Ecology of the Acanthocephala

Commonly known as spiny-headed worms, acanthocephalans have a characteristic eversible proboscis, which bears rows of recurved spines used for attachment to the intestine of their host. Acanthocephalans are endoparasitic and an extremely successful group found in almost all marine, freshwater and terrestrial systems, infecting a huge range of definitive (usually vertebrate) and intermediate (usually arthropod) hosts during their life cycles. This volume is concerned with the ecology (distribution and abundance) of the Acanthocephala, and through this approach aims to reveal the huge success of this group of parasites. The acanthocephalans have evolved differently from all other groups of parasites, and as such represent a distinct and alternative pathway of parasite evolution and host–parasite interactions. Written for parasitologists, ecologists and zoologists who are interested in learning about a different pathway of parasite evolution, this book is aimed at postgraduate and research scientists.

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Preface

To do science is to search for repeated patterns, not simply to accumulate facts. The only rules of the scientific method are honest observations and accurate logic. To be great science it must also be guided by a judgement, almost an instinct, for what is worth studying.

MacArthur (1972)

We conclude that the complicated interplay between virulence and transmissibility of parasites leaves room for many coevolutionary paths to be followed, with many endpoints.

Anderson & May (1982)

The Acanthocephala are generally considered to be a small and rather insignificant group of parasites. They are a minor phylum of interest to specialists; as they rarely, and then accidentally, infect humans or cause significant disease or disorder to their farmed and domestic animals, they receive a cursory treatment even in most parasitology textbooks. Nevertheless, there have been some books devoted exclusively to them, principally *Acanthocephala of Domestic and Wild Animals* (Petrochenko, 1956, 1958), Vol. V of *Systema Helminthum* (Yamaguti, 1963), *An Ecological Approach to Acanthocephalan Physiology* (Crompton, 1970) and *Biology of the Acanthocephala* (Crompton & Nickol, 1985). The first two of these books are fundamentally systematic in their approach, whereas the latter two are far more biological. Crompton & Nickol's (1985) book does contain some chapters on acanthocephalan ecology, but it was published 20 years ago, and more recent information on their ecology can only be found in the primary scientific literature. Much recent information is being presented at the International Acanthocephalan Workshops, but proceedings of these are not published.

Parasitology can be viewed as a special branch of ecology since it is concerned with the relationships between organisms and their environment. This present volume attempts to present a comprehensive account of the ecology of the Acanthocephala. By so doing, it aims to show how an ecological approach can open up a new perspective on the phylum such that acanthocephalans can now be seen as a common, widespread and very successful group of parasites. The pattern of their evolution has differed in many respects from those of all other groups of helminth parasites and so they present a distinctive and characteristic path of host–parasite co-evolution.

Their impact on their hosts extends beyond host individuals onto populations and communities of free-living organisms and indeed into whole ecosystems. They are also proving to be very sensitive indicators of some forms of pollution. It is intended, therefore, that this book will be of interest to a wider readership, especially to freshwater and marine biologists and also to ecologists in general, as well as to parasitologists who may be excited by the prospect of recognising and studying a different pattern of parasite evolution. It is aimed primarily at postgraduates and researchers and it assumes at least an undergraduate knowledge of parasitology and ecology. It challenges some current ideas and paradigms on biodiversity, by showing what can be achieved in evolutionary terms by a group of organisms that comprises a small number of species and exhibits a high degree of morphological uniformity. It aims to provoke an interest in the group and to stimulate the reader. It also attempts to pluck the phylum from the obscurity of current textbooks and place it on a par with, for example, cestodes and nematodes as being a group worthy of study for its own sake.

No book can be comprehensive in its coverage, and this one is no exception. I am solely responsible for the selection of examples, which have been chosen from a wide range of hosts and habitats around the world. Nearly all examples in figures and tables have appeared in published form previously and I must thank all the authors and publishers for permitting me to use them: the source of each is acknowledged fully in the legends to figures and captions to tables. While the author alone must be held responsible for presentation and any errors, no book can ever be completed without the help of many people. I would like particularly to thank Ward Cooper, the then Commissioning Editor at Cambridge University Press, for his advice and efforts on my behalf and also his successor Dominic Lewis for being available to answer my many queries and deal with problems. Many of the ideas presented here have been developed in discussion with friends and

colleagues over a long period of time; and although it is invidious to single out particular persons I would like to mention Al Bush, David Crompton, Bahram Dezfuli, Celia Holland, John Holmes, Brent Nickol and Phil Whitfield in particular who have all contributed, often unknowingly and unwittingly, to the development of my ideas. I owe them a great deal as colleagues and friends. Other ideas have emerged from discussions with my postgraduate students and postdoctoral fellows and to them, and especially to Rachel Bates and Alastair Lyndon, I express my thanks.

Many other people have helped me in a variety of ways, by providing me with photocopies and advice, and I would particularly like to express my thanks to Omar Amin, Chris Arme, David Gibson, Eileen Harris, Robert Poulin, Jamie Stevens and Bernd Sures. Two other people deserve special thanks. The first of these is Ian Tribe, who, although a botanist, read through the manuscript for me and made many very valuable suggestions. Finally, and above all, I must thank my wife Pat. My interest in acanthocephalans was set alight by some of the questions raised in her thesis and now 30 years later I am still trying to explain and understand the significance of some of her findings. She was in large measure responsible for planting the idea of this book in my mind and in getting me to start on it despite my insistence that I would never write another book. She has supported me and encouraged me continually throughout the writing, through the creative times and through the inevitable frustrating times. Quite simply, this book could not have existed without her and both I and anyone who reads it and enjoys it owes her an enormous debt.