1. INTRODUCTION

In experimental work directed toward the development of new effective anthelmintics, the cestodes have received far less attention than have the trematodes and nematodes. This may be partly because cestode infections are generally considered of minor importance compared with the much more numerous and pathogenic parasites of the other helminth classes. The tapeworms have a worldwide distribution, but their medical and economic significance is variable (Standen, 1963; Keeling, 1968). The larval stages of *Taenia solium* and *Echinococcus granulosus* may, however, produce serious human disease, and only recently have new broad-spectrum anthelmintics been developed with which treatment of cysticercosis and hydatidosis may now be contemplated.

In reviewing the drugs most commonly used against cestode infections in man and animals, Standen (1963) concluded that despite the availability of a limited range of reasonably effective drugs, improvements were needed. In the treatment of human taeniases there was a requirement for drugs with sufficiently wide margins of safety to obviate the need for special preparation of the patient by prolonged fasting before treatment and the removal of the drug by purgation soon afterward. A number of active anthelmintic substances have now been developed with specific activity against cestodes and even against important larval stages. The substances fall inevitably into different levels of development according to their performance in experimental screens.

2. EXPERIMENTAL METHODS

2.1. Techniques for Drug Testing against Adult Tapeworms in Vivo

Techniques are available for testing potential taeniacides against *Hymenolepis diminuta*, *H. nana*, and *Oochoristica symmetrica* in the mouse, but the use of these screens has to
be supplemented, for development of taeniacides active against the larger tapeworms of man and domestic animals, by tests in a secondary screen. Such a screen would usually involve the testing of selected chemical structures in cats or dogs infected with one of the large well-armed species, such as *Taenia pisiformis*, *T. hydatigena*, *T. taeniaeformis*, or *Echinococcus granulosus*, or in sheep infected with *Moniezia expansa*.

2.2. Drug Testing against Adult Tapeworms in Vitro

A technique was described by Sen and Hawking (1960) for testing chemical compounds against *Hymenolepis nana* in vitro, the adult worm being recovered from mice infected 20–40 days previously by perfusion in saline. An *in vitro* screening technique was also developed using appropriate lengths of *Moniezia expansa* suspended in Tyrode’s solution at 39–40°C (Duguid and Heathcote, 1950a,b). Standen (1963) recorded that Batham (1946) used Baldwin’s (1943) techniques for *in vitro* tests on nematodes for similar observations on late mature or gravid proglottids of *T. hydatigena* or *T. pisiformis*. Demonstration of activity *in vitro* is of no value unless it is followed up by *in vivo* tests confirming the validity of the observations. Equally, the demonstration of activity *in vivo* in compounds of unknown potency would establish the validity of the *in vitro* test, while information *in vitro* of activity in substances known to be taenicidal *in vivo* is less useful (Standen, 1963).

2.3. Drug Testing against Larval Tapeworms in Vivo

Mice infected with larval *Taenia taeniaeformis* (*Cysticercus fasciolaris*) were used to test the efficacy of atebrin, which was considered to affect the viability of the cysts but was much less active when treatment began after the cysts had matured (Cuthbertson and Greenfield, 1941). An indication of the activity of the new compound, praziquantel, against larval cestodes was first determined in mice infected with *Hymenolepis nana,* but immature cysticercoids were only partially susceptible to high doses of the drug (Thomas and Giinnert, 1977).

Similarly, the efficacy of benzimidazoles against larval tapeworms was first demonstrated in laboratory animal assays. The initial observations of efficacy were made in mice, jirds (*Meriones*), and rabbits experimentally infected with larval *Echinococcus granulosus*, *E. multilocularis*, *Taenia taeniaeformis*, *T. pisiformis*, *T. crassiceps*, and *Mesocestoides corti* (Heath and Chevis, 1974; Heath *et al*., 1975; Campbell and Blair, 1974a,b; Krotov *et al*., 1974; Thienpont *et al*., 1974). Rabbits infected with larval *T. pisiformis* under experimental conditions were used to detect the larvicidal activity of closantel (Chevis *et al*., 1980).

2.4. Drug Testing against Larval Tapeworms in Vitro

Lagrange (1946) described a technique for *in vitro* testing of drugs against cystic larvae of *Taenia hydatigena*. The method is based on exposure of the cysts to solutions of the chemical being tested and on observations on the inhibiting effect of such exposure