

EVOLUTION OF HOST-PARASITE ASSOCIATIONS AMONG SPECIES OF LICE AND ROCK-WALLABIES: COEVOLUTION? (J. F. A. SPRENT PRIZE LECTURE, AUGUST 1990)

S. C. BARKER

Department of Parasitology, University of Queensland, St. Lucia, Australia

It is indeed a great honour to receive an award that bears the name of John Frederick Adrian Sprent, the Foundation President of the Australian Society for Parasitology and the Father of Parasitology at the University of Queensland where I am at present a Research Fellow.

I am most grateful to the Society for this award. Sadly, financial reward for young scientists has always been rare but seems more so in these stringent times. It is awards like the John Frederick Adrian Sprent Prize that provide incentive for graduate students and in this way nurture the future of parasitology in Australia.

My postgraduate work was completed at Macquarie University under the guidance of Professor Geoff Sharman and Drs Robert Close and David Briscoe. I remain indebted to these fine Australian biologists.

My lecture, which is based on part of my PhD thesis, is entitled "*Evolution of host-parasite associations among species of lice and rock-wallabies: coevolution?*" The idea of coevolution has been pervasive in parasitology (see Brooks, 1979; Mitter & Brooks, 1983) and is, in the minds of many parasitologists, the null hypothesis for the evolution of host-parasite relationships. Host-parasite coevolution is attractive because it offers potential for inferring the phylogeny and historical zoogeography of hosts from that of their parasites, and the reverse, the phylogeny and historical zoogeography of parasites from that of their hosts. There have been surprisingly few studies, however, that have tested either the veracity of the coevolution model or, where hosts and parasites have not coevolved, sought to understand the processes at work.

Tests of the coevolution model using lice (Phthiraptera) are particularly important. Of all the macroparasites, lice might be expected to coevolve with their hosts because they lack free-living stages and intermediate hosts, are wingless and are largely dependent on the microenvironment of their hosts (Price, 1980). Consequently, transmission in general occurs only when hosts come into direct physical contact, e.g. during copulation and the care of offspring. Thus, when lice disperse they generally move to hosts that are conspecific. If opportunities to infest new taxa of hosts (i.e. switch hosts) are absent or rare then it is likely that hosts and parasites will evolve together. Parasites whose life-cycles involve free-living stages or intermediate hosts are exposed to a greater range of host taxa and thus are less likely to evolve with their hosts.

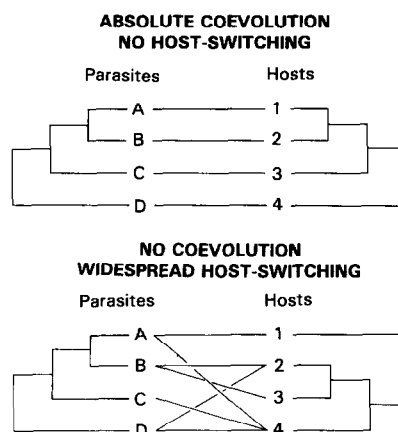


FIG. 1. Phylogenies of hypothetical hosts and parasites. Lines linking parasites and hosts indicate host-parasite associations.

HIGH HOST-SPECIFICITY

	Hosts			
	1	2	3	4
A	+			
B		+		
C			+	
D				+

LOW HOST-SPECIFICITY

	Hosts			
	1	2	3	4
A	+			+
B		+	+	
C				+
D		+		+

FIG. 2. Matrices of association for hypothetical hosts and parasites.

Host-parasite associations evolve through coevolution (association by descent or in the elegant terminology of Professor Sprent the passing of heirlooms), host-switching (colonization of new host taxa,