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Misidentification of Specimens Threatens the Integrity of Helminth Parasite Research

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Abstract

With the devaluing of the skills of morphological taxonomists misidentification of parasites appears to be increasing. In this paper examples from the acanthocephalan literature are reported. The need for morphological taxonomic expertise is emphasised including the importance of examining specimens.

Keywords: Helminth misidentification; Identification accuracy; Taxonomic expertise; Acanthocephalan; Amphibian; Fish; Parasite identification

Introduction

Of recent years, with the development of molecular techniques, the use of morphology in determining accurate identification of specimens has become undervalued. The knowledge and skills required for accurate morphological identification of individual worms is being disregarded and too much reliance is being placed on published host parasite lists and misused identification keys. As emphasised by Bush et al. [1], the result is a growing record of misidentified parasites in the literature, the consequence of which is to cast doubt on the reported findings. The absolute requirement for accuracy of specimen identification goes beyond the realm of formal taxonomy, affecting both the validity of phylogenetic and ecological analyses as well as the consideration of pathogenesis, zoonosis and control.

Although molecular data are becoming increasingly important in genus and species resolution, unless the samples are carefully characterised, their identity, as posted on GenBank, may be compromised. The correct identification of helminths requires satisfactory fixation and clearing for microscopic examination. Inadequately prepared specimens do not show characteristic morphology, making accurate identification difficult or impossible. Moreover, photographic images may not provide the detail necessary to make confident decisions. Another source of error, as reported by Bush et al. [1] is reliance on lists of published host records, which may be outdated or incomplete, for parasite identification.

Over the past few years, I have found several instances of Acanthocephala (thorny headed worms), incorrectly identified in the literature. These errors in acanthocephalan, and indeed of any other helminth parasite, identification have the potential to cause confusion at best or significant error in analysis at worst which may have serious consequences.

Corynosoma is a cosmopolitan acanthocephalan genus, largely parasitic in dolphins, seals and sea-lions. In the molecular analysis carried out as part of a study of the acanthocephalan Corynosoma hannae by Hernandez-Orts et al. [2] an isolate, registered on GenBank as Corynosoma australe by Garcia-Varela et al. [3] was found to have need mistakenly identified as C. hannae. The two species are clearly distinguished morphologically by the shape of the proboscis and the number and arrangement of hooks on the proboscis (the proboscis armature). Use of this sequence data, now known to be C. hannae, as that of C. australe in subsequent study of the genus will compromise any resulting analysis of geographic distribution, host-parasite relationships or infection parameters since all of these depend on accurate species identification.

Acanthocephalus ranae is an acanthocephalan parasite of amphibians found across Europe, including Turkey, with significant pathology described in host intestines [4]. Sakthivel and Gopalakrishnan [5] described seasonal variations, studied over 3 years, and pathological lesions caused by Acanthocephalus ranae in fish hosts from coastal locations in Tamil Nadu. These

authors provided a brief description, drawings and photographs of the putative A. ranae as well as infection data, and histopathology and histochemistry descriptions. Unfortunately, although it can be clearly seen from the images that the specimens in question are not A. ranae, it is impossible to determine which species they might be. In this instance the unwary reader might conclude erroneously that the geographic range and host species of A. ranae have been extended from Europe and amphibians to India and fish. Furthermore, the inaccuracy of the parasite identification throws some doubt on the description of the pathology caused by these unknown acanthocephalans.

Conclusion

The discovery of misidentifications such as the two examples outlined above highlight the importance of developing taxonomic skills in order to undertake thorough morphological examination of specimens. Careful comparisons with previously identified material, if available from museum collections and published descriptions should be carried out before species identifications are made. The importance depositing specimens in publicly available collections for the purposes of comparison was emphasized by Hernandez-Orts et al. [6]. These authors also pointed out the importance of examining type specimens when possible as an aid to identification, because of the morphological data they exemplify. As emphasised by Bush et al. [1] erroneous information cascades are created if misidentifications are repeated in the literature, leading to mistaken conclusions. These authors proposed a set of guidelines for use by authors, editors and reviewers to minimise the likelihood of errors of identification. These guidelines include accessing the skills of morphological taxonomists, which I endorse.

Conflict of interest

The author declares no conflict of interest.

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