2. The separation and collection of urine and faeces should be efficient with minimal risk of cross-contamination.

3. Quantitative measurement of food and fluid intake should be possible, with minimal contamination of excreta by solid or liquid diet.

For radiorespiration work, the following additional requirements should be met:

4. The animal must be housed in a completely closed system.

5. Efficient and continuous trapping of $^{14}CO_2$ should be possible.

6. The air flow through the unit should be sufficient to prevent accumulation of expired CO_2 or water vapour.

7. An emergency air supply should be automatically switched to the cage in the event of failure of the normal supply.

8. It should be possible to wash residual urine from the cage into the collection flask without interruption of CO_2 collection.

9. Easy decontamination of all parts of the unit must be possible.

These criteria have been met in the unit which will be demonstrated.

An all-glass urinary/faecal separator (Draper & Robbins, 1956) and food and water reservoirs are connected by ground glass joints to a glass metabolism cage. Expired CO_2 is absorbed in a train of three scintillation vials containing organic base compatible with liquid scintillator for direct counting. The expired air may be switched at any time through a parallel series of vials or through larger absorbers for overnight collection.

A vacuum pump provides an air-flow of 500 ml/min. The incoming air passes through a CO_2 trap and drying agent before entering the metabolism cage. The vacuum manifold may be connected simultaneously to six parallel metabolism units, each one equipped with a flow controller. In the event of failure of vacuum or electrical supply, a supply of air from a cylinder is switched on automatically *via* solenoid valves.

REFERENCE

DRAPER, H. H. & ROBBINS, A. F. (1956). A uricofecal separator for laboratory rat. ***Proc.** Soc. exp. Biol. Med.*, **91**, 174–175.

Drug resistance in *Babesia rodhaini*

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The rodent piroplasm *Babesia rodhaini* is normally maintained in rats (or in mice) by serial, twice weekly, intraperitoneal inoculations of parasitized blood. Three lines of this rat strain were made drug-fast to the babesicidal compounds Diminazene, Amicarbalide and Imidocarb by injecting subcutaneously at the time of inoculation of parasites a dose level of drug which would allow the development of a parasitaemia roughly equal to half that of the normal strain (ED50). As resistance to the drug developed, the dose levels were increased until the maximum tolerated level was reached.

TABLE 1. *ED50 in mg/kg against*

Drug	Normal strain	Drug resistant strain
Diminazene diaceturate	2·77 to 10·26	>400*
Amicarbalide diisethionate	0·17 to 0·58	>100*
Imidocarb dihydrochloride	0·03 to 0·09	> 80*

* Maximum tolerated dose.

Rate of development. Analyses of the dose levels used and the time (from the commencement of treatment) at which they were given were made by plotting both sets of figures on arithmetic and logarithmic scales. Only when the logarithm of the dose level was plotted against the logarithm of the time was a straight line obtained, if the first few weeks of treatment, when the dose levels were within the limits of the ED50 of the normal strain, are ignored. The slope of this line, calculated from the usual regression line formula, is different for each drug, giving a figure which indicates the ease with which resistance to the drug can be produced in this parasite.

TABLE 2. *ED50 against drug resistant strains, as a factor of that of the normal strain*

Strain: / Drug	Normal	Diminazine resistant	Amicarbalide resistant	Imidocarb resistant
Diminazene diaceturate	1	>65*	15	15
Amicarbalide diisethionate	1	20	>400*	15
Imidocarb dihydrochloride	1	50	100	>1,000*
Quinuronium sulphate	1	>60*	> 60*	>60*
Phenamidine diisethionate	1	>15*	> 15*	>15*
Gloxazone	1	0·7	0·8	0·3
Aureomycin	1	1	1·2	1·4

* ED50 is greater than the maximum tolerated dose.

The slopes of these lines for Diminazene, Amicarbalide and Imidocarb are in the ratio of 3 : 4 : 5.

Cross-resistance patterns. Babesicidal compounds including Diminazene, Amicarbalide and Imidocarb were assayed against the normal, the Diminazene resistant, the Amicarbalide resistant and the Imidocarb resistant strains of *B. rodhaini* in rats. The ED50 for each drug against the three resistant strains was calculated and compared with its effect against the normal drug sensitive strain of *B. rodhaini.*

The distribution of catecholamines in the nervous system of an Octopoda mollusc

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Noradrenaline and dopamine are known to be present in discrete areas of the vertebrate brain (Vogt, 1954; Bertler & Rosengren, 1959) and thought to be neurotransmitters. The presence of catecholamines has also been demonstrated in the nervous tissue of some Octopoda (Bertaccini, 1961; Cottrell, 1967) but their distribution is not known.

The nervous tissue of *Eledone cirrhosa* was subdivided into the regions shown in Table 1. The parts taken are defined by macroscopic criteria though they are easily