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REARING THE BLOOD-FEEDING FLY *HAEMATOBIA THIROUXI POTANS* IN THE LABORATORY

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ABSTRACT

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Two methods for rearing the African blood-feeding fly *Haematobia thirouxi potans* in the laboratory are described. The adult flies can be fed either on a bovine calf or *in vitro*, where they produced viable eggs only when provided with a 2% sodium/potassium chloride solution in addition to citrated bovine blood. The larvae were fed bovine dung.

The dung-breeding fly *Haematobia thirouxi potans*, is a parasite of cattle and buffalo in subtropical lowveld regions of southern Africa (Du Toit, 1938; Zumpt, 1973). Its biology closely resembles that of the buffalo fly, *Haematobia irritans exigua*, which is a pest of cattle in Australia (Tillyard, 1931; Seddon, 1967; Waterhouse, 1974). Because of this similarity between these 2 species, it has been decided to use *H. thirouxi potans* in southern Africa to screen biological agents which may help to control the buffalo fly in Australia. The lack of accessible and abundant field populations of *H. thirouxi potans* made a laboratory colony of the fly an essential prerequisite for these studies. Such a culture system could also supply immature and adult *Haematobia* flies for toxicological studies. The following account details methods developed for maintaining this species in the laboratory. The adult flies can be fed either on a bovine calf or on bovine blood *in vitro*.

Culture maintained on bovine calf

The culture was established with flies netted from buffalo culled in the Hluhluwe Game Reserve, Natal, RSA. During the 600 km journey from the lowveld to Pretoria, flies had access to a cotton wool pad soaked with bovine blood. The parent stock was released onto a calf held in a stall within an insect-proof room at the Dung Beetle Research Unit, Pretoria. This calf was fed hammer-milled lucerne hay supplemented with fresh grass and a salt lick. The room was lit continuously and the temperature maintained above 22 °C.

Gravid females oviposit only on fresh dung and the eggs hatch within 24 h. Dung was allowed to accumulate on a sheet of plastic for 24 h. It was then tipped onto steel trays suspended over a thin layer (1–2 mm) of sieved sand and held at 25–27 °C for the 4–7 days during which larval development took place. The prepupae left the dung during the morning, moved to the edge of the steel tray and dropped onto the sand where they pupated within 8 h. The sand and prepupae were lightly moistened with a mist-spray and covered with a plastic sheet to reduce desiccation. Twenty-four hours later the pupae were sieved from the sand and placed in covered Petri dishes in the room with the host. The adults emerged 5–7 days later. The lids of the Petri dishes were removed to release them within a few hours of their emergence. The life cycle under these conditions is completed in approximately 2 weeks. Using this system the culture has now been maintained for over 3 years.

The numbers of flies feeding on the animal vary from a few individuals up to several thousand. Fly burdens of several hundred cause the calf mild irritation and often skin lesions develop, as described by Du Toit (1938).

When the numbers of adults on the calf were high (several thousand) many immature larvae died in the dung. This problem was overcome by supplementing the calf's dung with an equal mount of field-collected dung, which was frozen to kill other insects and then thawed before use. The addition of dung also resulted in an increase in the size of the puparia (Fig. 1), and hence that of the adult flies. Larger females are more fecund than smaller ones (H. A. C. Fay, unpublished data). The prepupae leave the dung during the morning of 3 or 4 consecutive days, but the greatest number leave on the 2nd day (Fig. 1).

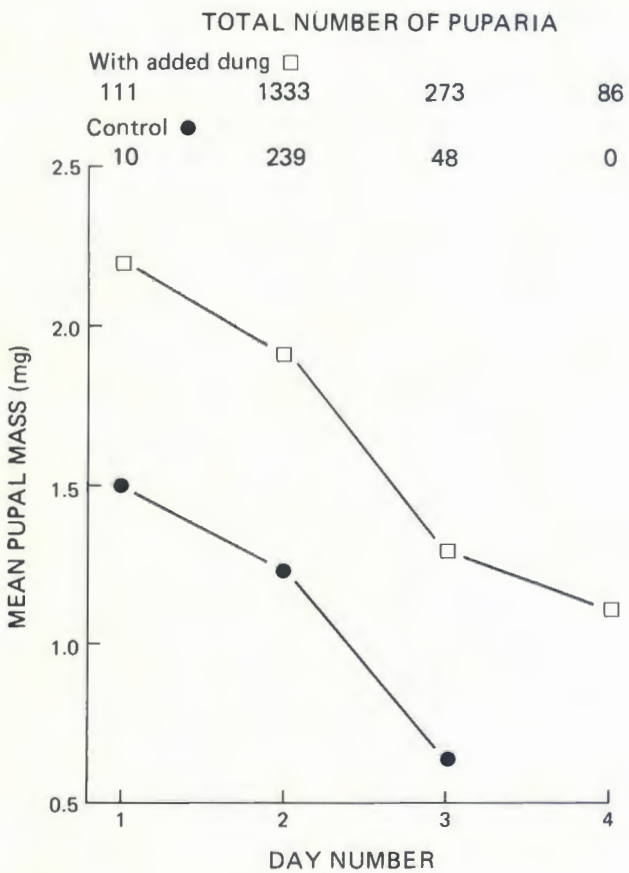

FIG. 1 Effect of the addition of dung to the mass of pupae of *H. thirouxi potans*. On 2 occasions dung was added in equal quantity to a subsample of the calf's dung and a 2nd subsample was kept as a control. The data were pooled for the 2 trials, during which totals of 790 and 1 310 pupae respectively were produced. Day 1 is the day on which the 1st prepupa emerged. Mean pupal masses were calculated for treatments and controls.

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Culture maintained on bovine blood

The 1st attempts to rear *H. thirouxi potans* away from the host were unsuccessful. The flies were provided with citrated bovine blood, which is a successful medium for rearing the horn fly, *Haematobia irritans irritans* (Harris, 1962; Bay & Harris, 1978). Although females survived for several weeks, their ovaries failed to mature. Adding a 5% sucrose solution allowed further ovarian development, but no eggs matured.

Pappas & Fraenkel (1977) noted that the blowfly *Phormia regina* required a potassium salt in its diet to achieve full ovarian development. A 2% sodium/potassium chloride solution was therefore provided for the caged flies from an inverted vial with a perforated lid. This was in addition to the blood diet (700 mℓ of bovine blood; 200 mℓ of acid-citrate glucose; 100 mℓ of a solution containing chloromycetin and 250 000 units of nystatin) and 5% sucrose solution. Flies fed on this diet laid viable eggs. Fresh refrigerated (4–5°C) blood mixture was provided at 08h00 and 16h00 daily, and salt and sugar were always available.

The environmental conditions under which the adult flies were held were based on those adopted for culturing *H. irritans irritans* in the USA, namely 32 °C ± 2 °C and 50–70% R.H. (Bay & Harris, 1978). Cages had fine mesh on the top, bottom and 2 sides, plus a muslin sleeve on a 3rd side. Each cage accommodated several hundred flies. Cages were washed daily with a sodium chloride solution to reduce the risk of bacterial infection. This was done without removing the flies.

Each cage stood above a tray containing dampened absorbent paper. Most eggs were laid onto the blood-soaked cotton pad, if possible into crevices, but a few were laid under solution reservoirs or were dropped through the cage bottoms. Most eggs were laid during the night, the majority 8–14 days after eclosion, although egg laying commenced 2–4 days earlier. Ovarian development was thus slower than on a live bovine host.

Each morning, eggs were collected and placed on thawed frozen dung which was held in ventilated boxes in the same room as the adult flies. The development from egg to pupation took 4–6 days. Twelve generations were reared using these artificial feeding methods before the culture was terminated.

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