

± 3 km. inland from coast on N. side, ± 450 m., III-25-27-70, under bark of *Bursera graveolens*.

Acanthoderes galapagoensis vonhageni Mutchler.—5 ♂♂, 5 ♀♀, Santa Cruz I., II-22-23-70, III-4, 5, 17-70, V-23-70, VI-20-30-70, VII-14-70, at U. V. light.

Estola insularis insularis Blair.—1 ♂, 6 ♀, Santa Cruz I., III-5-12-70, IV-24-26-70, V-2-10-70, at U. V. light.

Desmiphora maculosa Linsley and Chemsak.—1 ♀, Santa Cruz I., III-13-70, at U. V. light.

Nesozineus galapagoensis variabilis Linsley and Chemsak.—6 ♂♂, 6 ♀♀, Santa Cruz I., II-22 to 24-70, III-5-12-70, IV-28-70, V-23-30-70, VI-31-70, VII-29-70, at U. V. light.

Nesozineus galapagoensis galapagoensis (Van Dyke).—1 ♂, Isabela I., Tagus Cove, III-22-23-70, at U. V. light.

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The presence of *Sphaerularia bombi* (Tylenchida: Nematoda), a nematode parasite of *Bombus* queens (Apidae: Hymenoptera), in California.

—The parasitic nematode, *Sphaerularia bombi* Dufour, was first reported from queen bumblebees in France in 1742 and was then discovered in other parts of Europe and Britain (Poinar and van der Laan, 1972, *Nematologica* 18: 239–252). It was first reported from Eastern North America by Stiles (1895, *Entomol. News* 6: 248–250) and subsequently reported from other eastern localities (Medler, 1962, *Can. Entomol.* 94: 825–833; Fye, 1966, *Can. Entomol.* 98: 88–89). In 1957, Khan (*Can. J. Zool.* 35: 519–523) recorded the parasite from Saskatoon, Saskatchewan, Canada which was the western limit of its range until the present report.

Since this nematode parasite sterilizes *Bombus* queens, bumblebee populations are affected and similarly the pollination of many crops. The morphology and life history of *S. bombi* was recently investigated (Poinar and van der Laan, 1972, *ibid.*) as was its unusual manner of food uptake (Poinar and Hess, 1972, *J. Nematol.* 4: 270–277). The present report records the presence of *S. bombi* from two new hosts in California.

During the spring of 1972 and 1973 queens of *Bombus vosnesenskii* Radoszkowski, *B. occidentalis* Green and *B. edwardsii* Cresson were collected from various localities in the San Francisco Bay area. When infected queens were obtained, the mature parasitic females of *S. bombi* were fixed directly in TAF and the juveniles placed in dishes of shallow water where they molted to the adult stage in 6–8 weeks. They were then heat killed, fixed in TAF and processed to glycerin.

S. bombi was found parasitizing queens of *B. vosnesenskii* near the Guadalupe Canyon Road in San Bruno and at Lake Merced in San Francisco. The incidence of parasitism was low (about 3–5%) and the number of parasitic females varied from 1 to 4 per queen.

S. bombi was also collected from queens of *B. occidentalis* in San Francisco. The incidence of parasitism was low (1–3%) and the number of parasites per host ranged from 1 to 3. The nematode was not recovered from queens of *B. edwardsii*.

The incidence of parasitism of *S. bombi* was relatively low, especially when compared to the infection rate in some parts of Europe, and probably varies considerably depending on the locality and annual rainfall. The latter is undoubtedly an important aspect in determining the range of this parasite since queen bumblebees are infected during their hibernation period (Poinar & van der Laan, 1972, *ibid.*) and a certain amount of soil moisture is essential for nematode survival and host penetration. Therefore a lower incidence of parasitism would be expected in the arid western states. It is probable that *S. bombi* can persist only in certain localities where the climate is modified and meets the requirements of the parasite. Inquiry of other scientists working with bumblebees on the West Coast failed to confirm the presence of *S. bombi* in native *Bombus* species. W. P. Stephen of Oregon (1972, personal correspondence) stated "We have yet to find any evidence of *Sphaerularia* in the 100s of nonreproductive queens that we have dissected." Similar results were reported by R. W. Thorp of California (1972, personal communication).

It is interesting that *S. bombi* has also been collected from *B. terrestris* in South Island, New Zealand (MacFarlane, 1973, personal correspondence). *Bombus* was originally introduced into New Zealand from Europe. This is the only case known to the author of *S. bombi* in the Southern hemisphere.

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A simple emergence trap for small insects.—This trap was designed to catch biting midges (Ceratopogonidae) as the imagines emerge from puparia in the mud where the larvae live. Since it is simple and cheap to construct, and easy to operate, it could also be used with slight modifications for similar purposes in other kinds of research.

Each trap assembly consists of a square metal box, the pre-trap, with a pair of round openings at diagonally opposed corners leading to two glass vials, the traps proper. The pre-trap that we use is constructed of sheet metal (painted or galvanized), 50 × 50 cm square with sides 15 cm high, open below and closed over the top. In order to take the traps proper, the holes in the top



Poinar, George O. 1974. "The presence of *Sphaerularia bombi* (Tylenchida: Nematoda) a nematode parasite of *Bombus* queens (Apidae: Hymenoptera), in California." *The Pan-Pacific entomologist* 50(3), 304–305.

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