

# USE OF SOCIAL SPIDERS AGAINST GASTRO-INTESTINAL INFECTIONS SPREAD BY HOUSE FLIES

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It is generally known that house flies have developed resistance against insecticides such as DDT, BHC, DDD, chlordane, heptachlor, dieldrin, aldrin, endrin, isodrin, prolan, dilan, lindane, chlorothion, malathion, parathion, diazinon, toxaphene, and even against pyrethrum. Because flies are alleged spreaders of amoebiasis, cholera, dysentery, conjunctivitis, ophthalmia, trachoma, poliomyelitis, gastroenteritis, shigellosis, summer-diarrhoea, and typhoid fever, as well as of eggs of certain parasitic worms, we have used the social spider *Stegodyphus mimosarum* Pavesi to control flies biologically.

## *Biological Data*

In the Afrikaans Children's Encyclopaedia (vol IV, pp. 1664-1665), Dr. A. J. Hesse states: 'It is very strange to note that spiders who generally devour one another, sometimes live together in little colonies. These exceptions are very rare. Most spiders are marauders and do not even tolerate their own kind. In Africa, however, there are certain social spiders (*Stegodyphus*) that live together in little colonies. They live in one big untidy nest, which is built by all the spiders together. There is no division of labour in this community. The nest is like a boarding-house, divided into many rooms in which each spider has his own little room or compartment. They all sit down to a meal together, as the whole community wages war against any insect that has fallen prey to their snares.

'Improvements to the nest are undertaken by the whole community. The nest starts as a single silk cocoon. The little ones that are born here enlarge the nest and so it spreads out. Above the nest they spin their webs in all directions. There is no order in the spinning of these snares. Each spider spins along as far as he goes, and the threads criss-cross in all directions. This medley of threads acts as a snare. . . .

'These communal nests are sometimes very big, for instance as big as a football. A community of this nature consists of more than a hundred spiders. Everything entrapped in the snaring-threads is dragged into the nest by the little spiders, with the result that the big nest eventually becomes one massive spiderweb. . . .'

It is alleged that the Voortrekker pioneers and early farmers in the Orange Free State and the Transvaal employed social spiders effectively against house flies before the advent of sticky fly-paper and pyrethrum. As recently as 1930, farmers in the Petrusburg, Koffiefontein and Rouxville districts used these spiders with great success in kitchen windows.

According to an old Shangaan, social spiders were utilized in huts of his tribe in the Transvaal up to about 1914 and were very effective against house flies and cockroaches. Two senior health inspectors and a biologist independently informed me that in the Hlabisa and Nongoma districts of Zululand, this biological method of control was practised up to about 1937. The biologist told me that the Zulus placed the nests in a row halfway up the outside of huts and cook-shelters.

It is therefore suggested that the spiders should again be employed in Bantu areas, not only on the outside of huts, but especially under the eaves and inside huts, as well as in pens for cattle and goats.

During the past 2 years, housewives in parts of the Free State and the Cape Province, as well as workers at the Medical Ecology Centre, Johannesburg, resorted to the old type of sticky fly-paper, presumably because of DDT-resistant flies. It is therefore of practical interest to point out that well-sited *Stegodyphus* nests, not only reproduce, but also need no daily or half-weekly attention as required by sticky fly-paper. Moreover, it is not easy to run short of spiders once they are established, whereas additional insecticide supplies have to be bought frequently.

*Stegodyphus* spiders will not upset children or adults because:

(a) During 2 years of observation in 2 laboratories and several kitchens, spiders did not fall or wander from nests suspended from ceilings. They were not found on walls of experimental rooms.

(b) They do not extend their webs except in the immediate vicinity of the nest; thus not even the tidiest housewife needs be worried.

(c) During routine experimental handling of many

thousands of individual spiders by children, only 4 bites were registered during 2 years. These bites did not even turn septic. The social spider is therefore apparently completely harmless, and can be employed with safety in our homes.

In kitchens *Stegodyphus* operates efficiently when the nest is suspended by means of a string and a nail from the centre of the ceiling where flies prefer to sleep or sit because of the higher temperature, especially during winter. When electric lights are used, the nest is tied to the flex right up against the ceiling, and the spiders construct a sticky, silken cone from the nest to the bulb-shade. When the flies are too numerous for a singly-sited nest, many flies are not dragged into it, but remain stuck on the snare, and can be readily removed with the aid of a broomstick.

At Tzaneen, a hospital and some housewives are successfully using spider nests not only in kitchens, but also in bedrooms to protect babies and children against fly-borne diseases, even in screened houses. We all know how annoying a few flies sometimes are during a Saturday or Sunday siesta in midsummer. With the aid of social spiders it might perhaps even be possible to re-establish the good old Free State custom of getting youngsters to sleep or rest indoors from 1 to 3 p.m. during the summer months.

In the animal house of the Plague Research Laboratory, Johannesburg, where hundreds of rodents are reared, one nest of about 120 spiders, sited in the only west-facing window, sufficed to reduce the adult fly population by about 60% within 3 days.

At a dairy farm 4 miles from Tzaneen, 38 nests were used from March 1957. During May 1957 this farm was so free from flies that neighbours wanted to buy some of the experimental nests.

During two unseasonably warm spells in June this farm was again fly-infested. We, therefore, devised a new approach to the problem: From March to June some nests were kept without food and water in closed boxes, without marked mortality of the spiders. These nests were subsequently used as traps during the winter months because most nests in which spiders are allowed to feed and develop to maturity usually contain only egg cocoons and virtually no live spiders in midwinter. This new technique provides different stages of immature spiders in winter for control of adult hibernating flies. Fly breeding is greatly inhibited by our winter temperatures and virtually ceases during winter in most parts of the world. We may therefore expect that the use of immature spiders in winter will still further augment the efficacy of this biological method of control.

A senior health inspector used 8 nests of the social spider on his plot outside Bloemfontein. He was so impressed by the results that he developed a theory that the nests possess an effective and attractive chemical agent.

Two farmers, one from the Transvaal and the other from the Free State, claim that they virtually eradicated house flies from their farms by using 80 and 56 nests respectively. The Free State farmer and his neighbours claim that within 2½ months his fly population decreased by more than 99% while the fly densities of the neighbours remained unaltered. He developed a theory that the nests are highly repellent to flies. I suspect that he used a second social spider species, which we are now studying at Tzaneen: this spider discards the insect cadavers from the nests, which explains the theory.

Because veld-burning to obtain early spring grazing decimates veld nests, farmers are advised to collect the nests, especially those on the lowest branches of trees, those constructed on grass, and those on wire-fences.

These spiders are of value in unscreened pit-latrines which are common in many parts of the world, since flies transmit gastro-intestinal infections. Natives in the Tzaneen location, where 840 nests were sited in pit-latrines, claimed that in the spring of 1957 there were so few flies in their previously heavily-infested location, that it was possible for them to have their meals without flies.

Compared with insecticides against which flies have developed resistance in most countries, spider nests are cheaper and can be collected from the field. The nests can be protected against rain by using them under shelter or indoors, and they reproduce more than a hundredfold a year.

With reference to the question: 'What would happen to the social spiders when no flies are available?' it is interesting to point out that *Stegodyphus* was kept without food and water for 6 months without marked mortality. There is a species of spider which can live without food and water for 2½ years. However, there are usually moths and some other insects which also invade our homes so that in the absence of flies social spiders will still be assured of prey.

#### *Recommendations*

In order to help protect humans against fly-borne diseases, it is suggested that colonies of the social spider be placed in public places like markets, restaurants, milk bars, public houses, hotel kitchens, as well as in abattoirs and dairies, and especially in kitchens and latrines on all possible premises. In cowsheds they would also help to increase milk production.