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***Sphaeronema californicum*, nov. gen. nov. spec., (Criconematidae: Sphaeronematinae, nov. subfam.) an endoparasite of the roots of certain plants**

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A soil sample collected by the junior author on April 22, 1950 from a stream bank near Inverness, California contained several male nematodes which appeared to belong in the genus *Paratylenchus*. A thorough search of the original sample and an additional soil sample from the same locality failed to provide females for more positive identification. Root material was later secured from the principal plant, *Umbellularia californica* Nutt., growing in the immediate locality. These roots were washed clean and female nematodes were found inside the roots when the roots were dissected under a microscope. Many more females were readily found by briskly rubbing the roots together in a beaker of water and searching the sediment. The most effective means of collecting large numbers of all stages of this nematode was by staining the roots with acid fuchsin in boiling lactophenol as described by Goodey (1937). The roots could then be easily torn apart in clear lactophenol and the nematodes mounted in lactophenol or transferred directly to dehydrated glycerine for mounting. It was found even in the presence of a high population of this nematode that relatively few specimens could be secured by screening the soil. However, large numbers of males and larvae were readily collected by washing infected roots free of soil and storing in a beaker of clear water for several days. One sample of soil containing roots was held in a refrigerator at approximately 5° C. for over a year after which time numerous live specimens could be obtained from the roots in this manner.

Although the roots appeared to be severely damaged by the high population of nematodes found attacking them, the tree did not show any above ground symptoms which would suggest a weakening of the plant. The nematodes occurred more or less in colonies in the small lateral and feeder roots and the areas thus heavily infected showed a general breakdown of the cortex and bark. The adult females secrete a gelatinous matrix which usually contains many eggs, larvae and males. Considerable debris usually adhered to the matrix giving it a characteristic dirty appearance.

Further attempts were made to collect this species in or about the roots of *Umbellularia californicum* in at least five widely separated areas in California

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without success. However, a soil and root sample of an *Arctostaphylos* sp. collected by Dr. J. W. MacSwain of the University of California in the Sierra Nevada Mountains of California showed the roots of this plant to be attacked by this same species of nematode. This suggests that *Sphaeronema californicum* is probably widely distributed in California and may occur on several different species of plants.

SUBFAMILY SPHAERONEMATINAE, NEW SUBFAMILY

Criconematidae. Female body sub-spherical, cuticle thick, marked by a well-defined reticulate pattern. Lips of vulva protrude prominently, sub-terminal in position. Males degenerate, bursa absent.

TYPE GENUS: *Sphaeronema* n. g.

DIAGNOSIS: Sphaeronematinae are most closely related to the subfamily Paratylenchinae. This relationship is shown most markedly in the shape and structure of the male. The small cuticular flap found laterally near the vulva and the well-defined isthmus are also present in Paratylenchinae. In addition the enlarged female shape is only found in the genus *Cacopaurus* of this family. Sphaeronematinae are distinguished from Paratylenchinae by the sub-spherical shape of the female, by the reticulate pattern of the female cuticle, by the protruding lips of the vulva and by their endoparasitic habit of feeding.

GENUS *Sphaeronema* new genus

Sphaeronematinae: Larva provided with a strongly developed spear. Sclerotization of head with hexaradiate symmetry. Female sub-spherical, spear well developed, one or two very obscure annules present near lip region. Esophagus very strongly developed. Ovary single, uterus unusually large with thick muscular walls. Males slender, active, spear lacking, esophagus degenerate, bursa absent, spicule sheath present. Testis one.

TYPE SPECIES: *Sphaeronema californicum* n. sp.

Sphaeronema californicum new species

♀ : L. = 0.134-0.209 mm.; a = ?; b = ?; c = ?; V = subterminal.

♂ : L. = 0.395-0.470 mm.; a = 33.2-44.8; b = ?; c = 12.0-14.8;

T = 20.3-29.8%; gub = 3-4.5 μ ; spicule = 19-21 μ .

LARVA: (Fig. 1, A-C). L = 0.390-0.470 mm.; a = 25-31; b = 3.3-4.4; c = 10.7-11.5. Body slender, cylindrical. Annulation of body fine and obscure. Lateral field not marked by definite lines. Lip region continuous with neck. Sclerotization of lips hexaradiate. Spear 14.4-16.7 μ , prohabdion 53-57% of total length. Knobs of spear rounded swellings. Esophagus long, slender with well-defined isthmus. Excretory pore slightly anterior to nerve ring. Anus very obscure. Tail conoid, arcuate with bluntly rounded terminus, occasionally more sharply conoid than illustrated.

FEMALE: (Fig. 1, G-I). Body sub-spherical with protruding neck which frequently assumes elaborate shapes due to conformity with the host-plant cellular structure. Cuticle strongly developed, up to 9 μ thick, marked by conspicuous reticulate pattern. One or two very obscure annules near lip

Fig. 1.—*Sphaeronema californicum*. A—Neck region of larva, \times 650; B—Face view of larva, \times 1000; C—Tail of larva, \times 500; D—Neck region of male, \times 1000; E—Male tail, \times 1000; F—Male, \times 400; G—Female head, \times 1000; H—Criss section of median bulb of female, \times 330; I—Female, \times 330.

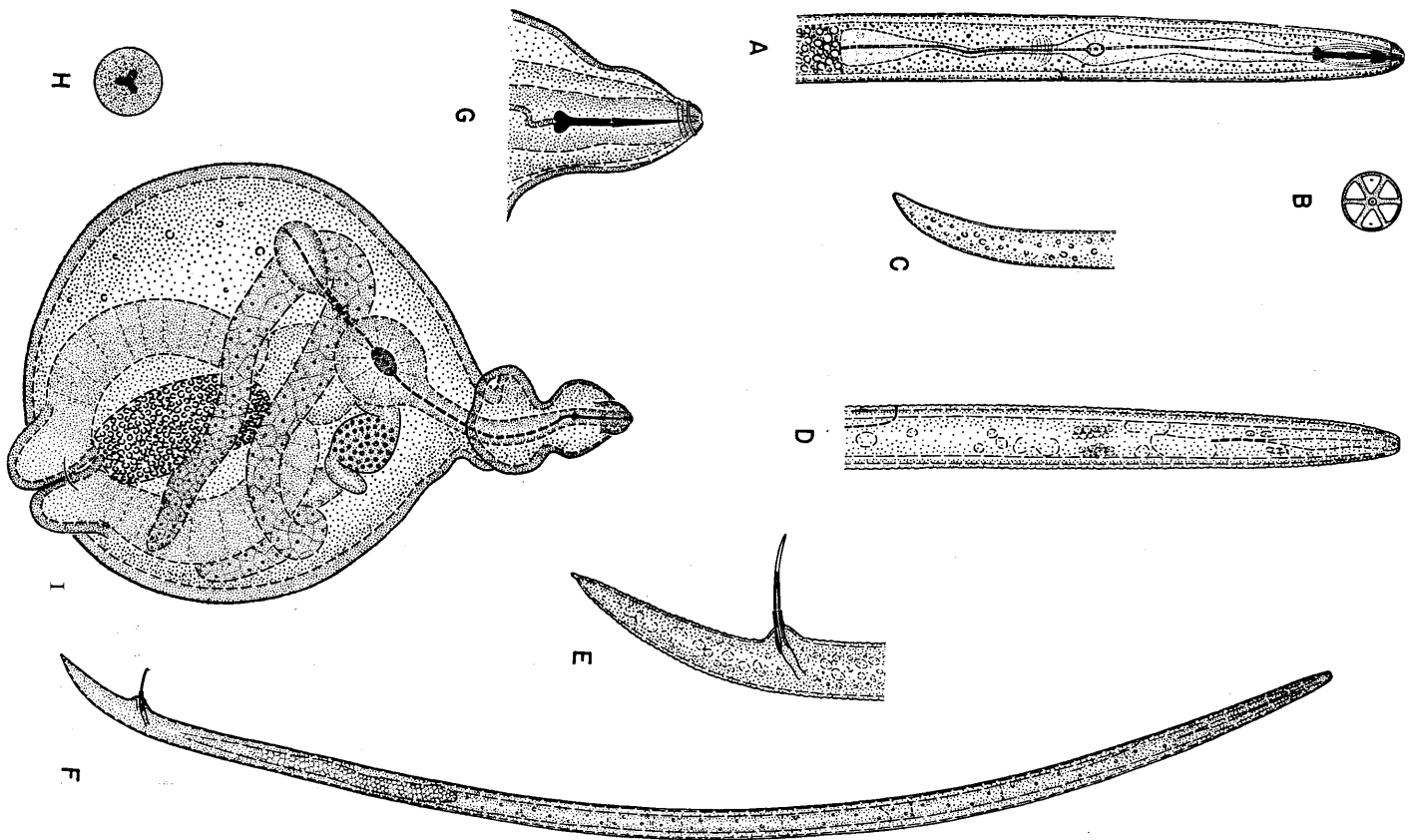


Fig. 1

region. Lateral field not marked by definite lines. Reticulate pattern assuming vague cross lines near and on lips of vulva.

Sclerotization of head very delicate, obscure in face view. Spear 14-20 μ long, prohabdion 51-60% of total length. Knobs of spear simple swellings, directed slightly posteriorly. Lip region set off by a very faint annule, the anterior surface of which bears minute smooth rounded lips. Esophagus well developed. Corpus elongate, cylindrical. Median bulb rounded with prominent tri-radiate sclerotized valve. Isthmus slender with well-set-off posterior bulb. Junction of esophagus and intestine obscure. Lumen of esophagus approximately 1 μ wide, heavily sclerotized. Excretory pore present on neck region about the level of median bulb. Dorsal gland orifice approximately 4-5 μ posterior to spear. Ovary single, leading to a greatly developed uterus with unusually thick, muscular walls. Vulva subterminal with prominent, protruding lips. Small somewhat indefinite cuticular flap present laterally near vulva lips. Anus and phasmids not observed.

Immature female nematodes prior to last molt pear-shaped without protruding vulva, reticulate pattern of cuticle lacking.

MALE: (Fig. 1, D-F). Lip region smooth, set off by slight constriction. Sclerotization delicate, obscure in face view. Cuticle marked by narrow transverse annules. Lateral field not marked by definite lines. Esophagus degenerate, spear absent. Excretory pore—0.066-0.099 mm. from anterior end. Hemizonid small, located on third annule posterior to excretory pore. The position of the hemizonid differs from the examples reported by Goodey (1951), who described it as anterior to the excretory pore in all cases observed by him. Testis 20.3-29.8% of length. Spicules 19-21 μ long, slender, slightly curved ventrally. Bursa absent. Gubernaculum 3-4.5 μ long, simple and slightly curved. Spicule sheath conspicuous. Cuticle bulges characteristically in region of cloacal opening. Phasmids not seen. Tail conoid with rounded terminus, curved slightly ventrally.

TYPE HOST: Roots of California laurel, *Umbellularia californica* Nutt.

TYPE LOCALITY: On shore of Tomales Bay, ¼ mile northeast of Inverness, Marin County, California; elevation near sea level.

HOST PLANTS: Also collected in roots of *Arctostaphylos* sp. near Pyramid Ranger Station, El Dorado County, Calif.; elevation 5,500 ft.

TYPE SPECIMENS: Holotype—female; allotype—male; 232 paratypes deposited in the University of California Collection, Berkeley, Calif.

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