

## RESEARCH ARTICLE

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**The palynomorphological characteristics of *Anthemis* in Albania**ANXHELA DAUTI<sup>1\*</sup>, GEZIM KAPIDANI<sup>2</sup>, BLERINA PUPULEKU<sup>1</sup>, NIKOLETA KALLAJXHIU<sup>1</sup>, ADMIR JANCE<sup>1</sup><sup>1</sup>University "Aleksandër Xhuvani", FNS, Department of Biology and Chemistry, Elbasan, Albania,<sup>2</sup>University of Tirana, FNS, Department of Biology, Tirane, Albania,\* Corresponding author Email: [dauti.anxhela@yahoo.com](mailto:dauti.anxhela@yahoo.com)**Abstract**

The genus *Anthemis* L. is the second largest genus of the tribe Anthemideae of Asteraceae family. It comprises about 210 species, distributed widely in Europe, south-west Asia, north and north-east Africa and extending into extreme southern Arabia and tropical east Africa. The plants of genus *Anthemis* are annual and perennial herbs with beautiful and attractive flowers. The article includes the palynomorphological study of the main members of genus *Anthemis* in Albania. In this article submitted comparative features of the species: *Anthemis altissima*, *Anthemis carpatica*, *Anthemis chia*, *Anthemis orientalis*, *Anthemis tomentosa*, *Anthemis triumfetti*, *Anthemis arvensis* and *Anthemis tinctoria*. The material for the study was obtained in National Herbarium in Tirana. For the study of palynomorphological features are analyzed 31 pollen grains from each species. The treatment of material is made with acetolysis method and basic fuchsin. The fixing of pollen grains is made with glycerin gelatin. The study and photos of pollen grains are realized with light microscope with 1000x power. The pollen grains of plants above are spheroidal or oblate spheroidal, three furrows three pores. The exine appears thick and has two-layers. The sculpture of exine is echinate. The work is part of the palynological study of general members in Asteraceae family in our country.

**Key Words:** *Anthemis*, palynomorphological, pollen grains, exine, spines.

**1. Introduction**

The genus *Anthemis* is part of the family Compositae Giseke, named as Asteraceae Dumort. The name of the genus came from Anthemidae Cass, a tribe which includes 109 genera [2] by adding *Castrilanthemum* shown from Vogt & Oberprieler [21]. According to the latest reconstruction phylogenetic of the family Asteraceae, Anthemideae is a member of subfamily Asteroidea and forms the sister group of Asterea [6]. Heywood & Humphries [8] tell about 130 species in this genus, while the latest estimates give us a number of 210 species annual, biennial or perennial [2,3] by ranking the genus *Anthemis* on the second genus of the biggest tribe Anthemideae. The genus *Anthemis* is related closely with the genus *Matricaria* L, *Chamaemelum* Mill, *Tripleurospermum* Schultz Bip and like this genus is known as Camomil. Some species of *Anthemis* are economically very important by using them as herbal tea to cure of anxiety, stomach disorders, insomnia, toothache; some of them are also used as insecticides.

The description of pollen grains of the genus *Anthemis* is made for the first time by Wodehouse [22, 23, 24] and then by many other researchers [18,

5, 12, 19, 9, 7]. In our country before is made the description of pollen grains of two species *Anthemis*: *Anthemis tinctoria* [10] dhe *Anthemis arvensis* [15].

This article includes the palynomorphological study of general members of the genus *Anthemis* in Albania and there are shown comparative palynological features of species: *Anthemis altissima*, *Anthemis carpatica*, *Anthemis chia*, *Anthemis orientalis*, *Anthemis tomentosa*, *Anthemis triumfetti*, *Anthemis arvensis* and *Anthemis tinctoria*. The study of the palynological of these species is a fragment of the study about the palynomorphological characteristics of general members in Asteraceae family in our country.

In order to accomplish the quantitative analysis of palynomorphological features, 31 pollen grains are taken in consideration. This study is focus on the type of pollen grains, shape, size, characteristics of furrow, sculpture of exine, etc. For the study of pollen grains is used light microscope Motic B1series. The measurements are performed with 1000X power and the photos are taken with 1000X power.

**2. Material and methods**

The material for the study was obtained in National Herbarium in Tirana. To achieve the study

of pollens' morphological characteristics we have used three analytical methods.

- Acetolysis of Erdtman method [4].
- Acetolysis of Avetisjan method [1].
- Basic fuchsine method of Smoljaninov, Gollubkov [17].

The fixing of pollen grains is made with glycerin gelatin prepared according to Kisser method [16].

The palynomorphological dates in this study regard the material acetolysed. The terminology is based on that recommended previously [14, 11].

#### *The method of acetolysis according to Erdtman*

The flower or leaf-bud is developed in an alcohol 96° in order to separate the other parts of the flower which can be separated inside distilled water. The bags of pollen grains with their pollen grains are dried in a thermostat, and then wetted with an acetolysis mixture (anhydrite acetic and sulfuric acid concentration and with pure chemicals in a 9:1 ratio), which is done every time in a repeating way. The test-tubes together with pollen grains and acetolysis mixture are placed in bathroom at a temperature 70-80 °C. The length-time of pollen grains staying in bathroom varies from different kinds. Then, the test-tubes are centrifuged where as they are cleaned several times with distilled water. Pollen grains are placed on slide and are observed with a microscope by dropping one dot from glycerin solution and water in a ratio 1:1. If the pollen grains are darken a lot then the material is separated in a test-tube by adding 1-2 sodium chloride 1-2 concentration sulfuric acid drops until the material becomes lighter. Then, it is done the second shower with distilled water. Through separation and centrifugation the material is taken and it is ready to become a preparation.

#### *The simplified method of acetolysis according to Avetisjan*

Pollen grains are placed in slide. Then, we dropped some ethyl alcohol (96%) drops on the slide composite. All fat substances of pollen grains created after the alcohol actions are cleaned with blotting-paper. The mixture of acetolysis is prepared every time frequently.

The slide composite is treated with 1-2 acetolysis solution drops and then it is warmed up in a thermostat or on the alcoholic lamp flames. The composite is controlled with a microscope continuously during the warming phase so it cannot

get darker more than what is allowed. After the desired color is reached the wash-up with alcohol (70 %) is done. Then the composite is washed from all other remains and then sealed with glycerin gelatin prepared according to Kisser method [16].

#### *The colored method of basic fuchsine according to Smoljaninov, Gollubkov*

Pollen grains are placed on the lama and then we add some alcoholic concentrated drops. In case the alcohol evaporates quickly we add an extra drop again. After that, we observe that the fat composite of pollen grains is spreader from alcohol toward the slide side. This fatness composite is taken away from the slide with blotting paper. After the slide is washed away from remains with blotting paper we add to it the colored solution of basic fuchsine which is prepared in two variants listed below:

1) Basic fuchsine, alcohol 75 % and phenol in this ratio 1:700:100

2) Basic fuchsine, ethyl alcohol 96 % and xylol in the ratio 1:600:800

Phenol and xylol are used in the transparency growth of markers and are necessary as antiseptic. After the color materials are fixed with gelatin glycerin which is prepared according to Kisser method.

### **3. Results and discussion**

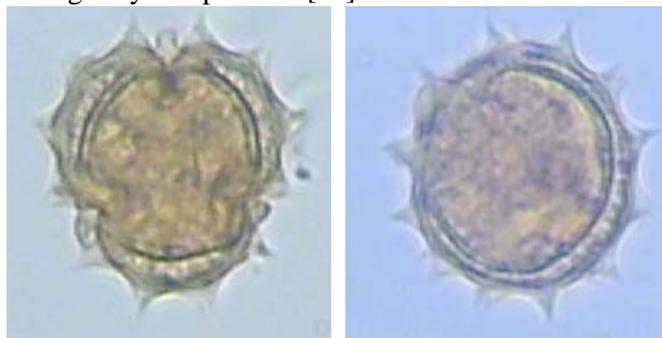
#### *Genus Anthemis L.*

The pollen grains representatives of this genus are monad with radial symmetry, three furrows three pores, with spheroidal outline. In polar view, pollen grains have circular outline, while in equatorial view they have elliptic outline. The furrows are deep and smooth. Mesocolpium varies from 10-13.8  $\mu$ . Pores have circular outline. The pore's diameter is about 5 $\mu$ . Exine is thick and two-layer with echinate sculpture. The spines are acuminate and their length varies from 3-5  $\mu$ , while their width varies from 2-3  $\mu$ . The distance between spinules varies from 2-12  $\mu$ . Thickness exine is about 4-7  $\mu$ . Ectexine is thicker than endexine, even staying in ratio 3:1. The diameter of pollen grain varies from 21-28  $\mu$ . (Fig. 1, 2, 3, 4, 5, 6, 7, 8, 9, 10, 11, 12, 13, 14, 15, 16)

The palynological features of each representative included in the study are expressed in Table 1 and shown through microscopic photos.

*Anthemis altissima* L., Sp. Pl. 893 (1753)

This is an annual herbaceous plant, which grows in cultivated lands, uncultivated lands, etc. It blooms during May – September [20].

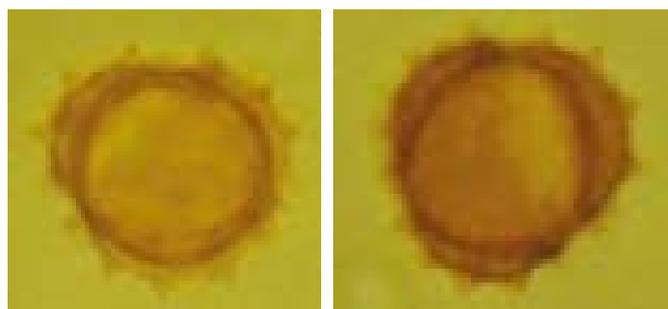


**Figure 1** *Anthemis altissima*, polar view (1000 X)

**Figure 2** *Anthemis altissima*, equatorial view (1000X)

*Anthemis arvensis* L., Sp.Pl. 894 (1753)

This is an annual herbaceous plant that grows in cultivated land, in wasteland etc. It blooms during may -october [20].

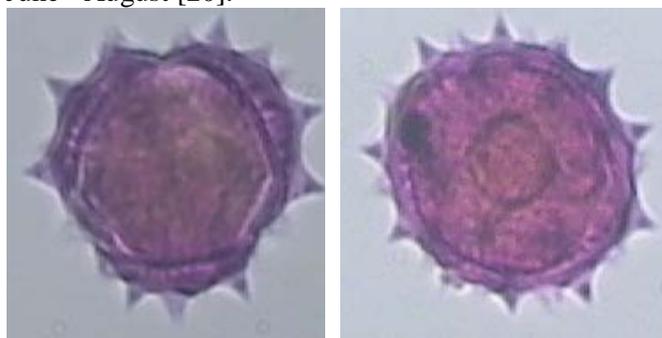


**Figure 3** *Anthemis arvensis*, polar view

**Figure 4** *Anthemis arvensis*, polar view

*Anthemis carpatica* Willd., Sp. Pl. 3:2179(1803).

This is a perennial herbaceous plant that grows in grassy areas and in rocky crevices. It blooms during June - August [20].

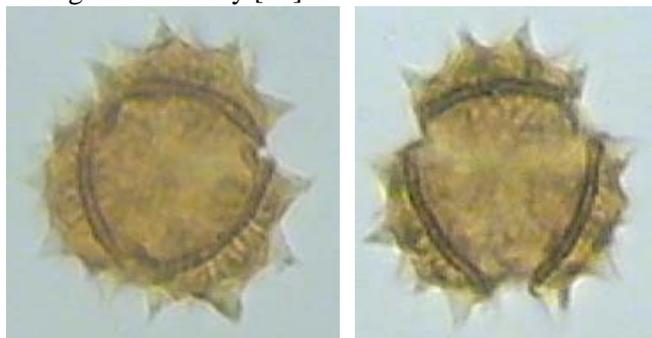


**Figure 5** *Anthemis carpatica*, polar view (1000 X)

**Figure 6** *Anthemis carpatica*, equatorial view (1000 X)

*Anthemis chia* L., Sp. Pl. 894 (1753)

This is an annual herbaceous plant that grows in cultivated lands, uncultivated lands etc. It blooms during March - May [20].

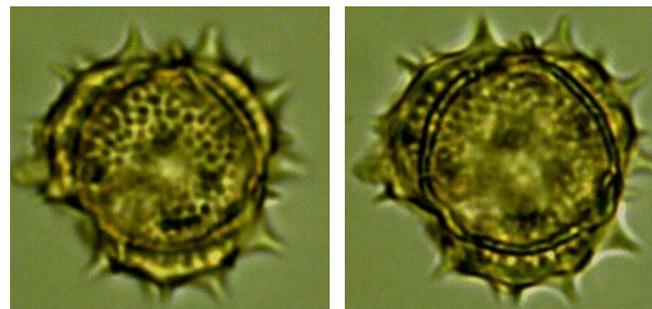


**Figure 7** *Anthemis chia*, polar view (1000X)

**Figure 8** *Anthemis chia*, polar view (1000X)

*Anthemis orientalis* Hayek (*A. cretica* L., Sp. Pl. 895 (1753)

This is a perennial herbaceous plant that grows in rocky places with grassy of mountain areas. It blooms during June – July [20].

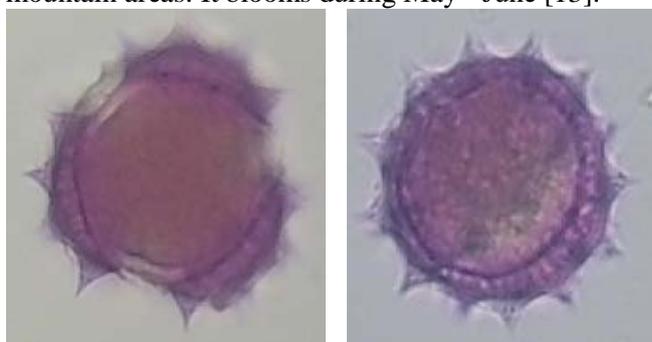


**Figure 9** *Anthemis orientalis*, polar view (1000X)

**Figure 10** *Anthemis orientalis*, polar view (1000X)

*Anthemis tomentosa* L.

This is a perennial herbaceous perennial plant that grows in places with sand-dunes, mainly in mountain areas. It blooms during May - June [13].

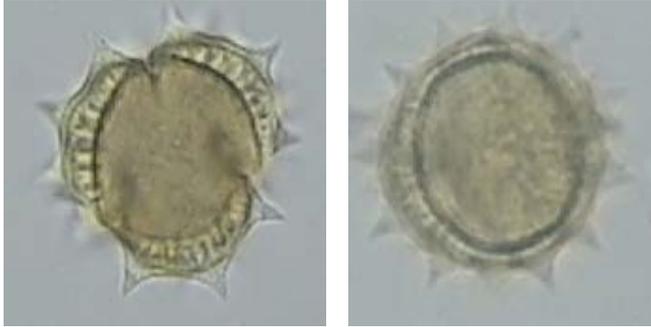


**Figure 11** *Anthemis tomentosa*, polar view (1000X)

**Figure 12** *Anthemis tomentosa*, equatorial view (1000X)

*Anthemis triumfetti* (L.) DC. In Lam. et D C., Fl. Fr. ed. 3; 5:483 (1815)

This is a perennial herbaceous plant that grows in grassy places etc. mainly in mountain areas. It blooms May – September [20].

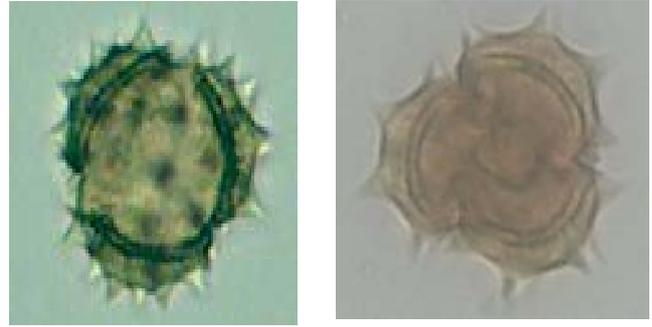


**Figure 13** *Anthemis triumfetti*, polar view (1000X)

**Figure 14** *Anthemis triumfetti*, equatorial view (1000X)

*Anthemis tinctoria* L., Sp. Pl. 896 (1753). (Cota tinctoria (L. Gay)

This is a perennial herbaceous plant that grows in dry grassy places, sandy soil, shrubby etc. It blooms during May - August [20].



**Figure 15** *Anthemis tinctoria*, polar view (1000X)

**Figure 16** *Anthemis tinctoria*, polar view (1000X)

**Table 1:** Comparative table of palynomorphologic features of genus *Anthemis*.

<i>Species</i>	<i>Diameter of pollen grain without spines (μ)</i>	<i>Ectexine (μ)</i>	<i>Endexine (μ)</i>	<i>The spines length (μ)</i>	<i>The spines width (μ)</i>	<i>Distance between spines (μ)</i>
<i>A. altissima</i>	22 – 28 (24)	3	1	3	3	12
<i>A. carpatica</i>	22 - 25 (23)	5	2	3	3	7
<i>A. chia</i>	23 - 26 (24)	4	1	4	3	5
<i>A. arvensis</i>	21 – 25 (22)	3.5	1	3	2	2
<i>A. orientalis</i>	22 – 26 (23)	3	1	5	3	10
<i>A. tomentosa</i>	24 – 28 (25)	3	1	3	3	5
<i>A. triumfetti</i>	24 – 27 (25)	4	1	5	3	3
<i>A.tinctoria</i>	22 - 25 (23)	4	1	3	2	3

The table above shows that the palynologic features of species *Anthemis* are quite similar between them as in their feature of the diameter of pollen grain as in features of thickness of endexine, length of spines and width of spines. From the survey of the table above results that the greatest thickness of exine it has *Anthemis carpatica* with 7μ where endexine is 2μ and ectexine is 5μ. From the feature distance between spines, species *Anthemis* can be divided into two main groups. In the first group are *A. chia*, *A. orientalis*, *A. altissima* where the distance between spines varies from 7-12μ, which means that the number of spines is smaller. In the second group are *A. arvensis*, *A. triumfetti*, *A. tinctoria*, where distance between spines is smaller than the distance of the spines in the first group. The greatest length of spines have *A. triumfetti*, *A. orientalis* with 5μ.

#### 4. Conclusions

From the analysis of palynotaxonomical features of pollen grains of 8 species *Anthemis* show that:

1. The palynotaxonomical features of species *Anthemis* are quite similar between them.
2. The greatest thickness of exine has *Anthemis carpatica* with 7μ.
3. From the feature distance between spines, species *Anthemis* divided into two main groups: with few spines in exine *A. chia*, *A. orientalis*, *A. Altissima* and with more spines in exine *A. arvensis*, *A. triumfetti*, *A. tinctoria*.
4. The greatest length of spines have *A. triumfetti*, *A. orientalis* with 5μ.

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