Journal of the Lepidopterists' Society
60(3), 2006, 171–174

OBSERVATIONS OF *KRICOGONIA LYSIDE* (PIERIDAE) IN THE FLORIDA KEYS

Additional key words: West Indies, migration, seasonal dispersal, Florida Keys

Kricogonia lyside (Godart), (Fig. 1) a butterfly native to the West Indies, the southwestern United States, and Central and South America, has historically occurred on an irregular basis on several of the middle and upper Florida Keys, as well as on the southeastern Florida peninsula (Young 1938, Minno and Emmel 1993, Smith *et al*. 1994, Glassberg *et al*. 2000, Minno *et al*. 2005). A highly migratory species, *K. lyside* often travels *en masse* within and between the islands of the Caribbean

Fig 1. *Kricogonia lyside* on Vaca Key, 23 July 2005 (Photo Credit: H. L. Salvato).

(Wolcott 1927, Williams 1930, Smith *et al*. 1994, Miyata 2000). The species also demonstrates similar mass movements in the southwestern United States with large influxes entering southern Texas from Mexico (Clench 1965, Gilbert 1985). Dispersal of *K. lyside* into and within southern Texas appears to be triggered by reductions in new hostplant growth (Gilbert 1985). However, whether or not similar ecological cues encourage *K. lyside* migrations, both within the Caribbean and to southern Florida, remains unknown. Luis R. Hernandez (pers. comm.) suggests tropical storm activity in the Caribbean may play a large role in the dispersal of *K. lyside* within the West Indies, and perhaps to southern Florida. Smith *et. al.* (1994) witnessed several *K. lyside* making landfall on Upper Matecumbe Key via strong, although not storm-related, easterly winds, indicating the species is capable of dispersal into the Keys during typical seasonal conditions. Young (1938), based on examination of fresh specimens collected near Biscayne Bay, suggested that the species reproduces within southern Florida and the Keys. However, neither oviposition nor larval activity has ever been observed for *K. lyside* in the region. A known hostplant of this species, lignum vitae, *Guaiacum sanctum* L., (Zygophyllaceae) occurs commonly within hardwood hammocks throughout the Keys and is also widely used in the region as an ornamental species in landscaping.

Following an apparent decade-long absence in Florida *K. lyside* was observed locally from June through September 2002 on Plantation Key (Salvato and Salvato 2002) and Key West (MHS unpublished data) in the Florida Keys. After these initial observations of *K. lyside* re-occurrence in the Keys MHS and HLS continued to survey for this species as part of a larger ongoing long-term study to determine the status and distribution of butterflies throughout the Keys. Surveys were conducted on warm, clear days under conditions that were considered sufficient for butterflies to be flying. Each sampling date included approximately 8–9 hours of field time (between 0800–1700 h) in which two surveyors (MHS and HLS) walked a standard route at survey sites within the study area to visually record *K. lyside* activity. On each sampling date a selected span of the Keys was monitored in either the Upper (Key Largo to Upper Matecumbe Key), Middle (Lower Matecumbe Key to Vaca Key) or Lower Keys (Bahia Honda Key to Key West). Survey sites on each island were visited monthly during May 2002 to December 2005, with the exception of Lignumvitae Key, which due to its inaccessibility, was only surveyed during June of each survey year. The amount of time spent surveying for *K. lyside* on each Key varied based on island size and number of survey sites. Overall, a total of 25 survey sites, of varying sizes, were monitored monthly during this study. These locations included State and County parks, National Wildlife Refuges and roadsides. *Guaiacum sanctum* was observed either directly within or adjacent to the majority of our study areas.

Although there were unconfirmed reports of *K. lyside* during 2003, we did not observe the species again in the

Keys until 13 June 2004, after which *K. lyside* was frequently encountered throughout the Florida Keys, as well as southern Miami-Dade County, marking the first known occurrences for the species on mainland Florida in several years. *Kricogonia lyside* was absent from the majority of the islands we surveyed by mid-August 2004; however, local occurrences remained on Bahia Honda within the lower Keys into November of that year.

In 2005, we began to re-encounter *K. lyside* during the early summer months with our first observations occurring on Lignumvitae Key on 11 June. Despite an abundance of *G. sanctum* on Lignumvitae Key, *K. lyside* had never been reported from this island (Minno and Emmel 1993, Smith *et al*. 1994). To our knowledge these observations of *K. lyside* on Lignumvitae Key represent the first reports from this island. From June through August of 2005 *K. lyside* was observed on every island we surveyed within the Keys (Fig. 2). Throughout this time frame the species was witnessed actively dispersing towards the east on both the northern and southern coastlines of the Keys, as well as on outer islands such as Lignumvitae Key, indicating a wider migratory swath than was noted earlier in either the 2002 or 2004 observations. As was observed in 2004, *K. lyside* remained on Bahia Honda until later in the season (at least through 24 September 2005) than elsewhere in the Keys. Table 1 provides an overview of *K. lyside* observations made on various islands within the Florida Keys during this survey. As with Lignumvitae Key, several of the *K. lyside* observations listed in Table 1 appear to be the first documented occurrences of the species on select islands, particularly within the Lower Keys (Minno and Emmel 1993).

We observed an estimated 10, 74 and 238 individuals of *K. lyside* during monthly surveys of the Keys in 2002, 2004 and 2005, respectively. In all years the majority of individuals were found on Key West, Bahia Honda, Vaca Key and Plantation Key with varying numbers of individuals occurring on 15 other islands in the Keys. Although the sexes are similar, males from western Cuba and the Bahamas are distinctive from other known *K. lyside* populations in that these individuals generally lack a black bar near the apex of the upper hindwing (Riley 1975, Minno and Emmel 1993, Hernandez 2004, J. Y. Miller, pers. comm.). Examination of photographs (n = 25), collected specimens (n = 2) and field observations (n = 322) indicate that the *K. lyside* males encountered during

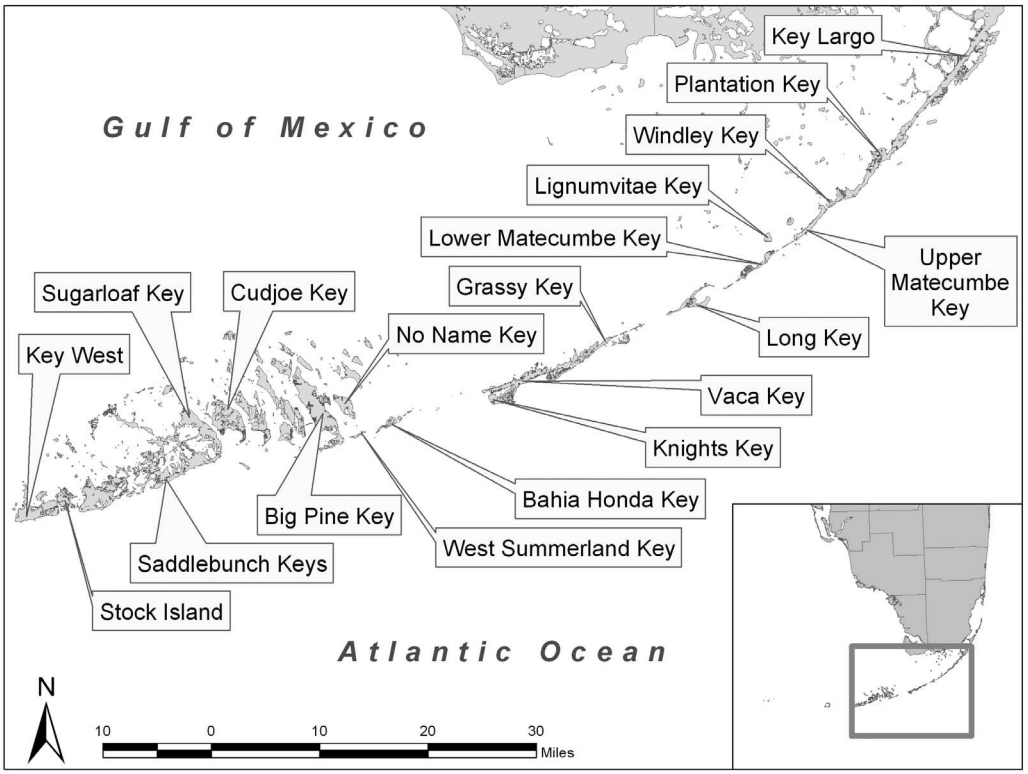

FIG 2. Islands in the Florida Keys on which *Kricogonia lyside* was observed during the survey period.

TABLE 1. *Kricogonia lyside* observations from the Florida Keys during June through September of 2002, 2004 and 2005.

Island	2002	2004	2005
Key Largo			3
Plantation Key	7	12	10
Upper Matecumbe Key		2	1
Windley Key		1	2
Lignumvitae Key			2
Lower Matecumbe Key		2	1
Grassy Key			1
Long Key		7	3
Vaca Key		3	40
Knights Key			12
West Summerland Key			3
Bahia Honda Key		32*	94
Big Pine Key			28
No Name Key			2
Cudjoe Key			4
Sugarloaf Key			2
Saddlebunch Key		1	6
Stock Island		2	4
Key West	3	12	20

* Indicates observations continued until November

these studies were morphologically similar to the western Cuban and Bahamian populations, suggesting that the seasonal occurrences of *K. lyside* in the Keys and southern Florida observed in this study were likely of West Indian origin.

During June to mid-August of 2004 and 2005 *Kricogonia lyside* was consistently observed in active dispersal, traveling in either an easterly or northeasterly direction between islands in search of, and in frequent interaction with, *G. sanctum*. Conversely, *K. lyside* observed later in the season during 2004 and 2005, specifically those remaining on Bahia Honda, occurred only locally and took nectar from any available sources, not just those in the immediate proximity of the hostplant.

Despite extensive searches throughout the study period for signs that *K. lyside* had reproduced or underwent diapause in southern Florida it was not until 9 July 2006 that MHS, HLS and Dennis J. Olle observed the species mating and ovipositing on the fruit and fresh growth of *G. sanctum* on Stock Island and Key West. Additionally on Key West, *K. lyside* was observed actively ovipositing on the leaves of Maracaibo lignum vitae, *Bulnesia arborea* (Jacq.)Engl., (Zygophyllaceae) a non-native species that occurs as an ornamental in the Keys and was not common in our study areas. To our knowledge these observations of oviposition provided the first accounts of *K. lyside* reproduction in southern Florida. However, *K. lyside* larval activity was not observed during these studies. Larvae of *K. lyside* feed nocturnally (Riley 1975, Hernandez 2004) and early instars are similar in coloration to that of the new *G. sanctum* growth on which they feed (Allen *et al*. 2005). The mature larvae are darker green with white and brown stripes (Minno *et al*. 2005). The cryptic coloration and nocturnal feeding habits of *K. lyside* larvae makes the species difficult to find on the hostplant (Luis R. Hernandez, pers. comm.) and may explain our inability to locate them. Additional studies are needed to better determine the occurrence and natural history of immature *K. lyside* in southern Florida. Furthermore, there were no signs of adult *K. lyside* activity across the Keys by mid-fall of 2002, 2004 and 2005, suggesting the species may disappear from Florida and then sporadically re-colonize, probably from Cuba. The tropical storm seasons in 2004 and, for the Keys particularly 2005, were extremely active. However, the influxes and northeastern movements of *K. lyside* across the Keys and into southeastern Florida preceded any significant storms occurring during these study years.

Our observations indicate that *K. lyside* periodically disperses to a greater array of islands in the Florida Keys than previously noted. We have documented that during some years large numbers of *K. lyside* adults occur in the Keys. Additionally, *K. lyside* appears to breed in southern Florida, but to what extent the species colonizes within the state requires further investigation.

The authors thank Luis R. Hernandez for sharing his field observations and insights on the biology of *K. lyside* in the West Indies. Jacqueline Y. Miller examined and presented the authors with her observations of *K. lyside* specimens within the collection of the McGuire Center for Lepidoptera and Biodiversity, Florida Museum of Natural History, Gainesville, Florida. The authors also extend thanks to Tim Adams, Don Stillwaugh Jr, Lyn and Brooks Atherton, Byrum and Linda Cooper, Dennis J. Olle and David L. Lysinger for sharing their field observations of *K. lyside* during the 2004–05 migrations. We also thank an anonymous reviewer for comments that helped improve the manuscript. Finally, the authors thank Barry Wood for creating and editing Figure 2.

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Received for publication 29 December 2005, revised and accepted 21 June 2006.

Journal of the Lepidopterists' Society
60(3), 2006, 174–176

A PRECAUTIONARY TALE ABOUT RARITY: ON THE LARVA AND LIFE HISTORY OF *LITHOPHANE JOANNIS* (LEPIDOPTERA: NOCTUIDAE)

Additional key words: shelter-forming. *Aesculus flava, Lithophane innominata, Lithophane patefacta*

This note is about rarity, and how species that are regarded as scarce may be anything but, once aspects of their life history are better understood. *Lithophane joannis* Covell and Metzler was not described until 1992. Prior to the authors' distribution of paratypes there were no specimens of *L. joannis* in any major eastern institution, i.e., the Smithsonian, American Museum, and Carnegie Museum. Not William Forbes; nor Jack Franclemont, Doug Ferguson, Michael Pogue, Eric Quinter, or Tim McCabe has collected the moth. Dale Schweitzer wrote his dissertation on the tribe—he has yet to see the moth alive. Despite year-round surveys in Great Smoky Mountains National Park (GSMNP)—and especially over the last five years during which time the Park has been the focus of intensive surveys as part of its "All Taxon Biodiversity Inventory"—the moth escaped detection. Yet *Lithophane joannis* is among the Park's most common lepidopterans in middle elevation cove forests.

On 19 May 2001 I collected two *Lithophane* larvae crawling up the trunk of a small yellow buckeye tree (*Aesculus flava* Ait.) (Hippocastanaceae) while collecting moths at a sheet and mercury light (with Doug Ferguson), above the Chimneys Campground (1000m) in Great Smoky Mountains National Park, Sevier County, Tennessee. The caterpillars looked similar to those of the *innominata* group (e.g., *L. hemina* Grote, *L. patefacta* (Walker), *L. petulca* Grote and *L. innominata* (Small), and others), but different enough to raise doubt. Based on the host association and phenotype, Dale Schweitzer guessed that the larvae were those of *Lithophane joannis*. Return trips to the same pullout along Newfound Gap Road in 2002, 2003, and 2004, yielded additional examples of the *Lithophane*. Typically, only one or two caterpillars were collected each year. Unfortunately, I failed repeatedly to rear examples through to the adult stage-inappropriate foliage was offered or larvae were lost during the obligatory, four-month prepupal diapause common to *Lithophane* and other xylenines. In 2005, while light trapping at the same site above the Chimneys Picnic area, I thoroughly searched the same 4m yellow buckeye tree that had yielded caterpillars in every year previous. Nine *Lithophane* caterpillars were found in 20 minutes of searching (by flashlight). The larvae were feeding, perched on the underside of leaves, or observed walking along the trunk, with the exception of two larvae that were recovered from within leaf shelters. Both of these latter individuals were in the process of molting.

Returning to the same area two days later (20 May, 2005), I happened upon a buckeye tree with numerous leaf shelters. Upon opening the first, I found a last instar *Lithophane*. Searching this same tree I counted more than 20 additional *Lithophane joannis* caterpillars in less than 10 minutes by opening other leaf shelters. Nearly every shelter had a caterpillar and some two (few if any of these were in the process of a molt). No additional