and 22.6-29.1 μm in width, light yellowish in color, reticulate in surface feature made up amorphous polygons, mostly pentagonal units, which are variable in size.

Pollen grains of the species studied here (*D.*



A **B** **C** **D** **E**

Figure 1. Pollen grains (from equator SEM x 2000, from polar LM x 1000)
A. *Dontostemon crassifoilus;* B. *Dontostemon elegans;* C. *Dontostemon integrifolius;* D. *Dontostemon pinnatifidus;* E. *Dontostemon senilis.*

crassifolius, D. elegans, D. integrifolius, D. pinnatifidus, D. senilis) did not differ clearly from one another in size and shape. However, pollen grains of *D. crassifolius* and *D. elegans* were relatively larger than those of the other species.

Therefore, we agree with Golubkova (1950), who made the conclusion morphology could not be considered as an important character for classifying the sections of the genus *Dontostemon.* Further comparative studies to other genera of Brassicaceae are needed to clarity whether they show also similar patterns of pollen morphology.

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Хураангуй

Dontostemon (Andrz.) C. A. Mey төрөлд хамаарах 5 зүйлийн ургамлын тоосны бүтцийн судалгааг электрон ба гэрлийн микроскопийг ашиглан гүйцэтгэж, зүйл тус бүрийн тоосны бүтцийн бичиглэлийг хийв. Хуурай тоосны мөхлөгүүд зууван, гурван талт бүтэцтэй, дунджаар 27.4-38.1 μm урттай, 22.6-29.1 μm өргөнтэй, цайвар шаргал өнгөтэй, янз бүрийн хэлбэртэй, ихэвчлэн таван өнцөгт бүхий торлосон барзгар гадаргуутай болохыг илрүүлэв.

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