

SHORT COMMUNICATION

New records for species of *Theope* (Lepidoptera, Riodinidae) for the state of Pernambuco and northeastern Brazil, with notes on their natural history

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ABSTRACT. New records for species of *Theope* (Lepidoptera, Riodinidae) for the state of Pernambuco and northeastern Brazil, with notes on their natural history. Five new records for the state of Pernambuco and one new record for NE-Brazil are reported in this paper for the genus *Theope*. Relationship between ants and *T. terambus* was observed for the first time which also consists on the first ever recorded myrmecophilous interaction between *Pheidole* ants and a *Theope* immature. *Schoepfia guianensis* is reported as a probable hostplant for *T. terambus*. Illustrations of seven species of *Theope* which occur in the northeastern Atlantic Rainforest are provided.

KEYWORDS. Myrmecophily; Nymphidiini; Pernambuco endemism center.

RESUMO. Novas ocorrências do gênero *Theope* (Lepidoptera, Riodinidae) para Pernambuco e Nordeste brasileiro e comentários de sua história natural. São registradas cinco novas ocorrências do gênero *Theope* para Pernambuco e uma nova ocorrência para o Nordeste do Brasil. É relatada pela primeira vez relação mirmecófila para *T. terambus*, assim como uma relação entre um imaturo de *Theope* e formigas do gênero *Pheidole*. *Schoepfia guianensis* é relatada como provável planta hospedeira de *T. terambus*. São fornecidas ilustrações para as sete espécies de *Theope* registradas nesse estudo.

PALAVRAS-CHAVE. Centro de endemismo Pernambuco; mirmecofilia; Nymphidiini.

Theope Doubleday, 1847 is the largest myrmecophilous genus in the butterfly family Riodinidae with 80 species. Since the genus was reviewed by Hall (1999), 11 new species were described (Gallard 2002, 2006; Hall 2008; Jauffret & Jauffret 2009; Brévignon & Gallard 2009) and others are likely to be discovered, especially in the Amazon basin (Hall 2008). In general, its species are small sized, with abundant iridescent blue scales on the dorsal surface and brown, gray or white ventrally. Characteristically, the butterflies of this genus land with their wings closed and the males perch in hilltops and ridge tops (DeVries 1997; Hall 1999).

As part of the myrmecophilous tribe Nymphidiini, *Theope* caterpillars have been associated with Dolichoderinae ants, notably those of the genus *Azteca* (Hall 1999). Although it has never been demonstrated the benefits of myrmecophily in *Theope*, the presence of tending ants supposedly protect its caterpillars against natural enemies, or for appeasement, in exchange for nutritious secretions as it was observed for other Lycaenidae and Riodinidae species (see Malicky 1970; DeVries 1991). The genus is exclusively Neotropical and typical of wet forest habitats. Because of their generally low abundance, inconspicuous behavior and small size, *Theope* species are often overlooked in surveys and poorly represented in collections and museums.

Seven *Theope* species are listed for the Atlantic Rainforest

of Northeastern Brazil: six in the state of Paraíba (Kesselring & Ebert 1982; Hall 1999) and two in the state of Pernambuco (Hall 1999). This coastal rainforest forms the Pernambuco endemism center (*sensu* Silva & Casteleti 2003), whose species richness still remains much underestimated (Tabarelli *et al.* 2006). The forest coverage of this biogeographic Region is currently scattered in very small and disturbed remnants due to cut down of rainforest and sugar cane plantations (Silva & Tabarelli 2000).

Theope individuals were sampled during four to six days per month, from April/2007 to March/2008, as part of a broader butterfly inventory that comprised approximately 300 net-sampling hours. The time of capture and approximate height of flight were registered for every collected specimen. Also, special attention was given to females fluttering about plants ("approaching"), as an indicative of possible ovipositing behavior, as described by Pierce & Elgar (1985).

The survey took place along the edges and understorey trails (4:1 sampling hours) of Atlantic Rainforest remnants located at the Usina São José S/A (7°41'4.09"–7°54'41.6"S and 34°05'17.6–35°05'07.2"W), a sugarcane industry situated in the municipality of Igarassu, northern Pernambuco, Brazil. The local rainfall exhibits a rainy season from January to August and a dry season from September to December (Schessl *et al.* 2008).

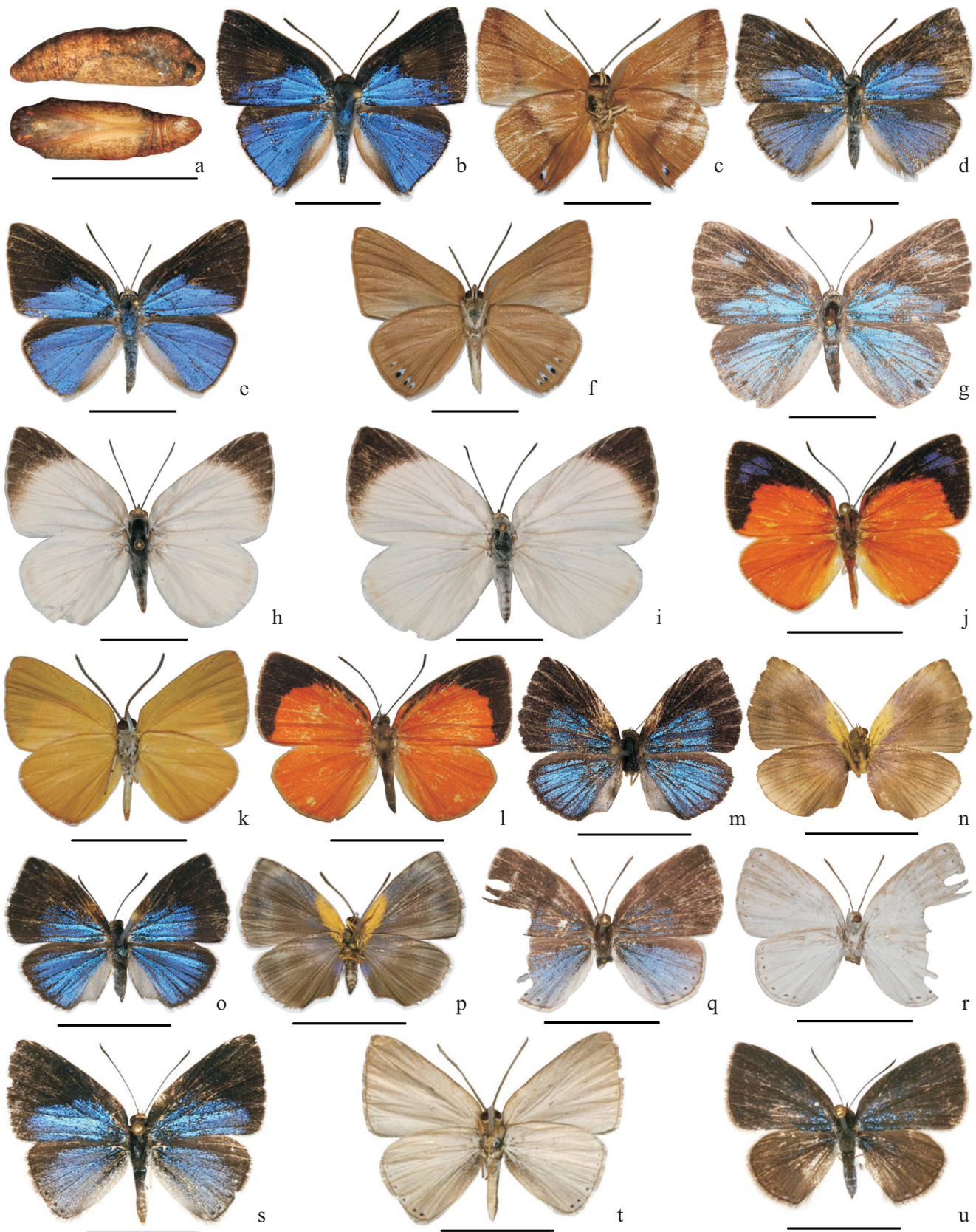


Fig. 1. *Theope* species sampled in Igarassu, northern Pernambuco, Brazil: *T. terambus* – (a) pupae in lateral and ventral view, (b) male, D (c) male, V (d) female, D; *T. virgilius* – (e) male, D (f) male, V (g) female, D; *T. pierioides* – (h) male, D (i) female, D; *T. eudocia* – (j) male, D (k) male, V (l) female, D; *T. thestias* – (m) male, D (n) male, V (o) female, D (p) female, V; *T. leucanthe* – (q) female, D (r) female, V; *T. foliorum* – (s) male, D (t) male, V (u) female, D. D = dorsal view; V = ventral view. Scale bar = 1 cm.

During one year of sampling, we have collected 71 individuals of seven *Theope* species (Table I, Fig. 1). Five species are new records for the state of Pernambuco (*T. eudocia*, *T. foliorum*, *T. terambus*, *T. thestias* and *T. virgilius*) and one – *T. thestias* – is a new record for the Northeastern region of Brazil. The closest area to Pernambuco in which this species occurs is in the municipality of Leopoldina, Minas Gerais, in Southeastern Brazil (Hall 1999), about 2000 km south-west of Igarassu.

The occurrence of *Theope* individuals was low throughout the sampling year and two seasonal peaks were verified: the first and highest on the wet season, from March to June and a discrete one on the dry season, from October to December (Fig. 2). The most temporally and spatially abundant species was *T. eudocia*, a common and widespread species, usually associated to secondary and degraded forest habitats (Hall 1999). These are common traits to most of the species found in this study (Hall 1999). All species were sampled in forest edges with the exception of *T. terambus*, which was also sampled in the forest understorey (Table I).

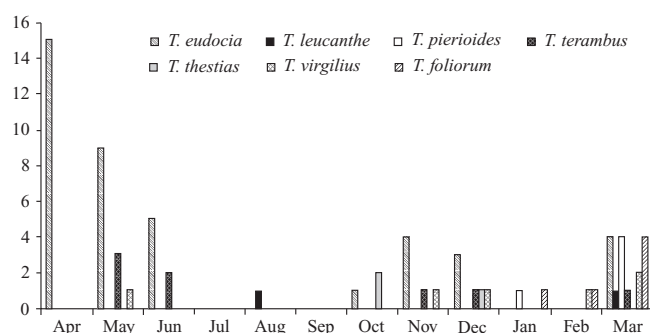


Figure 2. Occurrence of *Theope* species from April/2007 to March/2008 in Igarassu, northern Pernambuco, Brazil.

Hall (1999) reported a female-biased sex ratio of 6:1 for two species of *Theope* (*T. decorata* and *T. guillaumei*). In the present study, there was no strong sex ratio bias but the proportion of females was slightly higher in some uncommon species (Table I).

The species of the “*foliorum* group” (*T. foliorum* and *T. leucanthe*, *sensu* Hall 1999), smaller and more fragile, were found flying in lower heights, whereas the larger and more powerful flyers (*T. virgilius*, *T. terambus*, *T. pierioides*) flew higher from the ground (Table I).

A female of *T. terambus* was found in the forest understorey, approaching the leaves of an individual of *Schoepfia guianensis* Aubl. (Olacaceae) in a typical ovipositing behavior. After investigating the plant, a light to dark brown-mottled pupa of *T. terambus* (Fig. 1a) was found hidden in a foraging trail constructed by a species of *Pheidole* ant. It was attached to a tree branch by the cremaster, with its dorsal surface lying against the foraging trail wall. Pupation inside an ant built structure (carton) was already documented for *T. lycaenina* by Hall (1999). This behavior may comprise a complementary strategy to avoid natural enemies, analogue to shelter building by several Lepidoptera species (see Kaminski *et al.* 2009), including other *Theope* (Hall 1999; Kaminski 2008).

After eight days, a male adult of *T. terambus* emerged (Fig. 1b-c). The plant individual was revisited on several other occasions to find additional immatures but none was found and the ants seemed to have abandoned their local foraging trail.

To date, there have been reports of *Theope* larvae associated with ants of the genera *Azteca*, *Solenopsis* and *Dolichoderus* (Harvey 1987; DeVries *et al.* 1992; DeVries 1997). Although we have not found *T. terambus* larvae associated to the ants, this is the first record of a relationship between ants and an immature stage (pupa) of this species. In *Theope*, myrmecophily in the pupal stage was already observed, for *T. thestias* and *T. pierioides* (Kaminski, pers. comm.).

Pheidole ants had already been documented in association with riodinids of the genera *Thisbe*, *Protonymphidia*, *Setabis*, *Nymphidium* and *Eurybia* (DeVries 1991; DeVries *et al.* 1992). This is the first record of an association between this ant genus and a species of *Theope*.

The utilization of *Schoepfia guianensis* as foodplant by *T. terambus* larvae needs to be confirmed, consisting on the first record of an Olacaceae species as hostplant for the genus *Theope* (Beccaloni *et al.* 2008). We believe it is a plausible

Table I. Butterfly species of the genus *Theope* sampled in Atlantic forest fragments of Igarassu, Pernambuco.

<i>Theope</i> species	Number of individuals		Habitat	Height of flight (m)	Time of occurrence (h)
	Male	Female			
<i>T. eudocia</i> Westwood, 1851	22	19	Forest edge	1,0-5,0	09:30-14:50
<i>T. foliorum</i> H.W. Bates, 1868	2	4	Forest edge	0,5-1,5	11:00-12:20
<i>T. leucanthe</i> H.W. Bates, 1868	0	2	Forest edge	0,5-1,5	12:00-14:15
<i>T. pierioides</i> C. felder & R. Felder, 1865	2	3	Forest edge	Above 3	11:30-14:00
<i>T. terambus</i> (Godart, [1824])	3	5	Forest edge/Understorey	2,0-4,0	10:00-13:20
<i>T. thestias</i> Hewitson, 1860	1	2	Forest edge	1,5-3,0	10:30-11:30
<i>T. virgilius</i> (Fabricius, 1793)	4	2	Forest edge	2,5-4,0	11:00-13:20

hypothesis, because of two significant evidences: a) the presence of a symbiotic ant species on the plant, which could have influenced the female to oviposit in an unusual plant species (Pierce 1984; Pierce & Elgar 1985), and b) the pupation on *S. guianensis* host plant, since this behavior is already known for other *Theope* species (Kaminski, pers. comm.).

These findings illustrate the current situation on the state of knowledge of many animal groups of Northeastern Brazil, especially those which requires more specific and methodic surveys. The rapid impoverishment taking place at local forest fragments (Silva & Tabarelli 2000; Lopes *et al.* 2009) demands intensified research effort, in order to further elucidate the poorly understood biodiversity of this region.

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