OVERCROWDING LEADS TO LETHAL OVIPOSITION MISTAKES IN THE BALTIMORE CHECKERSPOT, EUPHYDRYAS PHAETON DRURY (NYMPHALIDAE)

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Errors in oviposition choice have the potential to expand host plant range or, alternatively, result in death of offspring hatching from eggs laid on inappropriate host plant species (Chew 1977, Larsson and Ekbom 1995). Euphydryas phaeton Drury (Nymphalidae), the Baltimore Checkerspot, has relatively recently expanded its oviposition range to include the introduced plant species, Narrow-leaved or Ribwort Plantain, Plantago lanceolata L. (Plantaginaceae) (Stamp 1979, Bowers et al. 1992). Plantago lanceolata has proven to be a suitable host plant and populations of E. phaeton in certain parts of the Northeast are flourishing on this host (Bowers et al. 1992, Bowers, pers. obs.; 4th of July butterfly count Rhode Island/Tiverton circle, 2012). Plantago lanceolata was introduced into North America approximately 200 years ago (Cavers et al. 1980) and a variety of native lepidopterans (including both specialist and generalist taxa) have incorporated this species into their diet (Robinson et al. 2002). The primary native oviposition host plant for E. phaeton is Turtlehead, Chelone glabra L. (Plantaginaceae), a species that is found in wetlands and is becoming less common as wetlands are disappearing. Aureolaria flava (L.) Farw. (Orobanchaceae) is used as an oviposition plant for populations designated as the subspecies E. phaeton ozarkae (Masters 1968) in the Midwest.

Euphydryas phaeton is a specialist on plants that contain iridoid glycosides (Bowers 1980, Bowers et al. 1992) and the incorporation of P. lanceolata as an oviposition plant is likely due, at least in part, to the similarity in the iridoid glycoside profiles of P. lanceolata and C. glabra (Bowers et al. 1992). Iridoid glycosides are bitter compounds found in plants in more than 50 families (Jensen 1991). Both Turtlehead and Ribwort Plantain contain the same two iridoid glycosides, aucubin and catalpol (Bowers et al. 1992). All host plant species on which Baltimore Checkerspot larvae feed contain iridoid glycosides (Bowers 1980, Bowers et al. 1992) and these insects have the ability to sequester these compounds, rendering them unpalatable to many of their natural enemies (Bowers 1980, Bowers and Farley 1990). While E. phaeton populations on Turtlehead are typically relatively small and localized, populations on Ribwort Plantain may become quite large. For example, in a survey of a P. lanceolata-feeding population in southeastern Massachusetts in the early 1990’s, counts of post-diapause larvae at two different sites estimated thousands to tens of thousands of individuals (Bowers, pers. obs.).

A more recent survey of adults from a population on June 19, 2010, in Bristol, Rhode Island, in a field of approximately seven acres, revealed a population estimate of over 3,200 individuals of E. phaeton. Counts of adults from 2009 had shown similarly high numbers (E. Marks, pers. obs.). This population uses P. lanceolata for both oviposition and larval feeding, and at the time of the survey, although old flowering stalks of P. lanceolata were observed, all plants that we found had been eaten down to the ground. On the day of the survey, both adult males and females were observed and late instars and uneclosed pupae were common. Larvae had dispersed out of the field, through the woods (approximately 8–10 meters), apparently in search of food, and were seen in large numbers on the side of the road. The only other potential host plant observed at this site was Nuttalanthus (formerly Linaria) canadensis (L.) D.A. Sutton (Plantaginaceae), which also contains iridoid glycosides (Mizouchi et al. 2011); however, this is not a preferred host plant (Bowers, pers. obs.). No Plantago major, another potential host plant, was observed at this site.

Large numbers of adults were observed nectaring on Common Milkweed, Asclepias syriaca L. (Asclepiadaceae) present in the field. To our surprise, we also found several egg masses of E. phaeton on this plant (Fig. 1)! Asclepias syriaca, like other milkweeds, contains a very different group of chemical compounds, cardiac glycosides (Malcolm 1991). These compounds are responsible for the unpalatability of the Monarch, Danaus plexippus L. (Nymphalidae) and the latex produced by milkweeds is rich in these compounds and deterrent and toxic to a variety of herbivores (Malcolm 1991). Although extensive searches were not made, no egg masses were observed on other plant species.

A search of 157 ramets of A. syriaca over 30 cm in height revealed 19 E. phaeton egg masses or their remains occurring on 15 individual plants, four plants had two egg masses. In some cases, egg masses were next to each other on the same leaf; in others they were on different leaves (Fig. 1A, B, D). On three individual ramets, larvae had moved from their egg masses to the top of the plant and were starting to make webs (Fig