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ID-5-P-2475 The detection of metal-based particles on the bumble-bees as bioindicators of air pollution

Dědková K.[1], Kašparová B.[1], Kukutschová J.[1]

[1]Nanotechnology Centre, VSB-TU Ostrava, Ostrava, Czech Republic

Email of the presenting author: katerina.dedkova@vsb.cz

Monitoring of the atmospheric pollution is an important part of the environmental protection. Living organisms can serve as bioindicators for observation and biomonitoring of the environmental pollution. This contribution describes the detection of metal-based particles on body of bumble-bees (*Bombus terrestris*) using Scanning electron microscopy (SEM) with EDX. Two groups of bumble-bees were selected for the detection. Bumble-bees caught in outdoor environment in Havířov region belonged into the first group and bumble-bees from laboratory breeding served as a reference in the second group. It was found, that bodies of bumble-bees from outdoor environment were covered with lot of micron-size particles based on dust, sand, salts and metals. These particles may come from natural but also anthropogenic sources emitting solid particles into the atmosphere. Contrary to this finding, any of these particles were found on the bodies of bumble-bees from the laboratory breeding. However, micron-sized particles of iron were detected on the head and wings of these bumble-bees. By comparison of secondary electron images and back-scattered electron images of the same area it was wound that iron particles were incorporated into the basis of hairs on the wings or cuticle on the head of the bumble-bees. The exact function of these iron-based particles in these specific bodyparts is still not well understood, whether they serve as biolocators within the magnetic field of Earth or just places of deposition of particles which entered the body after environmental exposure. SEM with EDX proved that this method could be used as one of a detection technique in the field of study of environmental pollution.

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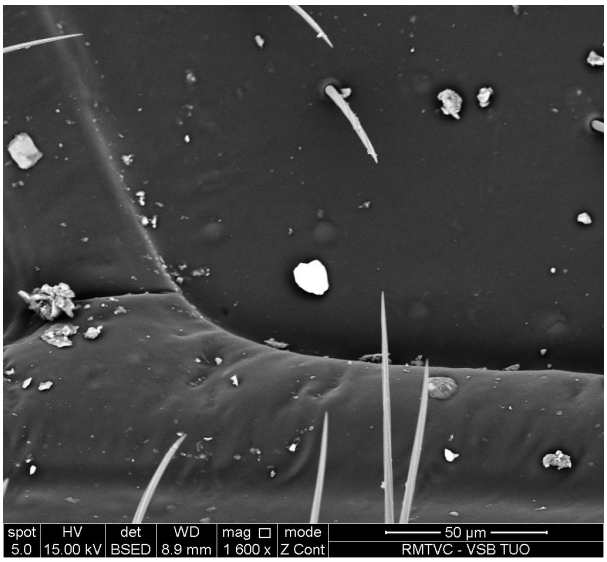

Fig. 1: Detecterd particle on the body of bumble-bee from outdoor environment.

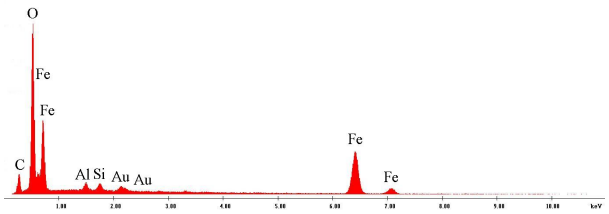

Fig. 2: EDX spectra confirming the presence of iron particle on the body of the bumble-bee from outdoor environment.

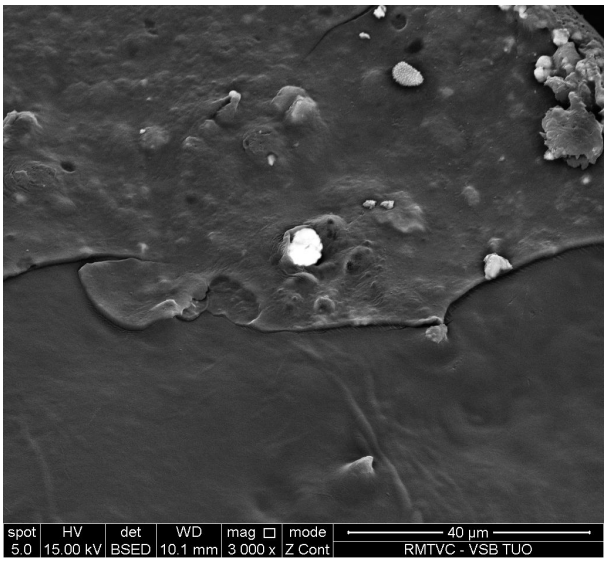

Fig. 3: Detecterd particles on the body of bumble-bee from outdoor environment.

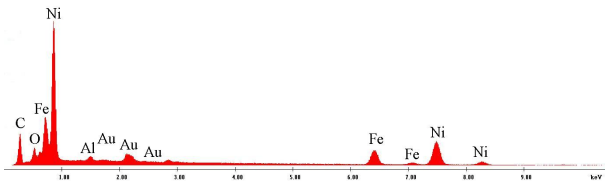

Fig. 4: EDX spectra confirming the presence of nickel and iron particles on the body of the bumble-bee from outdoor environment.