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ON A COLLECTION OF PAPUAN DRAGONFLIES (*ODONATA*)
MADE BY THE LATE MR. ALLAN R. McCULLOCH IN 1922-3,
WITH DESCRIPTIONS OF NEW SPECIES.

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(Figures 1-6.)

The collection of Dragonflies dealt with in this paper was made by the late Allan R. McCulloch of the Australian Museum, Sydney, during the period from November, 1922, to January, 1923, while exploring unknown regions of the central western part of Papua by boat and aeroplane, in company with Captain Frank Hurley. About one hundred and forty specimens are available for study; these were all originally in paper triangles, but many of the larger species have since been relaxed and set out on pins for the cabinet. An analysis of the Odonata collected shows that three families, eighteen genera and twenty-three species are represented, of which one genus and four species are new to science. Considering the grave difficulties attendant upon collecting in such a dangerous region, the result is a very good one, though it probably represents only a small fraction of the total Odonate fauna of the districts visited.

The specimens were taken in a number of localities, viz., Bramble Cay (Torres Strait), Goaribari Island, various parts of the Fly River, Herbert River, Aramia Lakes, and Lake Murray. Mr. McCulloch very kindly furnished me with some very interesting notes on the collection and the localities visited, from which I give herewith a number of extracts which may help us to visualize the conditions met with.

“ Ordinarily I could speedily have filled my collecting bottles, but was hampered with my rifle, and could not venture far from the other members of the party. One is apt to forget that one's head would be a prized trophy to any of the inhabitants of these parts (Lake Murray) and that even a jaunt in the dinghy is fraught with possible danger to the whole party. Hurley dislikes my venturing within “ arrow-shot ” of the banks, where I am tempted to chase the many and varied dragonflies which flit in such profusion around us.”

The reference here is evidently to *Rhyothemis splendens* Sel., of which several are in the collection before me.

“ Nov. 14th, 1922. Herbert River. Dragonflies with partly iridescent blue-black and partly translucent wings were plentiful in the thick undergrowth of the scrub. They fly with a slow and fluttering flight and are easy to catch, but my net is constantly hooked up in the ever-present thorns of the lawyer vine.”

“ Nov. 29th, 1922. Lake Murray. This lake is a large, swampy area in the centre of western Papua, which doubtless expands or contracts according to the amount of rain. It is drained by the short and winding Herbert River, which is a tributary of the Strickland; this again joins the Fly at Everill Junction. The lake is open but very shallow, being less than a fathom deep at the time of our visit.

Slightly deeper channels lead into two large arms, one winding away to the west and another to the north, and from each of these endless bays, inlets, and creeks extend away in every direction. The greater part of the banks is low and swampy, and either covered with grass or with a giant lotus whose wonderful pink and yellow flowers scented the air around the entrance to the lake. The heat was intense, and the water of the lake was always so heated that we dipped up water for a warm bath at the side of the ship. Dragonflies were more plentiful here than at any other place known to me, both as regards species and specimens. Nevertheless, I believe most of them occurred all along the Fly River right down to Mediri (about 60 miles from the mouth). At Mediri I failed to secure one species which I afterwards caught on Bramble Cay, whither it had been blown by the north-west wind."

"Dec. 15th to 21st, 1922. Bramble Cay, Torres Strait. This is a small sand-bank, two hundred yards in length, perched upon a reef, the northernmost of the Barrier Reef series. There is no fresh water and the rains of the heaviest storms disappear immediately through the coarse coral sand. The steady north-west winds which have prevailed during the last few days have driven a number of dragonflies of several species from the mainland of Papua to the island. I secured three species which I recognize as identical with those seen at Mediri."

"Dec. 26th, 1922. Aramia Lakes. These lie between the lower Fly River and the Bamu River; they are drained by the Aramia River, which wanders over an extraordinarily circuitous course to join the Bamu at Aramia Island."

"Jan. 8-11, 1923. Goaribari. This is an island at the head of the Gulf of Papua, off the mouth of the Omati River, and is nothing more than a mud-flat largely flooded at high tide, with a dense growth of mangroves."

With these vivid introductory word-pictures of the localities in our minds, we can now proceed to give a list of the species taken and to describe those which are new to science.

Order ODONATA (Dragonflies).

Suborder ZYGOPTERA (Damselies).

Family COENAGRIIDAE.

1. *TEINOBASIS RUFITHORAX* (*Selys.*)

A single male, taken on Fairfax Island, Fly River, November 10th, 1922. The species is widespread in Papua and also occurs on the small islands in Torres Strait.

2. *CERIAGRION ERUBESCENS* *Selys.*

Four males and five females, taken in various localities:—Alligator Island, Fly River, one female, November 10th, 1922; near Everill Junction, one female, November 12th, two females, November 13th, 1922; Herbert River, three males, two females, November 14th, 1922; Mediri, one male, December 12th, 1922.

Three out of the four males have the end of the abdomen missing, but the fourth is complete and shows the anal appendages typical of this species, which appears to be widespread throughout Papua and Queensland.

3. *PSEUDAGRION PAPUENSE* *n. sp.*

(Figures 1, 2.)

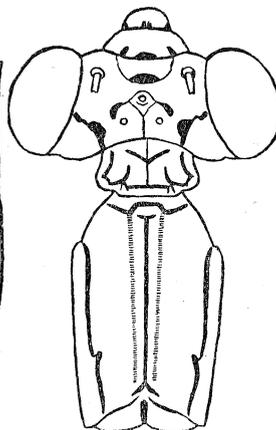
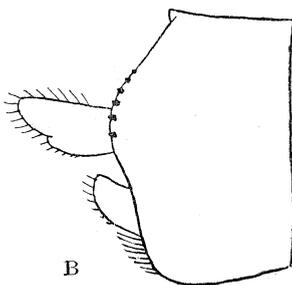
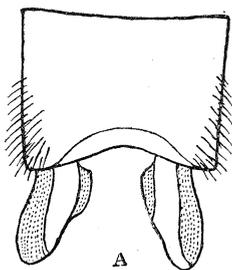


Fig. 1.

Fig. 1. *Pseudagrion papuense*, male, anal appendages.
a, dorsal, b, lateral view.

Fig. 2. *Pseudagrion papuense*, female, head and thorax;
to show colour-pattern.

Fig. 2.

♂ *Total length* 34, *abdomen* 28, *forewing* 19 mm.

Head blue, with black markings similar to those of the female, as shown in Figure 2; *labium* pale testaceous.

Thorax blue, marked with black as in the female (Figure 2). *Legs* livid grey, darker above.

Wings hyaline; *postnodals* 9-10 in forewings, 9 in hindwings; *pterostigma* trapezoidal, covering less than one cellule, brownish between black veins.

Abdomen blue; seg. 2 with a completely isolated trapezoidal black mark dorsally towards apex; segs. 3-7 with all dorsal part bronze-black except a narrow band at base and another at apex; the black part swells out laterally just before apex and is also slightly constricted in front of this swelling on each segment; segs. 8-10 entirely blue except for a crescentic blackish basal patch dorsally on seg. 10. *Appendages* (Figure 1):—*Superiors* about two-thirds as long as seg. 10 viewed dorsally; blue bordered broadly on the outer side and narrowly on the inner side with black; in shape as shown in Figure 1, *not bifurcated at tips*, and only slightly notched when viewed from the side. *Inferiors* short, somewhat blunt, upturned.

Teneral male coloured like the young female.

♀ Resembles the male in size and markings, but differs from it in having the blue colouration replaced by yellowish testaceous, turning to a darker brownish when fully mature. The black markings of head and thorax are shown in Figure 2; the two stripes close to the mid-dorsal line on synthorax are brownish in the mature female, absent in the teneral form. The copulatory hooks on the prothorax, characteristic of the genus *Pseudagrion*, are very small, directed forwards, pale testaceous.

Seventeen males and three females, taken on Lake Murray, November 16th and 19th, 1922.

Types :—Holotype male (November 16th, 1922), specimen no. K. 52315; allotype female (November 19th, 1922), specimen no. K. 52326; and series of paratypes of both sexes in the Australian Museum Collection, Sydney, N.S.W.

At first sight this species appears to be identical with the very common *Ps. australasiae* Sel., the males being closely similar in their colour patterns. They differ, however, in having the black dorsal patch on seg. 2 completely isolated, and more especially in the form of the superior appendages, which are remarkable in not being bifurcated apically.

4. ISCHNURA TORRESIANA *Tillyard*.

One female, November 16th, 1922, and a pair, November 19th, 1922, Lake Murray; one male, December 22nd, 1922, Aramia Lakes.

This species is the smaller and darker representative in Papua and North Queensland of the common Australian species *I. heterosticta* Burm.

5. AGRIOCNEMIS MACCULLOCHI *n. sp.*

(Figure 3.)

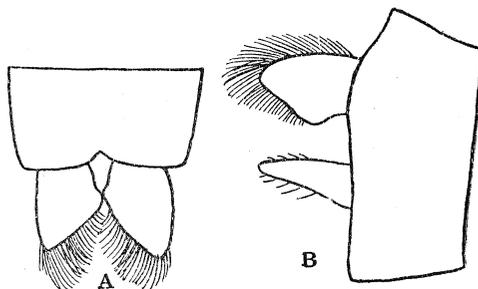


Fig. 3. *Agriocnemis maccullochi* *n. sp.*, male, anal appendages. *a*, dorsal, *b*, lateral view.

♂ *Total length* 18.5, *abdomen* 14, *forewing* 9.5 mm.

Head :—*Epicranium* dull blackish, with bright metallic greenish reflections in places, especially behind the eyes, which are dark brown; *antennae* black, ringed basally with pale testaceous; *frons* black in middle, pale testaceous at sides; *postclypeus* steely black; *anteclypeus*, *labrum* and *genae* testaceous; *labium* pale testaceous.

Thorax bronze-black above, sides blackish with more or less whitish pruinescence, this latter being sometimes strongly marked also on anterior dorsal part of synthorax. *Legs* blackish, touched with pale testaceous on undersides of coxae, trochanters and bases of femora; hind tibiae with 5-6 long, slender bristles.

Wings hyaline; *postnodals* 7 in forewing, 5 in hindwing; *pterostigma* trapezoidal, with distal side longer than basal, covering less than one cellule; central area dull fuscous, surrounded by a paler marginal area and the whole enclosed by black veins.

Abdomen blackish above; genitalia of seg. 2, sides of segs. 3-10 and basal ring of segs. 3-7 all pale testaceous. *Appendages* :—*Superiors*

nearly as long as seg. 10, very hairy, shaped as in Figure 3, black above, the hairs testaceous; *inferiors* about as long as superiors, much slenderer and more pointed, only slightly hairy, testaceous inclining to fuscous. Seg. 10 raised apically and also markedly incised in the middle line dorsally.

♀ Unknown.

Four males (one teneral), Western Reach of Lake Murray, November 19th and 20th, 1922. Note by collector:—"Very hard to catch."

Types:—Holotype male (November 20th, 1922), specimen no. K. 52345; and paratype males, November 19th, 1922, in Australian Museum Collection, Sydney, N.S.W.

This species differs from all others of the genus except the Indian *A. lacteola* Sel. in having the labrum non-metallic. Most species of *Agriocnemis* are quite easy to catch, but the closely allied *Austrocnemis splendida* Martin is most difficult to secure, owing to its habit of sitting on the horizontally floating leaves of various water-plants, to which it clings tightly by means of its very long legs. The new species has its legs only moderately long and its venation is that of a typical *Agriocnemis*. It seems quite likely that it may have a somewhat similar habit of resting on floating leaves of aquatic plants, which would make it very difficult to capture. The species is dedicated to its captor, the late Mr. Allan R. McCulloch.

Suborder ANISOPTERA (Dragonflies).

Family CORDULIDAE.

6. HEMICORDULIA SILVARUM *Ris.*

A very rare species, previously recorded only from South-west (Dutch) New Guinea. A single male, somewhat immature, is present in the collection, labelled "Papuan Gulf," without date. It is to be presumed that it flew on board the ship and was captured there.

Genus ANACORDULIA *n.g.*

(Figure 4.)

Closely allied to *Hemicordulia* and also to *Tetragoneuria*. It differs from the former in having the hindwing slightly angulated at the base in the male, and from the latter in the triangles of both wings being free and the anal loop of the hindwing blunter and ending somewhat further from margin, also in the inferior appendage of the male being about as long as the superiors. Post-trigonal space of both wings beginning with two rows of cellules. Subtriangle of forewing large, once-crossed. Anal loop of hindwing bluntly stocking-shaped, two cellules wide, and well-developed supplement, three cellules at distal end only, distal margin truncated obliquely to wing-margin below it. Two rows of cellules between anal loop and curved portion of posterior margin of hindwing. Anal triangle very narrow, with one short cross-vein; membranule bordering it for its whole length; anal angle projecting slightly beyond it. (Figure 4.)

Male with a well-developed keel on hind tibiae; fore tibiae without a

definite keel, but with a set of short, stiff, pectinately arranged setae ventrally on distal two-fifths, two series of long lateral bristles on basal

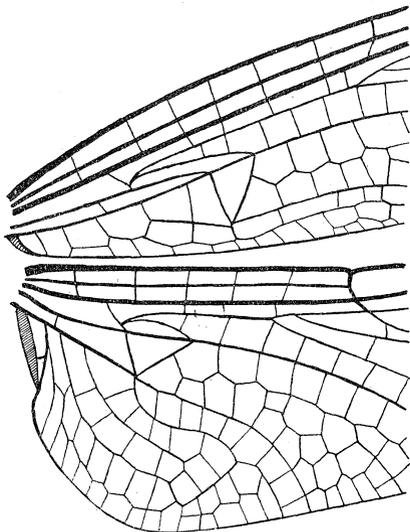


Fig. 4. *Anacordulia maccullochi* n.g. et sp., male. Basal third of [fore and hind wings, to show venation.

three-fifths, and a series of finer long hairs from end to end. Abdomen rather narrow, shorter than wings.

Genotype :— *Anacordulia maccullochi* n. sp.

7. ANACORDULIA MACCULLOCHI n. sp.

(Figures 4, 5.)

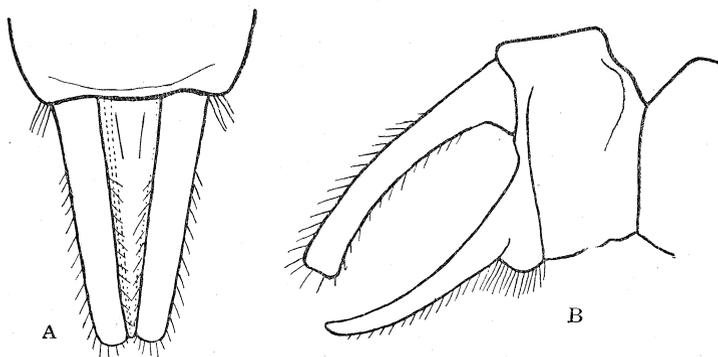


Fig. 5. *Anacordulia maccullochi* n.g. et sp., male, anal appendages. a, dorsal, b, lateral view.

♂ *Total length* 34.5 m.m., *abdomen* 22.5 mm., *forewing* 31 mm., *hindwing* 29 mm.

Head very wide (6 mm.). *Eyes* dark brown (probably green in life). *Vertex* rather large, strongly tuberculate, blackish; *middle ocellus* large and conspicuous, orange-brown, transparent. *Frons* very hairy, dark brown with steely reflections. *Clypeus* dark brown, shiny. *Labrum* chestnut brown with two black marks basally, one on either side of the middle line, confluent both basally and distally, isolating between them a small bright brown spot. *Labium* medium testaceous brown, hairy.

Thorax narrow (3 mm.). *Prothorax* dark brown above, medium brown on sides. *Synthorax* hairy above, dark brown with steely reflections on either side of mid-dorsal carina; on each side are two broad lateral bands of steely reflections, not sharply defined. *Legs* dark brown shading to blackish on hind femora. Fore tibiae with ten short, closely set distal setae forming a comb, five long setae in inner lateral basal row and seven in outer row. Hind tibiae with narrow keel extending its whole length, and two complete sets of lateral bristles.

Wings lightly tinted with brown all over, especially along the veins; base and costa from nodus to pterostigma slightly saffroned. *Antenodals* 7 in fore, 5 in hindwing, all complete. *Postnodals* 5-6 in fore, 7 in hindwing. *Pterostigma* 1.6 mm., not braced, covering less than the length of one cellule beneath it, very dark brown. *Oblique vein* second from subnodus in both wings. Forewings with four cellules before subtriangle in anal field. Hindwings with narrow anal triangle once-crossed.

Abdomen dull blackish, short, about three-fourths the length of hindwing; seg. 2 slightly swollen, seg. 3 slightly constricted, rest almost cylindrical. *Accessory genitalia* of seg. 2 large and prominent, the genital lobes large, very concave to the hamuli and forming a partial sheath for them covering their tips; each genital lobe ends in a sharp, downwardly directed process armed with stiff hairs; posterior hamuli convex, ridged and hairy externally. *Terminal appendages*:—*Superiors* 1.8 mm., dull black, straight, subcylindrical, converging apically when viewed from above (Figure 2 A); when viewed laterally, depressed, slightly curved, with truncate tips (Figure 2, B). *Inferior* about as long as superiors, sub triangular, concave above basally, distal portion strongly pointed, upcurved (Figure 2, B).

♀ Unknown.

Habitat.—Bramble Cay, Torres Strait, evidently blown by north-west wind from Fly River region, Papua. Mr. McCulloch probably refers to this species when he says that he saw at least one species which he secured at Bramble Cay which he could not catch in the swampy land around Mediri.

Type.—Holotype male, specimen no. K48426 in Australian Museum Collection, Sydney. This unique specimen is a fine discovery, and the species is dedicated to its captor, the late Allan R. McCulloch.

Family LIBELLULIDAE.

8. AGRIONOPTERA INSIGNIS ALLOGENES Tillyard.

One female, somewhat immature, from Goaribari Island, January 4th, 1923. The specimen agrees with Australian forms in having the triangles free and only one cross-vein in cubital space of hindwing. and hence belongs to the subspecies *allogenes* Tillyard.

9. ORTHETRUM VILLOSOVITTATUM VILLOSOVITTATUM *Brauer*.

One teneral female, Fairfax Island, Fly River, November 8th, 1922; one teneral male, Goaribari Island, January 4th, 1923; two teneral males, "Papuan Gulf," undated, presumably captured on board ship. Three specimens, one male and two females, taken at sea, about 20 miles south of Bell Point, Gulf of Papua, including a pair taken *in cop.* on the boat. This species is very common throughout Papua and Eastern Australia as far south as Sydney.

10. DIPLACODES TRIVIALIS *Fabricius*.

Four males (one teneral) and six females, Lake Murray, November 16th, 1922; a single male of exceptionally large size, Aramia Lakes, December 26th, 1922. A very common species in the tropics.

11. BRACHYDIPLAX DENTICAUDA *Brauer*.

= *B. australis* Kby.

Eight males and ten females from various localities, viz. :—Fairfax Island, Fly River, three males (two teneral), one teneral female, November 8th, 10th, 1922; Herbert River, two males, five females, November 14th, 1922; Samagi Village, Fly River, one teneral female, November 6th, 1922; Lake Murray, one female, November 16th, 1922; Sturt Island, Fly River, one male, one female, December 2nd, 1922; Adura Village, Fly River, one teneral female, December 5th, 1922; Bramble Cay, one male, December 18th, one female December 21st, 1922.

Evidently a very common species in this part of Papua; in North Queensland it is only moderately common.

12. NEUROTHEMIS DECORA *Brauer*.

One male, near Everill Junction, Fly River, November 12th, 1922; five males and one female, Herbert River, November 14th, 1922; one male, Lake Murray, November 16th, 1922. A very beautiful species.

13. NEUROTHEMIS STIGMATIZANS BRAMINA *Guerin-Meneville*.

One isochrome female, Herbert River, November 14th, 1922; three isochrome females, Western Reach, Lake Murray, November 19th, 1922; one male, fully mature, Bramble Cay, December 21st, 1922, with note on label "Same species seen at Mediri (Fly River)."

This Papuan subspecies is interesting in that the female has two distinct forms; the *isochrome*, in which the brown colouring of the wings is distributed on the same plan as in the male (but not extending as far as the pterostigma), and the *heterochrome*, in which the wings are quite differently coloured from those of the male. In the material before me. only isochrome females occur, and in all of them the brown colouration of the wings is followed distally by an opaque transverse band resembling that found on both sexes of *N. decora* Br. One of the females from Lake Murray also has the apices of all four wings brown; this is part of the colour-scheme of the heterochrome female, and appears to indicate that intermediate forms also exist. The Australian subspecies, *N. stigmatizans*

stigmatizans Fabr., common in North Queensland, possesses only heterochrome females with lightly shaded wings.

14. RHODOTHEMIS RUFA (*Rambur*).

One male, Fairfax Island, Fly River, November 8th, 1922.

15. HYDROBASILEUS BREVISTYLUS *Kirby*.

One male, one female, Aramia Lakes; one male, taken at sea, about 20 miles south of Bell Point, Gulf of Papua (blown across by the north west wind).

16. TRAMEA LOEWI *Brauer*.

One male, one female, Bramble Cay, Torres Strait (blown across by the north west wind), December 21st, 1922.

17. PANTALA FLAVESCENS *Fabricius*.

One female, Bramble Cay, Torres Strait, (blown across by the north west wind), December 21st, 1922.

18. MACRODIPLAX CORA *Brauer*.

One mature male, Lake Murray, November 16th, 1922.

19. RHYOTHEMIS GRAPHIPTERA *Selys*.

One male, one female, Western Reach of Lake Murray, November 19th, 1922; three males, five females, Lake Murray, November 16th, 1922.

20. RHYOTHEMIS PHYLLIS CHLOE *Kirby*.

Three females, Samagi Village, Fly River, December 6th, 1922; two females, Mediri, Fly River, December 12th, 1922.

21. RHYOTHEMIS REGIA CHALCOPTILON *Brauer*.

One female, Lake Murray, November 22nd, 1922; one male, Samagi Village, December 6th, 1922; three males and two females, including a pair taken *in cop.*, Aramia Lakes, December 26th, 1922. The wings are not quite as black as in most Australian examples of this species.

22. RHYOTHEMIS RESPLENDENS *Selys*.

One male, Buceros Island, Fly River, November 9th, 1922; one male, Fairfax Island, Fly River, November 8th, 1922; one male, one female, Adura Village, Fly River, December 4th, 1922; two females, Samagi Village, Fly River, December 6th, 1922.

This is the most brilliantly coloured species of the genus, the brilliant metallic blue wings of the male being very striking, especially when displayed in full sunshine.

23. RHYOTHEMIS HURLEYI *n. sp.*

(Figure 6.)

♂ *Total length* 34 mm.; *abdomen* 21 mm.; *forewing* 38 mm.; *hindwing* 36 mm.

Head.—*Eyes* dark brown. *Vertex* and most of *frons* deep metallic purple; *clypeus* and lower lateral parts of *frons* shiny brownish; *labrum* black; *labium* rich brown.

Thorax blackish above with dense soft grey hairs; sides dark brown with steely reflections. *Legs* black.

Wings of the general shape of those of *Rh. phyllis* Br., the hindwings very broad basally. Membrane for the most part hyaline, apices slightly suffused with brownish. Forewing with a very little dark brown at

extreme base; *pterostigma* 2.3 mm., dark brown, with two cross-veins below it, the first being slightly suffused with brownish on its distal side in right wing only. Hindwing with *pterostigma* slightly shorter and having the space below it dark brown from level of base of *pterostigma* to two-thirds of its length. Posterior margin at one-third from apex with a small blotch, metallic purple, irregular in shape, covering from two to four small cellules. Basal portion of hindwing from costa to posterior margin rich deep metallic purple, the boundary between this colour and the hyaline portion being irregular, as shown in Figure 3; on costa, the purple covers only the first two out of six antenodals, but lower down it expands

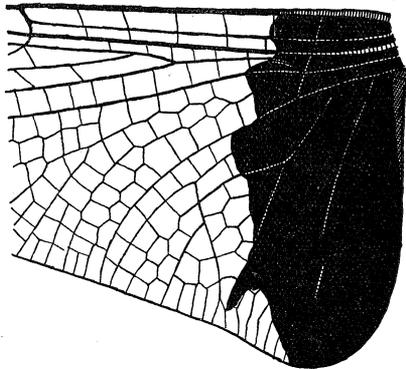


Fig. 6. *Rhyothemis hurleyi* n.sp., male. Hindwing from base to nodus, to show venation and colouring.

so as just to cover both triangle and supra-triangle, then cuts transversely across the post-trigonal space, then widens for another cellule and a half distad, and finally runs slightly obliquely and irregularly to a point on the posterior margin just distad of the main rounded curve of the anal part of the wing. Posttrigonal space of hindwing beginning with two cellules, then widening to three rows. *Antenodals* of forewing 9-10, the last incomplete, of hindwing 6; *postnodals* of forewing 10-12, of hindwing 12-14.

♀ Unknown.

Habitat.—Lake Murray and Aramia Lakes, Papua.

Types.—Holotype male (Aramia Lakes, December 26th, 1922), specimen no. K48414, and two paratype males (Lake Murray, November 19th, 1922), in Australian Museum Collection; one paratype male (Lake Murray, November 19th, 1922) in Cawthron Institute Collection.

This magnificent species, which I dedicate to Captain Frank Hurley, leader of the expedition to Lake Murray, resembles *Rh. severini* Ris., most closely in its scheme of colouration; but this Indo-chinese species has the wing-markings black, and the black portion at the base of the hindwing is of considerably greater extent, reaching on costa as far as the fourth antenodal out of seven; its boundary also runs more regularly across the wing than in the present species. *Rh. severini* also has a denser venation than the new species, with a larger number of smaller cellules both in the post-trigonal space and in the hyaline portion of the anal area.