

## SCIENTIFIC NOTE

***Daphnis nerii* (Lepidoptera: Sphingidae), a New Pest of Oleander on Guam, Including Notes on Plant Hosts and Egg Parasitism****Aubrey Moore and Ross H. Miller**Western Pacific Tropical Research Center, College of Natural and Applied Sciences,  
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**Abstract.** *Daphnis nerii* (L.), the oleander hawk moth, was first detected on Guam in August, 2005. In the field, larvae were observed feeding only on oleander, *Nerium oleander* L. However, in laboratory feeding tests, larvae survived to adulthood equally well on *N. oleander* and *Ochrosia mariannensis* A. DC., indicating that some endemic plants may be impacted by this invasive insect. Thirty out of thirty two *D. nerii* eggs collected from oleander leaves were parasitized. These eggs produced 181 hymenopterous parasitoids belonging to four species: *Trichogramma chilonis* Ishii (Trichogrammatidae), *Eupelmus* sp. (Eupelmidae), *Telenomus (Aholcus)* sp. (Scelionidae), and *Ooencyrtus* nr. *papilionis* (Encyrtidae).

**Key words:** Oleander hawk moth, *Daphnis nerii*, oleander, *Ochrosia mariannensis*, egg parasites

*Daphnis nerii* (L.), the oleander hawk moth, was first detected on Guam on August 15, 2005 when a night watchman at the Okura Hotel in Tumon caught an adult and took it to the Guam Plant Inspection Station for identification. The moth was tentatively identified as *D. nerii* and forwarded to the University of Guam for confirmation. A. R. Pittaway (personal communication) confirmed the species determination based on digital images we posted on the internet. Voucher specimens of adults were collected and preserved in the University of Guam insect collection. We found numerous larvae feeding on oleander growing around the Okura Hotel in Tumon. We also located a severe infestation of larvae feeding on oleander plants lining the roadside at the Paseo Park in Hagåtña, and found larvae on two isolated oleander plants growing on the University of Guam campus. This distribution of infested plants indicates that *D. nerii* was dispersing on Guam for some time before it was detected.

**Biology**

*D. nerii* lays eggs singly on both surfaces of oleander leaves. The eggs are light green and spherical, about 1.5 mm in diameter. Neonate larvae, 3 to 4 mm in length, are bright yellow with a long, thin black posterior horn. Later instars are green or brown with a large blue and white eyespot near the head and a yellow posterior horn. Pupae are light brown and 60 to 75 mm in length. Adults are large moths, with a wingspan of about 90 to 110 mm. See Pittaway 2006 for a more detailed description of life stages with color images.

### Geographic Range

*D. nerii* has a paleotropical origin. It is found in the southern Mediterranean region, North Africa and the Middle East. It is a rare vagrant to the far north, such as to Finland, Sweden, England, Ireland, and the Shetland Islands, and it has occasionally been found in the area extending from Afghanistan eastward to south-east Asia and the Philippines (Pittaway 2006). In 1974, *D. nerii* was detected in Hawaii and it has established there (Beardsley 1979).

*D. nerii* now appears to be established in the Mariana Islands. Previous to its discovery on Guam, it was detected on the island of Saipan, located 185 km to the north, in July 2003 when larvae were found feeding on *Gardenia* sp. (Arnold Route, Northern Marianas College, Saipan, Commonwealth of the Northern Mariana Islands, personal communication). Digital images of larvae and a reared adult were submitted to PestNet (Macfarlane et al. 2006) for identification and the reared adult was donated to the University of Guam insect collection.

### Host Plants

*D. nerii* larval host plants include trees and shrubs belonging to the families Apocynaceae, Rubiaceae, Leguminosae, Vitaceae, Icacinaceae, Graminae, Malvaceae, Oleaceae, and Anacardiaceae (Pittaway 2006, Robinson et al. 2008). The major host plant is *Nerium oleander* and minor host plants are *Vinca*, *Vitis*, *Gardenia*, *Asclepias*, *Jasminum*, *Trachelospermum*, *Amonia*, *Carissa*, *Tabernaemontana*, *Rhazya*, *Adenium*, *Catharanthus*, *Ipomoea* and *Thevetia* (Pittaway 2006). We observed larvae feeding only on oleander in the field on Guam.

Laboratory feeding tests were performed to see if neonate larvae could survive to adulthood on two common members of Apocynaceae endemic to the Mariana Islands: *Ochrosia mariannensis* A. DC., commonly known as langiti, and *Neisosperma oppositifolia* (Lam.), commonly known as fagot. Neonate larvae were collected within 24 h of hatching from eggs laid on oleander leaves in a cage. Groups of twelve larvae were placed on freshly cut leaves of *Nerium*, *Ochrosia*, and *Neisosperma*. Larvae were checked daily and leaves were replaced with fresh ones every second day.

On *Neisosperma*, all twelve larvae died before pupation. On *Ochrosia*, one larva escaped, three pupated and two of these successfully emerged as adults. On *Nerium*, two of twelve larvae pupated and both emerged as adults. We were unable to determine the cause of high mortality to larvae feeding on *Nerium*, the major host of *D. nerii*, in our experiment.

### Egg Parasitism

To check for egg parasitoids, we collected 32 unhatched eggs laid on oleander growing near the Okura Hotel, Tumon, Guam on September 20, 2005. These were placed individually in gelatin capsules. Microscopic examination after two weeks showed that only one egg produced a *D. nerii* larva, one egg did not hatch, and the remaining 30 eggs produced a total of 181 hymenopteran parasitoids. The gelatin capsules containing dead, dried parasites were sent to the Natural History Museum (NHM), London, UK, for identification by specialists. Four species of parasitoids from four different families were found.

***Trichogramma chilonis* Ishii (Hymenoptera: Trichogrammatidae).** Twelve eggs were parasitized by *T. chilonis*. Mean number of *T. chilonis* which emerged from each egg was 12.4 with a range of two to 21. This is a common and highly polyphagous, Asian and Pacific species. Our sample was unusual because it contained both normal, winged and dwarf,

wingless males (Polaszek, NMH, personal communication). *T. chilonis* was introduced to the Mariana Islands of Saipan, Tinian, and Rota for control of sugarcane stem borer, *Eucosoma schistoceana* Snellan in 1935 and was transported to Guam by unknown means (Nafus & Schreiner 1986). Nafus (1993) reported that 50% to 100% of sweet-potato hawk moth, *Agrius convulvi* (L.) (Lepidoptera: Sphingidae) eggs are parasitized by *T. chilonis* on Guam. This parasitoid has also been reared from eggs of the Asian corn borer, *Ostrinia furnacalis* (Lepidoptera: Pyralidae) (Nafus & Schreiner 1986a) and from *Hypolimnas bolina* and *H. anomala* (Lepidoptera: Nymphalidae) (Nafus 1993) on Guam. Elsewhere in Micronesia, *T. chilonis* was reared from eggs of the taro hawk moth, *Hippotion celerio* (Lepidoptera: Sphingidae) on Palau by Beardsley (Doutt 1955).

***Eupelmis* sp. (Hymenoptera: Eupelmidae).** Eight eggs were parasitized by an undetermined *Eupelmus* species. Mean number of this species emerging from each egg was 2.8 with a range of one to seven. Species determination was not possible because all specimens in our sample were male and the taxonomy of this genus is based almost entirely on female morphology. Four species of this genus are known from Guam (Polaszek, NHM, personal communication).

***Telenomus (Aholcus)* sp. (Hymenoptera: Scelionidae).** Six eggs were parasitized by an undetermined *Telenomus (Aholcus)* species. One egg produced three adults of this species and each of the rest produced one adult. Our sample contained both males and females. We are unaware of any previous records of *Telenomus* reared from *Daphnis* eggs. Nafus 1993 reared a *Telenomus* sp. from eggs of *H. bolina* and *H. anomala* on Guam and suspected that this was “an undescribed native or possibly endemic species”. Muniappan & Marutani 1990 also reared an undetermined *Telenomus* sp. from *Spodoptera litura* (Fabricius) on Guam.

***Ooencyrtus nr. papilionis* (Hymenoptera: Encyrtidae).** Each of the remaining four eggs produced a single *Ooencyrtus* nr. *papilionis*. *O. papilionis* Ashmead is a widely distributed species known from India to the Solomon Islands, New Caledonia and Vanuatu. It has a wide host range, having been noted as a parasitoid of the eggs of various *Papilio* species, other butterflies, sphingids and noctuids, including the fruit-piercing moth, *Eudocima ful-lonia* (Clerck). Our specimens are very close to *O. papilionis* but differ slightly in some important morphological characters, particularly antennae of the male. They show some characters that are intermediate between those of *O. papilionis* and *O. sphingidarum* Timberlake which has been recorded from the eggs of Sphingidae from the Marquesas Islands (Noyes, NHM, personal communication). Nafus (1993) reared a *Ooencyrtus* sp. from eggs of *H. bolina* and *H. anomala* on Guam and suspected that this was “an undescribed native or possibly endemic species.”

## Discussion

With the high level of biological control from egg parasitism that we observed (94%), it is unlikely that *D. nerii* will become a major pest on Guam. However, it should be noted that this statement is based on a single sample of 32 eggs from a single location. On average, 5.7 parasitoids emerged from each *D. nerii* egg and three of the four species which emerged are polyphagous.

We are unaware of any severe defoliation of oleander since the initial outbreak we observed at Paseo Park in 2005. However, outbreaks following ecological disruption by typhoons or overuse of insecticides are possible as with other other lepidopterous pests which are usually controlled by parasitoids on Guam (Schneider 1988).

In our laboratory feeding experiment, we observed equivalent survivorship to adulthood for larvae fed on *N. oleander*, the insect's major host plant and *O. mariannensis*, a novel host plant for *D. nerii*, which is common in Guam's forests. There is a possibility that *D. nerii* could become a forest pest if it expanded its host range to include *O. mariannensis* or one of several other Guam endemics in the Rubiaceae or Apocynaceae.

### Acknowledgments

We thank Phil Santos of the Guam Plant Inspection Station for bringing us the first specimen of *D. nerii* collected on Guam, A. R. Pittaway for help with identification of *D. nerii*, and A. Polaszek, J. Noyes, Natural History Museum, London, UK, and J. Pinto, University of California, for identifying parasitoids. Thanks also to Thomas Marler for suggesting testing *O. mariannensis* and *N. oppositifolia* as potential host plants. M. Wright and an anonymous reviewer provided helpful comments. Research reported in this article is part of a survey of invasive insects in Micronesia funded by a USDA Tropical/Subtropical Agricultural Research Grant (TSTAR). This is publication 484 of the Guam Agricultural Experiment Station.

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