Occasional transport of Leptohyphes apache Allen (Ephemeroptera: Tricorythidae) on Corydalus texanus Banks (Megaloptera: Corydalidae)

Many of us, at least some from former generations, remember and have anecdotes of “the good old guys”: scientists that are generous, supportive, knowledgeable, and approachable. Unfortunately, the hunt for the precious gold of points for evaluations, such as number of publications, has often altered that harmony and made generous scientists a scarce resource for future generations of biologists. We are lucky to have met and still have around active entomologists of that valuable generation, like Dr. Santiago Zaragoza-Caballero. We, gladly and respectfully, dedicate this modest contribution to him.

Phoresy is defined as a symbiotic relationship in which one organism is merely transported on the body of another organism of a different species (Lincoln et al., 1998). Among the aquatic insects this kind of association has been recorded in several groups. Chironomids (Diptera: Chironomidae) have been studied widely regarding the phoretic, commensalistic, and parasitic association their larvae establish with different insect groups like Ephemeroptera, Hemiptera, Megaloptera, Odonata, Plecoptera, and Trichoptera (Callisto et al., 2006). Megaloptera larvae or hellgrammites have been reported as substrate of phoretic association only with chironomids (Hilsenhoff, 1968; Benedict and Fisher, 1972; Gotceitas and Mackay, 1980; Furnish et al., 1981; Tracy and Hazelwood, 1983; De la Rosa, 1992; Epler and De la Rosa, 1995; Pennuto 1997, 1998, 2000, 2003; Hayashi, 1998; Pennuto et al., 2002; De Oliveira et al., 2004; Hayashi and Ichiyanagi, 2005; Callisto et al., 2006) and entoprocts (Entoprocta: Urnatellidae; Tracy and Hazelwood, 1983). Here we present the case of occasional transport of a mayfly larva, Leptohyphes apache Allen (Baumgardner, 1983) and Leptohyphes spiculatus Allen and Brusca (Allen, 1978), now considered a junior synonym of Leptohyphes apache Allen (Baumgardner, 2008). The mayfly larva was positioned on the metanotum of the hellgrammite, which was transferred into a glass vial with water from the river to observe the unusual association (Fig. 3). During almost an hour the larva was observed crawling around on the metanotum, mesonotum, and dorsum of the first and second abdominal segments. Also, the larva reached the lateral region of the mesonotum and metanotum near the leg base of each segment. Throughout observation, movement of the mayfly larva was slow and it seemed to be resting. Also, the mayfly did not leave the dobsonfly body at any time while they were maintained alive. Because of the unique incidence in the study site, as well as lack of previous published records, we considered that the association of a mayfly larva on a hellgrammite required further exploration. In order to elucidate whether the association was a random event or perhaps a behavior that occurs with some frequency, a second sampling expedition was effected.

In a second trip to the river, on the 28th of April of 2009, a total of 40 hellgrammites was collected and inspected for carrying of mayfly larvae. Water level of the river was low, around 20 cm deep, so hellgrammites were obtained softly from cobbles without kicking or any disturbance to substrate. Hellgrammites drifted spontaneously as cobbles were lifted, then they were carefully placed in a small aquarium where they could be observed in detail. Of the 40 inspected dobsonfly larvae, three were carrying Leptohyphes apache larvae, one each. We believe it is unlikely that the mayfly larva ended up on the dobsonfly larva as a product of manipulation. The collecting process was gently performed and the inspection for transported mayfly larvae was done immediately. We believe the encountered mayfly larvae were already on the hellgrammite.

Mayfly larvae of Leptohyphes Eaton have been described as poor swimmers (Edmunds et al., 1976), and the occasional association with a dobsonfly larva could help them to move across their habitat and to protect them against the water current in the river. At this time, it would be difficult to conclude that occurrence of the mayfly larvae on hellgrammites is merely accidental or represents a somewhat frequent behavior. From our observations, we believe this transport may not be simply a random event (e.g., the hellgrammite is like any other
Further observations and experiments are required to safely elucidate this question. If a pattern of fixed frequency and behavior of transportation is demonstrated, this may be a case of facultative phoresy.

The material examined is deposited at the National Insect Collection of Mexico’s National University (UNAM), Mexico City, with the following data: México: Morelos: Mpio. Jojutla, Tehuixtla, Río Amacuzac, 18° 33’ 51.3” N, 99° 16’ 57.3” W, 860 m, 3-XI-2008, Reynoso-Velasco and Ruiz-Silva, 1 Corydalus texanus Banks (larva) and 1 Leptozygotes apaches Allen (larva), benthos dip net; same data but 28-IV-2009, Reynoso-Velasco and Garcia, 3 Corydalus texanus Banks (larvae) and 3 Leptozygotes apaches Allen (larvae).

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Figure 1. Río Amacuzac at Tehuixtla, Morelos, the study site. Figure 2. Río Amacuzac at Tehuixtla, riffle section of the stream. Figure 3. *Leptohyphes apache* larva on the metanotum near the hind leg base of larva of the dobsonfly *Corydalus texanus*. Arrow points to head of the mayfly larva (within circle).