

SHORT COMMUNICATIONS

**DESCRIPTION OF THE LAST INSTAR LARVA
OF *CHALCOSTEPHIA FLAVIFRONS* KIRBY, 1889 AND
COMPARISON WITH OTHER BRACHYDIPLACTINAE
(ANISOPTERA: LIBELLULIDAE)**

M. DI DOMENICO¹, G. CARCHINI¹, M.J. SAMWAYS² and G. WHITELEY²

¹ Dipartimento di Biologia, Università degli Studi di Roma "Tor Vergata",
Via della Ricerca Scientifica, I-00133, Roma, Italy

² Invertebrate Conservation Research Centre, School of Botany and Zoology,
University of Natal, Private Bag X01, Scottsville 3209, South Africa

Received July 13, 2000 / Reviewed and Accepted August 15, 2000

The morphology of this African sp. is illustrated and described. A comparison is made with other known Brachydiplactinae, the South American *Elga leptostyla* and *Nephepeltia phryne* and the African *Hemistigma albipuncta*. The group is a very heterogenous one in terms of larval morphology.

INTRODUCTION

The genus *Chalcostephia* Kirby, 1889 is represented by only one species *C. flavifrons* Kirby, 1889, which is widespread in Africa. It is included together with another 24 genera in the subfamily Brachydiplactinae, all of which are widely distributed across the tropical regions of Africa, Asia, Australia and America (DAVIES & TOBIN, 1985).

The larval morphology of most of the genera of Brachydiplactinae is unknown. In this paper the larval morphology of *C. flavifrons* is described for the first time, and compared with that of the other known Brachydiplactinae larvae *Elga leptostyla* Ris, 1911, *Nephepeltia phryne* (Perty, 1834) (DE MARMELS, 1990), and *Hemistigma albipuncta* (Rambur, 1842) (WHITELEY et al., 1999).

METHODS AND TERMINOLOGY

The larvae described here were collected in the field and reared through to adult emergence in the laboratory. Species determination was from the teneral imago. Exuviae were stored in 75%

ethyl alcohol and were drawn using a stereo microscope with a camera lucida (50× magnification). All measurements were to the nearest 0.02 mm using a micrometric eyepiece. The following measurements were made: total body length, distance between tips of lateral spines on S8 and S9, anal pyramid length and width, metatibia length in dorsal view, mask length and width (after being cut at postmentum level and laid out, but not flattened) in ventral view, cerci length in lateral view. CORBET's (1953) terminology for the labium was adopted. Abdominal segments are indicated as S1 ... S10.

MORPHOLOGICAL DESCRIPTION

M a t e r i a l. – 6 ♀, 1 ♂, Shazibe river, Sodwana, KwaZulu-Natal (27°31'S, 32°40'E), 20-X-1996, J. Bannatyne & G. Whiteley leg.

H a b i t u s like *Sympetrinae* (Fig. 1).

H e a d small, eyes prominent. Head irregularly spotted. Post-ocular region with spots and a tuft of long hair-like setae. Antennae 7-segmented. 1st, 2nd and proximal half of 5th and 6th segments dark. Mask elongated, longer than wide, with a few small, irregular spots (Fig. 2a). Prementum with few spiniform setae on distal margin (Fig. 2b). Premental setae variable in number, from 9+11 to 13+14, the internal ones being very short (Fig. 2b). Palpi stout, irregularly spotted, with undulating distal margins and with few, long and strong spiniform setae very regularly spaced. Inner margins straight, with fewer and smaller spiniform setae. Both the distal margin of prementum, and the distal and inner margins of palpi saw-like, with very small, dark teeth (Figs 2b-c). Palpal setae 10&10. Movable hook sharp and slender, shorter than palpal setae (Fig. 2b). Articulation between prementum and postmentum between mesocoxae (Fig. 2a).

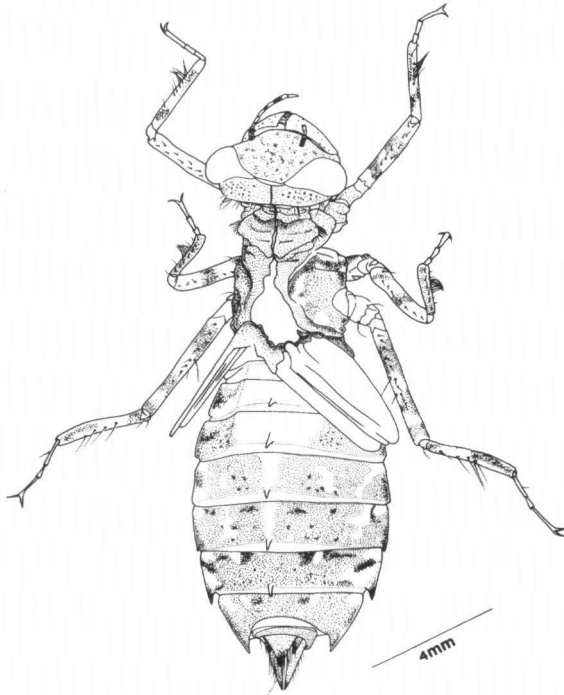


Fig. 1. *Chalcostephia flavifrons*, final instar exuvia.

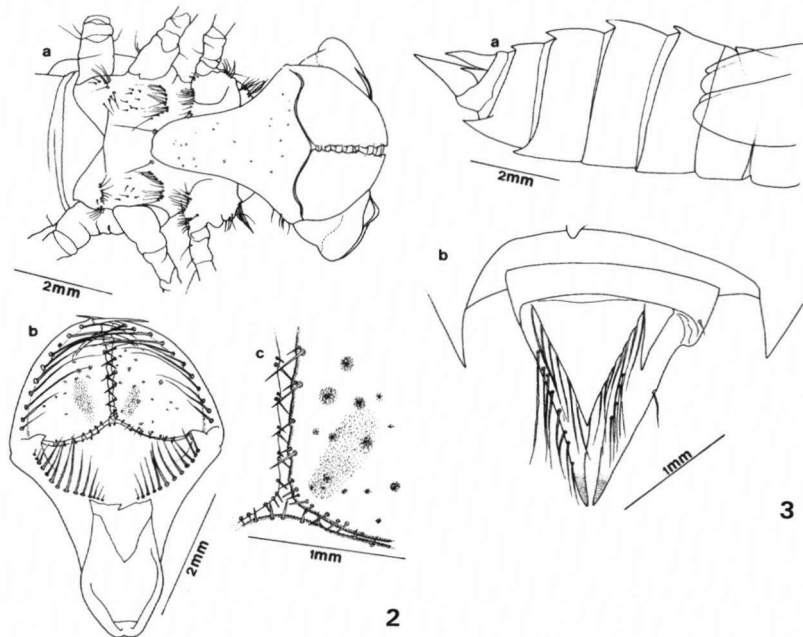
T h o r a x dark. Sternites setose, with tufts

of long, hair-like setae and shorter spiniform setae near the articulations with coxae. Mesosternum with two very long and slender hair-like setae at the level of the articulation between prementum and postmentum (Fig. 2a). Wing-sheaths reach S6 (Fig. 3a). Legs not very long, stout, with dark bands on femora and tibiae. Femora with a row of strong spiniform setae. Tibiae with long and slender hair-like setae (Fig. 1).

A b d o m e n ovoid, with S6 the widest segment. Colour variable. An irregular dorsal pattern of dark spots and bands on S6-S10. Central dorsal line on S1-S7 with a pale longitudinal band. Clear, stout dorsal hooks on S4-S8. Strong lateral spines on S8 and S9 (Figs 1, 3a). Anal pyramid slender, as long as S9 plus S10. Paraprocta much longer than epiproctum. Cerci length half that of epiproctum (Fig. 3b).

M e a s u r e m e n t s. – See Table I.

HABITAT. – Shaded pools and slow streams with sunflecks, and with an abundance of detritus in well-wooded coastal forest (with *Barringtonia*, *Hibiscus*, and *Phragmites*).



Figs 2-3. *Chalcostephia flavifrons*: (2) head and part of thorax, ventral view (a), – mask (b), – parts of the margins of prementum and palpi, dorsal view (c); – (3) abdomen, lateral view (a), – anal pyramid (b).

Table I
Summary of dimensions of 7 exuviae of *Chalcostephia flavifrons*

Character	Range(mm)	Mean (mm)
Total body length	17.00-17.71	17.43
Mask length	3.32-5.10	4.60
Mask width	3.45-3.60	3.53
Distance between tips of postero-lateral angles at S8	4.66-5.40	5.06
Distance between tips of postero-lateral angles at S9	2.40-2.66	2.48
Anal pyramid width	1.43-1.53	1.49
Anal pyramid length	1.70-1.96	1.86
Cerci length	0.51-0.72	0.63
Metatibia length	4.40-5.33	4.90

DISCUSSION

The subfamily of Brachydiplactinae includes dozens of species in 25 genera and up to now the larval morphologies of only four species (in four different genera) have been described, including *C. flavifrons* here. Evidence so far indicates that they are very heterogeneous with regard to the larval morphology. Different genera differ in many morphological characters, such as relative dimension of the eyes, shape of the palpal margins, presence of the dorsal hooks and dimensions of the anal pyramid (Tab. II). With the exception of the presence of the lateral spines on S8 and S9, which is a widespread character in Libellulidae larvae, no morphological character is common to all the species.

At this stage, it is not clear whether the Brachydiplactinae are a phylogenetically homogenous group with strong and sustained selection pressures favouring quite different larval morphologies, or whether they are perhaps a heterogeneous group. Although in the field, the adults of *C. flavifrons* and *H. albipuncta* may be found within a few metres of each other, both the larval and adult microhabitats are quite different. The larvae of *H. albipuncta* occur in shallow (sometimes almost dry) swamps, packed with reeds or papyrus. *C. flavifrons*, in contrast, is found in

Table II
Comparison of selected characters between Brachydiplactinae species

Character	<i>C. flavifrons</i>	<i>H. albipuncta</i>	<i>E. leptostyla</i>	<i>N. phryne</i>
Total body length (mm)	17.43	14.17	11.5	10.6
Eyes	prominent	prominent	small	prominent
Palpal crenations	shallow	shallow	deep	shallow
Dorsal hooks	S4-S8	absent	S3-S9	absent
Lateral spines	S8-S9	S8-S9	S8-S9	S8-S9
Anal pyramid	longer than S9	as long as S9	as long as S9	longer than S9

sunflecked, shady pools and streams in or adjacent to woodland. Presumably, these different microhabitat preferences also have different associated behaviours, including contrasting prey and predators.

ACKNOWLEDGEMENTS

We wish to thank the Italian M.U.R.S.T., programme "Popolamento animale del Mediterraneo occidentale" and the Italian C.N.R. for grants to G. Carchini, and the South African National Research Foundation for financial support to M.J. Samways. Ms MELINDA HATTON kindly assisted with manuscript preparation.

REFERENCES

- CORBET, P.S., 1953. A terminology for the labium of larval Odonata. *Entomologist* 83: 191-196.
- DAVIES, D.A.L. & P. TOBIN, 1985. *The dragonflies of the world: a systematic list of the extant Odonata*, Vol. 2. *Anisoptera*. Soc. Int. Odonatol., Utrecht.
- DE MARMELS, J., 1990. Nine new Anisoptera larvae from Venezuela (Gomphidae, Aeshnidae, Corduliidae, Libellulidae). *Odonatologica* 19(1): 1-15.
- WHITELEY, G., M.J. SAMWAYS, M. DI DOMENICO & G. CARCHINI, 1999. Description of the last instar larva of *Hemistigma albipuncta* (Rambur, 1842) and comparison with other Brachydiplactinae (Anisoptera: Libellulidae). *Odonatologica* 28(4): 433-437.