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THE IDENTIFICATION OF THE LARVA OF *PSOROPHORA (GRABHAMIA) SIGNIPENNIS* (COQUILLETT)

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INTRODUCTION. The usual published description of the fourth instar larva of *P. signipennis* states that the upper and lower head hairs are single. The writer has observed that a rather large percentage of specimens of this species collected in the southwest exhibit a varying number of branches of these head hairs. To the knowledge of the writer all but two of the previously published descriptions of this species state that the upper and lower head hairs are single, and these characters are usually used as a major point of differentiation of the species found in the United States. (Howard, *et al.*, 1912; Dyar, 1928; Carpenter, 1941; King, *et al.*, 1944; Matheson, 1944; Randolph and O'Neil, 1944; Carpenter, *et al.*, 1946; Pratt, 1946). Rozeboom (1942) states that the lower and upper head hairs are either single or double and uses other characters to distinguish the larva of this species. Yamaguti and LaCasse (1951) state that the lower head hairs are one to three forked and the upper head hairs are single.

THE PRESENT STUDY. The writer has examined over 400 specimens of this species from various localities in the southwest and 29.9 per cent of these specimens had at least one of the head hairs double or triple. This variation in number of branches of the head hairs occurs in both the upper and lower hairs with equal regularity. Some of the specimens examined had one hair double or triple, some two, others three, and less than one per cent of the total 29.9 per cent had all hairs not single. The following briefly summarizes the head hair variation observed.

It should be noted that many specimens examined varied from the usual published description in other characters, such as the number of comb scales and the number of pecten teeth. Larvae having as few as four and as many as eight comb scales and as few as two and as many as eight pecten

Locality	No. examined	No. with head Hair variation	Percent
Austin, Texas	144	22	15.3
Palmetto State Park, Texas	10	4	40
Sonora, Texas	16	2	12.5
Fort Sill, Oklahoma	50	24	48
Camp Bullis, Texas	160	25	15.6
Fort Hood, Texas	50	24	48
Total	430	101	

(Collections examined which consisted of less than ten specimens were not included in the above.)

teeth have been observed. Most of the previous descriptions of this species state that six comb scales and from four to six pecten teeth are present.

A species frequently confused with *P. signipennis* is *P. (Janthinosoma) cyanescens* (Coquillett). Rozeboom (1942) uses the dorsal preapical spine of the siphon as a character for distinguishing between the two species. This hair is quite short in *signipennis* and rather long in *cyanescens*. King, *et al.*, (1944) report a *signipennis* fourth instar larva from Mercedes, Texas, in which the dorsal preapical spine is quite a bit longer than the usual case. They distinguish between *signipennis* and *cyanescens* on the basis of the preantennal and antennal hair tufts. *Signipennis* has these tufts multiple and strongly feathered while *cyanescens* has them two to three branched and weakly feathered. King, *et al.*, report the dorsal preapical spine of their specimen to be about two thirds as long as the dorsal preapical spine of *cyanescens*, and therefore this feature could theoretically be used to distinguish between the two. The writer is of the opinion, however, that comparative characters are of limited value in taxonomy as one must always have the other species to which the comparison is made to make an accurate identification. Yamaguti and LaCasse (1951) use characters of the "cutting organ" of the mandible to distinguish between *signipennis* and *cyanescens*. The cutting organ of the mandible of *signipennis* has two pectinate blades followed by a pectinate seta while this organ in *cyanescens* has one pectinate blade followed by two pectinate setae. The characteristics of this structure are rather difficult to see in permanently mounted slides, but they have proven helpful in personal observations of freshly-killed, unmounted larvae. The writer believes, however, that the preantennal and antennal hair tuft characters are the best criteria for separating the two species.

The question normally arises whether there is a possibility of confusing larvae of *P. (G.) confinnis*, which has multiple head hairs, with one of *P. signipennis* possessing variable head hairs. As stated previously very few cases of all the head hairs of *signipennis* being other than single have been noted. In none of the above mentioned cases have more than two of the individual hairs been triple. There is little possibility that the two species would ever be confused since both upper and lower head hairs of *P. confinnis* have three to six branches.

Some difficulty could occasionally arise in distinguishing *P. (J.) ferox, P. (J.) longipalpus, P. (J.) horrida,* or *P. (J.) varipes,* from an apparently rare *signipennis* having all head hairs double. Such difficulty could be quickly resolved by the use of the length of the antennae and the degree of inflation of the siphon. *Signipennis* has antennae shorter than the head and a siphon only slightly inflated. On the other hand, the above mentioned species all have antennae as long as or longer than the head and the siphon strongly inflated. It should be noted that variation in the number of branches of the head hairs of *signipennis* has been observed only in the fourth instar.

In the examination of numerous fourth instar specimens of all species in this genus found in the United States, with the exception of *P. varipes* and *P. horrida* of which only a few have been personally examined, the writer has observed frequent and obvious variations in most of the species. Most of these variations are of no consequence in the determination of the species, but when variations of specific characters occur, such as the head hairs of *signipennis,* the aspect of the problem changes. The investigator should learn to consider each larva of the species of this genus he encounters as an individual rather than as a carbon copy of the printed description. If there is any doubt relative to the larval determination, the adult male or female should be examined if possible.

SUMMARY. Most of the published descriptions of the larva of *Psorophora signipennis* state that the upper and lower head hairs are single. These features have

been frequently used to differentiate this from other species. The writer has found that a rather large percentage of the specimens of this species collected in the southwest exhibit a varying number of branches on the head hairs. This frequently makes it difficult or impossible for the investigator unfamiliar with the genus to make an accurate and positive identification. The other species of the genus that are apt to be confused with *P. signipennis* in the larval state are discussed along with suggestions for distinguishing between them.

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ECOLOGICAL CONDITIONS WHICH INFLUENCE CONTROL OF MOSQUITO-LIKE NUISANCE PESTS (TENDIPEDIDAE)

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Prior to the advent of chlorinated hydrocarbon insecticides the few efforts made to control midge infestations in open bodies of water met with questionable success. This was due in part to the lack of detailed information relative to the habits and the development of even the more common species of the group—and in part to the attempted adoption of the early mosquito control oiling method for midge control. Since the midge immature stages possess gill-like respiratory appendages and procure their oxygen directly from the water in which they live, periodic surfacing is unnecessary. Under these conditions the possibility of larval contact with surface oil is so remote that its potentialities as an effective larvicide are practically nil. Likewise, in adult emergence, where the pupa rises directly from the bottom mud to the water surface and the adult escape there is nearly instantaneous, surface oil does not appear to be an effective adulticide. In more recent years a variety of methods have been utilized in midge control. The type of treatment selected to combat any particular species is dependent upon the habits of the specific pest and the existing chemical and physical characteristics of its environment.

While misting and fogging have pro-