SEX ATTRACTION IN THE FREE-LIVING NEMATODE

PANAGRELLUS REDIVIVUS

BY

C. L. DUGGAL

Department of Zoology and Applied Entomology, Imperial College Field Station, Ashurst Lodge, Silwood Park, Ascot, Berkshire, SL5 7DE, England

Newly moulted virgin females of Panagrellus redivivus Goodey attract and are attracted to adult males, whereas ageing virgin females slowly lose their attractiveness but remain responsive. Fourth-stage ♀ larvae and females that have copulated neither attract nor respond to adult males. Like sexes do not attract each other.

Since Greet (1964) demonstrated that males and females of the free-living nematode Panagrolaimus rigidus attracted each other sex attraction has been found in 19 other species of nematode from different habitats (Anya, 1976a). In these the female nematode attracted the male but the attraction of females to males was only found in Trichinella spiralis (Bonner & Etgas, 1967), Camallanus sp. (Salm & Fried, 1973) and Aspiculuris tetraptera (Anya, 1976b). Cross-specific attraction has been found between some species of Heterodera. There are no reports of attraction between like sexes in nematodes.

Green & Greet (1972) suggested that the sex attractant was produced in the hypodermis of female Heterodera spp. and secreted all over the body, although in Heterodera schachtii more attractant appeared to be secreted from the tail region. However, they also quoted Doncaster (unpublished) as suggesting that secretions from the vulva were necessary for sex attraction to occur. Certainly, when the female's vulva is blocked in Nematospiroides dubius, males failed to spread their bursae (Marchant, 1970). Anya (1976b) reported that male A. tetraptera were more attracted to substances originating from female reproductive organs than from other parts of the female body and suggested that the sex attractant was produced by secretory cells located in the pulvillus, a group of cells in the post-anal region. Female A. tetraptera were more attracted to substances from the region of the caudal gland than from other parts of the male. Samoiloff (1970) suggested that the attractive substance in Panagrellus silusiae was derived from dissolved remnants of cuticle during the final moult of the female and Cheng & Samoiloff (1971) showed that fourth stage ♀ larvae of P. silusiae attracted adult males and that fourth stage ♂ larvae were attracted to adult females. Windrich (1973) also reported that fourth stage ♀ larvae of Ditylenchus dipsaci attracted males. However, Cheng & Samoiloff (1972) found that ♀ larvae of P. silusiae treated with hydroxyurea, an inhibitor of DNA synthesis, had immature reproductive systems when adult and did not attract males suggesting that sexual attraction depended upon complete development of the reproductive system.
Little work has been done on sex attraction in virgin and copulated female nematodes or on newly moulted or gravid females. In the present work sex attraction in Panagrellus redivivus has been examined; the attractiveness of female P. redivivus to the male being the principal interest

MATERIALS AND METHODS

Monoxenic cultures of P. redivivus with Escherichia coli were prepared (Cryan, Hansen, Martin, Sayre & Yarwood, 1963) on Nigon's agar at 25°. Virgin females were obtained by separating fourth-stage ♀ larvae from the culture and allowing them to moult in the absence of males. Ageing virgin females were changed to fresh culture plates every 24 hours. Other worms were taken directly from the main culture.

Preparation of the sex attraction apparatus

The apparatus is shown in Fig. 1. It comprised a V-shaped piece of water agar (1.5% w/v) in a 50 mm dia Petri dish. The agar had a depth of approximately 5 mm and each arm of the V had a width of 10 mm (measured at right angles to its edge). Parallel lines were etched across the bottom of the Petri dish to divide each arm of the V-shaped apparatus into three sections.

Test chambers were made with 6-7 mm long tubular pieces from a 4 mm dia plastic drinking straw fixed with adhesive (UHU glue, Fismar Ltd., Eire) to the centre of a 5 mm dia disc of Whatman No. 1 filter paper.

![Fig. 1. Apparatus used for sex attraction experiments. A, piece of plastic drinking straw fixed on filter paper; B, straw in molten agar drop; C, small drop of molten agar inside straw; D, E. coli added into straw now called "chamber"; E, whole apparatus with two chambers at open ends and inoculation zone at apex of V.](image)