Control of mites and molds

Spencer, W.P. Life history of the laboratory mite. The adults live in the culture medium and do not crawl over the inside of the culture bottle or on pupation paper as do the non-parasitic mites. The males are much smaller than the females, and may be seen mating with them; both have a squat appearance in contrast to the long, thinner non-parasitic mite. The eggs are laid in the culture medium and the young mites after several days to a week metamorphose into the migratory stage. These are brownish in color, just visible to the naked eye, and are extremely active. They crawl up out of the culture medium onto the sides of the bottle, and readily penetrate cotton plugs or other stoppers. They are constantly on the move and may travel at least several feet. During the course of this migration they attach to any insect with which they come in contact, and sink the mouth parts into the insect. On Drosophila they tend to attach themselves most frequently to the legs, particularly the proximal joints, to the wings, and about the genitalia. However, no part of the fly is immune and in heavy infestation literally hundreds of mites may attach to a single fly. Most of these mites leave the fly in a week or ten days after attachment, then grow to the adult stage in the culture medium and reproduce.

In fast breeding species of Drosophila such as melanogaster or simulans it is quite feasible to use mite infested parents and by taking their first offspring (providing temperature and other culture conditions have been optimum) get rid of the mites in one generation. This assumes that precautions have been taken to keep any new migrants from getting into the culture bottle. The life cycle of these species is more rapid than that of the mites and it seems that mites which have become firmly attached to one host do not leave for a second host.

In slower breeding species the best procedure is to transfer parents one to several times until they are finally free of the parasitic stage. One transfer is not always sufficient as a heavily infested fly may carry some of the parasitic stage for over two weeks before they leave, and in the meantime the mites which were first to leave will have produced a new generation of the migratory stage.

Spencer, W.P. Mite and mold control 1) The life cycle of mites seems to be less affected by low temperature than is that of flies. Hence during a mite infestation it is important to provide the optimum breeding temperature for each species of Drosophila and for all stock cultures suspected of being exposed to infestation. In general temperatures of 24 C to 26 C are optimum for most species, with certain exceptions noted in the literature. Funebris, hydei, immigrans do better at 24 C, melanogaster, simulans, carribea at 25 C or 26 C.

2) Rapid turnover of stocks with immediate discarding of all old stocks. During periods when mites are present all old

stocks are placed in a dry sterilizer and heated sufficiently to kill mites and eggs before bottles are washed. This seems a surer way of killing all mites than using a disinfecting solution on bottles.

3) Flies to be used as parents for new stocks are placed in small vials for one week to ten days, even though they appear to be free of mites. Then they are transferred to fresh stock culture bottles of standard size. During this period the mites which may have been present on the flies will have left them to breed in the culture medium, but a new generation of the migratory stage will not have come on.

4) All cultures, both the vials, and final stocks are kept standing in shallow metal trays containing Lysol solution, 1 part to 200 parts water. These trays are placed in incubators (see below) of 40 cubic foot capacity. As strong carbolic acid fumes are detrimental to flies it is is important to use as weak a Lysol or carbolic acid solution as will be effective. The above solution, 1:200 is not detrimental in enclosed incubators with evaporating surfaces of 1 square foot to two cubic feet of air space and no ventilating fan.

Tests of the following as possible liquid media for the control of mites were made; coal oil, 10% sulphuric acid, No. 10 light motor oil, 5% copper sulphate, Lysol. The migratory stage crawls readily through or on the surface of all of these except Lysol, which is very effective as a lethal agent. They also crawl readily through a band of vaseline. Many mites were then immersed in various concentrations of Lysol; the cessation of movement of all appendages was taken as the killing time.

Table

Dilution of Lysol	Killing time, All mites dead in
1: 40	5 minutes
1: 80	10 minutes
1: 160	15 minutes
1: 320	50 minutes

5) When a mite infestation seems to be entirely cleared up a fair sample of culture bottles from various incubators should be kept over a long period of time (isolated of course) as tests. The adults of the parasitic mite can readily be seen in such culture bottles and distinguished from the non-parasitic species of mites which may be present, but which can hardly be considered a pest. The parasitic mite in the adult stage is larger and with a squatty body, the non-parasitic mite is long and with long white hairs on the body.

6) Assume that any shipment of flies from another laboratory contains mites; of course this works both ways. It has been my experience that flies taken in nature seldom harbor the laboratory mite. In a considerable amount of collecting I have found them only once. Of course in mite-infested laboratories stray flies will likely be infested.

7) During a period of mite infestation all apparatus used in handling flies and all table tops etc. should be frequently wiped clean with Lysol or other sterilizing media, and it should

be kept in mind that mites can easily be passed from bottle to bottle by handling.

Most of the trouble with molds can be avoided by starting cultures at the optimum temperature until larvae are present. Of course in slow breeding species such as sulcata or repleta parent flies should be matured in small vials for a week to ten days. If a multiple mutant stock, or any one difficult to carry becomes infected with mold or harmful bacterial growths, flies to be used as parents from this stock may be kept for a few days in a vial with a hardy culture of some other species. Here the larvae of the second species keep down the mold and the flies of the first stock have a chance to mature in a mold-free environment. Assume that mold spores will be spread by infected etherizing bottle, or any other piece of apparatus used in manipulating flies and take necessary precautions to prevent this.

Demerec, M. Control of mites. As a preventative measure against the spread of mites we are keeping stock cultures (and also all other culture bottles which are used during a long period) standing in a weak soap solution. For this purpose shallow (2 inches or 5 cm high) galvanized iron trays are used. These are made to order to fit our shelves (usually 12 x 36 x 2 inches). In case any of the cultures is infected with mites the soap solution prevents their spread to adjacent cultures and keeps the infection under control. Some of our trays have been in use for over five years without any sign of wear. The initial cost for trays, therefore, is spread over a long period. Mites can also be controlled effectively by avoiding accumulation of old culture bottles and by wiping frequently, shelves and tables, with carbon tetrachloride or kerosene. (Copied from DIS 2:61).

Gottschewski, G. Control of mites. Beim Auftreten von Milben werden Kulturflaschen und Abstellregale regelmässig mit einer 5% igen Sagrotan-Lösung abgewaschen. Ausserdem werden die vermilbten Kulturen 2 Tage nach ihrem Ansetzen erneut in frische Flaschen umgesetzt. Die Milben bleiben fast vollständig im Futter der alten Kultur und die umgesetzen Fliegen sind Milbenfrei. Dadurch ist es gelungen, die Milben vollständig zu vertreiben.

Gowen, John W. Control of mites Three or four years ago I would have said that the control of mites was relatively simple. At the present time, however, in view of my experience of the past two years, I do not consider it quite so simple - although entirely possible. My method of control consists in using cotton-stoppered bottles and in transferring pairs as soon as they hatch. This method repeated three or four times has, in every case, freed the culture of mites. Using paper caps it does not seem possible to control mites by this