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ПЕРСПЕКТИВИ ОТРИМАННЯ ВОДИ З ГНІЗДА МЕДОНОСНИХ БДЖІЛ

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PROSPECTS FOR OBTAINING WATER FROM THE NEST OF HONEYBEES

In the process of life, the honey bee colony accumulates in its nest products of plant and plant-animal origin. In this way, it provides its existence in the microclimate of the bee nest created by it and beyond. In the active season, the humidity in the honey bee nest can reach from 35 % to 95 %, and the temperature ranges from +33 to +35

Brovarskiy V.D. (2017) proposed a technology for obtaining a bee nest air condensate. It involves the use of an external device to condense moisture from the honey bee nest by connecting the hives by means of pipelines connected to the dehumidifier. As follows from the analysis result of the obtained condensate, the following substances were revealed and identified: C12:0 (lauric acid), 3-OH-C12:0 (3-OH-lauric acid), C14: (myristic), a-i C15:0 (a-i pentadecanoic acid), C15:0 (pentadecanoic), 3-OH- C14:0 (3-OH-myristic), C16:1 (palmitic), C16:0 (palmitic), cis C18:1 (vaccenic), C18:0 (stearic) [1, 2].

In 2018, we designed and manufactured an exploratory prototype device, namely a condensing frame (patent № 129535 from 25.10.2018) [3]. The device is made in the beehive frame form with a built-in condensation screen and a water chute, which is formed as a result of moisture and substances condensation that saturate the air inside of the honey bee nest. The use of the device involves its placement individually in each bee colony. The condensing frame is equipped with an electronic thermometer, which provides the ability to control the condensation screen temperature. The chute is placed under the condensation screen and allows to accumulate the substance condensate formed on the condensation screen (Fig.) [4].

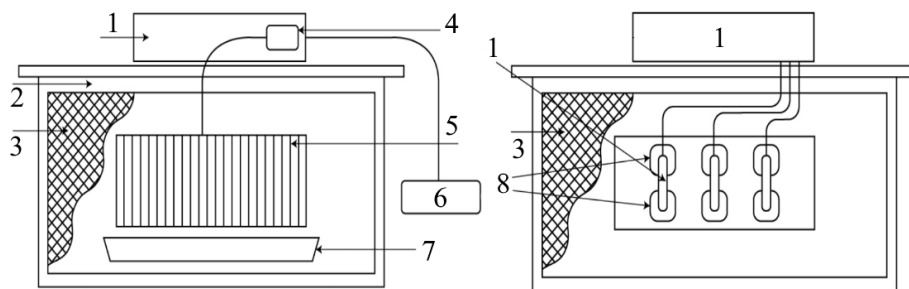


Fig. Schematic representation of the condensing frame (1 – water heat removal system; 2 – a frame; 3 – a protective grid; 4 – an electronic thermometer; 5 – a condensation screen; 6 – power supply; 7 – a chute; 8 – thermocouples).

One of our water samples using a condensation frame was investigated by gas chromatography with mass spectrometry (Agilent 6890 GC 5973N GC/MSD 7683 Autosampler) and the following substances were identified: Phenol, 2,4-bis(1,1-dimethylethyl); Dodecanoic acid, methyl ester; Methyl tetradecanoate; Methyl 13-methyltetradecanoate; Methyl 12-methyltetradecanoate; Pentadecanoic acid, methyl ester; Tetradecanoic acid, 5,9,13-trimethyl-, methyl ester; Pentadecanoic acid, 14-methyl-, methyl ester; Hexadecanoic acid, methyl ester; Hexadecanoic acid, 15-methyl-, methyl ester; Hexadecanoic acid, 14-methyl-, methyl ester; Heptadecanoic acid, methyl ester; Octadecanoic acid, methyl ester; Octadecanoic acid, 10-methyl-, methyl ester; Nonadecanoic acid, methyl ester; Eicosanoic acid, methyl ester; Heneicosanoic acid, methyl ester; Docosanoic acid, methyl ester; 1,2-Benzenedicarboxylic acid, mono (2-ethylhexyl) ester; Heneicosane, 11-decyl-; Heptacosane; Tricosanoic acid, methyl ester; Heptacosane; Tetracosanoic acid, methyl

ester; Eicosane; Nonacosane; Hexacosanoic acid, methyl ester; Heneicosane, 3-methyl-; Tricosane; (2-Methyl-[1,3]dioxolan-2-yl)-acetic acid, phenyl ester; Cyclotrisiloxane, hexamethyl-; Hexacosane; Octacosane; 1,2,4-Benzenetricarboxylic acid, 4-dodecyl dimethyl ester; 1H-Indole, 1-methyl-2-phenyl-; 5(1H)-Azulenone, 2,4,6,7,8,8a-hexa hydro-3,8-dimethyl-4-(1-methylethylidene)-, (8S-cis)-. Further identification and research of substances that were detected and their possible source of origin was performed on the following bases: <https://pubchem.ncbi.nlm.nih.gov/>; <https://webbook.nist.gov/>. The obtained results were processed for further research paper.

The relevance of research on water (condensate) of honey bee nest is confirmed by foreign colleagues [5]. The scientists conducted research on the composition of hive air and substances which are contained in the air where bees, bee venom and wax were located. The substances were collected by means of solid-phase microextraction, and they were researched by gas chromatography-mass spectrometry. A total of 56 compounds were identified, of which 43 were contained in hive air (air of the nest where honey bees are located).

The findings of the research are a prerequisite for further study of the water composition obtained from the honey bee nest for its use in the pharmaceutical and food industries. From our point of view, water (condensate) from the honey bee nest can be used in the future to create new bioactive food products. The study of water (condensate) composition and properties from the honey bee nest can contribute to the development of new biological treatments for veterinary medicine.

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