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THE DISTRIBUTION OF THE ODONATA OF HAWAII¹

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ABSTRACT

A total of 37 species of Odonata are currently known from the Hawaiian Islands. There is a large endemic damselfly genus (*Megalagrion*), two endemic dragonflies (*Anax strenuus* Hagen and *Nesogonia blackburni* McLachlan), and several species of introduced or unknown origin. Species distribution is recorded by island for the 6 main islands in the State of Hawaii.

INTRODUCTION

The Hawaiian Islands are located about 2,000 miles southwest of the United States in the Pacific Ocean. Kauai, the oldest high island geologically, is about 5 million years old while the most recent, Hawaii or the Big Island, has its oldest rocks dated about 800 thousand years.

Colonization by aquatic insects of these remote islands has been very difficult and infrequent. Most aquatic insect groups failed to reach the island. There are no native caddisflies, dobsonflies, mayflies, or stoneflies. This enabled rapid colonization of Hawaii's aquatic ecosystems by the speciose *Megalagrion* damselflies. This genus is of unknown origin but thought by many to have derived from an Asian *Pseudagrion*-like damselfly.

Despite much destructive development and disruption of the lowland rainforest streams and swamps, endemic dragonfly and damselfly habitat can still be found at much higher elevations. This is discussed and documented in a recent color field guide, "Hawaii Damselflies" (Polhemus, Asquith, 1996). It covers species ecology, habits, species distributions, and Hawaiian aquatic ecosystems. This essential beginners guide was reviewed by Daigle (1996). For more detailed taxonomic figures, the following two sources are recommended: "Biological studies in Hawaiian water-loving insects" (Williams, 1936), and Volume 2 of "Insects of Hawaii", (Zimmerman, 1948).

Extensive recent surveys conducted by the Hawaii branch office of the United States Fish and Wildlife Service (FWS), and by staff from the Bishop Museum in the 1990's have failed to uncover any new populations of several rare *Megalagrion* species, which are believed to be extinct by FWS, as discussed in the text.

TAXONOMIC HISTORY

Most of the Hawaiian Odonata were described in the 19th century. McLachlan (1883) listed 12 taxa, including his seven new species, and Blackburn described four new species the following year. In 1899, Perkins added 14 new species plus 5 races or subspecies in his work, "Fauna Hawaiiensis". This brought the total recorded taxa to 35 before entering the 20th century.

In 1910, Perkins included two new species and one variety for a total of 38 Hawaiian Odonata species. Kennedy added *Megalagrion* (as *Kilauagrion*) *dinesiotes* in 1934. Williams (1936) recorded *Enallagma civile* and Zimmerman (1948) added *Ischnura posita*, increasing the total to 41. Several species were synonymized by Kennedy (1917) and Zimmerman (1948), reducing the total to 34 species (24 endemic) as of 1948.

The description of *Megalagrion paludicola* (Maciorenk and Howarth, 1979) and the introduction of *Ischnura ramburii*, *Orthemis ferruginea*, *Tramea abdominalis*, and more recently, *Crocothemis servilia*, increased the total to 36. The addition of the new *Megalagrion mauka* from Kauai (Daigle, 1997) makes a current total of 37 species of Odonata found in the Hawaiian Islands.

DISTRIBUTION

Although Hawaii's political divisions are by county and districts, I have decided to simply record species distribution by island only. Voucher specimens collected by myself and others are deposited in the Florida State Collection of Arthropods (FSCA), International Odonata

¹ Bulletin of American Odonatology, 2000, 6(1): 1-5

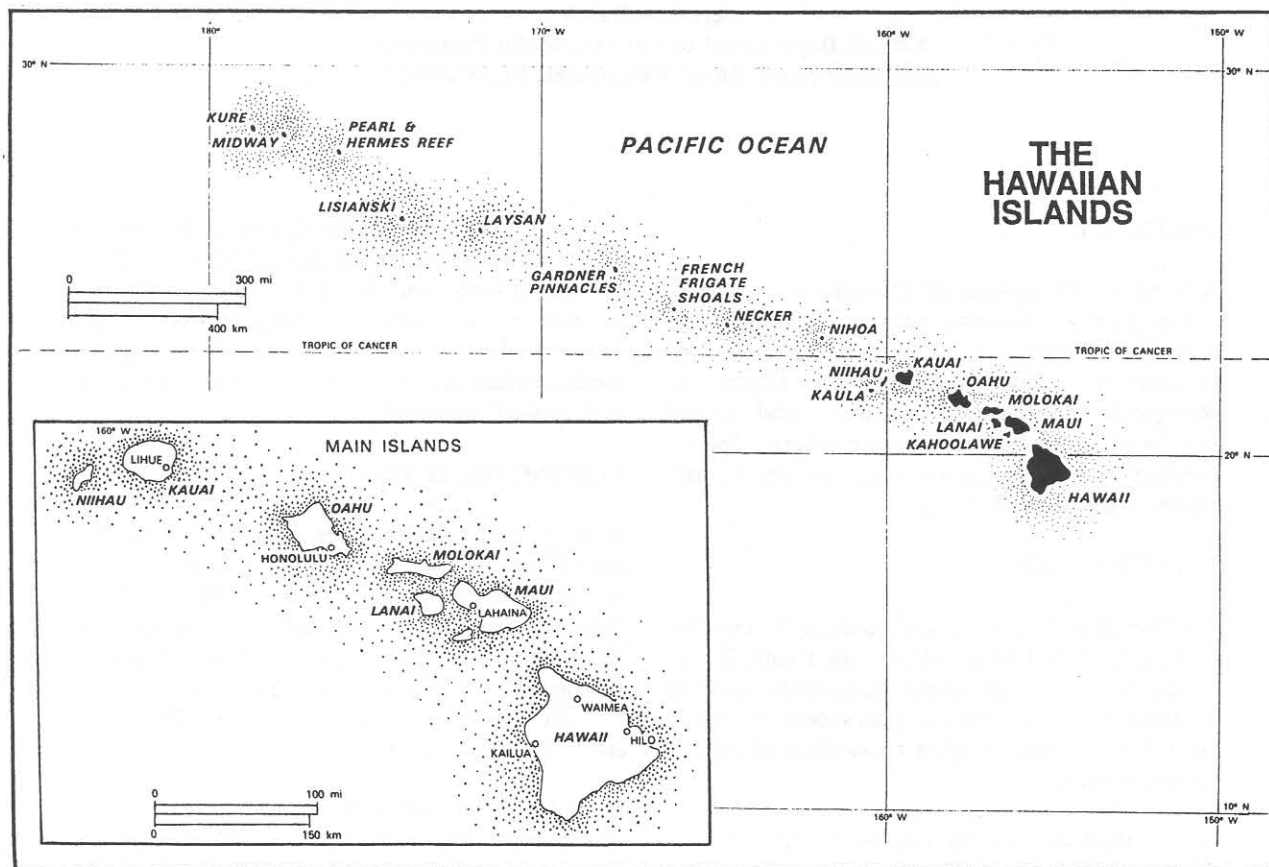


Fig. 1. Map of the Hawaiian Islands

Research Institute (IORI), United States National Museum (USNM), National History Museum in London (NHM), and private collections.

ZYGOPTERA

Megalagrion adytum (Perkins, 1899). Kauai. This species was recently reported by Fish and Wildlife Service (FWS) from 2 remote, upland Alakai Swamp sites. I have not seen this rare, high elevation, terrestrial species.

Megalagrion blackburni McLachlan, 1883. Molokai, Maui, Lanai, Hawaii. This is the largest of all the *Megalagrion* species. This showy, bold, red damselfly is common along the Hana Highway on eastern Maui.

Megalagrion calliphya (McLachlan, 1883). Molokai, Maui, Lanai, Hawaii. It is a stream species common along the Hana Highway where it

inhabits side pools that are acidic and stagnant. On Hawaii, it is found in upland rainforest pools.

Megalagrion deceptor (McLachlan, 1883). Oahu, Molokai, Maui, Lanai, Hawaii. I have examined the holotype (at the British Museum) of this red, seepage species. It is definitely distinct from the similar, bluish *M. hawaiiense* (McLachlan). It has a large spatulate tooth on the inner flap of the cercus which is lacking in *M. hawaiiense*. On Oahu, *M. deceptor* is only found in the western Waianae Mountains. *M. hawaiiense* is restricted to the eastern Koolau Mountains of Oahu.

Megalagrion dinesiotes Kennedy, 1934. Maui. I have examined the blackish holotype (UMMZ) and 5 paratypes. It is easily separated from the extinct reddish *M. nesiotes* (Perkins) by coloration and the structure of the male appendages. The paraprocts are much shorter and they are not visible when viewed dorsally (Kennedy, 1934). This rare, terrestrial species is known only from East Wailua

Iki stream along the Hana Highway on Maui. The FWS is incorrectly, in my view, treating this species as the same as the extinct reddish *M. nesiotes* which is being proposed for threatened status.

Megalagrion eudytum (Perkins, 1899). Kauai. This unwary, black species prefers waterfalls and wet bedrock cliffsides. The larvae climb up the smooth, wet rock surfaces to hide in mossy patches.

Megalagrion hawaiiense (McLachlan, 1883). Oahu. Distinct from *M. deceptor*, this bluish seepage species is restricted to the eastern Koolau Range. I have only found it in Kahana State Park. The smooth-edged basal flap on the cerci easily distinguishes this species from the red *M. deceptor*. Occasional specimens from the Koolaus may have a tiny concentric spinule ventrally on the basal flap but never anything like the large spatulate tooth and incision structure found in *M. deceptor*.

Megalagrion heterogamias (Perkins, 1899). Kauai. Common on the larger upland streams and rivers, especially in Waimea Canyon. It is a very showy and conspicuous species that perches on rocks and boulders, much like a river *Argia* from the mainland United States.

Megalagrion jugorum (Perkins, 1899). Possibly extinct. Maui, Lanai. This terrestrial, high mountain species has not been seen since the early 1900's and is believed to be extinct by the FWS.

Megalagrion kauaiense (Perkins, 1899). Kauai. This terrestrial bromeliaceous species suffered greatly from forested habitat destruction by hurricanes Iwa (1982) and Iniki (1992). It is starting to recover and I found a mating pair for the first time for me (1997) at Kokee State Park on the Pihea Trail.

Megalagrion koelense (Blackburn, 1884). Oahu, Molokai, Lanai, Hawaii. I have only found this bromeliaceous species along the Aiea Ridge trail in the Koolaus on Oahu. Dan Polhemus is treating all the historic taxa of *M. amaurodytum* (subspecies *amaurodytum*, *fallax*, *peles*, and *waiuanuenum*) as synonyms of *M. koelense*. I am following his hypothesis for the time being. Further research will determine the future status of this complex.

Megalagrion leptodemas (Perkins, 1899). Oahu. A very rare, seepage species found only in four locations in the Koolau Range. I have found this small, slender, red species on Maakua Stream and

in Kahana State Park. It is currently proposed by the FWS for endangered species status.

Megalagrion mauka Daigle, 1997. Kauai. This bold, red seepage species has been taken along the scenic Kalahau Trail of the Na Pali Coast. Workers may have known this species for years (Polhemus, pers. comm.) but no studies had been done to determine its taxonomic status. It is similar to *M. paludicola* and I believe it is the progenitor of *M. deceptor* which is found on the younger islands.

Megalagrion molokaiense (Perkins, 1899). Possibly extinct. Molokai. This giant, red terrestrial species is believed to be extinct by the FWS. No specimens have been collected since the early 1900's.

Megalagrion nesiotes (Perkins, 1899). Extinct? Hawaii. No populations of this red terrestrial species were rediscovered during recent FWS surveys, and the species is believed to be extinct. Specimens have not been collected since the early 1900's. Its nearest relative, *M. dinesiotes*, was recently rediscovered by me on Maui. The FWS is treating both species as *M. nesiotes* and recently proposed threatened status.

Megalagrion nigrohamatum (Blackburn, 1884). Maui, Molokai. It is believed to be extirpated from Lanai by The FWS. This beautiful green and yellow stream species is common along many of streams along the Hana Highway on Maui. It prefers to sit on mossy stones and rocks in slow moving, sun-dappled streams. Its stunning coloration is different from the common red format of a typical *Megalagrion*.

Megalagrion nigrolineatum (Perkins, 1899). Oahu. This colorful black and cream species is occasionally tinged with red on the thorax. It inhabits upland streams vegetated with trailing, streamside aquatic plants. It is proposed for endangered species status by FWS. I found it common at several streams along the Windward Koolaus, especially in Kahana State Park. Originally mentioned as a race of *M. nigrohamatum*, no formal taxonomic description exists. Current literature treats *M. nigrolineatum* as a subspecies of *M. nigrohamatum*. I strongly disagree and I am planning to document its elevation to full species status, based on coloration, distribution, and morphological differences.

Megalagrion oahuense (Blackburn, 1884). Oahu. This brownish-red terrestrial species lives in fern gullies along the Windward Koolaus. The larvae

are truly terrestrial, living under the ferns in damp debris. I have only found it along the Aiea Ridge Trail behind Pearl Harbor.

Megalagrion oceanicum McLachlan, 1883. Oahu. This large red stream species has suffered greatly from exotic fish predation since the 1970's. It is found only on a few windward streams in the Koolaus. I have only seen this scarce and very wary species at the headwaters of Maakua Stream. Currently proposed for endangered species status.

Megalagrion oresitrophum (Perkins, 1899). Kauai. This slender red species is common in backwater sidepools on most seepages and streams. It is very common on the acidic bog pools in the Alakai Swamp, flying with *M. paludicola*.

Megalagrion orobates (Perkins, 1899). Kauai. A wary but pretty red and yellow species that inhabits gorges and rocky canyons in central Kauai. I have only found it on Makeleha Stream near Kapaa.

Megalagrion pacificum (McLachlan, 1883). Molokai, Maui, Hawaii. I have only found this rare black and purplish-red species along the Hana Highway on Maui. It definitely prefers side pools containing lots of native grasses and sedges on slow-moving streams. Currently proposed for endangered species status.

Megalagrion paludicola Maciolek and Howarth, 1979. Kauai. This swamp-loving species is common in the upland Alakai Swamp at many bog pools and acidic depressions. Frequent quagmires in this boggy swamp make it difficult approach this spooky species.

Megalagrion vagabundum (Perkins, 1899). Kauai. This is the commonest seepage and stream species on Kauai and this red species is most likely to be seen by the casual observer at suitable habitat. I have found it common along the Kalahau Trail, almost at the trailhead parking lot at Kee Beach and at Makeleha Stream.

Megalagrion williamsoni (Perkins, 1910). Kauai. Extinct? It was known only from the UMMZ holotype until recently. Mark O'Brien of the UMMZ sent me a suspected specimen collected in 1920. I have examined it and found it conspecific with the holotype. Based on locality data, it is believed to be a terrestrial species from high elevations in the Alakai Swamp. It is hoped that future field work may rediscover this species.

Megalagrion xanthomelas (Selys, 1876). Oahu, Molokai, Lanai, Maui, Hawaii. This lowland species is probably the only species to be encountered by the casual observer. It has been found in slightly brackish beach streams on Hawaii and freshwater golf course ponds on Lanai. Although it has been found at about 22 locations, it is proposed for endangered species status due to increased beachfront development pressures. Another threat is introduced damselflies. I have seen *Enallagma civile* and *Ischnura ramburii* preying on teneral adults at the Ninole Springs, Hawaii population.

Enallagma civile (Hagen, 1861). All islands. It was introduced in the 1930's.

Ischnura ramburii (Selys, 1850). All islands. It was introduced in the 1930's.

Ischnura posita (Hagen, 1861). It is currently recorded from all islands except Lanai. Accidentally introduced in the 1930's, this species is too small to attack the native *Megalagrion* s. It prefers disturbed, polluted areas and it is rarely seen with *Megalagrion* s.

ANISOPTERA

Anax strenuus Hagen, 1867. All islands. This endemic species is very common at Kokee State Park on Kauai, especially along the Pihea Trail.

Anax junius (Drury, 1770). All islands, especially in the lowlands. Donnelly (1998) discussed the different shape (short abdomen relative to wings) of typical Hawaiian specimens.

Crocothemis servilia (Drury, 1773). Oahu. Recently introduced from Asia.

Nesogonia blackburni (McLachlan, 1883). All islands. I have found this endemic libellulid at high elevations on Kauai and Oahu.

Orthemis ferruginea (Fabricius, 1775). Lanai, Maui, Molokai. Introduced in the late 1970's. Probably on all islands by now. I have only seen it on Maui in 1993.

Pantala flavescens (Fabricius, 1798). All Hawaiian islands. This pantropical species inhabits nearly all oceanic islands.

Tramea abdominalis (Rambur, 1842). Oahu. Accidentally introduced. I saw this species at Kahana State Park.

Tramea lacerata Hagen, 1861. Historically on all islands. I have not seen this species in Hawaii.

CONCLUSIONS

Much work remains to be done with the *Megalagrion* genus. A revision is needed to stabilize species nomenclature. The larvae of most species have not been described. Federal endangered species protection may be needed for several rare species. However, populations of other common species appear to be stable on Kauai and Maui, where we can all observe and enjoy these spectacular island endemics.

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ADDITIONS TO THE DESCRIPTION OF *GOMPHOMACROMIA NODISTICTA* RIS, 1928
(ANISOPTERA: CORDULIIDAE)

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ABSTRACT

Gomphomacromia nodisticta Ris 1928, not found since its original description, was recorded in an Andean locality of NW Argentina. The structure of the penis is described, and some additional measurements and illustrations of diagnostic value are provided, as well as a comparison with the other species of the genus.

INTRODUCTION

The Neotropical genus *Gomphomacromia* Brauer comprises six species, which inhabit streams and seepages along the Andean mountain range. The genus shows gondwanic relationships, being closely related to the Australian Gomphomacromiinae genera (Theischinger & Watson, 1983). *Gomphomacromia paradoxa* Brauer is found in southern Chile and Argentina (Jurzitza, 1981; Theischinger & Watson, 1983; Muzón, 1995, 1997), *etcheverryi* Fraser in central Chile and southern Argentina (Fraser, 1957, 1958; Jurzitza, 1981; Muzón, 1995, 1997); *chilensis* Martin in central Chile (Martin, 1921; Jurzitza, 1981), *nodisticta* Ris in northern Argentina (Ris, 1928), *fallax* McLachlan in Ecuador, Peru, Brazil and Bolivia (Ris, 1918, 1928; Needham, 1933; Schmidt, 1952) and *mexicana* Needham in Mexico (this one doubtfully, since it has not been recorded after its original description; Needham, 1933; Gonzales Soriano & Novelo Gutierrez, 1996).

Gomphomacromia nodisticta was described by Ris in 1928, based on specimens collected in Catamarca province, Argentina (3 ♂, 1 ♀ El Candado, 2700 m, Cerros de Aconquija; 1 ♂ La Plaza, 2400 m, ibid.). Fraser (1947) mentioned it from Formosa province, but without giving further data.

Jurzitza (1981) revised the Chilean *Gomphomacromia* species, describing diagnostic structural features of the male secondary genitalia. The original description of *nodisticta*, in spite of being exhaustive, did not include a description of the penis. Because of that, the male genitalia is herein described, providing besides some additional measurements and illustrations.

MATERIAL

The collection site (Argentina, Salta, San Carlos dept., San Antonio, 25°59.72S 66°1.92'W, 2500 m, 2 April 1999, col. von Ellenrieder, 6 ♂♂, 1 ♀, 1 tandem), is situated in the same biogeographical province as the type locality (Prepuneña province, Chaqueña domain of the Neotropical region, after Cabrera & Willink, 1980), being both localities on the western slope of the Aconquija mountain range. The dragonflies were found in a mountain stream that crosses a seepage, flying about 1 m above the ground among the vegetation growing near the water, or resting on stones. The specimens are deposited in the Departamento Científico de Entomología, Museo de La Plata (MLP), except for a male and a female deposited in the personal collection of Dr. G. Jurzitza.

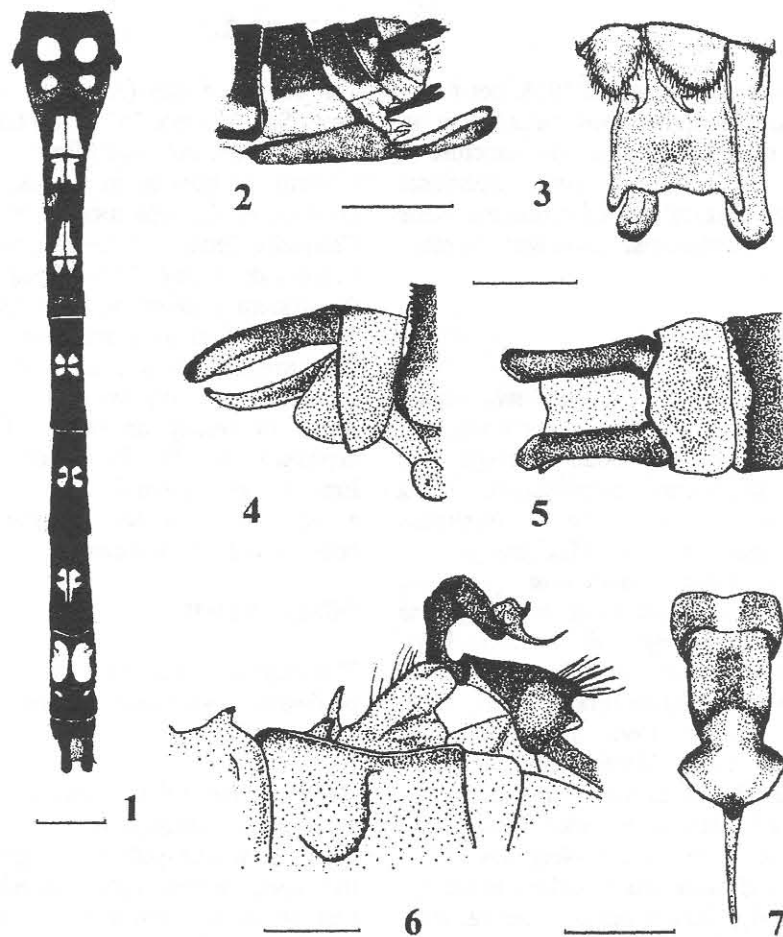
DESCRIPTION

The examined specimens fit Ris (1928) description of *Gomphomacromia nodisticta*, differing only in some details:

Head: Labium yellow; labrum orange; clypeus and antefrons goldish-brown to greenish-brown; posfrons whitish-yellow but greenish-brown near the eyes; vertex light reddish-brown; occipital triangle dark greenish-gray (pale brown in the examined specimens).

Thorax: Prothorax reddish-brown with a yellow spot on each side (only anterior margin yellow in the examined specimens). Pterothorax reddish-brown with light whitish-yellow spots: Large oval mesepisternal spot closer to the mesepisternal-mesepimeral groove than to the medial groove, occupying approx. 0.75 of the mesepisternal height; between both mesepisternal spots, mesepisternal color is black. Oval spot over the metepimeron posterior to the middle and very small spot at the ventro-posterior corner. Sterna reddish-brown. Femora reddish-brown, distad darker (femora inner surfaces black in the examined specimens); tibiae and tarsi black. Male tibiae I with a ridge at distal 0.66, II without ridge and III with a ridge at distal 0.9. Female tibiae without ridges. Wings hyaline, with a yellow spot at base (Between C, Sc and first antenodal) and at nodus. Antenodal crossveins in

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Figs 1-7. *Gomphomacromia nodisticta* Ris. 1: ♂ Abdomen, dorsal view. Scale: 2.5 mm; 2: ♀ VIII-X abdominal segments, lateral view. Scale: 2.5 mm; 3-5: ♂ Terminalia. Scale: 1 mm, 3: lateral view, 4: ventral view, 5: dorsal view; 6-7: ♂ Secondary genitalia. 6: lateral view. Scale: 1 mm, 7: ventral view of penis distal segment. Scale: 0.5 mm.

the examined specimens: Forewings, ♂: 7-11, ♀: 7-9; hindwings, ♂, ♀: 5-6; anal loop cells, ♂: 4-8, ♀: 9-10.

Abdomen: Cylindrical, except male segments VII-IX depressed and widened. Abdominal color pattern (Fig. 1): Segments I and II: Reddish-brown to black with a pair of rounded whitish-yellow spots, those of I larger. Segment III: Same as II except each pale spot divided in two by the transverse carina; anterior one between anterior border and carina, posterior one between carina and distal 0.25 of the segment. Segment IV: Same as III except posterior spot between transverse carina and distal 0.30 of the segment. Segments V and VI: Same as IV except pale spots small next to the transverse carina. Segment VII: Same as VI except medial-posterior end of posterior spots elongated distad. The spots extend from approximately the basal 0.3 to the distal 0.3 or to the end of the segment. Segment VIII: Black with a pair of large kidney shaped pale spots, occupying almost all the length of the segment. Segment IX: Black with a pair of small pale spots variable in shape (dash-shaped, triangular or quadrangular) occupying the basal 0.6 of the segment, or without pale spots. Segment X: Black.

Female terminalia (Fig. 2): Cerci twice as long as paraprocts, and slightly longer than twice the epiproct, ending in an acute spine in the examined specimens. Gonapophyses (Fig. 2): Vulvar scale lobes widened distad, with elliptical tips, 0.4 times as long as vulvar scale length. Projections of the dorsal base of vulvar scale lobes membranous. Gonapophyses of IX segment (according to Ris, 1918) cylindrical, approximately as long as cerci, surpassing the posterior margin of the X sternite in the examined specimens.

Male terminalia (Figs. 3-5): Cerci blunt, slightly depressed at their tips, with a slight longitudinal ridge in the basal 0.2 of their external margins (Fig. 3). Cerci straight and parallel at their basal 0.75, with divergent tips (Fig. 4). Epiproct quadrangular, distal 0.50 slightly wider than the basal 0.50, distal margin with a central concavity and a projecting tip on each side. Medial surface of paraprocts projected dorsally in a hook (Fig. 5).

Penis (Figs. 6-7): Distal segment divided in a basal and a distal portion. Sides of basal portion parallel; distal portion rhomboidal, wider than the basal one, with right lateral angles. Distal portion with two curved medial cornua on its ventral surface. Distal

cornu almost as long as basal portion of distal segment, with only its distal end forked.

Dimensions: Measurements in mm (mean and range, the latter is given in square brackets): Abdomen length (without terminalia), males: 26.57 [25.8-27.3], females: 28.35 [28.1-28.6]; hind wing length, males: 26.45 [25.1-27.3], females: 29 [28.8-29.2]; pterostigma length (of hind wing), males: 1.97 [1.8-2.1], females: 2.5; cerci length, males: 1.54 [1.5-1.6], females: 1.22 [1.2-1.25]; epiproct length, males: 1.01 [1-1.1], females: 0.52 [0.5-0.55]; female vulvar scale: 5; lobes of female vulvar scale: 2.05 [2-2.1]; membranous projections of female vulvar scale: 0.37 [0.35-0.4]; female gonapophyses of IX segment: 1.25 [1.15-1.35].

DISCUSSION

The diagnostic features of *Gomphomacromia nodisticta* stated by Ris (1928) were the presence of nodal yellow spots in the wings and of a pale metepimeral spot posterior to the pale metepimeral stripe. Several other characters that arose from the examination of the secondary genitalia and terminalia of male and female can be added (Table I).

Gomphomacromia nodisticta is very similar to *paradoxa* and *etcheverryi* in its color pattern, and to *chilensis* and *fallax* in its penis morphology. However, it can be easily distinguished from the first two by several characters of the penis distal segment (sides of basal portion parallel, distal portion wider than the basal one, distal cornu with distal 0.12 forked in *nodisticta*; sides of basal portion concave or convergent, distal portion narrower than the basal one, distal cornu with distal 0.50 or 0.25 forked in *paradoxa* and *etcheverryi*) and by the orientation of male cerci (distal tips divergent in *nodisticta*, convergent in *paradoxa* and *etcheverryi*) and female proportions of cerci, paraprocts and vulvar scale (cerci are twice as long as paraprocts and 0.24-0.25 times as long as vulvar scale in *nodisticta*, whereas in *paradoxa* and *etcheverryi* they are as long as paraprocts and 0.18-0.2 times as long as vulvar scale). It differs from *chilensis* by the thorax and abdominal color pattern (mesepisternal pale stripes present, abdominal segments IV-VII with paired yellow spots and segment X black in *nodisticta*; mesepisternal pale stripes absent, abdominal segments IV-VII black and segment X yellow in *chilensis*), by the orientation of male cerci (distal tips divergent in *nodisticta*, convergent in *chilensis*) and by the distal penis segment lateral angles of the distal process (right in *nodisticta*, acute in *chilensis*).

Table I. Comparison of *Gomphomacromia nodisticta* Ris with the other species of the genus. Except for *G. nodisticta*, *G. paradoxa* and *G. fallax*, information was gathered from bibliographical sources (Fraser, 1958; Jurzitza, 1981; Martin, 1921; Needham, 1933; Ris, 1918, 1928). Measurements in mm.

		<i>G. nodisticta</i>	<i>G. paradoxa</i>	<i>G. etcheverryi</i>	<i>G. chilensis</i>	<i>G. fallax</i>	<i>G. mexicana</i>
Mesepisternal pale stripes		Present	Present	Present	Absent	Reduced to absent	Absent
♂ Ridge tibia I		In distal 2/3	In distal 1/2	?	?	In distal 1/2	?
♂ Abd. color pattern	IV-VII	Paired yellow spots	Paired yellow spots	Paired yellow spots	Black	Paired yellow spots	Paired yellow spots
	VIII	Paired yellow large spots	Paired yellow large spots	Paired yellow large spots	Paired yellow small spots	Paired yellow minute spots or black	Black
	IX	Paired yellow small spots or black	Paired yellow small spots or black	Paired yellow small spots or black	Paired yellow large spots	Black	Yellow
	X	Black	Yellow post. stripe or black	Black	Yellow	Black	Yellow
♂ Cerci tips	Dorsal view	Divergent	Convergent	Convergent	Convergent	Convergent	?
	Lateral view	Blunt, slightly depressed	Depressed	Extremely depressed	Rounded	Rounded, slightly depressed	Blunt, slightly dilated
Distal segm. penis	Basal portion	Sides parallel	Sides convergent	Sides concave	Sides parallel	Sides parallel	?
	Lat. angles dist. port.	Right	Right	Right	Acute	Right	?
	Width dis. /bas. port.	> 1	< 1	< 1	> 1	> 1	?
	Distal cornu	Distal 1/8 forked	Distal 1/2 forked	Distal 1/4 forked	Distal 1/8 forked	Distal 1/8 forked	?
♀ Cerci/ epiproct length		2.3-2.4	1.5-1.85	?	?	2.2-2.3	?
♀ Cerci/ paraprocts length		2	1	1	?	2.1-2.4	?
♀ Cerci/ vulvar scale length		0.24-0.25	0.19-0.2	0.18	?	0.2	?
Lobes vulvar scale		Widened distal	Parallel sided	Parallel sided	?	Slightly widened distal	?
Tips vulvar scale lobes		Elliptical	Pointed	Pointed	?	Elliptical	?
♀ Gonapophyses IX		Cylindrical	Ribbon shaped	Ribbon shaped	?	Ribbon shaped	?

Both *mexicana* and *fallax* can be distinguished from *nodisticta* by the little size or absence of the yellow spots on abdominal segment VIII dorsum (present and occupying the whole segment length in *nodisticta*) and by the absence or reduction (at basal 0.50 to 0.20) of the mesepisternal stripes (always present and occupying 0.80 of the mesepisterna length in *nodisticta*). Besides, the female of *fallax* differs from that of *nodisticta* by the ratio cerci/ vulvar scale length (0.24-0.25 in *nodisticta*, 0.2 in *fallax*) and by the shape of segment IX gonapophyses (cylindrical in *nodisticta*, ribbon-shaped in *fallax*).

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