SCIENTIFIC NOTE: NOTES ON MATE-LOCATING BEHAVIOR BY THE SKIPPER *PHOCIDES POLYBIUS LILEA* (REAKIRT, [1867]) (LEPIDOPTERA: HESPERIIDAE: EUDAMINAE)

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Abstract- The mate-locating behavior of males of *Phocides polybius lilea* (Reakirt, [1867]) is described and illustrated for the first time, from the summit of the Pyramid of the Sun, Teotihuacán, State of Mexico, Mexico.

Key words: Aggregation, ecology, hilltopping, patrolling, perching, skipper

Males of a large variety of unrelated insects are known to congregate on hilltops, where they perch and/or patrol to await receptive females (Poulton 1904, Chapman 1954, Shields 1967, Alcock 1983, 1984, 1987). This behavior, frequently termed "hilltopping," has been noted for many butterfly species (e.g., Merritt 1952, Beall 1953, Guppy 1953, 1962, Knudsen 1954, Muspratt 1954, van Somern 1955, Shepard 1966, Emmel & Emmel 1967, Shields 1967 (and citations therein), Scott 1970, Atkins 1975, Alcock 1983, 1985, Alcock & O'Neill 1986, 1987, Baughman et al. 1988, 1990, Salazar 1996). A variety of hills may be suitable for butterflies that mate-locate on hilltops, ranging from prominent peaks to barely noticeable rises (Baughman et al. 1988), including man-made structures.

On January 18th, 2010, the authors observed butterflies on the summit of the Pyramid of the Sun at Teotihuacán, State of Mexico, NE of Mexico City, at 7460' (Fig. 1a, j), between 12:45 and 15:15 hrs. Conditions during this period were sunny with a very light breeze from the NW, with temperatures between approximately 23 to 26 degrees C. A total of eight species were observed on the summit, and five of them were demonstrating hilltopping behavior (see Appendix I). The most noteworthy hilltopping taxon observed was *Phocides polybius lilea* (Reakirt, [1867]). From 13:00 to 15:15 hrs., two male individuals of *P. p. lilea* were observed in continuous flight around the summit of the Pyramid (Figs. 1a-i), darting among the people gathered on the summit (which varied from between one dozen to three dozen people). In contrast to other species hilltopping on the summit, and indeed, to most hilltopping butterflies the authors have observed over time, the individuals of *P. p. lilea* never once settled to perch; they were apparently in continuous flight for the entire 2:15 hrs. period they were observed. Both individuals of *P. p. lilea* were strongly attracted to each other; each time one detected the presence of the other, the two would spiral off together into the distance, only to both return to the summit area moments later (a third individual may have arrived on the hilltop after 15:00 hrs.). Despite this, the individuals of *P. p. lilea* were completely uninterested in other butterflies on the summit, and made no obvious effort to pursue any of them. Attempts to persuade individuals of *P. p. lilea* to alight on saliva and saliva + Gatorade-soaked fingers were unsuccessful, although the persistence of the skipper individuals immediately adjacent to sightseers on the summit made their photography with hand-held digital cameras possible (Fig. 1). On numerous occasions, the single male *Papilio polyxenes asterius* (Stoll, 1782) hilltopping on the summit would engage in rapid chases of the individuals of *P. p. lilea* (Fig. 1i); while the individuals of *P. p. lilea* invariably kept ahead of the *Papilio* during such pursuits, they made no obvious attempts to interact with it.

While *P. p. lilea* has been reared several times from Texas (Lipes 1962, Neck 1978, 1982, 1983), Mexico (Comstock & Vázquez 1961, Kendall & McGuire 1975), and Costa Rica (Janzen & Hallwachs 2010), we have found no other published accounts of mate-locating behavior in males of this taxon. Shields (1967) reported hilltopping behavior in "*Phocides* spp." based on personal observations of Keith Brown, but no details of species or locality were provided. However, the senior author has noted mate-locating behavior in *P. p. lilea* on one other occasion. On December 26th, 1992, a single male of *P. p. lilea* was collected while demonstrating patrolling behavior on the hilltop at Isla de la Piedra, east of the port of Mazatlán, in the state of Sinaloa, Mexico. This site, while near sea-level, constitutes one of the few hilltops along the immediate coast in the Mazatlán area.

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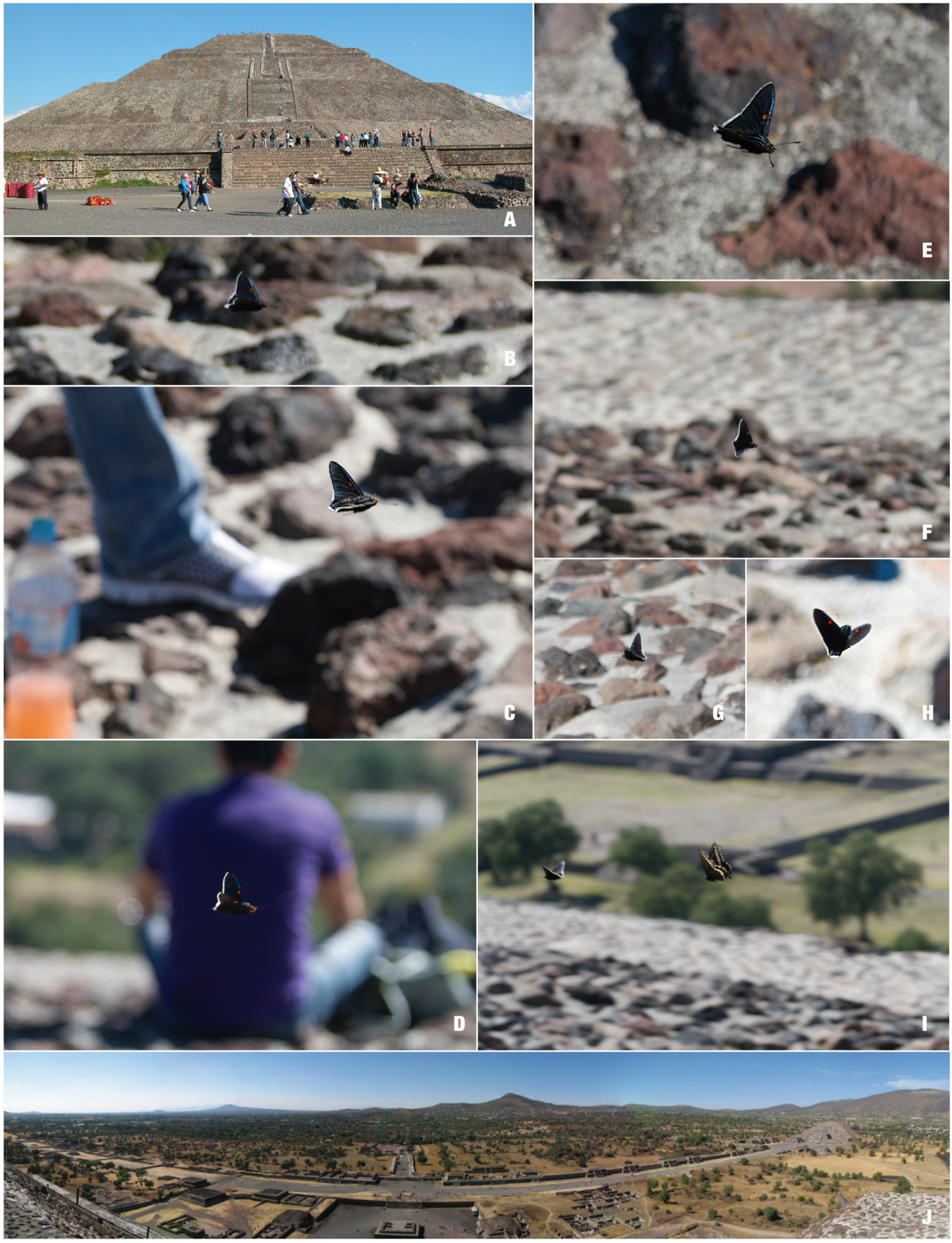

Fig. 1. Hilltopping males of *Phocides polybius lilea* at the Pyramid of the Sun, Teotihuacán, State of Mexico, Mexico, on January 18th, 2010. A) View of Pyramid of the Sun from the west base; B-H) views of male *P. p. lilea* flying over summit of Pyramid of the Sun, between sightseers; I) male *Papilio polyxenes asterius* chasing hilltopping male of *P. p. lilea*; J) panoramic view from the top of the Pyramid of the Sun, center facing west.

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APPENDIX I

Butterfly species observed at the Teotihuacán Archaeological Site, Mexico State, Mexico, on January 18th, 2010, with behavioral notes. All hilltopping behavior was observed on the summit of the Pyramid of the Sun (hilltop).

Phocides polybius lilea (Reakirt, [1867]) (two or three males observed in continuous flight on hilltop, as detailed above)
Pyrgus communis communis (Grote, 1872) (one female flyby on hilltop, also several males at base of Pyramid of the Sun and in vacant lot at N end of Pyramid of the Moon. Not identified through genitalic examination, although material collected nearby in 2007-2009 by the senior author has all been *P. communis* when genitalia are examined)
Ancyloxypha arene (W. H. Edwards, 1871) (one male seen in vacant lot at N end of Pyramid of the Moon)
Copaeodes minima (W. H. Edwards, 1870) (at least two males seen in vacant lot at N end of Pyramid of the Moon)
Papilio polyxenes asterius (Stoll, 1782) (one male perching and patrolling on hilltop from 12:45 to 15:15 hrs.)
Nathalis iole iole Boisduval, 1836 (one flyby on hilltop, also in vacant lot at N end of Pyramid of the Moon)
Eurema salome jamapa (Reakirt, 1866) (one male seen in vacant lot at N end of Pyramid of the Moon)
Phoebis philea philea (Linnaeus, 1763) (one pair observed in vacant lot at N end of Pyramid of the Moon)
Leptophobia apira elodia (Boisduval, 1836) (various individuals at base of Pyramid of the Sun and in vacant lot at N end of Pyramid of the Moon)
Pieris rapae rapae (Linnaeus, 1758) (various individuals at base of Pyramid of the Sun and in vacant lot at N end of Pyramid of the Moon)
Pontia protodice (Boisduval & Le Conte, [1830]) (at least two males perching and patrolling on hilltop from 13:00 to 14:45 hrs., also at least one individual in vacant lot at N end Pyramid of the Moon)
Electrostrymon guzanta (Schaus, 1902) (one female closely observed and videotaped in vacant lot at N end of Pyramid of the Moon)
Leptotes marina (Reakirt, 1868) (one flyby seen on hilltop, various individuals seen in vacant lot at N end of Pyramid of the Moon)
Cupido comyntas texana (F. Chermock, 1945) (various individuals seen at base of Pyramid of the Sun, one male seen in vacant lot at N end Pyramid of the Moon)
Danaus plexippus plexippus (Linnaeus, 1758) (one seen at base of Pyramid of the Sun)
Vanessa virginiensis (Drury, 1773) (at least two males perching and patrolling on hilltop from 13:15 to 15:15 hrs.)
Vanessa cardui (Linnaeus, 1758) (one male perching and patrolling on hilltop from 14:15 to 15:15 hrs.)
Vanessa annabella (W. D. Field, 1971) (various individuals at base of Pyramid of the Sun and in vacant lot at N end of Pyramid of the Moon; larvae found on *Malva* sp. at latter locality)
Anthanassa texana texana (W. H. Edwards, 1863) (one individual seen in vacant lot at N end of Pyramid of the Moon, also one seen at Entry Gate 2)