



MEDICINAL BEEKEEPING FOR BEEKEEPERS MODULE 7



HIVE AIR AND DEAD BEES

In this module you will learn what hive air and dead bees in apitherapy are, you will learn about their physical and chemical properties as well as methods of obtaining, preserving and storage them. In addition, this module will present the health-promoting properties of these bee products and the methods of their use in apitherapy.



HIVE AIR AND DEAD BEES

TRAINING CONTENT:

1. Hive air and dead bees – definition
2. General description of hive air and dead bees
3. Physical and chemical characteristics of hive air and dead bees
4. Pro-healthy properties of hive air and dead bees
5. Hive air and dead bees use, processing and storage



HIVE AIR - DEFINITION

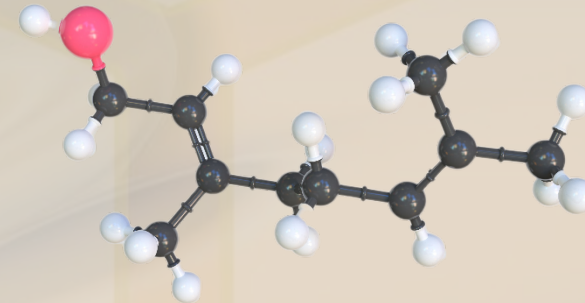
The air inside the hive is called **HIVE AIR**. Due to its specific climate, it is saturated with many volatile substances that are secreted by the bees themselves (pheromones), as well as semi-finished products collected by bees (nectar, pollen, honeydew, resin secretion of leaf buds) and products (honey, bee, propolis and wax). The hive air is often called the hive microclimate. The chemical composition of the hive air reflects the sanitary conditions inside the hive as well as the health condition of the bee colony.



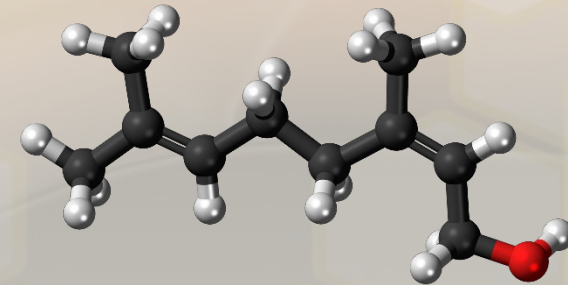
HIVE AIR – CHEMICAL COMPOSITION

The chemical composition of hive air is complex and not yet fully understood. It is recognized that there are about **44 volatile substances in the hive air**.

Among the bee pheromones identified in the hive air are **geraniol and nerol**, these are volatile compounds secreted by the Nasonow gland.



Molecular model of geraniol



Molecular model of nerol

HIVE AIR – CHEMICAL COMPOSITION

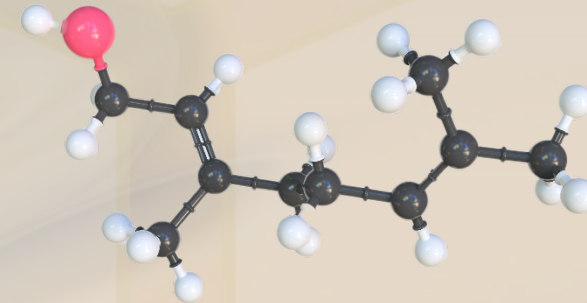
Geraniol:

- ❑ has an antibacterial and antifungal effect

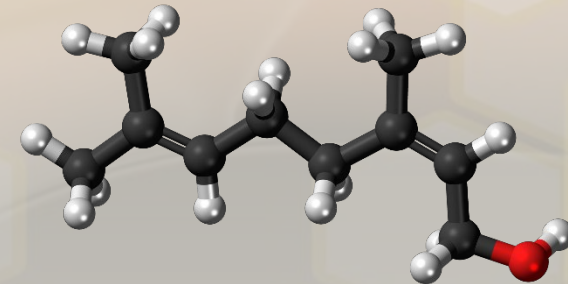
Nerol:

- ❑ has an antidepressant, sedative effect and regulates menopausal problems.

Among the volatile compounds present in the hive air, there are also volatile substances found in bee semi-finished products and in final products obtained from bees, such as honey, bee bread, royal jelly, wax or propolis. During storage or processing in the hive, these substances release numerous chemical compounds into the hive environment.



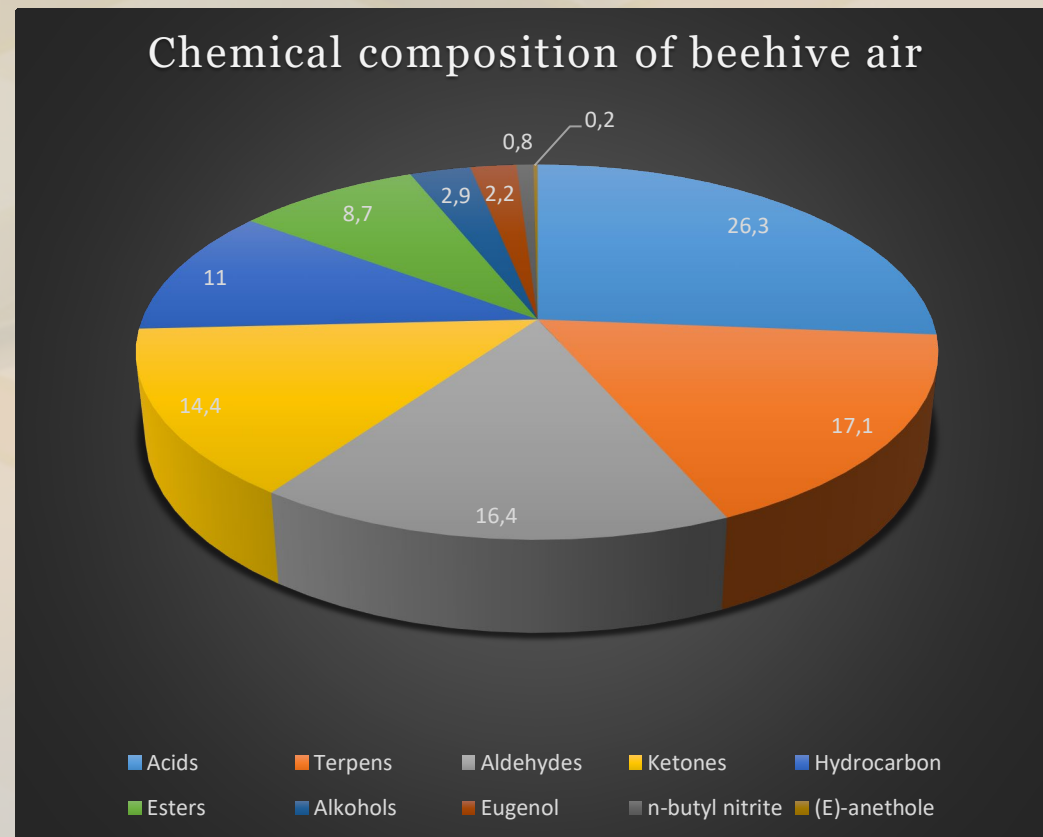
Molecular model of geraniol



Molecular model of nerol

HIVE AIR – CHEMICAL COMPOSITION

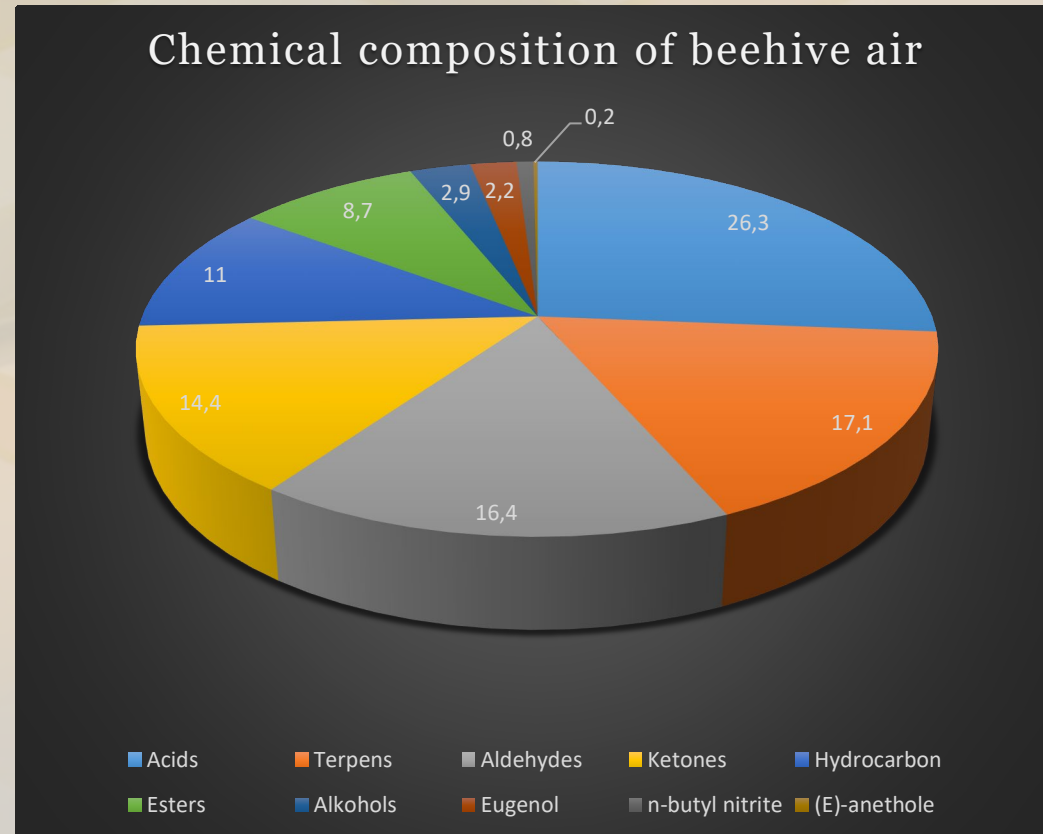
As research has shown, hive air contains about **26.3% of volatile acids** (e.g. n-caprylic acid, nonanoic acid, geranic acid, dodecanoic acid, tetradecanoic acid), **17.1% of terpenes** (e.g. limonene, β -Linalool, α -Cubebene, Germacrene, Copaene, α -Farnesene Terpene, β -Caryophyllene, α -Humulene, β -Cadinene), **16.4% volatile aldehydes** (including benzaldehyde, benzeneacetaldehyde, (E)-2-octenal, nonanal, decanal, 5-hydroxymethylfurfural, (Z)-2-Decenal, (E)-Cinnamaldehyde).



El-Wahed et al.

HIVE AIR – CHEMICAL COMPOSITION

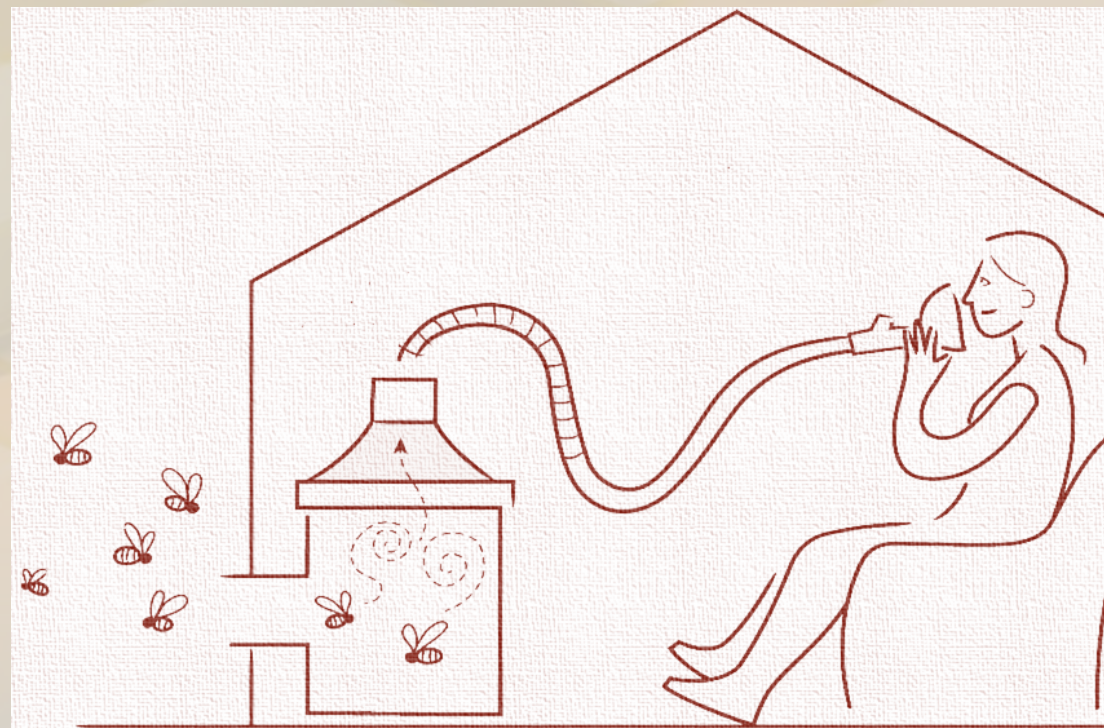
14.4% ketones (including 2 Nonanone, Pyranone, 2-Decanone, 9-Hydroxy-2 -nonanone, (Z)-Geranylacetone); **11.0% hydrocarbons** (e.g. Decane, Tridecane, Hexadecane, Octadecane, 9-Nonadecene) **8.7% esters** (Methyl salicylate, 2-Octyl acetate, (E)-2-Decenyl acetate), **2.9% volatile alcohols** (isopropyl alcohol, 3-hexenol, cyclooctanol, dec-2-en-1-ol), additionally eugenol (**2.2%**), n-butyl nitrite (**0.8%**) and (E)-anethole were found (**0.2%**)



El-Wahed et al.

BEEHIVE AIR CONDITIONS

The air of the hive is 25 - 35°C and is characterized by relatively high humidity (70-75%). An additional very important feature of hive air is its purity - it should be free of bacteria, viruses or pathogenic fungi. Breathing clean, antiseptic air, fragrant with honey, pollen and propolis, has a very good effect on well-being and vitality, it also helps in the prevention of treatment of various diseases, this is how the new field of Apitherapy "**APIINHALATION**" was created.

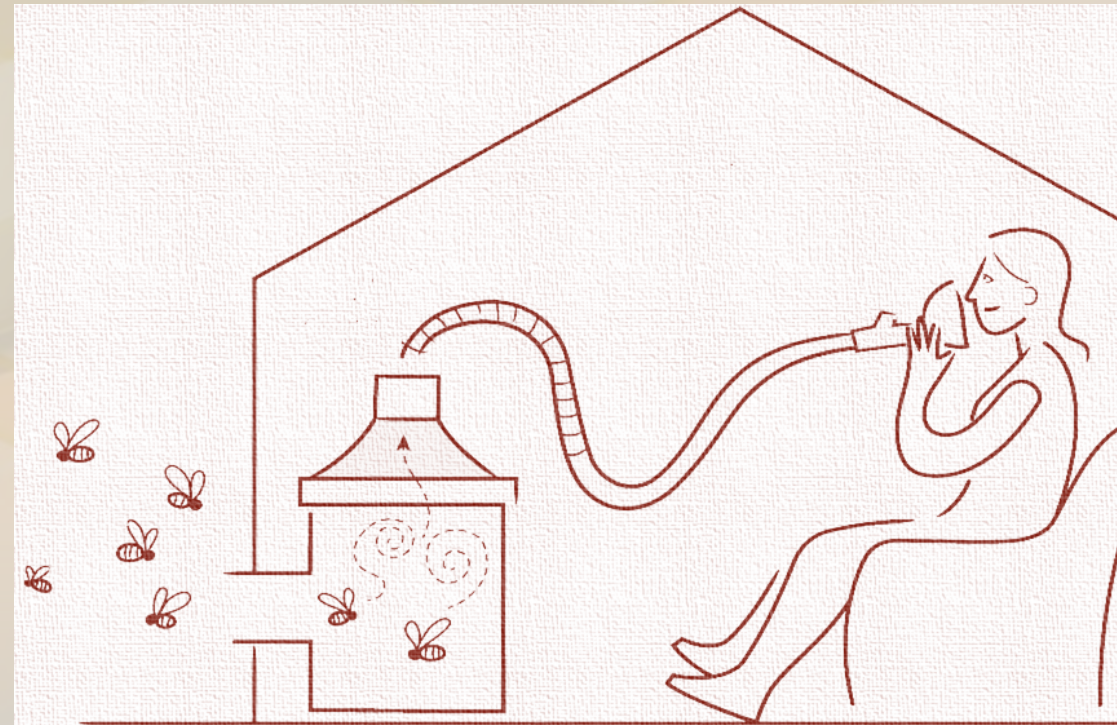


Apiinhalation source:

<https://www.beecurasystem.de/en/2020/10/23/bienenstocklufttherapie-mit-dem-beecura-inhalator-sicher-und-hygienisch/>

PRO-HEALTHY PROPERTIES OF BEEHIVE AIR

The use of beehive air as a treatment option was developed by Heinrich Huttner, an Austrian. Considering the wide spectrum of chemical compounds present in the hive air and their biological activity, hive air has been used in the treatment of **respiratory tract diseases, allergic diseases, cardiovascular diseases**, as well as **nervous and mental diseases**.

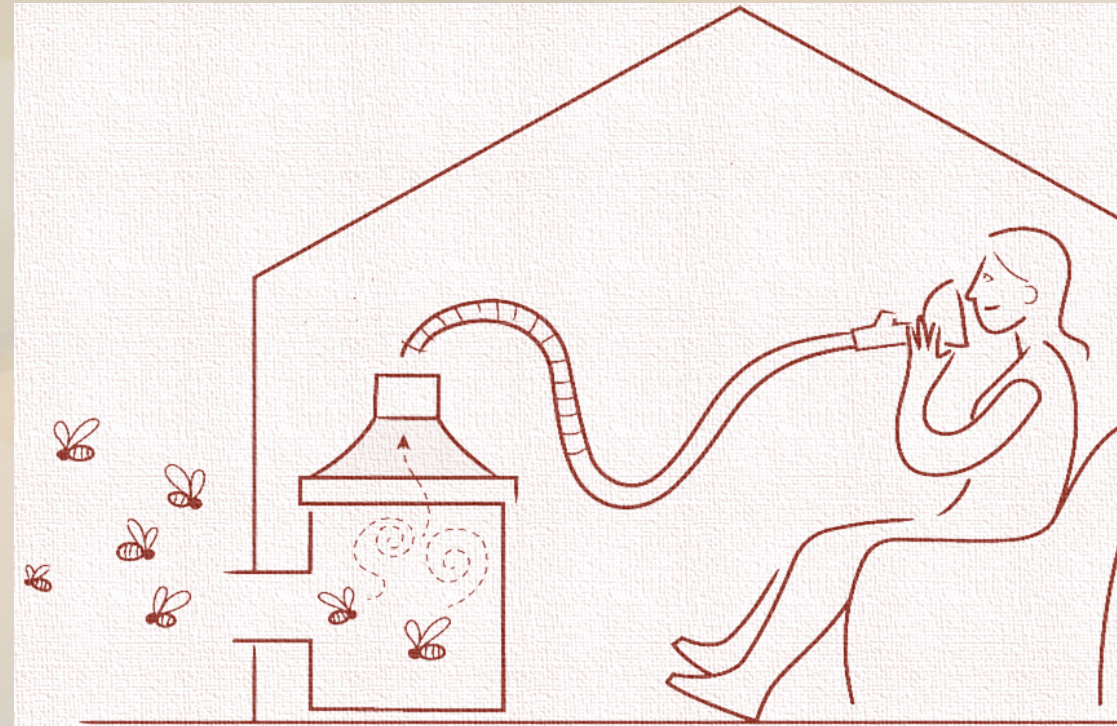


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PRO-HEALTHY PROPERTIES OF BEEHIVE AIR

They can be used in the treatment of inflammation of the mucous membrane of the upper respiratory tract, but also bronchitis. It also has a positive effect on **blood pressure, improves blood circulation and microcirculation, and seals blood vessels.** Observations also confirm the positive effect of bee air on **mental health.**

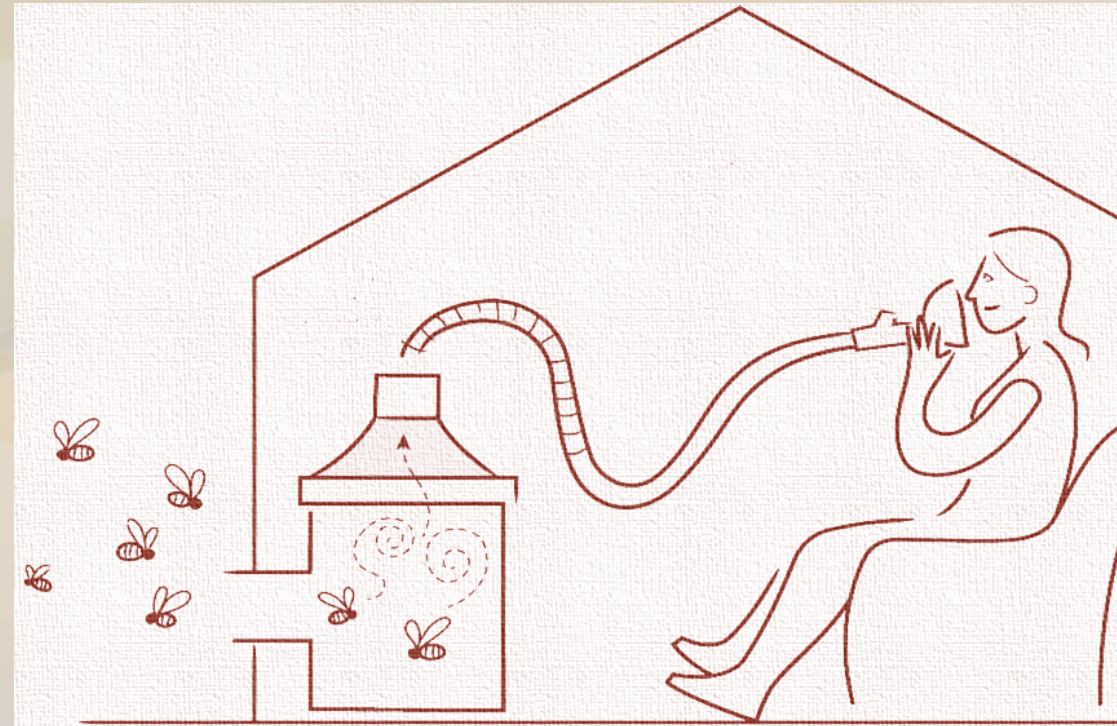


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BEEHIVE AIR - APPLICATION

One of the simplest and most primitive ways to use the hive air is to remove the upper part of the hive, secure it with a dense mesh and breathe the air coming out of it. A more common method of inhaling hive air is breathing hive air through specially developed inhalers consisting of a flexible hose made of plastic and a breathing mask. This device sucks the bees' air directly from the hive, passes through a heated hose to a breathing mask, and the patient can breathe it in.

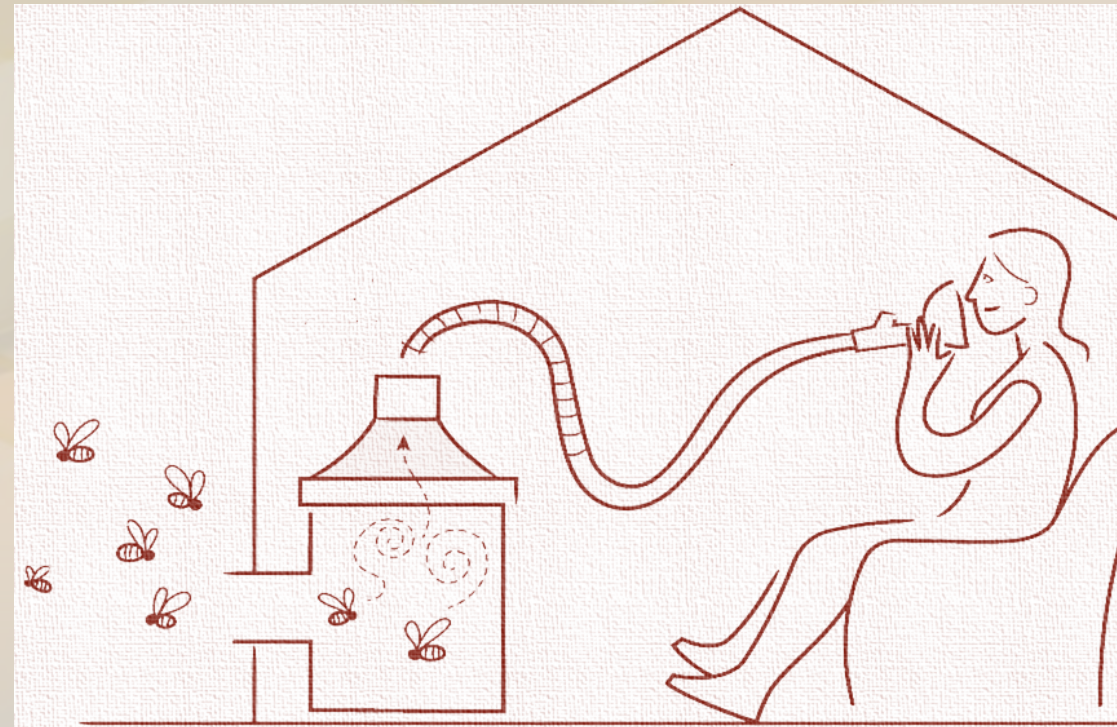


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BEEHIVE AIR - APPLICATION

Heating the hose is to reduce condensation, because along with moisture, active substances contained in the air of the hive are also deposited. Treatments involving inhalation of hive air are carried out in the summer, from May to August. Treatment cycles are carried out in various ways, usually inhalation lasts 15-60 minutes, it can be repeated twice a day and the duration of treatment can be from 12 to 22 days. Some people dealing with apitherapy even offer 8-hour inhalations - all night during sleep.



Apiinhalation source:

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APITHERAPY HOUSES

Apitherapy houses are small wooden buildings with built-in beehives. Hives can be placed inside or outside the place intended for people, they are covered with a dense mesh preventing bees from getting out of the hive and at the same time allowing the flow of hive air inside. In apitherapy houses there are chairs or couches placed above the hives, which allows you to feel the heat, sounds and vibrations emitted by the bees.



Apitherapy house

APITERAPY HOUSES

Bee air therapy is a part of **bee hive therapy**, in which, in addition to inhalation with bee air, a person is subjected to the action of **electromagnetic field** and **microvibrations** produced by bee colonies. While staying in the **apitherapy house**, a person is subjected to a biofield produced by bees - magnetic waves with a frequency of 12 Hz (hertz) which is compatible with the human biofield. It is also subjected to the action of micro-vibrations - arising as a result of the movement of the wings of bees staying in the hive. In order to increase these vibrations, the so-called bioresonance hives, containing resonance chambers designed to amplify micro-vibrations.



Apitherapy house

APITHERAPY HOUSES

The effect of the **warmth** of the bee colony on humans, which is an element of biotherapy, is also beneficial. Staying in the apitherapy house, a person is also subjected to **acoustic influences** - the sound of bees moving in the hive, as well as the movement of their wings. It has been found that this sound effect affects brain structures, having a relaxing and antidepressant effect, reduces mental fatigue and makes it easier for the patient to fall asleep.



Apitherapy house

DEAD BEES - DEFINITION

Dead bees, found most often after the winter period, are dead bees that beekeepers find on the bottom of the hive. Raw material is a blackbrown mass with a specific smell. On closer examination, whole undisturbed bees and various parts of bees (head, legs, abdomen, wings, etc.) are visible.



Dead bees

DEAD BEES - DEFINITION

The causes of dead bees may be various, it may be due to the weakness of the bee colony, bad weather conditions, incorrect distribution of supplies in the hive or their depletion, and sometimes bee diseases. The weight of the dead bees may reach 205-300 g. From an economic point of view, dead bees is undesirable, but it can be used for medicinal purposes.



Dead bees

DEAD BEES – CHEMICAL COMPOSITION

Dead bees contain about 8-10% of water, while after drying, its content decreases to about 3-4%. The chemical composition of dead bees is not constant in terms of chemical composition. **Protein content** ranges from **47.8-65%**, **melanin** content from **20.0 to 25.0%**, **wax and lipid substances** from **11.0 to 27.7%**, **chitin** from **11.00 to 24.0%** and **trace minerals** constitute **1.8-2.5%** (mainly iron, zinc, tin, nickel, cadmium, copper and cobalt).



Chemical composition of dead bees

DEAD BEES – HARVESTING, PRESERVATION, PROCESSING AND STORAGE

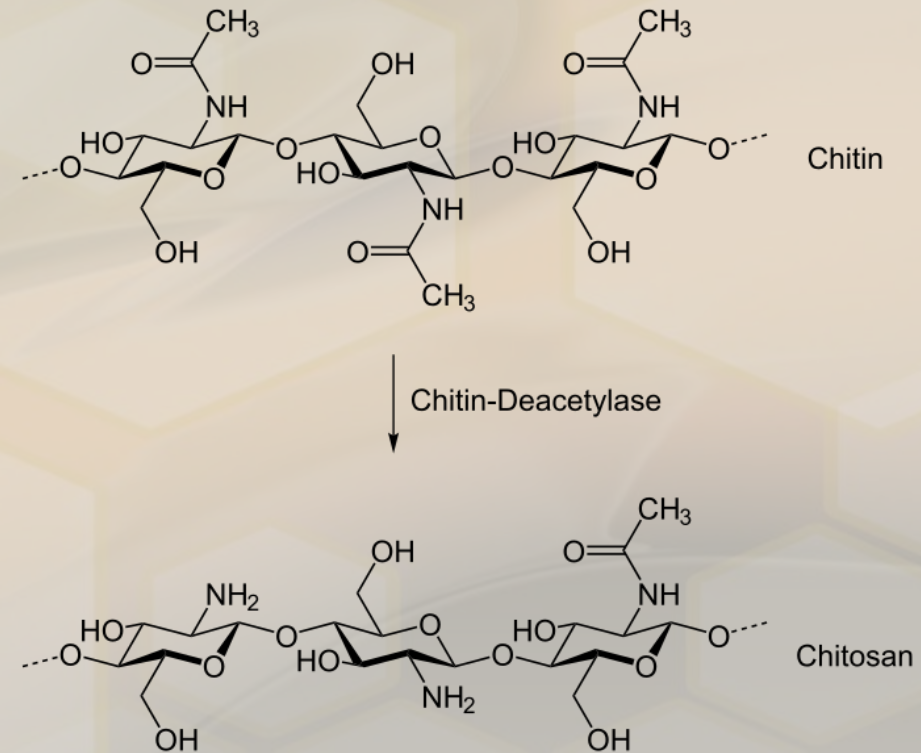
In order for **dead bees** to be used for medicinal purposes, it **must come from bees without symptoms of mite, bacterial or fungal infection**. It also cannot be moldy. In order to preserve them, dead bees are **dried at a temperature of up to 45°C**, crushed and stored in tightly closed, clean packaging in a cool and dry place, preferably in a glass container. Bee dust preserved in this way retains its healing properties for **up to 1 year**.



Dead bees

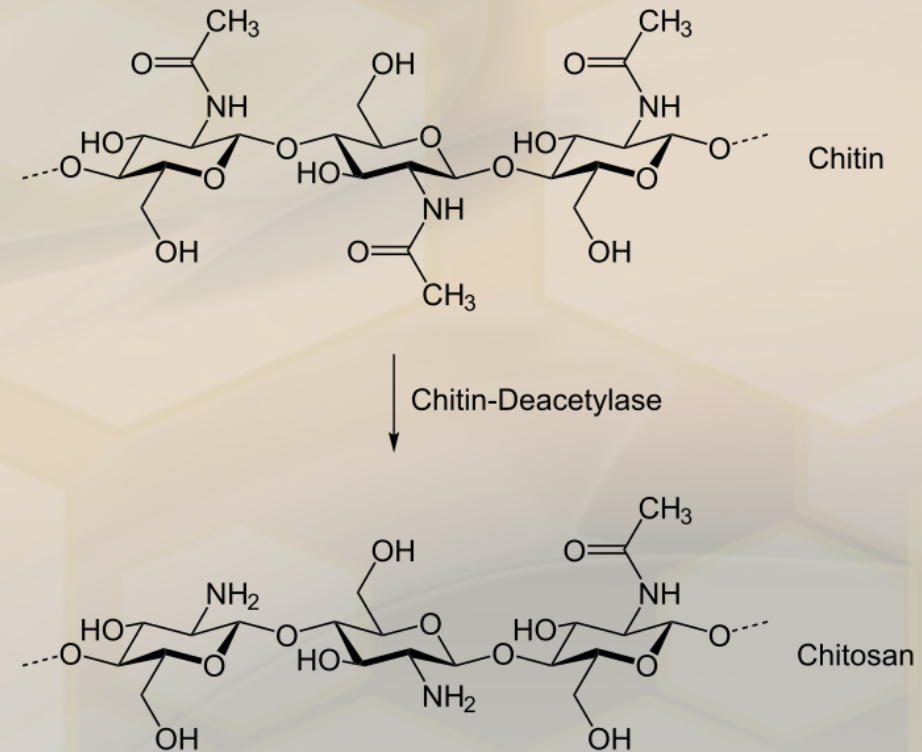
PRO-HEALTHY PROPERTIES OF DEAD BEES

The most widely used direction of using dead bees is to obtain **CHITOSAN** from it. Chitosan is a derivative of chitin, obtained as a result of its partial deacetylation. Chitosan-melanin complex is also obtained from chitin for therapeutic purposes.



PRO-HEALTHY PROPERTIES OF DEAD BEES

Chitosan is used in medicine due to its **antibacterial**, **anti-inflammatory** and **analgesic properties**; it **stops bleeding** and **helps wound healing**, which is why it is, among others, component of dressing materials. It is also used as a **carrier in mucoadhesive drug** delivery systems. Chitosan is also used as a **dietary supplement** to support weight loss, due to blocking the absorption of fats, although its effect has not been fully confirmed by research.



PRO-HEALTHY PROPERTIES OF DEAD BEES

The **CHITOSAN-MELANIN COMPLEX**, on the other hand, has strong antioxidant, anti-radiation, detoxifying, antimicrobial and antimutagenic properties. Preparations based on chitosan-melanin complex, containing other substances, such as an extract obtained from Siberian pine needles. This preparation turned out to be effective in:

- ❑ **gastroenterology** (improvement of bowel function),
- ❑ **cardiology** (renewal of the heart muscle after a heart attack, atherosclerosis),
- ❑ **neurology** (improvement of cerebral microcirculation in multiple sclerosis, Parkinson's disease and after cerebral hemorrhage),
- ❑ **endocrinology**, diseases of the musculoskeletal system,
- ❑ **pancreatitis**
- ❑ **immunological diseases.**

PRO-HEALTHY PROPERTIES OF DEAD BEES

Dead bees is also used to prepare **decoctions**, **ethanol extracts** and **extracts obtained with supercritical liquid CO₂**. Decoctions and ethanol extracts from dead bees turned out to be an effective drug used in prostatic hyperplasia.

Dead bees ether extract (10-20%) has proven to be effective in the treatment of diseases such as:

- ❑ **atherosclerosis**,
- ❑ **gastrointestinal disorders** (dysbacteriosis, indigestion, constipation),
- ❑ **sexual disorders** (impotence and frigidity).
- ❑ in the form of compresses, dead bees, rubbed with vegetable oil, can be used in patients suffering from **circulatory system diseases** (varicose veins, thrombophlebitis).

OBTAINING PRODUCTS FROM DEAD BEES

A **decoction of dead bees** is obtained by boiling with water (in the right proportions). After cooling and straining, a tablespoon of honey may be added to the decoction. The decoction is stored in a dark and cool place.

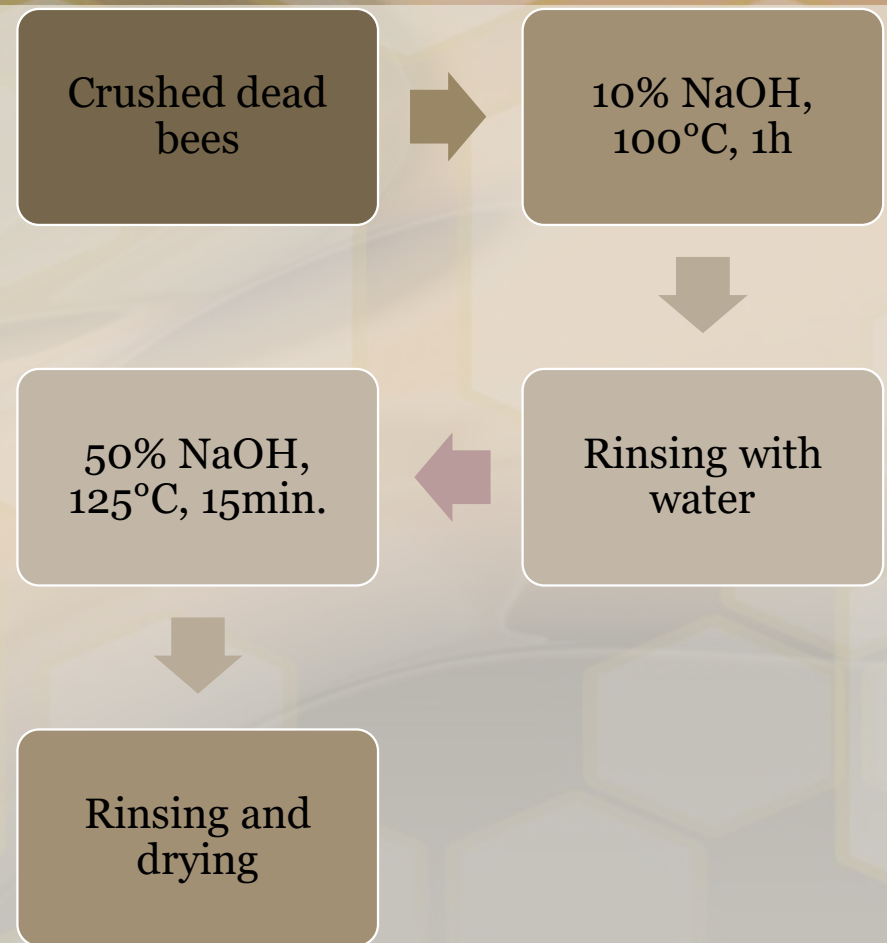
Ethanol extract, in turn, is obtained by pouring dead bees with 70% ethyl alcohol and storing for 10-12 days, shaking every day. After filtration, the extract is stored in a dark glass vessel at room temperature.



Dead bees' products

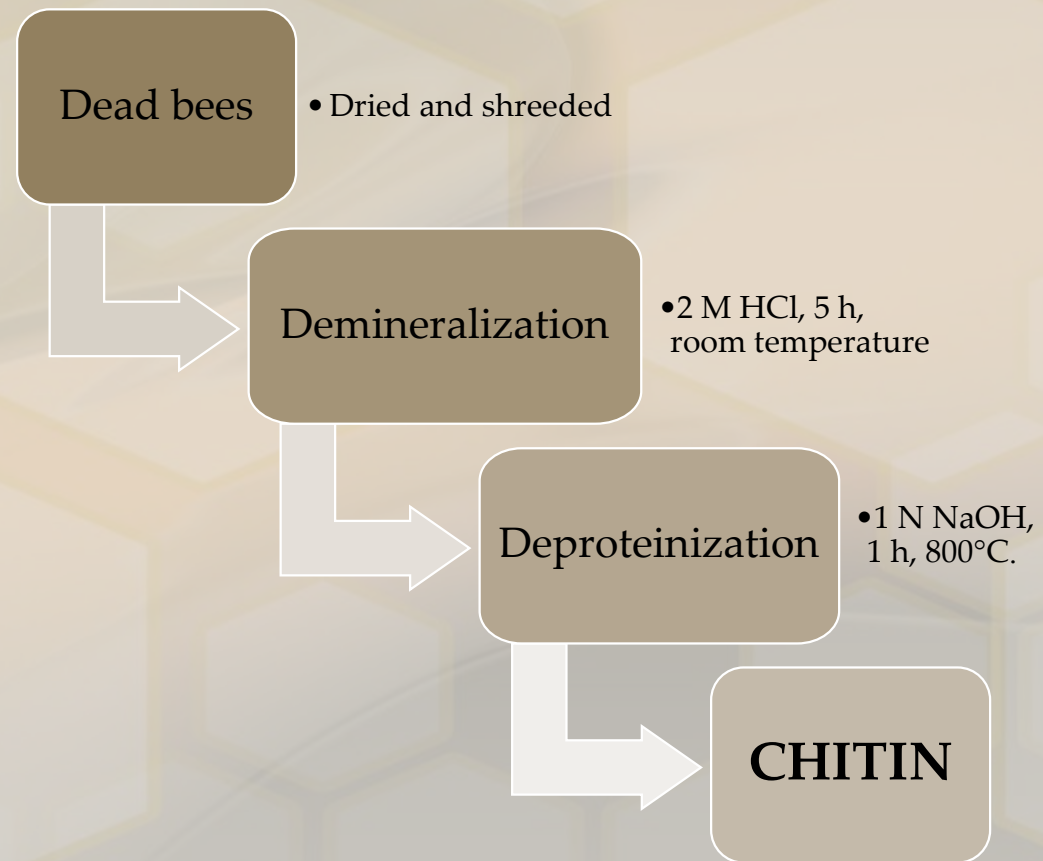
OBTAINING PRODUCTS FROM DEAD BEES

The **chitosan-melanin complex** from bee dust is obtained by treating the crushed bee dust with 10% sodium hydroxide solution at 100°C for 1 hour (removal of proteins and part of melanins). After rinsing with plenty of water, the residue is treated with 50% sodium hydroxide solution at 125°C for 15 minutes. After washing the lye with water and drying by sublimation, a light brown product is obtained.



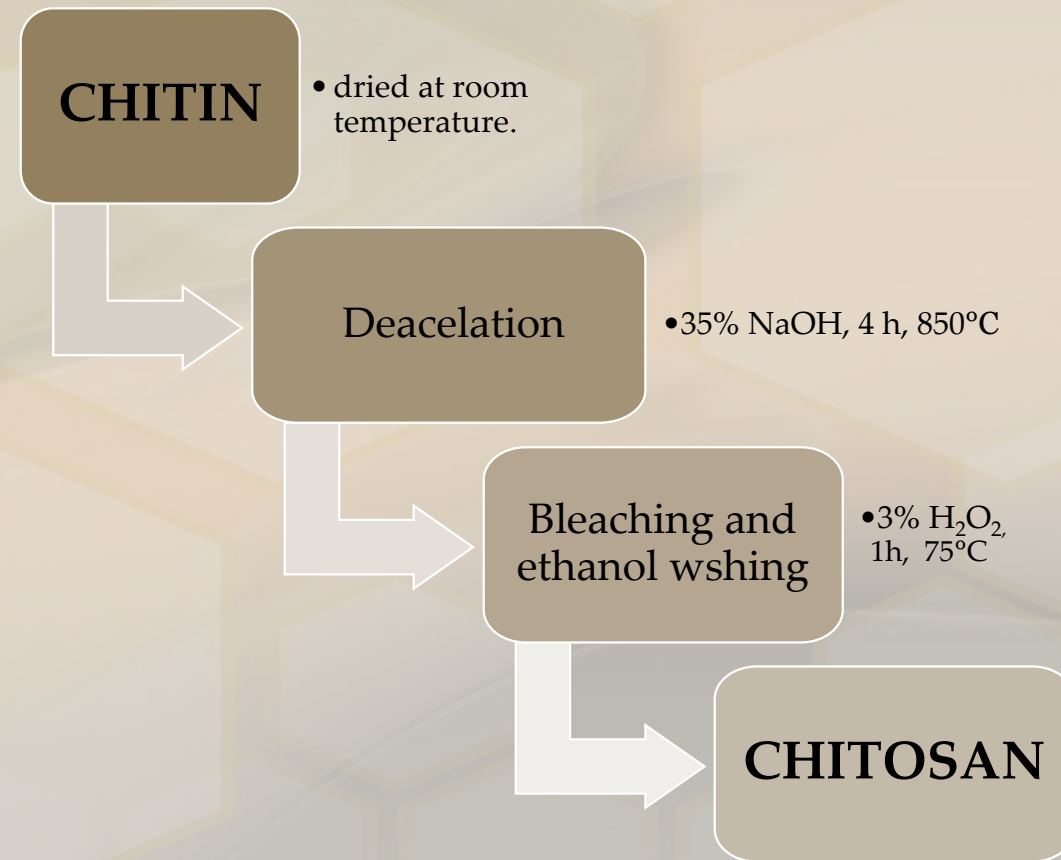
OBTAINING PRODUCTS FROM DEAD BEES

The **CHITIN** from dried crushed dead bees is obtained by through successive stages. 1st is demineralization, then deproteinization. The demineralization could be carried out by treating dead bees with 2 M HCl for 5 hours at room temperature. The deproteinization could be carried out by treating the crushed raw material with 1 N NaOH solution for 1 hour at 800°C. Next, the mass was filtered and dried at room temperature. Each process was accompanied by washing the raw material until neutral wash water (pH = 7).



OBTAINING PRODUCTS FROM DEAD BEES

In this way, chitin is obtained from which **CHITOSAN** is obtained by deacelation of chitin with 35% aqueous solution of NaOH for 4 hours at a temperature of 850 °C and dried at 50-55°C. Next, the resulting mass is decolorized with a 3% solution of H₂O₂ and washed with ethanol. The reaction product is a light beige mass with a specific smell.



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