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Guild structure of larval trematodes in molluscan hosts: prevalence, dominance and significance of competition

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4.1 INTRODUCTION

Descriptive analyses of parasite community structure are now available for a wide variety of vertebrate hosts (see Chapters 1, 5, 6, 7, 8 and 9; see also Choe and Kim, 1987). Parasite communities of invertebrate hosts have received less attention. Yet, important features distinguish invertebrates as hosts for parasites. These attributes may impart some unique characteristics to the structure or organization of parasite communities of invertebrate hosts in contrast to vertebrate hosts. Firstly, invertebrates are usually smaller than vertebrates. Secondly, many invertebrates, particularly arthropods and molluscs, serve as intermediate hosts for parasites that complete their development in a vertebrate host. These multiple host life cycles considerably complicate the nature of parasite community organization. Consequently events in the vertebrate hosts, remote in space and time, may play a direct role in the structure of parasite communities of invertebrate intermediate hosts. The reverse is also possible; dynamics in the invertebrate host may affect parasite community structure in the vertebrate hosts. Further, invertebrate populations are generally more amenable to experimentation and field manipulation than are vertebrates. Thus, the organizational features of parasite communities in invertebrate hosts may be

studied using the most powerful methodologies available to community ecologists (Castilla and Paine, 1987).

Arthropods and molluscs are the invertebrate groups in which species-rich assemblages of parasites have been most often reported (e.g. Price, 1973; Askew and Shaw, 1986; Martin, 1955; Holliman, 1961; Loker *et al.*, 1981). Most of the parasite species in these assemblages are parasitoids and parasitic castrators (Kuris, 1973, 1974; Combes, 1982).

These trophic interactions are defined on the basis of the interaction between the individual consumer (or its asexual progeny) and its host (Kuris, 1974). An individual parasitoid always kills its host. Pathogenicity is not intensity dependent and parasitoids are commonly large in body size relative to host size, often reaching from 10% to 50% the combined weight of host and parasitoid. Well known examples include ichneumonid hymenopterans and mermithoid nematodes. An individual parasitic castrator always blocks reproduction of its host. As with parasitoids, pathogenicity is not intensity dependent and body size of parasitic castrators is large compared with host size. Examples include rhizocephalan barnacle parasites of crustaceans and larval trematodes in their first intermediate molluscan hosts. With respect to host-parasite interactions, parasitoids and parasitic castrators are similar from an evolutionary standpoint. Both eliminate the reproductive future of the host.

Other parasites, termed typical parasites (Kuris, 1974), usually cause little or no pathology in individual infections. Pathology is intensity dependent, and at high intensities damage may be considerable. Body size is very small; typical parasites being less than 1% the weight of the host. Examples include adult trematodes and cestodes in their vertebrate hosts.

Because both parasitic castrators and parasitoids use much of the energy resources of their hosts and are so large relative to host size, the energy available to an infracommunity of parasitic castrators or parasitoids is quite likely to be a limiting resource. Thus, habitat displacement within the host is unlikely to ameliorate potentially competitive demands for resources within an individual host. Hence, all the parasitoid and parasitic castrator members of an infracommunity can be treated as a guild (*sensu* Root, 1973), using and potentially limited by the same resource, the host.

To examine community structure and function, I selected the guild of larval trematodes parasitizing the horn snail, *Cerithidea californica*. This abundant salt-marsh snail ranges geographically from Tomales Bay, California to Laguna San Ignacio, Baja, California (Abbott and Haderlie, 1980). It is often parasitized by a species-rich assemblage of larval trematodes (Martin, 1955; Yoshino, 1975; Sousa, 1983).