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Observations on the biology of Afro–tropical Hesperiidae (Lepidoptera) principally from Kenya. Part 1. Introduction and Coeliadinae

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Abstract

Partial life histories for eight Afro–tropical Coeliadinae are described and illustrated: *Pyrrhochalcia iphis* (Drury) (Côte d'Ivoire), *Pyrrhiades lucagus* (Cramer) (Ghana), *P. anchises anchises* (Gerstaecker) (Kenya), *Coeliades chalybe chalybe* (Westwood) (Côte d'Ivoire), *C. forestan forestan* (Stoll) (Kenya), *C. pisistratus* (Fabricius) (Kenya), *C. sejuncta* (Mabille & Vuillot) (Kenya), *C. kenya* Evans **stat. rev.** (Kenya). Descriptions of a further six species or subspecies are provided from the literature: *P. anchises jucunda* (Butler) (Oman), *P. aeschylus* (Plötz) (Republic of Guinea), *P. pansa* (Hewitson) (Réunion), *C. bixana* Evans (Democratic Republic of the Congo), *C. libeon* (Druce) (Democratic Republic of the Congo), *C. keithloa* (Wallengren) (South Africa), *C. lorenzo* Evans **stat. rev.** (South Africa). Unpublished photographs provided by T.C.E. Congdon illustrate early stages of *C.* sp. probably *fervida* (Butler) and *C. rama* Evans (Madagascar). Notes based on museum material are presented for C. *ramanatek* (Boisduval). Generalisations are made for the subfamily in Africa and the implications for generic groupings in the subfamily are considered. All except *C. libeon* are known

to feed on at least one species of Malpighiaceae, while *C. libeon* feeds on at species of at least two other families of Malpigiales. A new type of leaf shelter, the four–cut shelter, is introduced, characteristic of African Coeliadinae.

Key words: *Pyrrhochalcia*, *Pyrrhiades*, *Coeliades*, food plant, life history, leaf shelter, parasitoid

Introduction

The taxonomy of Hesperiidae, like all Lepidoptera and most insects, has been based on adults. However, characters from the life cycle are recognised as potentially important for taxonomic and phylogenetic decisions (Warren *et al*. 2008, 2009).

The long term project to catalogue the larger Lepidoptera, food plants, life cycle and natural enemies in part of Costa Rica (Janzen & Hallwachs 2009) is generating important insight into taxonomic questions based on life history, barcoding and adult morphology. This study has shown that almost all species of Hesperiidae based on morphology are valid, and correlate with a defined life history and food plants (Janzen *et al*. 2005; Hajibabaei *et al*. 2006). Some species have been divided into cryptic species pairs separated by a combination of barcoding, habitat preference, caterpillar appearance and food plants (Burns *et al*. 2007). One common species, *Perichares philetes* (Gmelin) has been divided into four, with recognisably different caterpillars, and two species feeding on palms and two on grasses (Burns *et al*. 2008). In the most extreme case reported to date, a single species, *Astraptes fulgerator* (Stoll) was found to comprise at least ten different species, with almost identical adults, but distinct caterpillars and food plants (Hebert *et al*. 2004), although a subsequent reanalysis of the DNA data by Brower (2006) suggested that, at most, recognition of seven species was justified. Parallel studies on the parasitoids reared in the Costa Rican study have shown that many morphologically based generalist parasitoid species can be divided into groups of almost identical species, each with a different narrow host range (Smith *et al*. 2006, 2007, 2008).

In a study on the Limacodidae of Southeast Asia (Holloway *et al*. 1987), it became apparent that what had been treated as widespread pest species often had radically different and easily distinguished caterpillars in different parts of their range. Further investigation based mainly on the examination of male genitalia showed that in several cases what had historically been treated as single species was actually a complex of species that had evolved in isolation on different island groups, and often on different islands within island groups. It was the differences between the caterpillars which triggered this study.

There are no comparable studies on Hesperiidae in Africa, and as yet, we do not know to what extent similar situations may have arisen in Africa. The results from the studies on Hesperiidae in Costa Rica in particular show the importance of studying early stages whenever possible, and the contribution that they can make to taxonomy, and the understanding of evolution.

Hesperiidae caterpillars almost all make some form of leaf shelter in which they hide when not feeding. Typically they will make three such shelters as they grow and the early shelters become too small. These shelters can have rather different architecture, but are more or less consistent for each species. Pupation is normally in the last caterpillar leaf shelter, although some species may make a new shelter for pupation, while a few leave the plant to pupate at the soil surface, e.g. at least two species of the Neotropical genus *Bungalotis* (Moss 1949), and the Neotropical *Epargyreus zestos* (Geyer) (Cock 2001), both Eudaminae (Warren *et al*. 2009). Greeney & Jones (2003) proposed a terminology for hesperiid leaf shelters and documented the different types that they found in the Neotropics. The terms to describe shelters include major cuts used to define the shape of the shelter, minor cuts used to position or shape the shelter, the shelter lid which is the leaf or portion of leaf manipulated to make the shelter, shelter bridge along which the shelter lid is folded over, shelter stem for a narrow bridge with parallel sides often on a vein or the midrib, perforations in the shelter parts, and channels cut from the edges of the shelter parts. Greeney & Jones (2003) recognised three category groups of shelters: Group I no–cut shelters (Types 1–4), Group II one–cut shelters (Types 5–7), and Group III two–cut