

The Great Lakes Entomologist

Volume 39
Numbers 1 & 2 - Spring/Summer 2006 *Numbers*
1 & 2 - *Spring/Summer 2006*

Article 11

April 2006

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Recommended Citation

Taber, Stephen W. and Maloney, Jennifer L. 2006. "The Egg of *Stylogaster Neglecta* Williston (Diptera: Conopidae)," *The Great Lakes Entomologist*, vol 39 (1)
Available at: <https://scholar.valpo.edu/tgle/vol39/iss1/11>

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**THE EGG OF STYLOGASTER NEGLECTA WILLISTON
(DIPTERA: CONOPIDAE)**

Stephen W. Taber¹ and Jennifer L. Maloney¹

ABSTRACT

Adults of both sexes and the previously unknown eggs of the parasitoid conopid fly *Stylogaster neglecta* Williston are illustrated and measurements are provided, including the total clutch size and the lengths and widths of eggs from random samples.

Flies of the genus *Stylogaster* Macquart belong to the family Conopidae, the members of which are sometimes known as thick-headed flies. Most conopids are parasitoids which spend the larval stage as internal parasites of Hymenoptera but *Stylogaster* species are atypical in their choice of host. The female probably uses her sword-like ovipositor to stab part of the egg into the host's body rather than to shoot it from a distance (Kotrba 1997). When the sclerotized apex of the egg reaches the hemocoel, an extrusible sac and usually, but not always, two or more spines deploy under osmotic pressure to hold the egg in place like the opening of a folding grappling hook (Stuckenberg 1963).

For excellent photographs of these eggs in place on potential hosts, see Couri and Pont (2006). As in the case of the egg-laying behavior, the exit site for larvae hatching from the egg remains unsettled. It has been described as the anterior, unattached end but also as from or near the extrusible sac at the opposite end, which is believed to have a function in anchoring the egg prior to hatching (Stuckenberg 1963, Smith and Cunningham-van Someren 1985, Woodley and Judd 1998).

Among those few *Stylogaster* species for which the larva is known, the host is a cockroach (Blattaria, Blattellidae) or a cricket (Orthoptera, Gryllidae) (Smith and Cunningham-van Someren 1985, Woodley and Judd 1998). *Stylogaster* eggs in the Neotropics and Africa have been found attached to a cockroach (Stuckenberg 1963) and to muscid, calliphorid, tachinid, syrphid, and lauxaniid flies (Stuckenberg 1963, Smith 1969, Couri and Pont 2006), but these potential dipterous hosts might be unsuitable for development. There is one record of an egg on the head of *Stylogaster* itself (Kotrba 1997).

Only two *Stylogaster* species are known to occur in the Nearctic (Camras and Parrillo 1985). They are *Stylogaster biannulata* (Say) and *Stylogaster neglecta* Williston (Fig. 1). The biology of the former species is known to a greater extent than that of any New World congener (Woodley and Judd 1998) but until now nothing has been reported about the life cycle of *S. neglecta*. These two flies are members of different species groups (Camras and Parrillo 1985) and thus their host, their egg, and their larval structures might be expected to differ despite their sympatry and great separation from Neotropical and Old World relatives. A recent redescription of *Stylogaster stylata* (Fabricius) synonymizes *S. biannulata* with that species (de Mello-Patiu and Gomes Rocha 2003) but as the geographic distribution reported on a subsequent page does not include the United States, some confusion remains about the status of that taxon. Herein I report the previously unknown egg stage of *Stylogaster neglecta*.

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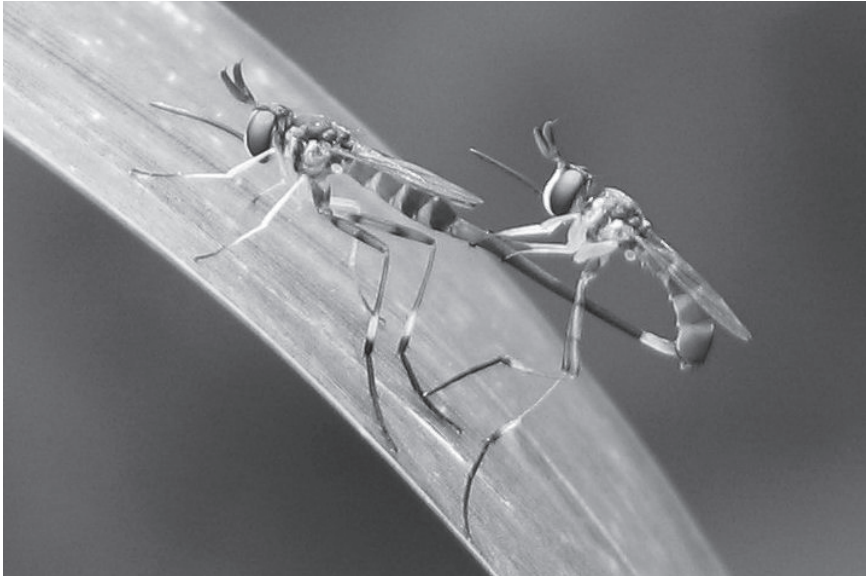


Figure 1. *Stylogaster neglecta*: pair in copula; 29 July 2004, London, Ontario, Canada, in fencerow adjacent to deciduous woods (photo courtesy of Robin McLeod).

MATERIALS AND METHODS

The adult *Stylogaster neglecta* female illustrated here (Fig. 2) was collected in a Malaise trap in a clearing between woods dominated by red maple (*Acer rubrum* L.), white birch (*Betula papyrifera* Marsh.), and oaks (*Quercus* spp.), and the open water of a cattail marsh (*Typha latifolia* L.) in Newaygo County, Michigan (GPS N43° 41.708' / W85° 44.393') on 24 July 2005. The specimen was pointed on a pin and identified 15 months later with the aid of a key to the species of the genus (Curran 1942), by which time it was in a thoroughly dry state. To determine if the female contained eggs it was placed in a relaxing chamber containing water and chlorocresol for one week. It was then dissected in a 0.5% saline solution with the aid of a stereomicroscope and the eggs were removed and transferred to fresh saline solution for counting and measurement. Samples were mounted on microscope slides in one drop of PVA (polyvinyl alcohol), lengths and widths of eggs were measured with a calibrated ocular micrometer, and photographs were taken with a 35mm film camera mounted on a microscope.

RESULTS

Egg description (Figs. 3-5, Table 1). Average length: 0.463 mm; average width at greatest diameter: 0.124 mm; as seen in usual perspective the shape is fusiform with a truncated posterior end but in a seldom-seen perspective the point that allows penetration of the host cuticle is visible. According to a recent study (de Mello-Patiu and Gomes Rocha 2003) this is a dorsal or ventral view whereas the more frequently seen lateral perspective presents the blunted appearance shown here. An extrusible sac extends from just behind the dark sclerotized posterior end to about the midpoint of the egg (Fig. 3 "ES"). The hind margin of the sclerotized apex is curved into a barbed shape resembling a crochet hook (Fig. 3 "B"). No spines are present. The chorion surface bears

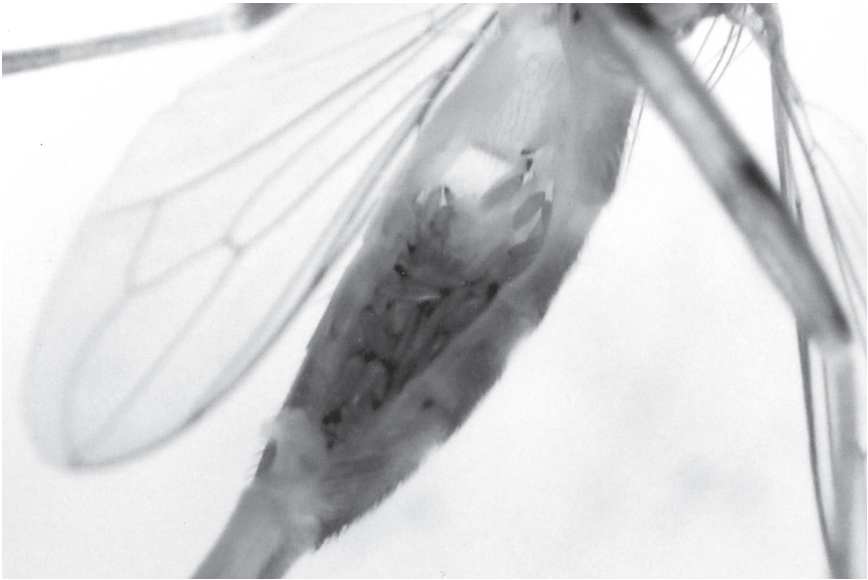


Figure 2. *Stylogaster neglecta*: adult female; with eggs *in situ*.

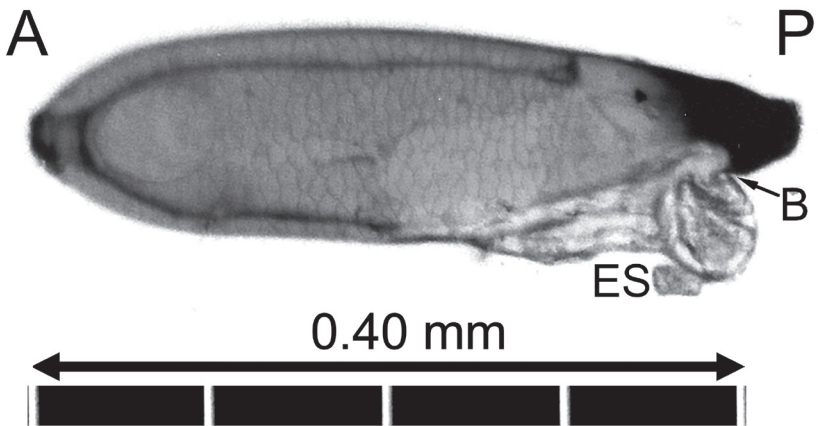


Figure 3. *Stylogaster neglecta*: egg; A = Anterior end, P = Posterior end, ES = Extrusible Sac, B = Barb.



Figure 4. *Stylogaster neglecta*; surface pattern of egg chorion.

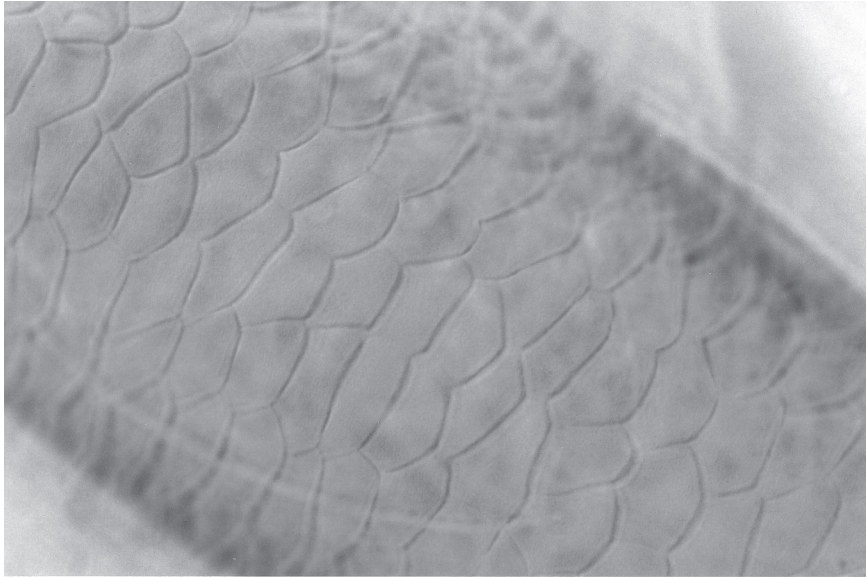


Figure 5. *Stylogaster neglecta*; surface pattern of egg chorion further magnified.

Table 1. Egg length and width (mm) N = 20

Length	Width	Length	Width
0.440	0.110	0.455	0.125
0.460	0.120	0.435	0.120
0.500	0.125	0.420	0.110
0.475	0.120	0.470	0.140
0.500	0.120	0.480	0.135
0.460	0.130	0.485	0.110
0.440	0.120	0.435	0.120
0.480	0.140	0.400	0.115
0.470	0.115	0.500	0.135
0.485	0.130	0.470	0.135
Egg Length		Egg Width	
Average	0.463	Average	0.124
Min.	0.400	Min.	0.110
Max.	0.500	Max.	0.140
S.D.	0.028	S.D.	0.010

scale-shaped reticulations extending from the anterior end for a distance approximately equal to three-fourths of the total length of the egg (Figs. 4-5). Reticulation, where present, is strongest in the middle portion of the egg and weakest at the anterior end. The total clutch size was 155 eggs.

DISCUSSION

The two most remarkable features about the egg of *Stylogaster neglecta* are the absence of any spines and the shape of the darkly sclerotized posterior end which in most other species is armed with two or four spines anterior to the apex. This apex is blunt from most perspectives though presenting a point in others. It and the associated extrusible sac appear to perform the function of anchoring the egg inside the body of the host without the aid of the spines that are indicated by nearly all other illustrated *Stylogaster* eggs. The crochet-hook modification of the apex is an indication of its hold-fast ability. The clutch size of 155 is the greatest yet reported for any *Stylogaster* species. One explanation might be the size of these eggs which are the smallest yet reported.

Though the only other Nearctic *Stylogaster* species is *S. biannulata*, the egg of *S. neglecta* bears a greater resemblance to the egg of the African species *Stylogaster seyrigi* Ségué. That egg is said to bear barbs that are “produced from posterior margin of head” (Smith 1967, p. 52), a condition which might correspond functionally to the crochet-hook configuration of *S. neglecta*. However, no such emargination of the sclerotized head is visible in the illustration of the African species, its chorion reticulation is restricted to the central portion of the egg, its extrusible sac occupies much less of the egg margin, the dark posterior apex appears to be more uniformly sharp, and with a length of 1.0 mm it is more than twice the size of its New World relative.

The egg of the second Nearctic species, *S. biannulata*, a relative distant enough for placement in a different species group (Camras and Parrillo 1985), bears two distinct barbs positioned just behind the sclerotized apex and each is nearly as long as that apex (Smith and Peterson 1987, Woodley and Judd 1998). The filament or thread located between these “backward-projecting” spines (pointing from the posterior toward the anterior end) might be present

on the egg of *S. neglecta* but it was never noticed. The chorion reticulation of *S. biannulata* is reported as strongest near the sclerotized end whereas the reticulation is weakest in this region for *S. neglecta*. Furthermore, the *S. biannulata* egg chosen for detailed description was reported as 0.65 mm in length (Woodley and Judd 1998), much longer than any *S. neglecta* egg in the clutch removed from the adult female of the present study (Table 1).

Flies of this genus are said to be elusive (Stuckenberg 1963) and “scarce in the field” (Smith and Peterson 1987). Adults have been collected from umbelliferous flowers, composite flowers, orchids, and mints in Africa (Smith 1967, Nilsson 1985), and on button bush (*Cephalanthus occidentalis* L.) in July in the eastern United States as noted in the original description of *Stylogaster neglecta* (Williston 1883). Malaise traps are more likely to secure additional adults (Camras and Parrillo 1995) and these will be used in an effort to collect more specimens in western Michigan. Of greater interest is the unknown host species into which these remarkably adapted eggs are delivered. Is it a cockroach, a cricket, or a member of its own dipterous order as the literature currently suggests it might be? The unusual structure of the *Stylogaster neglecta* egg holds out the possibility of something altogether new.

ACKNOWLEDGMENTS

We thank Robin McLeod for the photo of mating *Stylogaster neglecta*, Dr. Donald Bachand of Saginaw Valley State University for arranging the purchase of the Biological Abstracts database that made this work possible, Dean Ronald R. Williams for subsidizing the cost of publication, and Dr. Jeff Skevington and one anonymous reviewer for constructive criticism.

LITERATURE CITED

- Camras, S., and P. P. Parrillo. 1985. Review of New World *Stylogaster* (Diptera: Conopidae). *Ann. Ent. Soc. Amer.* 78: 111-126.
- Camras, S., and P. P. Parrillo. 1995. New *Stylogaster* and ranges of Conopidae (Diptera) from the Brazilian and Bolivian Amazonia. *Acta Amazonica* 25: 221-234.
- Couri, M. S., and A. C. Pont. 2006. Eggs of *Stylogaster* Macquart (Diptera: Conopidae) on Madagascan muscids (Diptera: Muscidae). *Proc. Calif. Acad. Sci.* 57: 473-478.
- Curran, C. H. 1942. American Diptera. *Bull. Amer. Mus. Nat. Hist.* 80: 51-84.
- Kotrba, M. 1997. Shoot or stab? Morphological evidence on the unresolved oviposition technique in *Stylogaster* Macquart (Diptera: Conopidae), including discussion of behavioral observations. *Proc. Ent. Soc. Wash.* 99: 614-622.
- de Mello-Patiu, C. A., and L. S. Gomes Rocha. 2003. Redescrção de *Stylogaster stylata* (Fabricius, 1805) (Diptera, Conopidae), com ênfase na morfologia da terminália e do ovo. *Arq. Mus. Nac., Rio de Janeiro* 61: 215-220.
- Nilsson, L. A. 1985. Pollination of *Plectranthus vestitus* (Lamiaceae) by trap-lining hovering bees in Madagascar. *Pl. Syst. Evol.* 150: 223-236.
- Smith, K. G. V. 1967. The biology and taxonomy of the genus *Stylogaster* Macquart, 1835 (Diptera: Conopidae, Stylogasterinae) in the Ethiopian and Malagasy regions. *Trans. Roy. Ent. Soc. Lon.* 119: 47-69.
- Smith, K. G. V. 1969. Further data on the oviposition by the genus *Stylogaster* Macquart (Diptera: Conopidae, Stylogasterinae) upon adult calypterate Diptera associated with ants and animal dung. *Proc. Roy. Ent. Soc. Lon. (A)* 44 (1-3): 35-37.
- Smith, K. G. V., and G. R. Cunningham-van Someren. 1985. The larva of *Stylogaster varifrons* Malloch (Dipt., Stylogastridae). *Ent. Month. Mag.* 121: 81-85.

- Smith, K. G. V., and B. V. Peterson. 1987. Conopidae, pp.749-756. In McAlpine, J. F. (ed.), Peterson, B. V., Shewell, G. E., Teskey, H. J., Vockeroth, J. R., and D. M. Wood (coords.). *Manual of Nearctic Diptera. Volume 2.* Research Branch, Agriculture Canada, Biosystematics Research Centre, Ottawa, Ontario, Monograph No. 28.
- Stuckenberg, B. R. 1963. A study on the biology of the genus *Stylogaster*, with the description of a new species from Madagascar (Diptera: Conopidae). *Rev. Zool. Bot. Afr.* 68: 251-275 + 1 plate.
- Williston, S. W. 1883. North American Conopidae: *Stylogaster*, *Dalmannia*, *Oncomyia*. *Trans. Conn. Acad. Arts Sci.* 6: 91-98.
- Woodley, N. E., and D. D. Judd. 1998. Notes on the host, egg, and puparium of *Stylogaster biannulata* (Say) (Diptera: Conopidae). *Proc. Ent. Soc. Wash.* 100: 658-664.