

## Measurement of Nematode Respiration with the Biological Oxygen Monitor<sup>1</sup>

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Cartesian Diver (1) and manometric (2) techniques have frequently been used to measure the respiration rates of nematodes. However, the sensitivity and ease of operation of the polarographic oxygen-sensing equipment currently available offers a technique of great future value to plant nematologists.

Our recent experience with the YSI Model 53 Biological Oxygen Monitor (Yellow Springs Instrument Co., Yellow Springs, Ohio 45387) has shown it is quite satisfactory for measuring the respiration rates of a *Caenorhabditis* sp. and *Aphelenchus avenae* Bastian. Oxygen consumption was monitored with as few as 5000 nematodes per cuvette. It was, however, necessary to modify the stirring system; the pertinent information is presented here to aid workers who may wish to measure nematode respiration using this type of equipment.

The magnetic stirrers provided (1.9 cm diameter discs) with the biological oxygen monitor, fit quite closely to the sides of the cuvette (2 cm i.d.) and caused a homogenizing action on whole nematodes. In experiments with 5000 of either nematode suspended in 3 ml of water in a cuvette about 80% of the nematodes were damaged after 40 minutes of stirring (see Fig. 1). The resulting decrease in respiration was directly related to the mechanical killing of the nematodes. Thus, while the stirrer supplied with the oxygen monitor is satisfactory for studies with mitochondria it is not satisfactory for work with whole nematodes.

The problem of stirrer damage to the nematodes was overcome by using a smaller stirrer of the type supplied with the Radiometer, model 25, pH meter (Radiometer, Copenhagen, Denmark). This stirrer is a round, teflon-coated magnetized disc, 1 cm in diameter. In an experiment similar to that described above there was practically no damage to either *Caenorhabditis* sp. or *A. avenae* over a period of 80 minutes. The

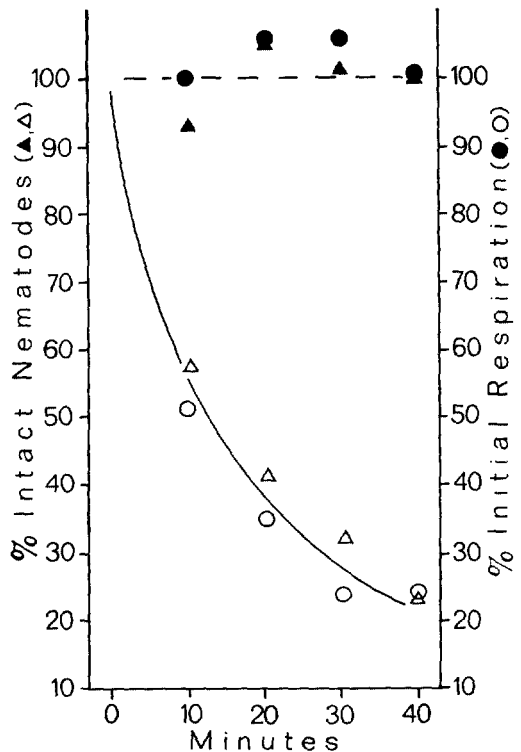


FIG. 1. Comparison of the effects of the stirrer supplied with the Biological Oxygen Monitor ( $\Delta$ ,  $\circ$ ) and a smaller substitute stirrer ( $\blacktriangle$ ,  $\bullet$ ) on the survival and respiration of nematodes. Results were essentially the same for both *Caenorhabditis* sp. and *Aphelenchus avenae*.

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differences in the effects of the two stirrers on the nematode damage and respiration are illustrated in Fig. 1.

The substitute stirrer gives adequate mixing so that reliable measurements of the oxygen concentration in the suspending medium can be obtained. At the normal speed of the stirrer motor the stirring disc bounces slightly in the liquid however it

does not touch the electrode assembly and thus does not affect its sensitivity.

#### LITERATURE CITED

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