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Insect Derived Medicines: A New Discovery Towards Entomotherapy

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Entomotherapy, the use of insects and insect-derived products for medicinal purposes represents an emerging and sustainable approach in modern healthcare. Insects have long been utilized in traditional medical systems such as Ayurveda and Traditional Chinese Medicine and recent scientific advances have renewed interest in their therapeutic potential. Insect-derived medicines contain a wide range of bioactive compounds including antimicrobial peptides, enzymes, venoms, hormones and anti-inflammatory substances that exhibit significant pharmacological activities. This article highlights the medicinal importance of selected insects such as bees, maggots, ants and silkworms. Bee products like honey, propolis, royal jelly and venom contribute to wound healing, immune enhancement and pain management. Maggot debridement therapy plays a vital role in cleaning chronic wounds and accelerating tissue regeneration. Ants provide bioactive substances useful in treating inflammation, infections and improving stamina, while silkworms supply compounds beneficial for neurological disorders, respiratory ailments and biomedical applications. The integration of traditional knowledge with modern biotechnology emphasizes the potential of insect-based therapeutics as eco-friendly, cost-effective and innovative alternatives in drug discovery and disease management. Entomotherapy, thus offers a promising frontier for future pharmaceutical research and clinical applications.

Keywords : Entomotherapy, bees, maggots, ants, silkworm, maggot debridement therapy

Introduction

Entomotherapy (sometimes called insect-based therapy) is the use of insects and insect-derived products for medicinal or therapeutic purposes. Insect-derived medicines refer to therapeutic substances obtained from insects or their products that are used in the prevention and treatment of diseases. Since ancient times, insects have played an important role in traditional medical systems such as Ayurveda, Traditional Chinese Medicine and folk medicine across many cultures. With advances in science and biotechnology, these traditional practices are now being scientifically explored and validated. Insects produce a wide range of bioactive compounds including antimicrobial peptides, enzymes, venoms, hormones and anti-inflammatory substances. These compounds show significant potential in treating wounds, infections, inflammation, pain and even chronic diseases. Well-known examples include honey and propolis from bees, maggot therapy for wound healing, silkworm products and bee venom used in controlled medical applications. In recent years, insect-derived medicines have gained attention due to the rise of antibiotic resistance, the need for novel drug sources and the sustainability of insects as biological resources. As a result insect-based therapeutics represent a promising and innovative field in modern medicine bridging traditional knowledge with contemporary pharmaceutical research.

Types of Medicinal insects

1.Bees

Bees (*Apis* spp.) are among the most important medicinal insects used in entomotherapy because they provide a wide range of biologically active products with therapeutic value. The most well-known product is honey, which possesses strong antibacterial, antifungal, antioxidant, and wound-healing properties. It has been traditionally used to treat burns, ulcers, cough, sore throat, and digestive disorders and modern medicine recognizes its role in tissue regeneration and infection control. Another valuable product is bee venom (apitoxin) secreted through the sting of worker bees. Bee venom contains peptides such as melittin and apamin that show anti-inflammatory and pain-relieving effects and it is used in apitherapy for treating arthritis, rheumatism, multiple sclerosis, and neuralgia, although it must be applied carefully due to the risk of allergic reactions. Propolis, commonly called bee glue, is a resinous substance collected from plant buds and mixed with wax and enzymes. It has potent antimicrobial, antiviral, anti-inflammatory and immunomodulatory activities and is widely used in treating mouth ulcers, throat infections, wounds and skin diseases. Royal jelly, a milky secretion from worker bee glands, is rich in proteins, vitamins, lipids and hormones and is known for boosting immunity, improving metabolism, enhancing fertility and delaying aging. Bee pollen is another medicinal product containing amino acids, minerals and antioxidants; it acts as a nutritional supplement, improves digestion, increases stamina and reduces inflammation. Beeswax, secreted from abdominal glands, is used in pharmaceutical preparations and ointments because it protects the skin, promotes healing and forms an antimicrobial barrier. Together, these bee-derived substances make bees one of the most valuable medicinal insects, widely used in traditional systems like Ayurveda and in modern therapeutic applications.

2.Maggots

Maggots, the larval stage of certain flies, are important medicinal insects widely used in entomotherapy, especially in modern wound management. The most commonly used species is the green bottle fly, *Lucilia sericata*. These medicinal maggots are applied in a controlled and sterile form in a treatment known as maggot debridement therapy (MDT) or larval therapy. Maggots selectively feed on dead and infected tissue while leaving healthy tissue untouched, which helps in cleaning chronic, non-healing wounds such as diabetic foot ulcers, pressure sores, venous leg ulcers and traumatic injuries. During feeding, maggots secrete proteolytic enzymes that liquefy necrotic tissue and possess strong antibacterial properties against pathogens like *Staphylococcus aureus* and *Pseudomonas aeruginosa*. Their secretions also increase wound oxygenation, reduce biofilm formation and stimulate the growth of healthy granulation tissue thereby accelerating healing. In addition, maggots help control infection by altering wound pH and producing antimicrobial compounds. Because they are natural, cost-effective and reduce the need for antibiotics or surgery, maggot therapy has regained importance in modern medicine alongside traditional practices. Thus, medicinal maggots represent a remarkable example of how insects contribute directly to effective and eco-friendly healthcare solutions.

3.Ants

Ants are widely recognized as medicinal insects in entomotherapy and traditional medicine because of their nutritional richness and the presence of many biologically active compounds with therapeutic effects. Several species such as the weaver ant (*Oecophylla smaragdina*), black ant (*Polyrhachis* spp.), carpenter ants (*Camponotus* spp.), and red ants (*Solenopsis* spp.) are commonly used in Asia, Africa and South America for medicinal purposes. Ant bodies and secretions contain important substances like formic acid, alkaloids, flavonoids, peptides, enzymes, steroids and antimicrobial proteins, which contribute to their medicinal value. One of the most important components is formic acid, responsible for strong antibacterial, antifungal and anti-inflammatory activities. In traditional practices, crushed ants or ant extracts are applied externally to treat wounds, skin infections, boils and ulcers, where they act as natural disinfectants and promote healing. Ant stings have been deliberately used

in some folk systems to relieve arthritis, joint pain, rheumatism and paralysis, as the injected venom improves blood circulation and reduces inflammation. Internally, ant-based preparations are consumed to improve immunity, stamina, fertility and metabolism, because ants are rich in proteins, essential amino acids, minerals like zinc, iron, calcium and bioactive lipids. Ant eggs and larvae are also eaten as nutrient supplements in several cultures.

Medicinal ants are further known for their role in treating respiratory problems, digestive disorders and nervous system ailments. Extracts from *Polyrhachis* ants in Chinese medicine are used as tonics to combat fatigue, aging and sexual weakness. Scientific studies have shown that ant-derived compounds possess antioxidant, immunomodulatory, antimicrobial and anti-tumor activities, making them promising for pharmaceutical research. Thus, ants are not only ecologically important insects but also valuable medicinal resources, contributing significantly to traditional healthcare systems and modern entomotherapeutic applications

4.Silkworm

Silkworms are important medicinal insects used in entomotherapy, especially in Asian traditional medicine because different stages and products of the silkworm (*Bombyx mori*) possess significant therapeutic value. The most widely used medicinal form is the stiff silkworm, known as *Bombyx batryticatus*, which is a silkworm larva naturally infected and mummified by the fungus *Beauveria bassiana*. This form has been used in Traditional Chinese Medicine for centuries. Silkworm bodies contain a variety of bioactive substances such as proteins, peptides, enzymes, fatty acids, flavonoids, sterols and polysaccharides, which provide medicinal effects including anti-inflammatory, antioxidant, antispasmodic, anticoagulant and antimicrobial activities.

In traditional medicine, silkworm preparations are used to treat convulsions, epilepsy, facial paralysis, stroke, headaches and tremors because of their neuroprotective and muscle-relaxing properties. They are also used to relieve phlegm, cough, asthma and throat infections as silkworm compounds help reduce mucus and inflammation in the respiratory tract. Silkworm extracts support wound healing and tissue regeneration and silk proteins such as sericin and fibroin are now widely used in modern biomedical applications for making surgical sutures, wound dressings and drug delivery systems.

Additionally, silkworm pupae are rich in nutrients like high-quality protein, essential amino acids, vitamins and minerals and are consumed as functional foods to improve immunity, energy and metabolism. Silkworm oil extracted from pupae contains beneficial fatty acids that help reduce cholesterol and support cardiovascular health. Because of these multiple therapeutic and biomedical uses, the silkworm represents one of the most valuable medicinal insects bridging traditional remedies and modern medical technology.

Conclusion

Insect-derived medicines represent a promising and innovative dimension of modern healthcare through the practice of entomotherapy. From ancient traditional systems to contemporary biomedical research, insects have proven to be valuable sources of bioactive compounds with antimicrobial, anti-inflammatory, antioxidant, immunomodulatory and regenerative properties. The therapeutic applications of bees, maggots, ants and silkworms highlighted in this article demonstrate how insect products contribute effectively to wound healing, pain management, immune enhancement, neurological support and the treatment of chronic and infectious diseases.

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