GOMPHIDÆ

BY

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Fasc. XXI.

GOMPHIDÆ

Few groups in the order Odonata have experienced such vicissitudes in their classification as the Australian *Gomphidæ* : originally placed in two genera, the species have changed from one genus to the other and then back to the original genus or to another. The incomplete data supplied or no data at all were the contributary causes to this confusion and must have presented baffling problems to E. DE SELYS. At a later date, René MARTIN, with great presumption and surprisingly supported by Dr R. J. TILLYARD, merged the Selysian genus *Hemigomphus* in *Austrogomphus* SELYS on the grounds that there were insufficient characters to separate them, and thus further aggravated the confusion which has persisted to the present time.

Recently, the receipt of a number of Australian Gomphines from Mr R. DOBSON of Sydney, has led me to make another examination of a few species which I received from Dr R. J. TILLYARD some years ago. I find these so incorrectly determined as to throw doubt on the R. J. TILLYARD species as a whole. He described quite a number of supposedly new species apparently without attempting to compare them with the old Selysian types or even considering a possible synonymy : it became clear that a revision of the whole group was eminently to be desired. In carrying this out, it was necessary that I should reexamine the types, and for the loan of these, I am greatly indebted to Dr V. VAN STRAELEN, Director of the Institut royal des Sciences naturelles de Belgique : I am also grateful to Dr R. MALAISE for the loan of Y. SJOSTEDT's types of *A. Mjobergi* and *A. pusillus* from the Riksmuseum, Stockholm, and to the Hope Professor of Zoology, Oxford University for loan of Dale's types in the Hope Museum. Acknowledgments are due to Mr R. DOBSON who not only presented me with specimens but also lent me the whole of his collection of Australian *Gomphidæ* for purposes of this revision. Lastly credit must be given to Mr D. E. KIMMINS of the British Natural History Museum for his continued assistance and advice in compiling this revision : owing to the regretable conservative attitude of that Museum in not permitting the loan of types, which is in strong contrast to the enlightened and cooperative attitude of the Continental Museums, I was greatly handicapped in my work and had continually to call on Mr D. E. KIMMINS to supply me with notes and figures of the types during such times as I was not in a position to do these examinations personally. My thanks are also due to Dr Max BEIER of the Vienna Museum for kindly making a search for the type of *Austrogomphus collaris* which unfortunately, he informs me, is lost. With the cooperation of all these specialists, I have been able to examine some 160 specimens including the whole of the ancient types save three (*collaris, Gouldii* and *præruptus*) and that of *A. Turneri* MARTIN.

HISTORICAL.

We owe the first classification of the Australian *Gomphidæ* to E. DE SELYS who, in 1854, just on a century ago, erected the two genera *Austrogomphus* and *Hemigomphus* : under the former he included — *Gouldii* SÉLYS, *collaris* SÉLYS, *australis* SELYS, *interruptus* SELYS and *Gomphus Guerini* RAMBUR : under the latter, he included only a single species, *heteroclytus* SÉLYS (but along with two species from S. America, *elegans* SÉLYS and *molestus* SÉLYS, which were removed subsequently to the new genus *Neogomphus* SELYS). In 1857 (Mon. Gomph., pp. 186 and 419) *heteroclytus* was struck off the list of Australian Gomphines under the mistaken impression that it was a South American species : later however, when further examples had been received from Australia, the species was restored to the Australian list. At the same time, *Austrogomphus Gouldii*, which had been described from an incomplete specimen, was now transferred to its correct genus *Hemigomphus*, a note made at the time stating that it was in all probability a synonym of *heteroclytus*. Finally a new species was described under the name of *præruptus* SELYS, which the author placed in genus *Onychogomphus*, suggesting at the same time that *Austrogomphus interruptus* might have to be transferred to the same genus. Twelve years later, in 1869, E. DE SÉLYS described *Hemigomphus ochraceus* from a specimen lacking the end of the abdomen and anal appendages : had he seen the complete insect which is now available to us, there is no doubt but that he would have placed it in *Austrogomphus* of which it is a very typical species. The last two species to be described by E. DE SELYS were *amphiclitus*, 1873 and *lateralis*, 1879 both of which he placed in *Hemigomphus*, the latter with some doubt. *Ictinus australis* SELYS was also described in this year but is not typical of the australian fauna and is the only example belonging to the subfamily *Ictinogomphinæ*.

I have combed through the voluminous E. DE SELYS-R. MC LACHLAN correspondence which came into my possession some years ago, to see if there be any mention of the various species now under review, and I find the following observations which it is of interest to quote. Letter dated March 25 th, 1872, Liége « La Gomphine de Queensland est un *Austrogomphus* (evidently referring to *amphiclitus*) sans doute n. sp. mais la coloration est celle des *Hemigomphus* actuels (voir Syn. Additions) comprenant *heteroclytus, Gouldii* et *ochraceus* (et non dans la Monogr. Gomph.). Elle semble très voisine de *Gouldii* dont les app. sont inconnus. De sorte qu'il est probable qu'il faudra réunir les Austrog. et les Hemig. ». Letter dated June 12th, 1872, Liége, contains a list of specimens returned by rail to R. MC LACHLAN, among which is « *Ictinus australis* n. sp. male and *Hemig. amphiclytus* n. sp. male, Queensland ». In the 1873 paper, this species occurs under the name of *amphiclitus*, the latter being the correct spelling of the name. A previous letter, dated June 8th gives as Australian genera *Austrogomphus* with 3 species and *Hemigomphus* with 5 but the species are not enumerated. In a letter dated Liége, October 18th, 1873, a list of new species is added as a postscript, among which occurs « *Hemigomphus* ? *lateralis* Nord Australia (Brit. Mus. sans abdomen) ». It would seem then that this species was received incomplete from the first ? In letter dated 29th September, Liége, 1878, E. DE SELYS asks R. MC LACHLAN if he thinks *amphiclitus* maght fit into his new genus *Leptogomphus*, an oriental one. Thus « La question est de savoir si *Hemigomphus amphiclitus* de votre collection, mâle (3rd add. N°. 58ter.) de Queensland, peut se placer comme je le soupçonne dans ce sous-genre nouveau. D'après ses appendices anaux ? D'après la nervule interne du ptérostigma — D'après les triangles discoïdaux — D'après la forme du triangle anal et de l'angle anal. Ma description publiée est assez longue, mais je vois que j'ai oublié de noter : combien d'anticubitales, combien de postcubitales, dans les ailes supérieures. Enfin comment sont les

épines des fémurs postérieurs ? J'espère que vous aurez la bonté de me répondre à ces questions ». Unfortunately I do not possess R. Mc LACHLAN's letters in reply to those of E. DE SELYS, but from a letter dated October 7th 1878, Waremme, it is evident that R. Mc LACHLAN was not in agreement, for E. DE SELYS writes. « Quant à l'*Hemig. amphiclitus*, vous avez raison. Ce n'est pas un *Leptogomphus*, mais en l'examinant de plus près que je ne l'avais fait autrefois, je vois dans les appendices supérieurs à l'extrême base une dent interne inférieure conique comme chez l'*Austrogomphus Guerini* et je suis persuadé qu'il appartient à ce dernier genre et non au *Hemigomphus* dont *heteroclytus* est le type classique ». This letter is most important, for the ventral tooth or spine of the superior appendages was not mentioned in the description of *amphiclitus*, nor did any correction occur afterwards. It is possible that this omission led M. MARTIN in later years to describe the same species under the name of *Risi*, which had a ventrobasal spine to the superior appendage. When I examined the type of *amphiclitus* recently, I noticed that the ventrobasal spine was present although not mentioned by E. DE SELYS and was not aware until I read this early letter that he had noted his own omission.

In 1879, when the final observations had been made on the Australian *Gomphidæ*, the Selysian classification was as follows.

1. *Ictinus* RAMBUR, *australis* SELYS.
2. *Austrogomphus* SELYS, *australis* SELYS, *collaris* SELYS, *Guerini* (RAMBUR) and *interruptus* SELYS.
3. *Hemigomphus* SELYS, *heteroclytus* SELYS, *Gouldii* SELYS, *amphiclitus* SELYS, *lateralis* SELYS and *ochraceus* SELYS.
4. *Onychogomphus* SELYS, *præruptus* SELYS.

It should be noted that W. F. KIRBY (1890, Cat. Odon. 71) gave *Gouldii* under *Heterogomphus* : this no doubt was a *lapsus calami* for *Hemigomphus*.

No further papers appeared on these insects until M. MARTIN's in 1901 (Mém. Soc. Zool. France, 19 : 230) in which he described two new species of *Austrogomphus-Risi* and *Turneri*. It was in this same paper that he merged the genus *Hemigomphus* in *Austrogomphus*, a policy followed by R. J. TILLYARD in 1909, so that from then onwards, all species described by these two authors went into the one genus *Austrogomphus* irrespective of their varying characters. R. J. TILLYARD even went so far as to say. « As regards wing-venation, all species are practically alike. Very little variation in this respect can be found throughout the whole subfamily » (1909, Proc. Lin. Soc. N.S.W., 34 : 239). How far this was from the truth, R. J. TILLYARD soon discovered when he came to study the development of wing-venation in the nymph, for in 1914 (l. c., 39 : 185-189) he reinstated the Selysian genus *Hemigomphus* on sound venational characters. Moreover he was able to point out that the nymphs of the two genera *Hemigomphus* and *Austrogomphus* differed markedly in shape and ecology. In a foot-note, he states that the genus *Hemigomphus* was suppressed by R. MARTIN owing to the very slight differences between it and *Austrogomphus*, but overlooks the fact that he himself had alluded to the two genera as « purely artificial ». In this paper, when giving the definitions of the two genera, he gives *Austrogomphus Guerini* RAMBUR as the genotype for *Austrogomphus*; it should be however « *Gomphus Guerini* RAMBUR ». Similarly for the genotype of *Hemigomphus* he gives *Austrogomphus heteroclytus* SELYS : E. DE SELYS however was never guilty of putting *heteroclytus* into *Austrogomphus*, so that the correct genotype should be *Hemigomphus heteroclytus* SELYS. R. J. TILLYARD completed his studies of the Australian *Gomphidæ* by putting all his species into

Austrogomphus save *heteroclytus* SELYS, *comitatus* TILLYARD and *armiger* TILLYARD, which he placed in *Hemigomphus*. As the only mention of *Gouldii* by him is as an *Austrogomphus*, it is to be presumed that he regarded it as belonging to that genus although E. DE SELYS had shown that it was practically identical to *heteroclytus*. R. J. TILLYARD's species *melaleucæ* placed by him in *Austrogomphus*, was said by him to be close to *præruptus* so here again we must presume that he regarded the latter as an *Austrogomphus* : indeed be quotes it as *A. præruptus* SELYS although it was described by E. DE SELYS as an *Onychogomphus* ·

Owing to the nature of the types, known only from female or incomplete or teneral specimens, difficulties must always confront the student of this group of Gomphines. *A. collaris* SELYS known only from a female and the type now lost; *H. Gouldii* (SELYS) known only from a single pair of specimens, both with the end of the abdomen missing (R. J. TILLYARD, 1909, Proc. Lin. Soc. N.S.W., **34** : **254**, states that there are three males in good condition in the National Museum, Melbourne, but how he made his determination is not explained : if he had seen them, he would have recognized that they were identical to his *comitatus*); *A. ochraceus* (SELYS) known only from one incomplete male; *A. interruptus* SELYS known from a single teneral female with the head missing and lastly *A. lateralis* (SELYS) described from a female with the abdomen missing. Truly poor material to make a study of. « The two types of *præruptus* and *Gouldii* were formerly in the old SAUNDERS collection but were lost when that collection was broken up and distributed : although most of it went to the British Museum I have been quite unsuccessful in my enquiries for the types. In the Selysian collection at Bruxelles, there are two species bearing MSS names in E. DE SELYS handwriting. These were never described by him, but R. MARTIN, in his 1901 paper, mentions them with the briefest descriptions. Mr D. E. KIMMINS is of opinion that this validates the two names, which I have therefore retained under the joint authorship of « SELYS in MARTIN ». This is of some importance as R. J. TILLYARD described the same two species as *manifestus* and *arenarius*, the Selysian names taking priority. As will be seen below, the venation of these two species — *acolytus* and *proselytus*, as well as the shape of the penile organ are similar in the two and differ from all other Australian Gomphines : for this reason, I have erected a new genus *Antipodogomphus* for their reception. From the nature of the two names, it seems clear that E. DE SELYS himself had recognized their close relationship to one another.

PRESENT LIST OF AUSTRALIAN GOMPHINES AND THE CLASSIFICATION ADOPTED IN THIS REVISION.

Family **GOMPHIDÆ.**

Subfamily ICTINOGOMPHINÆ.

Austrictinogomphus australis SÉLYS = *Ictinus australis* SELYS.

Subfamily EPIGOMPHINÆ.

Hemigomphus heteroclytus SÉLYS.
Hemigomphus Gouldii (SELYS) = *Austrogomphus comitatus* TILLYARD.
Hemigomphus armiger (TILLYARD).
Austroepigomphus præruptus = *Austrogomphus melaleucæ* TILLYARD.

Subfamily GOMPHINÆ.

Antipodogomphus acolytus (SÉLYS in MARTIN) = *Austrogomphus manifestus* TILLYARD.
Antipodogomphus proselytus (SÉLYS in MARTIN) = *Austrogomphus arenarius* TILLYARD.
Austrogomphus Guerini (RAMBUR).
Austrogomphus australis SELYS ? = *Austrogomphus collaris* SELYS.
Austrogomphus collaris SÉLYS.
Austrogomphus ochraceus (SELYS).
Austrogomphus Doddi TILLYARD.
Austrogomphus lateralis (SELYS).
Austrogomphus amphiclitus (SELYS) = *Austrogomphus Risi* MARTIN.
Austrogomphus pusillus SJOSTEDT.
Austrogomphus Mjobergi SJOSTEDT.
Austrogomphus arbustorum TILLYARD.
Austrogomphus bifurcatus TILLYARD.
Austrogomphus prasinus TILLYARD.
Austrogomphus angeli TILLYARD.
Austrogomphus Turneri MARTIN.

INCERTÆ SEDIS.

Austrogomphus ? interruptus SELYS.

Of the five genera included in the above list, all save *Austrictinogomphus australis* (SELYS) are endemic in Australia : the remaining four are divided by generic characters in their venation and genitalia. The latter shows such astonishingly broad variations that it is impossible to make comparisons between them : only in *Austrogomphus* and *Antipodogomphus* is there found common to both a forcipated process which embraces the glans of penis from behind as if to afford protection to it. No greater contrast could be found than that between the spoonshaped structure with its lateral membranous flaps of *A. præruptus* (Fig. 9, K, K′.) and the trumpet-like structure with its embracing collar behind and long spatulate director below of *Austrogomphus* (Fig. 10, A.). That of *Hemigomphus* (Fig. 9, I, I′.) is even more remarkable, its glans furnished with two high semicircular plates in close parallel apposition and a small moustache-like membranous frill at the apex. Only minor differences exist between the species of any one genus.

KEY TO THE AUSTRALIAN SPECIES OF THE *GOMPHIDÆ*.

1. Triangles and subtriangles of fore- and hindwings broken up into secondary cells by cross-veins; very large robust species with the 8th and 9th abdominal segments expanded laterally ... ... *Austrictinogomphus australis* (SELYS).

— Triangles and subtriangles of all wings entire; smaller or medium sized species without dilatation of the 8th and 9th abdominal segments 2

2. Three or more cross-veins between the sectors of arculus proximal to the first forking of Rs in forewing and never less than two in the hindwing 3

— Usually two, rarely three cross-veins between the sectors of arculus in forewing and never more than one in the hind 6

3. Anal-triangle of 4 to 5 cells; pterostigma short and markedly dilated; ventro-basal branches of superior anal appendages lie to inner side of branches of inferior appendages; incomplete basal subcostal antenodals rarely present ... ... *Austroepigomphus præruptus* (SELYS).

— Anal-triangle of male only 3-celled; pterostigma long and narrow; ventro-basal branches of superior anal appendages lie to the outer side of branches of inferior appendages, basal subcostal antenodals never present ... ... (*Hemigomphus* SELYS) 4

4. Humeral and antehumeral stripes of thorax broadly confluent and forming two broad irregular triangular areas on dorsum; superior anal appendages of male with a short, stout ventrobasal spine with its apex to outer side of inferior appendages; IIth sternite produced laterally into a claw-like process which embraces the outer side of inferior anal appendage ... ... *Hemigomphus armiger* (TILLYARD).

— Humeral and antehumeral stripes of thorax not confluent, the former often interrupted; superior anal appendages with a stout, ventro-basal claw-like process on its outer side (similar to that of *armiger* but arising from the appendage) embracing the outer side of inferior appendage 5

5. In the hindwing, the cell (rudimentary anal-loop) immediately posterior to the subtriangle divided into 2 cells; robust species with yellow black markings about evenly balanced; no black stripe on lower border of metepimeron; antehumeral stripe often confluent or nearly so with the mesothoracic collar. *Hemigomphus heteroclytus* SELYS.

— In the hindwing, the cell immediately posterior to subtriangle not divided : slimmer species with slim abdomen and with the black markings preponderating; a black stripe along the lower border of metepimeron; antehumeral stripes always well separated from mesothoracic collar ... ... *Hemigomphus Gouldii* (SELYS).

6. Anal-triangle with 3 cross-veins which meet at a point within the triangle; *Ac* (Cuq) more or less distal to the level of the anal-triangle (rarely in line with its outer border); an incomplete basal subcostal antenodal vein present in most or all wings (*Antipodogomphus* gen. nov.) 7

— Anal-triangle crossed by 2 curving veins from superior and outer sides of triangle to the inner; no subcostal antenodals present at base (*Austrogomphus* SELYS) 8

7. Humeral stripe broken up into 2 large spots, an upper and a medial; antehumeral stripes confluent with the mesothoracic collar, forming figures of 7 ... ... *Antipodogomphus acolytus* (SELYS).

— Humeral stripes broken up into 3 spots, superior, medial and a smaller inferior one; antehumeral stripes confluent with the mesothoracic collar, forming T-shaped figures; yellow markings very much more extensive than in the dark coloured *acolytus* ... ... *Antipodogomphus proselytus* (SELYS).

8. Antehumeral stripes not confluent with the mesothoracic collar 9

— Antehumeral stripes confluent with the mesothoracic collar to form figures of 7 13

9. Humeral stripe represented by a small upper spot only; antehumeral stripe reduced to an oval spot widely separated from the mesothoracic collar; antero-lateral stripe incomplete; postero-lateral stripe complete ... ... *Austrogomphus lateralis* SELYS.

— Humeral stripe represented by a small upper spot followed by a narrow stripe after a short interval; antehumeral stripe similar to *lateralis*; both lateral stripes complete and confluent above and below ... *Austrogomphus Turneri* MARTIN.

— Humeral stripes complete... 10

10. Very small species with abdomen less than 25 mm and hindwing less than 20 mm in length; anal-field of hindwing only 3 cells deep ... ... *Austrogomphus Mjobergi* SJOSTEDT.

— Larger species with abdomen over 25 mm and hindwing over 20 mm in length; anal-field of hindwing 4 cells deep 11

11. Superior anal appendages of male carrot-shaped but the extreme pointed apex placed at a lower level so that the appendage viewed from above seems to have a false rounded tumid apex with the true apex situated below it; antehumeral stripes not curved nor expanded outwards below ... ... *Austrogomphus ochraceus* SELYS.

— Superior anal appendages carrot-shaped, tapering evenly to an acute apex; antehumeral stripes oblique but curved 12

12. The narrow black stripe on lower part of frons of even width and not extending on to postclypeus; antero-lateral stripe of thorax interrupted or not at its middle ... ... *Austrogomphus australis* SELYS.

— The narrow black stripe on lower part of frons expanded at its middle and confluent with a black spot on the postclypeus; the antero-lateral stripe of thorax always entire ... ... *Austrogomphus arbustorum* TILLYARD.

13. Humeral stripes interrupted above and below; lateral thoracic stripes confluent at their middle; occiput of female with a short, black truncated process on each side ... *Austrogomphus Doddi* TILLYARD.

— Humeral stripes entire; lateral thoracic stripes not confluent; occiput of female variable, occasionally with processes 14

14. Very small species with hindwing less than 20 mm in length; antero-lateral stripe of thorax obsolete or a mere vestige present opposite the spiracle; anal superior appendages of male simple, cylindrical, closely parallel, apices shallowly excavate above ... ... *Austrogomphus pusillus* SJOSTEDT.

— Larger species with hindwing longer than 20 mm; antero-lateral stripe of thorax variable, always well defined in some part of its course; anal superior appendages variable 15

15. Humeral and antehumeral stripes often confluent above; antero-lateral stripes of thorax present only in the lower half; occiput of female with a stout hooked process on each side and a shorter process in the middle situated at a lower level than the lateral one; pterostigma bright ochreous ... ... *Austrogomphus Guerini* (RAMBUR).

— Humeral and antehumeral stripes not confluent above; antero-lateral stripes of thorax variable; occiput of female with or without processes; pterostigma partly or wholly black... 16

16. Two complete stripes on sides of thorax; occiput of female with four truncated processes on its hinder border, one on each side and a medial pair ... ... *Austrogomphus angeli* TILLYARD.

— Lateral stripes of thorax incomplete; occiput of female without processes 17

17. Lateral stripes of thorax deficient in their lower halves but broadly expanded and confluent above; superior anal appendages of male with a preapical spine on dorsum so that they appear to be bifurcated ... ... *Austrogomphus bifurcatus* TILLYARD.

— Lateral stripes of thorax deficient in their lower halves, the upper widely separated and narrow, the postero-lateral stripe often entirely absent 18

18. Apices of superior anal appendages of male obtusely rounded and furnished with 2 short, stout spines on dorsum and outer side, the latter carinated below and representing the true apex ... ... *Austrogomphus prasinus* TILLYARD.

— Apices of superior appendages of male tapered to an acute point which is carinated below ... ... *Austrogomphus amphiclitus* (SELYS).

In the above key, it will be noticed that several species have not been included : this is because the specific names of such are regarded as synonyms, or, in the case of *Austrogomphus ? interruptus* SELYS, because I believe that this species has been included erroneously in the australian fauna. In the case of those species of which the types are lost, I have had to rely on characters obtained from the original descriptions supplemented by others obtained from new material which I believe to be determined correctly as paratypes of the lost species. Thus *Gouldii* SELYS is described from *Austrogomphus comitatus* TILLYARD, the synonymy not being in doubt in this case : *præruptus* SELYS is described from *Austrogomphus melaleucæ* TILLYARD, another undoubted synonym, which R. J. TILLYARD partially admitted when he said his species lay « very close » to *præruptus* : *lateralis* SELYS is described from *occidentalis* TILLYARD and the actual type. In 1909, R. J. TILLYARD stated that « *lateralis* bears some points of resemblance to *occidentalis* » (Proc. Lin. Soc. N.S.W., 34 : 254)). Apparently he revised this opinion at a later date in favour of a full synonym, for I find among his specimens in the British Museum, some which are labelled as *lateralis*. *Austrogomphus Risi* MARTIN, stated by R. J. TILLYARD to have been described from a unique female in the E. DE SELYS collection, is actually a synonym of *Austrogomphus amphiclitus* SELYS (a species which R. J. TILLYARD never once mentioned in his writings and therefore probably overlooked when describing the male of *A. Risi*). R. MARTIN's type is in the F. RIS collection, not in the Selysian as stated by R. J. TILLYARD. The differentiation between *A. australis* SELYS and *A. collaris* SELYS is extremely doubtful and rests on a single character, the complete or broken antero-lateral black stripe on the sides of the thorax, à character which is not constant in *collaris*. I have omitted the latter from the key although I have figured both species in view of some slight doubt. A similar position is found in the case of *Austrogomphus Mjobergi* SJOSTEDT and *arbustorum* TILLYARD, where the only character which I can find to separate the two, is a difference in size. Unfortunately the two respective types

were not in my hands at the same time, so that I failed to confront them : for the time I treat them as separate species on the grounds of some slight variation in the shape of the male anal appendages and their difference in size. Lastly I have not been able to examine the type of *Austrogomphus Turneri* MARTIN, as the SENCKENBERG Museum will not loan out types. However I have to thank Dr Elli FRANZ for kindly sending me a figure of the markings of the head and thorax the latter of which were quite unintelligible in R. MARTIN's description. R. MARTIN's figure of the anal appendages is strikingly similar to those of *Austroepigomphus præruptus* (SELYS) but the thoracic markings are very different and more similar to those of *Austrogomphus Mjobergi* and *arbustorum* to which group *Turneri* evidently belongs.

FAMILY **GOMPHIDÆ.**

SUBFAMILY ICTINOGOMPHINÆ.

Genus AUSTRICTINOGOMPHUS FRASER.

1. — **Austrictinogomphus australis** (SELYS).

(T. f. 5 A.)

Ictinus australis SELYS, E. DE, 1873, Bull. Acad. Belg. (2) XXXV : 769. (Queensland.)
Ictinus australis KIRBY, W. F., 1890, Cat. Odon. : 77.
Ictinus australis ID., 1894, Ann. Mag. Nat. Hist. (6) 14 : 21.
Ictinus australis MARTIN, R., 1901, Mém. Soc. Zool. France, 19 : 233.
Ictinus australis VAN DER WEELE, H, 1909, Nova Guinea, Zool., 5 : 346. (*Lieftincki* SCHMIDT nec *australis*.)
Ictinus australis RIS, F., 1915, Nova Guinea, Zool., 13 : 122. (*Lieftincki* SCHMIDT, nec *australis* SELYS.)
Ictinus australis LIEFTINCK, M. A., 1933 Rev. Suisse Zool., 40 : 434. (Distribution given as Australia to N. Moluccas but specimens from latter said to vary from those from Australia.)
Ictinus australis SCHMIDT, E., 1934 Archiv. f. Hydrobiol. Sppl. XIII, 13 : 359, 362. (*Lieftincki* nov. sp. differentiated from *australis*.)
Austrictinogomphus australis FRASER, F. C., 1939, Proc. R. ent. Soc. Lond. (B) 8 : 21 (nov. gen.).
Ictinogomphus australis australis LIEFTINCK, M. A., 1942, Treubia, 18 : 565. (*Lieftincki* given as subspecies of *australis* SELYS.)

Material examined. — Cotype in R. McLACHLAN collection, British Museum; 2 males from Queensland, coll. R. DOBSON. These compared with 3 males and 2 females of *Lieftincki* SCHMIDT.

Dr M. A. LIEFTINCK has given a full description of the differences between *australis* SELYS and *Lieftincki* SCHMIDT in the last mentioned reference, and disagrees with E. SCHMIDT by not considering the latter as of full specific value. It seems highly probable that *australis* is a direct descendant from *Lieftincki*, so that the natural relationship would be *australis* a subspecies of the latter : in view of the decided and constant differences between the two, I prefer to regard both as of full specific value. Dr M. A. LIEFTINCK, in the reference quoted, expresses his disapproval of employing sexual characters, no matter how broad, for the creation of new genera, but this procedure is being adopted by practically all modern taxonomists, and so I have retained the genus *Austrictinogomphus* which possesses a penile organ so widely variable from the rest of the family *Ictinogomphinæ*, that if it was the only character to go upon, one would not hesitate to declare that they were not even nearly related to the others.

Subfamily EPIGOMPHINÆ.

Genus HEMIGOMPHUS Selys.

(T. ff. 9 A; 9 F; 9 I, I'.)

Hemigomphus Selys, E. de, 1854, Bull. Acad. Belg., XXI (2) : 66.
Hemigomphus Id., 1857, Mon. Gomph. : 181.
Hemigomphus Kirby, W. F., 1890, Cat. Odon. : 71.
Austrogomphus Martin, R., 1901, Mem. Soc. Zool. France, 19 : 230.
Austrogomphus Tillyard, R. J., 1909, Proc. Lin. Soc. N.S.W., 34 : 239.
Hemigomphus Tillyard, R. J., 1914, l. c. 39 : 188. (The genus reinstated.)
Hemigomphus Id., 1926, Insects Australia and N. Zealand : 83.

A small genus of medium sized Gomphines : nymphs with cylindrical torpedo-shaped abdomen, antennae with 4 segments, the 3rd segment greatly expanded, the 4th nearly obsolete; living in clear, running water and burrowing in sand. Venation of imago rather close, pterostigma of moderate size, not swollen, pairs of long main veins divaricate at wing border, discoidal cell in hindwing elongate, no basal subcostal cross-veins present, *Ac* distinctly d i s t a l to the level of the anal triangle, 3 or more cross-veins between the sectors of arculus proximal to the Radial fork. Male anal superior appendages usually simple and without a ventral branch. Genotype — *Hemigomphus heteroclytus* Selys.

The genus was founded by E. de Selys in 1854, merged with *Austrogomphus* by R. Martin in 1901 on quite erroneous grounds, which procedure was followed by R. J. Tillyard in 1909. The latter author, after further research, reinstated it in 1914; he showed that the nymph differed from that of *Austrogomphus* by the possession of papillae on the rectal gills and by the more distal branching of the anal trachea, which is reflected in the imago by the more distal position of the cross-vein *Ac* (Cuq). This simple character serves to separate instantly *Hemigomphus* from all other Australian *Gomphidæ* save species of *Antipodogomphus*.

2. — **Hemigomphus heteroclytus** Selys.

(T. ff. 9 A; 1 A; 5 B, C, D.)

Hemigomphus heteroclytus Selys, E. de, 1854, Bull. Acad. Belg., XXI (2) : 68.
Hemigomphus heteroclytus Id., 1857, Mon. Gomph. : 186, 419, 432, pl. X, anal appendages and genitalia.
Hemigomphus heteroclytus Kirby, W. F., 1890, Cat. Odon. : 71.
Austrogomphus heteroclytus Martin, R., 1901, Mém. Soc. Zool. France, 19 : 231. Victoria, Australia.
Austrogomphus heteroclytus Tillyard, R. J., 1909, Proc. Lin. Soc. N.S.W., 34 : 247. Victoria and N.S.W., local.
Hemigomphus heteroclytus Tillyard, R. J., 1914, l. c. 39 : 188 (Here Tillyard gives *Austrogomphus heteroclytus* as genotype but Selys never included the species in that genus).
Hemigomphus heteroclytus Id., 1926, Ins. Australia and N. Zealand : 83, pl. 5, f. 1 and t-f. F 17.

Material examined. — I male, Dale collection, Hope Museum, Oxford, in poor condition, segment 10 and appendages missing, wings broken. Labels « *heteroclytus* » and « *Hemigomphus heteroclytus* » « Ent Club »; 3 males in E. de Selys collection, Brussels Museum : labels. « Ent. Club, 44.12 », Mauve coloured label « Dale », « *Hemigomphus heteroclytus*, S. ♂ », second specimen bears a blank, pink label and a white label with « Adelaide » in E. de Selys handwriting. 5 males, I female in the R. J. Tillyard collection, British Museum, from Victoria and N. S. Wales.

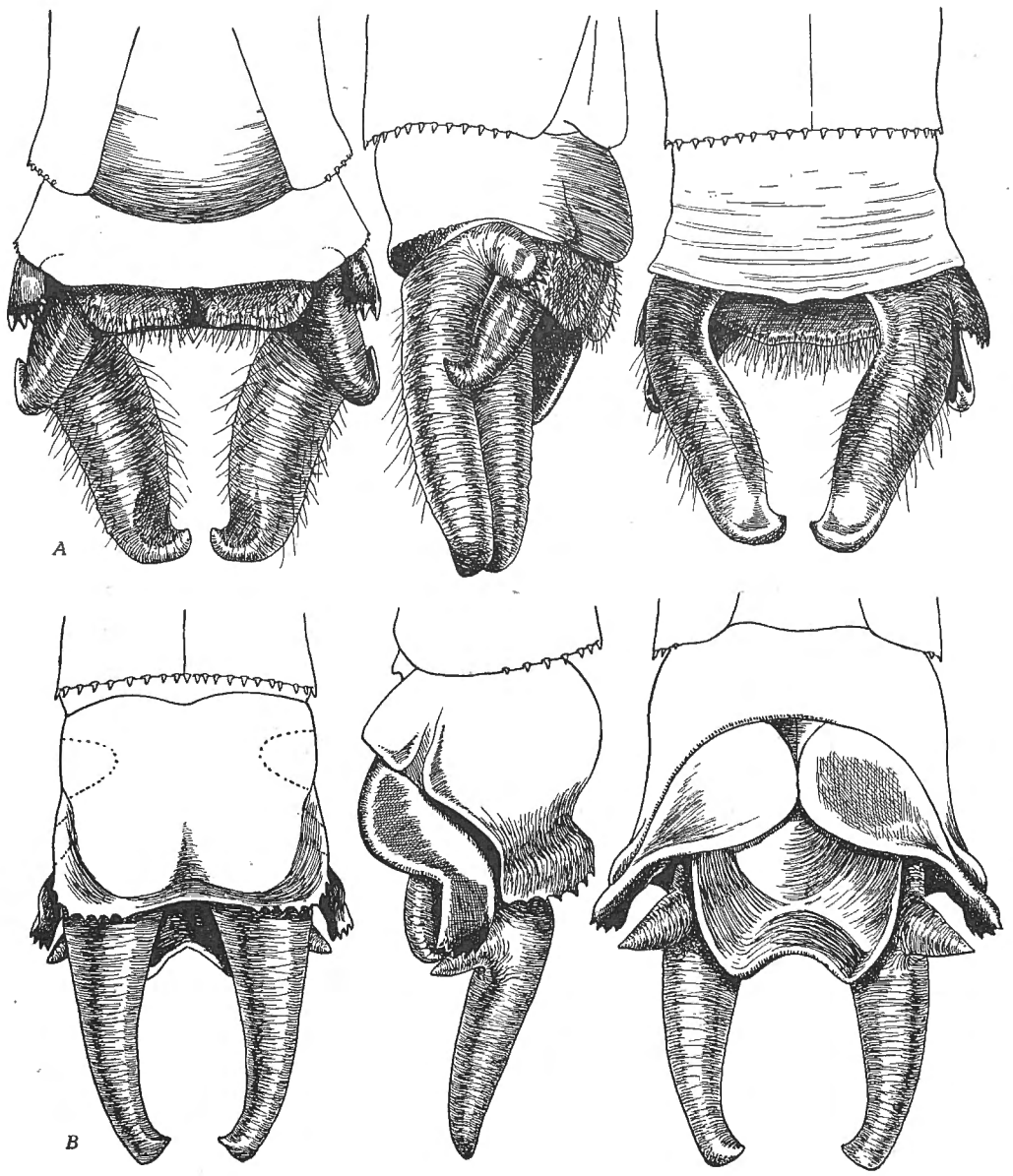

FIG. 1. — Male anal appendages.

A. — *Hemigomphus heteroclytus* SELYS, ventral, right lateral and dorsal aspects, ×13.
From the type in the Selysian collection.
(Note that the appendages of *Hemigomphus Gouldii* SELYS are entirely similar.)

B. — *Hemigomphus armiger* (TILLYARD), dorsal, left lateral and ventral aspects, ×13
From the type in the British Museum.

The species has been adequately described by E. DE SELYS, and the figures by H. HAGEN, although small, are very accurate. Its relationship to *H. Gouldii* SELYS is so close as to suggest the latter to be of not more than subspecific value. A constant character separating them is found in the thoracic markings where the antehumeral band is nearly or broadly united to the mesothoracic collar in *heteroclytus* but well separated in *Gouldii*; the black markings are also more restricted in *heteroclytus*, the band on the second lateral suture being restricted to a lower spot or else broadly interrupted at its middle. The superior anal appendages appear to be less depressed at the apical half than in *Gouldii* and show rather less black colouring at their bases.

3. — **Hemigomphus Gouldii** (Selys).

(T. ff. 5 E, F; 9 I, I'.)

Austrogomphus Gouldii Selys, E. de, 1854, Bull. Acad. Belg., XXI (2) : 64. (S. Australia. Collect. Saunders.)
Austrogomphus Gouldii Id., 1857, Mon. Gomph. : 171. (Melbourne.)
Hemigomphus Gouldii Selys, E. de, 1857, Mon. Gomph. : 420.
Hemigomphus Gouldii Id., 1869, Bull. Acad. Belg., XXVIII (2) : 24. (Melbourne.)
Hemigomphus Gouldii Kirby, W. F., 1890, Cat. Odon. : 71.
Austrogomphus comitatus Tillyard, R. J., 1909, Proc. Lin. Soc. N.S.W., 34 : 245, pl. 22, f. 3, 10; pl. 23, f. 1, 2. (Cooktown, N. Queensland.)

Material examined. — (Types lost, formerly in the Saunder's collection) : Type and allotype of *A. comitatus* Tillyard and 1 male paratype in the R. J. Tillyard collection, British Museum : 3 males in the R. Dobson collection, from Red Lynch, near Cairns, N. Queensland.

The types are lost : they formed part of the Saunder's collection but I have been unable to trace the specimens among this scattered collection. Failing these I have had to make my studies from material in the R. J. Tillyard collection now housed in the British Museum, wherein are the types of *comitatus*. There is no shadow of doubt about the synonymy of the two species : R. J. Tillyard never considered *Gouldii* when giving the differential characters but compared *comitatus* with *heteroclytus* not recognising at the time that he was repeating the same procedure as adopted by E. de Selys who compared *Gouldii* with *heteroclytus*, the respective comparisons bearing a close resemblance. R. J. Tillyard's sole mention of *Gouldii* is in the Proc. Lin. Soc. N.S.W., 34 : 254, where he gives the laconic note « Three males in good condition, are in the National Museum Collection, Melbourne ». His memory of these specimens, if he studied them at all, must have been very fleeting : it also seems quite clear that he overlooked altogether E. de Selys comparison of *Gouldii* with *heteroclytus* which was given in the Appendix to the Monograph des Gomphines, p. 420, otherwise he would have given also the differences existing between *comitatus* and *Gouldii*. The differentiation between *Gouldii* and *heteroclytus* have been given above under the description of the latter species but are best appreciated by comparing the thoracic patterns given in text-figure 5, B-F.

4. — **Hemigomphus armiger** (Tillyard).

(T. ff. 1 B; 5 G; 9 F.)

Austrogomphus armiger Tillyard, R. J., 1913, Proc. Lin. Soc. N.S.W., 37 : 577, pl. 62, ff. 6, 7 and 8 (W. Aust.).

Material examined. — Type and allotype, as well as 1 male and 2 females, West Australia, in R. J. Tillyard collection, British Museum.

I include this remarkable species under *Hemigomphus* with some doubt and with a view to not creating a monotypic genus : R. J. Tillyard himself thought that it might form the type of a new genus on account of the peculiar development of the anal appendages. R. J. Tillyard's description of these is incorrect in so far as the curious process shaped like a mole's forefoot or the anterior tibia of *Gryllotalpa*, which lies to the outer side of the base of the superior anal appendages : he states that it springs from the 10th segment but a close examination of the structure carried out by myself and checked by Mr D. E. Kimmins, shows that there is a distinct break in the continuity of the segment and the appendage, which is actually part of and derived

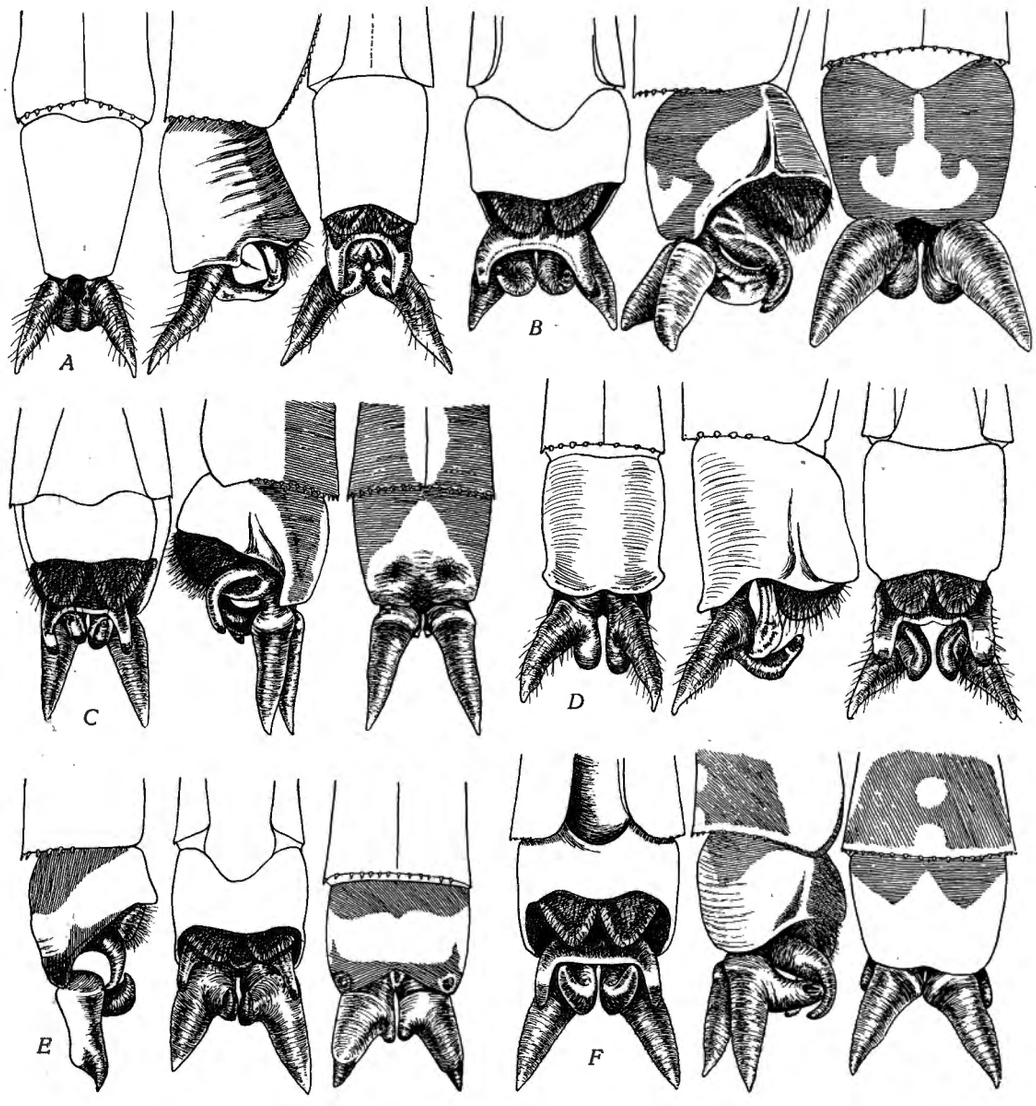

FIG. 2. — Male anal appendages.

A. — *Antipodogomphus acolytus* (SELYS in MARTIN), dorsal, right lateral and ventral aspects, ×15. From the type in the Selysian collection.

B. — *Austrogomphus collaris* SELYS, ventral, right lateral and dorsal aspects, ×15. From a specimen in the British Museum.

C. — *Austrogomphus Guerini* (RAMBUR), ventral, left lateral and dorsal aspects, ×17,5. From the type in the Selysian collection.

D. — *Antipodogomphus proselytus* (SELYS in MARTIN), dorsal, right lateral and ventral aspects, ×20. From the type in the Selysian collection.

E. — *Austrogomphus ochraceus* (SELYS), right lateral, ventral and dorsal aspects, ×15. From the allotype in the Selysian collection.

F. — *Austrogomphus australis* SELYS, ventral, right lateral and dorsal aspects, ×17,5. Trom the type in the DALE collection, Hope Museum, Oxford.

from the 11th sternite (Text-figure 1 B.). The posterior border of the 10th segment is deeply grooved dorsally and its borders on each side strongly spined, whilst a short, stout spine springs from the lower outer side of the base of the superior anal appendage, in the place where a similar clawed-process arises in *heteroclytus* and *Gouldii* : the close resemblance in shape and function of this process in the three species, convinces one that the process has switched from the appendage to the 11th sternite in the course of evolution. In addition to this remarkable armature, the species also exhibits a remarkable thoracic pattern, quite unique in the family *Gomphidæ* : the dorsal marking appears to have been formed by a medial curvature of the humeral stripe which has become confluent with the antehumeral stripe except for its upper and lower ends, whilst the mesothoracic collar has been reduced to a mere thickened horizontal line. The sides of the thorax are almost bereft of dark markings which are only represented by a short black stripe on the upper half of the postero-lateral suture.

Genus AUSTROEPIGOMPHUS gen. nov.

(T. ff. 9 H; 9 K, K'.)

A monotypic genus erected to contain the problematical *Onychogomphus præruptus* SELYS. Nymph unknown but probably of the cylindrical, torpedo-shaped type : imago of medium size with rather open venation : pterostigma short and dilated, forming a distinct bulge on the costal border : pairs of main veins parallel to border of wings; discoidal cell of hindwing moderately long; at least 3 cross-veins between sectors of arculus proximal to first Radial fork in forewing, and 2 in the hind; basal subcostal antenodals rarely present (in 5 out of 48 wings); *Ac* variable, usually in line with outer border of anal-triangle or near that level; the anal-triangle formed of 4 or 5 cells; anal appendages closely similar to those for *Austrogomphus*, the superiors with a baso-ventral branch; end segment of penis spoon-shaped with lateral membranous flaps; posterior hamules broadly bifid at apex; genotype *Onychogomphus præruptus* SELYS (= *Austrogomphus melaleucæ* TILLYARD).

W. F. KIRBY, in 1890, placed *præruptus* in *Hemigomphus* but E. DE SELYS never suggested that it might belong to this genus but thought that together with *A. interruptus* SELYS, it formed a special group within the genus *Onychogomphus*, and even thought that *interruptus* might be synonymous. The latter species belongs to the same subfamily *Epigomphinæ* but its venation is closer and its normal shaped pterostigma is quite unlike the short dilated one of *præruptus*, whilst the superior anal appendages of the latter are more typical of an *Austrogomphus* than any *Onychogomphus*. Moreover the latter genus belongs to the subfamily *Gomphinæ*.

5. — **Austroepigomphus præruptus** (SELYS).

(T. ff. 3 A; 5 H; 9 H; 9 K, K'.)

Onychogomphus præruptus SELYS, E. DE, 1857, Mon. Gomph. : 395, 432. (Description of type female from Adelaide.)

Onychogomphus præruptus ID., 1859, Bull. Acad. Belg. (2), VII : 535.

Hemigomphus præruptus KIRBY, W. F., 1890, Cat. Odon. : 71.

Austrogomphus melaleucæ TILLYARD, R. J., 1909, Proc. Lin. Soc. N.S.W., 34 : 241, pl. 22, ff. 1, 9; pl. 23, ff. 9, 10.

Material examined. — (Type lost, a female formerly in the SAUNDER's collection) : type and allotype of *A. melaleucæ* TILLYARD, as well as 7 males and 3 females in the R. J. TILLYARD collection, British Museum.

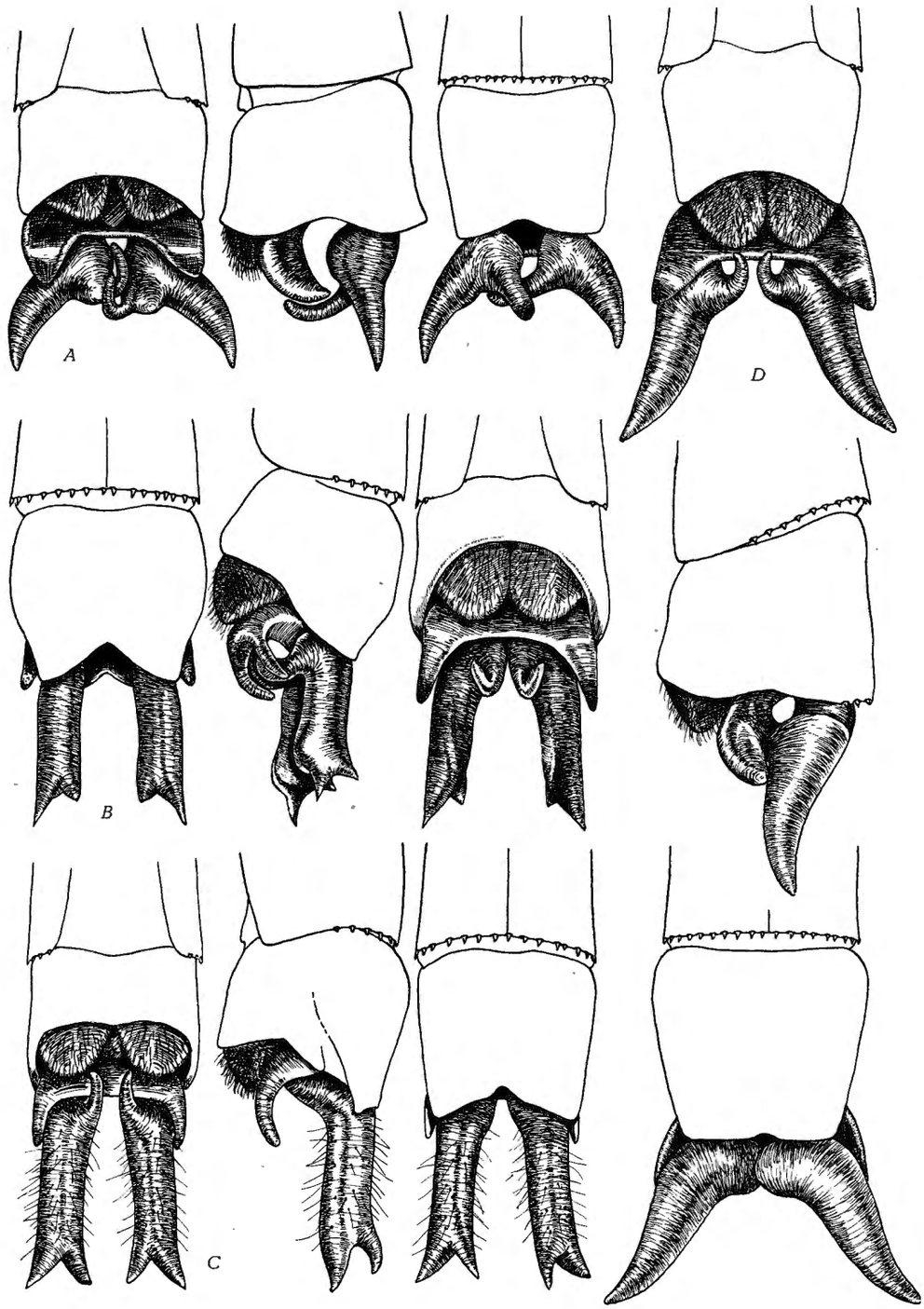

FIG. 3. — Male anal appendages.

A. — *Austroepigomphus præruptus* (SELYS), ventral, left lateral and dorsal aspects, ×21. From the type of *Austrogomphus melaleucæ* TILLYARD in the British Museum.

B. — *Austrogomphus prasinus* TILLYARD, dorsal, left lateral and ventral aspects, ×24. From the type in the British Museum.

C. — *Austrogomphus bifurcatus* TILLYARD, ventral, left lateral and dorsal acpects, ×27. From the type in the British Museum.

D. — *Austrogomphus lateralis* SELYS, ventral left lateral and dorsal aspects, ×27. From the allotype in the British Museum.

The descriptions by E. DE SELYS and R. J. TILLYARD agree in most details and the latter author acknowledge that his species lay « very close » to *præruptus* but the differences he gave are not at all convincing : the size, which differed, is negligible as this varies widely in the species, being greatest in wet areas, smallest in the arid zones : the facial markings are only degrees of melanism dependent on the age of the specimens and lastly the two spines on the back of the female occiput are entirely similar. Of these R. J. TILLYARD remarks « *præruptus* differs from *melaleucæ* by carrying two small black points, close together on the occiput ». But E. DE SELYS actually stated that the occiput was yellow and carried above two very small points black at the end, close together « and that these recalled those of *O. cerastes*. Comparing R. J. TILLYARD's figure of the occiput of *melaleucæ*, female with that of H. HAGEN's of *cerastes*, it is seen that they are identical ». It is most unfortunate that the type of *præruptus*, which was in the ancient SAUNDER's collection, is now lost, so that its identity can never be known with absolute certainty : nevertheless I have no doubts about its synonymy with *melaleucæ* TILLYARD. The shape of the superior anal appendages, resembling so closely those of *Austrogomphus*, appears to show a close relationship with that genus which may not be actual since they lie in different subfamilies : these appendages show a globular basal swelling to the outer side of the ventrobasal branch which is foreign to any species of *Austrogomphus*. R. J. TILLYARD's figure is surprisingly incorrect in showing the branches of the inferior appendage close together and parallel, whilst they are actually similar to and widely separated as in species of *Austrogomphus* : his figure shown in profile is correct. My figure (text-figure 3 A) shows the superior appendages divaricate and the branches interlocked : I suspect that this position is partly due to compression in paper and that, during life, they lie more or less parallel, with the branches closely apposed, side by side. The species shows an unusual melanism, with the lateral thoracic stripes so broadly confluent as to enclose an upper and a lower spot. The mesothoracic collar is reduced and widely interrupted, whilst the humeral stripe is reduced to an upper spot in the male, followed by a vestigial stripe in the female. The penis, shown in text-figure 9 K, K', differs from all other australian genera. My studies were made from the types of *melaleucæ*, 4 paratypes and 3 other pairs in the British Museum. The wing figure was drawn by Mr D. E. KIMMINS from a paratype.

SUBFAMILY GOMPHINÆ.

Genus AUSTROGOMPHUS SELYS.

(T. ff. 9 B; 10 A.)

A genus of medium sized Gomphines : nymphs with flattened abdomen : antennae with 4 segments which are moderately expanded : rectal tracheal gills without papillae : living among trash at the bottom of deep pools. Venation of imago usually open, especially in small species, pterostigma short or slightly swollen : pairs of long veins not or but slightly divaricate at wing border; discoidal cell of hindwing not markedly elongate : no basal subcostal cross-veins present : *Ac* proximal to the level of the outer border of anal-triangle, rarely in line with it : anal-triangle crossed by 2 curved veins from the costal and outer sides to the inner but never meeting within the triangle. Male superior anal appendages with a ventrobasal branch which curves down between the branches of the inferior appendage. Genotype. *Gomphus Guerini* RAMBUR.

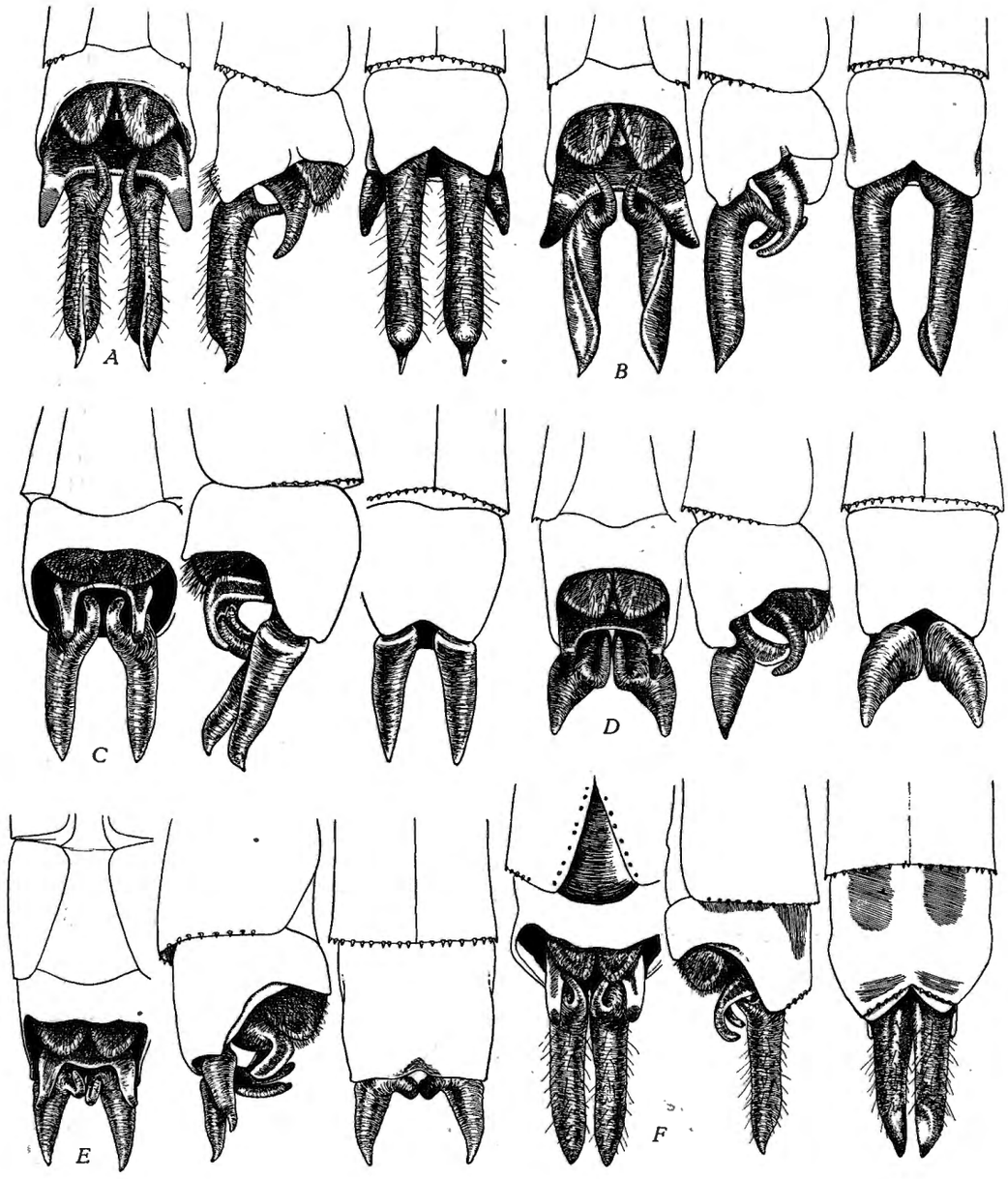

FIG. 4. — Male anal appendages.

A. — *Austrogomphus angeli* TILLYARD, ventral, right lateral and dorsal aspects, ×25. From the type in the British Museum.

B. — *Austrogomphus amphiclitus* (SELYS), ventral, right lateral and dorsal aspects, ×25. From the type in the British Museum.

C. — *Austrogomphus Doddi* TILLYARD, ventral, left lateral and dorsal aspects, ×19. From the type in the British Museum.

D. — *Austrogomphus arbustorum* TILLYARD, ventral, right lateral and dorsal aspects, ×15. From the type in the British Museum.

E. — *Austrogomphus Mjobergi* SJOSTEDT, ventral, right lateral and dorsal aspects, ×12,5. From the type in the Stockholm Museum.

F. — *Austrogomphus pusillus* SJOSTEDT, ventral, left lateral and dorsal aspects, ×22,5. From the type in the Stockholm Museum.

There is rarely any difficulty in determining whether any specimen belongs to the genus : the proximal position of *Ac* and the 2 curved vèins in the anal-triangle which run basalwards without meeting one another within the triangle are highly characteristic of the venation. Occasional specimens are met with where in one or both hindwings *Ac* lies in line with the outer border of the anal-triangle, and still more rarely, as an aberration, where it falls distal to the level of the triangle. In some rare cases, the two curved veins in the triangle converge and meet on the inner border of the cell. The long curved ventrobasal branches of the superior anal appendages are also characteristic but are found in species of *Antipodogomphus*, which however have a subcostal cross-vein at the base of each wing.

The genotype *Guerini* RAMBUR was fixed by W. F. KIRBY in 1890, as being the first described species, but E. DE SELYS under his new genus *Austrogomphus* in 1854, gave first place to *Gouldii* SELYS. It is unfortunate that this species turned out to be a *Hemigomphus* and would thus give rise to the utmost confusion if adopted as the correct genotype : to prevent this I have adhered to W. F. KIRBY's choice of *Guerini*, which is extremely typical of the genus. As no genotype had been designated, W. F. KIRBY was in his rights when selecting *Guerini* as first reviser.

6. — **Austrogomphus Guerini** (RAMBUR).

(T. ff. 2 C; 6 C, D; 10 C; 11 A.)

Gomphus Guerini RAMBUR, P., 1842, Ins. Névrop. : 162.
Austrogomphus Guerini SELYS, E. DE, 1854, Bull. Acad. Belg., XXI : 65.
Austrogomphus Guerini ID., 1857, Mon. Gomph. : 177.
Austrogomphus Guerini KIRBY, W. F., 1890, Cat. Odon. : 70.
Austrogomphus Guerini MARTIN, R., 1901, Mém. Soc. Zool. France, 19 : 230.
Austrogomphus Guerini TILLYARD, R. J., 1914, Proc. Lin. Soc. N.S.W., 39 : 188.

Material examined : 4 males and 5 females in the Selysian collection, one of which is P. RAMBUR's type. One of the females has been designated as allotype at the time of my examination. The specimens bear the following labels : a white Museum label inscribed « *Austrogomphus Guerini* R. Coll et det. SELYS », on all specimens : Female with segments 8 to 10 missing : small blue label inscribed « N.H. » (= Nova Hollandie). Female, complete specimen, labelled in E. DE SELYS handwriting « *Austrogomphus Guerini* R. ♀, Melbourne » and a second label « Melbourne ». Female with a white label attached to a silver one bearing « Nh ? », and with segments 4 to 10 missing; a fourth female, also with segments 4 to 10 absent, bears a blank silver label, one with « Nh ? » (no doubt again referring to Nova Hollandie) and a large white label in E. DE SELYS handwriting inscribed « *Austrogomphus Guerini* R. ♀ » : the fifth female rather teneral, with abdomen partly compressed and the head missing, with same labels as last and a pink label bearing a « G » on it, which I feel sure means the type from the F. E. GUERIN collection as mentioned in the Mon. Gomph. Males : P. RAMBUR's type in fair condition but wings a little frayed; E. DE SELYS label « *Austrogomphus Guerini* R, ♂ » : small white label inscribed « VD. L » (evidently meaning « VAN DIEMEN's Land ») : second male with segments 9 and 10 missing, left hindwing broken and thorax an empty shell : white label inscribed « New Holland » : third male with segments 6 to 10 missing but otherwise in good condition, the markings a very definite green and the face a pale yellowish green. Sides of thorax yellow, the black markings sharply defined. It bears a label « Melbourne » and one in E. DE SELYS handwriting « *Austrogomphus Guerini* R. » The last male in good condition, has one label « Melbourne » and a small blank pink label. In addition to the above, I have examined three

pairs in the R. Dobson collection from Berrima, Belmore Falls and Blue Mountains, N.S.W., in all of which the antehumeral and humeral stripes are not confluent as in the type; lastly 2 males and 3 females in the R. J. Tillyard collection, British Museum.

The species has been adequately described by P. Rambur and E. de Selys and figured by H. Hagen. It would appear that the dorsal stripes of the thorax are only confluent above in subadult specimens but only slightly separated in full adults.

7. — **Austrogomphus collaris** Hagen in Selys.

(T. f. 2 B.)

Austrogomphus collaris Hagen, H. in Selys, E. de, 1854, Bull. Acad. Belg. (2), 21 : 64.
Austrogomphus collaris Selys, E. de, 1857, Mon. Gomph. : 172, pl. 10, f. i.
Austrogomphus collaris Kirby, W. F., 1890, Caf. Odon. : 70.
Austrogomphus collaris Martin, R., 1901, Mém. Soc. Zool. France, 19 : 230.
Austrogomphus collaris Tillyard, R. J., 1908, Proc. Lin. Soc. N.S.W., 32 : 728.
Austrogomphus collaris Ris, F., 1910, Odonata S. W. Australia : 432.

Material examined. — (Type lost, a female, formerly in the Vienna Museum) : 1 male in my own collection, R. J. Tillyard coll., Barraba, N.S.W. : 5 males and 1 female, R. J. Tillyard collection, British Museum (One male from Bridgtown has the 1st lateral thoracic stripe complete as in *australis*).

Dr Max Beier, who has kindly made a search for the type, informs me that it can no longer be found; it was a very teneral female and therefore, presumably, without the black markings fully developed. The only reliable character with which to identify it, is the armature of the occiput, described by E. de Selys as « un tubercule arrondi, noirâtre, dirigé l'un vers l'autre. Au milieu des deux précédents, également en arrière, la lame porte un tubercule beaucoup plus petit ». Of the sides of the thorax he states « les côtés avec deux raies noirâtres complètes à la première et à la seconde suture ». R. Martin and R. J. Tillyard have determined the species from the Selysian description but it is by no means certain that their determinations are correct, for concerning the occipital armature, R. J. Tillyard states « The female carries behind the occiput, three tubercules of nearly equal size » and specimens sent to me show the black stripe on the first lateral suture to be definitely broken at its middle. In the teneral type, it would be expected that this break in the stripe would be much longer than in an adult. Other but minor differences are noted but may be due to the different ages of the specimens. The male was unknown to E. de Selys and is here described.

Male. Abdomen : 30 mm. Hindwing : 22 mm.

Head : labium pale yellow; labrum greenish yellow with two small black points at its base; epistome entirely yellow; frons with a narrow straight line at its junction with the epistome and a narrow black base above projecting slightly medially. Vertex black with a median cone-shaped yellow spot; occiput yellow fringed with long brown hairs, simple, very slightly concave and without processes. Behind head chrome yellow with a thick black border at the upper third of the eyes. Prothorax black marked with an oval spot on the anterior lobe, a geminate on the dorsum of middle lobe and a large yellow spot on each side of same. Synthorax black on dorsum with yellow markings, a narrow mesothoracic collar broadly broken at its middle, oblique slightly angulated antehumeral stripes shaped somewhat like a boomerang and not confluent with the collar anteriorly or humeral stripe posteriorly, the latter narrow, sinuous, broadening into a triangular spot above and thickening irregularly in its lower half. Laterally

greenish yellow with a black stripe over each suture, that on the first lateral interrupted at its middle, the lower part curving forwards to meet the humeral black and expanding into a large triangular spot over the spiracle. Legs black save the inner sides of the anterior femora which are citron yellow, as well as the coxae and trochanters. Wings slightly tinted with yellow at bases; pterostigma ochreous framed in very thick black veins, covering only 3 cells, about 3 mm long. 12 to 13 antenodals in forewings, 8 to 9 in the hind, 7 or 8 postnodals in all wings. Abdomen black on dorsum with yellow markings, segment 1 with an oval or triangular spot at apex and its sides broadly, segment 2 with a middorsal trilobed stripe, much constricted subapically, the oreillets and most of the sides yellow, segments 3 to 7 with well marked basal

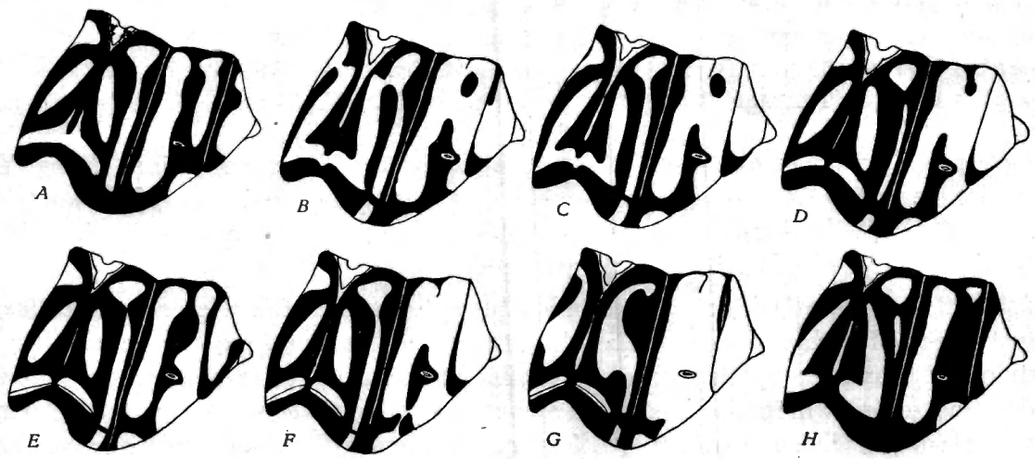

FIG. 5. — Thoracic markings (diagrammatic).

A. — *Austrictinogomphus australis* (SELYS). From a male in the DOBSON collection, Queensland.

B, C, D. — *Hemigomphus heteroclytus* SELYS. (B) from the type in the Selysian collection; (C) from a cotype in the DALE collection; (D) from a specimen in the DOBSON collection, Upper Kangaroo Valley, N.S.W.

E, F. — *Hemigomphus Gouldii* (SELYS). (E) from the type of *Austrogomphus comitatus* TILLYARD, in the British Museum; (F) from a specimen in the DOBSON collection, Cairns, N. Queensland.

G. — *Hemigomphus armiger* (TILLYARD). From the type in the British Museum.

H. — *Austroepigomphus præruptus* (SELYS). From the type of *Austrogomphus melaleucæ* TILLYARD, in the British Museum.

yellow rings which are continued on middorsum as a narrow stripe constricted basally and tapered apically, the basal annules tending to broaden from segment to segment and becoming broadest on segment 7 where the middorsal stripe is a wedge projecting into the dorsal black. Segment 8 with an oval basal spot on the middorsum and a broad spot on each side, segment 9 with its base ringed with yellow, this prolonged slightly along the dorsum and broadly on to the sides. Lastly segment 10 which is prolonged dorsally, variably yellow marked with black or black with a large fleur-de-lys dorsal yellow spot. Anal appendages yellow : superiors short, carrot-shaped organs, a little divaricate and furnished ventro-basally with a robust recurved spine almost as large as the appendage and curling down between the forks of the inferior appendage, somewhat compressed and with the extreme apex black. Branches of inferior appendage rather widely separated and slightly divaricate. Posterior hamules very broad, yellow with black apex curved downwards and then somewhat forwards.

I believe this species to be conspecific with *australis*, for whilst so many characters agree, the only one which differs is the interruption at the middle of the anterolateral stripe on thorax. A remeasurement of the type of *australis* shows it to be of the same size as *collaris* : both come from S. Australia and R. J. TILLYARD gives the latter as common there and in Victoria.

8. — **Austrogomphus australis** SELYS.

(T. ff. 2 F; 6 H; 7 A; 11 E.)

Austrogomphus australis SELYS, E. DE, 1854, Bull. Acad. Belg. (2), 21 : 64.
Austrogomphus australis ID., 1857, Mon. Gomph. : 175.
Austrogomphus australis ID., 1873, Bull. Acad. Belg. (2), 35 : 759.
Austrogomphus australis KIRBY, W. F., 1890, Cat. Odon. : 70.
Austrogomphus australis MARTIN, R., 1901, Mém. Soc. Zool. France, 19 : 230.
Austrogomphus australis TILLYARD, R. J., 1909, Proc. Lin. Soc. N.S.W., 34 : 254. (S. Australia, rare.)

Material examined. — The type male in the DALE collection, HOPE Museum, Oxford, which bears three labels, — a new one « *Austrogomphus australis* », 2. « Adelaide, New Holland » and 3. « 62 ». Three females in the British Museum collection, one of which is marked type in R. MC LACHLAN's handwriting, but incorrectly so.

If, as I think, *A. collaris* SELYS is actually this species, then the references to *collaris* given above must be added to those for *australis*. The three females mentioned above have the anterolateral stripe of thorax complete, as in the male type, but there is a male *collaris* amongst R. J. TILLYARD's series, which also has this stripe complete, so that unless a wrong determination has been made by R. J. TILLYARD, the difference between *collaris* and *australis* breaks down. The Selysian measurements given for *australis* are abdomen 29 mm and hindwing 26 : I make these same, — abdomen 29,5 and 22 respectively, which agree with the measurements for *collaris*. Some slight differences between the shape of the anal appendages may be due quite easily to the figures being drawn from a different aspect or the superior anal appendages displaced by compression in paper. The colour of segment 10 varies : in the type it is yellow with two basal black triangular marks; in *collaris* TILLYARD males, it is more often black with a yellow anchor-shaped marking on dorsum, but this is extremely variable, so that an extension of the dorsal black in the type of *australis* might well lead to the inclusion of a similar yellow mark. Thus the total evidence points strongly to *collaris*, described from a type female, being the same species as *australis* described from a type male, and of the two names, *australis* has priority.

I have examined the females of *collaris* determined as such by R. J. TILLYARD and now in the British Museum collection; I find that the tubercles on the crest of the occiput are of about the same length, the external ones more robust and directed somewhat obliquely inward, that is, closely similar to the same processes described by E. DE SELYS for the female of *australis*, save that the median tubercle was said by him to be much smaller in *collaris*. This median tubercle lies at a lower level than the external ones and so appears foreshortened dorsally, which may have given a false impression of its actual length. The female of *australis* determined by R. J. TILLYARD has identical tubercles to those of his *collaris*.

9. — **Austrogomphus ochraceus** (SELYS).

(T. ff. 2 E; 7 B, C; 9 B; 10 A, G.)

Hemigomphus ochraceus SELYS, E. DE, 1869, Bull. Acad. Belg. (2), XXVIII : 187.
Hemigomphus ochraceus KIRBY, W. F., 1890, Cat. Odon. : 71.
Austrogomphus ochraceus MARTIN, R., 1901, Mém. Soc. Zool. France, XIX : 230.
Austrogomphus ochraceus TILLYARD, R. J., 1914, Proc. Lin. Soc. N.S.W., 39 : 185.
Austrogomphus ochraceus ID., 1926, Ins. Aust. and N. Zealand : 83, fig. 20 B.

Material examined. — Type male in the Selysian collection, with abdominal segments 4-10 missing (Melbourne), and 2 pairs labelled « *Hemigomphus ochraceus* » in R. MARTIN's handwriting : 5 males and 3 females in the R. J. TILLYARD collection, British

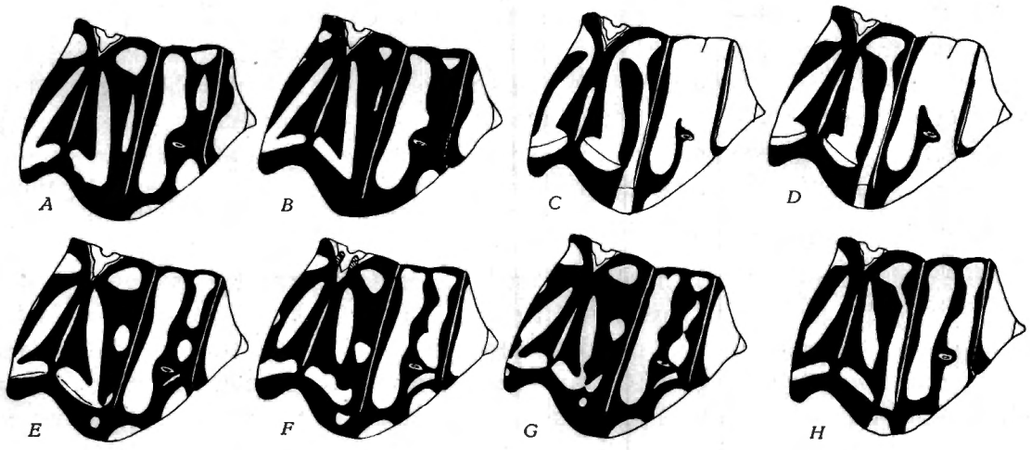

FIG. 6. — Thoracic markings (diagrammatic).

A, B. — *Antipodogomphus acolytus* (SELYS in MARTIN). (A) from the type in the Selysian collection; (B) from a female in the DOBSON collection, near Cairns, N. Queensland.

C, D. — *Austrogomphus Guerini* (RAMBUR). (C) from the RAMBUR type in the Selysian collection; (D) from a specimen in the DOBSON collection, Blue Mts, N.S.W.

E, F, G. — *Antipodogomphus proselytus* (SELYS in MARTIN). (E) from the type in the Selysian collection; (F) from a specimen in the DOBSON collection, Kuranda, N. Queensland; (G) from a specimen in the DOBSON collection, from Kuranda, N. Queensland.

H. — *Austrogomphus australis* SELYS. From the type in the DALE collection.

Museum : 3 males and 5 females in the R. DOBSON collection from Galston Gorge, Hornby, Nowra, Carrington Falls, French's Forest and Narrabeen, all in N.S.W. : 1 female, Narrabeen, Sydney, R. DOBSON coll., 3 males and 1 female, R. J. TILLYARD coll., in my own collection.

This species was described by E. DE SELYS from a male specimen lacking the terminal seven segments of the abdomen; he placed it in genus *Hemigomphus* on account of the character of its markings, but now that the complete insect has come to light, it is seen that the male anal appendages are those typical of *Austrogomphus*. Both R. MARTIN and R. J. TILLYARD had specimens of both sexes, the female being unknown up to then, but both failed to describe the full insect and the unknown female.

Male. Abdomen : 29-32 mm. Hindwing : 22-24 mm.

Head : labium yellow, labrum yellow with a narrow black line at base, rest of face and frons in front yellow with a narrow horizontal black stripe at base of frons anteriorly. The upper surface of frons yellow, its base narrowly black, rest of vertex and occiput black with an oval spot on the vertex between the eyes and a much larger rounded spot on the front and back of occiput; behind head black marked with a sharply defined round yellow spot behind and to the outer side of the occiput and a broad yellow fascia bordering the eyes in their lower half. Prothorax black marked with the following yellow spots. — the dorsum of the anterior lobe, a geminate spot on the middorsum of the middle lobe and a small round spot on centre of posterior lobe; the sides with a broad rounded spot. Thorax black on dorsum, with an incomplete yellow mesothoracic collar, short stout antehumeral stripes broadening below, converging above and widely separated from the mesothoracic collar, the middorsal carina narrowly yellow, sinuous yellow humeral stripes dilated into a triangular spot above, then constricted and again broadening at middle and finally curving round on to the mesinfraepisternum below. Laterally yellow with two narrow black stripes, the anterior continuous below with the humeral black and ending abruptly in a dilatation at the level of the thoracic spiracle : often a vestige of a stripe on the upper part of the first lateral suture and finally, a narrow stripe bordering the metepimeron anteriorly. Legs black except the inner sides of anterior femora which are greenish yellow. Wings tinted with yellow at bases nearly to level of arculus; pterostigma yellow framed broadly in black, covering about 4-5 cells, braced. nodal index variable, even in the opposite wings of individual specimens $\frac{9-13 \mid 14-10}{10-10 \mid 9-8}$: anal-triangle 3-celled, the veins running from costal and distal sides to the basal, usually curved and widely separated as usual for the genus; distal side of this triangle in continuation of *Ac* or distal to its level. Abdomen black marked with citron yellow; segment 1 with its middorsum and apical border broadly yellow, segment 2 with a middorsal lanceolate stripe with two constrictions, the apical end much narrowed; a broad yellow stripe on each side which includes the oreillets, segment 3 with a narrow middorsal yellow stripe extending the whole length save the apical fifth and a basal triangular spot on each side; segments 4 to 6 similar but the dorsal stripe finely linear, segment 7 with this stripe broadened in its basal half, tapering thence to the apex; segments 8 and 9 with basal dorsal spots and a broad lateral stripe on each side; on 8 the dorsal spot extends for nearly half its length but is very much abbreviated on 9; segment 10 with a broad transversely oval yellow spot on the dorsum and a rounded spot on each side. Anal appendages bright yellow; the superiors springing from a dorsal extension of segment 10, very short, stout, cylindrical and tapering to a point : above the apex the appendage swollen; below and near its base on the inner side a curved compressed hook is directed downwards and recurved at apex somewhat forwards. The inferior appendage broad, its outer sides prolonged into long narrow cylindrical upcurving hooks. (Fig. 2 E.). Genitalia as for the genus, hamules yellow, very broad as viewed in profile, tapering rather abruptly to an acute point.

Female : 29-32 mm. Hindwing : 23,5-25 mm.

Very similar in colour and markings to the male but somewhat larger and more robust; the black markings better defined and more extensive, especially the basal bordering to upper part of frons. The spot on vertex smaller and sometimes mushroom-shaped, connected by a narrow stalk to the occipital yellow, which latter is margined with dark brown. Occiput slightly emarginate (sligthly convex in the male), simple in both sexes and possessing only some coarse hairs. The yellow humeral stripe often with its upper part separated from the stem as an isolated triangular spot. Dorsal markings of abdomen as in the male but that on segment 7 expanding

into a broad basal ring, and those on 8 and 9 often only linear in character. Segment 10 yellow with the apical border irregularly narrowly black. Vulvar scales deeply bifid, the branches narrow, parallel and with pointed, slightly everted apices, about half the length of segment 9; anal appendages shortly conical, yellow.

Habitat. The type is labelled « Melbourne » : I have specimens collected by R. J. TILLYARD and Mr R. DOBSON from Kuranda, Queensland, Carrington Falls, N. S. Wales and Alexandra, so that the species seems to be widespread. Specimens received from Mr R. DOBSON have the colouring a beautiful citron yellow which no doubt represents the actual living colour.

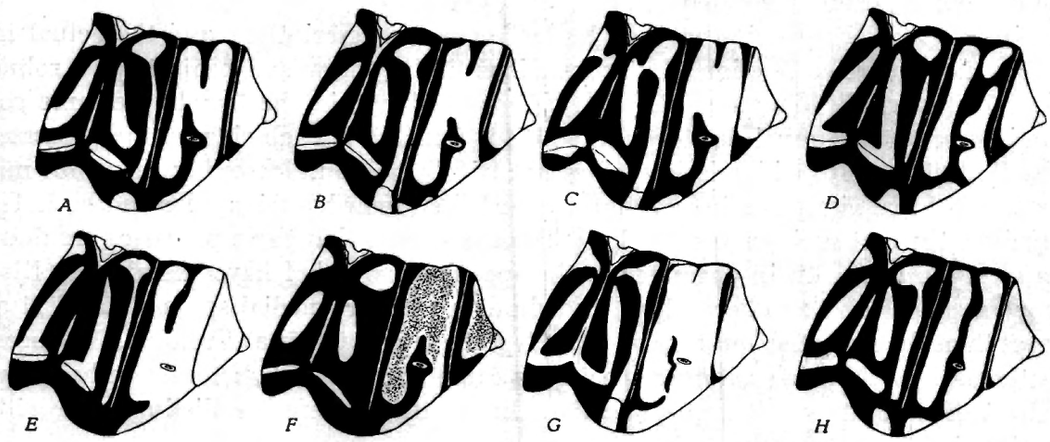

FIG. 7. — Thoracic markings (diagrammatic).

A. — *Austrogomphus australis* SELYS. From a specimen in the FRASER collection, determined by R. J. TILLYARD. as *collaris* SELYS.

B, C. — *Austrogomphus ochraceus* (SELYS). (B) from the allotype male in the Selysian collection; (C) from a paratype in the British Museum.

D. — *Austrogomphus Doddi* TILLYARD. From a paratype in the FRASER collection.

E. — *Austrogomphus amphiclitus* (SELYS). From the type in the British Museum.

F. — *Austrogomphus lateralis* SELYS. From the type in the British Museum (the stippled area is a greyish mauve).

G. — *Austrogomphus pusillus* SJOSTEDT. From the type in the Stockholm Museum.

H. — *Austrogomphus Mjobergi* SJOSTEDT. From the type in the Stockholm Museum.

E. DE SELYS in his original description states that the mesothoracic collar is separate from the antehumeral stripes but in a note appended to the description of *Hemigomphus ? lateralis* [Appendice aux troisièmes Additions des Gomphines, 1873, Bull. Acad. Belg. (2), xxxvi; 502] he gives the collar as confluent with the antehumerals : no doubt this was a slip up on his part, for the two markings are invariably widely separated. The nodal index is so variable as to be quite unreliable for purpose of identification : thus in three females I find — $\frac{8-11 \mid 11-7}{7-7 \mid 7-7}$, $\frac{10-15 \mid 15-11}{10-11 \mid 12-11}$, $\frac{13-8 \mid 9-13}{10-10 \mid 8-9}$. The peculiar shape of the superior anal appendages of the male is the best character for identification. Penile organ as for the genus (Fig. 10 A).

10. — **Austrogomphus Doddi** TILLYARD.

(T. ff. 4 C; 7 D; 10 D; 11 B.)

Austrogomphus Doddi TILLYARD, R. J., 1909, Proc. Lin. Soc. N.S.W., 34 : 249, pl. 22, ff. 4, 7; pl. 23, ff. 5, 6.
Austrogomphus Doddi ID, Ibid., 1913, 37 : 575, pl. 62, f. 2.
Austrogomphus Doddi SJÖSTEDT, Y., 1917, Arkiv. f. Zool., II : 17.

Material examined. — One pair received from R. J. TILLYARD, from Horton, R., Pallal, N.S.W. Type male and allotype female, as well as **12** males and **1** female in the British Museum collection, from Queensland.

I find a few discrepancies between R. J. TILLYARD's descriptions and the actual insects : in the male, in my own collection, the occiput is entirely yellow and projects as a robust cone upwards and posteriorly like an abbreviated rhinoceros horn; in the female the same cone-like structure is seen but to a much less degree, and it is flanked on each side by the processes mentioned by R. J. TILLYARD, which however are not triangular as he describes them but markedly truncate. I find that viewed obliquely they appear to be somewhat triangular and R. J. TILLYARD probably drew them at such an angle. R. J. TILLYARD states that these processes are downy but they are glossy and smooth in character in the specimens which I have examined. His figure is not good so that I give another, which also shows a smaller, medial spine situated at a much lower level than the two other processes. The type male was taken at Kuranda, N. Queensland, whereas the allotype female and other specimens came from N.S.W., and are rather larger and more robust than the type : it is possible that these latter represent a distinct race with some modifications in the shape of the occiput ?

11. — **Austrogomphus lateralis** (SELYS).

(T. ff. 3 D; 7 F.)

Hemigomphus ? lateralis SELYS, E. DE, 1873, Bull. Acad. Belg. (2), 36 : 501. (An incomplete female from N. Australia.)
Hemigomphus ? lateralis KIRBY, W. F., 1890, Cat. Odon. : 71.
Austrogomphus occidentalis TILLYARD, R. J., 1908, Proc. Lin. Soc. N.S.W., 32 : 729, pl. 35, ff. 5, 6; pl. 36, f. 3.
Austrogomphus occidentalis ID., 1909, Ibid., 34 : 254.
Austrogomphus occidentalis RIS, F., 1910, Fauna Sudwest-Australia, II : 432.

Material examined. — Type female, with abdomen missing, in British Museum collection : type and allotype, as well as **6** males of *Austrogomphus occidentalis* TILLYARD, in the British Museum collection, some labelled by R. J. TILLYARD as *lateralis* SELYS.

Although the type was said to have come from North Australia, I think that there can be little doubt about *occidentalis* TILLYARD being the same species. R. J. TILLYARD himself (l. c. 1909) thought that wide distance between the two localities rather negatived such a view but the fact that he subsequently determined his species as *lateralis* is sufficient evidence of his crystallised opinion. The curious character of the markings and their still more curious colouring, especially as to the sides of the thorax leave no doubt in my own mind. R. J. TILLYARD's descriptions are quite good but the figure of the anal appendages poor and are here figured again. The species is probably not so much local as seasonal which would account for its comparative rarety. The venation is typical for the genus *Austrogomphus* but *Ac*, in the type, lies distal to the anal triangle, whilst it is in line with the outer border in *occidentalis*.

12. — **Austrogomphus amphiclitus** (SELYS).

(T. ff. 4 B; 7 E.)

Hemigomphus amphiclitus SELYS, E. DE, 1873, Bull. Acad. Belg. (2), 35 : 757.
Austrogomphus amphiclitus KIRBY, W. F., 1890, Cat. Odon. : 70.
Austrogomphus Risi MARTIN, R., 1901, Mém. Soc. Zool. France, 19 : 232. (Type of *A. Risi*, from Queensland.)
Austrogomphus Risi TILLYARD, R. J., 1909, Proc. Lin. Soc. N.S.W., 34 : 251 pl. 22, ff. 6, 8; pl. 23, ff. 3, 4. (Atherton, N. Queensland.)

Material examined. — Type male in R. MCLACHLAN collection, British Museum : one pair from Queensland, R. J. TILLYARD collection, British Museum : two males and one female from Pallal, N. S. W., **16-21.I.1910** and one pair from Blackbutt, Queensland, **12.I.1913**, collected by R. J. TILLYARD, all in the RIS collection, Senckenberg Museum.

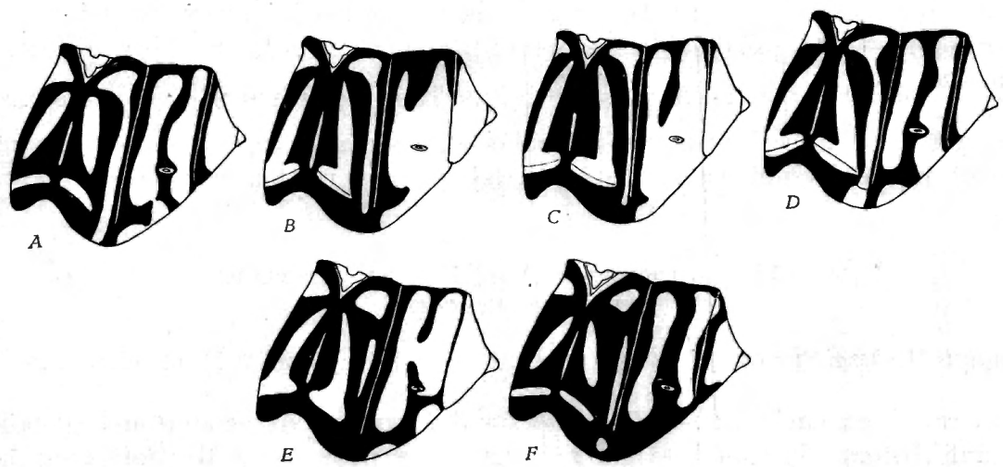

FIG. 8. — Thoracic markings (diagrammatic).

A. — *Austrogomphus arbustorum* TILLYARD. From the type in the British Museum.

B. — *Austrogomphus bifurcatus* TILLYARD. From the type in the British Museum.

C. — *Austrogomphus prasinus* TILLYARD. From the type in the British Museum.

D. — *Austrogomphus angeli* TILLYARD. From the type in the British Museum.

E. — *Austrogomphus ? interruptus* SELYS. From the type in the Selysian collection.

F. — *Austrogomphus Turneri* MARTIN. From a figure of the type in the Senckenberg Museum by Dr Elli FRANZ.

R. J. TILLYARD is incorrect in stating that the type of *A. Risi* MARTIN is in the E. DE SELYS collection : it is in the F. RIS at SENCKENBERG Museum. Neither R. MARTIN nor R. J. TILLYARD considered the possibility of *Risi* being *amphiclitus* SELYS or they would have been in no doubt about the determination. The male of *Risi* is rather larger than the type of *amphiclitus* but apart from this there are no differences and the anal appendages are identical. I have refigured these as R. J. TILLYARD's figures are rather crude. E. DE SELYS gave no reasons for placing this very typical Austrogomphine in *Hemigomphus*, although he gave good reasons for separating it from that genus by the very different character of the anal appendages of the male. Unfortunately E. DE SELYS entirely overlooked the ventral branches of the superior appendages and so missed the one character which stamped *amphiclitus* as an *Austrogomphus*. Subsequent authors were deceived by this omission.

13. — **Austrogomphus pusillus** SJOSTEDT.

(T. ff. 4 F; 7 G; 9 E.)

Austrogomphus pusillus SJOSTEDT, Y., 1917, Arkiv. f. Zool., Bd. II : 11, 13, pl. 2, ff. 1-5; pl. 3, f. 11.

Material examined. — The male type in the Riks Natural History Museum, Stockholm, the only specimen of the insect known. Carries labels : i. « Noonkaubah », ii. « N.V. Austr. Mjobergi », iii. A red label marked « Typus », and iv. « *Austrogomphus pusillus* SJOST. »

The species is an extremely small one, with abdomen **27** mm and hindwing **19** mm : the black markings are much restricted, the labrum, face and frons entirely free of black markings. This dwarfing and the preponderant yellow colouring are both probably due to the hot, dry nature of the habitat. The anal-triangle of the right hindwing shows an extra cross-vein bridging the lower angle, the other two cross-veins are normal in curvature and course for the genus : *Ac* is only slightly proximal to the level of the outer side of the anal-triangle : nodal index $\frac{6-10 \mid 10-8}{7-7 \mid 7-8}$; 4 rows of anal cells in hindwings. The species is most easily recognised by its small size and the long, cylindrical and parallel superior anal appendages which are slightly hollowed out on the dorsum near the apices : it is perhaps most nearly related to *A. prasinus* TILLYARD.

14. — **Austrogomphus Mjobergi** SJOSTEDT.

(T. ff. 4 E; 7 H; 9 G; 10 H.)

Austrogomphus Mjobergi SJOSTEDT, Y, 1917, Arkiv. f. Zool., Bd. II : 13, pl. 2, ff. 6-9; pl. 3, f. 10.

Material examined. — Two males and a female (type, cotype and allotype) in the Riks Natural History Museum, Stockholm. The type male bears the following labels : i. « Kimberly District », ii. A red label « Typus », iii. « N.V. Austr. Mjobergi », and iv. « *Austrogomphus Mjobergi* SJOST. ». The female allotype bears the same labels and an additional one « No. 199/51 » (Presumably the male type is No. 198/51 ? but is not so labelled). Cotype male bears the same labels as the others, save « Typus ».

This species, like *pusillus,* is extremely small, with abdomen **23-24** mm and hindwing **20** mm, the two being quite the smallest gomphines in the whole Australian fauna. The anal-triangle of the males is aberrant for the genus, the cross-veins converging and meeting on a short vein arising from the middle of the inner border of triangle : the female however, has the veins arranged as in typical *Austrogomphus.* Unlike other species of the genus, there are only 3 rows of cells in the anal field of the hind wings of both sexes and *Ac* lies more proximal than in any other species that I have examined. Type male with nodal index $\frac{8-9 \mid 9-8}{5-7 \mid 7-6}$: allotype female $\frac{5-11 \mid 11-6}{5-8 \mid 7-6}$. Anal appendages closely similar to those of *A. ochraceus* (SELYS). The occiput, in both sexes, simple, slightly and shallowly emarginate in the male, sinuous in the female, in which, quite low down behind the occiput, are to be seen numbers of very small spines with a tendency to be arranged in a row.

15. — **Austrogomphus arbustorum** TILLYARD.

(T. ff. 4 D; 8 A.)

Austrogomphus arbustorum TILLYARD, R. J., 1906, Proc. Lin. Soc. N.S.W., 31 : 548, pl. 34, f. i. (Kuranda, N. Queensland.)

Austrogomphus arbustorum ID., 1909, ibid., 34 : 253. (Cooktown, Queensland.)

Material examined. — Type and allotype, as well as 2 pairs in the R. J. TILLYARD collection, British Museum.

This species bears the closest resemblance to the previous one and if they should be conspecific, then *Mjobergi* becomes a synonym for *arbustorum* TILLYARD. Unfortunately I had returned the type of *Mjobergi* before I noticed this resemblance so did not compare the two types : *arbustorum* has a longer abdomen than *Mjobergi*, 28 mm compared to 24 mm and its venation is not nearly so reduced but the markings of the thorax are practically identical. R. J. TILLYARD remarks that the specimens he took at Cooktown, were considerably smaller than those from Kuranda (actual measurements not given) so that the difference in size disappears. The respective localities of the two species are far apart but both in N. Australia. R. J. TILLYARD gives his species as a synonym of *proselytus* SELYS, MSS, on the strength of a communication from René MARTIN, but it seems certain that R. MARTIN meant *arenarius*, which name he had mixed up with *arbustorum* : the two species belong to different genera.

16. — **Austrogomphus bifurcatus** TILLYARD.

(T. ff. 3 C; 8 B.)

Austrogomphus bifurcatus TILLYARD, R. J., 1909, Proc. Lin. Soc. N.S.W., 34 : 244, pl. 22, f. 2; pl. 23, ff. 7, 8. (Atherton, N. Queensland.)

Material examined. — Type male in the R. J. TILLYARD collection, British Museum.

This species is closely related to *A. prasinus* and *amphiclitus* and the three form a very natural group characterised by similar thoracic markings and very similar male anal appendages. The shape of these latter will serve to determine it from any other *Austrogomphus*. It is remarkable that R. J. TILLYARD entirely overlooked the ventral branches of the superior anal appendages, which he neither mentioned nor figured.

17. — **Austrogomphus prasinus** TILLYARD.

(T. ff. 3 B; 8 C.)

Austrogomphus prasinus TILLYARD, R. J., 1906, Proc. Lin. Soc. N.S.W., 31 : 552 (Kuranda, N. Queensland), pl. 34, f. 3.

Austrogomphus prasinus ID., 1909, Ibid., 34 : 253.

Material examined. — Type and allotype, as well as 3 males and 2 females in the R. J. TILLYARD collection, British Museum : 7 pairs in the R. DOBSON collection from Kuranda, N. Queensland, Redlynch Intake near Cairns, Queensland, Freshwater near Cairns and the Clohesy R. Kuranda-Mareeba Road, N. Queensland : 2 pairs from Kuranda in my own collection.

The size of this species varies somewhat widely. Male, abdomen 25-26 mm, hindwing 28-32 mm : female, abdomen 29-36 and hindwing 28-29 mm. As mentioned above, *prasinus*

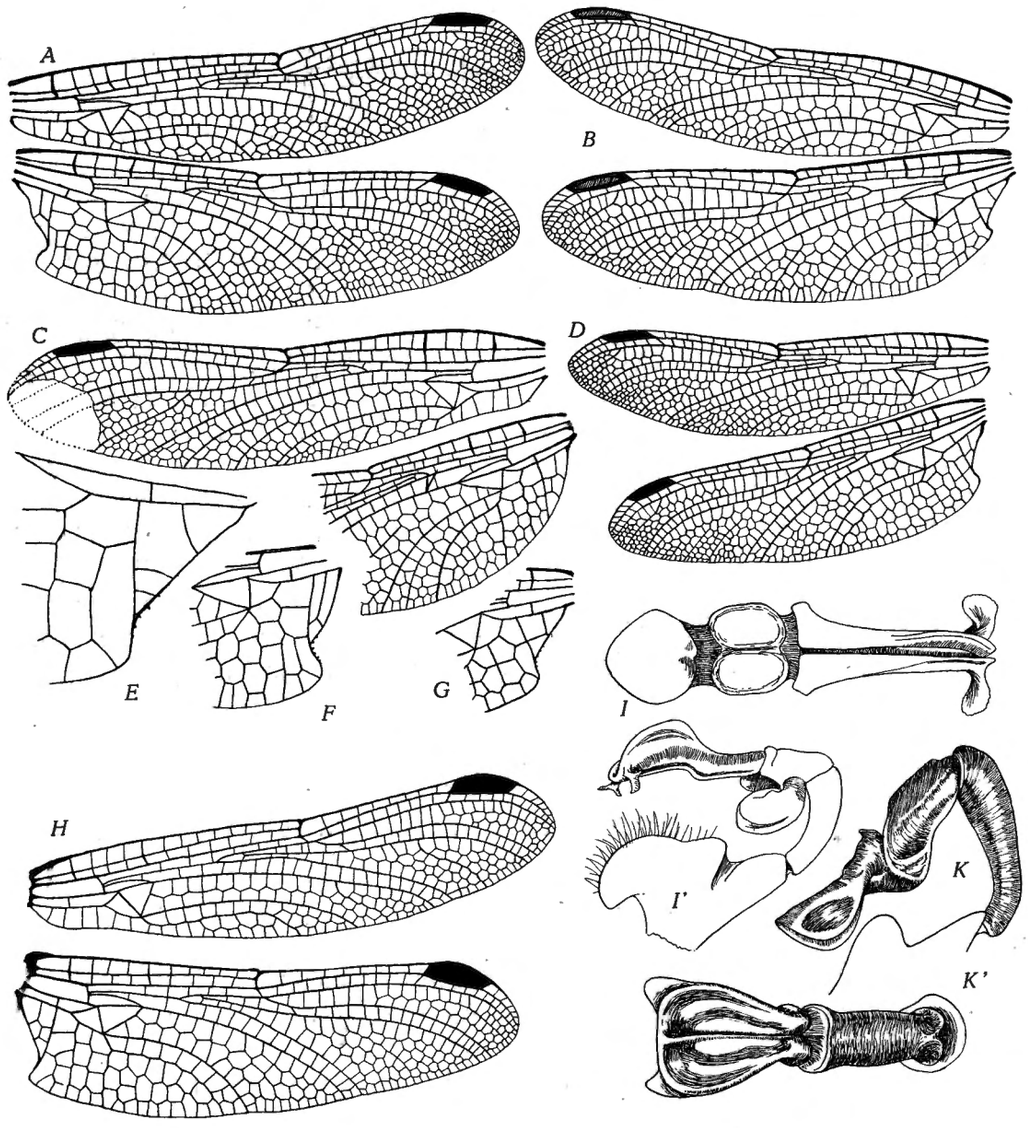

FIG. 9.

A-H. — Wings.

A. — *Hemigomphus heteroclytus* SELYS, male, from the type in the Selysian collection, ×2,7.

B. — *Austrogomphus ochraceus* (SELYS), male, from the allotype in the Selysian collection, ×3.

C. — *Austrogomphus ? interruptus* SELYS, female, forewing and base of hindwing, from the type in the Selysian collection, ×2,7.

D. — *Antipodogomphus acolytus* (SELYS in MARTIN), male, from the type in the Selysian collection, ×2,2.

E. — *Austrogomphus pusillus* SJOSTEDT, male, base of hindwing. From the type in the Stockholm Museum, ×ca 7.

F. — *Hemigomphus armiger* (TILLYARD), male, base of hindwing. From the type in the British Museum, ×3.

G. — *Austrogomphus Mjobergi* SJOSTEDT, male, base of hindwing. From the type in the Stockholm Museum, ×3,2.

H. — *Austroepigomphus præruptus* (SELYS), male, from a paratype of *Austrogomphus melaleucæ* TILLYARD, in the British Museum (figure by D. E. KIMMINS), ×2,5.

I-K'. — Penile organ.

I, I'. — *Hemigomphus Gouldii* (SELYS), ×40. (I') left side; (I) dorsal view of end segment.

K, K'. — *Austroepigomphus præruptus* (SELYS), ×32. (K) left side; (K') dorsal view of end segment.

is closely related to *bifurcatus* and *amphiclitus* : R. J. TILLYARD mentions that it is closely allied to *A. Risi* MARTIN, not realising that the latter is a synonym of *amphiclitus*. The species has been fully described by R. J. TILLYARD and it is only necessary to give improved figures of the anal appendages of the male, as well as the thoracic markings.

18. — **Austrogomphus angeli** TILLYARD.

(T. ff. 4 A; 8 D; 11 C.)

Austrogomphus angeli TILLYARD, R. J., 1913, Proc. Lin. Soc. N.S.W., 38 : 233, pl. 15, ff. 3-7. (Morgan, Murray R., S. Australia.)

Material examined. — Type male and allotype female in the R. J. TILLYARD collection, British Museum. The exact relationship of this species to others in the same genus is not very clear; the thoracic markings closely simulate those of *Doddi*, whilst the superior anal appendages belong to the group *amphiclitus-prasinus-bifurcatus*. The highly specialized character of the female occiput places it in the *Guerini-australis-Doddi* group and I am inclined to consider it as belonging here. Its identification is not difficult; the combination of superior anal appendages similar to those of *amphiclitus* together with two complete black stripes on the sides of the thorax distinguishes the male, whilst the female is determined by the armature of the occiput.

19. — **Austrogomphus Turneri** MARTIN.

(T. f. 8 F.)

Austrogomphus Turneri MARTIN, R., 1901, Mém. Soc. Zool. France, 19 : 230. (Type in F. RIS collection, from Queensland.)

Austrogomphus Turneri TILLYARD, R. J., 1909, Proc. Lin. Soc. N.S.W., 34 : 254. (Rocky Cape York, the female allotype.)

I have not seen the type of this species and have had to rely on the figures of the anal appendages and rather confused description given by R. MARTIN, together with figures of the head and thoracic markings sent me by Dr Elli FRANZ. The species has very restricted yellow markings and are more reminescent of those of *Antipodogomphus* than *Austrogomphus* in which genus, they most nearly approach those of *arbustorum* and *lateralis*. A greater knowledge of the type is needed to place the species with certainty but provisionally I retain it in the latter genus.

Genus ANTIPODOGOMPHUS gen. nov.

A genus of medium sized Gomphines closely related to but showing a higher development than the genus *Austrogomphus*. Nymph unknown but probably similar to that of the related genus. Venation of wings rather closer than in *Austrogomphus*, pterostigma rather short and only slightly dilated; paired veins running closely parallel up to the wing border; discoidal cell of hindwing not unduly elongate; anal-triangle 3-celled, the dividing cross-veins running from the costal and outer sides to meet within the triangle before the middle of the basal side (thus differing markedly from what is found in *Austrogomphus* where the veins are curved and never meet); a basal subcostal antenodal present in all or most wings; *Ac* nearly always distal to the level of the outer side of anal-triangle; not more than 2 cross-veins between the sectors of arculus proximal to the first Radial fork in forewings; Abdominal segments 9

and 10 considerably elongated; male superior anal appendages always with a basal branch, the apices of which pass down between the branches of the inferior appendage. Genotype, — *Austrogomphus acolytus* SELYS in MARTIN.

This new genus, which is purely australian in distribution, is clearly a derivative of *Austrogomphus* showing a greater organisation of the venation. It contains only two species,

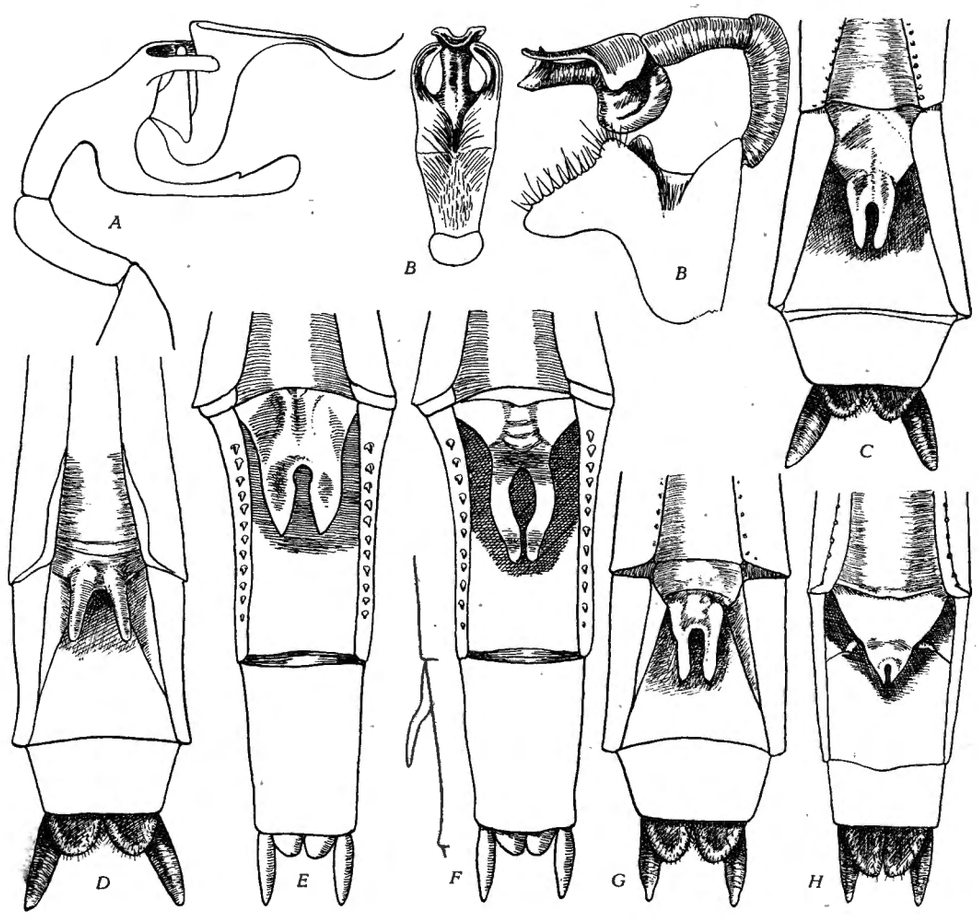

FIG. 10.

A-B. — Penile organ.

A. — *Austrogomphus ochraceus* (SELYS), seen from the right side, ×ca 40.

B. — *Antipodogomphus proselytus* (SELYS), ×54. Right figure : from the left side; Left figure : dorsal view of end segment.

C-H. — Female genitalia.

C. — *Austrogomphus Guerini* RAMBUR, ×18.
D. — *Austrogomphus Doddi* TILLYARD, ×13.
E. — *Antipodogomphus proselytus* (SELYS), ×13.
F. — *Antipodogomphus acolytus* (SELYS), ×13. (Vulvar scale shown in profile of the latter.)
G. — *Austrogomphus ochraceus* (SELYS), ×13.
H. — *Austrogomphus Mjobergi* SJOSTEDT, ×12.

both of which are easily distinguished from other species of the australian fauna belonging to the subfamily *Gomphinæ* by the presence of incomplete basal subcostal antenodals in most or all wings. Very rarely *Austroepigomphus præruptus* possesses such veins but it belongs to the subfamily *Epigomphinæ*. Both species are to be distinguished from *Austrogomphus* by the different character of the cross-veins in the anal-triangle, curved and not meeting within the

triangle in the latter, straight and meeting in *Antipodogomphus*. The posterior hamules are closely similar to those of *Austrogomphus* but the penile organ is very different, the apical segment being tubular, somewhat like the corolla of a daffodil, without flagella and with a two-armed, forcipated structure covering it above.

20. — **Antipodogomphus acolytus** (SELYS in MARTIN).

(T. ff. 2 A; 6 A, B; 9 D; 10 F.)

Austrogomphus acolytus SELYS, E. DE, MSS name attached to type.
Austrogomphus acolythus MARTIN, R., 1901, Mém. Soc. Zool. France, 19 : 233. (The name misspelt.)
Austrogomphus manifestus TILLYARD, R. J., 1909, Proc. Lin. Soc. N.S.W., 34 : 248, pl. 22, ff. 4, 7.
Austrogomphus manifestus ID., 1912, Ibid., 37 : 576, pl. 62, ff. 3, 4, 5.

Material examined. — Type male and allotype female, as well as one other female in the Selysian collection. Male labelled, — (i) Small white label with « G » (= Gayndah), (ii) White label with « ♀ » (evidently an error), (iii) Mauve label « Gayndah », (iv) Large white label in E. DE SELYS handwriting « *Austrogomphus acolytus*, ♂ », (v) Large mauve label in R. MARTIN's handwriting « *Austrogomphus acolythus*, Gayndah ». The first female labelled in E. DE SELYS handwriting « *Austrogomphus acolytus* » and both females labelled in R. MARTIN's handwriting « *Austrogomphus acolythus*, SELYS, Gayndah ». The types of *Austrogomphus manifestus* TILLYARD, as well as 4 ♀♀ in the British Museum, from N. Queensland and Pallal, N.S. Wales.

R. J. TILLYARD's descriptions are quite good except that he failed to notice the characteristic features of the venation. He noted how closely related it was to *arenarius* (*proselytus* SELYS) especially in the elongation of abdominal segments 9 and 10, a character which also serves to separate it from species of *Austrogomphus* in which these segments are of the normal relative proportions. It is more than possible that this elongation is reflected in the shape of the nymph, just as they are in species of *Macrogomphus*. The occiput of the female bears two short black pointed spines on the centre of the ridge, but they are set wider apart than similar spines found in the female of *Austroepigomphus præruptus*. The species is a darker one than its relative *proselytus* and there are only two spots representing the humeral stripe instead of three, a small upper triangular one followed by a linear one. The anal appendages are closely similar to those of *proselytus* but rather longer and slimmer.

21. — **Antipodogomphus proselytus** (SELYS in MARTIN).

(T. ff. 2 D; 6 E, F, G; 10 B, B', E; 11 D.)

Austrogomphus proselytus SELYS, E. DE, MSS name attached to type.
Austrogomphus proselythus MARTIN, R., 1901, Mém. Soc. Zool. France, 19 : 233. (Refers to type but name misspelt.)
Austrogomphus arbustorum TILLYARD, R. J., 1905, Proc. Lin. Soc. N.S.W., 4 : 547, 549. (Wrong synonymy given.)
Austrogomphus arenarius TILLYARD, R. J., 1905, l. c., 4 : 549.
Austrogomphus arenarius ID., 1909, l. c., 34 : 253.

Material examined. — Type male and allotype female in the Selysian collection. Male labelled, — i. Yellow label marked « G » (= Gayndah ?), ii. Mauve label marked « Gayndah », iii. White label in E. DE SELYS' handwriting « *Austrogomphus proselytus* S, ♂ », iv. Mauve label in R. MARTIN's handwriting « *proselythus* Gayndah ». The female allotype bears a mauve and a

white label in E. DE SELYS' handwriting « Gayndah » and « *Austrogomphus proselytus*, ♀ » I also examined two pairs in the R. DOBSON collection from Kuranda, N. Queensland and the types of *arenarius* TILLYARD as well as 4 males and a female in the British Museum.

The history of this species is an exact parallel to that of *acolytus*, its near relation. R. J. TILLYARD failed here also to notice the presence of incomplete basal antenodals in the venation. In his description of *acolytus* (*manifestus*) (l. c. 1912, 37 : 577) he states correctly that the abdominal segments 9 an 10 are elongated and thus resemble the closely allied *proselytus* (*arenarius*), yet in his description of the latter, he gives segments 8 to 10 clubbed. His figure of the anal appendages of *arenarius* shows a small tubercle just behind the base of the ventral

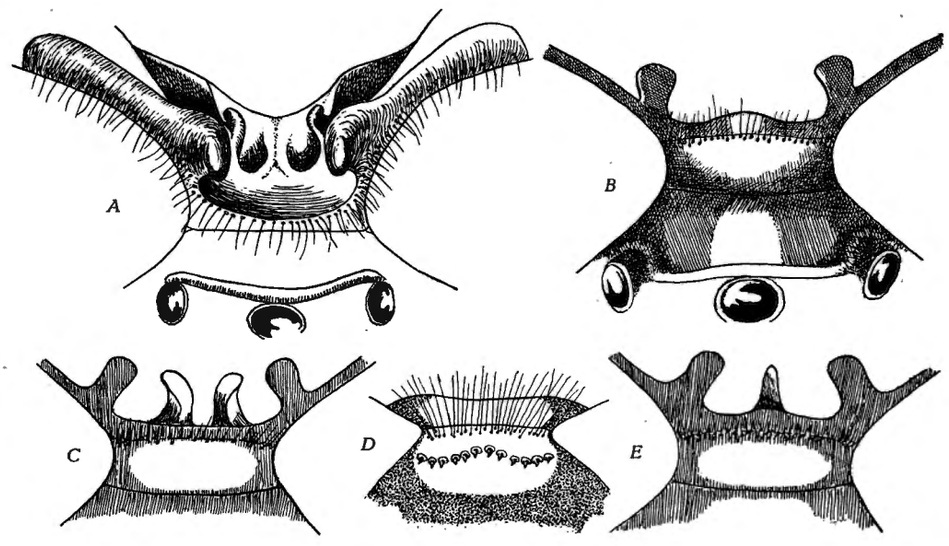

FIG. 11. — Female occiput.

A. — *Austrogomphus Guerini* (RAMBUR), ×ca 26.
B. — *Austrogomphus Doddi* TILLYARD, ×ca 26.
C. — *Austrogomphus angeli* TILLYARD, ×20.
D. — *Antipodogomphus proselytus* (SELYS), ×ca 19.
E. — *Austrogomphus australis* SELYS, ×ca 26.

branch and this is also mentioned in the description. This was so unusual a feature that I suspected an artifect and wrote to Mr D. E. KIMMINS to reexamine the type : be replied that I was correct in my surmise and that he had been able to detach the « tubercle » easily, which proved to be a piece of dried excreta. The best characters for differentiation appear to be the beautiful yellow markings of the thoracic dorsum, the mesothoracic collar and antehumeral stripes being united in *proselytus* to form a pair of apposed capital Ts, flanked outwardly by a row of three large spots. In *acolytus*, the confluence of the mesothoracic collar and antehumeral stripes forms a pair of figures 7 flanked outwardly by only two spots, an upper one followed by a short streak resembling an exclamation note. The anal appendages are closely similar, those of *acolytus* perhaps being somewhat longer and slimmer. The penis is similar in the two species, the apical portion being shaped like the corolla tube of a daffodil, roofed over by a pair of forcipated processes somewhat like that found in *Austrogomphus* : there is no flagellum but a mere short membranous frill (t. fig. 10 B).

INCERTÆ SEDIS.

22. — Austrogomphus ? interruptus Selys.

(T. ff. 8 E; 9 C.)

Austrogomphus interruptus Selys, E. de, 1854, Bull. Acad. Belg. (2), 21 : 66. (Female with head and end of abdomen missing : male unknown.)

Austrogomphus interruptus Id., 1857, Mon. Gomph., 179 (The same female type, country unknown), 170 (Doubt expressed as to it being an *Austrogomphus*), 179 (May be an *Onychogomphus*), 397-398 Compared to *præruptus* and emphasises the difficulty in placing a single imperfect female in any genus).

Austrogomphus interruptus Id., 1859, Bull. Acad. Belg. (2), 7 : 531. (Probably an *Onychogomphus* related to *ruptus* and *præruptus*.)

Hemigomphus (?) *interruptus* Kirby, W. F., 1890, Cat. Odon. : 71.

Hemigomphus interruptus Martin, R., 1901, Mém. Soc. Zool. France, 19 : 230.

Hemigomphus interruptus Ris, F., 1930, Unpublished catalogue. (Makes no comment.)

Material examined. — Type female, a teneral specimen with head missing, in the Selysian collection.

The placing of this solitary imperfect and teneral female offered the greatest difficulties to E. de Selys. He showed that it was related by its various characters to quite a number of species belonging to three genera, *Austrogomphus*, *Hemigomphus* and *Onychogomphus*, of which he favoured the last. Except for its rather elongated triangle in the hindwing, he does not appear to have employed or laid stress on venational characters, which seem to be important, if only in showing to what genera, the species does not belong. The elongated triangle of the hindwing tends to rule it out of *Austrogomphus* and at the same time permits comparison with *Hemigomphus*. The vein *Ac* (Cuq) is in line with the outer border of the anal-triangle (or its equivalent in the female) and in this neutral position, gives us no information. The venation as a whole is considerably closer than in any *Austrogomphus* and agrees largely with *Hemigomphus* : there are 2 cross-veins between the sector of arculus in the hindwing, which at once places it as an Epigomphine and definitely rules out *Austrogomphus*. There are no incomplete subcostal basal cross-veins in any wing, which rules out *Antipodogomphus*. Thus we are reduced to either *Hemigomphus* of the australian fauna or some other genus of oriental or neotropical origin. E. de Selys appears to have favoured the oriental genus *Onychogomphus*, group *saundersii* but this is impossible as this genus belongs to subfamily *Gomphinæ*, whereas *interruptus*, as shown, belongs to the *Epigomphinæ*. I know of no neotropical genus which it could be related to by its venation, so that by a process of exclusion, the species lies closest to *Hemigomphus* : if this is so, then the locality « Adelaide » may well be correct. E. de Selys made no less than seven references to this species all under the generic name of *Austrogomphus* : only two these are quoted by W. F. Kirby, who was incorrect in referring to it as « *Hemigomphus* (?) *interruptus* Selys ». The possibility of the species belonging to *Austroepigomphus* has not been considered here, as that genus has a more open venation and a short and much dilated pterostigma very different to the rather long and narrow one of *interruptus*.

SUMMARY.

This paper completes the descriptions of those species of the Australian *Gomphidæ* which were made by E. DE SELYS from incomplete types or from only one sex. With much more material than was available to him, it has been possible to relegate species to their correct genera and to build up a comprehensive classification on the sound foundation which he laid. A key for the identification of species, including all those described since 1879, is given together with a full list of references and the synonymy involved. Text-figures are given of the thoracic markings, male and female genitalia, male anal appendages, the occipital armature of the female and the wings of four genera involved.