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A simple, self-maintaining rearing cage for spider broods

G. S. Oxford and R. J. Pitts
Department of Biology,
University of York,
York YO1 5DD

Virtually no formal genetical studies have been made on spiders. Among the reasons for this are undoubtedly the difficulties encountered in making controlled crosses and the tedious nature of rearing numerous offspring to a stage at which their phenotypes can be scored. As part of an investigation into the ecological genetics of the visually polymorphic spider *Enoplognatha ovata* (Clerck) (Oxford, 1976) it was essential to perform breeding experiments in order to elucidate the mode of inheritance of the colour morphs. (For a description of the morphs see Locket & Millidge (1953) and Oxford (1976).)

Initial attempts involved isolating second instar progeny as they emerged from the cocoon into individual 12 x 50 mm glass tubes, one quarter filled with damp cotton wool. Spiders were initially fed on Collembola (*Folsomia candida* – see Usher & Stoneman (1977)) and then on appropriately sized *Drosophila melanogaster* larvae. Mortality was high, often 100%, and the weekly maintenance of a hundred tubes or so from each cross was extremely time consuming. Latterly, we have tried an alternative approach using population cages.

The cage is constructed on a rigid plastic tray (500 x 350 mm by 70 mm high) into the corners of which are bolted welding rods (500 mm long, 5 mm diameter) threaded at their lower ends (Fig. 1). The rods pass through holes in the corners of the tray and are secured vertically by nuts above and below the plastic. The tray is perforated in several places to allow access of water. The cage itself is made of fine nylon curtain netting with a mesh size small enough to retain second instar *Enoplognatha* (i.e. *ca* 0.5 mm). This is sewn or stapled into a cylinder of sufficient diameter to fit over the cage support rods, and of a height 1.5 times that of the rods. The material is passed over the outside of the rods and secured to the floor of the tray with insulation tape. Soil (e.g. John Innes No. 1 compost) is added to give a depth over the tray of about 30 mm. The cage material is gathered at the top and secured with string around a plastic tube about 150 mm long and 10 mm in diameter, which allows access to the cage without opening the material. This tube is normally closed with a cork. The cage is placed on a layer of "oasis"-type matting which is kept constantly wet.

After a week, the cage can be populated with Collembola and fungus gnats (Diptera: Mycetophilidae) which maintain stable populations of high density and serve as spider food. Both organisms feed on fungal hyphae which grow in the damp compost. The flies are most easily obtained from garden compost heaps or may be attracted to a tray of damp soil left out of doors. It is advisable to add flies to the cage at intervals so as to produce overlapping generations and thus ensure a constant food supply for the young spiders.

Once the fly and collembolan populations are established a gravid female spider or female plus cocoon can be added. Virtually the only maintenance required is keeping the "oasis" matting wet and, when the spiders have grown to sufficient size, supplementing their diet with *Drosophila* flies, added to the cage via the access tube.

Using the cage method, we have reared about forty young from a single *E. ovata* cocoon (*ca* 110 eggs), a survival rate which is as good as that obtained by rearing spiders individually in glass tubes, but with only a fraction of the maintenance effort. The rearing cage described above could be adapted for many other species. For example, fungus gnat species vary in size, and thus an appropriate sized prey can be chosen to suit different sized spiders.

For species which spin small webs in crannies, baffles could be placed on the soil surface to increase the number of suitable corners. We are at present trying these in our *E. ovata* cages.

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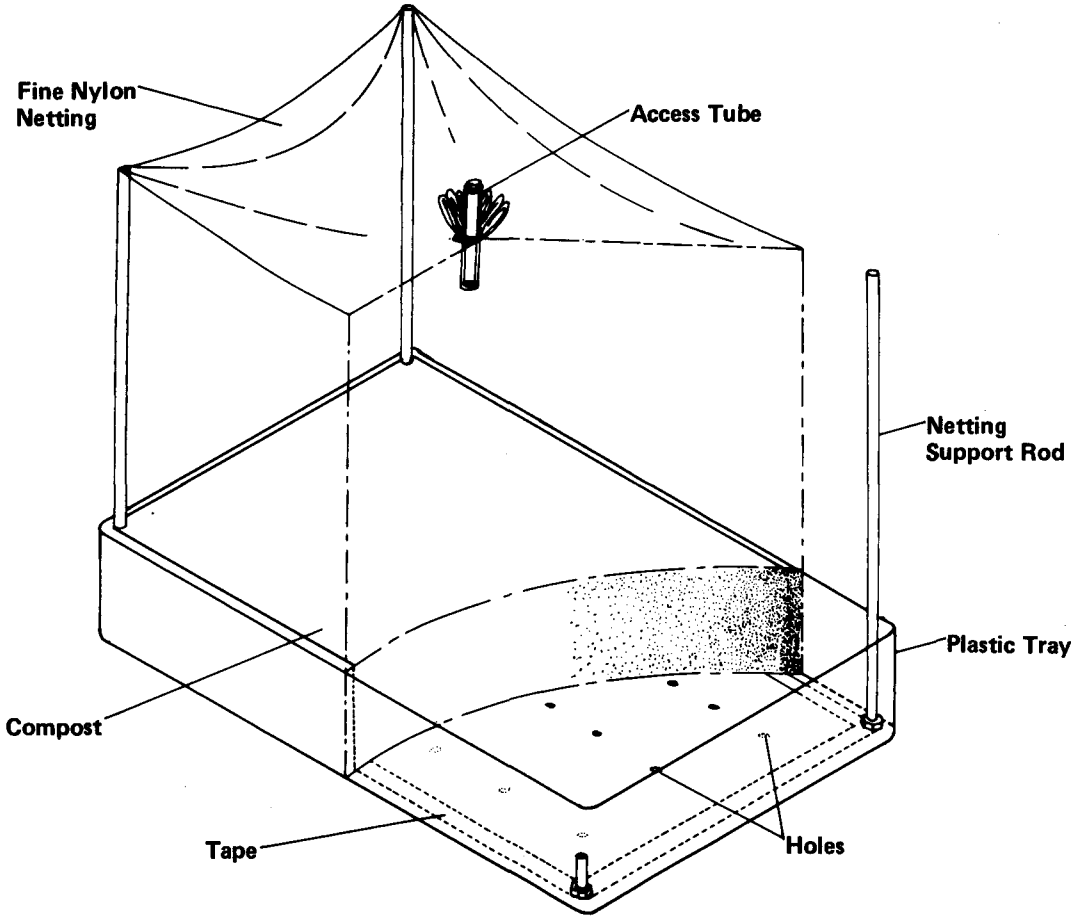

Fig. 1: Diagram showing the construction of the rearing cage. Details are given in the text.

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