Microscopy is an essential technique in veterinary general practice. This article discusses how the role of microscopy in veterinary practice has evolved from its beginnings and where the opportunities and limitations are to be considered in modern veterinary microscopy in a general practice setting.
Veterinary medicine evolved from advanced farriery in the eighteenth century, a development which was accelerated with the establishment of veterinary schools in Paris and London. However, these schools remained glorified horse infirmaries for most of the next century. One of the earliest descriptions of veterinary microscopy is in a treatise on ‘Microscopy in Veterinary Practice’ written in 1867 by Gordon Brown FRCVS, a future principal of the Royal Veterinary College in London. He later developed a portable microscope for field use.

Microscopes were initially used in the disciplines of histology, microbiology and parasitology and have been an essential diagnostic tool in veterinary practice ever since. The focus of early veterinary microscopy was the diagnosis of diseases of public health significance and the author can remember having to demonstrate the ability to identify Bacillus anthracis, the causative agent in Anthrax, before being accepted as a local veterinary inspector for the Ministry of Agriculture. The use of the microscope has expanded enormously since then, with an emphasis on the diagnosis and treatment of companion animal diseases now occupying most veterinarians.

Whilst more advanced illumination techniques such as phase contrast, dark ground and fluorescence microscopy are commonly utilised in veterinary research institutes and specialist diagnostic laboratories and electron microscopy has been regularly used in veterinary research since the 1970s, it is the use of bright field light microscopy in veterinary general practice that is to be considered here.

Most veterinary premises in the UK will house a microscope of some sort; ranging from budget monocular scopes, without even the luxury of a mechanical stage, to research quality binocular models capable of true Kohler illumination (Figure 1).

The models most frequently sold to the veterinary profession are branded or generic Chinese microscopes (Figure 2) of variable optical and mechanical quality, some of which are not built to withstand the rigours of clinical veterinary practice and prove a false economy. Many practices have an area dedicated to laboratory examinations, where microscopy and in-house haematology as well as serum biochemistry evaluations are made. These areas can represent a significant source of income in general veterinary practice, as well as giving access to rapid results following diagnostic tests.

The uses to which the practice microscope can be put are detailed in Table 1. Whilst basic urinalysis and examination of skin samples for ectoparasites are undertaken in most practices, there is huge variability in the ability of practitioners and technicians to perform haematological and cytological examinations. Quality control in practice laboratory situations is often poor or missing, despite the pivotal role these examinations can play in diagnosis and treatment planning. For example, the identification of a skin mass as a mast cell tumour will have significant implications for the margins of excision in future surgical procedures. On the other hand the diagnosis of parasitic infestations with mites such as Demodex sp. is best achieved by the examination of fresh hair plucks or skin scrapings as these samples do not travel well to an outside laboratory.

Photomicroscopy techniques are becoming more widespread and digital photomicroscopy lends itself to the sharing of microscopical results both for advice on interpretation in unusual cases and for the documentation of results in cases where there may
be legal implications such as in welfare prosecutions, or where litigation is possible.

Whilst the importance of these rapid diagnostic techniques cannot be over-estimated, the author is aware of the significant variability in training and experience in the application of these techniques in veterinary general practice and is involved in efforts to improve these areas; both emphasising the opportunities and limitations of light microscopical examinations in the diagnosis and management of clinical disease.

Specialisation in veterinary practice is becoming more widespread but it is still the case that the same practitioner who examines a dog with a skin mass (Figure 3), will perform a fine-needle aspirate at the consultation, stain and examine the sample (Figure 4) at lunchtime and perform excision surgery the next day.

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After qualifying as a veterinary surgeon from the Royal Veterinary College (RVC) in 1980, David joined a (very) mixed general practice and was involved in the medical and surgical care of companion animals (dogs, cats and small mammals), livestock, horses and some exotic pets. He was also involved in providing a pathology and microbiological diagnostic service for domestic poultry, introducing him to the value of microscopy in practice. After seven years he returned to the RVC Hertfordshire campus as a research scholar in the Dermatology department providing clinical services and receiving training in dermatohistopathology. Whilst there he was involved in developing and teaching the undergraduate dermatology course. In 1988 he was appointed Director of the RVC first opinion teaching hospital in Camden Town, overseeing the practical teaching of small animal medicine and surgery. He continued teaching dermatology at undergraduate and post graduate level and provided a dermatology referral service for veterinary practices in central London.

In 1992 he left the RVC to establish his dermatology and dermatological pathology service in East Anglia, becoming more involved in giving advice on microscopy to veterinary surgeons.

<table>
<thead>
<tr>
<th>Technique</th>
<th>Examples</th>
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<tbody>
<tr>
<td>Urinalysis</td>
<td>Examination for crystals suggestive of calculi. Examination of stained samples of sediment for bacteria, inflammation or neoplasia.</td>
</tr>
<tr>
<td>Parasitology</td>
<td>Examination of coat brushings for flea faeces. Examination of skin scrapings for ectoparasites or dermatophyte fungi. Examination of faecal samples for nematode eggs.</td>
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<tr>
<td>Microbiology</td>
<td>Examination of exudates for bacteria. Examination of skin samples for bacteria, yeasts or dermatophytes. Identification of bacteria or fungi from culture plates.</td>
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<tr>
<td>Cytology</td>
<td>Examination of fine needle aspirate samples or direct impression smears for inflammatory or neoplastic cells, usually using rapid Romanowsky stains.</td>
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Table 1: Techniques using microscopy in veterinary general practice

Figure 4. Fine needle aspirate from the dog in Fig 3 demonstrating neoplastic mast cells.