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A NEW RECORD FOR *CALYCOPIS CECROPS* (LYCAENIDAE) IN COLORADO BY AIRCRAFT-INTRODUCTION

A new butterfly record for Colorado, *Calycopis cecrops* (Fabricius), was collected by Howard Bone, in the rear cargo pit of a United Airlines 727 at Stapleton International Airport, Denver, on 12 July 1977. The flight was a charter from the east coast arriving in Denver around 1030 MDST. The cargo pit doors of such aircraft are left in the open position the entire time the aircraft is on the ground, and this can easily be from 30 minutes to over an hour, which is ample time for any insect to fly into the pit. The mentioning by others (Eliot 1977, J. Lepid. Soc. 31: 75; Riotte 1977, J. Lepid. Soc. 31: 182) that Lepidoptera can be transported by both military and commercial airliners is confirmed by this record.

Another possibility of an aircraft-introduced species is that of *Tmolus azia* (Hewitson). This species has been collected in the state twice. The first specimen was collected by Jim Eff on 16 July 1957, Chatauqua Mesa, Boulder Co., Colorado. The second specimen was collected by Marc Epstein on 26 July 1975, Magnolia Rd., Boulder Co., Colorado. These records are both equidistant from the airport. The facts that 1) there are no other records from the state, that 2) they were collected about the same time of year, and that 3) there were no other records during the 18 year interval, suggests the possibility these two specimens were introduced by aircraft.

This unusual occurrence of stowaways on aircraft could provide a very logical explanation for the introduction of butterflies at great distances from their normal ranges. A butterfly could easily fly into the pressurized, air-conditioned cargo pit of an aircraft, and be flown across the country or overseas in a matter of a few hours.

The normal range of *Calycopis cecrops* is from eastern Kansas through southern Ohio to southern New Jersey and southward to Florida and Texas. The closest distance to Colorado within this range is approximately 500 air miles (805 km), but this specimen traveled some 1500 air miles (2414 km) from the east coast inside an airplane. The normal range of *Tmolus azia* in North America is southern Arizona and southern Texas, which is approximately 600 air miles (966 km) from Colorado.

The specimens of *Calycopis cecrops* and *Tmolus azia* (collected by Marc Epstein) are deposited in the collection of the Denver Museum of Natural History.

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NEW FOODPLANT AND OVIPOSITION RECORDS FOR THE EASTERN BLACK SWALLOWTAIL, *PAPILIO POLYXENES* ON AN INTRODUCED AND A NATIVE UMBELLIFER

Papilio polyxenes (Fabr.) is one of the most common Papilionidae in open fields of the eastern United States. Its larvae are considered to prefer plants of the Umbelliferae, although in laboratory no-choice situations they will eat several species of Rutaceae. Some individuals can also survive when fed on the cucumber (or mountain magnolia) tree, *Magnolia acuminata* L. (Scriber and Feeny, in prep.).

In Greene County, Ohio, and Ithaca, New York, the preferred foodplant for *Papilio polyxenes* (Fabr.) appears to be the introduced wild carrot, *Daucus carota* (L.), as it likely is for most of the northeastern United States. In the eastern United States, a variety of species of *Umbelliferae* have been reported as foodplants (Scudder, 1889, The butterflies of eastern United States and Canada, 2: Forbes, 1960, Cornell University Agr. Expt. Sta. Memoir #371; Teitz, 1972, An index to the described life histories of Macrolepidoptera of the continental United States and Canada, Vol. 1; Tyler, 1975, the Swallowtail Butterflies of North America, Naturegraph). In addition to carrot, those plants upon which *polyxenes* larvae have been observed naturally in New York (J.M.S.) are wild parsnip, *Pastinaca sativa* L., poison hemlock *Conium maculatum* L., angelica *Angelica atropurpurea* L., and goutweed, *Aegopodium podograria* L. In 1976, *polyxenes* larvae in Ohio were found (M.D.F.) upon bulb-bearing water hemlock, *Cicuta bulbifera* L., angelica, *Angelica atropurpurea*, and wild parsnip, *Pastinaca sativa* in addition to wild and cultivated carrot. Here we have two separate observations of *polyxenes* on plants which should be reported due to the apparent lack of any previous natural observations and also due to their particular ecological significance.

Our first observation is that of a female ovipositing on a characteristically woodland native plant species, *Cryptotaenia canadensis* (L.), Honewort (Fernald, 1950, Gray's Manual of Botany, 8th ed.). The observation (J.M.S.) was made on 15 July 1977 at 10:00 hrs along a wooded creek at the end of Carlsbrook Drive in the township of Beavercreek, Ohio (Greene County). Conditions were favorable for oviposition, with the temperature approximately 30°C and the humidity also very high. Although these seem to be the ideal conditions for oviposition of most eastern swallowtails, solar radiation was probably a very important contributing factor as well, especially with the potential thermoregulation of body temperature in adults (R. C. Lederhouse, pers. comm.).

Although *P. polyxenes* larvae eat *Cryptotaenia* in laboratory no-choice conditions (Erickson, 1975, Psyche 81: 109–130; Scriber, 1975, Comparative nutritional ecology of herbivorous insects; Generalized and specialized feeding strategies in the Papilionidae and Saturniidae Ph.D. Thesis Cornell University, Ithaca, N.Y.), the adults are rarely seen flying in forested areas where the foodplant occurs. Reasons for use of this particular wooded patch in Ohio are uncertain. This female may have drifted into the area more by chance than choice since the wooded habitat was a rather narrow strip in an otherwise open area of residential lawns and first year successional habitats. Inside the woods the *polyxenes* female hovered and circled several *Cryptotaenia* plants before depositing one egg in an immature flower head. The female did not investigate the other *Umbelliferae* (*Sanicula, Heracleum, Osmorhiza*) nearby, and instead flew off across the lawns out of sight. Although larvae ate and survived upon *Heracleum maximum* (Bartr.) plants from this same wooded location, post-flowering *Heracleum* plants in mid-July were less suitable for larval growth than were the mid-May plants (Finke, 1977, Factors controlling the seasonal foodplant utilization by the specialized herbivore, *Papilio polyxenes.* (Lepidoptera: Papilionidae) M.S. thesis, Wright State Univ., Dayton, Ohio). We do not know whether the pre-flowering *Heracleum* plants would have been more attractive for oviposition by *polyxenes* in May. *P. polyxenes* larvae from Greene County, Ohio refused to eat *Sanicula gregaria* Bickni., and others died after several days of eating *Osmorhiza longistylis* (Torr.) and *O. claytoni* (Michx.) (Finke, ibid.).

Utilization of other woodland umbellifer species, *Taenidia integerrima* and *Thaspium barbinode* by *Papilio joanae* Heitzman may have contributed to reproductive isolation by habitat and the relatively new species status of this *polyxenes* relative (Heitzman, 1973, J. Res. Lepid. 12: 1–10). The significance of habitat as an isolating mechanism for adults and larvae of the two species is an interesting aspect of their ecology which needs further investigation.

Our second observation was made in Ithaca, New York (Tompkins County) on

5 June 1977. Eight *Papilio polyxenes* larvae were observed feeding upon one plant of the introduced Lovage, *Levisticum officinale* (Doch). It is uncertain if these larvae (all of which were molting from the 3rd to 4th instar) were derived from one or several adults. It is extremely unlikely that they wandered onto the *Levisticum* from another plant, as there were no other umbellifers nearby. Larvae were collected and reared through to pupation on *Levisticum*. Adults have been preserved as voucher specimens (at the Univ. of Wisconsin, Madison).

The 1973 and 1974 Ithaca populations of *P. polyxenes* produced larvae which consumed *Levisticum officinale* and grew at rates comparable to those for larvae on 35 other *Umbelliferae* in laboratory no-choice situations (Scriber, ibid.). *Papilio polyxenes* larvae obtained from an adult caught in Costa Rica by Paul Feeny all refused to eat or else ate and died in a similar no-choice situation (Scriber, pers. obs.). Some *polyxenes* larvae from a Costa Rican female × Ithaca male mating were, however, able to eat *Levisticum* and grew to the 2nd and 3rd instar before the culture was lost to virus (J.M.S. and R. C. Lederhouse). The genetic basis for this feeding ability remains undetermined. Some recent studies with Costa Rican polyxenes larvae indicate a marginal and variable ability to utilize *Levisticum* does exist in this Central American population (Wm. Blau, pers. comm.).

The *Levisticum officinale—Papilio polyxenes* interface would appear to offer a good system for investigation of the evolutionary dichotomy underlying differences in ovipositional and larval feeding stimulants. The closely related *P. machaon* in Sweden, for instance, will oviposit freely on *Levisticum*, but 100% of the larvae die feeding on it (Wilkund, 1975, Oecologia 18: 185–197). Wilkund (ibid) suggests that the rareness and relatively recent introduction of the plant into Sweden may partially account for nonavoidance of the plant by ovipositing adults. The differences in larval feeding success between *polyxenes* of New York and Costa Rican populations may also be a function of the amount of time the plant and insect have been in contact. *Levisticum* does not, to our knowledge, occur in Costa Rica (Standley, P. C., 1938, Flora of Costa Rica, Field Mus. Natur. History, Chicago Botanical Series, Vol. 18 (no. 420); and Wm. Blau, pers. comm.).

In summary, we would like to emphasize the fact that foodplant utilization by *P. polyxenes* populations appears variable, depending upon local habitat factors and plant phenology in any particular year as well as regional or geographic host-plant preferences which may have evolved over a longer period of time. More field observations and laboratory studies could clarify many unknown or puzzling aspects of the coevolution of the Papilionidae and their hostplants.

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