Introduction of propolis

The Holy Qur'an has a long Sorat with the name of bees (Al Nahl). The ayahs number 68-69 In the name of God Most Gracious, Most Merciful (68) "And thy Lord taught the bee to build cells in hills, on trees and in (men's) habitations; (69) Then to eat of all the produce (of the earth), and find with skill the spacious paths of its Lord: there issues from within their bodies a drink of varying colors, where in is healing for men: Verily in this is Sign For those who give thought".

"بسم الله الرحمن الرحيم " وأوحى ربك إلى النحل أن اتخذى من الجبال بيوتا ومن الشجر ومما يعرشون ثم كلى من كل الثمرات فاسلكى سبل ربك ذللا يخرج من بطونها شراب مختلف ألوانه فيه شفاء للناس إن فى ذلك لآية لقوم يتفكرون "

(النحل 68-69)

Bees have been in existence for over 125 millions of years, their evolutionary success has allowed them to become perennial species that can exploit virtually all habitats in the world. This success is largely because of the chemistry and application of bee products: honey, beeswax, venom, propolis, pollen and royal jelly. As the most important "chemical weapon" of bees against pathogen microorganisms, propolis has been used as a remedy by humans since ancient times **(Hegazi, 1998).** For this reason propolis has become the subject of intense pharmacological and chemical studies for the last 30 years. As a result, a lot of useful knowledge was gathered. However, it is important to note that in the last decade the paradigm concerning propolis chemistry radically changed. In the 1960's, propolis was thought to be of very complex. It is a huge mixture contain around 300 compounds (**Hegazi and Abd El Hady, 2002**), but more or less constant chemistry, like beeswax or bee venom. In the following years, the analysis of numerous samples from different geographic regions lead to the disclosure that the

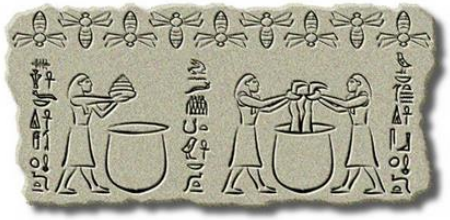
chemical composition of bee glue is highly variable. This circumstance was soon understood by seasoned chemists **(Bankova *et al*., 2005).**

What is Propolis?

Fig.1: Raw propolis

Propolis, or "bee glue," is a well-known substance that beekeepers find in their hives. Propolis according to researcher has shown to be effective against a variety of bacteria, viruses, fungi, and molds. It has been shown to be a non-specific immunostimulant (**Hegazi, 2006**). Propolis is a natural brownish-green resinous product collected by honey bees. The word is derived from the Greek pro (before) and polis (city). Propolis was being used to make the protective shield at the entrance of beehive. Also it used to fill the cracks in the hive, to attach the corners of frames to the grooves in the hive, and also to polish the cells of the honeycomb. The bodies of dead lizards, snakes and mice that have entered hives are sealed into the walls with bee glue, thereby protecting the colonies against the unpleasant odder and bacterial flora of the putrefying corpses **(Ghisalberti *et al*., 1978),** and has been reported to have various biological activities such as antibacterial **(Petrova *et al*., 2010) ,** antiviral **(Abd El Hady & Hegazi , 2002, Hegazi et al., 2003& 2004 and Abd El Hady et. Al., 2007) ,** antiinflammatory **(Moura *et al.*, 2009) ,** and anticancer **(Hegazi et al., 1998 and Kimoto *et al*., 2001)** .

History:



Propolis is one of the few natural remedies that have maintained its popularity over a long period of time. In ancient times propolis was used specially in antiquity, in Egypt . There some thousand years BC propolis was very well known to the priests who had monopolized medicine, chemistry and art of mummifying corpses **(Hegazi, 1998)**. The fact that propolis was also known to the old Greeks is demonstrated by **(Makashvili, 1978).**

Chemical composition of propolis:

Propolis usually contains a variety of chemical compounds, such as polyphenols (flavonoids, phenolic acids and their esters), terpenoids, steroids, and amino acids. The composition of propolis depends on the vegetation at the site of collection. Because of the geographical differences, propolis samples from Europe, South America, and Asia have different chemical compositions **(Marcucci *et al.*, 2001).** Propolis from Europe and China contains many kinds of flavonoids and phenolic acid esters **(Bankova *et al* ., 2000).** By contrast, the major components in propolis of Brazilian origin are terpenoids and prenylated derivatives of p-coumaric acids **(Marcucci *et al.*, 2001).** Due to the differences in their chemical compositions, the biological activities of propolis from different areas are also different.

Numerous studies, carried out with the combined efforts of phytochemists and pharmacologists, led in recent years to the idea that different propolis samples could be completely different in their chemistry and biological activity. **(Bankova *et al*., 2005).**

So what about the Egyptian propolis? Many pervious studies were carried on the Egyptian propolis resulted in the following:

A) Identification of more than 200 bioactive compounds (by GC/MS and HPLC). **(Abd El Hady & Hegazi 2002 and Hegazi & Abd El Hady 2002)**.

B) Egyptian propolis possessing many biological activities such as antitumor, antioxidant, antibacterial, antifungal, antiviral activities and suppress LDL oxidation. **(Hegazi, et al., 2000a, 2000b; Hegazi & Abd El Hady,2002, Hegazi, et al., 2004); Hegazi (2006) and Abd El Hady et al., 2007).**

In the last few years attention was directed towards the isolation of the bioactive compounds from the very complex mixture of propolis. However, very rare studies were reported in the current literature about isolated compounds from Egyptian propolis(**Hegazi & Abd El Hady, 2010**) therefore it is deemed necessary in this study to try to isolate some compounds from the Egyptian propolis and also studying their antioxidant activity.

Antioxidant activity

In the human body the oxidation is linked to the ageing process, mutation of the genetic material and of the degradation of the alive tissue. The responsible compositions for that malicious action are known as free radicals. Active oxygen or reactive oxygen species **(ROS)** and related species, as parts of free radicals, play an important physiological role and, at the same time, they may exert toxic effects as well. The active oxygen species are essential for production of energy, synthesis of biologically essential compounds, and phagocytosis, a critical process of our immune system. They also play a vital role in signal transduction, which is important for cell communication and function. On the other hand, there is now increasing evidence which shows that these active oxygen species may play a causative role in a variety of diseases including heart disease , cancer, and agin. (**McVean *et al*., 2000; Hegazi & Abd El Hady 2002, Abd El Hady et al., 2007; Muñoz *et al*., 2007).**

Types of Free radicals and their sources:

Different environmental stress factors like pollution, drought, temperature, excessive light intensities, ultraviolet light, ionizing radiation, chemical reactions, nutritional limitation and metabolic processes are able to increase the production of ROS (for example, H_2O_2, $O_2^{-\bullet}$, $^{\bullet}OH$), and have numerous pathological effects, such as causing lipid peroxidation, protein peroxidation, DNA damage, and cellular degeneration related to cardiovascular disease, ageing, cancer, inflammatory diseases and a variety of other disorders **(Rijstenbil 2002).** Antioxidants are molecules which can safely interact with free radicals and terminate the chain reaction before vital molecules are damaged. In the nature, there are several enzymetic systems within the body that scavenge free radicals, the principle micronutrient (vitamin) antioxidants are vitamin E, beta-carotene, and vitamin C. Additionally, function of one of the body's antioxidant enzyme systems, is sometimes included in this category. But the body cannot manufacture these micronutrients so they must be supplied in the diet.

Recently, propolis has been studied as an alternative to combat that oxidation. Its chemical composition, formed essentially by phenolic compounds suggests us to believe that it is a product with great antioxidant strength.

The antioxidant activity of phenolics is mainly due to their redox properties, which allow them to act as reducing agents, hydrogen donators, and singlet oxygen quenchers. In addition, they have a metal chelation potential (**Hegazi & Abd El Hady 2002, Abd El Hady et al., 2007**)

Both active oxygen species and antioxidants are double-edgeds words and the balance of their beneficial and toxic effects is determined by the relative importance of many competing biological reactions.Propolis obviously possesses antioxidant activity, as reported by many researchers. However, there are few studies on the relationship between the antioxidant activity and individual chemical constituents in propolis. Thus, in this study, it was deemed desirable to isolate some bioactive compounds from Egyptian propolis and investigate its ***in vitro*** antioxidant activity.