Code:1616

Leucochloridium paradoxum: Anatomy of a “Zombifying” Parasite

A Narrative-Analytic Review of the Behavioural Manipulation Mechanism of the Snail Host, Compared with Other Behaviour-Manipulating Parasites and Fungi

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Backgrounds

Background: One of the identified examples of host biological manipulation by parasites is the ability of a parasite to induce behavioral or morphological changes in its host(1). These changes usually facilitate transmission to its definitive host: the intermediate host, snails of the genus Succinea, becomes more easily seen and preyed upon by birds, allowing the parasite to reach its destination(2). Leucochloridium paradoxum selects only snails as intermediate hosts, since snails of the family Succineidae are the only hosts in which this parasite can complete its larval stages(2, 3). Specific co-evolution, strong dependence, and the particular characteristics of the snail’s tentacles allow simultaneous manipulation of behavior and appearance(3). The aim of this article is to review and analyze existing studies on the biology, life cycle, host selection, and possible mechanisms of behavioral manipulation by Leucochloridium paradoxum in snail hosts(1, 3). This phenomenon is subsequently examined in comparison with other known examples of host behavioral changes caused by parasites(4) and within the framework of Richard Dawkins’ concept of the “extended phenotype.”

Methods

A search of PubMed, Google Scholar, Scopus, and Web of Science was conducted to identify articles published in recent years concerning the parasite Leucochloridium paradoxum. The search terms included combinations of Leucochloridium paradoxum, zombification, comparison with other zombifying organisms in nature, and aggressive mimicry.

Findings

Overall, host behavioral manipulation has been observed in many groups and various forms of living organisms(1, 4). This indicates that the relationships between parasites and hosts extend beyond merely pathogenic interactions(1). This complexity results in behaviors that are distinct from the complications of disease(1, 5).





Conclusion

Research and study of this phenomenon can clarify the relationship between the parasite, infection, as well as behavior and the nervous system(4, 5).

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