

The contribute of parasitology to the ecopathology in Italy: a one-way collaborations?

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Abstract: A prospect regarding the application of an ecological approach in parasitology is provided, presenting the advantages this approach can offer to parasitology itself. Thereafter, a review of papers published by Italian authors regarding parasitology in wild mammals and birds, with special emphasis to the year and type of publication and to the use of an ecological approach, is given. The diffusion of ecological approach in the published papers is discussed, taking into account the important role of Italian parasitologists as first promoters of the ecopathology in Italy in 1992. Since then, this approach provides a great scientific contribute to the understanding of disease transmission and control methods in wildlife. Nevertheless, it seems that this approach remains restricted to this limited group of hosts, while a future application of the ecological approach to different host species is to be encouraged as it may provide both an additional instrument and an alternative point of view for the study of parasites.

Key words: Parasitology, ecology, wildlife, ecopathology.

Lecture

Parasitology was born and developed mainly as a medical-health discipline identifying parasites as a pathogenic noxa and thus generally focusing its attention to the development of the knowledge related to clinical fields such as pathology and therapeutics. Conversely, the relationship with host population may identifies parasites as an ecological issue. A brief definition of ecology as the "scientific study of the interactions that determine the distribution and abundance of organisms" (Krebs, 1972; Begon et al., 2006) embrace at least two aspects involved in parasitology. The first regards the concept of interaction; according to it, the study of parasite and host populations became an ecological subject, side by side with other interactions such as predation and competition. The second regards the concept of abundance, which is of particular interest even from the medical point of view since the effects induced by most parasites are proportional to the intensity of infection occurring in the host. The latter aspect is of particular interest since classical epidemiological approach to parasitological diseases, dealing principally with parameters such as prevalence and incidence, may fail to reach some aspects by losing quantitative assessment of parasites.

While the term *ecology* was introduced by Haeckel in 1869, ecology as a science can be considered relatively "young" since it is only in 1925-'26 that the first formalized works describing the interaction between organisms, the Lotka-Volterra models, was published.

The ecological approach to the study of parasites is even younger, as it was officially considered only in 1971, when Crofton proposed his definition of parasitism as "an ecological relationship which must be expressed quantitatively in terms of populations" (Crofton, 1971). Afterwards, an ecological classification of parasites was proposed, based on the characteristics of the interaction of parasites with host populations, recognising two main groups: the macro and the microparasites. The Crofton's perspective stimulated primarily the works of Anderson and May (1978), in which the dynamic of the interactions between host and parasite populations have been quantitatively explored and formalized, and later a wide range of different studies regarding different ecological aspects applied to parasitology was published. In Italy, the ecological approach was applied, initially, to the study of macroparasite, and only later to microparasites such as bacteria and viruses. This was probably due to the great attention of the Italian parasitologists to the new approaches proposed by ecology; moreover, while the term "parasite" can be used in English in a broader sense, in Italian the term "parassita" mainly refers to helminths and arthropods. Thus, when, in 1992, the scientific Italian society for wildlife diseases (SIEF: Società Italiana di Ecopatologia della Fauna) was founded, almost all its members were parasitologist in the narrow meanings of the term and the term ecopathology (ecopatologia) was coined with the meaning of an ecological approach to the study of diseases. In 1994, during the first congress of the SIEF (AA.VV., 1996) a review of Italian scientific papers published from 1970 to 1994

on host-parasite relationship in wild mammals was presented (Guberti and Rossi, 1996) assessing the use of the ecopathological approach in the 425 collected articles. In October 2009, a new review of the publications of Italian authors about homeotherm wildlife diseases from 1995 to 2009 was carried out with the aim to evaluate any changes on the use of the ecopathological approach since 1994. Here we updated and extended the collected database and analysed it with the aim to evaluate the contribution of ecopathology to the study of parasitology in Italy. We classified the papers in relation to the scientific approach used (ecological or not) and, according to the classification used by Guberti and Rossi (1996), as: 1) simple description (first identification/isolation, reports, lesion descriptions); 2) description of parasite population (prevalence, seasonal trends, and so on); 3) measure of interaction between host and parasite populations (dynamic of host-parasite relationship); 4) management of diseases in host populations. We have found a total of 596 publications; 497 of them were about mammalian hosts (average 33,15 papers/year). Out of 596, 317 papers (53%) were about macroparasites and 86 were published by the journal "Parassitologia" both as communications during congresses and as standard publications. As already stated, we have considered only the studies about mammals and birds, but we have to stress that the ecological approach has been applied to a large number of studies regarding diseases in poikilotherms (cold-blooded animals), especially fishes. Moreover it is important to underline that, although we reviewed only studies about wildlife hosts, the ecological approach to the study of host-parasite relationship is undoubtedly appropriate also to domestic animals and thus we have probably underestimated the number of parasitological studies carried out with an ecological approach. This approach is even more desirable considering it is a useful tool both to characterize epidemiological picture and to define sustainable control measures. The topics investigated by the ecopathologists are mainly related to macroparasite, 48% of the studies, followed by microparasites (32%) and to a lesser extent toxicology (8%), pathology (3%) and others. The number of publications related to any aspect of ecopathology and about macroparasite shows a general increase from 1995 to 2009 (Fig. 1). The most of the papers were published in congress proceedings, while ISI journals provided the second address gathering up to 100 papers about macroparasites. Books and other kind of publications received a minor attention (Fig. 2).

Comparing our results with the observations of

Guberti and Rossi (1996), the papers on macroparasite are still more directed toward the first and second ecopathological level (parasite simple description and description of parasite population). However respect to the other topics (microparasite) the measure of interaction between host and parasite populations and the dynamic of host-parasite relationship are more investigated (Fig 3), while little attention is still given to the management of disease.

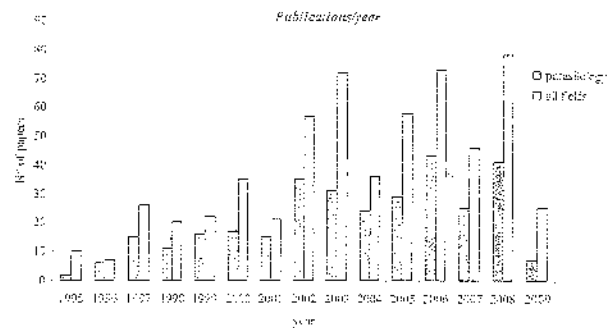


Fig. 1.

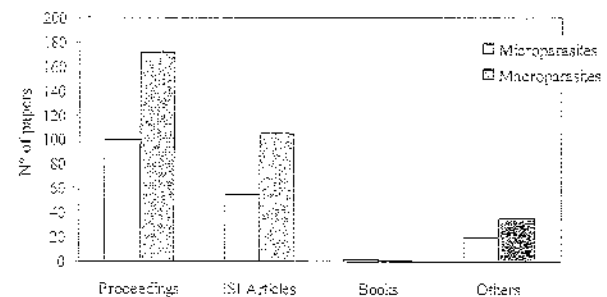


Fig. 2.

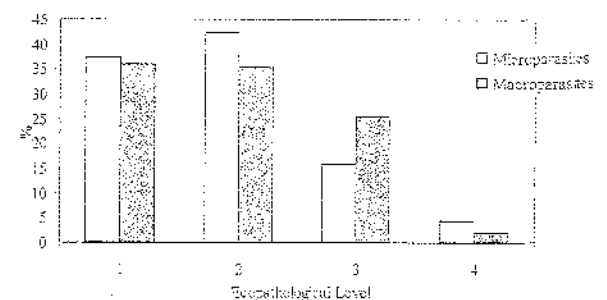


Fig. 3.

Despite ecopathology was created in Italy by parasitologists, which gave a strong impulse to this discipline, the role of ecology in the study of parasites still remain restricted to a limited number of research groups. This limited application of the ecological approach can be attributed to a certain degree of misinterpretation of the term ecopathology which is often erroneously identified as the study of diseases in wildlife, while it should be better identified as the study of the host-parasite relationship according to ecological theory. This approach, providing both an alternative point of view and additional instruments for the study of host-parasite interactions, parasite dynamic and distribution, should be viewed as an opportunity without limiting it to a restricted group of host such as wildlife, and we are sure it will be in the future.

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