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Earthworms in Modern Medicine (Annelida: Oligochæta)

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Abstract

Earthworms (Annelida: Oligochaeta) are increasingly recognized as valuable sources of bioactive compounds with significant medical potential. Extracts such as lumbrokinase, peptides, and polysaccharides demonstrate anticoagulant, fibrinolytic, antimicrobial, and anti-inflammatory properties. These activities support applications in cardiovascular therapy, wound healing, infection control, and regenerative medicine. Advances in isolation and characterization techniques have enabled the transition of earthworm-derived substances from traditional remedies to evidence-based biomedical research.

Keywords: Lumbrokinase; Anticoagulants; Anti-Bacterial and Anti-Inflammatory Agents; Antioxidants; Wound Healing/drug effects; Regenerative Medicine; Drug Discovery; Biological Products/therapeutic use

Introduction

Earthworms have long been described as soil engineers or nature's ploughmen for many years (Darwin, 1881) [1] Earthworms, long used in traditional remedies across Asia, are now being studied in biomedical research for their pharmacological potential (Reynolds and Reynolds, 1979; 2025a, b) [3-5]. In Traditional Chinese Medicine, also in Japan, Korea and Vietnam, earthworms (known as Di Long, and earthworm, respectively) have been used for centuries to treat fever, asthma, and convulsions. They are increasingly recognized as valuable contributors to modern medicine, offering bioactive compounds with antimicrobial, anti-inflammatory, and immunoprotective properties.

Discussion

Modern science has identified several ways whereby earthworms contribute to medicine:

1. Antimicrobial properties: Extracts from earthworms show activity against bacteria and fungi, making them promising candidates for new antibiotics.
2. Proteins and enzymes: Earthworms produce bioactive proteins, peptides, and enzymes which aid in wound healing, reduce inflammation, and support tissue regeneration.

3. Immunoprotective agents: Their immune systems contain leukocytes and humoral products which can stimulate human immunity, offering potential in treating infections and immune-related disorders.
4. Anti-inflammatory effects: Earthworm extracts have been shown to reduce swelling and pain, which could be applied in arthritis and other inflammatory conditions.
5. Cardiovascular benefits: Certain enzymes, such as lumbrokinase derived from earthworms, are being investigated for their ability to dissolve blood clots and improve circulation.

Current meta-analyses and clinical studies confirm that these traditional uses align with measurable pharmacological effects, bridging ancient practices with modern biomedical applications (Ramasamy, 2024; Verma et al., 2024) [2, 6].

Trends in future earthworm-medical research include exploring earthworm-derived compounds for: 1) novel antibiotics to combat drug-resistant infections, 2) natural wound-healing agents for surgical recovery, 3) natural alternatives to synthetic anticoagulants, 4) their bioactive compounds may be harnessed for nanomedicine and targeted drug delivery, and 5) therapies for cardiovascular disease, especially clot-related conditions.

Conclusion

Earthworms, often overlooked as simple soil dwellers or engineers, are now proving to be biomedical allies. Their extracts and enzymes hold promise for tackling some of the most pressing medical challenges today, from antibiotic resistance to cardiovascular health. As research advances, earthworms may move from traditional medicine into mainstream clinical practice. Their natural compounds could inspire the next generation of medicines.

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