

SHORT COMMUNICATIONS

**MEGALAGRION MAUKA SPEC. NOV.  
FROM KAUAI, HAWAII  
(ZYGOPTERA: COENAGRIONIDAE)**

J.J. DAIGLE

Department of Environmental Protection, 2600 Blair Stone Road,  
Tallahassee, Florida 32399-2400, United States

*Received March 15, 1996 / Reviewed and Accepted May 6, 1996*

The new sp. (holotype ♂, allotype ♀: Kauai, Hanalei County, Hawaii, Kalahau Trail at Haena; 15-III-1995; deposited at FSCA, Gainesville, FL, USA) is described and compared with its closest relative on Kauai, *M. paludicola* Maciolek & Howarth. *M. mauka* differs in the larger size and black, not red venter. Male paraprocts are shorter, more ascendant but not convergent as in *M. paludicola*. Females lack the median notch in the pronotum's posterior lobe as seen in *M. paludicola*.

INTRODUCTION

The new species is closely related to *Megalagrion paludicola*, also endemic to Kauai (MACIOLEK & HOWARTH, 1979). There are currently 23 species and 5 subspecies in *Megalagrion* (POLHEMUS, 1993), all restricted to the Hawaiian Islands. The addition of *M. mauka* increases the total to 24 currently recognized species in this genus. The larva of the new species is unknown.

**MEGALAGRION MAUKA SPEC. NOV.**

Figures 1, 3, 5

**Material.** – Holotype ♂, allotype ♀: Kauai, Hanalei County, Hawaii, seepage stream at 1.0 mile marker on Kalahau Trail at Haena, 15-III-1995, Jerrell J. Daigle (JJD) – Paratypes (17 ♂, 3 ♀, all JJD leg.): same data as holotype and allotype, 1 ♂; same data, but 16-III-1995, 3 ♂, 1 ♀; same data, but 3-IX-1995, 7 ♂, 1 ♀; same data, but 5-IX-1995, 5 ♂, 1 ♀; – seepage tributary at 0.70 milepoint on Kalahau Trail, 5-IX-1995, 1 ♂. – The holotype and allotype are deposited in the Florida State Collection of Arthropods (FSCA) in Gainesville, Florida. Paratypes are deposited in the Bishop Museum in Honolulu, Hawaii, the National Museum of Natural History (USNM) in Washington, D.C., and the International Odonatological Research Institute (IORI) in Gainesville, Florida. The remaining paratypes

are in the collections of Jerrell J. Daigle, Sidney W. Dunkle, Rosser W. Garrison, and Ken J. Tennessen.

**E t y m o l o g y.** – The species name means “towards the mountains” in the Hawaiian language. After hiking up the Kalahua Trail from the beach, one encounters various seepage streams crossing the trail where the species occurs.

**MALE (holotype).** – **H e a d.** – Eyes in life brick red dorsally, red ventrally. Vertex black. Large postocular spots, occipital bar, frons, and labrum brick red. Anteclypeus, genae, mandibles, maxillae, and labium dark brown. Postclypeus, rear of labrum, antennae, and dorsal rear of head black.

**T h o r a x.** – Anterior lobe of pronotum brick red but black distally. Middle lobe black with two large brick red areas proximally and pair of small red dorsoapical spots distally. Red posterior lobe nearly erect. Propleuron brick red with some black near anterior lobe. Middorsal thoracic carina red; mesepisternum black dorsally, brick red laterally. Black humeral stripe entire. Mesinfraepisternum black, brick red ventrally. Mesepimeron black dorsally, brick red ventrally. Black stripe descending from distal end of black interpleural suture to proximal end of black metapleural suture. Metepisternum brick red. Metepimeron red with a black spot distally. Metinfraepisternum black with small brick red ventroposterior area. Venter black but intersternum red.

**Legs.** – Distal coxae brick red, proximal coxae black. Legs red with reddish-black armature.

**Wings.** – Typical *Megalagrion* venation. 20 postnodal crossveins in forewings, 18 in hindwings. Veins black with diamond-shaped reddish pterostigma overlying  $1\frac{1}{2}$  cells.

**A b d o m e n.** – Mostly brick red; segments 1-5 brick red, each with a very thin black apical ring. Segment 1 with margin of lateroventral flap black. Segment 6 brick red with incomplete black apical ring; segment 7 black with brick red basal ring and brick red stripe lateroventrally. Segment 8 brick red with lateroapical black spot. Segments 9 and 10 entirely brick red. Caudal appendages red with black tips (Figs 1, 3). Basal flap of cercus red with large, black decumbent tooth. In dorsomedial view, inner margin of cercus between decumbent tooth and apex with numerous cross striations. Viewed dorsally, cercus nearly straight but weakly incurved to apex. Spatulate decumbent tooth incised basally. Epiproct short, not visible dorsally or laterally. Viewed dorsally, tips of paraprocts barely or not visible (Fig. 1). Viewed laterally, paraproct strongly ascendant in apical half, reaching upwards to or past cercus tooth (Fig. 3).

**M e a s u r e m e n t s (mm).** – Total length including appendages 47, abdomen 38, forewing 28, and hindwing 27.

**FEMALE (allotype).** – **H e a d.** – Eye coloration and top of head same as holotype. Facial coloration red.

**T h o r a x.** – Coloration and pattern similar to holotype. Posterior medial borders of flat mesostigmal plates even and depressed tightly against the thorax. Dorsal margin of mesostigmal plates uneven, distinctly ridged lengthwise. Mesostigmal

plates similar to *M. paludicola* but with several deep parallel striations and with a deep groove widened distally. Anterior carina of frame straight, lateral carinae strongly concave; rami black. Viewed dorsally, middle margin of pronotum's posterior lobe straight (Fig. 5). Viewed laterally, mesostigmal plates not raised above middorsal thoracic carina.

Legs. — As in holotype.

Wings. — As in holotype except 22 postnodal crossveins in forewings.

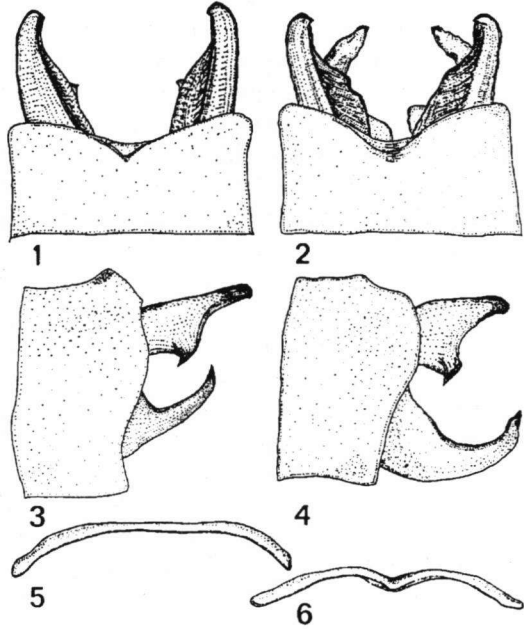
Abdomen. — Similar to holotype. Segment 1 entirely brick red. Segment 2 brick red with a tiny dorsobasal black slash. Segment 3 entirely brick red. Segment 4 with small black dorsoapical and lateroapical spots. Segment 5 with incomplete black apical ring. Segment 6 similar to segment 5 but with thin black line extending throughout length of segment dorsally. Segment 7 black dorsally, red ventrally with red basal ring. Segment 8 similar to segment 7. Segment 9 red with black interrupted basal ring and a black dorsoapical slash. Segment 10 entirely red. Vulva black. Ovipositor mostly red.

Measurements (mm). — Total length including appendages 42, abdomen 34, forewing 29, and hindwing 26.

VARIATION AMONG PARATYPES. — Paratypes similar to holotype and allotype. The total length of ♂ ranges from 45-47, ♀ 42; abdomen ♂ 37-38, ♀ 34; forewing ♂ 27-28, ♀ 28-29; hindwing ♂ 26-27, ♀ 26; Postnodal crossveins in forewing of ♂ 20, ♀ 19-22, hindwing ♂ 17-18, ♀ 18-19.

#### COMPARISON WITH *MEGALAGRION PALUDICOLA*

In the field, the robust brick red *Megalagrion mauka* males can be distinguished from the red *M. paludicola* males by the larger size, the black venter, and the shorter but strongly ascendant paraprocts. When viewed from above, the tips of the



Figs 1-6. *Megalagrion mauka* sp.n., holotype ♂ and allotype ♀ (Figs 1, 3, 5) and *M. paludicola* Maciolek & Howarth, paratypes (Figs 2, 4, 6): (1-2) dorsal view of ♂ abdominal appendages; — (3-4) lateral view of ♂ abdominal appendages; — (5-6) dorsal view of ♀ pronotum posterior lobe.

paraprocts in *M. mauka* are barely visible (Fig. 1) but in *M. paludicola* the paraprocts are strongly convergent inwards (Fig. 2) and the tips almost meet. In lateral view, the longer paraprocts are strongly concave in *M. paludicola* with much shorter apical tips (Fig. 4). In *M. mauka*, the ascending paraprocts usually reach or extend upwards past the tips of the cerci's decumbent teeth (Fig. 3). In *M. paludicola*, the face is entirely red but the postclypeus and rear of labrum are black in *M. mauka*. Segment 8 is almost entirely brick red in *M. mauka* but mostly black in *M. paludicola*.

The mostly yellowish-green heterochromatic *M. paludicola* females can be separated from the brick-red homochromatic *M. mauka* females by other characters. In *M. mauka* females, the middorsal thoracic carina is red and the rami of the mesostigmal plates are black. Both middorsal thoracic carina and rami are pale yellow in *M. paludicola* females. Structurally, the *M. mauka* female posterior lobe is even-edged along its dorsal margin (Fig. 5) while *M. paludicola* has a brace-shaped posterior lobe with a distinct median notch (Fig. 6). On the mesostigmal plates, the lateral carinae in *M. mauka* is more concave than the flatter lateral carinae curvature in *M. paludicola*. In *M. mauka*, the ovipositor is red with some black dorsally but it is entirely yellow in *M. paludicola*.

The black venter in *M. mauka* will separate it from all the red species found on Kauai, including *M. paludicola*. Also, the ascendant paraprocts and the adult homochromatism separate it from its probable descendants, the *Megalagrion hawaiiense* complex, found on the other geologically younger Hawaiian islands.

ZIMMERMAN's (1948) figures and key to Kauai's *Megalagrion* males can be modified for the addition of *M. paludicola* and *M. mauka* as follows:

- |        |   |                   |
|--------|---|-------------------|
| 8(7)   | Abdomen not red, usually black; pterostigma not crimson; terminalia as in figure 198, c-d, e-f .....  | 9                 |
|        | Abdomen largely red; pterostigma usually crimson .....  | 10                |
| 9(8)   | Head, thorax and first two abdominal segments conspicuously bluish white pruinose; terminalia as in figure 198, e-f, lower inner margin of superior appendage with anterior tooth small but discernible ..... | <i>eudytum</i>    |
|        | Not pruinose; terminalia as in figure 198, c-d, lower inner margin of superior appendage without a small anterior tooth .....   | <i>adytum</i>     |
| 10(8)  | Terrestrial, terminalia as in fig. 198, g-i .....   | <i>kauaiense</i>  |
|        | Superior appendage with black decumbent tooth .....   | 11                |
| 11(10) | Venter red; longer paraproct convergent inwards; female heterochromatic; tannic bogs and swamps .....   | <i>paludicola</i> |
|        | Venter black; shorter paraproct not convergent; female homochromatic; mountain seepage streams .....  | <i>mauka</i>      |

#### BIOLOGY

The large brick red *Megalagrion mauka* males were first noticed at a seepage stream at the Kalahau Trail's 1.0 mile marker, in the late afternoon on March 15, 1996. On later trips, males were seen all day long during sunny weather. They were resting on overhanging branches of trees growing along the seepage stream.

Males would rest mostly in the canopy, conducting brief forays down to the seepage streams looking for females. The first male to arrive in the morning exhibited territorial behavior by perching near an open sunny seepage site and chasing away other males. After a short time, that male would fly up to the canopy and a different male would take its place. Females were scarce, usually hiding in the high streamside shrubbery away from the sunny areas. A recently emerged male was found crawling up a large sisal (*Agave* sp.) plant near one of the seepages. A search for nearby exuviae was unsuccessful.

A companion species, *Megalagrion vagabundum* Perkins, was seen on the seepages. A few slender *M. oresitrophum* Perkins were observed at the larger 0.70 milepoint seepage stream.

It appears that *M. mauka* is restricted to cliffside seepage streams while *M. paludicola* is confined to upland bogs and swamps on the island of Kauai. So far, they have not been collected together; this is unlikely considering their observed habitats. Further investigation along the Na Pali Coast on the Kalahau Trail should reveal additional suitable habitat where *M. mauka* may be found.

#### ACKNOWLEDGEMENTS

I wish to thank SIDNEY W. DUNKLE, ROSSER W. GARRISON, DANA. POLHEMUS, and KEN J. TENNESSEN for their review and comments.

#### REFERENCES

- MACIOLEK, J.A. & F.G. HOWARTH, 1979. *Megalagrion paludicola*, a new species of damselfly (Odonata: Zygoptera: Coenagrionidae) from Kauai. *Pacif. Insects* 21(2/3): 165-171.
- POLHEMUS, D.A., 1993. Damsels in distress: a review of the conservation status of Hawaiian *Megalagrion* damselflies (Odonata: Coenagrionidae). *Aquat. Conserv. marine freshw. Ecosyst.* 3: 343-349.
- ZIMMERMAN, E.C., 1948. *Insects of Hawaii*, Vol. 2, pp. 321-385, *Apterygota to Thysanoptera inclusive*, Univ. Hawaii Press, Honolulu.