

ON THE PREVALENCE OF AN ALIEN RHIZOCEPHALAN PARASITE AT THE SOUTHERN AND NORTHERN LIMITS OF ITS INTRODUCED RANGE

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Abstract

The Erythrean crab *Charybdis longicollis* had established populations in the Levantine basin of the Mediterranean Sea in the mid 20th century, that were parasitized, in the last decade of that century, by the rhizocephalan *Heterosaccus dollfusi*, itself an Erythrean alien. In May 2008 the host populations were sampled at the southern (Israel) and northern (Turkey) limits of its introduced range. The prevalence of infection and multiple externa-bearing hosts were higher in Israel than in Turkey. It seems that off the Israeli coast the water temperature permits the synchronous ontogenetic development of both host and parasite ensuring availability of plentiful young, recently-molted prospective hosts for infection by the short-lived parasite cypris.

Keywords: Crustacea, Temperature, Parasitism

Absence of natural enemies, be it competitors, predators, or parasites, is one of the explanations given for the success of alien biota. Yet, though parasite species richness may be lower in alien hosts in their new range, the prevalence of infection may be many times higher. The Levantine populations of the Erythrean invasive swimming crab *Charybdis longicollis* have been parasitized by the sacculinid rhizocephalan *Heterosaccus dollfusi*, itself an Erythrean alien [1]. An earlier study that examined the temporal variability of *H. dollfusi* prevalence at Palmahim, Israel, a site at the southern end of its introduced range, found that despite the high prevalence of the parasite and its injurious impact on the host, there was "no noticeable reduction in the host population"[2]. We sought to examine the spatial variability of the parasite's prevalence along a latitudinal gradient within its introduced range. To that end we sampled the host populations off Ashdod (Israel) and Antalya (Turkey) in May 2008 and July 2009.



Fig. 1. Map of the investigated area: *=Antalya, **=Ashdod.

The prevalence of infection in Ashdod was more than three times higher than in Antalya. Multiple parasitization was common in the Ashdod population of *C. longicollis*: over half of the externa-bearing hosts harboured more than one externa. In contrast, most of the externa-bearing hosts (84.2%) collected off Antalya bore a single externa, and only few more than three. Multiple externa are related to prevalence of infestation, as the parasite avoids settling on an already infected host, and does so only when the chances of encountering an uninfected host are diminished. The small number of externa-bearing hosts bearing more than a single externa off Antalya (15.8%), though the density of the host population is high, is further proof that the infection rate off Antalya is

indeed a fraction of that in Ashdod and not a fortuity of the sampling.

Antalya					Ashdod				
	May 2008		July 2009			May 2008		July 2009	
	N	%	N	%		N	%	N	%
M	481	51.0	673	59.6	M	234	14.9	150	23.9
F	280	29.7	215	19.0	F	136	8.7	320	33.1
MI	20	2.1	109	9.6	MI	843	53.7	239	5.1
ME	82	8.7	66	5.8	ME	239	15.2	375	19.5
FI	11	1.2	20	1.8	FI	34	2.2	86	3.4
FE	70	7.4	47	4.2	FE	83	5.3	288	14.9
tot	944		1130		tot	1569		1458	
parasite ratio	19.4		21.4		parasite ratio	76.4		67.8	
	May 2008		July 2009			May 2008		July 2009	
	average CW	range	average CW	range		aver. CW	range	aver. CW	range
M	41.8	21.6-63.5	39.5	21.2-59.0	M	28.2	17.0-59.7	34.4	25.7-52.5
F	34.8	24.6-46.7	33.1	23.8-44.7	F	27.1	19.4-40.6	29.4	24.5-38.6
MI	34.3	27.1-53.4	31.3	21.2-44.8	MI	26.6	15.0-42.2	32.7	21.1-46.0
ME	36.7	26.3-54.7	38.8	30.6-56.0	ME	30.5	20.2-43.3	34.8	26.0-47.1
FI	30.3	25.3-39.0	34.2	28.8-44.3	FI	29.9	21.7-38.1	33.2	27.1-39.7
FE	36.0	25.8-43.9	37.3	28.0-47.8	FE	31.0	20.1-40.9	33.1	24.0-46.2

Fig. 2. Incidence of parasitization and carapace width (mm) in *Charybdis longicollis* respectively collected off Antalya, Turkey, and Ashdod, Israel, in May 2008 and July 2009. M, F: unparasitized males and females, MI, FI: internally parasitized males and females, ME, FE: externa-bearing males and females.

What then could constrain the parasitization of *C. longicollis* in the northern part of its introduced range? Could it be a biological response of a thermophilic alien to a latitudinal gradient of temperature? Data from the population off the Israeli coast suggest that this critical stage takes place in spring. Off the Israeli coast the water temperature permits the synchronous ontogenetic development of both host and parasite ensuring availability of plentiful young, recently-molted prospective hosts to the short-lived parasite cypris. The lower water temperature off Antalya may affect the timing of ontogenetic stages of one or the other, or increase the mortality of infected hosts, resulting in a sharply reduced infection success.

References

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