

## **STUDY OF SOME HEAVY METALS FROM PROPOLIS AND HONEY**

Gabriela STANCIU\*, Magdalena MITITELU\*\*

\**“Ovidius” University of Constanta, Faculty of Chemistry, 124, Mamaia, Constanta, Romania*

\*\**“Ovidius” University of Constanta, Faculty of Pharmacy, 124, Mamaia, Constanta, Romania*

### **INTRODUCTION**

Propolis is a mixture of various amounts of beeswax and resins collected by the honeybee from plants, particularly from flowers and leaf buds. These resins are used by worker bees to line the inside of nest cavities and all brood combs, seal small cracks in the hive, and perhaps most important of all, to mix small quantities of propolis with wax to seal brood cells. These uses are significant because they take advantage of the antibacterial and antifungal effects of propolis in protecting the colony against diseases.

A multitude of traditional uses are known for this versatile substance. The Greeks and Romans already knew that propolis would heal skin abscesses and through the centuries its use in medicine has received varying attention. The ancient Egyptians knew about the benefits of propolis and in Africa it is still used today, as a medicine, an adhesive for tuning drums, sealing cracked water containers or canoes and dozens of other uses.

The major compounds of propolis are resins composed of flavonoids and phenolic acids or their esters, which often form up to 50% of all ingredients.

One of the most widely known and extensively tested properties of propolis is its antibacterial activity. Many scientific tests have been conducted with a variety of bacteria, fungi, viruses and other microorganisms. Many of the tests have shown positive control of the organisms by various extracts and concentrations of propolis. A synergistic effect has been reported for propolis extract used together with antibiotics. Whether propolis exhibits bactericidal or bacteriostatic characteristics often depends on its concentration in the applied extract.

Dermatological and cosmetic applications are at this time probably the most common uses for propolis and its extracts. Its effects on tissue regeneration and renovation have been well studied. Together with its bactericidal and fungicidal characteristics it provides many benefits in various applications in cosmetics.

Honey is a sweet, viscous fluid, elaborated by bees from the nectar of plants and stored in their combs as food. It is used worldwide as a basic foodstuff, either by direct ingestion or as a sweetener in a variety foodstuff. Honey contains many trace minerals that are essential to health (iron, copper, aluminium, potassium etc.). plants absorb elements and deliver them to the nectar, which is a major resource used by bees to make honey. Therefore, honey will vary in mineral content not only according to the resources in the soil, but also according to the kind of plants from which the bees took nectar.

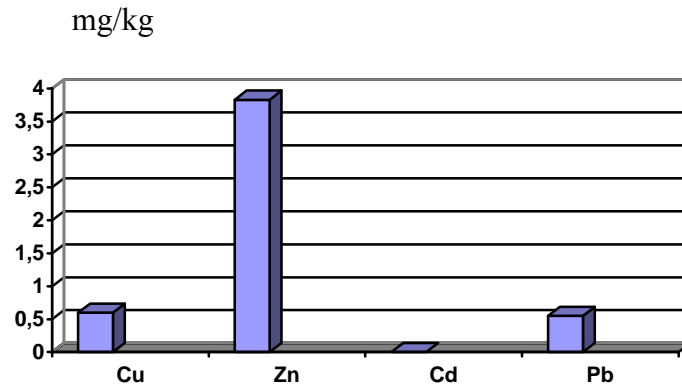
### **EXPERIMENTAL**

Propolis and two kind of honey (honey of acacia and poliflower honey) were taken from private peasants.

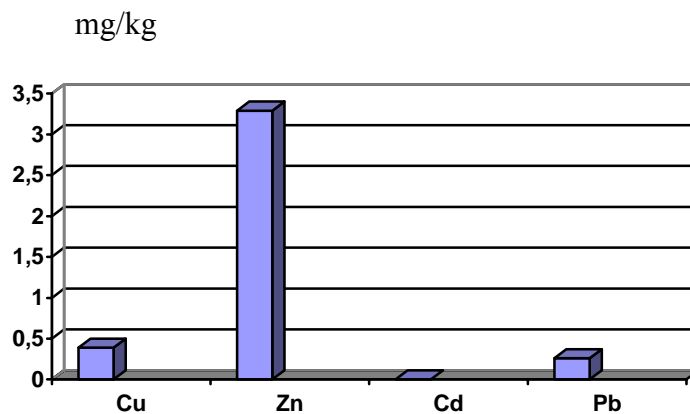
For to analysed the heavy metals concentrations, the samples were dried at 105 °C and then were mineralized by wet digestion method (HNO<sub>3</sub> - H<sub>2</sub>SO<sub>4</sub>). About 0.5g of each sample was predigested in 2 mL 65% HNO<sub>3</sub> for 24 hours at room temperature, then 2 mL of 98% H<sub>2</sub>SO<sub>4</sub> were added and the mixture was digested in a VELP DK6 heating digester. After cooling, the solution was made up to 25 mL of deionised water. All used reagents were of analytical reagent grade (Merck). The resultant solutions were analysed with an atomic absorption spectrophotometer GBC-AVANTA (air / acetylene flame) for to determine the heavy metals concentration: Cd ( $\lambda = 228.8$  nm), Cu ( $\lambda = 324.7$  nm), Zn ( $\lambda = 213.9$  nm) and Pb ( $\lambda = 217$  nm). Two replicate determinations were done for each solution.

## RESULTS AND DISCUSSIONS

The heavy metals concentrations in the analysed samples are presented in the figures 1, 2 and 3.



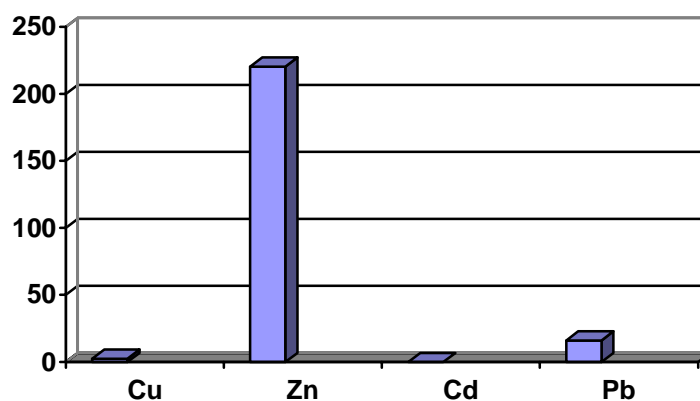
**Fig. 1** Concentration of heavy metals in acacia honey



**Fig. 2** Concentration of heavy metals in poliflower honey

The concentration of Cd is below the limit of detection of apparatus (< 0,02 mg/kg). The concentrations of the metals analysed are very closer in the samples of honey. We remark a high level of Zn in honey comparing to the others elements.

mg/kg



**Fig. 3** Concentration of heavy metals in propolis

We remark from figure 3 that the concentrations of Cu, Zn, Cd and Pb are much higher in propolis than in honey (especially for Zn: 220,36 mg/kg).

### CONCLUSIONS

The analysed samples of honey have presented a low content in heavy metals investigated. Although more extended investigation is necessary, it can however be stated that in the light of these data the concentrations of these elements in honey samples investigated do not pose any serious concern to human health.

The concentration of Cd was below the limit of detection of apparatus ( $< 0,02$  mg/kg). The concentrations of Cu, Zn, Cd and Pb are much higher in propolis than in honey.

### REFERENCES:

- LIU W., LEE H. K. , (1998), *Talanta*, 45, 632.
- HAGESTUEN E.D., CAMPIGLIA A. D. , (1999), *Talanta*, 49, 548.
- KALAC P., NIZNAMSKA M. et al. , (1996), *Sci. Total Environ.*, 177, 251.
- NUSKO R. , (1997), *Fresenius J. Anal. Chem*, 357, 1050.
- LIU W., LEE H. K., (1998), *Talanta*, 45, 632.
- HAGESTUEN E.D., CAMPIGLIA A. D. , (1999), *Talanta*, 49, 548