

N O T E

Larval Development Sites for Aquatic Dolichopodidae (Diptera)¹

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The Family Dolichopodidae has more than 6000 described species (Robinson and Vockeroth 1981, Pp. 625-639, Manual of Nearctic Diptera. Vol 1. Agriculture Canada, Ottawa, Canada). Adult dolichopodids are predatory, but the life histories of most larval stages are poorly studied or unknown, with the exception of those larval *Meditera* spp. that feed on larvae and pupae of bark beetles (Coleoptera: Scolytidae) (Beaver 1966, Proc. Royal Ent. Soc. Lond. Series A. 41: 145-154). Dyte (1959, Ent. Month. Mag. 95: 139-143) summarized what is known about larval habitats and was able to add, through rearing, additional records for 5 genera. Merritt et al. (1996, Pp. 515-548, An Introduction to the Aquatic Insects of North America. 3rd ed. Kendall/Hunt, Dubuque) and Foote (1991, Pp. 690-915, Immature Insects. Vol. 2. Kendall/Hunt, Dubuque) indicated that some dolichopodid larvae are aquatic. For example, larvae of *Liancalus similis* Aldrich develop in algal mats below waterfalls (Corpus, 1986, J. Kansas Entomol. Soc. 59: 635-640). Dyte (1967, Proc. Royal Ent. Soc. Lond. Series A. 42: 119-128) believed that larval *Liancalus* spp. were predatory, but Corpus (1986) observed no feeding behavior.

Aquatic entomologists use emergence traps to collect adult insects as they emerge from aquatic habitats. Dolichopodidae are usually not reported from emergence traps, perhaps because the majority of aquatic insect surveys have not focused on brachycerous Diptera. Still, emergence trap collections might indicate dolichopodid developmental sites. Most aquatic dolichopodids live along the margins of bodies of water or on emergent rocks, and emergence traps should capture these species. We identified an adult dolichopodid from an emergence trap in the Great Smoky Mountains National Park (GSMNP). Because the dolichopodid was unexpected, we examined additional trap residues from aquatic invertebrate surveys in the GSMNP and our museum collections to determine whether dolichopodids were present. Ac-

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ording to Corpus (1986), adult Dolichopodidae are found in close proximity to larval developmental sites. Emergence traps are designed to collect adult insects as they emerge from the water, but flies occasionally crawl or swim under the edges of the traps. We consider this possibility when discussing the dolichopodids trapped. Voucher specimens were deposited in the Clemson University Arthropod Collection, the Montana State University Insect Collection, and the Great Smoky Mountains National Park Museum. We briefly discuss each species trapped. Aquatic emergence traps were nylon mosquito nests hung over the streams. The bottom edges of the nets were underwater and weighted with rocks.

A single *Argyra basalis* Van Duzee was collected from Little Briar Branch, Sevier County, TN, on 24 June 1999. The collection represents a new state record for *A. basalis* in Tennessee. According to Merritt et al. (1996), some *Argyra* are aquatic or semi-aquatic and live in the margins of bodies of water. Our emergence trap collection probably represents a pupa or larva from stream substrate.

Unidentifiable females representing three species, *Chrysotus* sp1, *Chrysotus* sp2, and a member of the *Dolichopus gratus* group, were trapped in the Great Smoky Mountains National Park. Both *Chrysotus* species were trapped from the Little Pigeon River, Sevier Co., TN, on 24 June 1999. The *Dolichopus gratus* group females emerged from LeConte Creek, Sevier Co., TN, on 24 June 1999, and a beaver pond outflow near Ravensford, Swain Co., NC, on 13 June 2001. Some *Dolichopus* species have aquatic larvae in the margin of streams (Merritt et al. 1996), but habitats of larval *Chrysotus* have not previously been identified.

Gymnopternus albiceps Loew, *G. difficilis* Loew, and *G. spectabilis* Loew were the most frequently trapped Dolichopodidae. Specific identifications of female *Gymnopternus* were not possible, but we believe that females trapped with males represent the same species. All three *Gymnopternus* were trapped from an unnamed tributary of the Raven Fork River in North Carolina. The trap was set upstream of a shallow (5 to 10 cm deep) riffle with nearly complete canopy cover and a gravel and sand substrate. *Gymnopternus albiceps* was trapped on 20 June 2001, and *G. difficilis* was trapped on 29 May 2001. The most frequently trapped species was *Gymnopternus spectabilis*, which was trapped on 29 May, 8 June, 12 June, 13 June and 16 June 2001. Robinson (1964, Misc. Pub. Ent. Soc. America 4: 103-192) did not discuss the biology of *Gymnopternus* in the southern United States, but Steyskal (1946, Bull. Brooklyn Entomol. Soc. 41: 168-169) briefly described the mating behavior of *G. barbatulus* Loew in the Great Smoky Mountains National Park. He noted that *G. barbatulus* aggregates and mates at seepages, which suggests that oviposition could occur in the same habitat.

Peloropecodes acuticonis (Van Duzee) and *P. brevis* (Van Duzee) were trapped from the Little Pigeon River, Sevier Co., TN, on 24 June 1999. The collection of *P. acuticonis* represents a new state record for Tennessee. Both males and females were present in a 1:1 ratio, which further suggests that these adults were emerging from the stream and did not accidentally enter the trap. Merritt et al. (1996) did not include *Peloropecodes* in their list of aquatic or semi-aquatic Dolichopodidae.

A single male *Rhaphium signiferum* (Osten Sacken) was trapped on an unnamed stream in the GSMNP on 24 June 1999. *Rhaphium* is a large genus with more than 70 Nearctic species. Aquatic or semi-aquatic larvae have not been reported, but our emergence trap data could indicate that larval *R. signiferum* develops in aquatic or semi-aquatic habitats. However, a single male could indicate an accidental collection.

A pair of *Sympycnus lineatus* (Loew) were captured in emergence traps set on 21

December 1999 in Barton Creek, Travis Co., TX. These flies were deposited at the Montana State University Insect Collection as voucher specimens for an unpublished Ph.D. dissertation, which documented the macroinvertebrates of Barton Creek (Leopold 2001. Recolonization Mechanisms of Macroinvertebrates of Barton Creek, Travis Co., Texas, Unpubl. Ph.D. Diss. Clemson Univ., Clemson, SC). The larval habitats for *S. lineatus* are unknown, but Robinson (1964) indicates that adults hover over moist rocks and falling water. This behavior and the emergence trap collections suggest that the oviposition and larval developmental sites could be aquatic. Corpus (1986) noted similar behavior in *L. similis*, which was later demonstrated to have aquatic larvae and pupae. Merritt et al. (1996) noted that some *Sympycnus* spp. could be aquatic.

A single *Tachytrechus indianus* Harmston and Knowlton was trapped in Little Rhododendron Creek, Sevier Co., TN, on 24 June 1999. According to Merritt et al. (1996), *Tachytrechus* spp. are aquatic or semi-aquatic and live in tree holes, beaches, and the margins of streams. Steyskal (1964) noted that some species of *Tachytrechus* mate and aggregate along streams.

Two dolichopodids were trapped in an emergence trap used to collect Chironomidae at the Toxicon Field Site on Rocky Pines Road, Palm Beach Co., FL. On 11 November 1992, a female *Amblypsilopus* sp. was trapped. On 25 August 1992, a male *Pelastoneurus lugubris* Loew was captured. According to Robinson (1964), *Pelastoneurus* species are found on wet soil, and Merritt et al. (1996) noted that some *Pelastoneurus* larvae live in algal mats. The immature stages of *P. lugubris* could be aquatic or semi-aquatic.

Our emergence trap data further support the inference that some larval *Argyra*, *Dolichopus*, *Pelastoneurus*, *Sympycnus*, and *Tachytrechus* are aquatic or semi-aquatic. According to Robinson and Vockeroth (1981), the larvae of *Gymnopternus* are unknown. Because we trapped *Gymnopternus* spp. on multiple dates and localities, there is now evidence that the larvae of these species are aquatic. The limited collections of *Amblypsilopus*, *Chrysotus*, *Peloropectes*, and *Rhaphium* suggest that these flies might have aquatic or semi-aquatic larvae, or could have accidentally entered the traps.

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