S. picae is 6 which is considerably smaller than that of *S. teres* (12 to 15). The constriction between the anterior and posterior regions of the proboscis occurs at the ninth or tenth hook in *S. teres*, while in *S. picae* it occurs at the seventh or eighth hook. In *S. teres* the last two or three spines of each longitudinal row do not have roots, but in *S. picae* these spines are provided with anterior roots or manubria. The maximum length of hooks in our specimens is considerably less than that in *S. picae* (37μ and 34μ). Because of these differences we believe that *S. teres* and *S. picae* should be regarded as two distinct species.

Summary

Sphaerirostris teres (Westrumb, 1821) is reported from *Corvus corax* and *C. corone* in Egypt. The range of measurements for this species as given by Golvan (1956) is extended. *Corvus corax* appears to be a new host, and Egypt appears to be a new locality record. Results of this study indicate that *Sphaerirostris picae* Dollfus, 1953, and *S. teres* are not synonyms as was suggested by Golvan (1956).

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NOTES ON PARASITES OF IMMATURE TABANIDAE (DIPTERA) AND DESCRIPTIONS OF THE LARVA AND PUPARIUM OF *CARINOSILLUS PRAVUS* (DIPTERA: TACHINIDAE)

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Abstract

Carinosillus pravus Reinhard (Diptera: Tachinidae) is reported for the first time as a parasite of tabanid larvae. The larva and puparium of this species are described and figured, and comparative notes between it and *C. tabanivorus* (Hall) are offered. Additional records of two previously reported parasites of tabanid larvae or pupae, *Phasiops flavus* Coquillett (Diptera: Tachinidae) and *Trichopria tabanivora* Fouts (Hymenoptera: Diapriidae), are furnished, and the first record of a dipteran parasite of tabanid pupae is noted.

Published reports of dipterous parasites of larvae and pupae of Tabanidae have been rather limited. In fact, no confirmed reports of dipterous parasites of tabanid pupae have been found in the literature. Review of the available literature revealed that six species of parasites have been reported from North American tabanid larvae. Jones and Bradley (1923) reported the rearing of two; they reared *Anthrax lateralis* Say (Bombyliidae) from the larva of *Leucotabanus annulatus* (Say) and *Phasiops flavus* Coquillett (Tachinidae) from the larva of *Tabanus trimaculatus* Palisot. Jones and Anthony (1964) added *T. petiolatus* Hine to the list of hosts for the latter species. These same authors added the larvaevorid fly *Ormia punctata* Robineau-Desvoidy to the list of tabanid larval parasites on the basis of an adult reared from an unidentified species of *Tabanus*. Tashiro and Schwardt (1953) reported the rearing of *Vibrissotheresia pechumani* Reinhard from the larva of *Tabanus* species. Hall (1937) described *Carinosillus* (as *Myocera*) *tabanivorus* from a single male reared from *T. trimaculatus* by Dr. C. B. Philip (Philip 1931). Greene (1937) described and figured the puparium of the latter parasite; Hays (1958) described the larva and adult female (as *Phorostoma tabanivora*) and furnished notes on the biology of the species. James (1963) reported the rearing of many *Carinosillus* (as *Phorostoma*) *sororcula* (West) from tabanid larvae.

During the course of a taxonomic and ecological study of tabanid larvae in the springs of 1966 and 1967, several larvae of *Tabanus fairchildi* Stone were taken from a small mountain stream in Monroe Co., Tennessee. These larvae were collected in early May and all were apparently last instar larvae. When collected the larvae exhibited no signs of being parasitized but in the course of rearing them six proved to be hosts for the larvae of *Carinosillus pravus* Reinhard (reared adults of the parasite identified by Dr. C. W. Sabrosky of the Systematic Entomology Laboratory, U. S. Dept. of Agriculture, Washington). Until the first definitive signs of parasitization, these larvae exhibited no noticeable differences from the normal larvae, an observation which agrees with the findings of Hays in his studies of *C. tabanivorus*. The following is a list of other definitive signs which agree with those noted by Hays for *C. tabanivorus* infections: 1) the infected larvae became lethargic, 2) they contained excess liquid, 3) they were somewhat discolored and 4) they refused to feed. Within a few days only the larval skin and a small

amount of liquid remained and the puparium of the parasite would be found nearby. Also in agreement with Hays' findings were these observations on the parasite: 1) the presence of a single parasite in any one host, 2) the parasite filling about two-thirds the volume of the host and 3) the almost continuous movement of the parasite.

In my observations, the puparium was always found outside the host. The parasite always emerged from the host through the body wall in the region of the first and second abdomnial segments. A typical muscoid puparium was formed and the pupal period ranged from 17 to 21 days for the three adults reared.

Hays reported no observations of oviposition by *Carinosillus tabanivorus*, but he stated that the nature of the material (loose sphagnum moss) from which he took parasitized larvae "supported the belief that the adult parasite may actively seek out the host and oviposit upon it." No observations of oviposition by *C. pravus* were made in this study. The habitat of *Tabanus fairchildi* seemingly rules out similar oviposition by *C. pravus*. *T. fairchildi*, commonly known as the river horse fly, passes its larval stages on the bottoms of rivers and streams under rocks and stones, usually in riffle areas in water from 6″ to 24″ deep. If the adult parasite oviposits directly on the host, oviposition would have to occur in the relatively short period between the hatching of the egg of the host and the dropping of the young larva into the water. From the high rate of infection, it seems more likely that *C. pravus* oviposits on or near the tabanid egg mass and that the parasitic larva, upon hatching, seeks out its host and enters its body. Development throughout the larval period of the host larva occurs without noticeable damage until the host reaches the last larval stadium. The known range of *C. pravus*, according to U. S. Department of Agriculture Handbook No. 276 (1965), includes North Carolina, Michigan, Ohio and Arizona, the latter being outside the range of *T. fairchildi*. The range differences indicate that *C. pravus* must have other hosts.

Carinosillus pravus Reinhard

Larva. Mature larvae measured 12 to 15 mm when alive and 12 to 13 mm when preserved. They were creamy white, roughly cylindrical when living and somewhat compressed dorso-ventrally in preserved state, becoming roughly elliptical in cross-section; tapered at both ends, moderately on thoracic segments, only slightly at posterior end, widest in the region of the fifth and sixth segments; overall, eleven segmented (Fig. 1). The anterior spiracles are rusty red-orange, located on a slightly raised area; they possess a series of narrow distal projections (9 to 10) some of which are bi-lobed at their distal end. They arise between the prothorax and mesothorax just dorsal to the lateral mid-line. The posterior spiracles are shiny black; located in an oblique, postero-dorsal depression and are composed of three wedge-shaped lobes which arise from a black button whose outer margin roughly describes a circle, each lobe rising from the button a

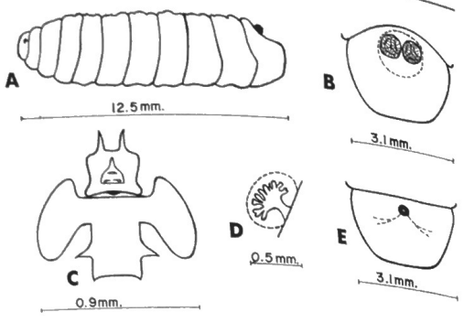

Fig. 1. A. Mature larva of *Carinosillus pravus* Reinhard, B. Dorsal view of posterior spiracles, C. Mouth-hooks, D. Anterior spiracle, E, Ventral view of anal region.

distance equal to half their maximum distal dimension and tapering to a somewhat sinuous ridge upon which is found the spiracular slit. The anal opening is located ventrally on the eleventh segment approximately one-fourth the segment length from the anterior margin of the segment and is surrounded by an evident, light brown, sclerotized ring.

Puparium. The puparium is dull colored, ranging in color from dark yellowish-red to dark reddish-brown, generally darker at ends (Fig. 2). The antherior end is rounded with forward projecting spiracles which are rather small, shiny, constricted posteriorly, reddish-brown basally and light reddish distally. They are separated by a distance equal to about five times their dorsal length and constricted apically in dorsal view with their entire surface roughened or somewhat tuberculate. The posterior end is very slightly pointed,

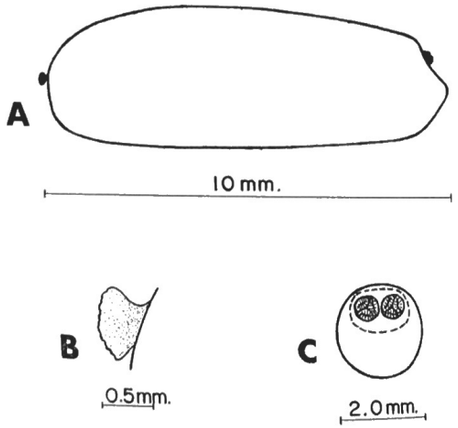

Fig. 2. A. Puparium of *C. pravus*, B. Anterion spiracle, C. Posterior spiracles.

oblique dorsally with the spiracles located in a depression in this area; the spiracles are shiny black, similar to posterior spiracles of the larva, but are

slightly smaller and project almost directly rearward. The spiracular slits are scarcely evident on the distal ridges of the wedge-shaped lobes; the button is distinct and of the same color as the lobes. The anal plate is visible as a small, mid-ventral, slightly darker circle.

Three other parasites were encountered in this study. One adult of the relatively uncommon tachinid fly *Phasiopus flavus* Coquillett was reared from the larva of an unidentified species of *Tabanus* (not *T. trimaculatus*). Many specimens of the well-known pupal parasite *Trichopria tabanivora* Fouts (Hymenoptera: Diapriidae) were obtained from pupae of *Tabanus fairchildi* Stone, a new host record. The parasitized larvae were so numerous and from so many areas in East Tennessee as to indicate that this parasite plays an important role in controlling *T. fairchildi* in the region. Three very small dipteran larvae, as yet unidentified, were taken from a *Chrysops* pupa. This is the first report of a dipteran parasite of a tabanid pupa.

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NEW DISTRIBUTION RECORDS FOR AQUATIC NEUROPTERANS, SISYRIDAE (SPONGILLA-FLIES) IN THE TENNESSEE RIVER DRAINAGE[1]

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Abstract

Occurrence of Sisyridae in the Tennessee River drainage is rare. Examination of literature relative to the aquatic fauna of the area did not reveal a locality record for this family. Examination of hundreds of stations throughout the Valley over the past ten years had not revealed a single specimen of this family until 1966. In the course of a study in Elk River, mile 27, Tennessee, a single Sisyridae was found. The specimen was recognized as belonging to the Sisyridae, but was too young to identify to genus. In October 1967 a sample from Tennessee River mile 296.6, Wheeler Reservoir, Alabama, revealed six specimens of *Climacia areolaris* (Hagen) larvae. The largest specimen was 4mm in length. Specimens were found on colonies of *Spongilla* sp. On November 15, 1967, a specimen of *Climacia areolaris* was collected at Clinch River, mile 44.3, in Tennessee.

The family, Sisyridae, contains the only aquatic representatives of the Order Neuroptera. There are two spine-like aquatic, Neartic genera of Sisyridae, *Sisyra* and *Climacea*. *Sisyra* has dorsum with setae but without conspicuous tubercles. *Climacea* has conspicuous tubercles bearing setae. *Climacea arcolaris* (Hagen), has 2-3 spine-like processes at the base of setae (Fig. 1). This is the only species of the genus *Climacea* in eastern North America that can be distinguished. First-instar larvae do not have gills, are usually found in the water, not on sponge. Second-instars are usually found on sponge and have jointed tracheal gills on abdominal segments 1 through 7. Third-instar larva are migrating instars which may or may not be found on sponge (Brown 1952).

Occurrence of Sisyridae in the Tennessee River drainage is rare. Examination of literature did not reveal a record for this family. Consultation with some workers in the area revealed that specimens have been found, but neither records nor specimens were retained. Examination of hundreds of stations throughout the Valley over the past ten years had not revealed a single specimen of Sisyridae until 1966. In the course of a study in Elk River, mile 27, Tennessee, a single, early instar was found. The specimen was recognized as belonging to the Sisyridae but was too young to recognize to genus.

[1] Paper presented at the Seventy-Seventh Annual Meeting of the Tennessee Academy of Science, Tennessee Technological University, Cookeville, Tennessee, November 17, 1967.