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THE LARVAE OF *TEINOPODAGRION CAQUETANUM* DE MARMELS AND *T. VALLENATUM* DE MARMELS (ZYGOPTERA: MEGAPODAGRIONIDAE)

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The last instar larvae are described and illustrated. They are diagnosed against the congeners on the basis of published descriptions. The principal diagnostic features are found in caudal gills, cerci and protuberances of occipital lobes. A key to the known *Teinopodagrion* larvae is provided.

INTRODUCTION

Megapodagrionidae is a pantropically distributed family. The larval stages of most species are unknown, especially those of the neotropical taxa. *Teinopodagrion* is well distributed along the Andes mountain range. DE MARMELS (2001) reports for Colombia *T. caquetanum, T. macropus, T. mercenarium, T. muzanum, T. oscillans, T. temporale, T. vallenatum*, and as possible residents, *T. curtum, T. turikum, T. venale* and *T. vilorianum*. So far 25 species are known, and the larval stages of only four of these were described (DE MARMELS, 1982, 2001; VON ELLENRIEDER, 2006). The following descriptions of *T. caquetanum* and *T. vallenatum* larvae will bring the total number to six.

MATERIAL AND METHODS

Larvae were preserved in 75% ethyl alcohol and deposited in the entomological collection of the Natural History Museum of the Universidad de los Andes (UNIANDES), Bogotá. Drawings were made using a stereoscope Zeiss Stemi SV6 coupled to a camera lucida. Measurements are given in millimeters, total length includes gills.

TEINOPODAGRION CAQUETANUM DE MARMELS, 2001

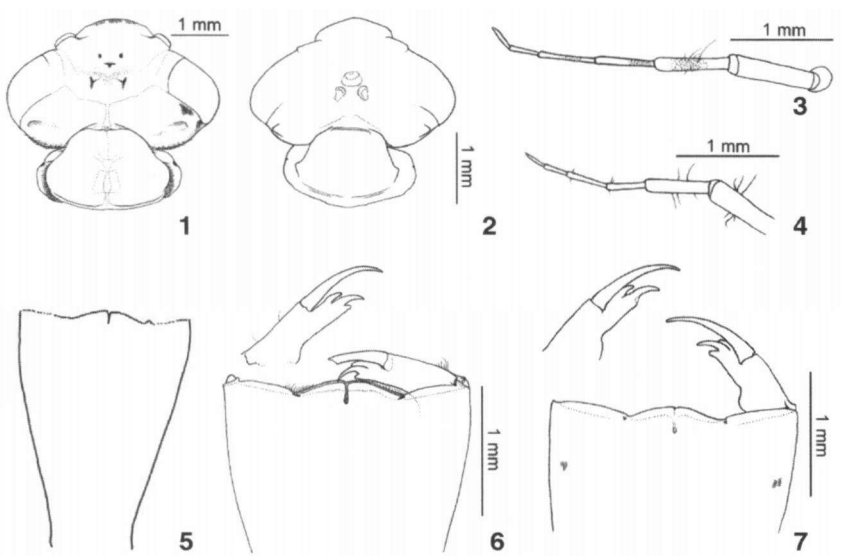
Figures 2, 4, 7, 9, 11, 13, 16, 18, 19

M a t e r i a l. – 2 ♂ last instar larvae. Colombia: Meta, Villavicencio, vereda La Argentina, 594 m a.s.l, 10-XII-2004, L. Pérez leg.

General colour of larvae terra cotta, presumably due to some ferrous compound covering body. Legs long, gills short and slender.

H e a d. – 1.6 times as wide as long, occiput concave, occipital lobes with slender, conical protuberances (Fig. 2). Antenna 6-segmented; first and second segments of aproximately same size; without any discernible colour pattern, but with some median sized hairs (Fig. 4). Articulation of pre- and postmentum between first pair of legs, maximum width of prementum at 67, 56% its length. External margin devoid of spines, ligula moderately convex, finely serrate, median cleft shallow, prementum and palp devoid of setae and spines (Fig. 7). Movable hook longer than external edge of palp. Palp with three teeth, of which internal and external ones are approximately the same size; median tooth twice their length. Mandibular formula (sensu WATSON, 1956) L 1'1234 0 a (m^{1234}) b; R 1' 1234 y a (m^{0}) b (Fig. 9).

T h o r a x. – Prothorax narrower than head, with dorsolateral conical projections of same size as those on occipital lobes (Fig. 2). Legs without any dis-



Figs 1-7. Last larval instar of *T. vallenatum* (Figs 1, 3, 5, 6) and *T. caquetanum* (Figs 2, 4 , 7): (1-2) head, dorsal view; – (3-4) right antenna, dorsal view; – (5) prementum; – (6-7) prementum, dorsal view.

cernible colour pattern (Fig. 11). Flat meso- and metathorax irregularly black patterned. Posterior wing pads surpassing proximal border of S5.

A b d o m e n. – Without any discernible colour pattern, but with a small blunt protuberance on S6 and slender dorsal hooks on S7, 8, and 9. Hook on S9 surpassing length of segment posteriorly (Fig. 13), distal border of S10 without triangular incision. Abdomen/lateral gill length proportion is 66, 15% (Tab. I). Lateral gills triquetral, median gill foliaceous; pointed and prolongued, without any discernible colour pattern. (Fig 16). Cerci elongate with curved dorsal and ventral edges, and with blunt tip directed downwards (Fig. 18). Gonaphophyses small, unpatterned and without spines (Fig. 19).

M e a s u r e m e n t s (in mm). – Total length: 17.8 (including gills), median gill 4.5, lateral gill 5.3.

HABITAT. – Larvae were collected from a small stream in the foothills of the Colombian Eastern Cordillera, which drains to the Orinoco. It has a sandy bed, presenting a ferrous compound which tinged the larvae with a terra cotta colouration. The associated riparian forest is heavily fragmented and composed of endemic shrubs and trees from the tropical lowland rain forest.

TEINOPODAGRION VALLENATUM DE MARMELS, 2001

Figures 1, 3, 5, 6, 8, 10, 12, 14, 15, 17, 20

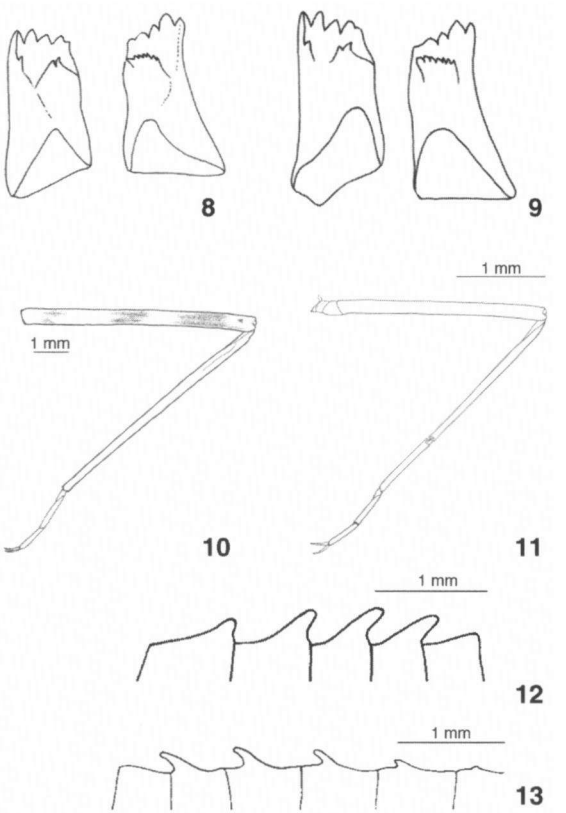
M a t e r i a l. – 3 ♂ last instar larvae. Colombia: Magdalena, Santa Marta, Sierra Nevada de Santa Marta, Quebrada Malabrigo, Vía Cerro Kennedy, 1600 m a.s.l , 1 ♂, 20-X-2001. Colombia: Magdalena, Santa Marta, Sierra Nevada de Santa Marta, Quebrada Harimaca, 800 m a.s.l., 1 ♂, 13-IV-2005. Colombia: Magdalena, Santa Marta, Sierra Nevada de Santa Marta, Río Gaira, Pozo Azul, 1100 m a.s.l., 1 ♂, 11-II-2006.

Larva pale with conspicuous dark stripes on caudal gills and legs (Fig. 14).

H e a d. – Triangular, occiput concave (Fig. 3); conical protuberances of occipital lobes not strongly protruding. Antenna 6-segmented, being the first segment the largest, second and third segments with dark stripe, stripe on second segment located at middle and presents some fine hairs, on third segment the dark stripe more basally located (Fig. 5). Articulation of pre- and postmentum located between first pair of legs, maximum width of prementum at 72% its length. Palpal and premental setae absent (sensu CORBET, 1953), lateral edge of prementum beset with short spines along its entire length (Figs 5, 6). Mandibular formula (sensu

Table I
Dimension proportion of some body parts of *T. caquetanum* and *T. vallenatum*

Proportion	*caquetanum*	*vallenatum*
Longitude central/lateral gill	84%	80%
Width/longitude	13.7%	17.5%
Width/longitude lateral gill	8.4%	11.26%
Width/longitude prementum	67.56%	72%
Longitude lateral gill/abdomen	66.15%	83%



Figs 8-13. Last larval instar of *T. vallenatum* (Figs 8, 10, 12) and *T. caquetanum* (Figs 9, 11, 13): (8-9) mandibles, inner view; – (10-11) anterior legs, dorsal view; – (12-13) abdomen, lateral view.

WATSON, 1956) L 1'1234 0 a (m^{1234}) b; R 1' 1234 y a (m^{0}) b (Fig. 8).

T h o r a x. – Pro- and mesothorax dorsally presents a cordiform black spot, its blunt end becomes visible and extends up to the wing pads insertion point (Fig. 14). Wing pads extending to base of S8. Femora with three black stripes, of which the most basal one being narrower and least conspicuous. Tibiae and tarsi pale, unpatterned (Fig. 10), covered with short spines, the first spine is longer, claws simple.

A b d o m e n. – With protruding lateral keels on S1-S8. Abdomen/lateral gill length proportion is 83% (Tab. I). Blunt dorsal hooks present on S6-S9 being the one on S6 the smallest (Fig. 12). Distal border of S10 with a small weakly marked triangular incision; maximum width of abdomen at S5 and S6, S9 is the narrowest. Caudal gills long, lateral gills triquetral, median gill foliaceous, the latter visibly shorter, wider and with blunt tip (Fig. 15). All three gills beset with spines along entire borders, these spines being larger and denser towards tips. Two wide transverse dark bands on all three gills, besides of irregularly dispersed spots. Male gonapophyses small and triangular, finely spinous ventrally (Fig. 20). Cerci short and blunt, dorsal edge in basal half arched downwards, ventral edge arched upwards in distal half (Fig. 17).

M e a s u r e m e n t s (in mm). – Total length: 20.7 (including gills), median gill: 6.7, lateral gill: 8.7.

HABITAT. – The larvae were collected in a mountain stream with heavy sand bottom and slow current in well-preserved riparian forest in dry tropical forest.

KEY TO THE LAST LARVAL INSTAR OF *TEINOPODAGRION* (MODIFIED FROM VON ELLENRIEDER, 2006)

1 Male cercus cylindrical 2
– Male cercus tapering to end 3
2 (1) Labium extending beyond coxae II; caudal lamellae shorter than abdomen; wing cases extending to end of S6; tibiae unpatterned; abdomen with dark longitudinal marks and dorsal hooks on S5- 9; Venezuela and Colombia ..... ***oscillans***
– Labium extending to between coxae I and II; caudal lamellae shorter than abdomen; wing cases extending to end of S5; tibiae with one basal dark band; abdomen pale and with dorsal hooks on S1- 9, those on 2-5 minute; Peru and Bolivia ..... ***decipiens***
3 Tibiae unpatterned; wing cases extending to beginning or slightly distal to beginning, of S5; dorsal hooks on S5- 9; Venezuela and Colombia ..... ***venale***
– Tibiae with or without basal spots; caudal lamellae longer or shorter than abdomen 4
4 Tibiae with three basal spots; caudal lamellae longer than abdomen; wing cases extending to end of S5; dorsal hooks on S1- 9 Bolivia and Argentina ..... ***meridionale***
– Tibiae without basal spots; caudal lamellae shorter than abdomen; dorsal hooks on S6-9 5
5 Wing cases extending to beginning of S5; antennal segments unpatterned; blunt protuberance on S6 and slender dorsal hooks and increasing in size from 7, 8, and 9 ..... ***caquetanum***
– Wing cases extending to beginning S8; second and third antennal segments with dark stripes; dorsal hooks of S7, S8 and S9 are very similar in size, on S6 is small. (Endemic to Sierra Nevada de Santa Marta, Colombia) ..... ***vallenatum***

DISCUSSION

T. vallenatum is an endemic species of the Sierra Nevada of Santa Marta (DE MARMELS, 2001). Its known altitudinal distribution varies from 800 m a.s.l. in Minca, Pozo Azul site to 1600 m a.s.l in Quebrada Malabrigo. *T. caquetanum* is found in the foothills of the Colombian Eastern Cordillera which drains to the Orinoco basin.

T. caquetanum and *T. vallenatum* larvae are quite similar in general appearance. Diagnostic characters of *T. vallenatum* are:

Dorsal hooks are present on S6-S9, that on S6 is very small, hooks of S7, S8 and S9 are very similar in size and thickness; abdomen has lateral keels similar to those found in larvae of *Hetaerina* (Calopterygidae). In *T. caquetanum* the dorsal hooks are more slender than in *T. vallenatum*, and only those on S8 and S9 are similar in size.

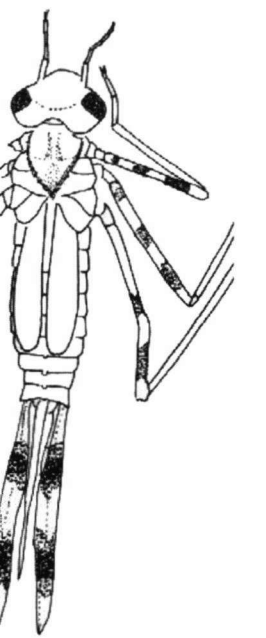
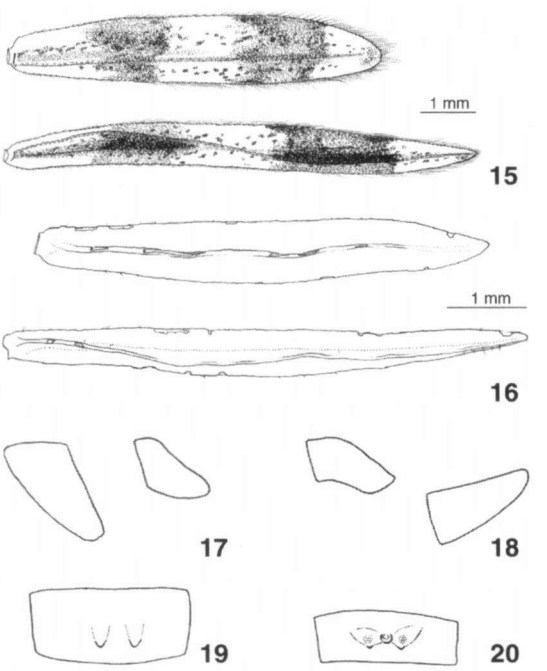


Fig. 14. *Teinopodagrion vallenatum*: last larval instar, general aspect.



Figs 15-20. Last larval instar of *T. vallenatum* (Figs 15, 17, 20) and *T. caquetanum* (Figs 16, 18, 19): (15-16) caudal lamellae, lateral view; – (17-18) cercus, dorsal and lateral views; – (19-20) gonapophyses. – [Figs 17-20 not to scale]

Median gill in *T. vallenatum* presents an intermediate width between those of *T. venale* and *T. oscillans*, besides of having a blunt tip. In *T. caquetanum* the median gill is very small.

Cercus of *T. vallenatum* male is evidently different from that of *T. venale* and *T. oscillans*. In these two species the cercus is directed upwards and has smooth edges, while in *T. vallenatum* the edges of cercus show sudden change in their direction towards tip, e. g., with dorsal margin directed downwards in basal half, and with ventral margin arched upwards in distal half of cercus (Fig. 17). Segments 2 and 3 of the antenna of *T. vallenatum* have dark stripes; segment 2 presents few and relatively short hairs, segment 3 has no hairs. Neither *T. venale* nor *T. oscillans* shows dark stripes or hairs on antennae. Wing pads extend to anterior margin of S8 in *T. oscillans*, while in *T. venale* they just reach to S5.

The main differences between *T. vallenatum* and *T. caquetanum* lay in the shape of cerci, projections of occipital lobes and pronotum. (Figs 2, 3). The latter in *T. vallenatum* is devoid of lateral projections and almost rounded; the occipital lobes show small, scale-like projections and wider than in *T. caquetanum*.

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