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RESULTS OF A PALYNOLOGICAL STUDY OF THE CONTENTS OF SMALL GLASS BOTTLES FROM LATE ANTIQUITY FROM THE KANCHAANI CEMETERY (SOUTHEASTERN GEORGIA)

ABSTRACT

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Eight small glass bottles (vials) have been obtained from five graves of the Kanchaani cemetery, dating to the 1st-3rd centuries AD. The objects came to the laboratory almost intact, and their contents have also survived. Analysis of the plant pollen and the study of non-pollen palynomorphs (NPP) of these contents showed that there was a set of various medicinal plants in seven bottles, and one bottle contained an infusion made from insects, which also had medicinal properties. The pollen of 23 medicinal plants has been determined to genus and species levels in the contents of the bottles. The paper describes in detail the characteristics of all found medicinal plants and their use in folk medicine. It turns out, that the ethnopharmacology of the Late Antiquity Period in the region under consideration was rather well developed.

Keywords: Late Antiquity Period cemetery, medicinal plants, small glass bottles, Georgia
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1. INTRODUCTION

Palynological examination of the content of the vessels from the Late Antiquity Period of Georgia have never been conducted before, although such analysis has been done of analogous material from the Early Antiquity Period. The evidence studied came from two graves (Nos 22 and 24) of the Vani site located in Western Georgia (Chichinadze *et al.* 2012, 2017, 2019), where organic remains of amphorae and oenochoe were examined. These materials were dated to the 5th-4th centuries BC. Grave 339 of the Pichvnari cemetery, in which the contents of a tumbler were analyzed also dates to the 5th century (Kvavadze and Davadze 2014). From eastern Georgian sites, only the vessel found in Grave 5 of the Khovle necropolis, dated to the 3rd-2ndcenturies BC, was studied (Kvavadze and Shatberashvili 2010). It should also be noted, that the vessels from all above mentioned sites are made of clay, with the exception of the oenochoe. The contents of glass vessels of either the Early Antiquity Period or the later period have hardly been studied palynologically either in Georgia or abroad. To this day, it has not been completely clarified what the purpose of this ritual of deposition of these vessels was, namely, what these rather beautiful vials that accompanied the dead into the graves had contained. Most scholars call them scent bottles, which were supposed to have contained the fragrant perfume oil (Lucas and Harris 1962; Colombini *et al.* 2009), but some studies claim that they contained plant infusion or oil for medical purposes (Bardinet 1995; Mortensen 2014).

The Kanchani cemetery is located on the left bank of the river Mashavera on the territory of the village Boslebi, Dmanisi municipality, Kvemo Kartli region, South Georgia. The cemetery consists of two parts - the first (GPS: X 442005.992; Y4576010.687; 980 M.) and

Fig. 1. Map of Georgia and location of the Kanchaani cemetery

Fig. 2. Bottles and vials from the burials of the Kanchaani cemetery: 1 – Grave 2, vial No. 76; 2-5 – Grave 3, bottles No. 84-87; 6 – Grave 4, bottle No. 98; 7 – Grave 12, vial No. 199; 8 – Grave 3, pot No. 82; 9 – Grave 3, pot No. 83

the second (GPS: X 442462.927; Y 4576054.721; 980 M.), (Fig. 1). During the excavation at the cemetery, twenty-five graves were investigated, eight in the first part, seventeen in the second part. All of them are inhumation graves, skeletons were buried in flexed position, on the left or right side, mostly facing west. Among the grave goods were ceramic and glass vessels of various sizes, iron, bronze and gold items, silver coins, beads, *etc*. Based on these material the cemetery in general is dated to the 1st-3rd centuries AD.

Among the grave goods should be distingushed small size glass bottles (Fig. 2). They are almost intact, and their contents have also survived. Six bottles were found in the first part, and two in the second part. They are made of transparent glass. The shape, colour, size as well as the technique of production of each of these bottle varies. One of them was mould-blown, the others were made by the free blowing method. The moulded vessel is light brown and thin-walled, with a high neck, a flat open mouth, a spherical,slightly elongated body, a ring-based bottom, and two ears. Embossed rays extend across the sides of the body. In the free blown vessels, several types are distinguished in shape: jug-like, amphora-like and flask-like (Fig. 2). Such glass vessels were quite often found in the territory of Georgia in Early Antiquity Period graves (Saginashvili 1970; Maisurashvili *et al.* 2018). It should be noted that especially many glass bottles were found at the Urbnisi cemetery. Interestingly here bottles in the burials were placed around the head and in the chest area of the skeletons (Saginashvili 1970).

2. MATERIAL AND METHOD

18 samples of the contents were extracted and palynologically examined from eight small glass bottles and two ceramic pots obtained in the graves of the Kanchaani cemetery. Two samples were taken from each bottle – one from the neck and the other from the bottom. Four small glass vials (Nos 84-87) and two pots (Nos 82 and 83) were found only in Grave 3. In the other four graves, single glass bottles were documented: Bottle No. 76 – Grave 2; Bottle No. 98 – Grave 4; Bottle No. 199 – Grave 12; Bottle No. 203 – Grave 14 (Figs 2-4). Because of the small number of soil samples collected from the neck of the bottles, palynological material almost was not detected in this part of the bottle. The exceptions are the vials No. 84 and No. 98, found in the third and fourth graves (Table 1). In general, the contents are dark organic remains with friable earth. The only exception is the sample from vial No. 199 (Grave 12), the contents of which is of whitish colour.

For the comparative analysis of the palynological spectra, samples were collected from two ceramic vessels within Grave 3. These vessels were selected because they were found next to the glass bottles, together forming a single group for examination.

Material extracted from the contents of vials was processed in a palynological laboratory using the standard chemical method adopted today (Erdtman 1969; Moore *et al.* 1991). At the first stage, the contents were boiled a long time in 10% potassium alkali. At the second stage, the material was centrifuged in a heavy liquid and, finally, acetolysis, that is, colouring, of the material was performed. After washing, the material was placed in glycerol. Palynological study was carried out by means of a new generation light microscope Olympus BX-43. Palynomorphs were photographedusing the same microscope.

The results of the palynological research and the analysis of non-pollen palynomorphs are shown on the diagrams (Fig. 3 and 4). The spectra differ from each other by the complexes of plant pollen. Let us discuss peculiarities of each of them.

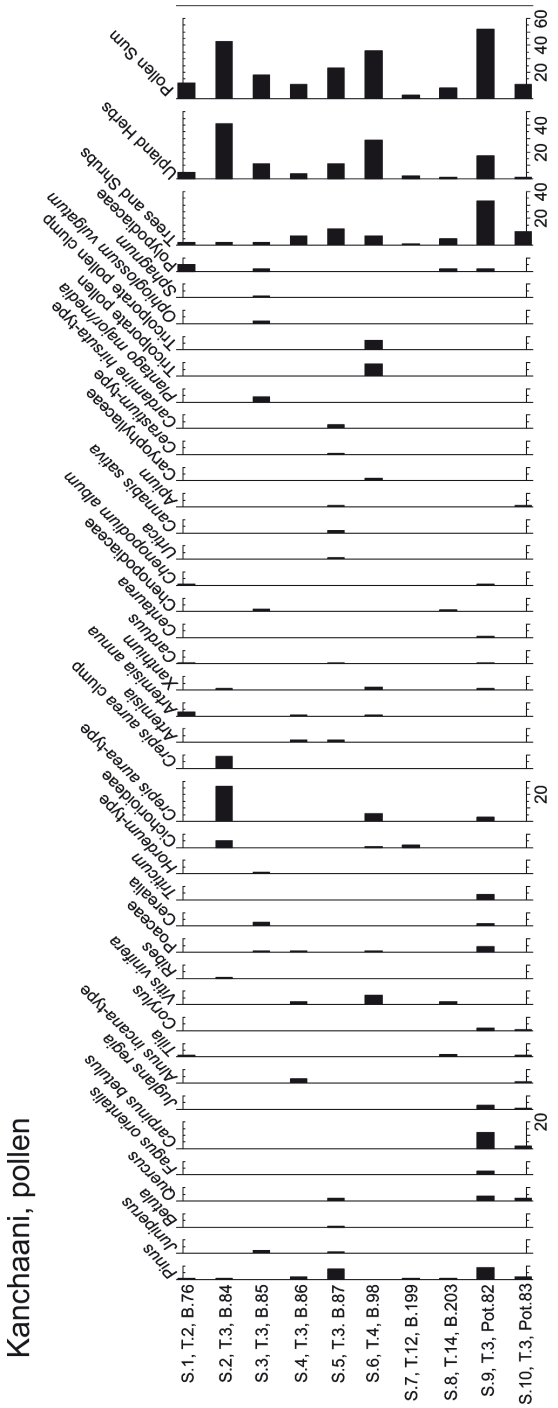

Fig. 3. Pollen diagram of organic remains of bottles and vials from Kanchaani cemetery.
Explanation: S – sample, T – tomb, B – bottle

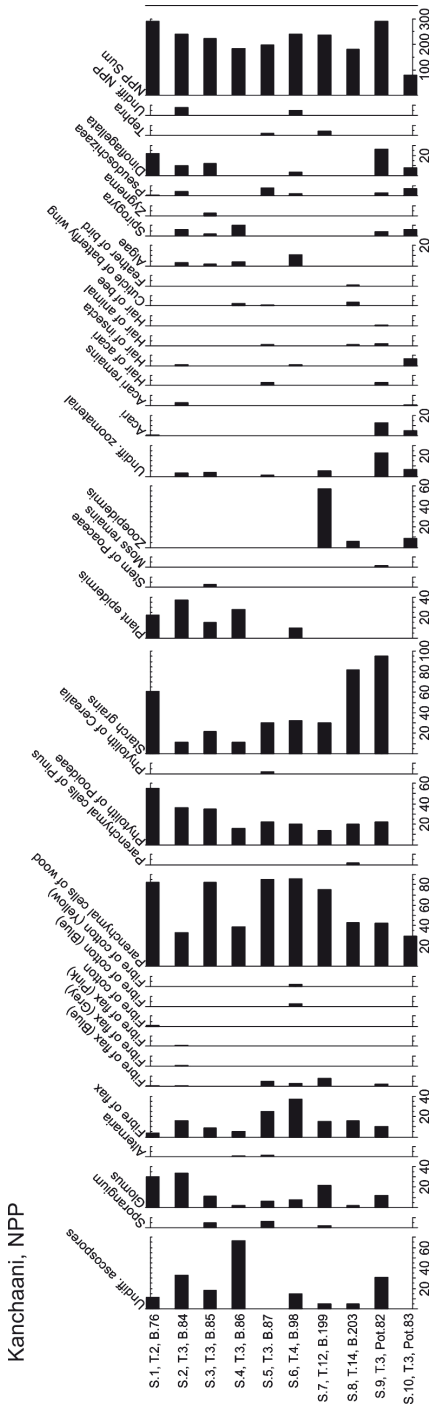

Fig. 4. Non pollen palynomorphs diagram of organic remains of bottles and vials from Kanchaani cemetery.
Explanation: S-sample T – tomb, B – bottle

Table 1. List of samples taken from Kanchaani Cemetery with archaeological and palynological description

Sample No.	Sample No. on Diagram	Grave No.	Bottle No.	Archaeological context	Palynological context
1	1	Grave 2	Neck of Bottle No. 76	Inhumation burial, crouched on the left side, its head facing north. The grave contained a glass bottle in front of the chest of the skeleton with other goods.	Empty
2			Bottom of bottle No. 76		Pollen of 6 plants taxon, 11 types of NPP type
3	2	Grave 3	Neck of bottle No. 84	Inhumation burial, crouched on the left side, its head facing south-west. The grave contained four glass bottles in front of the chest of the skeleton with other goods.	Pollen of 2 plants taxon, 4 NPP type
4			Bottom of bottle No. 84		Pollen of 6 plants taxon, 14 types of NPP
5	3	Grave 3	Neck of bottle No. 85		Empty
6			Bottom of bottle No. 85		Pollen of 9 plants taxon, 14 types of NPP
7	4	Grave 3	Neck of bottle No. 86		Empty
8			Bottom of bottle No. 86		Pollen of 6 plants taxon, 11 types of NPP
9	5	Grave 3	Neck of bottle No. 87		Empty
10			Bottom of bottle No. 87		Pollen of 11 plants taxon, 14 types of NPP
11	9	Grave 3	Pot No. 82		Pollen of 15 plants taxon, 15 types of NPP
12	10	Grave 3	Pot No. 83		Pollen of 8 plants taxon, 9 types of NPP
13	6	Grave 4	Neck of bottle No. 98	Inhumation burial, the grave was damaged, and the position of the skeleton is unclear. The glass bottle was found in the southern part of the grave	Pollen of 2 plants taxon, 3 types of NPP
14			Bottom of bottle No. 98		Pollen of 9 plants taxon, 13 types of NPP

Sample No.	Sample No. on Diagram	Grave No.	Bottle No.	Archaeological context	Palynological context
15	7	Grave 12	Neck of bottle No. 199	Inhumation burial, crouched on the right side, its head facing south. The grave contained a glass bottle in front of the stomach of the skeleton with other goods	Empty
16			Bottom of bottle 199		Pollen of 2 plants taxon, 10 types of NPP
17	8		Neck of bottle No 203	The Inhumation burial, Only a fragment of a young person's cranium and a glass bottle were found in the grave.	Empty
18		Grave 14	Bottom of bottle No. 203		Pollen of 5 plants taxon, 11 types of NPP

3. RESULTS

Sample 1, Grave 2, bottle No. 76.

Of woody plants: pollen grains of lime tree (*Tilia*), and pine (*Pinus*) were found in the sample of the contents of this vial. Of herbaceous plants: wormwood (*Artemisia annua*), thistle (*Carduus*), goosefoot (*Chenopodium album*) and forest ferns (*Polypodiaceae*) were detected. Among non-pollen palynomorphs, parenchymal cells of wood predominate (Fig. 4). There were a lot of starch and phytoliths of herbaceous plants. Plant epidermis and fungal spores were well represented as well. There were also spores of fungus *Glomus* in considerable numbers. This fungus grows only on friable soil, and it turned up in this vial from earth, which must have fallen into the bottle after decaying of the cork. There were remains of freshwater algae, ticks and tissue fibres among non-pollen palynomorphs in the examined sample. There were a small quantity of flax fibres, among them also were ones that were light blue in colour. Additionally, cotton fibres were discovered, but they were fewer in number when compared to flax.

Sample 2, Grave 3, bottle No. 84

Four small vials (Nos 84-87) and two pots (Pot Nos 82 and 83) were found here (Fig. 5). From woody plants: pollen of pine (*Pinus*) and currant (*Ribes*) were found in the contents of the bottle. Herbaceous plants were represented by only one species of hawk's-beard (*Crepis aurea*- type). More than 20 pollen grains and 7 pollen clumps of hawk's-beard

were counted, which were found only on the pistil (Fig. 6). Non-pollen palynomorphs were more diverse. Plant epidermis, parenchymal cells of wood and phytoliths of herbaceous plants prevail. Fungal spores, hairs of insects, starch and linen fibres were also found. Remains of freshwater algae were rather well represented.

Pollen grains and clumps of hawk's-beard were also found in the sample taken from the neck of the same bottle. As was already noted, these should be the remains of a hawk's-beard flower. Pollen of common cocklebur was also found in the sample taken from the neck of the bottle. The composition of the non- pollen palynomorphs was nearly the same as in the sample taken from the bottom of the vial. Plant epidermis, phytoliths and wood cells predominate. But fungal spores and linen fibres were more frequent in the sample taken from the neck. Linen fibres of pink, light blue and grey colours were found here.

Sample 3, Grave 3, bottle No. 85

Among woody plants, only pollen of juniper (*Juniperus*) was found in the palynological spectrum of the sample under discussion. In the group of herbaceous plants, the number of pollen grains of plantain (*Plantago major/media*) prevails (Fig. 3). Pollen of cereals, including barley (*Hordeum* type.), was identified. There were also Poaceae. Of sporous plants, spores of adder's-tongue fern (*Opioglossum vulgatum*) and mosses (*Sphagnum*) were found (Fig. 7). Burnt parenchymal cells of wood were abundantly present among the non-pollen palynomorphs. There were a lot of phytoliths of cereals and their starch. Plant epidermis, remains of stalks of cereals, zoo-epidermis and fungal spores were also observed. The following freshwater algae were detected: *Spirogyra*, *Dinoflagellata*, and *Zygnema*. Other algae were also found, the genera of which were not determined at this stage of the study.

Fig. 5. Grave 3, location of bottles Nos 84-87 and pots Nos 82 and 83

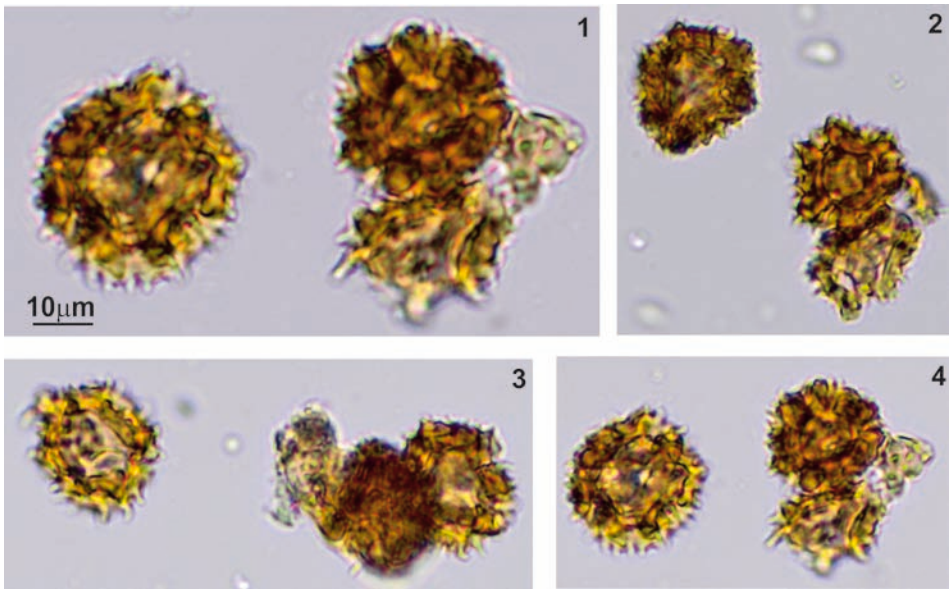

Fig. 6. Grave 3, bottle No. 84: 1-4 – *Crepis* and clumps of *Crepis* pollen

Sample 4, Grave 3, bottle No. 86.

This is a small bottle with a very narrow neck (Fig. 2). Of woody plants: pollen grains of pine (*Pinus*), spruce (*Picea*), alder (*Alnus incana*-type) and vine (*Vitis vinifera*) were found. It should also be said that plant pollen grains were well preserved (Fig. 8). From the herbaceous plants: there were only wormwood (*Artemisia, Artemisia annua*- type) and grasses (Poaceae). Fungal spores and tracheal cells of wood predominate among non-pollen palynomorphs. There was a lot of plant epidermis, phytoliths and starch. Remains of freshwater algae (*Spirogyra*) were also well represented. Fibres of flax textile were observed as well.

Sample 5, Grave 3, bottle No. 87

Of woody plants: pollen grains of juniper (*Juniperus*), pine (*Pinus*), birch (*Betula*) and oak (*Quercus*) were found in the contents of this vial, and of herbaceous plants: those of apium (*Apium*), wormwood (*Artemisia*), hairy bittercress (*Cardamine hirsuta*), thistle (*Carduus*), common mouse-ear chickweed (*Cerastium*), stinging nettle (*Urtica*), and cannabis (*Cannabis sativa*). In non-pollen palynomorphs, parenchymal cells of burnt wood prevail here as well. There were a lot of grains of cereal starch and their phytoliths. Wheat phytoliths were also observed. Fungal spores, remains of ticks and insects were represented in a small quantity. Hairs of animal was also found, as well as algae *Pseudoschizaea*. There was a rather large amount of linen textile fibres. Among them fibres dyed blue and light blue were detected.

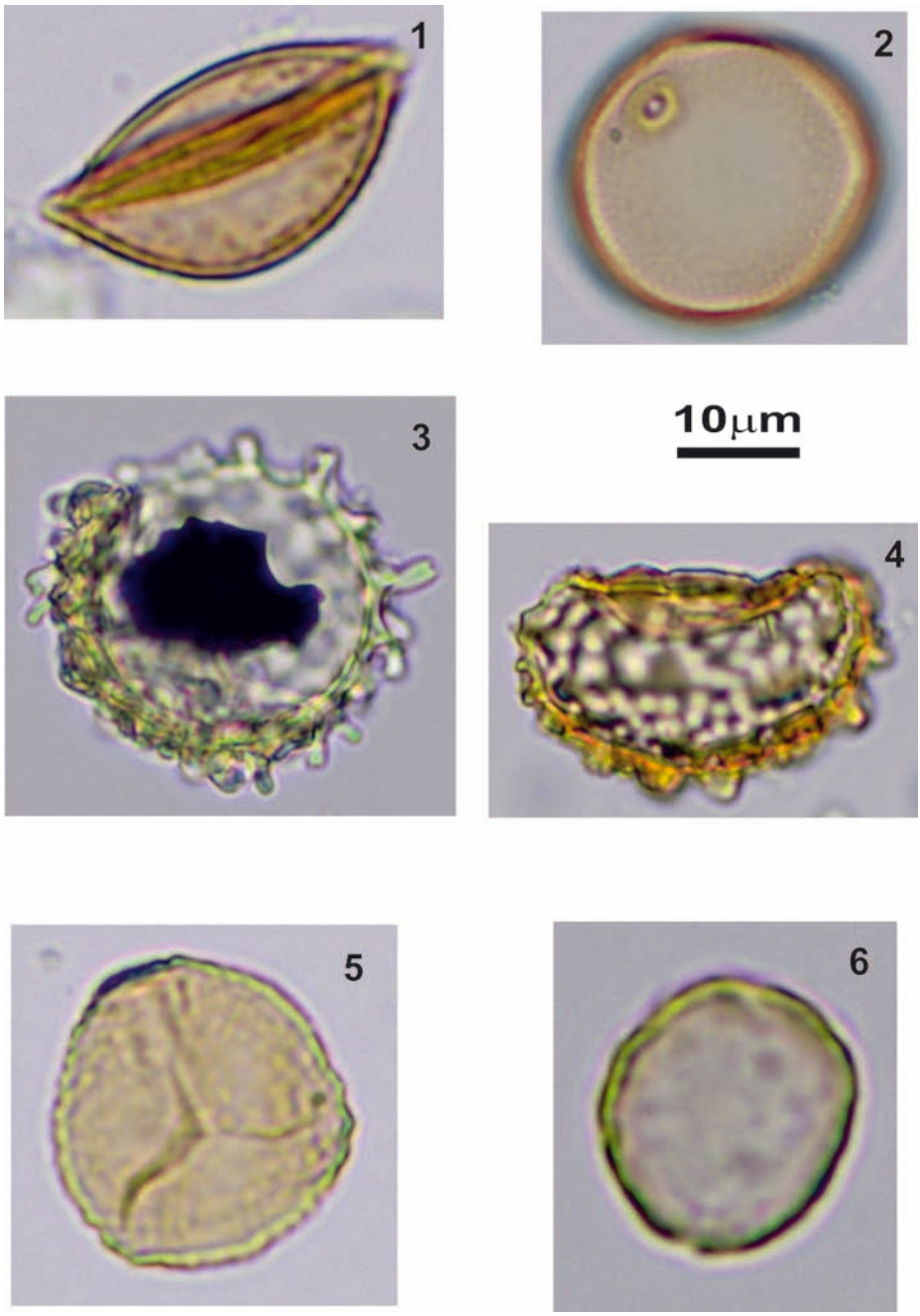

Fig. 7. Grave 3, bottle No. 85: 1 – *Juniperus*; 2 – *Hordeum* type; 3,4 – *Ophioglossum vulgatum*; 5 – *Sphagnum*; 6 – *Cannabis sativa*

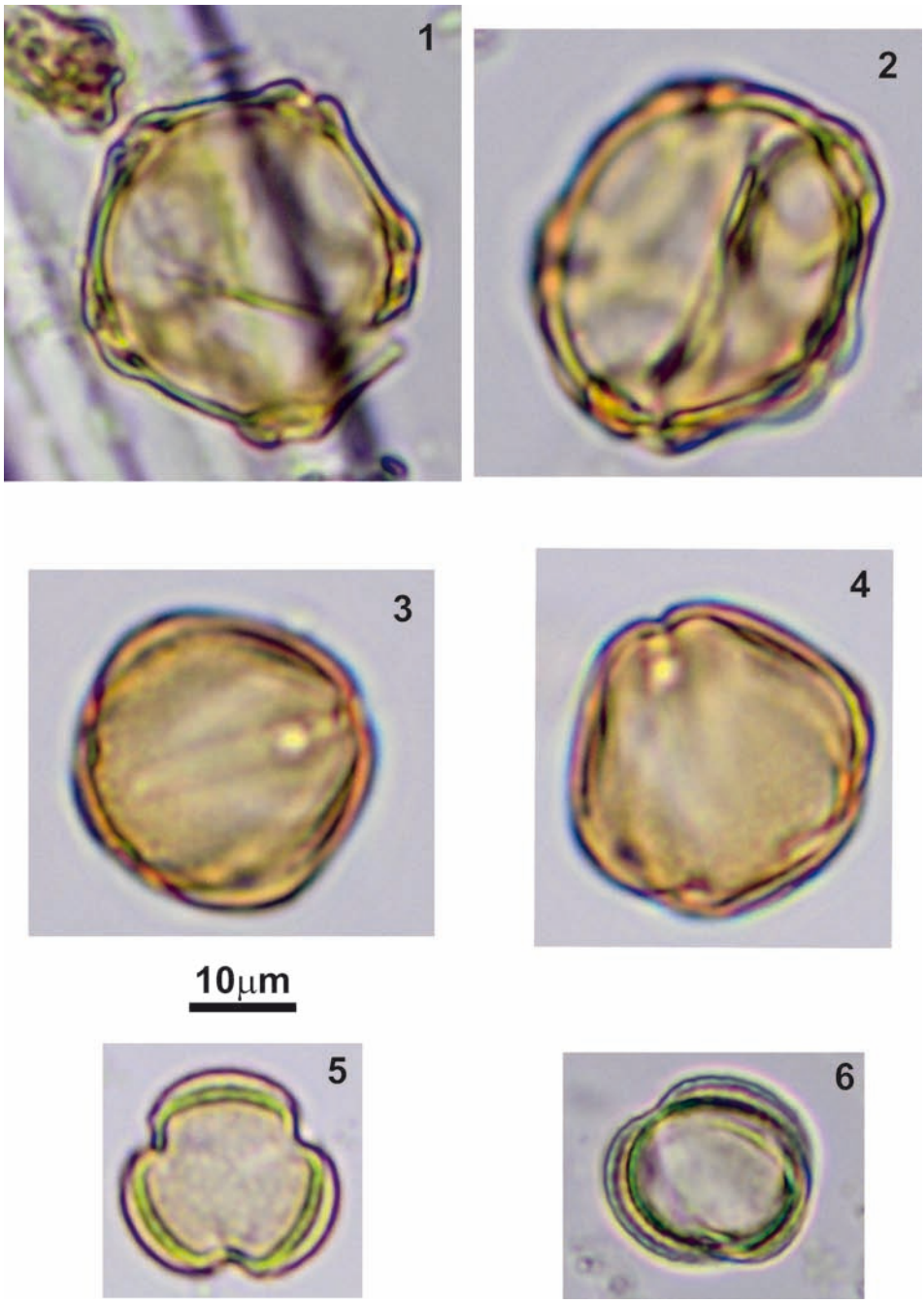

Fig. 8. Grave 3, bottle No. 86: 1, 2 – *Alnus*; 3, 4 – *Vitis vinifera*; 5, 6 – *Artemisia*

Sample 6, Grave 4, bottle No. 98

In the contents of the bottle only vine pollen grains (*Vitis vinifera*) were found in the group of woody plants and bushes. There were more herbaceous plants here, among them pollen grain clumps of hawk's-beard (*Crepis aurea*type), common cocklebur (*Xanthium*), plants of the pink family (Caryophyllaceae), grasses (*Poaceae*) and other undetermined tricollporate pollen. Parenchymal cells of wood and vine starch prevail among the non-pollen palynomorphs. Among textile fibres, linen predominated, which was well represented. Linen and cotton fibres, were dyed light blue. Some yellow cotton fibres were also found. Besides, fungal spores, phytoliths of cereals and freshwater algae were identified.

Plant pollen was almost absent in the sample taken from the neck of the same bottle, but there were a lot of parenchymal cells of wood and linen fibres. Plant epidermis, fungal spores, starch, phytoliths and remains of freshwater algae were present in a small amount. Therefore, we can suppose that we have the remains of a wooden cork in the neck of the vial. Linen was wrapped around the cork, as there were a lot of wood cells and textile fibres in this sample.

Sample 7, Grave 12, bottle No. 199

The contents were left only in the big and elongated neck of the vial under discussion, as it was found in an almost horizontal position and placed by the abdomen of the deceased. This bottle resembles more a chemical measuring glass. It is of big size and greenish in colour. The palynological spectrum contains only one pollen grain of pine and two pollen grains of representatives of the genus *Cichorium*. Cells of wood and epidermis of insects and their microscopic remains of other types prevail among the non-pollen palynomorphs. About 60 insect remains have been counted, that was not recorded in any other vials. That's why we assume that some kind of infusion made of insects was kept in this bottle. It should also be noted that remains of volcanic ashes were found only in the contents in question. Fungal spores, starch and phytoliths were also found in the contents of the vial neck. Linen fibres and among them those dyed light blue were well represented. There were freshwater algae *Spirogyra* and *Pseudoschizeae* in small numbers.

Sample 8, Grave 14, bottle No. 203

This is a small vessel with a narrow neck. Its contents were dark and dense (non friable). Of woody plants, pollen grains of pine (*Pinus*), lime tree (*Tilia*) and vine (*Vitis vinifera*) were found in the palynological spectrum. Of herbaceous plants, only pollen grains of goosefoot and spores of forest ferns were detected. Starch, including that of vine, predominates in the non-pollen palynomorphs. There were a lot of parenchymal cells of charred wood and among them cells of pine (*Pinus*) (Fig. 9). Phytoliths were well represented. Small amounts of fungal spores, bird feathers, animal hair and scales of butterfly wings were found. It should also be noted that dark cells of wood were found in the content of the vial, which were microscopic traces of ashes or smoke, as well as light ones that should be the remains of a cork. Only pine cells were of light colour here, so we might assume that the cork was made of pine tree. The cork must have been wrapped in a piece of linen here as well, as there were a lot of linen fibres in the neck (Fig. 3).

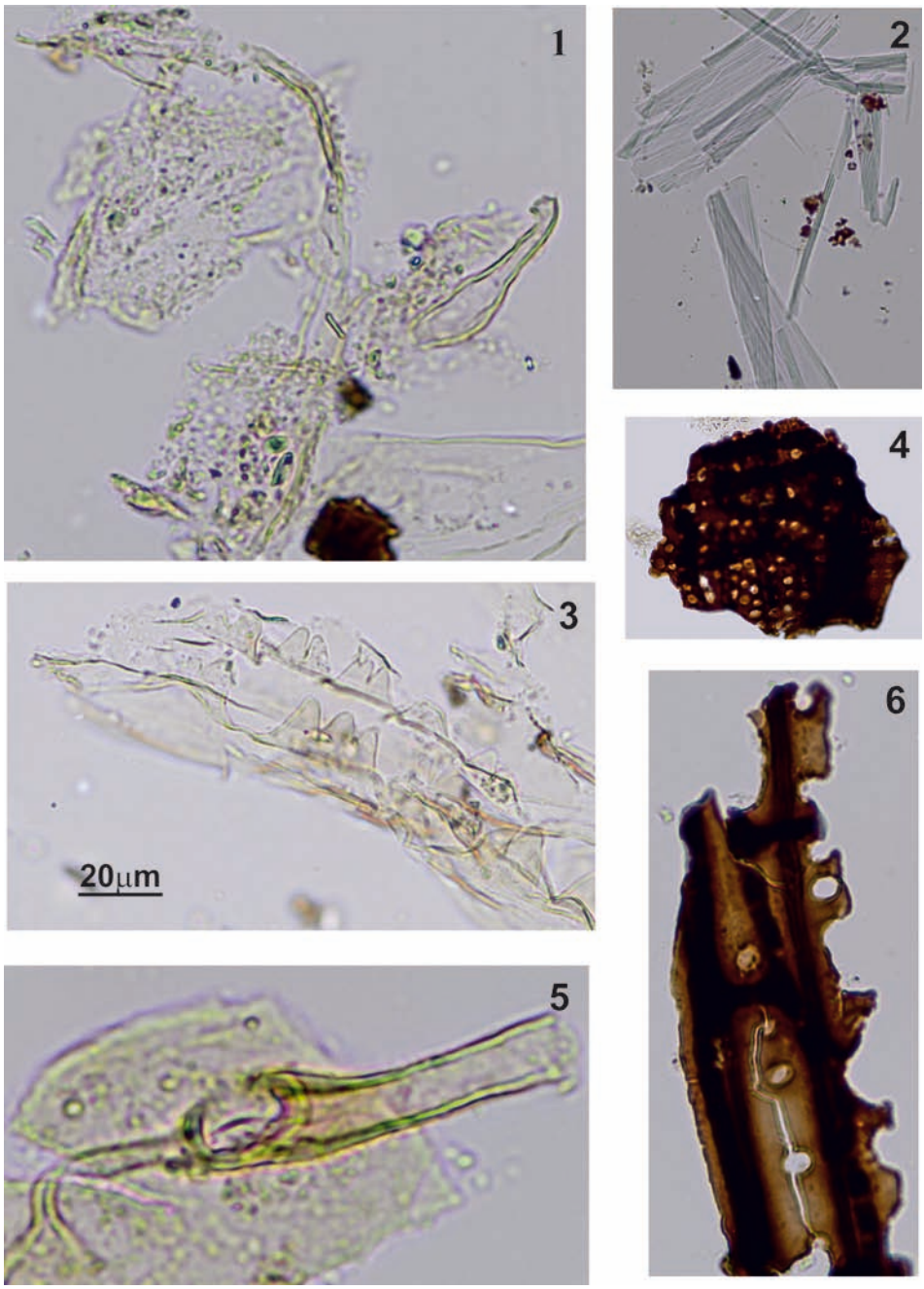

Fig. 9. Grave 12, vial No. 199: 1, 3, 4 – insects epidermis; 2 – flax textile fibres; 4 – tracheal cells of undiff. wood; 5 – Grave 14, viol 203: insect epidermis; 6 – parenchymal cells of *Pinus* (pine) from cork

Sample 9-10, Grave 3, pots Nos 82 and 83

As has been already noted, the contents of two clay vessels from the Grave 3 were also examined. They were both small jugs, approximately, about one litre in volume (Fig. 2). The palynological spectrum of the content of the vessel with a broken handle (Pot No. 82) was rather rich in the composition of pollen grains (Fig. 3). Among woody plants: pollen grains of hornbeam (*Carpinus betulus*) and pine (*Pinus*) prevail. The pollen of oak (*Quercus*), beech (*Fagus orientalis*), walnut (*Juglans regia*) and hazel (*Corylus*) was observed. The quantity of herbaceous plants in the spectrum was less than the above mentioned trees. This group also contains pollen of some cereals. These were wheat, absinth, thistle, Iranian knapweed, goosefoot, and spores of forest ferns. Starch prevails in non-pollen palynomorphs. There were a lot of wood cells, fungal spores, phytoliths. Remains of insects and other invertebrates, as well as algae, were well represented. There was a small amount of linen fibres, moss residues and spores of the fungus *Glomus*, indicating contamination from the soil. Pot No. 83 from Grave 3 is characterized by a completely different palynological spectrum. There was almost no pollen of herbaceous plants. From tree plants, separate pollen grains of pine, oak, hornbeam, walnut, alder, birch, lime tree and hazel were present in a small amount (Fig. 3). From non-pollen palynomorphs, only cells of wood, insect remains and freshwater algae were found (Fig. 4).

4. DISCUSSION

The palynological spectra of the material under discussion differbothin the complexes of plant pollen grain and in the quantity of non-pollen palynomorphs. This picture is well seen on the palynological diagram (Figs 3 and 4). It is also noticable that the spectra of the big-sized vials with a wide mouth (Nos 76, 84 and 199) are distinguished by a large number of spores of the fungus *Glomus*. This indicates a greater contamination of its contents with grave soil. As has already been mentioned, this microscopic fungus grows only in the loose soil (Van Geel 1998; Geel *et al.* 2003; Geel and Aptroot 2006). The least amount of the spores of this fungus was detected in the small and narrow necked vessel (Nos 86-88 and 203), where the soil of the grave walls could not penetrate so easilyinto the vessel. The same situation is found with the number of phytoliths. There are more of them in large and wide-mouthed vials than in the ones with narrow necks. Phytoliths consist of silica, so they also are well preserved in the soil (Piperno 2006).

The study and analysis of the plant composition of those palynological spectra that are less contaminated, showed that they consisted completely of plants with medicinal uses. Table 2 provides a detailed breakdown of the diseases for which these plants have been used. It's worth noting that only the members of the pink family (Caryophyllaceae) are odorous within the spectrum, and nearly all of them possess medicinal properties (Chandra and Rawat 2015). Among trees and shrubs, nine medicinal plants are evident. Notably,

pollen grains of pine were discovered in five of the bottles under consideration. In traditional medicine, pine flowers, cones, needles, and at times its resin are used to create remedies for respiratory diseases such as asthma, pneumonia, and tuberculosis. (Khare 2007; Alarcon *et al.* 2015; Bussmann *et al.* 2016). The pollen of juniper (which also belongs to the coniferous plants) was found in two bottles (Nos 85 and 97). Juniper can be used as a remedy for epilepsy (Adams *et al.* 2012; Alarcon *et al.* 2015), as well as an antiseptic (Alarcon *et al.* 2015) in ethnopharmacology. It is also used as an antibacterial agent, a remedy for hepatitis, diabetes, helminthiasis and other diseases (Swanston-Flatt *et al.* 1990; Tilford 1997; Al-Snafi 2018). The medicine is made from almost any part of the juniper, namely from the fruits, cones, needles, wood. Healing oil is also made from it, as its wood contains oil (Al-Snafi 2018). It should also be noted that juniper pollen grains are poorly preserved in the soil, as it has a very thin exine (Kurmann 1994). It can be assumed that both vials in which juniper pollen was found in better condition (Fig. 7), were used to keep juniper oil. Another argument is that it was in these bottles that the largest amount of pollen of medicinal plants was found (Table 1). The oil preserved pollen of other eight plants in bottle No. 85 and that of nine plants in bottle No. 87. The diagram shows that in other bottles, except for No. 89, there are much fewer taxa. Therefore, we can suppose that the bottles would have contained oil, which preserved not only grains of juniper pollen but that of other plants as well. The vials are of a small size, which is another argument in favour of the fact that they would have contained oil, each drop of which had healing properties.

Oil must have been kept in the bottle No. 98, where vine pollen is also presented. Like juniper pollen grains,vine pollen is hardly ever preserved in the soil (Kvavadze *et al.* 2010; McGovern *et al.* 2017). Therefore it should be proposed that oil in the bottle No. 98 was pressed from grapeseeds, which are always followed by pollen grains (Tvalchrelidze and Kvavadze 2016). The number of plant taxa (nine) is also large in the palynological spectrum in question. It should also be noted that all of them are of medicinal plants (Table 2).

The palynological spectrum of the bottle No. 84 is of great interest. It contains a large number of pollen of hawk's-beard (*Crepis*), including numerous clumps of pollen (Fig. 6). This suggests that there would have been an infusion of the flower of this plant. Its pollen, like other Cichorioideae, is preserved well and possibnly here we are dealing with traces of an infusion of flowers boiled in water. There are also many algal residues in the spectrum (Fig. 4). Hawk's-beard (*Crepis*) treats hepatitis. It is used as an anti-inflammatory and antioxidant agent (Fleurentin et al. 1986; Quattrocchi 2012; Pedreiro *et al.* 2021). Hawk's-beard (*Crepis*) was also found in the bottle No. 98, which would have contained vine oil. It was also identified in the content of the jug No. 82. Several species of hawk's-beard (*Crepis*) still grow in the territory of Georgia, and 38 of its species are widespread throughout the Caucasus (Grosgeim 1949).

As was already noted, in the vessel No. 199 from Grave 12, only remains of insects were found, that means that their infusion or decoction would have been in it (Fig. 9). Insect remains were also found in both clay jugs from the third grave. In the traditional medicine

Table 2. List of medicinal plants of the Late Antiquity Period found in the small glass bottles from Kanchaani cemetery and their pharmacological properties

Plant	Family	Pharmacological Properties	References
Pinus (pine)	Pinaceae	Asthma, rheumatism, antiseptic, pneumonia, cystitis, painkiller, wounds	Lim 2012b; Kizirarslan and Sevg 2013; Alarcün *et al*. 2015
Juniperus (juniper)	Cupressaceae	Epilepsy, gastrointestinal diseases, antiseptic, diarrhea, diuretic, earache	Swanston-Flatt *et al*. 1990; Tilford 1997; Al-Snafi 2018
Betula (birch)	Betulaceae	Antipyretic, epilepsy, painkiller, cystitis, rheumatism	Adams *et al*. 2012; Papp *et al*. 2014; Al-Snafi 2015
Quercus (oak)	Fagaceae	Wounds, hypertension, preventing a cold, diabetes, antimicrobial	Keskin and Alpýnar 2002; Mikaili *et al*. 2012; Taib *et al.* 2020
Alnus (alder)	Betulaceae	Antihelminthic, diarrhoea, dysentery, gastritis, hemorrhage	Quattrocchi 2012; Menale and Mouio 2014; Dahija *et al*. 2016
Tilia (lime)	Tiliaceae	Preventing a cold, cough, high temperature, antiseptic, hemorrhage, cystitis	Demiray 2009; Güler *et al*. 2015; Poljšak and Glavač 2021
Vitis vinifera (common grape vine)	Vitaceae	Epilepsy, anemia, painkiller, antiallergic, preventing a cold, cancer, toothache, antibacterial	Adams *et al*. 2012; Kanagarla *et al*. 2013; Hayta *et al.* 2014
Ribes (currants)	Grossulariaceae	Diabetes disease, kidney stones; analgesic; antiseptic	Duke 2002; Hayta *et al*. 2014; Cao *et al*. 2021
Hordeum (barley)	Poaceae	Hepatitis, abdominal pains, cough, diarrhoea, painkiller, toothache	Chevallier 1996; Marwat *et al*. 2012; Lim 2013
Crepis (hawksbeard)	Asteraceae	Anti-inflammatory, antioxidant	Fleurentin *et al*. 1986; Quattrocchi 2012; Pedreiro *et al.* 2021
Artemisia (fragrant wormwood)	Asteraceae	Malaria, fever, antiseptic, rheumatism, antihelminthic, diarrhoea, diabetes, anti-bug	Hayta *et al*. 2014; Bussmann *et al*. 2016; Koul *et al*. 2017
Artemisia annua (wormwood)	Asteraceae	Malaria, antiseptic, fever, anti-bug	Liu *et al*. 1992; Ferreira 2004; Mueller *et al*. 2004; de Ridder *et al*. 2008;
Xanthium (cocklebur)	Asteraceae	Antimicrobial, gastrointestinal diseases, antibacterial, preventing a cold, rhinitis, toothache	Eissa *et al.* 2013; Li and Xing 2016; Khan *et al*. 2020
Carduus (thistle)	Asteraceae	Gastrointestinal diseases, snakebite, antipyretic, causing vomiting	Dold and Cocks 2000; Zheleva-Dimitrova *et al.* 2011; Hayta *et al*. 2014
Chenopodium album (goosefoot)	Chenopodiaceae	Antihelminthic, diuretic, arthritis, rheumatism, scurvy, talc	Meuninck 2013; Bibi *et al.* 2014; Trivedi and Singhh 2018
Urtica (stinging nettle)	Urticaceae	Rheumatism, asthma, hemorrhage, high temperature, mumps, rhinitis, anemia, fungal diseases	Kültür *et al*. 2007; Dyubeni and Buwa 2012; Kregiel *et al*. 2018
Cannabis sativa (ordinary hemp)	Cannabaceae	Sensation of dizziness, diarrhoea, fracture, swelling, painkiller, antihelminthic	Kalant 2001; Bibi *et al*. 2014; Jamila and Mostafa 2014
Apium (celery)	Apiaceae	Antispasmodic, diuretic, rheumatism, gout, painkiller, diarrhoea, dysentery	Leto *et al.* 2013; Kooti *et al.* 2014; Alarcün *et al.* 2015

Plant	Family	Pharmacological Properties	References
Cerastium (chickweed)	Caryophyllaceae	Headache, renal colic, body ache, decoction, cough	Angmo *et al*. 2012; Chandra and Rawati 2015;
Cardamine (toothworts)	Brassicaceae	Dysentery, epilepsy; diuretic, depurative, antispasmodic	Wiart 2006; Hatfield 2004; Quatrocchi 2012
Plantago (great plantain)	Plantaginaceae	Antiseptic, skin diseases, arthritis, diseases of respiratory ways, gastrointestinal diseases, burning, hemorrhage	Kültür *et al*. 2007; Tetik *et al*. 2013; Najafian *et al*. 2018
Ophioglossum vulgatum (adder's tongue)	Ophioglossaceae	Antiseptical, hemorrhage, angina, hematoma, vomiting, wounds, antiviral, treating frostbite, burning	Mannan *et al*. 2008; Quattrocchi 2012; Lim 2016a; 2016b.
Sphagnum (sphagnum moss)	Sphagnaceae	Hot compress, abscess characteristic of diseases of urogenital systems, eye lotion	Souter 1995; Allen and Hatfield 2004; Meuninck 2013

of many countries around the world, the treatment of several diseases using insect extracts or decoctions is a well-established practice. For example, in China there are more than hundred such kind of insects (Feng *et al.* 2009). Today there is a special branch of medicine called "entomotherapy", that is entomological therapy "Insect-derived compounds for therapeutic use have huge promise as they have remedial, analgesic, antibacterial, diuretic, sedative, anticancer and anti-rheumatic properties" (Kaur *et al.* 2023). Insect infusions possess antibacterial, antianalgesic properties, treats diarrhea, rheumatism and other diseases (Yamakawa 1998; Costa-Neto 2002, 2005; Bairagi 2019; Mozhui *et al*. 2021).

The fact that the vessel with insect infusion in Grave 12 was placed near the abdomen of the deceased might suggest that he suffered from diarrhoea, and that is why the vessel full of remedy was placed near the abdomen (Fig. 10).

Palynological examination of the content of eight vials has shown that each each vessel contained an infusion or decoction of various medicinal plants. The pollen of 23 medicinal herbs have been determined to genus and species, which indicates that the population inhabiting the territory of Georgia in the Late Antiquity Period very well knew the properties of numerous plants. At that time, the medicinal properties of insects were also well known, that is why three vessels with medicines made of insects accompanied the dead in the graves.

It is interesting to note that all the bottles had a wooden cork.These corks would have been made of pine wood (Richter *et al.* 2004) and wrapped in a piece of linen for greater safety, or probabaly corks were only made of textile. This is evidenced by the presence of wood parenchymal cells and large amounts of flax fibres in a spectrum of non-pollen palynomorphs. Among the wooden cells there are light cells that did not burn out in the fire, but rotted naturally. The cells that were burnt in fire are of much darker in colour, than the parenchymal cells of a decayed tree (Kvavadze and Kakhiani 2010). Based on this difference, it is possible to determine the presence of decoction and tincture of medicinal plants. In the case if there is a healing tincture, in the spectrum of non-pollen palynomorphs, light-

Fig. 10. Grave 12, location of vial No. 199

coloured, decomposed wood parenchymal cells predominate, which are the remains of the cork. In the case of the decoction, the spectrum is dominated by the burnt wood parenchymal cells.

5. CONCLUSION

The palynological study and, in particular, the existence of non-pollen palynomorphs have shown that small glass bottles placed in graves were tightly closed from the very beginning with corks that were wrapped with a piece of cloth. This circumstance has preserved all the components of the contents in the bottles. These are pollen of medicinal plants, remains of freshwater algae, which had existed in the water in which plants were boiled. During boiling, sterilization also took place, which subsequently contributed to the preservation of pollen grains and microscopic remains of other organisms. In addition, in four bottles, where the preservation was particularly good, traces of vine seed oil and juniper fruit or wood oil were found. It is well known that oil is an excellent conservation agent (as fungi, microbes or bacteria that destroy the organic remains do not thrive in it).

Palynological analysis has revealed the presence of infusion and decoction of various medicinal plants in eight bottles. The pollen of 23 medicinal plants was detected. This suggests that during the Late Antiquity Period, the population living near the Kanchaani cemetery knew the medicinal properties of several plants. Moreover, during the 1st-3rd centuries AD, the population was also aware of the medical properties of insects, which were placed in the graves of two individuals as part of the funerary rites.

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