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ON SOME REMARKABLE AUSTRALIAN
LIBELLULINÆ.

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PART II. DESCRIPTIONS OF NEW SPECIES.

(Plate xiv.)

The numerous *Libellulinae* which are found in the tropical regions of Queensland afford a most interesting study to the naturalist. Many of them, of course, are forms found also in New Guinea or in the other islands lying northwards from Australia, but we also find some remarkable exceptions which are distinct from the island forms, yet very closely allied to them. One may safely say, however, that the time that has elapsed since the tropical oceanic *Libellulinae* invaded northern Australia and settled there has scarcely yet been sufficient for the formation of many new species. Variation has taken place along unexpected lines, and the result has been rather to upset some of the current ideas of the true value of certain venational characters to which European authors had given undoubted generic value. The general tendency of the *Libellulinae* of northern Australia appears to be one of gradual simplification, which can be noticed as taking place in the following ways:—

1. *Abolition of superfluous nervures*, shown by change from a once or twice-crossed triangle to a free triangle, or a reduction in the number of rows of discoidal cells following the triangle. Probably the same tendency operated in the formation of the heteromorphic females of *Neurothemis*; and it is interesting to

note that of the two species of that genus inhabiting Australia, one (*N. stigmatizans* Fabr.) possesses the heteromorphic or simplified female only, while in the other (*N. oligoneura* Brauer) the change has extended to both sexes, so that the original intricate venation is entirely lost.

2. *Loss of pruinescence*, exemplified by specimens of the genera *Zyxomma* and *Orthetrum* taken in Australia.

3. *Decrease in size*; many examples of this might be given; see *Zyxomma obtusum*, below.

4. *Simplification of colour-pattern*; see *Agrionoptera regalis* below.

5. *Contraction and intensification of dark pigmentation on the wings*. *Neurothemis oligoneura* Br., affords a striking example of this; see also *Camacinia Othello*, below.

The interesting problems connected with these peculiar tendencies cannot be discussed in this paper, but the particular facts relating to each species described in it will be noted in their proper places. Seven species are now added to the Australian list, of which five are new to science, while the hitherto unknown male of *Rhyothemis Alcestis* Tillyard, is also described.

1. ZYXOMMA OBTUSUM Albarda.

A single male taken by Mr. E. Allen, at Cairns, exhibits remarkable differences from the type-form. It has absolutely no pruinescence, and is considerably smaller than the type. It is easily distinguished from *Z. petiolatum* Rambur (the only other species of the genus found in Australia) by the shape of the abdomen, which is short and rather thick, with segment 3 pinched.

2. RHYOTHEMIS ALCESTIS Tillyard. (Plate xiv., fig.2).

♂. *Wings* very similar to those of the female, already described.* *Head* and *thorax* as in ♀. *Abdomen* slightly longer and less

* These Proceedings, 1906, xxxi., p.482.

cylindrical, segment 3 scarcely narrower than the rest. *Appendages*: *superior* 1.7 mm., narrow wavy sublanceolate, slightly thickened towards the tips, which are pointed; deep black. *Inferior* 1.2 mm., subtriangular, black, tip curved upwards.

In the living insect the black basal half of the wings possesses a rich purplish-brown sheen, and is considerably deeper than in the female. One very mature specimen in my collection has a very large portion of the outer half of the wings slightly clouded with dull brown.

Hab.—Kuranda, N.Q. (Mr. E. Allen and Mr. F. P. Dodd). Rare; January.

3. CAMACINIA OTHELLO, n.sp. (Plate xiv., fig.1).

♂. Unique. Total length 52 mm.; abdomen 32.5 mm.; forewing 45.5 mm.; hindwing 44 mm.

Wings: *neuration* close, black; basal half of all four wings, as far as nodus, of a deep opaque black colour; the boundary between the black and hyaline portions crossing the wing slantwise, ending on the forewings about 7 mm. beyond apex of triangle, and on hindwings at about the termination of the sectors of the triangle; rest of wings hyaline except tips, which are just touched with smoky-black; hindwings broad at bases; *pterostigma* 6 mm., black; *membranule*, fore 2.5 mm, very narrow, hind 3.5 mm., broader, dull dirty grey; *triangle of forewings* very narrow, 6-7-celled, followed by very irregular rows of cells in the discoidal area, first 7, then 7 or 8 placed rather irregularly, then several irregular curved rows of 5 or 6; the discoidal area is then divided into two by a short auxiliary sector, curving up to meet the short sector 6 cells from the margin of the wing; *triangle of hindwings* long and narrow, 4- or 5-celled; *short sector* broken for 2 cells where it meets the auxiliary sector; *sectors of arculus* separated at bases in forewings, *just touching* at bases in hindwings; *nodal sector* distinctly waved just beyond middle; *basilar spaces* of all wings free; *submedian space* of forewings containing one cross-nervule before level of arculus and three rather close together beyond arculus, that of hindwing carrying

one cross-nervule near its middle, another nearer the arculus, and a third arising from base of arculus so as to form a small sub-triangle; *hypertrigonal space* with 3-4 cells in forewing, 1-2 in hindwing. *Nodal Indicator* ||25-26 16-17| Head: all parts shining jet black, except *labium* ||15-16 18-19| dark brown; front and *clypeus* hairy; *vertex* a large bifid tubercle, hairy, standing up high and carrying two conspicuous spikes or horns; front *ocellus* pale, transparent; other two smaller, brownish; *antennae* 4 mm., slender, black. *Thorax* deep black all over, some brown hairs on breast. *Legs* black with short spines. *Abdomen* rather short and stout, 4 slightly narrower than 2-3, 2-4 rounded, 5-9 triangular in section, 8-10 narrower than the rest: colour jet black: 2-3 with supplementary carina. *Appendages*: *superior* 2mm., separated at bases, undulating sublanceolate, hairy, pointed, black; *inferior* 1.3 mm., broad subtriangular, slightly hollowed out above, very dark brown.

Hab.—Cooktown, N.Q. A single male in magnificent condition taken on a billabong near the Annan River on Dec. 29th, 1907. Its flight is slow and majestic, and it is fond of settling on prominent twigs or branches overhanging the water.

This magnificent insect is closely allied to *C. gigantea* Br., from which it can be at once distinguished as follows:—

(a) The opaque portion of the wings in *C. gigantea* extends considerably *beyond* the nodus.

(b) The colouration of *C. gigantea*, both on body and wings, is rich brown. Mr. Laidlaw, who has seen this insect in the Malay Peninsula at Kwala Aring, says:—"It haunts the same localities as *Neurothemis stigmatizans*, which resembles it very closely in colour, though, of course, much smaller."

It is quite possible that *C. Othello* arose as a differentiation from the parent stock *C. gigantea*, which does not occur in Australia. Note the intensification and contraction of the opaque pigment of the wings. This tendency carried to its fullest extent can best be seen by comparing *Neurothemis stigmatizans* with *N. oligoneura*. Compare with these two species *C. gigantea* and *C. Othello*, and one feels that the same tendency is at work here,

though the differentiation has not proceeded nearly as far as in *N. oligoneura*.

♀. Unknown. It would be most interesting to find the female and compare its neuration with that of the male.

4. ORTHETRUM PRUINOSUM Burmeister.

A single male of this species taken by me at Cairns in December, 1907, exhibits considerable difference from the type, being of smaller size, and lacking pruinescence on the abdomen. Typical *O. pruinorum* is found in Java, and the species is represented in India and Ceylon by the race *neglectum* Fabr., and in the Celebes and Borneo by the race *clelia* Selys. I cannot do better than quote the remarks of my friend, Dr. Ris of Switzerland, the expert in *Libellulinae*, on the specimen from Cairns, which I sent him to examine:—"Your specimen extends the limits of the concern (*O. pruinorum*) to Queensland in a form that is certainly not of the *clelia* type but of the true *pruinorum* type, and thus must suggest its origin from the Sunda region, and its way to Australia probably has been across Timor. Your specimen is distinct from *O. pruinorum* typical, by the darker colour of the thorax, the absence of pruinosity from the abdomen, the larger and lighter pterostigma, and many reddish nervules on the costal and basal part of the wings—otherwise very similar to the Javanese typical form. The differences are very probably racial, certainly not specific."

The specimen is chiefly of interest as affording direct evidence of a stream of immigration to the Cape York Peninsula independent of that across Torres Straits from New Guinea.

5. AGRIONOPTERA ALLOGENES, n.sp.

This species was described by me under the name *A. insignis* Rambur(?) in these Proceedings for 1906 (p.485). Since that description was published, I have sent specimens of my type-series to Dr. Ris, and he tells me that they are distinct from the type *A. insignis* Ramb., of Java. The most remarkable character which differentiates them, and one that is quite constant, is that in the typical *A. insignis* the triangle of the forewing has a cross-

nervure, while in the Australian *A. allogenes* this triangle is always free. This character actually demands either that a new genus should be instituted for *A. allogenes* (the cross-nervure of the forewing triangle being included in the original definition of the genus *Agrionoptera*) or else that the definition of the genus should be extended to include *A. allogenes*. Dr. Ris' opinion is that in spite of the remarkable difference in the triangles, the two forms must be placed in the same genus, and are probably not even more than subspecies or geographical races of one widely diffused and variable species. In *Agrionoptera*, as in *Nannodythemis* (which I have already dealt with in Part i. of this paper) lack of sufficient material from many localities has caused the genus to be founded, partly at least, on an important character which was accepted as constant and of generic value, whereas the discovery of this new Australian form, so closely allied to the type *A. insignis* Ramb., shows us the necessity for revising our classification of the group and eliminating from the generic definition a character which is not shared in common by all its members.

In the markings of thorax and abdomen, the four species *A. insignis* Ramb., *A. quatuornotata* Br., *A. similis* Selys, and *A. allogenes* are extremely similar, and the individual variation of specimens is sufficient to prevent us from drawing a hard and fast distinction between them; *A. similis* and *A. allogenes*, however, differ from *A. insignis* and *A. quatuornotata* by having only one submedian cross-vein instead of two.

Note.—In the description of this species formerly made by me, and referred to above, I compared this beautiful insect with the larger *Lathrecista festa*, an insect of similar form and habits. At that time I possessed only three immature examples of the latter of an orange-brown colour; and this led me into the error of saying that *A. allogenes* "is far more brilliantly coloured than *L. festa*." On my recent visit to Cooktown, however, I took a fine series of *L. festa* (♂) and also some *A. allogenes* (♂), both mature; and I can now correct my statement, and say that of all the brilliant red dragonflies I have seen in Australia, *L. festa* is perhaps the most brilliant, outrivalling even such vivid insects

as *Erythemis rufa* and *Orthetrum villosovittatum* in the pure vermilion of its abdomen. *A. allogenes* has a narrower and duller abdomen with the last three segments black, while *L. festa* is brilliant red throughout. It, however, lacks the brilliant metallic frontal spots possessed by *A. allogenes*.

This insect occurs at Cairns and Cooktown both in winter and summer.

6. AGRIONOPTERA REGALIS, n.sp. (Plate xiv., fig.3).

♂. Total length 48 mm.; abdomen 33 mm.; forewing 41 mm.; hindwing 40 mm.

Wings: *neuration* black, *pterostigma* black, 5 mm.; *membranule* very small, brownish; *triangle of forewings* with one cross-nervule, followed by one row of three cells and then five rows of two cells in the discoidal area, increasing afterwards to three again; *triangle of hindwings* free. *Nodal Indicator* |14 13-14|
 Head: *occipital triangle* very small, black; *eyes* |14 13-15|
 dark brown; *vertex* small, much tubercled, bifid, bright metallic blue, the three *ocelli* arranged round it in a triangle; the central ocellus large and conspicuous, and all three transparent, pale yellowish; *front* wide above, low in front, somewhat cleft medially, brilliant metallic blue, a dull yellowish-grey area low down on each side; *postclypeus* pale yellow with a flap or fold on each side overhanging the *anteclypeus* and carrying a small point; *anteclypeus* and *labrum* pale yellow; *labium* and *genæ* large, pale rich brown; a large black central mark with a semicircular bar on *labium*; *mouth* broadly edged with black. **Thorax:** *Prothorax* hairy, very dark brown. *Meso-* and *metathorax* hairy in front, very dark brown or almost black above, downy; a short double yellowish line on dorsal ridge and a pair of indistinct yellowish marks inside interalar ridge; sides greyish-black, crossed by a broad *longitudinal* band of dull yellow, nearly in line with the abdomen, somewhat irregular, and enclosing the conspicuous meso-spiracle; *notum* black, *scuta* and *scutella* yellowish. *Legs* black, *procoxæ* and part of underside of *profemora* pale yellow, *tibiæ* with conspicuous stiff hairs or spines. **Abdomen:** 1-2

very short, slightly enlarged; 3 with transverse carina one-fourth from base, 3-4 slightly narrowed in middle, 5-8 slightly enlarged again, 9-10 slightly narrower. Colour black; 1, a touch of pale yellow on dorsum, a yellow spot on each side; 2, a yellow dorsal mark, a small round spot on each side. These markings vary in shape and size with the specimens. No other markings. Appendages: *superior* 2.3 mm., sublanceolate, somewhat curved, bases separate, tips pointed and curving outwards; hairy, black. *Inferior* nearly as long, subtriangular, tip upcurved, blunt and rounded; black.

♀. Total length 49 mm.; abdomen 33 mm.; forewing 44 mm.; hindwing 42.5 mm. *Nodal Indicator* $\left\{ \begin{array}{l} 16 \\ 15-16 \end{array} \right\}$ Head: *vertex* and *front* brilliant metallic green $\left\{ \begin{array}{l} 16-17 \\ 15-16 \end{array} \right\}$ or greenish-blue; *clypeus* dull shiny yellowish-brown; *labrum* black, a brown spot on each side. *Thorax* as in ♂. *Abdomen*: 1-2 rather broad, narrowing to 4 then broadening to end. Colour black; 1, a yellow spot above, a pale yellow round spot on each side; 2, an elongated dorsal mark and a spot on each side, yellow; 3, a similar dorsal mark before the carina, a slight yellow line behind the carina, on each side a small yellow basal spot and a fine yellow line behind the carina; 4-6, a suspicion of a fine yellow dorsal line near bases. Size of markings varies with the specimens. Appendages short, 1.2 mm., very wide apart at bases, straight, pointed, black.

Hab.—Cooktown, Cairns and Kuranda, N.Q. Rare. November-February.

This remarkable insect has habits totally different from most of the tropical *Libellulinae*, which are sun-loving insects inhabiting swamps and wide, open rivers. It is found only in the densest tropical forest, inhabiting small swiftly running mountain-creeks. It hawks about over the pools like an Aeschnid, but is also very fond of some particular twig or branch, to which it will continually return. It appears to shun sunlight, and is not difficult to capture.

It is closely allied to *A. longitudinalis* Selys (with which *A. biserialis* Selys and *A. Karschii* Förster are synonymous), but

differs from it in its larger size, in lacking the yellow points on the dorsal region of the thorax, in not having the wings tipped with brown, and in the yellow markings of the abdomen being restricted to the first two or three segments, whereas *A. longitudinalis* is marked from 1 to 7. The expanse of *A. longitudinalis* is 75-78 mm., that of *A. regalis* 85-90 mm.

I possess ten specimens of *A. regalis* taken by myself at Cooktown, also a fine pair taken by Mr. Dodd at Kuranda, and one taken by Mr. Allen at Cairns. The species probably extends to Cape York, and specimens from that locality are much to be desired, as they may show intermediate variation between type *A. regalis* and the New Guinea *A. longitudinalis*. In spite of the great similarity between these two species, I am inclined to think that *A. regalis* is deserving of more than subspecific rank.

The species is peculiar in being an exception to the general rule that the Australian form is generally considerably smaller than the closely allied form from Papua or the Malay Archipelago.

7. NANNOPHLEBIA ELUDENS, n.sp. (Plate xiv., fig. 4).

♂. Total length 28 mm.; abdomen 20 mm.; forewing 20 mm.; hindwing 18.5 mm.

Wings: *neurulation* thin, black; bases very faintly clouded with pale yellow up to or slightly beyond triangles; *pterostigma* short, 1.4 mm., broad, black; *membranule* minute; first post-nodals of all wings not continuous. *Nodal Indicator* $\left\{ \begin{array}{l} 6 \\ 4-5 \end{array} \right\}$ Head: *vertex* small tubercled, brown; *front ocellus* $\left\{ \begin{array}{l} 5 \\ 4-5 \end{array} \right\}$ large, transparent, pinkish; *eyes* brown; *front* slightly cleft medially, brown above, sides and face dull yellow or olive-green; *clypeus* dull yellowish; *labrum* yellowish edged with black; *labium* pale straw-colour. *Thorax*: *prothorax* brownish. *Meso-* and *metathorax* rich dark brown or black above, with a fine yellowish line on dorsal ridge; shoulders and sides yellowish or olive-green (the more mature the insect the more greenish the colouring) marked with a rather broad dark brown lateral band running from fore wing-join to mesocoxa, a narrower and more irregular band arising from the first one and proceeding to the lower

metapleurum, continuing across the underside, and a short brown band arising under the hind wing-join and proceeding along the pleural suture for not more than 2 mm.; notum dark brown or black spotted with yellow or olive-green. *Legs* black, undersides of profemora and bases of undersides of meso- and metafemora pale straw-colour. *Abdomen*: 1-2 swollen, 3-6 very slender, 7-10 wider. Colour black, marked with yellow in the young, olive-green in the mature insect as follows:—1, sides yellowish; 2, a transverse basal band, and on each side a very large spot, extending down to the genital appendage, which is very prominent, dark brown; 3, a transverse basal band; 4-6, a transverse central ring, narrow on 4-5, broader on 6; 7-10 black. *Appendages*: *superior* 1 mm., separated at bases, curving inwards to meet at tips, rather slender and of uniform width, pale straw-colour, tips pointed and just touched with brown; *inferior* 0.8 mm., subtriangular, slightly upcurved, pale straw-colour.

♀. Similar to male, generally slightly larger and with a deeper shading of yellow on bases of wings. *Abdomen*: 1-3 swollen, 4-6 narrow, 7-10 wider; generally with a fine transverse central line on 7; other markings as in male. *Appendages* short, 0.5 mm., conical, pale straw-colour.

Another very distinct form of the female exists, which may be recognized as follows—size much larger than the usual type; total length 33 mm., abdomen 23 mm., forewing 25 mm., hindwing 23.5 mm. *Bases of wings* deeply suffused to level of arculus only; *vertex* yellow, *tibiæ* pale brown; *abdomen* marked as follows: 1, broad basal band; 2, basal band, lateral central spots nearly meeting on dorsum; 3, with broad transverse band often interrupted by brown lines on dorsum; 4 with two transverse narrow bands; 5-6 with a narrow band near base and a wider central one; 7 with a fine basal transverse line and a broad central band narrowest on dorsum; 8-10 black. *Pterostigma* 2 mm.

Hab.—Cairns and Kuranda, N.Q. Not uncommon; January-May.

The three species *Nannophlebia Lorquini* Selys, *N. imitans* Ris, and *N. eludens*, n.sp., are very closely related, but may be distinguished as follows:—

N. Lorquini has the base of its front in the male very largely, in the female somewhat more narrowly, metallic greenish-black. *N. imitans* has the front metallic greenish-black above. *N. eludens* has no metallic colour on front. *N. imitans* has no yellow on the dorsal ridge of thorax; *N. Lorquini* has a very fine yellow line; so has *N. eludens*.

N. imitans has the abdomen all black except a yellow ring on 2. *N. Lorquini* has the abdomen similar to *N. eludens* ♂.

It is very probable that these three species are only geographical subspecies of one widely distributed and exceedingly variable species. The Australian form is, however, sufficiently distinct and constant to merit a new name. I have named it *N. eludens* because of its peculiar elusive zigzag flight up into the air when disturbed from its usual rest on a favourite twig.

8. TETRATHEMIS CLADOPHILA, n.sp. (Plate xiv., fig. 5).

♂. Total length 25 mm.; abdomen 16.5 mm.; forewing 21 mm.; hindwing 19.5 mm.

Wings: *neuration* fine, black; basal half to nodus slightly suffused with dull yellow; *pterostigma* 1.6 mm., rather broad, black; *membranule* nil; one cross-nervule in hypertrigonal spaces, 3-4 submedian nervules. *Nodal Indicator* $\left\{ \begin{array}{l} 8 \quad 5 \\ 7 \quad 4-5 \end{array} \right.$ *Head*: *eyes* dark brown; *vertex* dark metallic green, $\left\{ \begin{array}{l} 8 \quad 5 \\ 7 \quad 4-5 \end{array} \right.$ front *ocellus* transparent, pink; *front* cleft medially, downy, orange-yellow; *clypeus* dirty glaucous-grey; *labrum* black; *labium* pale straw-colour; *mouth* edged with brown. *Thorax*: *prothorax* pale dirty brownish. *Meso-* and *metathorax* very dark steely metallic green above; on each side a subhumeral blotch of yellow placed very far forward, somewhat narrowed or pointed behind; sides greenish-yellow with a brown band in the pleural suture; interalar ridge, scuta and scutella yellowish or brownish. *Legs* black, *tibiæ* with long cilia. *Abdomen* short, cylindrical; 1-2 yellow, an anal transverse black band on 2 and base of 3; rest of basal

half of 3 yellow, anal half black; 4-10 black, a transverse basal yellow band on 4; a basal yellow spot on each side of 5-6; basal half of 7 yellow. Appendages: *superior* 1 mm., slender, black, somewhat hooked; *inferior* 1 mm., subtriangular, blackish, tip upcurved.

♀. Similar to male, wings slightly longer; abdomen slightly shorter, 1-2 slightly enlarged. Bases of wings to nodus conspicuously suffused in mature specimens. *Labrum* black, with two round yellowish spots. Abdomen coloured as follows—1-2 yellow, 3 yellow, a basal black band and a longitudinal black band on dorsum; 3-4 with a black line showing on supplementary carina; 4-6 with a large yellow mark on each side; 7, basal two-thirds yellow; 8-10 black; 9-10 very short; 10 with a projecting tongue underneath, brownish. Appendages very short, wide apart, straight, pointed, black.

Hab.—Cooktown, N.Q. Rare; January, 1908.

I have named it *T. cladophila* because of its great fondness for returning again and again to the same twig, even after being frightened away with the net.

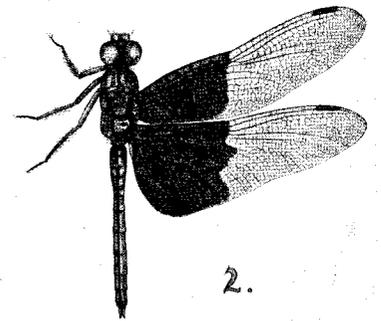
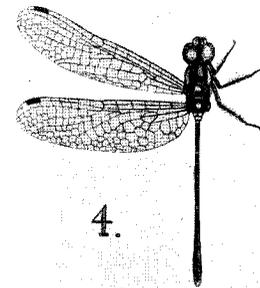
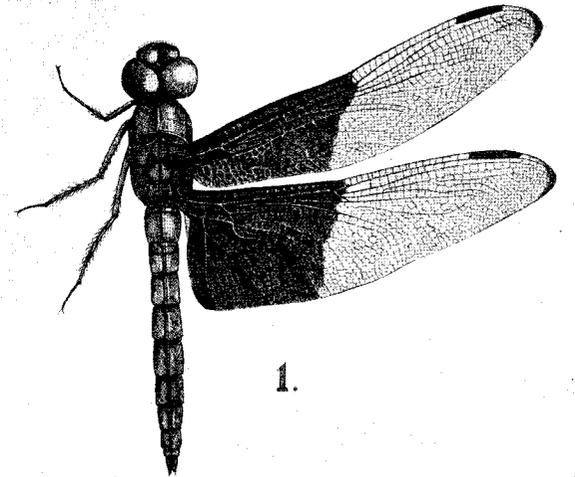
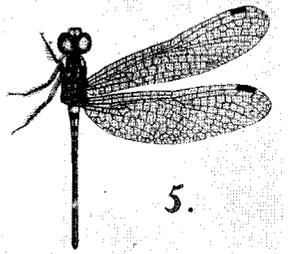
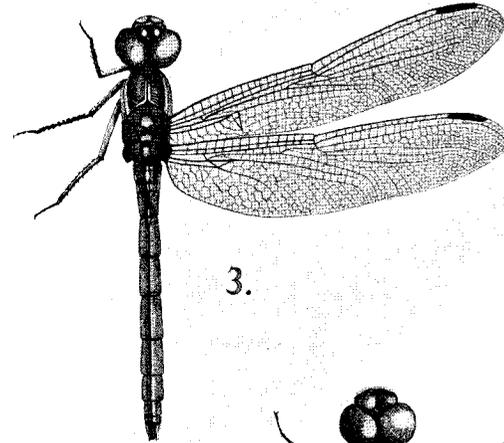
This quaint little dragonfly differs considerably from the *Tetrathemis* which I took at Cairns in 1905; the latter was determined by M. René Martin as identical with *T. flavescens* Kirby, from Borneo. The chief difference is that the vertex and thorax of *T. flavescens* are brown; the yellow shading of the wings only apparent at the bases and near the nodus, and *not throughout* the basal half of the wings. The markings of the abdomen and the shape of the appendages and tenth segment of the female also differ considerably. [For purposes of comparison, see pp 487-488, these Proceedings for 1906, "New Australian Species of the Family Libellulidae."]

It is interesting to note that the vertex presents the same difference in *T. cladophila* and *T. flavescens* as it does in *Nannophlebia Lorquini* and *N. eludens*. But in the former two the difference has extended to the thorax also, which is metallic in *T. cladophila*.

In conclusion, I wish to acknowledge the kind and ready help of my friend, Dr. Ris of Rheinau, Switzerland, in supplying information on nearly allied species and in generously giving me the benefit of his experienced opinion on some of the more difficult forms described in this paper.

EXPLANATION OF PLATE XIV.

- Fig. 1.—*Camacinia Othello*, n.sp., ♂ nat. size.
 Fig. 2.—*Rhyothemis Alcestis* Tillyard, ♂ nat. size.
 Fig. 3.—*Agrionoptera regalis*, n.sp., ♂ nat. size.
 Fig. 4.—*Nannophlebia eludens*, n.sp., ♂ nat. size.
 Fig. 5.—*Tetrathemis cladophila*, n.sp., ♂ nat. size.



R.J.T. del.