

HELMINTH COMPONENT COMMUNITIES OF *PODARCIS PITYUSENSIS* (SAURIA: LACERTIDAE) FROM ISOLATED AND NON-ISOLATED HOST POPULATIONS

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Abstract: Analysis on the component communities of four populations of *Podarcis pityusensis* (Lacertidae) have been carried out. Two of the host populations were isolated one another, both living in separated islets, and two were non isolated populations both living in the same island. We tested the Poulin's hypothesis concerning the structure of helminth component communities in isolated and non-isolated host populations. Three of the host populations show helminth communities that agree Poulin's predictions. But in one of them that predictions are failed probably due to antropic actions.

Key words: Helminth communities; *Podarcis pityusensis*. **Running head:** Helminths from isolated and non-isolated lizard host populations.

Resumen: Comunidades componentes de helmintos parásitos de *Podarcis pityusensis* (Sauria: Lacertidae) en poblaciones de hospedadores aisladas y no aisladas.- Se ha llevado a cabo un análisis cualitativo comparativo entre las comunidades componentes de helmintos parásitos de cuatro poblaciones de *Podarcis pityusensis* (Lacertidae), dos de ellas aisladas entre sí, habitantes de dos islotes distintos y otras dos no aisladas, habitantes de la misma isla. Se ha testado la hipótesis de Poulin relativa a la estructura de las

comunidades helmintianas componentes de poblaciones de hospedadores en condiciones de aislamiento y no aislamiento. Tres de las poblaciones analizadas cumplen con las predicciones de Poulin, mientras que una de ellas se aleja de las mismas. Se señalan causas relacionadas con la antropización del área como las más probables en cuanto a la modificación de la estructura prevista de la comunidad helmintiana componente de las lagartijas de dicha zona.

Palabras clave: Comunidades helmintianas; *Podarcis pityusensis*.

Resum: Comunitats components d'hèlmints paràsits de *Podarcis pityusensis* (Sauria. Lacertidae) en poblacions d'hostes aïllades i no aïllades.- S'ha portat a terme una anàlisi qualitativa comparativa entre les comunitats components d'hèlmints paràsits de quatre poblacions de *Podarcis pityusensis* (Lacertidae), dues aïllades entre elles mateixa, habitants de dos illots diferents, i altres dues no aïllades, habitants de la mateixa illa. S'ha testat la hipòtesi de Poulin en relació a la estructura de les comunitats helmintianes components de poblacions d'hostes en condicions de aïllament i no aïllament. Tres de les poblacions analitzades compleixen les prediccions de Poulin, mentre que una de elles, se'n allunya. Se'n assenyalen possibles causes relacionades amb

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l'antropització, com les més probables quan a la modificació de l'estructura prevista de la comunitat helmintiana component de les sargantanes d'eixa zona.

Paraules clau: Comunitats d'hèlmints; *Podarcis pityusensis*.

INTRODUCTION

Component community of parasites in a host is the ensemble of populations of all parasite species exploiting a host population at one point in time. The various parasite component communities of the different populations of one host species are all subsets of the entire set of parasite species exploiting that host species across its entire geographical range. This larger collection of parasite species is referred to as parasite fauna (POULIN, 1998).

Hypothesis about evolution of faunas and component communities of parasites (see POULIN, 1998) predict that frequent contacts and exchanges of parasites between host populations of the same species should lead to highly homogeneous component communities all saturated with species (in relation to host parasite fauna). In contrast, if different host populations are isolated from one another, we may expect them to develop very different component communities.

Podarcis pityusensis (Sauria: Lacertidae) is a very useful host to test this hypothesis. It is an endemic lizard from Pityusic Islands (Balearic Archipelago, West Mediterranean) which parasite fauna is well known (ROCA & HORNERO, 1994) as well as the

component communities from most of their isolated populations (HORNERO, 1991).

In this paper we analyze the component communities from four host populations of *P. pityusensis*. That of La Savina and the rest of the island of Formentera as non-isolated populations (Figure 1) (although CIRER, 1987 considered as the same subspecies the lacertid lizards living in the island of Formentera, *P. pityusensis formenterae*, HORNERO, 1991 considered as a distinct population lizards living in the area of La Savina because it is an antropic area), in which contacts and exchanges of parasites between them may have been able (Formentera is a plain and uniform island, favouring genetic flow among lizard populations), and so we might expect homogeneous



Figure 1. The Pityusic Islands. Prospected host populations: 1-La Savina, 2-Formentera, 3-Murada, 4-Iagomago

component communities. And that of the islets of Murada and Tagomago, isolated host populations in which we might expect different and non-saturated component communities.

MATERIAL AND METHODS

The Balearic Islands, located east of the Iberian peninsula, are composed by four main islands and a number of peripheral islets. Lacertids living in Eivissa and Formentera (and surrounding islets) (Figure 1) are represented by the endemic species *Podarcis pityusensis* (SALVADOR, 1986; SALVADOR & PÉREZ-MELLADO, 1984).

Lizards were caught as follows: 94 specimens from Formentera island (except La Savina); 34 from La Savina (the seaport of Formentera); 32 from Tagomago; and 31 from Murada, both small islets near Eivissa island. Helminths from that lizards were

obtained and processed after standard helminthological techniques (see ROCA & HORNERO, 1994).

We discuss our results in terms of species richness (BUSH *et al.*, 1997) and homogeneity or heterogeneity of component communities from the analysis of helminth infracommunities of each individual host for each host population.

RESULTS

Helminth fauna of *P. pityusensis* is formed by all the parasite species parasitizing this lacertid lizard in its distribution area (Eivissa and Formentera islands and peripheral islets around them) (ROCA & HORNERO, 1990). In all, two Trematoda, four Cestoda, eight Nematoda and one Acanthocephala were found parasitizing different sites of lizards (Table 1).

HELMINTH SPECIES	SITE
<i>Paradistomum mutabile</i>	Gall bladder
<i>Brachylaima</i> sp.	Intestine
<i>Oochoristica gallica</i>	Intestine
<i>Nematotaenia tarentolae</i>	Intestine
<i>Diplopylidium acanthotetra</i> (larvae)	Body cavity
<i>Mesocetoides</i> sp. (larvae)	Body cavity
<i>Skrjabinodon medinae</i>	Cloaca
<i>Spauligodon cabreræ</i>	Cloaca
<i>Parapharyngodon bulbosus</i>	Cloaca
<i>Parapharyngodon echinatus</i>	Cloaca
<i>Parapharyngodon micipsæ</i>	Cloaca
<i>Strongyloides ophiusensis</i>	Intestine
<i>Acuaria</i> sp. (larvae)	Body cavity
Spirurida gen. sp. (larvae)	Body cavity
<i>Centrorhynchus</i> sp. (larvae)	Body cavity

Table 1. Parasite fauna of *Podarcis pityusensis*

Component community of lizards of Formentera island (Table 2) includes twelve of the fifteen species that constitutes the helminth fauna of the host. Three of them, *D. acanthotetra*, *Mesocestoides* sp. and *Acuaria* sp. were found as larval stages, so *P. pityusensis* is an intermediate host for these species. The rest of helminth species were found as adult forms. Component community of lizards of La Savina is formed only by four species. On the other hand, component communities of two separated lizard populations (Tagomago and Murada) include six and three species respectively (Table 2).

DISCUSSION

POULIN's (1998) predictions for helminth component communities state that isolated populations of the same host species will harbour poor and non-saturated communities (in relation to host helminth fauna), and both

communities will be different. In fact component communities of lizard populations of the islets Tagomago and Murada, are poor (only six and three helminth species respectively) (Table 2) and non-saturated in relation to helminth fauna (fifteen helminth species) (Table 1). Both communities are quite different having only one common helminth species, *Parapharyngodon micipsae*. Both islets Tagomago and Murada are 8,000 years old (COLOM, 1988) and during this time no contacts between hosts and no exchanges of parasites have been possible, consequently component helminth communities of both host populations became different.

Frequent contacts and possible exchanges of parasites are expected among lacertid lizards from Formentera and La Savina, non-isolated populations. It might be reflected in rich, saturated and homogeneous component communities (POULIN, 1998). Thus, in lizards from Formentera we found rich and saturated component community

Helminth species	FORMENTERA	LA SAVINA	TAGOMAGO	MURADA
TREMATODA	<i>Paradistomum mutabile</i> (41.5) <i>Brachylaima</i> sp. (1.1)		<i>Paradistomum mutabile</i> (43.8)	
CESTODA	<i>Oochoristica gallica</i> (11.7) <i>Nematotaenia tarentolae</i> (17) <i>Diplopylidium acanthotetra</i> (5.3) <i>Mesocestoides</i> sp. (1.1)	<i>Diplopylidium acanthotetra</i> (14.7)	<i>Oochoristica gallica</i> (6.3) <i>Diplopylidium acanthotetra</i> (15.6)	<i>Mesocestoides</i> sp. (19.4)
NEMATODA	<i>Serjabinodon medinae</i> (24.5) <i>Spauligodon cabrenae</i> (58.5) <i>Parapharyngodon bulbosus</i> (23) <i>Parapharyngodon micipsae</i> (22) <i>Strongyloides ophiusensis</i> (4.3) <i>Acuaria</i> sp. (2.1)	<i>Serjabinodon medinae</i> (14.7) <i>Spauligodon cabrenae</i> (55.9) <i>Parapharyngodon micipsae</i> (5.9)	<i>Serjabinodon medinae</i> (6.3) <i>Spauligodon cabrenae</i> (53.1) <i>Parapharyngodon micipsae</i> (21.9)	<i>Parapharyngodon bulbosus</i> (41) <i>Parapharyngodon micipsae</i> (35.5)

Table 2. Component communities of *Podarcis pityusensis* from prospected localities. Prevalences are given in parenthesis (%)

(see Tables 1 and 2). But lizards from La Savina show poor and non-saturated component community. So this host population do not agree POULIN's (1998) hypothesis. Why this situation occurs? Considering helminths found as adult form (see results), *P. mutabile*, *Brachylaima* sp., *O. gallica*, and *N. tarentolae* have indirect life cycles (see TIMON-DAVID & TIMON-DAVID, 1967; MAS-COMA & FELIU, 1984; HORNERO, 1991) and the nematodes *S. medinae*, *S. cabreræ*, *P. bulbosus*, *P. micipsae* and *S. ophiusensis* are monoxenous (ROCA *et al.*, 1986a,b; ROCA & HORNERO, 1992). In La Savina host population, we have not found any heteroxenous helminth species and this suggests that in this area there are not the appropriate intermediate hosts for the development of life cycles of that parasites. As these intermediate hosts are present in other areas of the island of Formentera, we believe that the antropic action near of the seaport is the cause of disappearance of these moluscs and insects. These human actions were in the way of destroying natural habitats for terrestrial snails and insects, changing them by buildings.

So, we can conclude that POULIN's (1998) hypothesis is adequate if considering monoxenous helminths. Nevertheless other factors depending of habitats in which hosts live, may be considered in the establishment of helminth component communities, in the case of helminths with indirect life cycles.

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