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POSSIBLE APPLICATIONS OF VIDEO TECHNOLOGY AND DIGITAL IMAGE PROCESSING IN FISH PARASITOLOGY: MORPHOLOGICAL EXAMINATION OF THE GROUPS APICOMPLEXA AND MYXOSPOREA–ACTINOSPOREA BY VIDEO TECHNOLOGY

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Summary

Drawings made and measurements taken of fresh preparations are often indispensable for the identification of fish parasites. However, fresh microscopic preparations rapidly deteriorate and remain suitable for examination for a short time only. The so-called video-technical method described in this paper facilitates the examination of fresh preparations. With the help of this procedure, parasites which are fragile, prone to drying, or can be found only once a year can be studied at any moment in time and over a prolonged period.

Until now, researchers have primarily used drawings and photographs made of light microscopic pictures as an aid to the taxonomic classification of fish-parasitic protozoans belonging to Apicomplexa and Myxosporea (Bandoni and Duszynski, 1988; Lom and Arthur, 1989). These were usually prepared by freely drawing or photographing the image seen in the microscope, or with the help of a so-called drawing tube mountable on a microscope. Certain protozoans having a fragile, thin wall, such as fish-parasitic coccidia or the actinosporean stages of myxosporeans occurring in oligochaetes, are difficult to draw and measure, as during the often lengthy examination under a cover slip these parasites may become damaged and dry, and after fixation they frequently shrink and become unsuitable for examination. Because of the one-year developmental cycle of many of these species, researchers using this technique would have to wait for a long time until another opportunity for examination arose.

Digital image processing and morphometric programmes have become widespread by now. Their use in parasitology cannot be considered a novelty, as studies employing these techniques have been reported by several authors (Gubányi, 1995; Shinn *et al.*, 1995). However, the literature fails to inform us whether these new techniques have gained wide use in the morphometrics of Apicomplexa and Myxosporea. The aim of this short communication is to provide suggestions for, and assistance in, the application of these new techniques.

In our laboratory, the technique presented below has been used for the description of several species of Apicomplexa (Molnár, in press), Myxosporea (Masoumian *et al.*, 1996; Molnár *et al.*, 1996), and Monogenea (Jalali *et al.*, 1995), as well as in the processing of actinosporean stages (Pallós, 1995). Through a Panasonic wv-CL350 type camera connected to our Olympus BH2 type light microscope with a so-called C-mount, the microscopic image is transmitted into a Panasonic video recorder which records it on VHS videotape using an optional recording time (usually 30 sec per magnification) and magnification. The image thus obtained can later be replayed as required, frozen at frames which are the easiest to draw, or advanced frame by frame. The unit is complemented by a Grundig MMC-235 type video monitor which allows the examiner to study the microscopic picture in great detail (e.g.

an oocyst 8–10 µm in diameter can reach a diameter of 10 cm in the highest magnification). Often a drawing of the parasite under study is made directly on a transparent sheet of paper placed onto the screen, and the measurements necessary for species identification are also taken in this way.

In addition, the system includes a PC-fitted image processing card and a software (Video-Galaxy) developed specifically for it. With the help of these the microscopic image can be visualised on the computer screen, saved on the hard disk or on floppy diskette, or printed. For structures having well-defined outlines (e.g. chitin hooks of parasites), the image printed by the computer may even be published, depending on the resolving power of the camera and the printer (Gubányi, 1995).

Because of the lower resolving power of the technique available in our laboratory and due to the less marked outlines of oocysts and spores, we have not yet obtained pictures suitable for publication; however, this could be accomplished if a technique of higher resolving power were used. In our case, the technique has rendered it easier to draw parasite stages and take their measurements with the help of printed images of coccidia, myxosporeans, their actinosporean stages, and monogeneans.

The present paper does not intend to address technical matters related to video technology. Its sole aim is to draw the attention of colleagues concerned to a method which is a major aid to taxonomic work.

References

Bandoni, S. and Duszynski, D. W. (1988). A plea for improved preservation of type material for coccidia. *J. Parasit.* **74** (4), 519–523.

Gubányi, A. (1995). Morphometrics of taeniid tapeworms I. Multivariate analysis of distance measurements of the rostellar hooks. *Parasit. hung.* **28,** 21–41.

Jalali, B., Papp, M. and Molnár, K. (1995). Four new *Dactylogyrus* species (Monogenea: Dactylogyridae) from Iranian fishes. *Folia Parasitol.* **42,** 97–101.

Lom, J. and Arthur, J. R. (1989). A guideline for the preparation of species descriptions in Myxosporea. *J. Fish Dis.* **12,** 151–156.

Masoumian, M., Baska, F. and Molnár, K. (1996). *Myxobolus nodulointestinalis* sp. n. (Myxosporea, Myxobolidae), a parasite of the intestine of *Barbus sharpeyi*. *Dis. aquat. Org.* **24,** 35–39.

Molnár, K. (1996). Nodular coccidiosis of the pikeperch *Stizostedion lucioperca* and Volga perch *Stizostedion volgensis*. *Dis. aquat. Org.* **26** , 35 - 41.

Molnár, K., Masoumian, M. and Abasi, S. (1996). Four new *Myxobolus* spp. (Myxosporea: Myxobolidae) from Iranian barboid fishes. *Arch. Protistenkd.* **147,** 115–123.

Pallós, A. (1995). Occurrence of actinosporean stages of myxosporeans in oligochaetes (in Hungarian, with English summary). M. Sc. Thesis, University of Veterinary Science, Budapest. pp. 1–37.

Shinn, A. P., Sommerville, C. and Gibson, D. I. (1994). An evaluation of methods used to discriminate *Gyrodactylus salaris* Malmberg, 1957 from other species of the genus. In: Program and Book of Abstracts of the IVth International Symposium of Fish Parasitology. 3–7 October 1995, Munich, Germany, p. 78.