WATER CONTENT OF THE SECOND-STAGE LARVA OF *HETERODERA SCHACHTII* DURING THE HATCHING PROCESS

BY

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Interference microscopy shows that there is no significant change in the water content of second-stage larvae of *H. schachtii* before hatching whether they have been immersed in root-diffusate or in water, but immediately after hatching larvae take up water rapidly.

Recent work on *Globodera rostochiensis* (Woll.) shows that, after immersion in root diffusate, the water content of the unhatched second-stage larva increases before hatching (Ellenby & Perry, 1976) and a further increase occurs immediately after hatching (Ellenby, 1974). However, species of cyst-nematodes vary in their dependence on root diffusates to stimulate hatching. Baunacke (1922) first showed that more larvae emerged from cysts of *Heterodera schachtii* Schm. in water in contact with host roots than from cysts in water alone but compared with *G. rostochiensis*, *H. schachtii* hatches well in water, often having an *in vitro* water hatch of from 10% to 40% (Shepherd, 1962). This paper compares the influence of root diffusate and water on the water content of second-stage larvae of *H. schachtii* during the hatching process.

MATERIALS AND METHODS

Cysts of *H. schachtii* were raised on sugar beet grown in potting compost in pots and were stored in the dried soil at 5°. Tests showed that over 80% of the encysted eggs hatched when in root diffusate for 5 weeks, whereas less than 20% hatched in water. After soaking in distilled water at 20° for 7 days, cysts of medium size were selected; in all tests they were kept at 20° in single-cyst ring-cells (Ellenby, 1943).

As in experiments on *G. rostochiensis* (Ellenby & Perry, 1976), the variation in water content of larvae before hatching was examined in two ways. In the first, whole cysts were paired; one of each pair was placed in root diffusate and the other in distilled water. In the second experiment, a single cyst was cut longitudinally; one half was placed in diffusate and the other in distilled water. The root diffusate and distilled water were replenished daily from stocks kept at 4°. Root diffusate was obtained by standing the well washed roots of an actively

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growing sugar beet plant in distilled water for two hours (Ellenby & Gilbert, 1958).

In the experiment on whole-cysts, ten eggs were removed from one cyst immediately before cysts were transferred from distilled water to root diffusate and 10 from a cyst from those to be kept in distilled water. The water content of the 20 larvae so obtained was the value for day 0. The procedure was repeated 24 h later (day 1) and, subsequently, on days 2, 3 and 5; in total, ten cysts were used. In the experiment using half-cysts, the procedure was the same except that five eggs were taken from each half cyst on each occasion.

The water content of individual larvae was estimated by interference microscopy (Ellenby, 1968a, b; Perry, 1977a). Water uptake of larvae before hatching was measured as described by Ellenby & Perry (1976). Each egg was transferred to distilled water on a slide and a cover-slip placed in position. The egg was located under an interference microscope and slight pressure on the cover-slip,

![Graph](image)

Fig. 1. The water content of *H. schachtii* larvae before hatching: (a) experiment with whole cysts, (b) experiment with halved cyst. Each point is a mean from either ten larvae (a) or five larvae (b) liberated from eggs immediately before immersion in root diffusate (day 0) and on subsequent days (●); controls (○) were in distilled water.