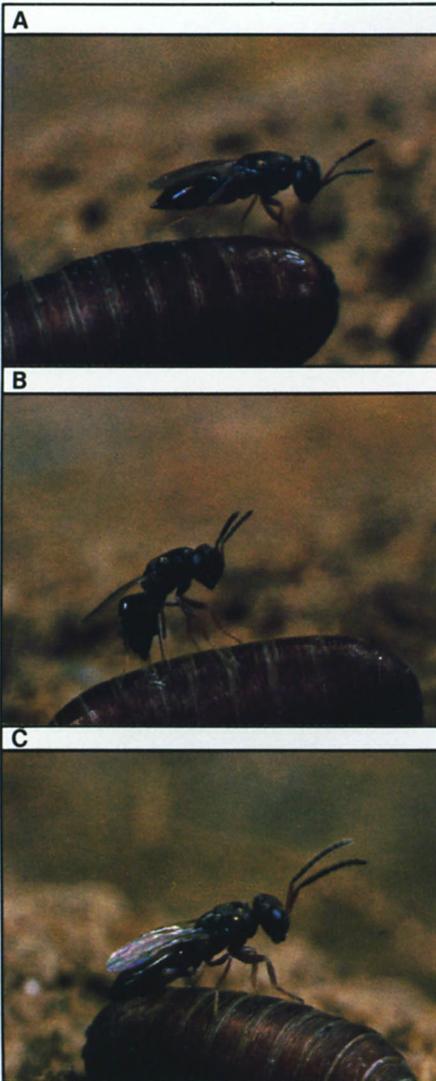


Improved parasites for filth fly control

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(A) Parasite *Sphegigaster* sp. from Israel positions itself on house fly puparium before stinging and paralyzing the pupa (B), after which it will lay eggs. (C) Giant strain of parasite *Muscidifurax zaraptor* from western Colorado stings house fly pupa.

Inundation with parasitic wasps to control domestic flies on poultry ranches and dairies can increase parasitism and minimize adult fly densities. This technique, combined with proper manure management, water control, general ranch sanitation, and restricted use of pesticides, may reduce fly problems to below annoyance levels, especially when parasites are released earlier in the season than would occur naturally. It is becoming increasingly apparent, however, that the rapidity and degree of control vary in different climates. This variation may be related to the fact that parasitic species available for inundation have been heretofore restricted to single strains of two or three species.

The parasite species involved specifically attack filth breeding flies, but they are primarily attracted to accumulated animal wastes, such as those associated with livestock and poultry confinement operations. Recent investigations have shown that fly parasite strains and species differ in their activity according to differences in stresses caused by climate, a pattern that is being recognized for other host-parasite relationships. The use of new wasp species and strains that excel in a wider variety of climates now offers the possibility for substantial gains in the biological control of filth flies.

A reassessment of natural enemy complexes associated with such flies as *Musca domestica* L., *Stomoxys calcitrans* (L.), *Fannia canicularis* (L.), and *Fannia femoralis* Stein in the continental United States pointed to the absence of several noteworthy species and strains of parasitic wasps that attack these pests in other parts of the world. These wasps have characteristics suited to the broader climatic range of the central and western United States, where excessive heat and drought restrict the performance of resident species or those that have been available from commercial insectaries.

An example is the parasite *Sphegigaster* sp., which is widely active in the native African range of house and stable flies. A new isolate from Israel possesses a high degree of drought resistance, aggressiveness, and reproductive capacity that makes it a good candidate for filth fly control in the

American West. Its ability to parasitize pupae at the manure surface in cool weather makes it potentially useful for winter fly control in California. Field tests in southwestern California show that *Sphegigaster* is capable of parasitizing such flies on poultry ranches, reducing their emergence by over 80 percent around release sites at liberation rates of 100 per square meter of breeding habitat.

A drought-resistant strain of the pupal parasite *Spalangia endius* Walker from New Zealand offers the possibility for a broader biological control in the semiarid American West. This New Zealand relative also demonstrates activity at lower temperatures (70° F) than the resident form (78° F) and hybridizes with other strains of the same species where it is released. The resulting population of hybrids shows increased vigor over both parental populations in its ability to parasitize a greater number of flies within the same period and in its increased longevity.

A giant strain of *Muscidifurax zaraptor* Kogan & Legner, occurring in the central part of the western Great Plains from Colorado to New Mexico, has enhanced qualities of fecundity, cold-hardiness, heat tolerance, and habitat foraging capability. Strains of this pupal parasite that occur in California and the midwestern United States are much more restricted in their ability to penetrate the breeding habitat in search of fly pupae and are less fecund and tolerant of high temperatures and winter cold.

A recent biological control success against stable flies has been reported on the Island of Mauritius, where *Tachinaephagus stomoxida* Subba Rao has been introduced from Uganda. Although a tropical species, it offers possibilities of controlling biting stable flies in America through annual inoculative releases.

Cultures of these parasites and their rearing technology are being released to commercial insectaries for wider public access, with the purpose of permanently establishing them in California.

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