Odonatologica 11(4): 339-346 *December 1, 1982*

CALEDOPTERYX MACULATA SPEC.NOV. FROM NEW CALEDONIA (ZYGOPTERA: MEGAPODAGRIONIDAE)

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Received and Accepted September 9, 1982

C.maculata sp.n. (holotype ♂: Trib. Rivière des Pirogues, Terr. Rte 2, 23-XI-1981; allotype ♀: Forêt de Thi, nr Noumea, 7-XII-1981; both deposited in Bishop Mus., Honolulu) is described, figured, and distinguished from *C. sarasini* (Ris). It is a sylvan sp., found near the steeper zones of streams and rivers. Brief observations on the behaviour are also provided.

INTRODUCTION

The sole described species of the endemic New Caledonian genus *Caledopteryx* Kennedy, 1925 is *C. sarasini* (Ris, 1915). CAMPION (1921) recorded specimens with dimensions much smaller than the type specimens of *C. sarasini,* and LIEFTINCK (1975) commented on the variability of the species in its venational characteristics and pigmentation patterns.

In November/December 1981, during an expedition organised under a cooperative research agreement between the Office de la Recherche Scientifique et Technique Outre-Mer (O.R.S.T.O.M.), Noumea, New Caledonia, and Victoria University of Wellington, New Zealand, Odonata were collected at 39 sites throughout New Caledonia. Collections at 8 southern sites yielded a series of *Caledopteryx maculata* sp. nov., here described, a species which accounts for some of the variability previously attributed to *C. sarasini.*

CALEDOPTERYX MACULATA SP.N.

(Figures 1, 3, 4, 6, 7)

Material. — 28♂ 15♀ as follows: 6♂ 6♀, 21 Nov. 1981, Forêt de Thi, D.A.L. Davies (all in D.A.L.D. collection); 3♂ 3♀, 21 Nov.-7 Dec. 1981, same locality, W.J. Winstanley; 9♂ 1♀, 19 Nov. 1981, Tributary of Rivière des Pirogues, Terr. Rte 2, 2.8 km E. of Col de Mouirange, 143 m, W.J.W. and C. Ihily; 2♂, 23 Nov. 1981, same locality, W.J.W.; 1♀, 19 Nov. 1981, Trib. Rivière des Pirogues, Terr. Rte 2, 4.3 km E. of Col de Mouirange, 209 m, J.R. Grehan; 2♂, 20 Nov. 1981, Trib. Rivière du Caronage near La Capture, W.J.W.; 3♂ 3♀ (1♀ with exuviae), 23 Nov. 1981, Mts Koghis, 490 m, W.J.W.; 3♂, 4 Dec. 1981, Creek Pernod, Terr. Rte 2, W.J.W. and C. Ihily. (Bishop Museum, Hawaii; Musée d' Histoire Naturelle, Paris; British Museum (Natural History), London; National Arthropod Collection, D.S.I.R., Auckland, New Zealand; and collection of W.J.W.).

Holotype ♂: Trib. Rivière des Piroques, Terr. Rte. 2, 2.8 km E. of Col de Mouirange, 23 Nov. 1981, W.J.W. (Bishop Museum, reference 12699).

Allotype ♀: Forêt de Thi, near Noumea, 200 m, 7 Dec. 1981, W.J.W. (Bishop Museum).

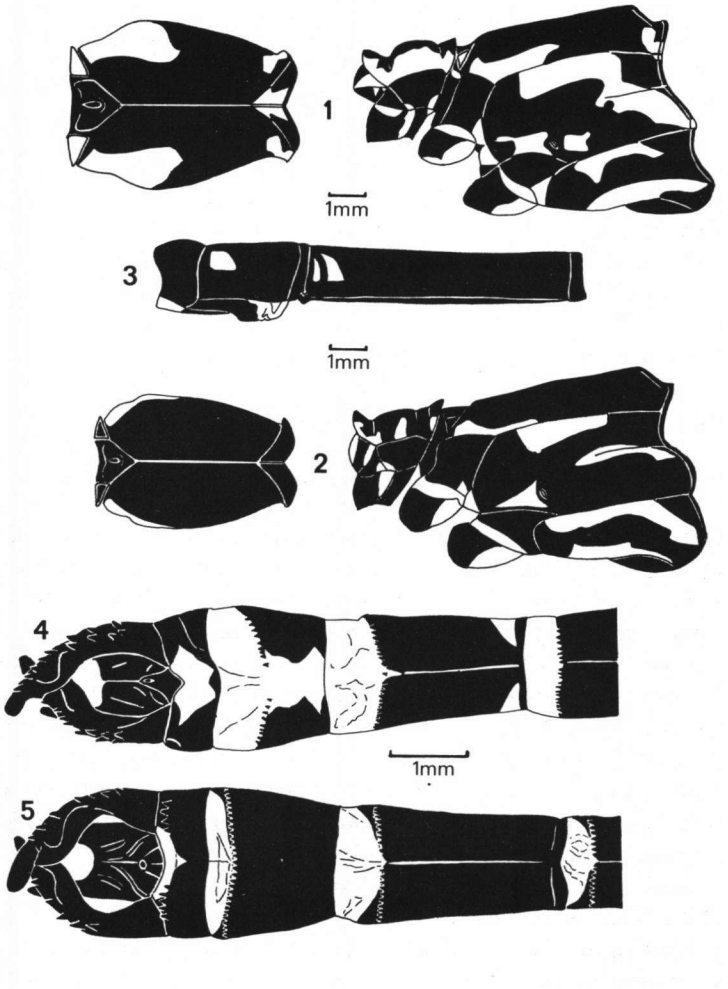
All other specimens examined paratypes.

MALE

Measurements. — Abdomen with appendages 40.5-46.0 mm (n=28, $\bar{x}$ 43.1 mm). Hindwing 32.5-37.0 mm (n=28, $\bar{x}$ 34.5).

Head. — Labrum blue, rimmed with black distally. Genae and mandible bases blue. Clypeus blue with black marks at the mandible bases. Reddish brown streaks between the posterior ocelli and the antennal bases. Post ocular spots light blue, large, extending laterally to the eyes, and continued anteriorly along the ocular sclerite as a narrowing band to the level of the antennae. Rest of head black. Clypeus, frons and occiput sparsely clothed with long fine hairs.

Thorax (Fig. 1). — Metallic black with light markings (yellowish in preserved specimens, greenish blue in life) as follows: Along the lateral margins of the pronotum, and part way along its anterior border, a broad sinuous band, and ventral spots on the pro-episternum and pro-epimeron. A broad stripe on the anepisternum along the anterior third of the humeral suture, and a smaller, club-shaped mark from the humeral suture anterior to the ante-alar ridge. Mesially, a broad, sagittate mark in the ante-alar sinus. A broad stripe dorsally on the mesepimeron along the medial half of the humeral suture continued as a zigzag across the mesepimeron and narrowing across the metepisternum to terminate posteriorly at the metapleural suture. An irregular blotch ventrally on the mesepimeron and metepisternum anterior to the spiracle, and another smaller blotch on the metepisternum immediately posterior to the metathoracic spiracle. Occasionally, the post spiracular blotch may be confluent with the dorsal stripe across the metepisternum, or reduced, or absent. On the metepimeron a scimitar-shaped stripe mesially along the metapleural suture, with a longer lanceolate stripe ventrally. Thorax sparsely clothed with long, pale hairs. Legs mainly black



Figs. 1-5. Male structural features of *Caledopteryx maculata* sp.n. (Figs. 1, 3, 4; — ex stream 2.8km E of Col de Mouirange) and *C. sarasini* (Ris) (Figs. 2, 5; — ex Col des Roussettes): (1-2) anepisternum (dorsal) and thorax (left lateral); — (3) anterior abdominal segments (left lateral view); — (4-5) terminal abdominal segments (dorsal view).

with light marks posteriorly on the coxae and proximally on the femora. Trochanters greenish.

Wings (Fig. 6). — Membrane hyaline, enfumed in mature specimens. Pterostigma dark brown. 2 Ax (3 in one hindwing in one specimen). Px 23-31 in forewing, 20-26 in hindwing. Ac distal to Axl. Arculus proximal to Ax2 occasionally (11/112) at Ax2. IR3 at subnodus or one cell distal, R3 usually between Px9-11 in forewing, occasionally between Px 8-13; in hindwing usually between Px 7-9, occasionally between Px 6-10. IR2 between Px 12-18 in forewing and Px 10-15 in hindwing. Quadrilateral long, moderately sloped. Medio-anal link fractured, rarely (1/112) straight. Ab usually proximal to the arculus, occasionally level with the arculus (8/112), or rarely (2/112) distal to it. Up to 6 cells between CuP and the margin. Venational aberrations in the form of dichotomising Px or incomplete veins, not infrequent. In one specimen, R3 forks distally in one forewing (Fig. 6). Occasionally (17/112) with 1 crossvein in the space between 1A and the margin proximal to the medio-anal link, rarely (3/112) with 2.

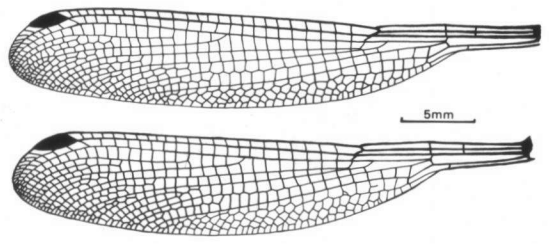


Fig. 6. *Caledopteryx maculata* sp.n., male (ex stream 2.8km E of Col de Mouirange): left forewing and hindwing.

Abdomen (Figs. 3,4). — Metallic black with greenish blue blotches ventrally on segment 1, and antero-laterally on segments 2-8, the marks on 3-7 traversed by a narrow blackish-brown line which is incomplete dorsally on segment 7. Distal membranes of segments 7-9 bright blue dorsally, and extensive longitudinal blue marks dorsally on segments 9 and 10. Segments 1 and 2 with a sparse covering of long, pale hairs. Segments 3-10 covered with numerous short spines and with short, pale hairs ventrally. Dorsal appendages black, inferior appendages blackish brown.

In mature specimens a pruinescence may be developed on the mouthparts, thorax, and abdomen.

FEMALE

Measurements. – Abdomen with appendages 36.0-41.5 mm (n=15, $\bar{x}$ = 39.2). Hindwing 35.0-37.5 mm (n=15, $\bar{x}$ = 36.4).

Pigmentation and pattern similar to the male but the light blue areas on the abdomen restricted to the dorsal membranes at the posterior of segments 7 and 8.

Antero-lateral blotch on segment 8 wanting. Appendages short and stout, black. Ovipositor protuberant, extending beyond dorsal appendages. Px fewer than in male, 21-27 in forewing, 19-25 in hindwing (Tab. I).

The specific epithet *"maculata"* alludes to the lateral blotches on the abdomen.

DISTINGUISHING FEATURES OF *CALEDOPTERYX MACULATA* SP.N. AND *C. SARASINI* (RIS)

The two species are distinguishable instantly in the field, even at a distance. The sides of the thorax are dull olive in *C. sarasini* but lighter, and bluish, in *C. maculata.* In males, the extent of the blue areas on the terminal segments of the abdomen is conspicuously greater in *C. maculata* (Figs. 4,5). RIS (1915) remarked that the thorax and abdomen in *C. sarasini* is black with a greenish metallic sheen, and the green reflections are vivid in live specimens in both sexes. In *C. maculata,* there are bluish green blotches on segments 2-8 of the abdomen (Fig. 3), the black parts of the thorax and abdomen are duller, and they lack the green lustre. The whole effect is to render *C. maculata* a much paler damselfly. Preserved specimens are less distinctive at a glance but the lateral abdominal blotches and the dorsal club-shaped mark on the anepisternum serve to identify *C. maculata* from *C. sarasini* which lacks these features (Figs. 1-3). The more proximal position of arculus and 1A, and the fractured medio-anal link are some venational characteristics which distinguish *C. maculata* (Fig 6). There is an overlap in the Px complement of the two species but the mean is substantially lower in *C. maculata* (Tab. I).

Table I

Postnodal crossvein complement in two *Caledopteryx* species

Species and sex		Forewing		Hindwing	
		Range	Mean	Range	Mean
maculata	♂ (n=28)	23-31	25.4	20-26	22.8
	♀ (n=15)	21-27	24.0	19-25	22.0
sarasini	♂ (n=23)	22-34	28.1	20-28	24.0
	♀ (n=14)	23-32	26.8	20-28	23.5

In size, thoracic pigmentation, and venation, there is interpopulation and intrapopulation variation in *C. sarasini* which arouses a suspicion that this may be more than a single species.

The larvae described and illustrated by LIEFTINCK (1976) as *C. sarasini* were collected near Ouenarou (22°11'S 166°44'E) whence only *C. maculata* adults are known (Fig. 7). We collected no *C. sarasini* larvae to compare against our *C. maculata* material. The adult male from which LIEFTINCK (1975) described and illustrated the labium and genitalia of *C. sarasini* was also taken near Ouenarou and has been determined as *C. maculata* (M.A. Lieftinck, pers. comm.).

GENERAL OBSERVATIONS

DISTRIBUTION

Our data on the distribution of the species are meagre, but specimens examined from Pouébo, Hienghene, Mt. Gaata, Vallée d'Amoa, Ouindo (near Poindimie), Koné, Col des Roussettes, La Crouen, Mokoue/Dothio, Col d'Amieu, Dogny, and Col de Nassirah are *C. sarasini* and those from Houailou, Mt. Nekando, Mt. Mou, Mgnes. des Sources, Mt. Pouedihi, Mts. Koghis, Col de Mouirange, Creek Pernod, Forêt de Thi, Plum, R. du Caronage, and Prony are *C. maculata* (pers. obs; pers. comms. S.J. Brooks, M.A. Lieftinck, and G. Nishida). These localities are shown in Figure 7 together with Canala, the type locality for *C. sarasini*. *C. sarasini* appears to occur mainly in the north, and *C. maculata* mainly in the south. All of the specimens examined by CAMPION (1921) are *C. maculata* (S.J.Brooks, pers. comm.), and his male from Houailou (21°15'S 165°38'E) shows that the ranges of the two species overlap.

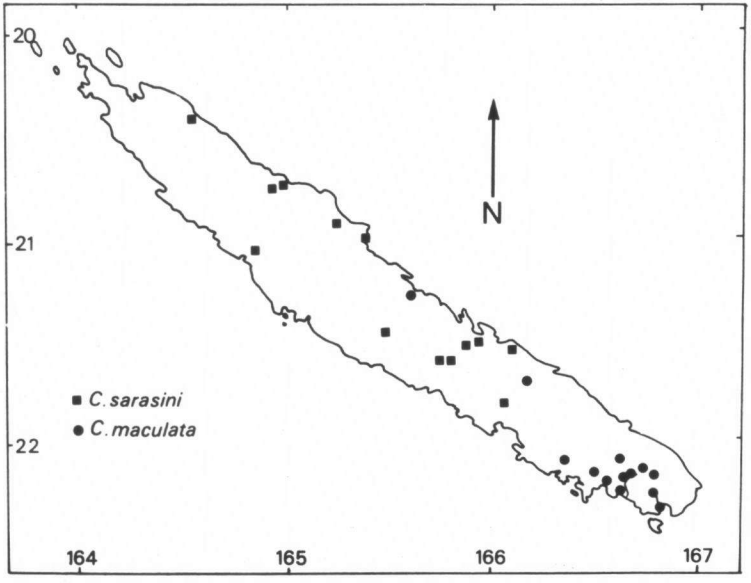


Fig. 7. Localities from which *Caledopteryx* specimens have been examined.

HABITAT

Both *Caledopteryx* species generally occur in the steeper sections of forested catchments. A number of specimens of *C. maculata* were taken along a forest track on Monts Koghis about 0.5 km away from the nearest stream, but normally

both species are found near water. Males settle horizontally on prominent perches commanding a view of potential oviposition sites, and often return to the same sites after being disturbed. The wings are outstretched laterally when at rest. Like *Caledargiolestes uniseries* (Ris), several *Isosticta* species, and males of *Trineuragrion percostale* Ris, the *Caledopteryx* species are not wary, and individuals not infrequently will land on the collector.

Females have been observed to land in shallow glissades to oviposit directly onto steep rockfaces. Oviposition was also seen into a small rivulet flowing over a clay bed, and into a steep hillside seepage area where leaf litter had accumulated. The teneral female taken with her exuviae at Mts. Koghis was found on a rockface approximately 1 m away from the water about halfway up a 3 m waterfall. Larvae were flushed with the point of a stiff leaf from horizontal cracks in the rocks on the faces of waterfalls at Mts. Koghis.

ANATOMICAL MODIFICATIONS

PAULSON (1981) has reported that some other megapodagrionid and chlorocyphid dragonflies have anatomical modifications which enhance the visual impact of localised bright pigments of the abdomen. The membranous nature of the vivid blue areas on the posterior segments of the abdomen in the *Caledopteryx* species suggests that the membranes can be expanded or contracted to alter their display potential, and photographs confirm that territorial *C. maculata* males inflate these membranes.

ACKNOWLEDGEMENTS

We are grateful to Dr J. GUTIERREZ who coordinated the generous logistic support accorded by O.R.S.T.O.M., Noumea, and to C.IHILY of that institution for his assistance in the field. We thank the Director, Service des Eaux et Forêts, Noumea, for facilitating our entry to areas under his control, and Mr and Mrs M. BRINON for their help and hospitality in Forêt de Thi. S.J. BROOKS, British Museum (Natural History), London, M.A. LIEFTINCK, Rhenen, The Netherlands, and G.M. NISHIDA, Bishop Museum, Honolulu, Hawaii, kindly provided information on *Caledopteryx* specimens they examined. This research was assisted by grants from the New Zealand Entomological Society and the Internal Research Committee, Victoria University of Wellington, to J.R. Grehan and W.J.Winstanley.

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