Stapfia	55	613-621	11. September 1998

Supra-specific diversity in Australian "*Argiolestes*" (Odonata: Zygoptera: Megapodagrionidae)

Günther THEISCHINGER

A b s t r a c t : What was hitherto referred to as *Argiolestes* SELYS from Australia is divided into three genera. They are *Archiargiolestes* KENNEDY, formerly considered as a junior synonym of *Argiolestes* SELYS, and *Griseargiolestes* and *Miniargiolestes*, both described as new. Revised diagnoses including adult and larval characters are presented for those genera and for *Austroargiolestes* KENNEDY. A key is given to the final instar larvae of the megapodagrionid genera known from Australia.

K e y w o r d s : Megapodagrionidae, new genera, Australia.

Introduction

According to WATSON et al. (1991) the Australian species currently placed in *Argiolestes* are not closely allied to their exotic congeners and the south-western species differ in some respects from those in eastern Australia.

Subsequent and more detailed study of the adults, particularly of the wing venation and the male secondary genitalia, of Australian "*Argiolestes*", however, revealed that it includes three very distinct groups, none of which is *Argiolestes* [type species *A. australis* (GUERIN); see LIEFTINCK (1956)]. This notion was confirmed by even more recent work on the larvae of the Australian Megapodagrionidae. As taxonomic consequence the division of Australian "*Argiolestes*" into three genera appears appropriate. It includes the resurrection of *Archiargiolestes* KENNEDY and the introduction of two new genera.

Archiargiolestes KENNEDY had been established already by KENNEDY (1925). He based it on *A. pusillissimus* KENNEDY and also included *A. pusillus* (TILLYARD) and *A. griseus* (HAGEN in SELYS). WATSON (1977) called the Western Australian members of this group *Argiolestes pusillus* complex without discussing its generic placement. In this paper two new genera are established, *Miniargiolestes* for *A. minimus* TILLYARD from Western Australia, and *Griseargiolestes* for the eastern Australian group centred around *A. griseus* SELYS.

A. minimus was generally considered as a member of *Argiolestes* before and after it was included in *Austroargiolestes* by KENNEDY (1925). The Australian group of species centred around *A. griseus* HAGEN in SELYS was, except for the inclusion of *A. griseus* in *Archiargiolestes* by KENNEDY (1925), also generally included in *Argiolestes*.

In the diagnoses below, the terminology follows WATSON & O'FARRELL (1991).

The material on which this study is based is held in the Australian National Insect Collection, Canberra, and in the collection of the author.

Generic diagnoses

Archiargiolestes KENNEDY (Figs 1-9)

Archiargiolestes KENNEDY - Mus. Comp. Zool. 67: 291 (1925).
Type species: *Archiargiolestes pusillissimus* KENNEDY 1925, by original designation.

A d u l t s (Figs 1-5). - Thorax (Fig. 1) dark without humeral or lateral stripe; line of junction between dark and light areas of synthorax irregular, with dark stripe extending down in front of metapleural suture; no black marking on metepimeron. Discoidal cell of forewing (Fig. 2) with costal and distal side subequal in length; cu-a (Fig. 2) about midway between Ax1 and Ax2 and more distant from arculus than length of arculus; basal anal cell (Fig. 2) 1/3 to 2/3 as long as adjacent cubital cell; anal field (Fig. 3) only with cells that are wider than long or about square, none of them divided. Glans penis (Fig. 4) with basal sclerite convex ventrally, and adjacent to it a well developed lobe; tip bilobed with simple lobes originating from narrow base. Male superior anal appendages (Fig. 5) toothed; inferiors less than 1/3 as long as superiors, convergent, parallel or slightly divergent at tip.

L a r v a e (Figs 6-9). - Prementum (Fig. 7) elongate, distally markedly more than twice as wide as basally, length/width index ca 1.4; ligula of prementum strongly convex; no larger premental setae. Labial palp (Fig. 8) tridentate, the inner tooth rather small but conspicuous; 1 larger palpal seta in small and large larvae (throughout all instars). Postocular lobe (Fig. 9) not prominent. Abdominal gills rather long, narrowly leaf-shaped, with rather pointed tips and well developed terminal styli, spinulate and with short hairs along lateral margins.

H a b i t a t s : Streams, boggy seepages and swamps, including summer-dry swamps.

D i s t r i b u t i o n : South-western Australia.

S p e c i e s : *A. parvulus* (WATSON), *A. pusillissimus* KENNEDY, *A. pusillus* (TILLYARD).

M a t e r i a l e x a m i n e d : Adults and larvae (identified by Watson) of all species.

Griseargiolestes gen. nov. (Figs 10-20)

Type species: *Argiolestes griseus* HAGEN in SELYS 1862, by present designation.

N a m e : Combination of grise (from griseus) and *Argiolestes*.

A d u l t s (Figs 10-16). - Thorax (Fig. 10) dark with well developed humeral stripe and at least dorsal portion of lateral stripe; black marking on metepimeron either a small but prominent patch or a long stripe. Discoidal cell of forewing (Fig. 11) with costal side almost twice as long as distal side; cu-a (Fig. 11) usually about midway between Ax1 and Ax2 and more distant from arculus than length of arculus; basal anal cell (Fig. 11) 1/3 to 2/3 as long as adjacent cubital cell; anal field (Fig. 12) with many cells that are longer than wide, none to some of them divided. Glans penis (Figs 13-15) with basal sclerite concave ventrally, forming kind of a wide deep pocket, the sides of it slightly protruding, and without adjacent lobe; tip bilobed with simple lobes originating from wide base. Male superior anal appendages (Fig. 16) inserting near the outer margin of abdominal segment 10, their inner margins being well separated, with low medio-ventral flange, terminating in a variably sharp tooth; inferior appendages approximately 1/3 as long as superiors.

L a r v a e (Figs 17-20). - Prementum (Fig. 18) stout, distally less than twice as wide as basally, length/width index ca 1.15-1.35; ligula of prementum slightly bilobed; no larger premental setae. Labial palp (Fig. 19) bidentate; no larger palpal setae. Postocular lobe (Fig. 20) not prominent. Abdominal gills not very long, narrowly to broadly leaf-shaped, with well developed terminal styli, not spinulate, but often long hairs along lateral margins.

H a b i t a t s : Streams, boggy seepages and swamps.

Distribution: North-eastern and south-eastern Queensland and New South Wales, Victoria.

Species: *G. albescens* (TILLYARD), *G. eboracus* (TILLYARD), *G. fontanus* (TILLYARD), *G. griseus* (HAGEN in SELYS), *G. intermedius* (TILLYARD), *G. metallicus* (SJÖSTEDT).

Material examined: Adults of all species, larvae of *G. albescens*, *G. eboracus*, *G. griseus*, *G. intermedius*.

Miniargiolestes gen. nov. (Figs 21-29)

Type species: *Argiolestes minimus* TILLYARD 1908, by monotypy.

Name: Combination of mini (from minimus) and *Argiolestes*.

Adults (Figs 21-25). - Thorax (Fig. 21) dark without humeral or lateral stripe; line of junction between anterior dark metallic green and whitish pigmentation of synthoracic pleura almost straight, passing diagonally from mesocoxa to base of hind wing, thus black marking on metepimeron covering anterodorsal corner. Discoidal cell of forewing (Fig. 22) with costal side much longer than distal side; cu-a (Fig. 22) much closer to Ax2 than to Ax1 and usually less distant from arculus than length of arculus; basal anal cell (Fig. 22) at least about 3/4 as long as adjacent cubital cell; anal field (Fig. 23) only with many cells that are longer than wide, often many but at least some of them divided. Glans penis (Fig. 24) with basal sclerite convex ventrally and forming kind of a protruding nose, and adjacent a well developed lobe; tip widely bilobed with highly elaborate lobes originating from narrow base. Male superior anal appendages (Fig. 25) with bases thickened, possessing low, ventral subterminal flange; inferior appendages well developed, elaborate, approximately 1/3 as long as superiors, divergent at tips.

Larvae (Figs 26-29). - Prementum (Fig. 27) elongate, distally markedly more than twice as wide as basally, length/width index ca 1.4; ligula of prementum strongly convex with well developed median cleft; no larger premental setae. Labial palp (Fig. 28) tridentate, the inner tooth rather small but conspicuous; 1 larger palpal seta in smaller larvae (up to about 3rd-2nd last instar), no palpal setae were detected in large larvae (final instar). Postocular lobe (Fig. 29) prominent (head flared). Abdominal gills long, narrowly leaf-shaped, with rather pointed tips and well developed terminal styli, many substantial spines and moderately long hairs along posterior portion of lateral margins.

Habitats: Streams and rivers.

Distribution: South-western Australia.

Species: *M. minimus* (TILLYARD).

Material examined: Adults and larvae of *M. minimus*.

Austroargiolestes KENNEDY (Figs 30-38)

Austroargiolestes KENNEDY - Mus. Comp. Zool. 67: 294 (1925).
Risiolestes FRASER - Treubia 8: 486 (1926).
Type species: *Argiolestes icteromelas* SELYS 1862 by original designation.

Adults (Figs 30-34). - Thorax (Fig. 30) dark with well developed humeral stripe and at least dorsal portion of lateral stripe, the two often confluent; black marking on metepimeron either a small but prominent patch or a long stripe. Discoidal cell of forewing (Fig. 31) with costal side markedly longer than distal side; cu-a (Fig. 31) from about midway between Ax1 and Ax2 to markedly closer to Ax2, but usually more distant from arculus than length of arculus; basal anal cell (Fig. 31) up to 3/4 as long as adjacent cubital cell; anal field (Fig. 32) with cells that are longer than wide, none to many of them divided, some into up to 4 cells. Glans penis (Fig. 33) with basal sclerite variably convex ventrally, and adjacent a well devel-

oped lobe; tip a simple more or less rounded or rounded and widened lobe, or more complicated, but never widely bilobed. Male superior anal appendages (Fig. 34) with outer margin set well inside line of expanded abdominal segment 10, inner margins basally close together; generally an inner basal angle and an inner subapical angle; with ventral subapical spur; inferior appendages less than 1/3 as long as superiors, never reaching beyond basal angle of superiors, strongly sclerotized or less strongly sclerotized and of variably irregular shape and with rounded apical lobe.

Larvae (Figs 35-38). - Prementum (Fig. 36) not stout, distally at least 2.5 times as wide as basally, length/width index ca 1.2-1.3; ligula of prementum convex, with well developed median cleft; no larger premental setae. Labial palp (Fig. 37) tridentate, the inner tooth rather small but conspicuous; no larger palpal setae. Postocular lobe (Fig. 38) from rounded to moderately prominently angulated or flared. Abdominal gills long, leaf-shaped, with rounded tips and without terminal styli, spinulate and with short hairs along lateral margins.

Habitats: Rivers, including those that dry to pools, streams, including rainforest streams, boggy seepages and possibly terrestrial situations.

Distribution: North-eastern, south-eastern and southern inland Queensland, north-eastern and south-eastern New South Wales, Victoria..

Species: *A. alpinus* (TILLYARD), *A. amabilis* (FÖRSTER), *A. aureus* (TILLYARD), *A. brookhousei* THEISCHINGER and O'FARRELL, *A. calcaris* (FRASER), *A. christine* THEISCHINGER and O'FARRELL, *A. chrysoides* (TILLYARD), *A. elke* THEISCHINGER and O'FARRELL, *A. icteromelas* (SELYS), *A. isabellae* THEISCHINGER and O'FARRELL. The adults of *Austroargiolestes* can be subdivided into several quite distinct groups, the known larvae, however, in spite of their ecological differences, appear rather uniform.

Material examined: Adults of all species; larvae of *A. icteromelas* and *A. isabellae*, possibly (identification doubtful) also *A. alpinus*, *A. aureus*, *A. chrysoides*.

Key to the final instar larvae of the megapodagrionid genera known from Australia

1. Large larvae (length excluding gills >20 mm); labial palps tridentate with innermost tooth small and appressed; 4-5 palpal setae; gills short and wide, much shorter than wing-pads..... ..... *Podopteryx* SELYS

- Smaller larvae (length excluding gills <20 mm); labial palp bidentate (Fig. 19) or tridentate with innermost tooth small but prominent (Figs 8, 28, 37); at the most 1 palpal seta on each palp (Fig. 8); gills mostly long and narrow, never much shorter than wing-pads (Figs 6, 17, 26, 35) 2

2 (1). Labial palp bidentate; no palpal setae (Fig. 19) ..... *Griseargiolestes* gen. nov.

- Labial palp tridentate; palpal setae present (1 on each palp) (Fig. 8) or absent (Figs 28, 37)..... 3

3 (2). From eastern Australia; no palpal setae (Fig. 37); gills with apical portion rather parallel sided and without terminal styli (Fig. 35) ..... *Austroargiolestes* KENNEDY

- From south-western Australia; palpal setae present (1 on each palp) (Fig. 8) or absent (Fig. 28); gills with apical portion distinctly tapered and with terminal styli (Figs 6, 26)..... 4

4 (3). Postocular lobe prominent (Fig. 29); no palpal setae (Fig. 28); gills with substantial spines along apical portion of lateral margins (Fig. 26) ..... *Miniargiolestes* gen. nov.

- Postocular lobe not prominent (Fig. 9); palpal setae (1 on each palp) present (Fig. 8); gills only spinulate along lateral margins (Fig. 6)..... *Archiargiolestes* KENNEDY

Discussion

Analyses of adult and larval characters of what was formerly (e. g. FRASER 1961) known as *Argiolestes* from Australia produced parallel classifications. Four groups of species can be distinguished. They are considered as distinct on generic level. If the speciation events leading to those genera occured in Australia, the sistergroup relationships considered most likely are: *Austroargiolestes* - *Archiargiolestes* + *Griseargiolestes* + *Miniargiolestes*; *Archiargiolestes* + *Miniargiolestes* - *Griseargiolestes*; *Archiargiolestes* - *Miniargiolestes*. At this stage it cannot be excluded that these Australian genera also include forms from outside of Australia.

References

FRASER F.C. (1926): Notes on a collection of dragonflies (order Odonata) from the Dutch East Indies and descriptions of four new species from the neighbouring continent. — Treubia **8**: 467-494.

FRASER F.C. (1960): "A Handbook of the Dragonflies of Australasia". — (Royal Zoological Society of New South Wales: Sydney).

KENNEDY C.H. (1925): New genera of Megapodagrioninae with notes on the subfamily. — Bull. Mus. comp. Zool. Harv. **67**: 291-311.

LIEFTINCK M.A. (1956): Revision of the genus *Argiolestes* SELYS (Odonata) in New Guinea and the Moluccas. — Nova Guinea (N.S.) 7: 59-121.

SELYS E. (1862): Synopsis des Agrionines. Troisieme Legion: Podagrion. — Bull. Acad. r. Belg. (II) **14**: 1-42.

THEISCHINGER G. & A.F. O'FARRELL (1986): The genus *Austroargiolestes* KENNEDY (Zygoptera: Megapodagrionidae). — Odonatologica **15**: 387-428.

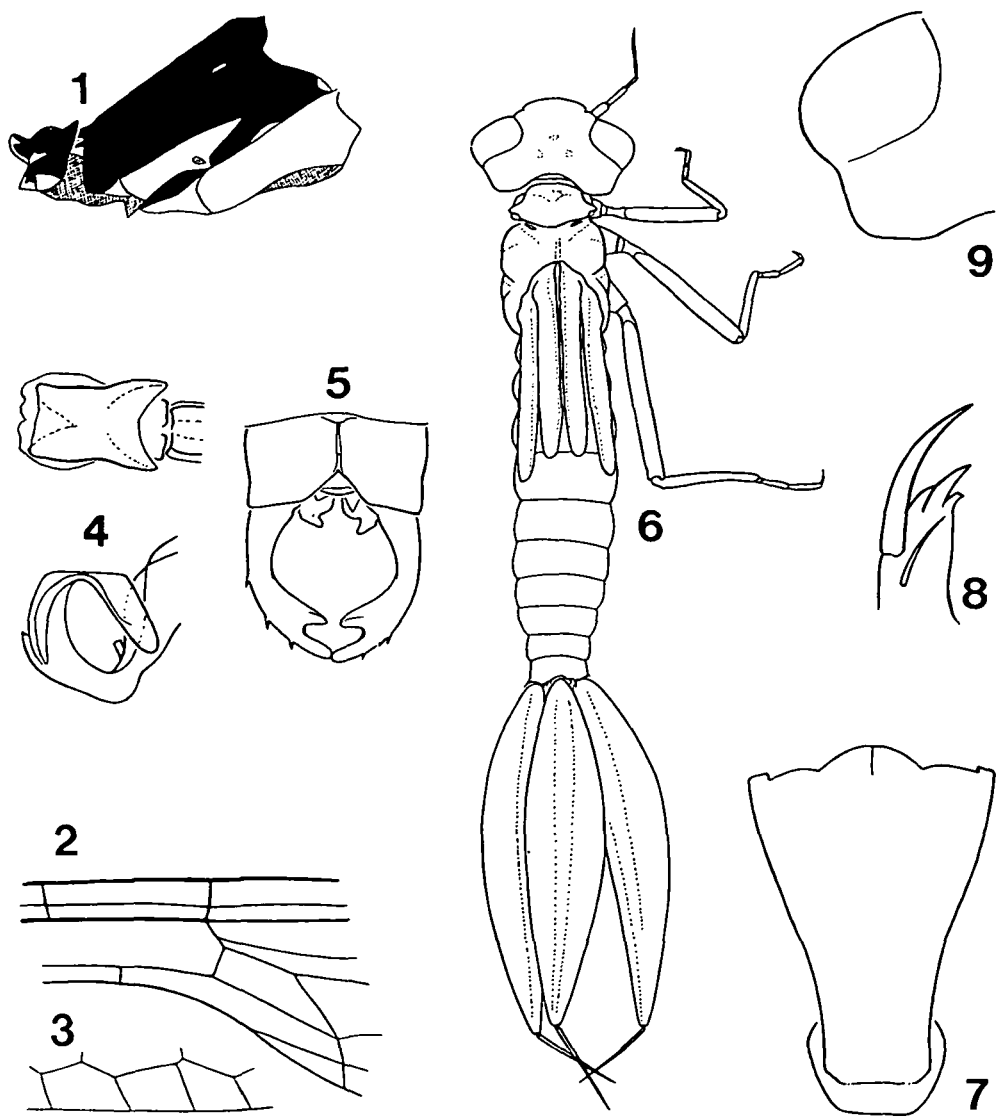
TILLYARD R.J. (1908): The dragonflies of south Western Australia. — Proc. Linn. Soc. N.S.W. **32**: 719-742.

WATSON J.A.L. (1977): The *Argiolestes pusillus* complex in Western Australia (Odonata: Megapodagrionidae). — J. Aust. ent. Soc. 16: 197-205.

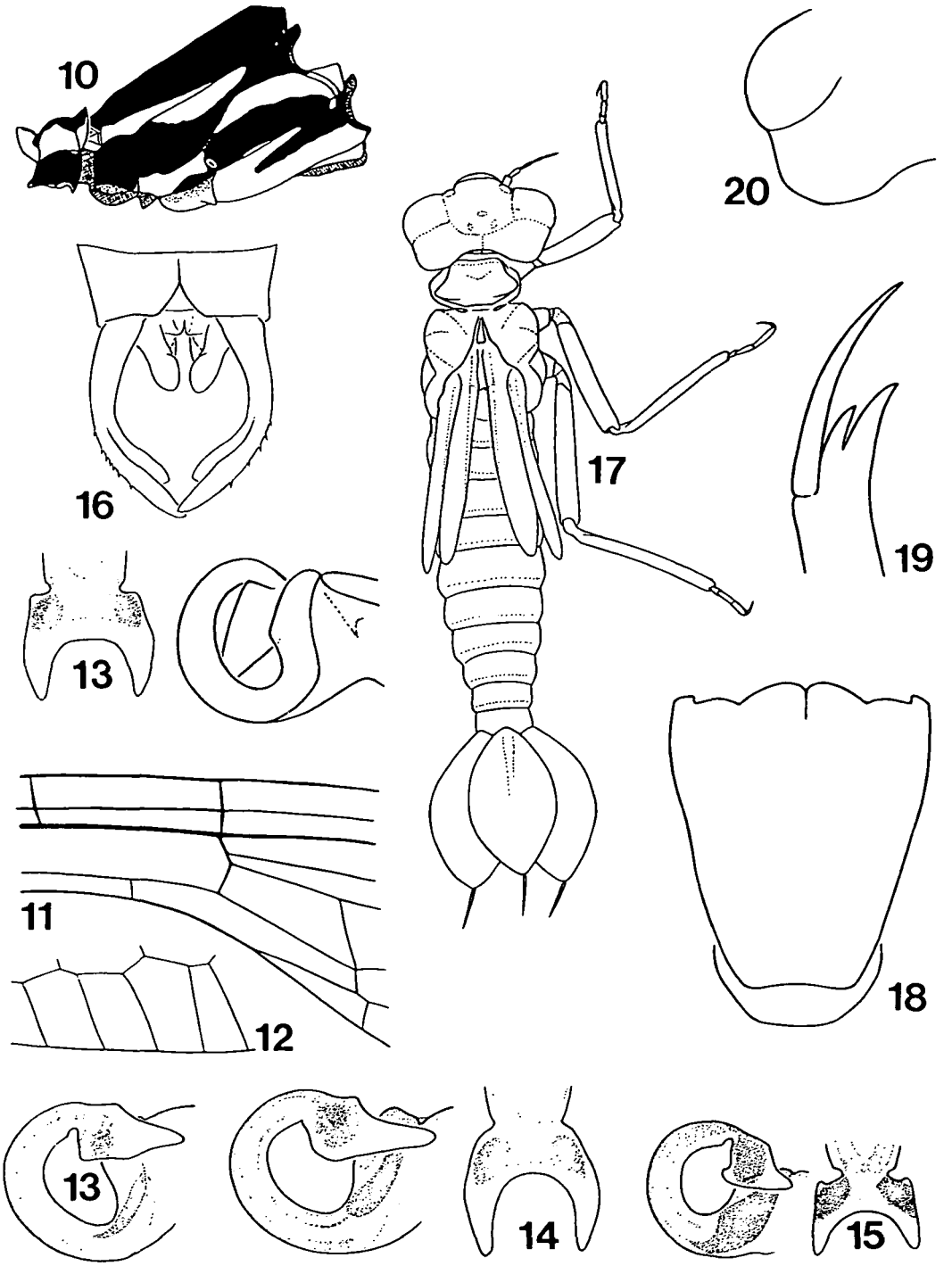
WATSON J.A.L. & A.F. O'FARRELL (1991): Odonata (dragonflies and damselflies). — In CSIRO (Ed.): The Insects of Australia. 2nd ed. Melbourne University Press: Melbourne.

WATSON J.A.L., THEISCHINGER G. & H.M. ABBEY (1991): "The Australian Dragonflies". A Guide to the Identification, Distributions and Habitats of Australian Odonata (CSIRO Melbourne).

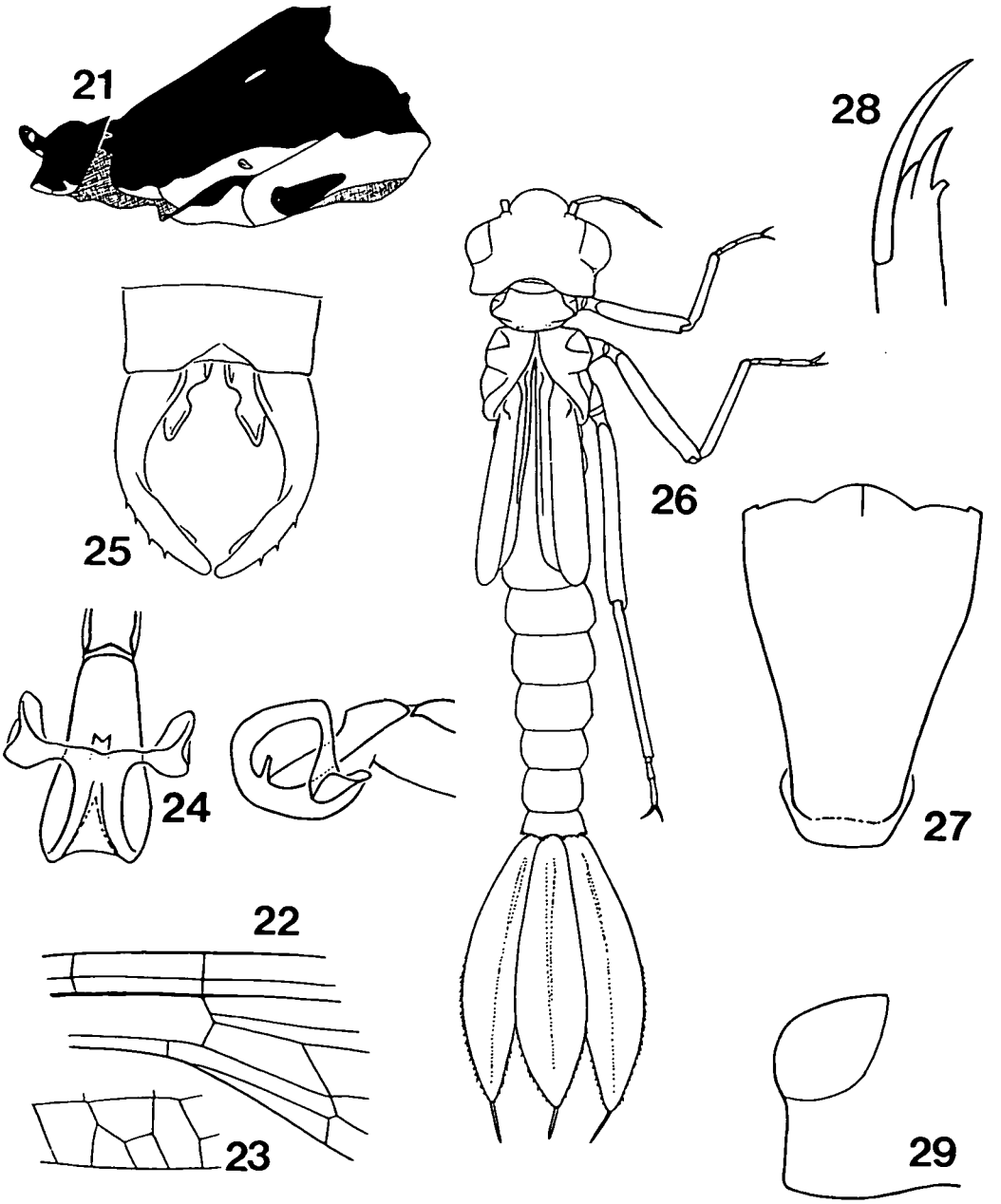
Address of the author: Günther THEISCHINGER
2A Hammersley Rd,
Grays Point, N.S.W. 2232,
Australia



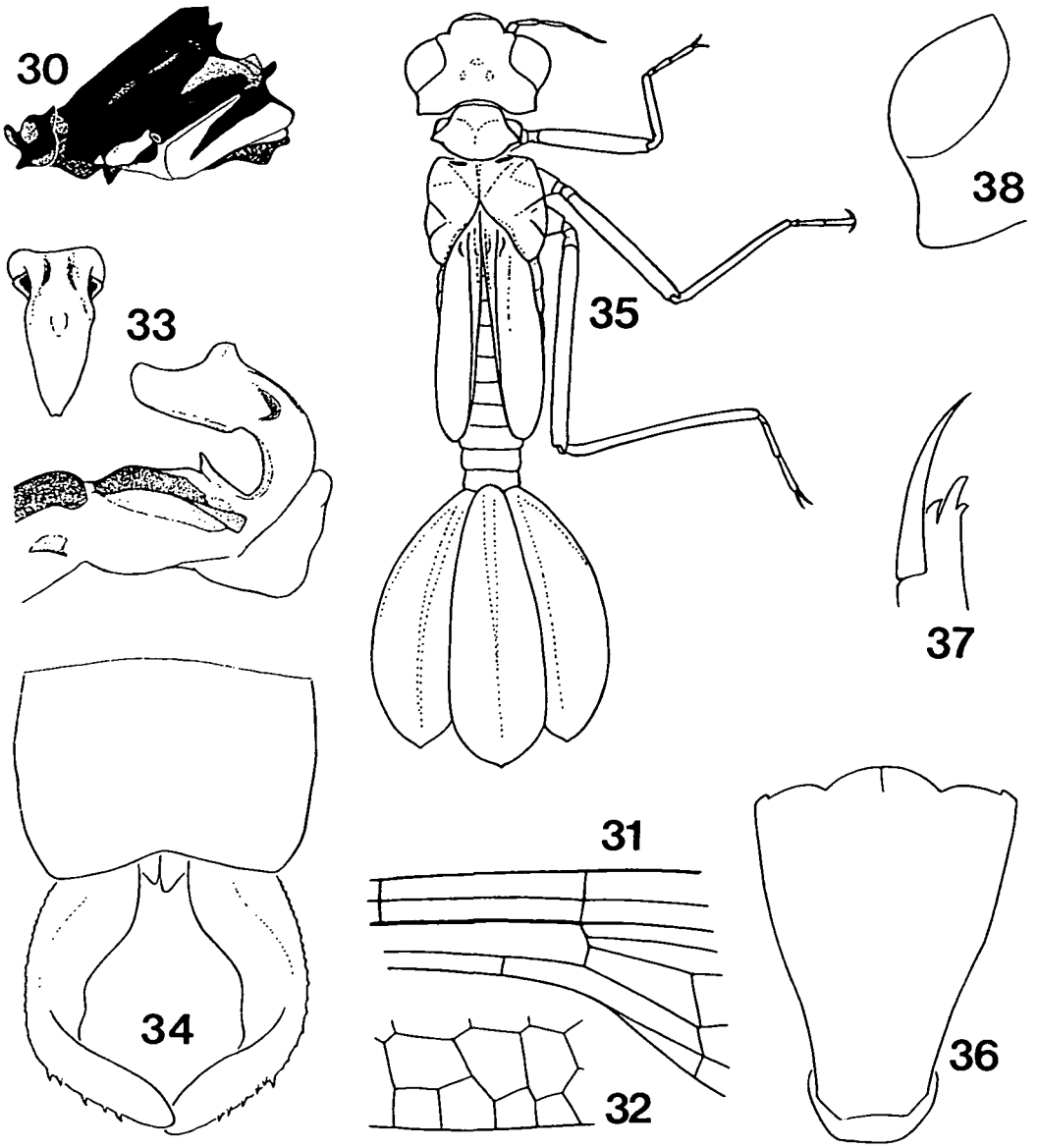
Figs 1-9. *Archiargiolestes* KENNEDY: **1-5**, adult male: **1**, *A. parvulus* (WATSON), thorax, lateral aspect; - **2-5**, *A. pusillissimus* KENNEDY: **2**, **3**, forewing: **2**, base; - **3**, cells approximately halfway of anal field; - **4**, glans penis, ventral and lateral aspect; - **5**, anal appendages, dorsal aspect; - **6-10**, final instar larva: **6**, *A. parvulus* (WATSON), habitus, dorsal aspect; - **7**, *A. pusillissimus* KENNEDY, labium, ventral aspect; - **8**, *A. pusillus* (TILLYARD), labial palp, dorsal aspect; - **9**, *A. pusillissimus* KENNEDY, postocular lobe.



Figs 10-20. *Griseargiolestes* gen. nov.: **10-16**, adult male: **10-13**, *G. griseus* (HAGEN in SELYS): **10**, thorax, lateral aspect; - **11**, **12**, forewing: **11**, base; - **12**, cells approximately halfway of anal field; **13**, glans penis, ventral and lateral aspect; - **14**, **15** glans penis, ventral and lateral aspect: **14**, *G. eboracus* (TILLYARD); - **15**, *G. albescens* (TILLYARD); - **16**, *G. griseus* (HAGEN in SELYS), anal appendages, dorsal aspect; - **17-20**, *G. griseus* (HAGEN in SELYS), final instar larva: **17**, habitus, dorsal aspect; - **18**, labium, ventral aspect; - **19**, labial palp, dorsal aspect; - **20**, postocular lobe.



Figs 21-29. *Miniargiolestes* gen. nov., *M. minimus* (TILLYARD): **21-25**, adult male: **21**, thorax, lateral aspect; - **22**, **23**, forewing: **22**, base; - **23**, cells approximately halfway of anal field; **24**, glans penis, ventral and lateral aspect; - **25**, anal appendages, dorsal aspect; - **26-30**, final instar larva: **26**, habitus, dorsal aspect; - **27**, labium, ventral aspect; - **28**, labial palp, dorsal aspect; - **29**, postocular lobe.



Figs 30-38. *Austroargiolestes* KENNEDY, *A. icteromelas* (SELYS): **30-34**, adult male: **30**, thorax, lateral aspect; - **31**, **32**, forewing: **31**, base; - **32**, cells approximately halfway of anal field; - **33**, glans penis, ventral and lateral aspect; - **34**, anal appendages, dorsal aspect; - **35-38**, final instar larva: **35**, habitus, dorsal aspect; - **36**, labium, ventral aspect; - **37**, labial palp, dorsal aspect; - **38**, postocular lobe.