

Two Records of *Phereoeca praecox* (Tineidae) in South Carolina and Observations on Its Biology

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TWO RECORDS OF *Phereoeca praecox* (TINEIDAE) IN SOUTH CAROLINA
AND OBSERVATIONS ON ITS BIOLOGY

Additional key words: feeding, bagworm, household casebearer, distribution, barcode

The genus *Phereoeca* contains several micro-moths that typically occur in tropical and neotropical locations. To date, two *Phereoeca* species have been found in the United States: *Phereoeca praecox* (Gozmany and Vari, 1973) (Fig. 1) and *Phereoeca uterella* (Walsingham, 1897). *P. praecox* occurs in the western United States (Gulmahamad 1999; Powell and Opler 2009), while *P. uterella* occurs in Florida, Louisiana, Mississippi and North Carolina, and is predicted to be present throughout most of the coastal regions of the South (Kimball 1953, Villanueva-Jimenez et al. 2010).

Both of these species spend their entire larval stage in a case (Fig. 2) that they spin out of silk and cover with sand and other debris. The cases are flat, 8 to 14 mm long and 3 to 5 mm wide. The larvae have a brownish fuscous head and sclerites on the dorsal thorax, and reach a length of about 7 mm when fully developed.

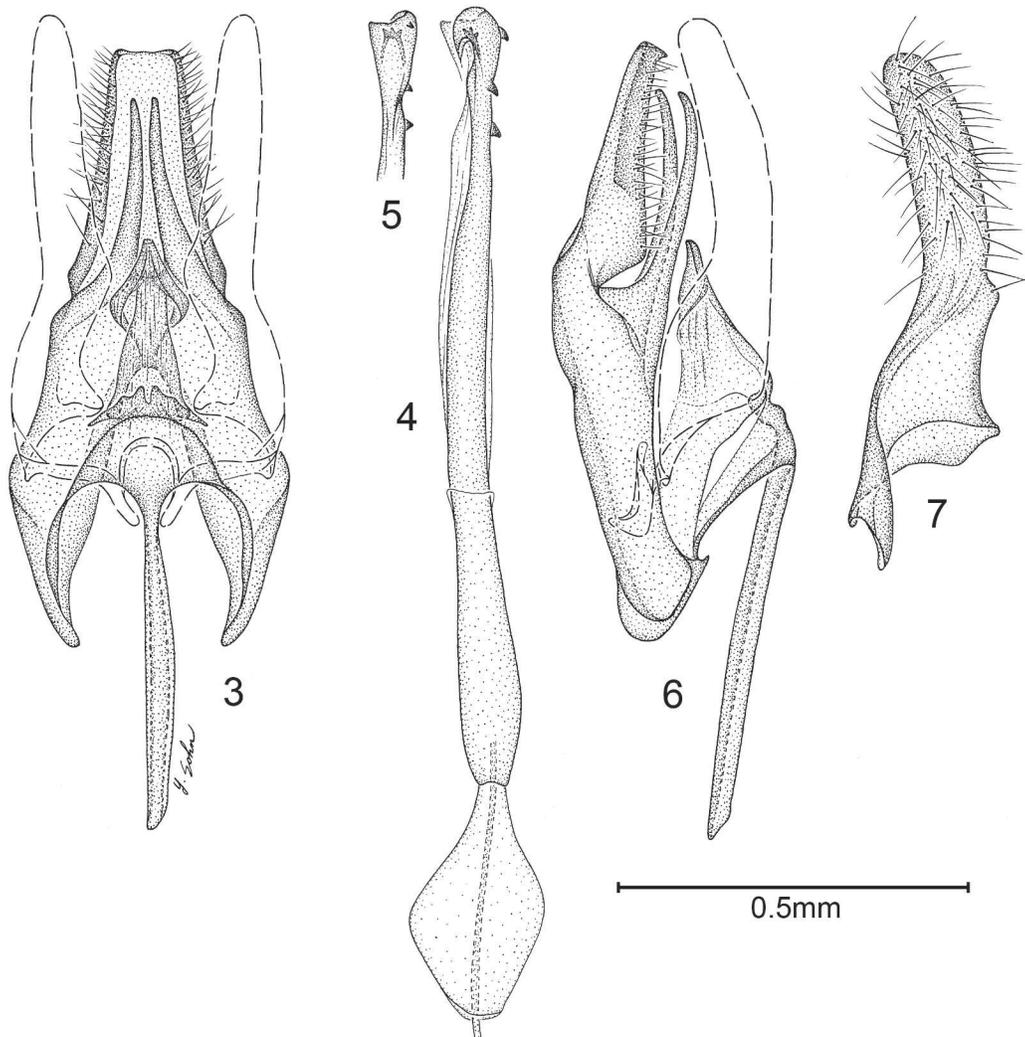
Adult females are larger than males, with wingspans of 10 to 13 mm and 7 to 9 mm respectively (Walsingham 1897, Hinton 1956, Gozmany & Vari 1973).

P. praecox and *P. uterella* reportedly feed on wool carpets, clothing, and other fabrics, making them minor pests, though they are not known to be of major economic concern (Heppner 2005). *Phereoeca* are most often found in bathrooms and other humid places in homes when encountered by humans (Kea 1933), but little is known about specific habitat requirements.

While the two moth species have a similar overall appearance, *P. praecox* and *P. uterella* can be distinguished by differences in the COI barcoding sequences and by the morphology of the male genitalia (Figs. 3–7). In particular, the male valvae of *P. praecox* (Fig. 7) are broader (more than twice the width) than the valvae of *P. uterella*.



FIGS. 1–2. *Phereoeca praecox*. 1. (♀), Clairmont, San Diego County, California. Wingspan 12.8 mm. 2. Larval case of adult in Figure 1. Length of case 10 mm.



FIGS. 3–7. *Phereoeca praecox*. Male genitalia: 3. Ventral view of genital capsule. 4. Phallus. 5. Apex of phallus. 6. Lateral view of genital capsule. 7. Valva, mesal lateral view.



FIG. 8. *Pheroeca praecox* larvae feeding on feces from Aruba Island rattlesnake (*Crotalus unicolor*) in exhibit in the Aquarium Reptile Complex at Riverbanks Zoo and Garden.

We collected larval and adult *P. praecox* specimens from two separate locations in South Carolina, representing the first documented occurrences of this species in the state. We collected a single larval specimen from the wall in the bathroom of a private residence in Florence County, South Carolina, USA in April 2014 near Second Loop Road and Poinsett Drive (34°09'58" N, 79°47'07" W). We also collected several larval and adult specimens for examination from exhibits and a service area in the climate-controlled Aquarium Reptile Complex at the Riverbanks Zoo and Garden in Richland County, South Carolina in August and November 2016 respectively (34°00'37" N, 81°04'27" W), where a breeding population has been established for at least seven years. We collected all specimens by hand and preserved them in 95% ethanol. We identified specimens morphologically (e.g., Hinton 1956) and genetically using the barcoding region of the COI gene (Folmer et al. 1994, Hebert et al. 2003). We used four Riverbanks Zoo specimens for DNA analysis which all yielded an identical haplotype (Genbank Accession No.: KY575118) of 658 nucleotides. While *P. praecox* occurs in the western United States, these are the first documented findings of the moth in South Carolina, which expands the moth's known range in the United States.

Larvae at Riverbanks Zoo occur in a wide range of reptile habitats, including temperate rainforest, tropical rainforest and xeric conditions, and larvae do not appear to show a preference for moisture levels. Our observation of larvae in xeric exhibits suggests they may not be dependent on high humidity. Pupae are commonly observed on the sides of the exhibit or under rocks, logs and other enclosure furniture and on the

concrete walls in the service area behind the exhibits. Adults are also commonly observed in exhibits and on the service area walls.

Larvae are active throughout the day, especially when organic matter is present. Larvae feed on fecal material (Fig. 8) and the molted skins from snakes and lizards as well as on dead rodents offered to reptiles for food. Larvae found on dead rodents aggregate around the rodents' faces or near openings where cockroaches have chewed through the carcasses, though we have not observed if larvae feed on hair or flesh.

While it is generally accepted that *Pheroeca* species feed on proteinaceous materials, specific larval feeding habits are the subject of contention. It has been widely reported that the larvae feed on woolens and furs (e.g., Kea 1933, Mallis 1990); however, some authors (Robinson & Nielson 1993, Heppner 2005) suggest that these claims are false and based on misidentification of the larvae. Hetrick (1957) suggested that larvae most commonly feed on the silk of spiders, psocopterous and embiopterous insects based on his observations of wild and caged larvae. He also speculated that the silk of other insects might provide food for the larvae. More recently, larvae were observed feeding on cotton window shades (Heppner 2005), though this seems atypical since cotton is largely cellulosic, rather than proteinaceous. Moreover, larvae have refused cotton fibers when held in captivity (Kea 1933). Our observation of carcass feeding is novel, though we cannot say if it is common outside of the confines of the Riverbanks Zoo. However, it does show that larvae are able to exploit a greater range of food sources than previously reported. A more thorough understanding of feeding requirements awaits additional study.

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