

# In-practice and Field Techniques for the Investigation of Parasitic Infections

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## **Abstract**

Diagnostic investigations and tests play a key part in the detection, identification, and study of parasites, and in the determination of their role in disease. Although some require the expertise and facilities of a specialist laboratory, many others can be performed easily, competently, and at low cost in the clinic. The veterinarian may also need to perform laboratory tests away from home and at times in the field (e.g., client's house, zoo, wildlife park, rehabilitation center). Under such circumstances, a range of portable, usually lightweight equipment may be used, including battery- and solar-powered products. When investigating any parasite disease problem, the use of properly formulated and updated protocols is essential, including those needed to implement safety measures. © 2009 Published by Elsevier Inc.

**Key words:** Detection; diagnosis; fieldwork; parasites; veterinary practice

Parasites, in this article a term restricted to metazoa and protozoa, are a frequent cause of ill health in exotic species. If these organisms are to be adequately detected and/or controlled, accurate identification and diagnosis are essential. For a proper understanding of host-parasite relations (see Pérez, Pizzi, this issue), a range of microscopical and other laboratory-based studies are often required to establish a foundation of knowledge on the subject.

Some techniques, especially those requiring specialized equipment and expertise in molecular biology, will require the facilities of a laboratory. Many others can, however, be executed easily and competently in a practice. On occasion, the exotic animal veterinarian may need to carry out laboratory tests in the owner's home, in the field (e.g., zoo, wildlife park), or, if free-living species are involved, a rehabilitation center. Under such circumstances, the appropriate equipment will require transportation to, and use in, an environment that may lack many of the standard back-up facilities, such as running water and a supply of electricity. This aspect of parasitological investigation is discussed in more detail later.

This article will describe and discuss methods to identify, diagnose, and treat parasites that are suitable for use in the exotic animal veterinary practice, both away from the hospital and in the field. It is suggested that greater and better deployment of such techniques will not only enhance the quality of exotic animal parasitology but also significantly reduce practice costs.

## **Antemortem and Postmortem Examination of the Entire Animal**

A complete physical examination of the patient follows the taking of a full history coupled, wherever

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**Figure 1.** Detection and diagnosis of parasitic infestations in fish and other aquatic species is much facilitated if a visit is made to the premises where the animals are kept.

possible, with inspection of the environment in which the animal lives (Fig 1). The latter may need to be performed at night or at certain times of day because some ectoparasites exhibit a distinct circadian rhythm. Behavioral observations on the live animal can be of great value in early detection of parasitic infestations but are often overlooked or are incorrectly performed (see Ramnath, this issue).

Gross examination should include the photographing or drawing of affected areas of the body, such as areas of hair loss, damaged feathers, or retained slough. Whenever possible, lesions should be measured or mapped so that any subsequent



**Figure 2.** A carefully restrained raptor (*Buteogallus* sp.) with skin lesions, possibly due to parasitic mites (inset), is examined at the owner's premises (Photo credit, Paul Budgen).



**Figure 3.** A cluster of ticks near the cloaca of a monitor lizard (*Varanus exanthematicus*). Such parasites can easily escape detection unless a hand lens is used and the illumination is good.

changes in size can be detected. Color should also be recorded and, whenever possible, given a score.

Good lighting is essential, and the use of an ultraviolet light (e.g., Wood's lamp) is often advantageous. Odor may be significant in some parasitic infections, and female staff, who generally have a better sense of smell than men, may be better at detecting any abnormal scents.

Brushing the coat of mammals and plumage of birds may yield surface debris, including parasites or their shed skins and droppings. If damp white paper or cloth is placed under the animal during this process, parasites and their debris can be easily collected. If ingested blood is present, a red stain will be seen. Clipping of hair or (small portions) of feathers may permit detection of surface parasites such as fleas, lice, and *Cheyletiella* spp. mites.

Any definite lesions should be examined with a magnifying (hand) lens (Figs 2 and 3), followed by such techniques as hair/feather plucking, adhesive tape impressions, and (multiple) skin scrapings (Table 1). Hand lenses are an essential part of examining small patients, as well as facilitating the detection of diverse parasites, ranging from trombiculids to louse eggs ("nits"), which exotic species may harbor. It is extraordinary how many veterinary practices, including those with an interest in exotic species, do not supplement eyesight with items such as a hand lens, magnifying loupe, or dissecting microscope.

Gross examination is relevant to internal as well as to external parasites. Proglottids of cestodes may be found extruding from the rectum of small mammals, and trematodes may be present in the buccal cavity of snakes or birds. Examination of orifices should include the use of otoscopes, specula, and endo-

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