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Paleopalynological Features of *Juglans* Type, in Elbasan City, Albania[#]

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Abstract: The study is carried out in Elbasani town. Paleopalynological data are reported in the present study, obtained in depositions of last XX centuries (last historic period of New Holocene, last Quaternary), from five representative stations of Elbasani town. A series of biological studies have been done in this district during two last decades' periods. In this work, are given some palynological data about the dispersion of *Juglans* type part of Juglandaceae family during New Holocene period (last Quaternary) in the area where is positioned Elbasani town. The purpose of this paper is to present the correlation between the depth and dispersion of *Juglans* type on different periods of time. For this goal we took about 16 sediment samples in each station, every 25 cm from the surface up to 4 m depth, through a dry drilling sonde, 110 mm and 130 mm diameter. Observations, counting and photos of palynomorphs it was carried on using light microscopes, magnification up to 1000x.The age of the sample, is prescribed on the age of archeological objects nearby; the depth 4 m is considered to be about 2000 years. Paleopalynological data for this genre are given for the first time in the literature of our country. The results submit a correlation between the depth and number of spores for this genre.

Keywords: *Paleopalynological, New Holocene-Quaternary, spore, pollen, Juglans type -Juglandaceae family.*

Introduction

Pollen and spores together, can undoubtedly be preserved, because the outer wall of the grains is extraordinarily resistant (Pacini & Franchi, 1978). Comparison of plant spores and pollen present in those primitive, allows judging the performance of primitive and specialized features of outer wall of the grains, and their evolutionary paths (Pacini & Hesse, 2005). Analysis of pollen has a long history and with multiple purposes. The analysis of fossil pollen or paleopalinology is considered the most applied techniques in Quaternary paleoecology (Birks & Birks, 1980).

The given material presents palynological data of Holocene deposits in Elbasan region. Plant microfossils of this Type have not been studied previously from any of the localities of Elbasani town and there is no kind of studies by foreign or native authors for spore and pollen content data about this plant in Holocene deposits in our city. (Kapidani, 1996; Kapidani & Jançe, 2004; Jançe, 2015).

This study provides important information about the reconstruction of paleoflora, paleoclimate, stratygraphy of the Holocene, etc (Faegri & Iversen, 1989; Davis, 1999). The study in Holocene deposits also provides the factors which have their impact on the potential transformation of the flora in Elbasan city. (Moore & Webb, 1978; Shalla et al., 1983; Muhameti et al., 1984; Forest et al., 1999; Kapidani & Jançe, 2004; Jançe & Kapidani, 2011; Jançe, 2015).

Observations, counting and photos of palynomorphs it was carried on using light microscopes, magnification up to 1000x. Information on the method of collection, preservation and laboratory processing of the pollen grains of this plant were provided by this study as well.

The quantitative data through spores of Juglans Type deposited on the ground shows the direction of evolution of this Type, part of Juglandaceae Family, mentioned in the study. (Kapidani, 1996; Kapidani & Jançe, 2004; Jançe, 2015).

Materials and Methods

Via these inputs are provided for the transformation of the natural environment and human impact about this transformation (Behre, 1981; Miras *et al*., 2004; Court-Picon *et al*., 2005). Paleopalynologic

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analyses are most commonly used for paleoclimates and paleoecologic studies of Quaternary and Holocene period (Huntley & Prentice, 1993; Allen *et al.*, 2000; Lotter *et al*., 2000). During this study we have taken 16 soil samples, starting from 4 meters of depth to 0.25 m.

The distance between the sampling stations is 0.25 m. Palynological examination of all samples showed that all contained a large amount of organic matter that appeared suitable for pollen analysis.

The method of acetolysis according to Erdtman

The soil sampling is based on Erdtman method (Erdtman, 1960; 1969). Erdtman acetolyze method consists on processing the material with an acetolyze mixture, acetic anhydride $(CH_3COO)_2$ and sulfuric acid (H_2SO_4) in a 9:1 ratio. In order to get better results first mix $1cm^3$ soil with 10ml KOH (10%).

The emasculation process is followed by a centrifugal process for three minutes (3000 rotation/minute). After that, granules were placed on slide and were observed with a microscope by dropping a drop from glycerin solution and water in a ratio 1:1.

The acetolyze method is widely used in palynology; it gives better visibility over the spores and pollens compared with the other methods used during the microscopic observation process. (Erdtman, 1960, 1969; Kapidani, 1996; Kapidani & Jançe, 2004; Jançe & Kapidani, 2011; Jançe, 2015). We then use this method to assess the paleoelevation and will discuss the results for the Elbasan city.

Fixture of prepared composites.

The fixture of prepared composites was realized by using the method of glue-preparations through gel-glycerin. The gel-glycerin was prepared based on the Kisser method (Kisser, 1935) by using 50gr of gelatin, 175 ml of distillate water, 150gr glycerin, 7gr phenol (crystals).

Once the distillate water was heated up to 50oC, the gel was dropped into it. It was mixed up several times till melted properly.

Then the glycerin and the composite were added and boiled till the liquid became thicker and viscose. After the phenol was added to the mixture, a uniform melted composition was taken.

The prevention of air bubbles that might emerge during the process of composite preparation was made by warming up in advance all equipment used over the process. The final composite was isolated to the edges of microscope slide with spray or paraffin and after 3 days it was ready to be used and stored.

Results and Discussions

On table 1 are presented the data about the number of spores for *Juglans* Type according to the depth. Also is presented and the total number of spores for this Type. The minimum number of spores for *Juglans* Type (10 spores per sample) is taken in 3.75 m of depth while the maximum number (34 spores per sample) is taken close to the surface, in 0.25 m of depth.

On figure 1 is clearly shown a great increasing for the number of spores for *Juglans* Type from the bottom towards the surface. Based on the data presented in Table 1 and Figure 2 the spore's total number of *Juglans* Type is respectively significant with the total of 300 spores.

From the survey results of Table 1 for all stations noted that, all palynomorphs for *Juglans* Type are present at all depths (Figure 3).

It should be noted that the pollen is preserved better if sedimentary environment lacking oxygen, or is acidic, suitable conditions these, for decomposing organisms of pollen (Havinga, 1967; 1971).

This increase in the spores' presence of *Juglans* Type perhaps should be linked to the gradual impact in times of anthropogenic factors for the transformation of the natural landscape herbal through cultivation of fruit and useful plants in Elbasan city. (Jançe, 2015).

The Juglandaceae are a family, known as the walnut family, of trees. The leaves are pinnately compound or ternate, and usually 20–100 cm long. The trees are wind-pollinated, and the flowers are usually arranged in catkins. (Manos & Stone, 2001).

The two most important species are *Juglans regia* for timber and nuts, and *Juglans nigra* for timber. Both species have similar cultivation requirements and are widely grown in temperate zones. Walnuts are light-demanding species that benefit from protection from wind. Walnuts are also very hardy against drought.

Table 1. Number of spores according to the depth

Sample	Depth (meters)	Number of spores (*Juglans* Type)
1	4	**11**
2	3.75	**10**
3	3.5	**12**
4	3.25	**14**
5	3	**13**
6	2.75	**16**
7	2.5	**20**
8	2.25	**22**
9	2	**20**
10	1.75	**15**
11	1.5	**19**
12	1.25	**19**
13	1	**22**
14	0.75	**24**
15	0.5	**29**
16	0.25	**34**
Total number of spores		**300**

Walnut husks are often used to create a rich yellow-brown to dark brown dye used for dyeing fabric and for other purposes.

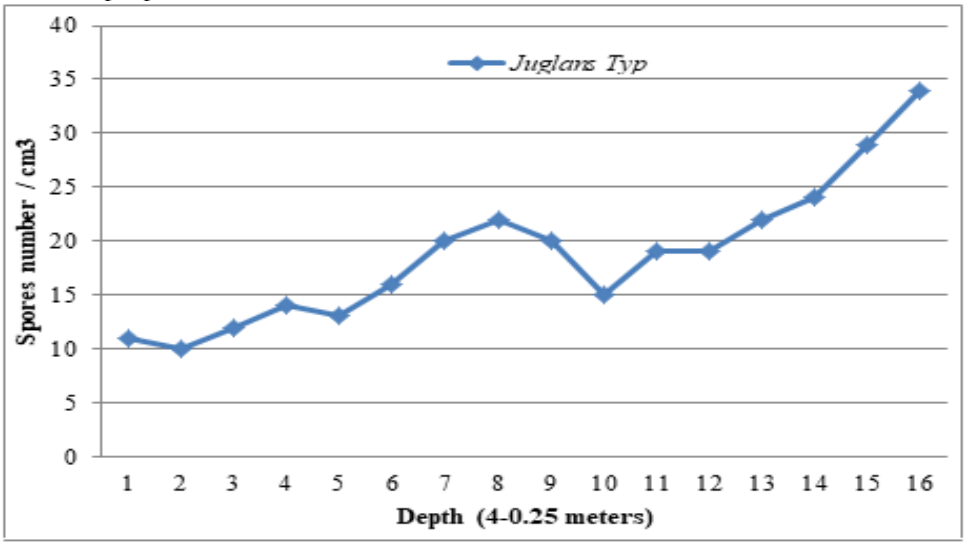

Figure 1. The spore's dispersion of *Juglans* Type according to the depth

The common walnut and the black walnut and its allies, are important for their attractive timber, which is hard, dense, tight-grained and polishes to a very smooth finish. Because of its color, hardness and grain, it is prized furniture and carving wood. Walnut wood has been the timber of choice for gun makers for centuries, due to its resilience to compression along the grain. (Brinkman, 1974).

Climate can cause land use changes and adjustments reactions or human societies to climate fluctuations cause complex impacts on the environment (Weninger et al., 2009; Mercuri et al., 2011).

Landscape of the Elbasan city with plant surrounded by gentle hills of the Mediterranean climate must have been the subject of major transformations to increase the area of olives, walnuts, grapes and other agricultural plants. Elbasan region for centuries mentioned as an important exporter of olive oil, wine, other agricultural products. (Panajoti, 2008).

We are entitled to think that the trend towards increasing to the pollen of walnuts in the samples should be on the impact of agricultural policies over the years to increase the plantation of fruit treesand other cultivated plants associating with them. (Jançe, 2015).

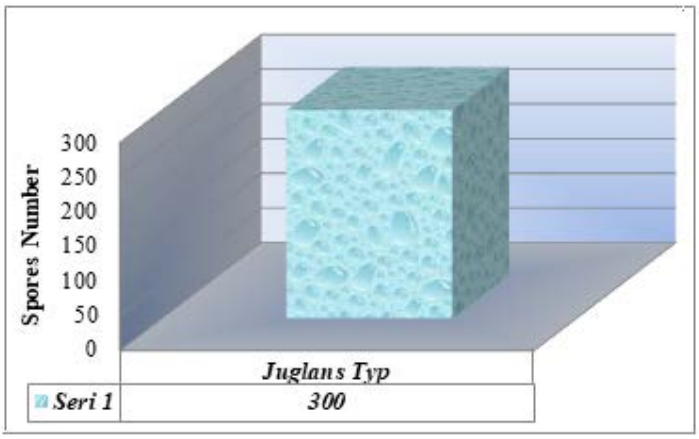

Figure 2. The total number of spores according to *Juglans* Type

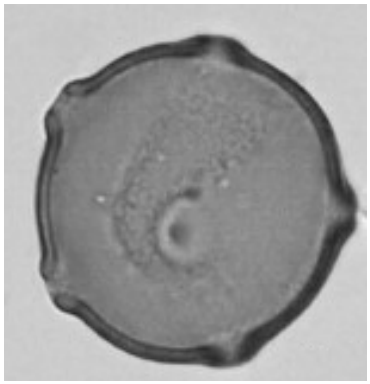

Figure 3. *Juglans* Type pollen *(1500x) (Source: Jançe, 2014).*

Conclusions

- The representatives of Juglandaceae family are present for depth 4 meters up near the surface.
- The spore's number of *Juglans* Type is increasing their overall presence from the bottom toward the surface.
- We believe that the rate of growth of particles pollen walnuts in all of these samples, in addition to the impact of ecological factors in maintaining good, must be related to the influence of anthropogenic factors in the cultivation of plants needed to.

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