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Authors: Homziak, Nicholas T., and Homziak, Jurij

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PAPILIO DEMOLEUS (LEPIDOPTERA: PAPILIONIDAE): A NEW RECORD FOR THE UNITED STATES, COMMONWEALTH OF PUERTO RICO

NICHOLAS T. HOMZIAK[1] AND JURIJ HOMZIAK[2]
[1]29 Crescent Terrace, Burlington, VT 05401
jhomziak@sover.net

[2]Rubenstein School of Environment and Natural Resources
317 Aiken, University of Vermont, Burlington, VT 05405
jurij.homziak@uvm.edu

ABSTRACT

We report the first record of the citrus pest *Papilio demoleus* Linnaeus collected near Guánica in the United States, Commonwealth of Puerto Rico, in March 2006.

RESUMEN

Reportamos la primera ocurrencia de la mariposa asiática *Papilio demoleus* en Puerto Rico qua fue coleccionado alrededor de Guánica, Puerto Rico, en marzo, 2006.

Translation provided by the authors.

Papilio demoleus L., commonly known as the lime or citrus swallowtail, is found throughout southern Asia (Corbet & Pendlebury 1992, cited in Guerrero et al. 2004) where it is a commercially important pest of citrus. In recent times it has expanded its range into new areas of the Old World following the introduction and cultivation of citrus (Matsumoto 2002). More recently, Guerrero et al. (2004) documented the presence of *P. demoleus* in the eastern Dominican Republic on the island of Hispaniola; the first confirmed report of this species in the Americas. Eastwood et al. (2006) subsequently reported that *P. demoleus* had spread across much of the Dominican Republic and, using molecular data, were able to trace its provenance and confirm the pest status of the introduced population. To date it has not been recorded from any other locality in the Western Hemisphere (although there is a dubious record from California (Tilden 1968, cited in Guerrero et al. 2004). Here, we report the collection of 1 specimen (female) of *P. demoleus* in a residential enclave within the Guánica Dry Forest Reserve in Puerto Rico (Fig. 1). It was 1 of 3 specimens observed alighting and possibly ovipositing on an ornamental lime tree (*Citrus aurantifolia* Swingle) in a residential garden.

Collection data are UNITED STATES: COMMONWEALTH OF PUERTO RICO, Municipality of Guánica. 4.III.2006. Nicholas T. Homziak. 7.1 km south and east of town of Guánica on Rte 333 (from junction with Rte 116) to right turn at Hoya Hondo, then 1 km south. (17 degrees, 57.0 minutes North; 66 degrees, 52.6 minutes West). Elevation: near sea level. The identity of the specimen was confirmed by Rod Eastwood (Griffith University, Brisbane, Australia, personal communication). The residential area is located along a slight coastal ridge; largely cleared of the original Subtropical Dry Forest. The low area behind the ridge is dominated by introduced drought-tolerant legumes on poorly draining saline soils. There is commercial citrus production in the nearby region of Yauco.

Guerrero et al. (2004) suggested that the lime swallowtail was likely to disperse rapidly away from its initial point of introduction in the eastern Dominican Republic. *Papilio demoleus* is recognized as a major pest of citrus throughout most of its Old World range, causing significant economic losses (Agribusiness Information Centre of India, 2005; Malaysian Tropical Fruit Information System 2004; Pakistan Agricultural Research Council 2003). Based on its dispersal and life history characteristics documented in Asia, *P. demoleus* is likely to expand and become a serious citrus pest throughout the Caribbean and adjacent mainland locations. Our collection of a specimen from Puerto Rico indicates that it is expanding its range across a much wider area, with potentially serious economic implications for regional citrus production in the Caribbean and Florida.

Papilio demoleus has a history of successful dispersal and range extensions throughout Asia. Found throughout Southeastern Asia (Commonwealth Institute of Entomology 1979), it has extended its range across mountain ranges, deserts, and other inhospitable terrain to become a major citrus pest in India (Agribusiness Information Centre of India, 2005), Pakistan (Pakistan Agricultural Research Council 2003), Iraq (Larsen 1977, cited in Eastwood et al. 2006) and the Middle East (Farid 1987; Badawi 1981). From South

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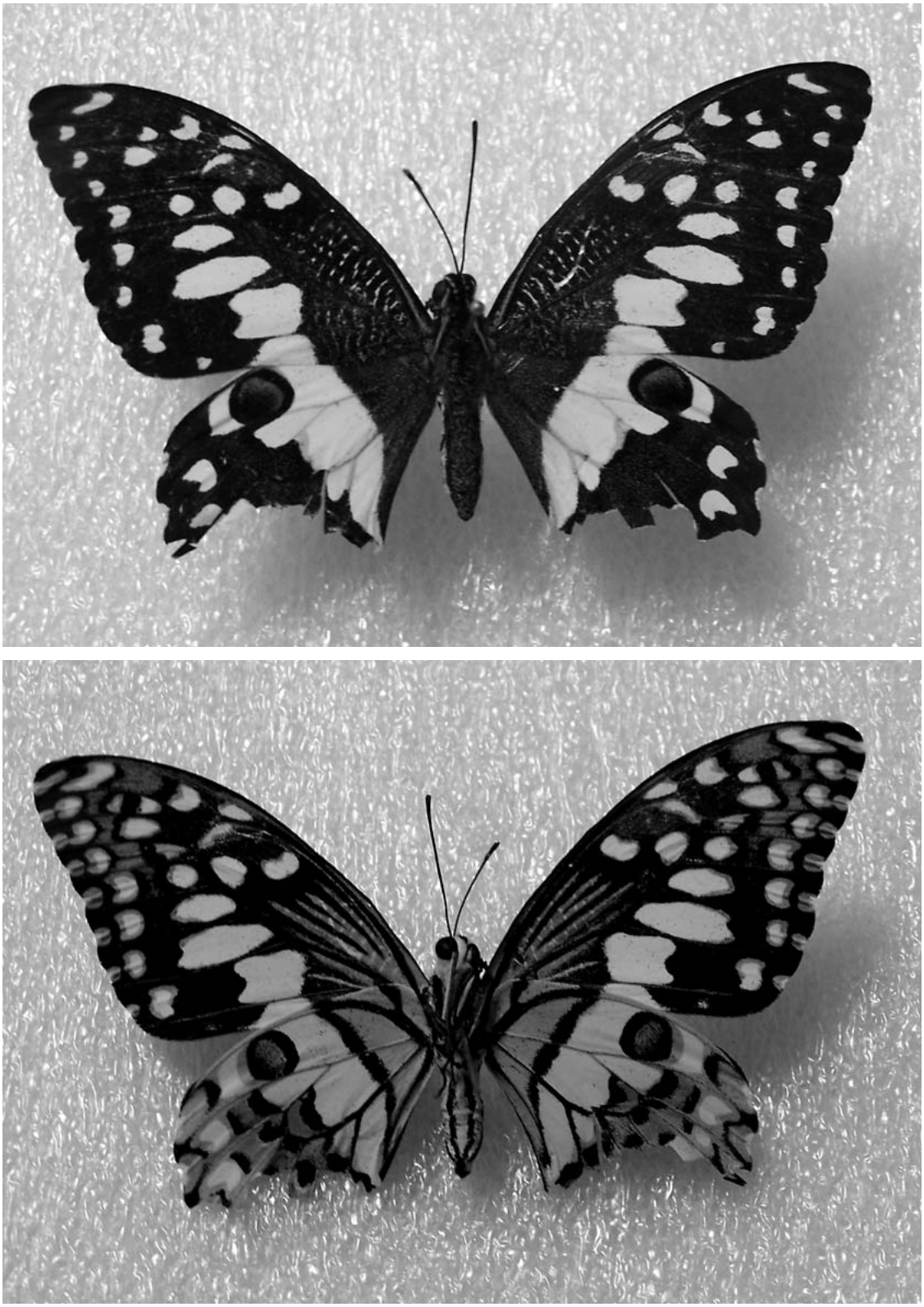


Fig. 1. *Papilio demoleus* from Guánica, Puerto Rico, (a) dorsal view, (b) ventral view.

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and East Asia it has extended its range into the Indo-Pacific, dispersing throughout the islands of Indonesia (Dunn 1999; Matsumoto 2002; Moonen 1991) to New Guinea (Moonen 1999) and Australia (Smithers 1978; Williams et al. 1998). With this capacity for successful migration and range extension, *P. demoleus* is likely to rapidly expand its range beyond Hispaniola to include most islands in the Caribbean and adjacent mainland areas, including Florida.

Papilio demoleus has the potential to become a pest because it shows rapid population growth under favorable circumstances (Bhan & Singh 1997; Chatterjee et al. 2000; Pathak & Rizvi 2003; Radke & Kandalkar 1988). *Papilio demoleus* can have 5 broods per year in warm temperate China (Chen et al. 2004). Under ideal experimental conditions in India, Pathak & Rizvi (2003) reported generation time for *P. demoleus* to be just over 30 d.

Dispersal ability and the capacity for rapid population growth make *P. demoleus* a potentially serious pest throughout the Caribbean with significant economic impact. Citrus is an important agricultural commodity in most of the Caribbean. It is already in decline in several countries because of pests and diseases (Donovan 2002). In a review of the Caribbean citrus industry, Donovan (2002) reports that citrus production contributes significantly to income generation, foreign exchange earnings, employment, food security, economic diversification and growth in the region. Citrus production and associated manufacture are important contributors to the GDP of most Caribbean island nations.

Based on estimates from the Caribbean Cooperative Citrus Association, 52,000 persons are employed in the industry across CARICOM, generating over US$61 million dollars in foreign exchange earnings. Instead of crop value, production data may be more informative because most Caribbean citrus is produced for domestic markets. Production for CARICOM countries in 2001 was estimated to be 510,000 metric tons, 520,000 metric tons for Cuba, 70,200 metric tons for the Dominican Republic and 27,000 metric tons for Haiti. Countries of the Organization of Eastern Caribbean States (OECS) also produce significant amounts of citrus. Most production is by small farmers for domestic consumption. Small citrus farms (less than 5000 boxes per year) make up between 93 and 98 percent of all CARICOM farms and supply 42 percent of citrus fruits. Because the citrus industry is critical to the economic survival of many small farmers, this group would be most affected by the spread of *P. demoleus* in the Caribbean.

In 2002, the value of the Florida citrus crop exceeded $1.5 billion; the U.S. total (Florida, California, Arizona, and Texas) was more than $2.6 billion (National Agricultural Statistics Service 2004). The introduction of *P. demoleus* could have a significant economic impact on production and profitability of the industry. While advanced pest management tools are more readily available in the US than in the wider Caribbean region, growing insect resistance to microbial and other control strategies (Narayanan 2005) may leave the industry vulnerable to this new pest species.

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