

## GENERAL NOTES

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### EMERGENCE OF ADULT *ECTOMYELOIS MURISCUS* (DYAR) (PYRALIDAE) FROM A POD OF *THEOBROMA SIMIARUM* DONN. SMITH (STERULIACEAE) IN COSTA RICA

The pyralid moth *Ectomyelois muriscus* (Dyar), a species widely distributed in Central America, northern South America, and the West Indian archipelago, undergoes its life cycle in the pods of *Theobroma cacao* Linnaeus (Sterculiaceae) and other fruits (Heinrich 1956, American moths of the subfamily Phytectininae, U.S. Natl. Mus. Bull. No. 207). I have been unable to locate published records of this moth species infesting pods of other *Theobroma*, a genus represented by several species in tropical America (Cuatrecasas 1964, Cacao and its allies—A taxonomic revision of the genus *Theobroma*, Contrib. U.S. Natl. Mus. 35:379-614). Given the marked differences in external texture, pubescence, and other morphological features of pod walls among *Theobroma* species, one might expect some degree of ovipositional selectivity to exist for moth species associated as larvae with pods of these neotropical tree species. Here I report the emergence of 41 adults of *Ectomyelois muriscus* from one rotted and dried pod of *Theobroma simiarum* Donn. Smith in Costa Rica, representing a new host record for the moth, and for a *Theobroma* species with mature pods differing markedly in pod-wall texture from the previously reported host, *T. cacao*.

One of 12 fallen, mature, and decaying pods of *T. simiarum* was collected beneath one of four trees of this species in the "*Theobroma* and *Herrania* garden" on the grounds of the "Centro Agronomico Tropical de Investigaciones y Ensenanza" (CATIE) at Turrialba (9°55'N, 83°41'W; about 600 m elev.), Cartago Province, Costa Rica in mid-August 1984. The 26 × 8 cm brown pod had no external insect emergence holes at the time it was collected. Subsequently the pod was kept on a desk in an office. Following an initial emergence of a few moths, I confined the pod in a plastic bag in the office. All adults were kept, and voucher specimens sent to the U.S. Dep. Agr. Systematic Entomology Laboratory (U.S. National Museum) for determination.

Between 20 October and 7 December 1984, 42 moths emerged from the pod, with an approximately 1:1 sex ratio. From one to four moths emerged on a given day during this period, but there were many days when no moths emerged. Most moths emerged before 0800 h. Several freshly-eclosed moths clung motionless to the pod for several hours, and flew only when disturbed. By the time the last moth emerged, only three exit holes were found on the external surface of the pod. Clearly, several moths used the same exit holes for emergence. Each exit hole had a 10-25 mm long silken tube externally, apparently built by larvae inside the pod wall and pushed out at the time of multiple eclosions. But eclosion behavior was not observed. Nor did I open the pod to determine where larvae were feeding, as the intact fruit was necessary for other research purposes.

The adults exhibited a staggered emergence pattern, because the emergence period lasted about six weeks. The female moth probably deposits clusters of eggs on the external surface of the sand-papery-rough pubescent pod, since adults appeared to emerge in clusters from a few exit holes. Perhaps this particular pod received three different egg batches. Assuming the observed laboratory emergence pattern was similar to that occurring in nature, a brood of *E. muriscus* emerges near the end of the Turrialba rainy season, and before the short, erratic dry season. The availability of decaying pods of *T. simiarum* varies greatly throughout the year, suggesting a changing pod supply for pod herbivores or pod saprotrophs (whichever the case may be).

Given the previously reported association of *E. muriscus* with *T. cacao* in both Central and South America, my discovery of this moth species in a pod of *T. simiarum* may not be surprising. *Theobroma simiarum* is one of two species of the genus endemic to Costa Rica. Given the broad geographical range of *Ectomyelotus muriscus* in tropical America, it undoubtedly has other natural hosts, possibly species of *Theobroma* other

than *cacao* or *simiarum*. The dense, thick tomentum (pod wall external surface) may represent a suitable oviposition substrate for *Ectomyelois muriscus*, but other surface textures must also be suitable given the marked difference in this feature between *Theobroma cacao* and *T. simiarum*. Larvae of *Ectomyelois muriscus* most likely tunnel through the woody epicarp and softer mesocarp tissues of the pod. Yet they may infest pods once the latter are into advanced stages of decay, perhaps rendering pod-wall tissues more penetrable to larvae.

Near the end of the rainy season at this locality, mature pods of various species of *Theobroma* are available, in addition to those of *T. cacao*, the most abundant species due to large commercial plantations. When the dry season arrives near the end of December, dryness may trigger a large moth emergence, a pattern somewhat different than that observed in the office. The very dry conditions of the office may have mimicked the dry season for moth larvae and pupae present inside the *T. simiarum* pod, leading to a staggered emergence as conditions became increasingly dry.

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#### THE FEMALE OF *PAPILIO XANTHOPLEURA* GODMAN & SALVIN (PAPILIONIDAE)

Before 1985, literature concerning *Papilio xanthopleura* Godman & Salvin stated that its female occurs in two forms: a "normal" female resembling the male, and a large yellow one, form *diaphora* Staudinger (Staudinger 1891, *Deut. Entomol. Z. [Iris] Lepid.* 4:61-158; Rothschild & Jordan 1906, *Novit. Zool.* 13:412-752; Jordan 1907, *in* Seitz, *Macrolepidoptera of the World*, Vol. 5, Alfred Kernen Verlag, Stuttgart, 592 pp.; Munroe 1961, *Can. Entomol. Suppl.* 17, 51 pp.; D'Almeida 1965, *Catalogo dos Papilionidae Americanos*, Soc. Braz. Entomol., Sao Paulo, 366 pp.; D'Abrera, *Butterflies of the Neotropical Region*, Part 1, Papilionidae and Pieridae, Lansdowne Editions, East Melbourne, 172 pp.). None of the literature illustrates a *xanthopleura* female.

Johnson, Rozycki and Matusik (1985, *J. N.Y. Entomol. Soc.* 93:99-109), examined the type and other specimens of *diaphora*, and showed that the type and all known representatives of *diaphora* are males, and male genital and wing characters in *diaphora* indicate it is not conspecific with *xanthopleura*. As a result, *diaphora* was accorded species status, it became apparent that females of *diaphora* are presently unknown in collections, and no "normal" females of *xanthopleura* were in the following major collections: Allyn Museum of Entomology, American Museum of Natural History (AMNH), British Museum (Natural History), Carnegie Museum of Natural History, Collection of David Matusik (Skokie, Illinois), Collection Dep. de Zoologia, Universidade Federal do Paraná (Brazil), Collection of Ernesto W. Schmidt-Mumm (Bogotá, Colombia), Collection of Rick Rozycki (Chicago, Illinois), Collection Tommaso Racheli (Rome, Italy), Instituto de Zoologia Agrícola Maracay (Venezuela), Museu Nacional, Rio de Janeiro (Brazil), Museo de Historia Natural "Javier Prado" (Lima, Peru), National Museum of Natural History (Smithsonian Institution), and the collection of a commercial dealer noted for his holdings in unusual Papilionidae.

Therefore, we borrowed a female of *xanthopleura* (Fig. 1A, C) from the Staudinger Collection (Zoologisches Museum der Humboldt Universität, Berlin, German Democratic Republic [ZMH]). The female resembles male *xanthopleura* on the wing undersurface but, contrary to the above literature, differs markedly from the male on the upper surface of the wings. Males of *xanthopleura* are black above except for brilliant "powder green"