The Use of Animals in Medical Teaching and Research in Rhodesia

BY
J. J. RANKIN, D.PHIL.
*Reader in Medical Biology, University College of
Rhodesia and Nyasaland.*

It has become commonly accepted practice to use experimental animals in medical schools, teaching hospitals and research institutions. However, the extent to which such animals are used varies considerably, depending largely on the individual needs of the country concerned and also on the degree of legislation which may exist for the protection of animals. For example, certain "stress" and shock experiments are permitted in the United States of America, whereas in the United Kingdom they are not allowed, even under licence. In view of the fact that a new medical school is being established in Rhodesia, it is perhaps pertinent to consider the problem of the use of experimental animals in the light of Rhodesian needs and conditions.

I LEGISLATION

The general principles behind all legislation on this question are, first, that no animal should be permitted to suffer pain unnecessarily; and second, that numbers used must be minimal. Invertebrate animals, even such as lobsters and squids, are not included, as the existence of a pain sense in such forms has not been shown conclusively. All vertebrate forms from cyclostomes to mammals are usually considered to be pain sensitive and hence are to a greater or lesser degree protected by law. The groups most commonly used in medical practice are amphibia and mammals, but in research birds, reptiles and fish are also taken as experimental material. It is, however, wrong to assume that all animal experimentation involves painful procedures and results, as there are many experiments which do not fall into this category—for example, in behavioural, growth, dietary and genetic studies.

Before its dissolution the Federal Government passed the Scientific Animals Experiments Act. 1963, which came into operation on the 27th December, 1963, and arising from that Act the Minister of Home Affairs issued the Scientific Animals Experiments Regulations, 1963. By the terms of this Act all scientific animal experiments—that is, those which are "likely to cause pain" and which are performed for the purposes of scientific research, including medical, agricultural, veterinary and tsetse research, or higher education—must be performed under licence by the licensee himself. Licences are obtained on personal application if supported by certain authorised persons and if the experiments meet the approved standards; inspection of premises and methods is also provided for. Delegation of licences is not permitted and only the licensee himself is permitted to perform the experiments covered by the licence. The Federal Act follows the United Kingdom Home Office regulations, but makes no provisions for different categories of experiment and does not attempt to differentiate between types of animals to be used. In this respect the Act is more lenient than the Home Office regulations. It has, however, a certain lack of flexibility in that there are no special provisions for routine teaching purposes such as would permit repetitive animal demonstration experiments. For example, as the law now stands it is illegal to kill a frog by pithing when required for neuro-muscular kymographic recordings unless the operator has a specific licence for this.

One major flaw in the Act is that it covers only "research" and "higher education" and leaves completely untouched such farming practices as castration and other operations on cattle without anaesthesia by lay personnel and the burning alive of queleas by spraying roosting sites with paraffin and setting them on fire or the aerial spraying of flocks of these birds with parathion. Pharmaceutical animal testing of various drugs and other compounds and the use of animals in diagnosis, such as for tuberculosis and for pregnancy, comprise two other major fields which are not specifically covered by the Act. Although this follows current practice in the United Kingdom, there has been much recent pressure to restore pregnancy tests to Home Office control and to set up a new control of pharmaceutical testing (Hume, 1961). The Federal Act as it stands apparently has been taken over by the Government of Rhodesia, but it is hoped that it soon will be expanded and amended to cover these and other difficulties and loopholes.

II. REQUIREMENTS OF NEW MEDICAL SCHOOL

What, then, will be the requirements of the new Rhodesian medical school? These may be

considered under three main headings: (a) teaching; (b) clinical diagnosis, public health and pathology; and (c) research.

(a) *Medical Teaching*

Basic physiological phenomena are best illustrated in the first instance on laboratory animals, as it is often undesirable to introduce the medical student directly to such occurrences in man without essential prior knowledge. It is wellnigh impossible to go through any biology or physiology course without making use of animals to demonstrate, for example, blood flow or neuro-muscular activity or hormonal and endocrine action. Dietary deficiencies may be induced, symptoms noted and treatment evaluated and reproductive and genetic processes followed in detail. Similarly, the exact clinical course of locally important conditions such as sporozoan infections, bacterial and fungal diseases and schistosomiasis can be demonstrated and the relative value of various types of control and therapy at known stages shown clearly by the use of susceptible animals.

In many such cases current research and teaching have to go on almost simultaneously, as only now, for instance, are facts becoming known regarding many host-parasite relationships and control measures.

(b) *Clinical Diagnosis, Public Health and Pathology*

The value of animals in this field is unquestioned and we shall no doubt continue to require *Xenopus* or *Bufo* for pregnancy diagnosis tests: guinea pigs, rabbits or rats for confirmatory diagnosis of bacterial infections such as tuberculosis or for testing of milk for *Brucella*; cows and horses for production of vaccines, antitoxins and sera; poisonous snakes for antivenom sera, and so forth.

(c) *Research*

Here the field is especially wide in Rhodesia. We have a number of diseases and disorders of doubtful etiology; research on them will undoubtedly involve extensive use of both "laboratory" and indigenous animals if any advance is to be made on modes of transmission, analysis of clinical manifestations, therapy and control. This is particularly the case in the parasitological field with its problems of immunology. It is doubtful, for example, whether we shall make any clinical advance in the battle against schistosomiasis unless the condition is observed experimentally in cattle and monkeys—both of which are known to be potential principal hosts.

The extent to which investigations on indigenous animals may be of importance to a proper understanding of various human diseases involving parasites and vectors is still uncertain, but it is becoming increasingly obvious that we can no longer avoid this fruitful line of study. We require, for instance, a complete survey of the haematology of game animals and small mammals, including the associated biochemistry and genetics, if we are to understand the reasons for host choice and site-on-host choice of such forms as rickettsia and babesia-bearing ticks, trypanosome-carrying tsetse flies and perhaps even plasmodium- and filaria-carrying mosquitoes. We have not yet fully discovered why in Rhodesia we have not had serious outbreaks of bubonic plague or anthrax in spite of the existence of almost all the required contributory factors—or why hookworm infestations are generally lighter here than in neighbouring territories.

Many basic physiological problems in indigenous mammals, especially in reproduction and endocrinology, have as yet been completely uninvestigated, but indications given by pilot experiments are that here also there may be many lines of study with a direct bearing on medical practice.

It is just possible that a continuation of studies on local primates might give us many answers to problems in haematology, physiology, immunology and in clinical conditions such as pyrexias of unknown origin.

III. The Need for a Controlled Animal Centre

It can thus be seen that animals are important to the new medical school. It will be necessary, therefore, to include them in any planning programme and in particular to provide for suitable housing and care. Anyone who has had experience of handling animals knows that the success of experiments bears a direct relationship to the health and wellbeing of the animals used. The basic needs of an animal house may be summarised as follows:—

(1) Skilled supervision—using trained personnel. This is the prime requirement.

(2) Adequate housing—including ventilation, temperature and light control, elimination of noise, suitable bedding and separation of animal species according to habit and disposition.

(3) Adequate feeding—involving correct storing of food; preparation of diets for differing needs and the growing or rearing of certain types of food not otherwise readily available.

(4) Cleanliness—including facilities for pressure hosing, sterilisation of rooms, cages and equipment, separation of clean and

"dirty" entrances and passageways, disposal of waste, including incineration.

(5) Facilities for quarantine—for sick and exposed animals and also for new arrivals, including newly captive animals.

(6) Facilities for surgery.

(7) Facilities for *post-mortem* examination.

(8) Facilities for radio-isotope work, including disposal of radio-active waste.

(9) Workshop equipment — especially f o r mending cages and for making new cages for specific requirements.

(10) Separation of infective experimental animals from non-infective.

(11) Provision for large breeding stocks of known genetic constitution. *This is of utmost importance in Rhodesia, where there is no single local source of genetically controlled and certified laboratory animals.* Breeding stocks should ideally be housed in a separate building or section to prevent infection wiping out the entire stock.

(12) Special indoor-outdoor facilities for indigenous animals which do not thrive in total indoor conditions. Certain animals. for example, those which may carry foot and mouth disease, must be housed at a distance from the main animal population.

(13) Suitable records must be kept and housed in the animal house.

The importance of such care and maintenance cannot be overstressed. as without it one can lose entire stocks and colonies almost overnight and thus endanger both short and long-term research programmes. It is also clear that without such animal facilities the medical school cannot hope to make a serious attack on Rhodesian diseases nor can it adequately train its potential doctors. *Provision for such facilities has been included in the plans of the new medical school, but unfortunately no money has yet been allocated for this purpose.* Members of the faculty of medicine have given serious consideration to the matter in consultation with colleagues in the faculty of science and have a clear idea of what is required. It is to be hoped that financial support will be forthcoming, but there is no immediate prospect of this. This matter is one of urgency and of major importance to the new medical school and also to the future of medical work in Rhodesia.

REFERENCES

Hume, C. W. (1961). Experiments on animals in Great Britain. Universities Federation for Animal Welfare, London.

Federal Government Act No. 17, 1963. Scientific Animal Experiments Act, 1963. Government Printer, Salisbury.

Federal Government Notice No. 380, 1963. Scientific Animal Experiments Regulations, 1963. Supplement to Federal *Government Gazette*, 27th December, 1963. Government Printer, Salisbury.