A new species of *Chaetocneme* Felder, 1860 from Papua New Guinea (Lepidoptera: Hesperiidae)

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Abstract: A new skipper butterfly *Chaetocneme richardsi* **n. sp.**, from the Upper Sepik, West Sepik Province, Papua New Guinea, is described and figured. The new species lacks a forewing costal fold and is compared with putative related species in the *helirius* and *tenuis* species groups of *Chaetocneme* Felder, 1860, particularly the Bismarckian endemic *C. sombra* Evans, 1934.

INTRODUCTION

Chaetocneme Felder, 1860, belongs to the hesperiid subfamily Pyrginae, and is most closely related to the Oriental *Capila* Moore, [1866] (Parsons, 1998). The genus contains approximately 18 species, with the majority restricted to the New Guinea mainland (Parsons, 1998). Most *Chaetocneme* are rarely encountered in the wild and the majority of species are poorly represented in collections (Parsons, 1998). The adults are usually crepuscular, flying mainly at dusk, generally resting through the day on the undersides of leaves in the understorey. They are occasionally taken at artificial light (Parsons, 1998). The life histories of few species are documented but, where known, they feed on a range of plant families, including Myrtaceae, Lauraceae and Annonaceae (Lane, 1993; Miller, 1990; Parsons, 1998; Wood, 1984).

A male specimen of an unusual *Chaetocneme* was collected during an expedition to the Upper Sepik in early 2010. It was immediately recognised as representing a new species, based on distinctive external facies, in particular the lack of a forewing costal fold that is found in males of most other *Chaetocneme* species. This costal fold at the base of the dorsal forewing contains tightly packed androconial scales which are covered by a flap. The only other known *Chaetocneme* in which the costal fold is absent are the Bismarckian *C. sombra* Evans, 1934 and an undescribed species related to *C. tenuis* (van Eecke, 1924) (Parsons, 1998).

Several *Chaetocneme* taxa, including the new species described here, are unicolorous brown on both wing surfaces, with no obvious markings. However, as well as the presence or absence of a costal fold, the size, wing shape and colour, colour and width of the terminal fringe, and particularly the male genitalia, are generally diagnostic. Parsons (1998) illustrated line drawings of the male genitalia of almost all species occurring in Papua New Guinea, showing the extensive diversity in the genitalic morphology. The purpose of this paper is to describe this new species and to compare it to related species.

MATERIALS AND METHODS

Type and other relevant specimens were examined and/or deposited in the following institutions: Australian Museum, Sydney, Australia (AMS), Australian National Insect Collection, Canberra, Australia (ANIC), and the British Museum (Natural History), London, England (BMNH).

Adult specimens were photographed using a Nikon D300s Digital SLR Camera with a Nikon AF-S VR Micro-Nikkor 105mm f/2.8G IFED Macro lens and Nikon R1C1 Close-up Kit Flashes Speedlights. Genitalia were photographed using the same camera with a Meiji Techno EMZ-5TR-P-FOI Trinocular Stereozoom Microscope, with OPTEK FL95E Fibreoptic Illuminator and twin arm optical fibre. Individual sliced genitalia images were concatenated using the software Helicon Focus 6.0 and edited in Adobe Photoshop CS6. Plates were designed in Adobe InDesign CS6.

RESULTS

Chaetocneme richardsi sp. nov

(Figs. 1 - 3, 16)

Adult Description. *Male* (Figs. 1, 2). Forewing length 28 mm, antenna 16 mm (nudum count 19). Head deep chestnut red-brown; labial palpus reddish brown above and orange below, eye ringed with white; antenna black, ringed with orange-brown, club with red-brown ventrally. Thorax deep chestnut red-brown above, beneath anterior of thorax and legs orange, posterior part of thorax deep brown. Abdomen deep red-brown above, medium brown beneath.

Forewing with costa nearly straight and without costal fold, termen slightly concave, apex notably rounded, inner margin straight. Forewing upperside uniform rich chestnut red-brown and unmarked, termen and apex broadly dark brown; veins black; cilia narrow and orange-brown. Forewing underside uniform deep velvet brown and unmarked except for a slightly paler brown postmedian patch and paler brown area along inner margin and at base; costa orange-brown near base; cilia narrow and orange-brown.

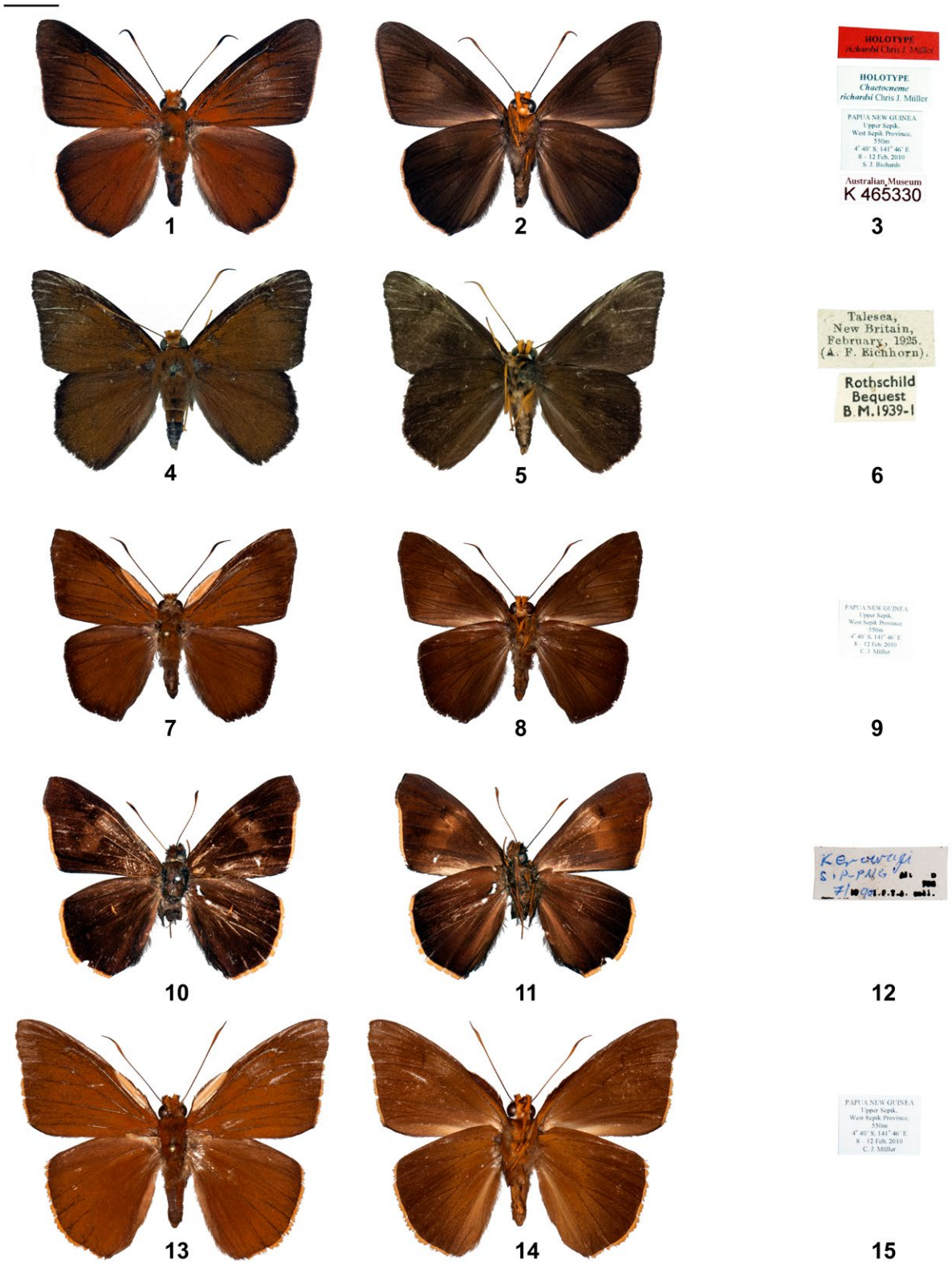
Hindwing upperside uniform rich chestnut brown and unmarked; termen broadly dark brown; cilia narrow and orange. Hindwing underside uniform deep velvet brown and unmarked, slightly paler brown broadly along inner margin; cilia narrow and orange.

Male Genitalia (Fig 16). Tegumen tall, crown- or shield-like, approximately equal in length and width; uncus long and narrow dorsally, laterally resembling beak of an albatross; gnathos spiny, long and narrow, tapered towards tip of uncus; valva large, bulbous in lateral view, slightly indented along upper margin and with a single prominent spike near base of cucullus; cucullus about a quarter length of valva, narrow, upthrust, terminating in an anteriorly facing tip bearing about seven sharp spines of equal length; saccus prominent, upturned at right angles to tegumen; aedeagus large and wide, bearing complex cornuti both in middle of post-zonal section and within vesica, which is flanged and flute-like.

Female. Unknown.

HOLOTYPE ♂: **PAPUA NEW GUINEA**: labelled "Papua New Guinea, Upper Sepik, West Sepik Province, 550m, 4°40'S, 141°46'E, 8 - 12 Feb, 2010, S. J. Richards"; deposited in AMS (AMS Registration No. K.465330).

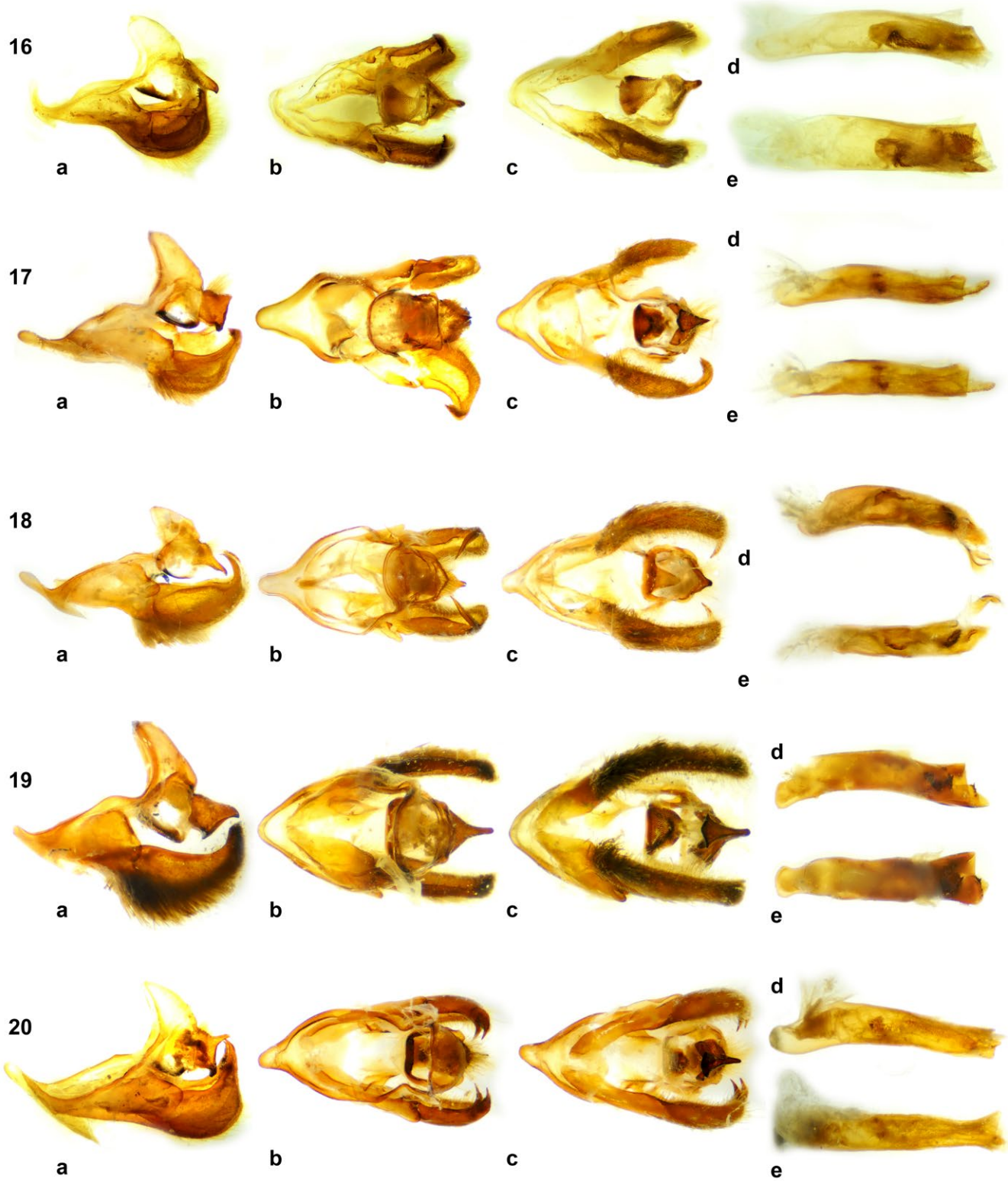
Type locality. Papua New Guinea: Upper Sepik, West Sepik Province (4°40'S, 141°46'E, 550 m).



Figs. 1–15. Adults of *Chaetocneme*. **Fig. 1**, *Chaetocneme richardsi* n. sp., ♂ (Holotype), dorsal view; **Fig. 2**, *C. richardsi* n. sp., ♂ (Holotype), ventral view; **Fig. 3**, *C. richardsi* n. sp., (Holotype), label data; **Fig. 4**, *C. sombra* ♂, dorsal view; **Fig. 5**, *C. sombra* ♂, ventral view; **Fig. 6**, *C. sombra* ♂, label data; **Fig. 7**, *C. tenuis* ♂, dorsal view; **Fig. 8**, *C. tenuis* ♂, ventral view; **Fig. 9**, *C. tenuis* ♂, label data; **Fig. 10**, *C. helirius* ♂, dorsal view; **Fig. 11**, *C. helirius* ♂, ventral view; **Fig. 12**, *C. helirius* ♂, label data; **Fig. 13**, *C. naevifera* ♂, dorsal view; **Fig. 14**, *C. naevifera* ♂, ventral view; **Fig. 15**, *C. naevifera* ♂, label data. Scale bar = 10 mm.

Etymology. The species name honours Stephen J. Richards, who collected the holotype specimen while on expedition to the Upper Sepik with the author, during early 2010.

Distribution and phenology. *Chaetocneme richardsi* is known only from the northern part of the central cordillera, Papua New Guinea.



Figs. 16-20. Male genitalia of *Chaetocneme*, showing a) lateral view, b) dorsal view, c) ventral view, d) aedeagus in lateral view, e) aedeagus in dorsal view. **Fig. 16**, *Chaetocneme richardsi* (Holotype); **Fig. 17**, *C. sombra*; **Fig. 18**, *C. tenuis*; **Fig. 19**, *C. helirius*; **Fig. 20**, *C. naevifera*. Scale bar = 1 mm (Figs. 16 – 19), 0.8 mm (Fig. 20).

Diagnosis: The new species is one of a few in the genus *Chaetocneme* which is unicolourous on both wing surfaces, lacking obvious markings. However, *C. richardsi* is highly distinctive in its wing shape and the ground colour plus the colour and width of the terminal fringe. In mainland New Guinea, *C. naevifera* (Mabille, 1888) (Figs. 13 – 15, 20), *C. tenuis* (Figs. 7 – 9, 18) and *C. helirius* (Cramer, [1775]) (Figs. 10 – 12, 19) bear no markings on the upperside but all of these species possess forewing costal pouches. Only *C. sombra* (Figs. 4 – 6, 17), endemic to the Bismarck Archipelago, and an

undescribed species from Humboldt Bay, Indonesian Papua, do not possess the costal flap. In both of these species the terminal fringe is uniformly dark brown, whereas in *C. richardsi* it is distinctly orange. The wing shape of *C. richardsi* is distinctive from other members of this group, with quite narrow wings vertically, but the forewing apices are evenly rounded, whereas they are pointed or falcate in other species. The ground colour of the upperside of *C. richardsi* is a distinct deep, chestnut brown rather than an ochreous or plain brown as in related species, and the underside is a deep velvet brown. The terminal fringe (cilia) in *C. richardsi* is narrow and deep orange, whereas in putative related species it is wide and either brown (*C. sombra*, *C. tenuis*), yellow (*C. naevifera*) or cream-yellow (*C. helirius*).

The male genitalia of *C. richardsi* are also highly distinct, having a long uncus that is somewhat similar to, but much longer, taller and narrower dorsally than that of *C. tenuis* (but *C. tenuis* has the valva terminating in a long spike), whereas the others have an anvil-shaped sclerotized underside to the uncus. The valvae are disproportionately large and terminate in an upward pointing tip bearing several spines of equal length, unlike any known species. The saccus is upturned at right angles to the tegumen in *C. richardsi* whereas it is parallel or at low angles in other taxa. The aedeagus of *C. richardsi* is more squat than related species and is elaborately flanged, with a sclerotised inner tube and anterioral section, unlike in related species.

DISCUSSION

Parsons (1998) evaluated the adult male wing and genitalic characters of the genus *Chaetocneme* in detail and theorised that the presence of a costal fold is significant in the recognition of species. Parsons (1998) considered that it is unlikely that the presence or absence of such an important morphological structure is simply a genetic dimorphism within species. *C. richardsi* n. sp. is one of only a few *Chaetocneme* taxa in which the costal fold is absent, thus readily distinguishing it from other unicolourous members of the genus in mainland New Guinea, namely *C. naevifera*, *C. tenuis* and *C. helirius.*

Though the type specimens of *C. naevifera* and *C. helirius* could not be located, their descriptions with illustrations provide no doubt as to their identity in the respective publications by Mabille (1888) and Cramer [1775]. It must be noted that the type locality of *C. naevifera* was given as 'Batjan' by Mabille (1888), yet was recorded as 'New Guinea' by both Rothschild (1915) and Parsons (1998). The type specimen of *C. tenuis*, located in Naturalis Biodiversity Center, Leiden, was not examined but it was illustrated in colour by van Eecke (1924) and its genitalia was dissected and illustrated by Parsons (1998).

The sole, holotype specimen of *C. richardsi* was taken at fluorescent light at approximately 2300 hrs, following a period of heavy rain. The type locality is at the boundary of hill forest with lower montane forest, where the terrain is undulating and dissected by numerous fast flowing rivers and streams. Also, in the same general area, several other species of *Chaetocneme* were recorded, including *C. antipodes* (Guérin-Méneville, 1831), *C. callixenus* Hewitson, 1867, *C. critomedia* (Guérin-Méneville, [1831]), *C. naevifera* (Mabille, 1888), *C. tenuis* and *C. lunula* (Mabille, 1888). A number of *Chaetocneme* larvae were discovered at the type locality of *C. richardsi*, feeding on the foliage of *Litsea* Lam. and *Neolitsea* (Benth. & Hook.f.) Merr. species (Lauraceae) and unidentified species of Annonaceae. Adults of *C. antipodes* and *C. critomedia* were reared from mature larvae located on *Neolitsea* sp. and Annonaceae, respectively, but no immature larvae could be raised to adult, due to time constraints. It is therefore possible that *C. richardsi* larvae were among these and feed on one of these plant families.

Chaetocneme butterflies are particularly elusive and several species are known from few specimens. *C. kumpiana* Evans, 1934, for example, is known only from a single specimen from the Weyland Mountains, Indonesian Papua Province. Others, such as *C. morea* Evans, 1934 and *C. lunula*, are widely distributed yet known from few specimens. It is therefore probable that *C. richardsi* has a much wider range in suitable habitats outside of the Upper Sepik Basin.

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